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

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# This Issue in the Journal

**A survey of respiratory and sleep services in New Zealand undertaken by the Thoracic Society of Australia and New Zealand (TSANZ)**
Jeff Garrett, Bob Chen, D Robin Taylor

This paper represents the first major audit of respiratory services ever carried out in New Zealand. The aim was to evaluate what impact, if any, that had arisen from the publication of *Respiratory Standards of Care by the Thoracic Society of Australia and New Zealand* in 2004 (and which were first developed in 1996). The study revealed major gaps in both workforce and service development with 5-fold variation in practice across New Zealand. DHBs are not accountable to anyone for the provision of respiratory services. No national targets exist for any respiratory disorder and there is no effort undertaken to assess quality of care by any DHB. Major differences exist between New Zealand and Australia with respect to workforce development and provision of services. There is a need to urgently re-establish a national advisory committee and to more uniformly implement the standards of care first established in 1996.

**Live donor liver transplantation in New Zealand: a report on the first 20 cases**
John McCall, Margaret Johnston, Barry Harrison, Ian Dittmer, Ron Benjamin, Yvonne Fullerton, Andrew Holden, Kerry Gunn, Peter Johnston, Ed Gane, David Orr, Simon Chin, Helen Evans, Stephen Mouat, Stephen Munn

The paper describes the first 20 cases of live donor liver transplantation (LDLT) in New Zealand, including 7 adult-to-adult and 13 adult-to-child. This is a major operation with significant risks for the donor as well as recipient, but is undertaken because there are insufficient deceased donor organs available to meet the current need for liver transplantation. The results to date in New Zealand have been good with all donors making a full recovery and all recipients alive. No patients have needed re-transplantation.

**The readmission rate as an indicator of the quality of elective surgical inpatient care for the elderly in New Zealand**
Juliet Rumball-Smith, Phil Hider, Patrick Graham

The quality of hospital care can be measured by various indicators, of which the rate of readmission/death within 30-days of discharge is one. This study calculated this rate for the elderly (aged 65 years or over) who were admitted to public hospitals nationally for one of five defined surgical procedures. Between 2001 and 2004, the calculated rate for this group of patients increased by 13% (although this difference did not reach statistical significance). The patients of the sample who were of NZ Māori ethnicity were 60% more likely to experience readmission/death within 30 days of discharge than non-Māori non-Pacific patients.

**Lymph node infarction and its association with lymphoma: a short series and literature review**
Rajpal Singh Punia, Neerja Dhingra, Rajan Chopra, Harsh Mohan, Sandeep Chauhan

Lymph node infarction is extremely rare. An infarcted lymph node can proceed to lymphoma (presenting as tumours in lymph nodes). Six cases of lymph node infarction were studied from the records of the pathology department at our hospital in Chandigarh, India. A diagnosis of non-Hodgkin lymphoma was made in 5 of the 6 patients. In conclusion the pathologist should be cautious when examining an infarcted lymph node. Though all patients might not develop lymphoma, they require close follow-up and repeat biopsies to detect its subsequent development.

**Sentinel lymph node biopsy experience in Taranaki: a prospective audit in a provincial New Zealand hospital**
Emily Davenport, Michael W Fancourt, William T C Gilkison, Steven M Kyle, Damien A Mosquera

Sentinel lymph node biopsy is a technique used in women with breast cancer to assess whether the cancer has spread to the lymph nodes in the armpit. This paper examines the use of this technique in Taranaki since its introduction 5 years ago. It shows that a small hospital, such as Taranaki Hospital, can have results just as good as the bigger hospitals.

**Functional outcome of surgery for fractures of the ankle**
Keith Winters

The paper is a retrospective analysis looking at the functional outcome of all patients who underwent operative fixation of ankle fractures at Hutt Hospital. It demonstrated significant functional impairment, even after a year, with the high energy fracture patterns and elderly performing worse.

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# Respiratory services in New Zealand: a breath of fresh air is needed

Roland J Meyer

Respiratory services include the care of patients with very common conditions such as respiratory infections, asthma, chronic obstructive pulmonary disease (COPD), and obstructive sleep apnoea (OSA). Moreover respiratory specialist services are crucial for the optimal assessment and management of patients with thoracic malignancies, above all lung cancer and highly specialised and resource-intensive patient care for conditions such as cystic fibrosis, interstitial lung diseases, and pulmonary arterial hypertension.

Chronic respiratory conditions are often associated with determinants of poor health such as poor housing. In addition, the impact of tobacco smoking continues to be enormous and this is likely to continue for some years. Indeed, there is significant morbidity, mortality, costs to society, and often overcrowding and gridlock in our hospitals because of respiratory conditions, some of which could have less impact with better prevention and chronic care.

Respiratory interventions are difficult to count. Health politicians and administrators may struggle to work out what is involved and what doctors, nurses and other health professionals actually do. Heart or hip operations are far easier to quantify.

Indicators of respiratory health in New Zealand are limited and we may not even know how bad things are. We do know that patients with COPD will have lost well over half of their lung function before being diagnosed, patients with significant OSA may not be diagnosed for 6 years or more, patients with lung cancer have a high probability of not even receiving initial specific cancer treatments, and patients with chronic cough may be waiting for a specialist assessment for 6 months—if a specialist can be "found".

Most respiratory conditions are managed daily by primary care teams. Good links to specialist services are crucial for up-to-date advice on chronic care, future prevention measures, and in cases where problems occur. GPs may feel it is a struggle to refer patients for specialist services, and specialists may be uncertain when to transfer the care of patients back to GPs.

Findings of *A survey of respiratory and sleep services in New Zealand undertaken by the Thoracic Society of Australia and New Zealand (TSANZ)* are published in this issue of the *Journal*.[1] The authors should be commended for undertaking this work—the findings are a reality check for health professionals and administrators alike.

Significant regional differences in the provision of respiratory services emerge thus raising concerns about a lack of timely and equitable access to comprehensive respiratory care in many parts of the country.

These differences are clearly linked to the critical medical workforce problems New Zealand is experiencing. However it also raises concerns about the ability of a DHB

to plan future respiratory services, plan for future changes in the demographic profile. Increased pressures due to an increased burden of chronic (respiratory) diseases are also significant. It will be difficult to make services more efficient and more responsive to the population's needs, to achieve collaboration and integration without a specialist being involved. Things may be becoming worse rather than better.

Key findings include:

- 5 DHBs (including 4 of the 6 South Island DHBs) do not have a respiratory specialist within their respective region.
- A 7-fold variation in the prescription of oxygen therapy between DHBs (used predominantly for patients with severe COPD or those with end-stage chronic lung disease).
- A 5-fold variation in investigating and treating patients with sleep-disordered breathing.
- Only 9 of 21 DHBs offer pulmonary rehabilitation, which is regarded as the most comprehensive intervention for patients with moderate to severe chronic lung disease (COPD in particular).[2]
- The ability to provide anything but the basic lung function tests seems under threat in some places as is the training of the future workforce.

It would seem unlikely that these obvious inequities will lead to the same level of public and political interest as the perceived gaps in cardiac surgical services[3] or breast cancer treatments[4]: more money there makes good headlines, in spite of some uncertainty within the health community whether these were indeed the "most urgent" priorities.

Inequity of access to respiratory services only becomes apparent if we know what to count, and improvements will only be made if then there is a voice in society to lobby for this. It would seem important for the Ministry of Health (MoH) to have this information and it is hard to comprehend why we know so little.

The 2004 document *Standards for adult respiratory and sleep services in New Zealand*[5] was published to advise and support the management of respiratory disorders in each of the DHBs.

A National Respiratory Council was set up in the same year to provide advice to the MoH and the DHBs, to assist in determining priorities for respiratory services. After less than a year it failed.

The authors of the published survey comment that "the uptake and implementation (of the "Standards") by the respective DHBs has been patchy" and that "this likely reflects the lack of accountability of DHBs and the fact that no national health target in respiratory medicine have ever been set".

The subsequent engagement of senior clinicians with the MoH and the respective DHB planning and funding divisions has to be questioned. The voices of the experts in the field may not have been heard because there were none employed or because the barriers between clinicians, politicians, and health officials have been too wide (nationally and at a DHB level).

Overall there may be a risk that outside of our hospitals the TSANZ "Standards" and this survey are seen as a very 'hospital-centric' view of respiratory services rather than looking at the entire continuum of care.

Some may argue that hospital specialists are simply trying to strengthen their respective hospital-based services by calling for more resources, more technological advances, and more specialist staff. This is not the main issue now: shortages and inequities (i.e. the lack of staff and services) are real.

Is there a solution?

The specialists themselves must remain engaged and be willing to look at "changing the way acute and chronic services are managed,"[6] develop alternatives to the traditional model of acute hospital admissions, outpatient visits and follow-up visits. Specialists must widen their horizon. This includes the willingness to regularly look beyond the individual patient in front of us—e.g. to know that DAP stands for the District Annual Plan of one's DHB and each year clinicians and clinical leaders must be in a position to contribute to this.

Silos need to be removed. The different layers of the sector must work together—in particular in respiratory services. IMPRESS: Improving and Integrating Respiratory Services, a joint initiative of the British Thoracic Society (BTS) and the British General Practice Airways Group (GPIAG), may be a model here in New Zealand.[7] Of note, the joint DHB/PHO "Canterbury Initiative" to move to integrated respiratory services has been launched.

Services must be more efficient, more equitable, and must be located closer to the patients and the communities with a stronger emphasis on prevention and chronic care management. This is more—not less—important when resources are very limited. Specialists must be involved, patient outcomes must be defined and closely monitored, with improvements here being the main aim.

Politicians and health administrators, while dealing with the critical workforce issues,[8] must also work harder to enable senior clinicians to participate in crucial planning work in a sustainable fashion. The TSANZ should be supported in mobilising its members to contribute.

There are a number of initiatives underway nationally and regionally to plan and develop our future health services, but from a clinician's perspective it would seem that the pace of this work has been very uneven throughout New Zealand, that the process has been confusing, and that a unifying and consistent strategy is lacking.

Various initiatives may seem *ad hoc* and at times reduplicated. It may be unclear how the consultations and the different "Calls for submissions" that may appear as part of one's email "tsunami" are related: DHBs , shared services agencies, and the Ministry of Health do not seem to have the same agenda and timetable at all times.

Key clinicians at DHB level may not become involved, either because of insufficient FTEs, time or resource, the increasing pressures of providing acute services, general disengagement or mistrust in any planning exercise that is seen to be "top-down", attempting to just cut costs, and potentially threatening medical professionalism.[9]

In some parts of New Zealand respiratory services do not feature highly as regional planning networks between DHBs are developed (such as suggested for the Central Region DHBs in August 2008) but clearly they need to.[10]

The Cancer Control Council with the four regional networks may indeed be a template for respiratory services. A disease-specific council, however, would not be effective without a dedicated MoH disease strategy. Such a strategy does not exist for respiratory health. A cancer control strategy was called for 10 years ago in 1999;[11] the strategy was launched in 2003 and even now progress may be much less than hoped for.[12] There must be lessons to be learnt here.

Specialist societies such as the Thoracic Society play a crucial role in delivering future plans for respiratory services in New Zealand but they must be aligned with the realities of the New Zealand health system.

Respiratory specialists are key players but not without the primary and community care sector. All must be given the resource to participate. Without proper indicators and evidence there is a risk of futility.

I call for:

- More clinical leadership, and a greater visibility and a louder voice for the relatively small number of New Zealand respiratory specialists and their professional body, TSANZ.
- Clinical indicators, as without them we do not even know where we are and we cannot assess need or plan services. Indicators must be relevant, accurate, and give a picture of the entire disease continuum.
- A willingness for change by all; putting the patients first in services that are sustainable and equitable.
- Better cooperation and better integration throughout the health sector—this must include the interface between primary care and secondary care services in planning throughout New Zealand regions and DHBs. New models are required while enabling the acute and hospital services to continue to function. The need for action is critical, and all must work together to ensure any respiratory service in the future.

**Competing interest:** The author is a member of the TSANZ.

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# A survey of respiratory and sleep services in New Zealand undertaken by the Thoracic Society of Australia and New Zealand (TSANZ)

Jeffrey Garrett, Bob Chen, D Robin Taylor

**Abstract**

**Aims** In 2004, the NZ Branch of the TSANZ published "Standards for Adult Respiratory and Sleep Services" on the Ministry of Health's (MoH) website.[1] The aim of this survey was to evaluate each of the 21 District Health Boards' (DHBs) performance against the published standards, concentrating particularly on staffing, infrastructure, clinical support services, implementation of guidelines, quality assurance activity, and basic services (sleep, lung function, and oxygen).

**Methods** Postal questionnaire survey of all DHBs in late 2006.

**Results** All 21 DHBs responded. Only 10 of 21 DHBs were complying with the minimum standards of care. Main deficiencies in care related to: inadequate medical staffing rates, lack of quality assurance measures and insufficient laboratory testing (sleep and lung function). The lack of monitoring of such basic activities as outpatient clinic attendances, oxygen and sleep services, and the non implementation of treatment guidelines were of particular concern. Seven-fold variations in prescription of assisted ventilation equipment and oxygen therapy exist across the country.

**Conclusions** When evaluated against minimum standards of care published in 2004, major gaps in service provision exist in New Zealand. Access to services is variable. There is a lack of national leadership and insufficient regional organisation leading to large gaps in service provision of even basic respiratory services. Immediate changes to the current service provision structures are required.

Concerned by the inequality in standards of care observed by practicing respiratory physicians, the New Zealand Branch of the Thoracic Society of Australia and New Zealand (TSANZ) developed Minimum Standards for Respiratory Services in New Zealand in 1996.[2]

The "Standards" were distributed to members of the TSANZ to help guide them in the development of services within their respective hospitals. However, they were never formally implemented. Further development of the "Standards" was undertaken in 2002 by the TSANZ. On this occasion the review was limited to adult services but was broadened to include sleep disorders. These "Standards" were finally recognised by the MoH and subsequently published on the MoH website in 2004.

In 2004, a National Respiratory Council was established by the TSANZ with representation from the New Zealand Asthma and Respiratory Foundation (NZARF), primary care, the Paediatric Society, the MoH, District Health Boards New Zealand (DHBNZ), and the TSANZ. The structure was similar to that established for umbrella

groups in cardiology, mental health, renal medicine, diabetes, and (more recently) cancer services.

The principle aims of the Council were to advocate for the further improvement of respiratory services in New Zealand, to provide advice to the MoH and to the DHBNZ Committee regarding priorities in service development, and to encourage adherence to the "Standards" by respective DHBs. However, the Council was disbanded in 2005, principally as a result of a lack of perceived engagement by the MoH and DHBNZ.

Since more comprehensive specialist respiratory services are centred within larger New Zealand hospitals, it is essential that larger DHBs work closely with smaller DHBs. The "Standards" were created to outline the various structures and workforce necessary to achieve these aims. They included an explanation of the scope of respiratory practice, an analysis of the burden of respiratory disease, the need for the main emphasis to be maintained in primary care and within the community, and the need for patient-focused education and self-management strategies.

Māori and Pacific Health issues, new technologies and treatments, disease-specific issues, outcome and impact indicators, prioritisation criteria for outpatient clinic appointments and hospital admissions, and credentialing tools for respiratory physicians and respiratory services were also included.

Minimum service requirements (Table 1) and staffing rates were also defined based on an assessment of international figures in countries with comparable health care resources. The minimum rates agreed upon were lower than for Australia, USA, Canada, and the UK but were deemed realistic given New Zealand's economic constraints and health care infrastructure.

This audit set out to assess whether the "Standards for Adult Respiratory and Sleep Services in New Zealand"[2] were being taken up by any of the 21 DHBs and to evaluate the extent to which deficiencies in care, infrastructure or staffing rates exist relative to the size of population each DHB serves. The audit also set out to evaluate whether any impact or outcome indicators were being collected and systematically measured. An assessment of oxygen and sleep services was undertaken (2 of the 12 respiratory services considered auditable by way of postal questionnaire).

**Table 1. Summary of minimum respiratory services required within various sectors of health**

| | LOCAL (<50,000 population) | DISTRICT (50–250,000 population) | REGIONAL (>250,000 population) | NATIONAL |
|---|---|---|---|---|
| **Diagnostic Facilities** | PEF Meters<br>Spirometry<br>Arterial Blood Gas Oximetry<br>Overnight Oximetry<br>Skin Allergy Testing | Spirometry<br>Plethysmography / DLCO<br>Bronchial Provocation<br>FNA lung (CT guided)+<br>Fibreoptic | Full lung function<br>Cardiopulmonary exercise<br>***Exhaled Nitric Oxide***<br>Pulmonary angiography+<br>Full | Molecular biological diagnostic services<br>Epidemiology |

| | | | | |
|---|---|---|---|---|
| | Mantoux Testing<br>Pleural Aspiration & Biopsy | bronchoscopy<br>Transbronchial biopsy BAL<br>***Transbronchial Needle Aspiration***<br>Partial Sleep Studies<br>Nuclear medicine scans<br>CT scans<br>MRI scans | polysomnography<br>Transcutaneous CO2 monitoring<br>Multiple sleep latency testing<br>Rigid bronchoscopy<br>***Endobronchial Ultrasound***<br>Medical Thoracoscopy<br>Reference TB Laboratory | |
| **Affiliated Services** | 24 hour chest radiology<br>CT scans*<br>Standard pathology and microbiology* | ICU<br>Cardiology, ORL<br>Oncology & Radiotherapy | Thoracic surgery<br>Specialised Thoracic histo/cyto/radiology services | |
| **Interven-tional Services** | | | Bronchial artery embolisation | Lung transplant-ation, LVRS<br>Thrombo-endarterecto-my<br>Laser therapy<br>Brachy-therapy<br>Stenting of airway<br>***One way valves*** |
| **Clinical Services** | Education: asthma, bronchiectasis, COPD, PTB, Palliative Care, Pulmonary Rehabilitation, Domiciliary Oxygen* | Provision of NIV<br>Domiciliary Oxygen, TB, Palliative Care<br>Rehabilitation Teams | Provision of NIV<br>Management of multi-drug resistant PTB<br>MDT CF Team<br>Pulmonary Hypertension | |

*Need to be affiliated with Regional Hospital such that difficult cases can be discussed. +Radiologist needs to have developed sufficient expertise to be allowed to perform.

(Italics) added since publication in 2004.

Those services offered at a local level would be expected to be available at a district level and so on.

## Methods

A structured questionnaire (see http://www.nzma.org.nz/journal/122-1289/3456/Appendix.pdf) was sent to the CEOs of each of the 21 DHBs in late 2006. The questionnaire sought information on:

- Whether any respiratory disorders were included in local DHB-listed health priorities;
- Whether strategies related to chronic care management had been implemented in the DHB specifically in relationship to COPD, asthma, lung cancer, cystic fibrosis, and obstructive sleep apnoea (OSA);

- The number of respiratory physicians, respiratory nurse specialists, respiratory scientists, sleep technologists and respiratory allied health personnel (physiotherapists, clinical health psychologists) employed;
- The type of respiratory support services provided, (e.g. availability and type of sleep study equipment, bronchoscopy techniques, lung function equipment);
- Oxygen and assisted ventilation services;
- Outpatient Clinic figures;
- Key performance indicators (KPIs);
- Laboratory services (sleep or lung function);
- Whether respiratory physicians and/or respiratory services had been credentialed.

The questionnaire also sought information on whether multidisciplinary team meetings were conducted and whether regional links had been developed between DHBs to manage more complex patients with (for example) sleep-related breathing disorders or lung cancer.

## Results

The questionnaire was eventually returned by all 21 DHBs, the last in June 2007.

Although no respiratory disorders are listed amongst 15 national health priorities, 14 of 21 DHBs reported respiratory disorders (COPD, asthma, lung cancer) in their list of health priorities. All DHBs reported strategies to address chronic care management of respiratory disorders. The most frequently mentioned were asthma and COPD with related pulmonary rehabilitation and smoking cessation programmes.

In line with recent MoH initiatives, the majority of DHBs reported a strong focus on primary care services. The relationship between primary and secondary care services appeared strongest in the smaller DHBs though their strategies were more usually broad in content rather than disease specific. Chronic care strategies fell into two categories: 1. preventive and 2. clinically focussed. The preventive initiatives included flu vaccination programmes, health promotion (e.g. healthy homes projects, exercise and healthy eating programmes), and community screening programmes. Respiratory clinics in the community were provided by some DHBs, mainly for asthma and COPD.

Fourteen of the 21 DHBs reported an asthma strategy. Those without a strategy tended to be the smaller DHBs. Only 10 of the 21 DHBs reported initiating specific strategies for COPD. Twelve of the 21 DHBs reported services that have evolved between primary and secondary care providers and included GP liaison team (formal education sessions with GPs and practice nurses by secondary specialist physicians and specialist nurses) and combined respiratory clinics (involving respiratory physicians, respiratory nurses, GPs, and practice nurses).

Six of the 21 DHBs provide a radiation oncology service and 10 of the 21 DHBs a medical oncology service. Those DHBs not providing oncology services reported a regional referral pathway which seemed to be working well but only 15 were undertaking multidisciplinary care meetings. Similar findings existed for thoracic surgery. Two DHBs had insufficient facilities or specialists to investigate or stage lung cancer patients and had no bronchoscopy service; 9 DHBs were unable to sample mediastinal nodes using bronchoscopic techniques (a standard test for staging lung cancer) and 10 DHBs could not perform cardiopulmonary exercise tests to evaluate fitness for thoracic surgery.

Seventeen of the DHBs had access to CT scanning and/or Isotopes scans. The four DHBs without these services had referral pathways to another DHB. Sixteen of the 21 DHBs offered CT assisted percutaneous needle biopsy or bronchial artery embolisation. The 5 DHBs without this service had referral pathways to another DHB.

Twelve of the 21 DHBs provided a sleep service although only 9 had sleep testing equipment. The other 9 DHBs offered a referral pathway to another DHB. Only 9 of the 21 DHBs reported a service to manage respiratory complications of obesity, and no specific funding base for bi-level ventilation existed in any of the DHBs. Fifteen of the 21 DHBs reported provision of a cystic fibrosis service. Of the 6 DHBs not providing this service, all offered a referral pathway to another DHB.

The 21 DHBs were ranked according to the size of population served into large (population >250,000), medium (population 100,000–250,000), or small (population <100,000). Four of the 6 large DHBs, 4 of the 9 medium-sized DHBs, and 2 of the 6 small DHBs complied with the standards.

**Table 2. Procedures**

| DHB | Population (1000s) | Flexible Bronch | Rigid Bronch | TBNA | Induced Sputum | |
|---|---|---|---|---|---|---|
| | | | | | TB | IADs |
| Canterbury | 530 | Y | Y | Y | Y | N |
| Waitemata | 480 | Y | N | Y | N | N |
| Counties | 430 | Y | N | Y | Y | Y |
| Auckland | 425 | Y | Y | Y | Y | Y |
| Waikato | 390 | Y | N | Y | Y | Y |
| Wellington | 250 | Y | Y | Y | Y | Y |
| Bay of Plenty | 190 | Y | Y | Y | Y | N |
| Otago | 171 | Y | Y | N | Y | N |
| Palmerston North | 170 | Y | N | Y | Y | N |
| Hawke's Bay | 150 | Y | N | Y | Y | N |
| Northland | 150 | Y | Y | Y | Y | N |
| Nelson/Marlborough | 135 | Y | N | Y | Y | N |
| Hutt | 130 | Y | N | N | Y | N |
| Southland | 105 | Y | N | N | Y | N |
| Lakes | 103 | Y | N | N | N | N |
| Taranaki | 100 | Y | Y | Y | Y | N |
| Whanganui | 64 | Y | N | N | Y | N |
| South Canterbury | 54 | Y | Y | N | Y | N |
| Tairawhiti | 44 | Y | Y | N | N | N |
| Wairarapa | 39 | N | N | N | N | N |
| West Coast | 31 | N | N | N | N | N |

Y=Yes; N=No; Shaded cell=doesn't comply with standards.

Of those providing bronchoscopy services (n=19) only 12 performed transbronchial needle aspiration (Table 2). Induced sputum testing remains an alternative to bronchoscopy for the investigation of tuberculosis, requires little technical support, and is substantially more sensitive than obtaining spontaneous sputum samples from patients (particularly those without a productive cough).[3]

Although 17 offered induced sputum examination, the two hospitals without bronchoscopy services did not. The number of hospitals providing induced sputum examination to evaluate inflammatory airways disorders was higher (12 of 21) than anticipated. Induced sputum testing is a well validated tool for testing for both infection and inflammatory airways disorders[4] and does not include the testing of routine sputum samples. The test for evaluating inflammatory airways disorders requires careful quality controls and with the need for formal training by the technician performing the test. (A follow-up enquiry revealed only 5 of 21 DHBs have access to induced sputum testing with appropriate quality control measures and not the 12 reported.)

Whilst all hospitals provided a spirometry service, two of nine medium-sized hospitals could not measure either lung volumes or DLCO (a basic measurement of diffusion), four of the nine could not test for bronchial hyper-responsiveness (a standard asthma test), and five of the nine could not perform a cardiopulmonary exercise test (CPET) (Table 3). Whilst CPET was deemed essential only for DHBs servicing populations of over 250,000 in 2002, a more realistic standard now would be for CPET to be routinely available to populations of greater than 100,000.

**Table 3. Lung function testing**

| DHB | Population (1000s) | Lung volumes | DLCO | BHR | Exercise test | eNO |
|---|---|---|---|---|---|---|
| Canterbury | 530 | Y | Y | Y | Y | Y |
| Waitemata | 480 | Y | Y | Y | Y | N |
| Counties | 430 | Y | Y | Y | Y | Y |
| Auckland | 425 | Y | Y | Y | Y | Y |
| Waikato | 390 | Y | Y | Y | Y | N |
| Wellington | 250 | Y | Y | Y | Y | Y |
| Bay of Plenty | 190 | Y | Y | Y | Y | N |
| Otago | 171 | Y | Y | Y | N | N |
| Palmerston North | 170 | Y | Y | Y | Y | N |
| Hawke's Bay | 150 | Y | Y | Y | Y | N |
| Northland | 150 | N | N | N | N | N |
| Nelson/Marlborough | 135 | Y | Y | N | N | N |
| Hutt | 130 | Y | Y | N | N | Y |
| Southland | 105 | Y | Y | Y | N | Y |
| Lakes | 103 | Y | N | N | N | N |
| Taranaki | 100 | Y | Y | Y | N | N |
| Whanganui | 64 | N | N | N | N | N |
| South Canterbury | 54 | Y | Y | N | N | N |
| Tairawhiti | 44 | N | N | N | N | N |
| Wairarapa | 39 | N | N | Y | N | N |
| West Coast | 31 | N | N | N | N | N |

Y=Yes; N=No; Light shaded cell=doesn't comply with standards; Dark shaded cell=doesn't comply with 2006 standards.

Five of the lung function laboratories servicing medium sized DHBs did not have trained respiratory scientists/physiologists and therefore, under New Zealand

standards, are ineligible for laboratory accreditation. The credentialing of respiratory scientists *per se* was not included in the survey. Only six of the DHBs had had their lung function laboratories accredited by the TSANZ (a more robust accreditation process than New Zealand runs). As a consequence, 13 DHBs cannot be recognised as postgraduate respiratory medicine training centres by the TSANZ and may not be able to employ respiratory registrars (advanced trainees). The net effect will be to increase the difficulty smaller DHBs have in attracting advanced trainee registrars to their hospitals and ultimately in attracting senior medical staff.

Whilst the place of exhaled Nitric Oxide (eNO) testing in patients with asthma (or possible asthma) has not been fully established the test has been adopted by some New Zealand hospitals (6 of 21) (Table 3).[5] It is, however, available through two asthma societies in New Zealand and which raises the question as to the primary responsibility for service provision.

In New Zealand, lay societies have historically attempted to fill holes created by inadequately funded hospitals and this appears to remain the case. Issues surrounding quality assurance measures when such testing is undertaken outside of a professional organisation are real. However, the lack of quality control around testing would seem to extend beyond lay societies and to include a number of smaller DHBs in New Zealand.

All 21 DHBs ran an oxygen service (Table 4).

**Table 4. Oxygen therapy service**

| DHB | Dedicated Clinician | LTOT/$10^5$ | Portable Oxygen/$10^5$ | COPD (%) | TSANZ guidelines |
|---|---|---|---|---|---|
| Canterbury | Y | 51 | 16 | 70 | Y |
| Waitemata | Y | 28 | 0 | 75 | Y |
| Counties | Y | 28 | 1.3 | 80 | Y |
| Auckland | Y | 39 | 4.5 | 83 | Y |
| Waikato | Y | 50 | 13 | 77 | Y |
| Wellington | Y | 80 | 1.0 | 90 | Y |
| Bay of Plenty | Y | 34 | 30 | 90 | Y |
| Otago | Y | 65 | 0 | 75 | Y |
| Palmerston North | Y | 34 | 8.5 | 90 | Y |
| Hawke's Bay | Y | 90 | 0 | 14 | Y |
| Northland | Y | 57 | 11 | 90 | Y |
| Nelson/Marlborough | Y | 20 | 30 | ? | (local guidelines) |
| Hutt | Y | 70 | 2.5 | 80 | Y |
| Southland | Y | 78 | 39 | ? | ? |
| Lakes | N | 76 | 21 | 80 | Y |
| Taranaki | N | 40 | 14 | 85 | Y |
| Whanganui | N | 82 | 3.5 | 80 | Y |
| South Canterbury | N | 102 | 10 | 78 | Y |
| Tairawhiti | N | 75 | 2 | 60 | ? |
| Wairarapa | N | 150 | 45 | 76 | Mostly |
| West Coast | N | 85 | 10 | 100 | Y |

Y=Yes; N=No; Shaded cell=doesn't comply with standards.

The rate at which long-term oxygen therapy (LTOT) is provided ranged from 20 to 150 patients per 100,000 with a mean of 63/100,000 (Table 4). The projected rate of prescription of LTOT, if international guidelines are carefully followed, is around 35–55/100,000 based on the known prevalence of chronic respiratory failure. Five DHBs are therefore under-prescribing and 11 DHBs over-prescribing oxygen (6 DHBs are grossly over-prescribing).[6,7] Four DHBs do not provide portable oxygen therapy (despite good scientific evidence of benefit and support of use in NZ guidelines[8] and which 20 DHBs stated, guided their practice).

The rate of prescription of portable oxygen ranged from 0–50/100,000 with a mean of 14/100,000. The predicted rate, if guidelines are followed, should be 5–10/100,000 inferring that some DHBs are grossly over-prescribing. In view of the large range of prescribing rates for both LTOT and portable oxygen, a draft copy of this report was sent to all DHBs to allow a check for inaccuracies in the figures supplied.

Despite an attempt to differentiate portable oxygen (the use of a light weight delivery device to be used when patients are mobile) (Table 5),[8] there was some confusion regarding this question and some DHBs had listed all oxygen equipment dispensed. Since the only oxygen therapies of proven benefit are LTOT and portable oxygen, there appear to be many instances where patients are receiving oxygen for which there is no scientific evidence of benefit (e.g. short-burst oxygen, administration of oxygen to current smokers, or oxygen therapy prescribed for long-term use at the time of discharge from hospital[9] rather than when the patient is stable).

Twelve of the 21 DHBs reported a specified budget for the management of sleep-related breathing disorders based predominantly on volume contracts. The number of full sleep studies performed by each of the DHBs ranged from 0 to 750 with a mean of 161 in the previous 12 months (Table 5). The rates ranged from 0 to 98/100,000 with a mean of 25. The number of partial sleep studies (non PSG) performed ranged from 0 to 105 translating to rates of between 0 and 65/100,000 with a mean of 22/100,000. The number of home sleep studies ranged from 0 to 968 (0 to 125/100,000) with a mean of 22/100,000. Only 8 of 21 DHBs conducted home studies.

Although an overnight oxygen study can be used as a screening test (level IV) to more detailed testing (levels I-III), it was used in three DHBs as the only investigation. Thus, based on a liberal interpretation of a "sleep study," the overall rate of testing at the time of this audit was 50/100,000/year (this may have increased in 2008 to around 75/100,000/year; personal communication, A Neil, 2008).

These rates fall well below that of Australia (282/100,000), Canada (370/100,000), and the US (427/100,000).[10] It is also well below the rate required to adequately investigate and treat OSA acknowledging that at least 10% of Māori [11] and Pacific Islanders have OSA and that 2000/100,000 studies a year would be required to adequately screen the population.[10] Of equal concern was the finding that there are only two fully accredited (to TSANZ specifications) sleep laboratories in New Zealand and that no formal accreditation of any of the sleep services in DHBs outside of Auckland and Wellington has ever taken place.

All 21 DHBs provided inpatient non-invasive ventilation (NIV) for patients with acute type 2 respiratory failure. The service was provided in a variety of settings: emergency department, intensive care unit, and medical ward. Fourteen of the 21 DHBs reported a lead clinician responsible for this service, but in only 13 had the service been audited (a mandatory requirement when establishing NIV).[12]

Only 13 of the 21 DHBs used the MoH/TSANZ prioritisation criteria for respiratory outpatient referrals and 11 reported the use of MoH/TSANZ prioritisation criteria for sleep-related breathing disorders. Only one DHB audited waiting times against any of the criteria. Seven DHBs reported the measurement of key performance indicators (KPIs) in respiratory medicine. The KPIs recorded included: readmission rates within 30 days, average length of stay for hospital admissions (both are national criteria for all hospital admissions), outpatient waiting times, and time from referral to commencement of treatment in lung cancer.

Eleven of the 21 DHBs reported their respiratory service had been credentialed. Most had employed independent respiratory physicians from other DHBs and had used the "Standards" as the reference document. Only 15 of the 21 DHBs reported that their respiratory physicians had been credentialed.

**Table 5. Sleep services**

| DHB | Sleep Lab | PSG/yr | Partial/yr | Home/yr | CPAP Total | Bi-level Ventilation Total |
|---|---|---|---|---|---|---|
| | | Rates10$^5$ | | | | |
| Canterbury | N | 0 | 44 | 40* | 179 | 12 |
| Waitemata | N | 53 | 0 | 0 | 170 | 6 |
| Counties | N | 24 | 12 | 40 | 197 | 9 |
| Auckland | Y | 59 | 12 | 0 | 185 | 8 |
| Waikato | Y | 40 | 20 | 5 | 258 | 19 |
| Wellington | Y | 80 | 15 | 21 | 194 | 20 |
| Bay of Plenty | Y | 19 | 19 | 125 | ? | 2 |
| Otago | Y | 24 | 0 | 60 | ? | 17 |
| Palmerston North | N | 30 | 55 | 140** | 235 | 17 |
| Hawke's Bay | N | 0 | 54 | 0 | 166 | 40 |
| Northland | N | 84 | 4 | 0 | 283 | ? |
| Nelson/Marlborough | N | 0 | 60 | 0 | ? | 20 |
| Hutt | N | 80+ | 15+ | 21+ | 194 | 20 |
| Southland | N | 0 | 0 | 102 | 260 | 4 |
| Lakes | N | + | + | + | 256 | 6 |
| Taranaki | N | 0 | 65*** | 0 | 246 | 6 |
| Whanganui | N | + | + | + | ? | 0 |
| South Canterbury | N | + | + | + | ? | ? |
| Tairawhiti | N | 15 | 20 | 0 | 100 | 0 |
| Wairarapa | N | 0 | 0 | 0 | ? | 0 |
| West Coast | N | 0 | 0 | 0 | ? | 0 |

*Majority overnight oximetry; **66% overnight oximetry, ***Mainly performed in private (mixture of partial and overnight oximetry); +Referred through to Regional Centre; – no numbers (calculated); Y=Yes; N=No; Shaded cell=doesn't comply with standards.

Fourteen of 21 DHBs were below the minimum standard for employment of specialist respiratory physicians (Table 6) and the overall rate of 0.67/100,000 was 60% that of the UK 1.2/100,000,[13] 40% of Australia 1.9/100,000, and 25% of that predicted in UK workforce planning (2.5/100,000).

Of particular concern was the fact that more than 400,000 New Zealanders have no access to a respiratory physician. Seven of the 21 DHBs employed fewer respiratory nurse specialists than defined in the "Standards." Although the overall rate of employment of specialist respiratory nurses was encouraging major gaps were noted with two DHBs employing no nurse specialists.

For large DHBs, the rate of allied health workers (physiotherapists, clinical health psychologists) dedicated to the practice of respiratory medicine ranged from 0.1 to 0.5/100,000 with a mean of 0.4. For medium-sized DHBs, the rate was 0.3 to 0.9 with a mean of 0.6—and for small DHBs, the rate was 2.8/100,000. The low rate of employment of allied health professionals within larger DHBs is of particular concern. Allied health workers are an essential part of a multidisciplinary approach to chronic care management and the rate estimated falls well below the minimum standard of 1 per 100,000 population.

**Table 6. Staffing**

| DHB | Respiratory Physicians/$10^5$ | Respiratory Nurses/$10^5$ | Respiratory Fn Scientist/ $10^5$ | Sleep Nurse/ Technologist/$10^5$ |
|---|---|---|---|---|
| Canterbury | 1.25 | 1.6 | 1.0 | 0.4 |
| Waitemata | 0.65 | 0 | 0* | 0 |
| Counties | 1.15 | 1.1 | 0.3 | 0.3 |
| Auckland | 1.4 | 0.9 | 0.75 | 0.95 |
| Waikato | 0.66 | 0.75 | 0.55 | 0.6 |
| Wellington | 0.95 | 0.8 | 1.8 | 1.4 |
| Bay of Plenty | 1.0 | 1.0 | 0.5 | 1.0 |
| Otago | 1.3 | 1.6 | 0.6 | 0.7 |
| Palmerston North | 0.75 | 1.8 | 1.3 | ? |
| Hawke's Bay | 1.3 | 0.66 | 1.3 | 1.8 |
| Northland | 0.15 | 0 | 0 | 0 |
| Nelson/Marlborough | 0 | 0.3 | 0* | 0 |
| Hutt | 0.55 | 1.7 | 0.55 | 0* |
| Southland | 0 | 1.0 | 0.75 | 0.75 |
| Lakes | 0.4 | 1.10 | 0 | 0 |
| Taranaki | 0.5 | 2.2 | 0* | 0 |
| Whanganui | 0 | 1.5 | 0 | 0 |
| South Canterbury | 0 | 2.5 | 0.5 | 0 |
| Tairawhiti | 2 | 1.0 | 0 | 0 |
| Wairarapa | 0 | 2.0 | 0 | 0 |
| West Coast | 0 | 3.0 | 0 | 0 |

* Running Lung Function Lab without Technician; Shaded cell=doesn't comply with standards.

## Discussion

**Summary of current status—**Whilst a number of DHBs have identified respiratory disorders amongst their health priorities (mainly COPD and asthma), the implementation of effective strategies appears patchy with limited supportive infrastructure and few outcome measures to assess impact. Whilst integrated care programmes appear more advanced within smaller DHBs, the lack of detail around these and the lack of disease-specific measures makes it hard to evaluate their effectiveness. The higher uptake of integrated care programmes in smaller DHBs may reflect closer working relationships between primary and secondary care providers in smaller communities than exists in metropolitan areas.

Whilst some clinical support services appear well developed (e.g. bronchoscopy, CT scanning, and percutaneous needle biopsies), there were worrying deficiencies in physiological support services (namely sleep and lung function testing), and transbronchial needle aspiration (a standard method of investigating mediastinal adenopathy). The latter is a basic test that can be undertaken by all bronchoscopists after relatively straightforward training.

Five lung function laboratories were operating without qualified respiratory scientists and no longer comply with national guidelines for lung function testing. This 'unsafe' staffing of pulmonary function laboratories is possibly due to a shortage of qualified respiratory scientists in the workforce and reflects a deficiency in workforce development at both a national and regional level.

Only six lung function laboratories are registered for accreditation by the TSANZ. The 15 DHBs without TSANZ accreditation of their lung function laboratories will not be able to support postgraduate training in respiratory medicine. At least 730,000 of the population do not have access to a test of bronchial responsiveness, a basic test of airway pathophysiology which is used diagnostically and in pre-employment screening, or in evaluating patients at risk of developing occupational asthma. Bronchial challenge tests are also used as a screening test for SCUBA diving in patients with a history of asthma (a positive test indicates an increased risk of acute bronchospasm and may preclude patients from diving).

Fifteen of 21 DHBs do not have access to a nitric oxide analyser, which complements other tests in the evaluation of airways diseases. The lack of availability of this test in DHBs has led to asthma societies in New Zealand acquiring equipment. This *ad hoc* application of new technology in New Zealand is common and contributes to substantial variation in practice.

A seven-fold variation in the prescription of oxygen therapy and five-fold variation to both the investigation and treatment of patients with sleep-related breathing disorders exists between DHBs. Even DHBs with the highest rates of both investigation and treatment of sleep-related breathing disorders fall well behind the rates of investigation and treatment performed in Australia, Canada, and the USA.

Increasing levels of obesity are clearly linked to rising levels of OSA. OSA affects at least 120,000 New Zealand adults. Based on this analysis, only 6000 are receiving treatment. Whilst the smaller DHBs have no sleep testing equipment, they do have a

referral pathway to regional sleep laboratories but are often unable to tell us how many patients are referred. Many have no record of the number receiving assisted ventilation.

The estimated total societal cost per annum in New Zealand from OSA has been estimated as $40 million or around $419 per case.[11] The incremental direct medical cost per quality of life gain from use of CPAP is only $94 (nearly 100-fold lower than the costs PHARMAC pay for new drug therapies to achieve the same result). Clearly, the majority of OSA sufferers are untreated and undiagnosed under the current service structure.

**Key deficiencies—**As a consequence of the increasing prevalence of a range of respiratory conditions notably COPD, asthma, OSA and pneumonia, respiratory disorders have now overtaken ischaemic heart disease and cancer as the most common cause of mortality[14] and remain the most common reason for primary care consultation and the second most common cause of hospital admissions.

Despite these figures, not one respiratory condition is listed as a health priority by the MoH, although (to their credit) some DHBs recognise this deficiency. Consequently, there is no monitoring of a DHB's performance with respect to implementation of respiratory guidelines on treatment and no monitoring of performance against minimum standards of care. Further, no national or regional infrastructure exists to help establish or monitor respiratory services.

It is therefore not surprising that over 400,000 New Zealanders have no access to a respiratory physician, that 11 of 21 DHBs fall below the minimum standard of care as defined by the TSANZ, and that there are no national health targets for respiratory services upon which to base individual DHB performance.

The lack of planning for respiratory services is of major concern to those practicing respiratory medicine in New Zealand. Despite substantial efforts by the TSANZ to improve services for a range of respiratory conditions in New Zealand since 1996, progress has been limited. Despite scientific evidence of clear benefit from comprehensive management of sleep-related breathing disorders there are large geographic areas in New Zealand where access to diagnostic testing for OSA is absent and little or no treatment is prescribed. Although only two respiratory therapies were evaluated in this audit, the implication is that such variation also exists for a variety of other respiratory services.

There are many-fold differences in the complexity and quality of respiratory care offered around New Zealand. There is little external evaluation of quality and no evidence that a number of smaller DHBs have implemented practices that conform with international guidelines (e.g. sleep, NIV, lung function testing). Whilst there were large gaps in provision of services there were also examples whereby smaller hospitals were providing services (e.g. bronchial artery embolisation and rigid bronchoscopy), whereby the small number of procedures undertaken would make made maintenance of expertise difficult. Since no information is systematically collected or analysed there is no way of evaluating whether outcomes are adversely affected as a result.

Whilst the TSANZ standards of care have obviously influenced quality of care, uptake, and implementation of the standards by individual DHBs has been patchy.

This reflects the lack of accountability of DHBs and the fact that no national health targets in respiratory medicine have ever been set. In fact, there is a complete lack of national monitoring of even basic respiratory health care information and this review is the only systematic evaluation of respiratory services ever undertaken in New Zealand.

**The way forward: recommendations—**This review therefore calls for the following changes:

- The resurrection of a *National Respiratory Council* with similar structure and function as exists for a range of other services (e.g. cancer, renal medicine, diabetes, mental health, and cardiac services). The National Council would have an advisory role with respect to new technology, new therapies, establishment of national targets, and KPIs to assess individual DHBs' performances, and would support the development of National Guidelines on a variety of respiratory disorders. It would also function in an advisory role to PHARMAC to ensure that proven respiratory therapies were made available in a more timely manner and to review and rationalise the use of existing drug therapies. It would review the current capped funding structure for OSA management and ensure adequate provision of and access to portable and comprehensive diagnostic sleep studies. It would also support the further integration of common respiratory disorders between primary and secondary care (e.g. OSA, COPD, bronchiectasis, asthma) and explore models of care that are appropriate to high need individual groups such as Māori[15] and Pacific Islanders.
- The implementation of four *Regional Respiratory Networks* to organise services and management strategies at a regional level. These networks would focus on a variety of issues—e.g. regional management of a range of disorders including cystic fibrosis, pulmonary tuberculosis, sleep-related breathing disorders and lung cancer, clinical support services including lung function and sleep laboratory, postgraduate training programmes (for specialist nurses, respiratory scientists, general practitioners), and the co-ordinated implementation of new technology and therapies.

Representation of all stakeholder groups involved in respiratory care on the committees would ensure improved communication between health care professionals, primary and secondary care providers, professional societies, and lay organisations as well as Māori and Pacific communities. In fact this structure was proposed in 1996 by the TSANZ.

**Disclosure:** Drs Garrett and Taylor are Past Presidents of the NZ Branch of the TSANZ.

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# Live donor liver transplantation in New Zealand: a report on the first 20 cases

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**Abstract**

**Background** Liver transplantation (LT) is established treatment for adults and children with acute or chronic liver failure, however there are insufficient donor organs to meet demand and 14% of New Zealand patients have died waiting or were de-listed due to deterioration whilst on the waiting list. Live donor liver transplantation (LDLT) offers an alternative graft source that enables timely transplantation, but also carries the risk of morbidity and mortality for the donor.

**Aim** To report the initial experience with LDLT in New Zealand.

**Methods** Review of donor and recipient outcomes for the first 20 cases.

**Results** 129 potential live liver donors were assessed for 68 recipients. Donors were evaluated according to a multi-step protocol including independent donor advocacy. Twenty LDLT were performed on 7 adults and 13 paediatric recipients using 5 right lobe, 2 extended left lobe, 2 left lobe, and 11 left lateral section grafts. Five donors (25%) experienced postoperative complications, none of which were life-threatening. Four recipients had acute liver failure and 16 had chronic liver disease including one retransplant. There was a high rate of recipient biliary complications (40%) but graft and recipient survival is 100% to date.

**Conclusion** LDLT has been successfully introduced in New Zealand with good donor and recipient outcomes.

The New Zealand Liver Transplant Unit (NZLTU) performed the first liver transplant in New Zealand in February 1998. As of June 2008, 339 transplants have been carried out in children and adults with an overall 5-year patient survival of 88% and a retransplant rate of 5%. These outcomes compare well internationally.[1]

A major challenge facing solid organ transplantation is the shortage of donor organs. New Zealand has a deceased donor rate of 7–10 per million and a high prevalence of liver disease—reflecting endemic chronic hepatitis B (HBV) (90,000 people with chronic infection) as well as increasing chronic hepatitis C and non-alcoholic fatty liver disease. In addition, the small population and geographic isolation of New Zealand reduces the chance of a deceased donor liver being available for patients with a short window before disease progression renders them untransplantable.

Since 1998, the median waiting time has increased from 35 days to 170 days and the overall waiting list mortality is 14.3%. Waiting list mortality is greatest for patients with acute liver failure (40%) and hepatocellular carcinoma (30%).[2,3]

During the late 1990s international experience with live donor liver transplantation (LDLT) increased rapidly and important technical and donor safety issues began to be addressed.[4–6] After extensive discussion the NZLTU developed a detailed protocol for LDLT and approval was granted by the Auckland Regional Ethics Committee to introduce the procedure in 2001. The first LDLT was undertaken in August 2002 and this paper reports our experience with the first 20 cases to June 2008.

## Methods

**Eligibility—**Recipients first had to fulfil the usual listing criteria for liver transplantation (LT). An assessment was made about suitability to receive a partial liver graft (either deceased donor split liver or LDLT) and an information booklet on live donation provided. No further efforts by the transplant team were made to solicit potential live donors.

**Donor evaluation—**Live donor enquiries were directed to a liver transplant co-ordinator who initiated a step-wise assessment protocol (Table 1). The first step was to check pre-requisite criteria including age (initially 21–55 years, revised to 18–60 years), BMI (<30), ABO compatibility, and the absence of known medical conditions. The donor and recipient were required to have an established relationship but were not required to be related. The next steps involved in-depth discussion of the operation including morbidity and mortality risks with the donor surgeon, further blood tests, and independent medical, social and psychiatric assessments. The physician who assessed the donor was not a member of NZLTU and was not involved in the management of the recipient.

### Table 1. Donor assessment protocol

| |
|---|
| **Step 1 – Contact via co-ordinator**<br>Information booklet provided<br>Height, Weight, BMI<br>Medical History<br>Screening blood test; blood group, LFT, U&E, FBC, virology (HBV, HCV, HIV) |
| If no contraindications identified<br>Further blood tests; repeat blood group, auto-antibodies, clotting and thrombophilia screen*, EBV, and CMV serology |
| **Step 2 – Consultation**<br>Donor Surgeon<br>Independent Physician<br>Chest X-ray, ECG ± echocardiogram<br>Psychiatrist<br>Social Worker<br>Anaesthetist |
| **Step 3 – Radiology**<br>MRI Liver – (including MR angiography and cholangiography, steatosis, volumetry)<br>±CT angiography |
| **Step 4 – Additional tests if required:**<br>ERCP (or operative cholangiogram) if MRC inadequate<br>Liver Bx (BMI > 26 or suggestion of steatosis on imaging) |
| **Step 5**<br>Donor Selection Meeting<br>Cooling Off Period (>1 week except Acute Liver Failure)<br>Surgery Date |

The radiological examination was performed with MRI. Choice of anatomical graft type was determined by donor anatomy, calculated graft and residual liver volumes, and safety considerations for the donor and recipient respectively. A residual liver volume ≥35% was required for the donor and a graft volume of at least 40% of standard liver volume for the recipient (graft-to-recipient weight ratio

of 0.8). Smaller graft volumes are considered for recipients with compensated cirrhosis undergoing LT for hepatocellular carcinoma (HCC).[7]

The donor assessment team met to consider all aspects of the assessment before making an offer to proceed. The donor then entered a 'cooling-off' period before making a final decision. Donors were offered an opportunity to withdraw, right up to the time of surgery.

**Donor surgery—**The donor operations were performed under general anaesthesia plus epidural infusion and a low CVP anaesthetic technique.[8] Briefly, the respective inflow and outflow vascular structures to the future graft and liver remnant were dissected but not divided, leaving the entire liver vascularised during division of the parenchyma with an ultrasonic surgical aspirator (CUSA®). A cell-saver was not used. After removal the graft was perfused with cold preservation solution (UW® or HTK®) and further graft preparation was performed on the back table. Donors were extubated in theatre and transferred to a high dependency ward.

Early mobilisation and thromboembolic prophylaxis were routinely employed. At discharge donors received written instructions and a 24-hour contact number, and were reviewed regularly in clinic. Further follow up was arranged at 1 and 3 months then annually. A donor database has been maintained for audit purposes.

Recipient surgery—Recipient hepatectomy was performed with IVC preservation and the graft hepatic vein anastomosed end-to-side to the IVC ("piggyback" technique). Direct end-to-end portal vein and hepatic artery anastomoses were used in all cases. Biliary reconstruction was donor to recipient choledocho-choledochotomy in seven and Roux-en-Y hepatico-jejunostomy in 13.

Recipients were managed and followed up in accordance with the NZLTU paediatric and adult protocols respectively.[2,9]

## Results

129 people came forward as potential live donors for 68 recipients (Figure 1). Sixty-nine were excluded after the initial screen and the remainder entered the next stage of assessment. Of those, 26 were accepted, 22 underwent laparotomy, and 20 underwent donor hepatectomy. The reasons for not proceeding with donation are listed in Table 2.

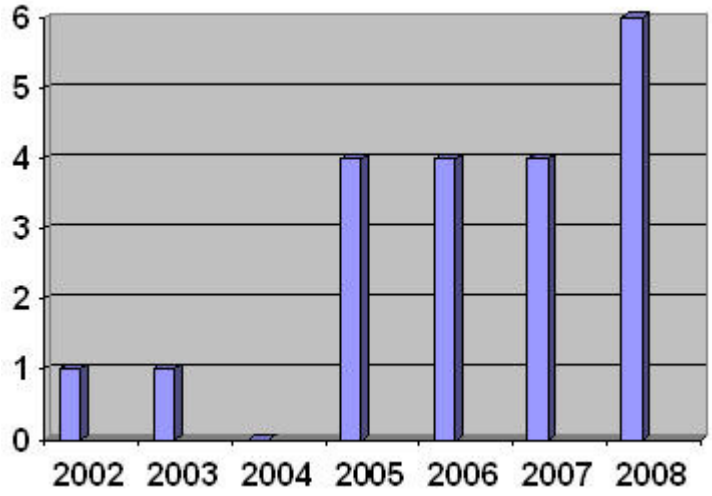
### Table 2. Donor and recipient reasons for not proceeding

| | |
|---|---|
| ABO incompatible | 7 |
| BMI >30 | 12 |
| Donor withdrew | 14 |
| Other donor already in workup | 12 |
| Medical comorbidities | 25 |
| Positive thrombophilia screen | 6 |
| Non-medical or psychosocial | 4 |
| Unsuitable donor anatomy | 9 |
| Recipient deteriorated | 5 |
| Recipient transplanted | 10 |
| Recipient improved | 1 |
| Currently in evaluation | 4 |
| **Total** | **109** |

Of note, two donors underwent laparotomy without proceeding to hepatectomy. One had aberrant arterial anatomy incompatible with donation that was not evident on preoperative imaging. Another developed ischaemic ECG changes during liver mobilisation. This donor, a 23-year-old with no risk factors for ischaemic heart

disease subsequently underwent full cardiological evaluation including coronary angiography, which was normal. The presumed diagnosis was Prinzemetal's angina.

**Figure 1. Number of live donor liver transplantations per annum (August 2002–June 2008)**




Of the 20 who donated, median age was 35 (range 19–55) years; there were 11 males and 9 females. Six were Maori and 14 were European New Zealanders. The relationship to the recipients was parent (6), sibling (3), friend (4), aunt (2), grandparent (2), and son (3).

**Donor outcome—**The median time from donor enquiry to transplantation was 60 (range 1–169) days. Median (range) duration of donor surgery was 300 (220–360) minutes. There were 5 right, 2 extended left, and 2 left hepatectomies, and 11 left lateral sectionectomies. Donor residual liver volume ranged from 36% to 80%. Operative blood loss was less than 500 mL in all cases and no blood products were used.

The median (range) postoperative stay was 6 (5–8) days. One donor required re-operation on day 2 for bleeding from a small artery in the falciform ligament. Thereafter he made an uneventful recovery. There were two wound infections. Three donors were readmitted; one with low-grade fever (culture negative), one with abdominal pain and constipation, and one with gastric outlet obstruction that developed 6 weeks postoperatively. Endoscopy showed severe duodenitis which responded to medical treatment.

All donors have been able to return to their previous employment and physical activities but one remains troubled by chronic wound pain more than a year after surgery.

**Recipient outcome—**4 of the 20 recipients (20%) had acute liver failure (2 seronegative hepatitis, 1 Wilson's disease, and 1 acute hepatitis B) of whom 3 were in ICU and 2 were ventilated and on haemofiltration at the time of transplantation. The

other 16 recipients had chronic liver disease including 1 retransplant (11 biliary atresia, 3 hepatitis B or C cirrhosis complicated by HCC, 1 Budd-Chiari, 1 sclerosing cirrhosis).

Six recipients needed early re-operation for venous outflow obstruction, biliary anastomotic leak (2), cut surface bile leak, portal vein thrombosis, and hepatic artery thrombosis respectively. One right lobe recipient had prolonged mild graft dysfunction and ascites presumed secondary to small-for-size syndrome.[10]

Median postoperative stay for recipients was 14 (range 9–75) days. Biliary complications occurred in 8 recipients (40%) including 3 anastomotic leaks and 8 strictures. Re-operation was required for 4; the remainder were successfully managed by endoscopic or percutaneous intervention. One recipient has a cognitive deficit following emergency LDLT for acute liver failure due to HBV infection and remains in supervised residential care, and another has recurrent HCC 5 years after LDLT. To date there has been no recipient mortality or graft loss.

## Discussion

The initial experience with LDLT at NZLTU has been encouraging. There were no severe donor complications and all recipients are alive with functioning grafts. This experience is small by international standards although it represents the largest single centre experience so far amongst the six liver transplant units in Australasia.

The first successful LDLT was performed in Brisbane in 1987 using the left lobe for a child.[11] In 1994, the first LDLT using the right lobe was reported from Japan[12] and from the mid 1990s onwards LDLT grew rapidly in Asia, followed by the West, in response to a growing gap between donor organ supply and demand.[13] The first adult LDLT in Australasia using the right lobe was performed in Perth in 2000.[14] By the end of 2007 an estimated 14,000 LDLT have been performed worldwide.[15]

LDLT has always been controversial, especially for adult recipients where the need for a larger graft raises concerns for the safety of the donor.[16] Worldwide, at least 15 donors are known to have died as a result of the donating [17] and there have allegedly been additional deaths that have not been formally documented.[15]

Whilst some donor deaths may be preventable it is not possible, even with the best care, to eliminate all of the risks associated with major surgery. Moreover, the risk donor mortality increases in proportion to the percentage of liver removed. From the sum of international experience the mortality risk for a left lobe donor (usually for a paediatric recipient) is estimated be 1:1000 and the mortality risk for a right lobe donor (for an adult recipient) is estimated to be 1:300.[6,15,17]

We terminated two donor operations without proceeding with hepatectomy. In one case this was due to inadequate arterial imaging using MRI. The advent of 64-slice CT will enable more accurate non-invasive delineation of vascular anatomy and the higher spatial resolution possible with MR angiography at 3T may achieve similar results. We have found the MRI protocol excellent for assessing hepatic steatosis, incidental hepatic masses, portal and hepatic venous anatomy, and the 3-D free breathing MRC sequences have provided good visualisation of biliary anatomy. The other aborted operation was due to apparent intra-operative myocardial ischaemia in a young fit donor with no risk cardiac factors and negative postoperative investigations.

Donor safety is the primary consideration when devising criteria protocol for LDLT and the NZLTU donor outcomes are in keeping with reports from larger centres.[18,19] Some programmes accept a donor residual liver volume as low as 30% and set no upper age limit.[20] We set the minimum residual liver volume at 35% and the upper age at 60 to reduce the risk of hepatic insufficiency. The ratio of donor enquiries to LDLT performed was 6.5, although more than half were able to be triaged on the initial screen without needing to undergo full evaluation. A number of potential donors also withdrew of their own accord.

Well defined non-negotiable donor selection criteria, and maintaining clear separation between the donor evaluation and the recipient care is essential to avoid conflicts of interest that could compromise donor safety.[21] These requirements make LDLT very labour intensive and logistically challenging for small transplant units. Nevertheless LDLT should only be embarked on with these safeguards in place.

The need for good process is most evident in the setting of acute liver failure, where the time from listing to transplant, or death, is measured in days. Some transplant units do not offer LDLT for acute liver failure because of the pressure that acuity puts on the donor, as well as members of the transplant team.[22] NZLTU has an agreement with the five Australian Liver Transplant Units to prioritise patients with acute liver failure. Despite this, 40% of such patients deteriorate and become untransplantable before a liver becomes available.

NZLTU therefore offers LDLT whenever circumstances allow and 20% of the LDLT were performed in the acute setting. In each case the entire donor evaluation protocol was followed, albeit within a compressed timeframe. This small experience of LDLT for acute liver failure is similar to other larger units operating in an environment with limited deceased donor availability.[23]

Safety considerations are also important for the recipient and LDLT is not always a safe option. The most important requirement is for a hepatic mass sufficient to enable recipient recovery. The factors governing this are complex and depend on more than just the relative size of the donor and recipient. Other key factors include the severity of recipient portal hypertension, renal function, other comorbidites, and graft biliary and vascular anatomy.[10,24]

All these factors need to be taken into account and the learning curve associated with LDLT reflects the complexity of decision making as well as the technical complexity of the surgery. In North America the learning curve in most units seemed to require about 20 cases.[25] Small units do not have a sufficient caseload to sustain a long learning curve and must instead learn from more experienced centres.[26,27]

A high rate of biliary complications (40% in the current series) is found in most series of partial liver transplantation (split or LDLT).[26,28,29] Refinements in technique can address some issues, but there is a trade-off between increasing access to transplantation and the extra morbidity associated with the use of partial liver grafts. Biliary and vascular complications are more frequent in LDLT and associated with a higher incidence of early graft loss,[25] however we have not experienced any mortality or graft loss in the first 20 cases.

LDLT is an accepted procedure worldwide although many technical and ethical challenges remain. The NZLTU has initiated a LDLT program with good outcomes to

date. The percentage of liver transplants performed using live donors in New Zealand is increasing and this trend is likely to continue unless more deceased donor organs become available to meet current demand.

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# The readmission rate as an indicator of the quality of elective surgical inpatient care for the elderly in New Zealand

Juliet Rumball-Smith, Phil Hider, Patrick Graham

**Abstract**

**Aim** To conduct a hypothesis-raising and descriptive study of the rate of readmission/death for patients aged over 64 years as a measure of the quality of inpatient care, for elective surgical procedures between 2001 and 2004.

**Methods** Data from the New Zealand Health Information Service was used to calculate an annual rate for patients aged 65 years or over between July 2000 and July 2004 who were readmitted or deceased within 30-days of discharge following an: elective transurethral prostatectomy, laparoscopic cholecystectomy, knee arthroplasty, hip arthroplasty, or inguinal hernia repair.

**Results** It is probable that the risk of readmission/death within 30-days of discharge ('RoD') rose 13% (95% CI of increase: 0%, 27%) from 7.5% in 2001/2002 to 8.5% in 2003/2004. The risk of RoD was greater among patients aged 80 years or over (RR 1.38, 95% CI 1.26, 1.51), males (RR 1.26, 95% CI 1.12, 1.41), and NZ Māori (RR 1.6, 95% CI 1.2, 2.3).

**Conclusions** There is evidence for a probable increase in the rate of RoD between 2001 and 2004, and its relative risk varied with gender, age, and ethnicity. However, this study was not able to control for potential confounders (length-of-stay, casemix, or comorbidities) which may affect the estimated result. Ongoing research is recommended to explore the use of RoD rate as an indicator of health services quality and consider whether this rate is increasing, despite health system quality interventions. In addition, further investigation is needed to evaluate the quality of hospital care in New Zealand with respect to ethnicity, age, and gender.

Numerous indicators may be used to evaluate the quality of hospital services, including readmission rate.[1] The readmission rate may reflect the impact of hospital care on the patient's condition up to the point of discharge, as well as describing the efficiency of the service.[2] The readmission rate is easily calculated by hospital information systems, and may be readily combined with other data.[3] Studies of discharge rates in New Zealand hospitals have demonstrated a general trend of increasing rates for all categories of admission, including readmission.[3]

New Zealand's ageing population represents a health system challenge. The funding, planning, and management of their health service needs, and the safeguarding of their quality of life, are priorities for the Government.[4] However, there is little information available regarding readmission rates of the elderly. The evaluation of readmission rate for this population provides an indicator of the inpatient quality of care received by this vulnerable and growing group.

The literature demonstrates that surgical readmissions are more 'avoidable' than medical readmissions.[5–7] Furthermore, elective surgery is technically performed under planned, controlled conditions, with more thorough preparation by anaesthetic and surgical specialists. The ward is prepared and staffed for the patient, who is anticipated to have a predictable and stable recovery. Some studies using readmission rate as an indicator of quality choose to limit data to a defined set of surgical conditions, in order to reduce the impact of factors such as disease progression and relapsing medical conditions.[8–10]

This study restricted patients to those admitted electively for one of five specified surgical procedures: Hip arthroplasty, transurethral prostate resection, knee arthroplasty, inguinal hernia repair, and laparoscopic cholecystectomy.

## Methods

**Definition of readmission/death rate—**'Readmission rate' was defined as the unintended acute readmission of a patient within 30 days of discharge. This definition is compatible with current literature [11] and is the time period used by the United States, United Kingdom, Australian, Canadian, and New Zealand government bodies to assist assessment of the quality of health services.[12–15] This timeframe maximises the specificity of the indicator,[16] and is consistent with the natural time course of patient readmission.[9] In accordance with Ashton and Wray,[17] death within 30 days of discharge was included as part of the readmission indicator. Thus the marker 'readmission/death within 30-days of discharge' was used for the statistical analyses, and is denoted by 'RoD'.

**Data—**Data regarding all inpatient events at public hospitals and deaths within 30 days of discharge between 1 July 2000 and 31 July 2004 were obtained from the New Zealand Health Information Service.

**Selection of surgical procedures—**New Zealand public hospital surgical volumes between 2001 and 2002 were reviewed to determine the most commonly performed elective operations for patients aged 65 years and over.[18] After operations primarily associated with chronic diseases (such as cancer, diabetes, and cardiovascular disease) and the long-term administration of pharmaceuticals were excluded, the five most common procedures: hip arthroplasty, transurethral prostate resection, knee arthroplasty, inguinal hernia repair, and laparoscopic cholecystectomy were selected as the operations that were studied. These five operations are surgical procedures frequently performed in New Zealand hospitals and are associated with a variety of disease processes common among the elderly.

**Inclusion and exclusion criteria—**All New Zealand residents whose discharge was coded as 'routine' were included in the study. This excluded patients who were transferred to rehabilitation units or other hospital facilities, or who had discharged themselves against medical advice were excluded in accordance with current research practice. These exclusions eliminated less than 6% of discharges over the study period.

**Analyses—**The data for the 12-month period between July 2001 and June 2002 was compared with data from the period July 2003 and June 2004 to compare changes in the rate over time. Sub-group comparisons were made using a 4-year period between July 2000 and June 2004. The following demographic characteristics were analysed: aged over 80 years, gender, and ethnicity. Age-standardised rates were calculated using the New Zealand Māori population 1996-2000 as the standard, and comparisons were made between either Māori or Pacific people and Non-Māori Non-Pacific people. The study was designed to have 85% power to detect a change of 10% based on an expected readmission rate for the elderly of 15%.[10]

## Results

Patients aged 65 years or over undergoing the five specified operations electively in New Zealand public hospitals between 1 July 2000 and 30 June 2004 were eligible for inclusion, thus including readmission data up to 31July 2004. The dataset comprised

21,398 discharges, of which 1720 (8.2%) people were readmitted/died within 30 days of discharge.

**Table 1. The rate of readmission/death according to year, and demographic characteristics**

| | Variable | Number of subjects | % Rate of RoD (95% CI) | Relative risk | 95% CI | P-value |
|---|---|---|---|---|---|---|
| Year* | 2001/02 | 5792 | 7.7 | 1 | | |
| | 2003/04 | 5865 | 8.7 | 1.13 | 1.00, 1.27 | 0.0569 |
| Age | Age < 80 years | 13054 | 9.9 (9.3, 10.6) | 1 | 1 | |
| | Age ≥ 80 years | 8344 | 7.2 (6.7, 7.6) | 1.38 | 1.26, 1.51 | 0.0001 |
| Sex† | Female | 7420 | 7.7 (7.1, 8.3) | 1 | 1 | |
| | Male | 5445 | 9.6 (8.9, 10.5) | 1.26 | 1.12, 1.41 | 0.0001 |
| Age standardised ethnicity rates | NMNP | 20261 | 6.5 (5.7, 7.2) | 1 | 1 | |
| | NZ Māori | 892 | 10.7 (7.3, 14.0) | 1.60 | 1.2, 2.3 | 0.0047 |
| | Pacific | 245 | 11.8 (4.0, 19.6) | 1.80 | 0.8, 4.1 | 0.1456 |

CI=Confidence Interval, NMNP=Non- Māori Non-Pacific.

*The rates calculated are those for all five procedures collectively.

†Subjects who underwent a transurethral resection of the prostate or an inguinal hernia repair were excluded from this analysis, as these procedures are predominantly performed on men.

‡These rates were age-standardised using the NZ Māori population 1996–2000 as the standard.[19] Accordingly the 'relative risk' denotes the standardised risk ratio for the ethnicity comparisons, and the '% rate of RoD' is the age-standardised rate of RoD.

## Discussion

The results from this study demonstrate that it is probable, but not definitive, that the rate of RoD among patients aged 65 years and over has increased over time. The rate of RoD was higher among the very elderly (aged 80 years and over) compared with those aged between 64 and 79 years. Men were at higher risk of RoD compared with women. There were no significant differences between either NZ Māori or Pacific

people when compared with the Non-Māori Non-Pacific (NMNP) group. However, significant differences emerged when the data were age-standardised according to the Māori population. When compared to the NMNP group, the relative risk for NZ Māori was estimated at 1.6 (1.2, 2.3), and 1.8 for Pacific people (0.8, 4.1).

Readmission rate as a quality indicator has a number of benefits, in particular its ease of calculation from routine data sources, and the ability to perform secondary analyses. It also has international validity as an indicator of the quality of care.[15,20–22] Although the proportion of preventable readmissions is variable in the literature, it is agreed that the readmission rate includes a significant fraction of events of ill-health that could have possibly been avoided.[11,22–24]

The association between readmission rate and quality of care has been validated in methodologically-sound meta-analyses, cohort and case-control studies.[22,25] However, researchers and analysts must recognise the limits to readmission rate and the threats to its validity. The impact of confounding factors must be restricted or controlled for, in order for the rate to have legitimacy. It is important to remember that readmission rate is simply a proxy marker for the quality of care, and as Ashton and Wray state: 'to date, no one has validated the findings of secondary analysis against the gold standard of chart review'.[17p1540]

When reviewing the quality of care of an institution, the readmission rate should act as a contributing indicator only, and not be the sole source of information. There remains the possibility to have regrettable outcomes despite excellent care (and vice versa), similarly readmission may also represent appropriate clinical practice. There is also the need to beware of readmission rate becoming a 'perverse incentive', especially if it is used as a performance measure attached to resources. Financial incentives attached to reducing readmission rates may distract from making improvements in other areas, and may mean that quality issues not associated with indicators are ignored.

In this study, male subjects and those aged 80 years and over were more at risk for readmission/death, findings that are supported by the published literature.[5,26] While an increased vulnerability due to advancing age may be logical in terms of physiological and physical resilience to surgery and adjuvant therapies, it is difficult to apply the same logic to the observed sex differences in the rates of readmission. It is possible that differences in the prevalence of comorbidities, and the severity of the presenting condition between the sexes may account for the disparity.

Further research to identify possible explanations as to why the risk of RoD should vary according to gender is needed. It is recommended that the health system recognise age and gender as risk factors for readmission, and it is possible that the effect of these factors may be able to be mitigated with specific quality initiatives.

Although the difference in the rate of RoD between the two time periods was not significant, after assessment of the associated confidence intervals, it is likely that the rate of readmission/death within 30-days of discharge in this study population increased between 2001 and 2004. This difference may represent a reduction in the quality of inpatient care received by these patients, and is surprising given the number of interventions designed to improve the quality of inpatient care over this time, such as the introduction of the Elective Services Performance Indicators, and the extensive

application of strategies and targets to the provision of services by the health care sector.

Further analysis is recommended, including comparisons of rates by District Health Board, rural versus urban populations, examination of private hospital data, and assessment of the rates of those transferred to extended care facilities compared with those discharged to home. It would also be helpful to replicate the current analysis using subsequent data to if there is a trend of increase in the rate of RoD over time.

The results of this study demonstrate that after age standardisation, Māori have a higher risk of RoD than NMNP. Although the interpretation of this finding is limited by the lack of control for confounding factors such as severity of illness and comorbidities, it is possible that the result represents ethnic disparities in hospital care. Further research is needed to ascertain whether Māori are receiving the same standard of care as non-Māori, by obtaining consistent and valid ethnicity data, and incorporating qualitative and quantitative assessment tools. A study designed for this purpose, funded by the Health Research Council of New Zealand, is currently in progress. A difference in the quality of hospital care related to patient ethnicity represents an area for direct intervention to improve Māori health outcomes.

Limitations of study:

- The readmission rate was calculated with data from the National Minimum Dataset. The validity of this dataset relies on the accuracy of information from source documents, and this accuracy being maintained as it is transferred. It is possible that misclassification may have potentially affected the results; in particular, it is known that the validity of routinely-collected ethnicity data may be suspect. A recent NZ study examined the validity of hospital ethnicity data by comparing their records with self-identified data, [27] and demonstrated that only 67–75% of NZ Māori had their ethnic group recorded accurately, compared to 99% of non-Māori. It is probable that NZ Māori were similarly undercounted in this study, and had accurate data been available, the calculated relative risk of RoD may have been even greater.
- This study may be significantly under-powered. The rates of RoD calculated in this study are lower than that of other published reports pertaining to the elderly. Benbassat and Taragin reviewed nine such studies, and noted that of the five that used a 30-day interval, the readmission rates ranged from 12–16%. [11] The difference between the rates of this study and that of others presumably lies in its restriction to subjects undergoing elective surgical procedures, indirectly selecting for a healthier, more robust population. Given the small proportion of the study population who were readmitted, smaller effect sizes and higher degrees of significance may have been able to be obtained in the statistical analyses had the initial sample size been larger. It would be important to incorporate this information into any future studies using a similar population.
- The study compared two discrete time periods only and does not include a more extensive time series analysis. It is possible that the difference in the risk of RoD over the two time periods represents external events, such as influenza

incidence. Further research should be undertaken with data from more years to assess whether there is a demonstrable trend over a longer time period.

- The study did not include a control group composed of patients less than 65 years, to assess if the rate of change during the study period differed between the elderly and younger patients. However, there are problems with such an analysis, as the surgical conditions chosen are predominantly applicable to the elderly, and when considered for younger patients they may not produce a sufficiently large or homogeneous control population.
- A significant limitation of the study is the lack of control for potential confounders, such as co-morbidities, length of stay, and clinical severity. Controlling for clinical condition was also not able to be performed due to insufficient statistical power. Accordingly, it is possible that differences in the case-mix and clinical characteristics of the patients may have impacted on the results. Any further investigation of readmission rates in this population should include adjustment for these factors.

Strengths of study:

- The restriction of the dataset to a defined set of elective surgical conditions minimised the influence of potential confounding factors. The eligibility criteria aimed to ensure a relatively 'healthy' population of patients who would be the most resilient to adverse events and lower quality of care. Continuing this assumption, it is anticipated that the rate of RoD in the general elderly population would be higher than that calculated in this study, although further research is needed to quantify this difference.
- A significant criticism of readmission rate internationally is the loss of subjects who may be readmitted to a different hospital than that of their index stay.[17] New Zealand is fortunate to have a national electronic dataset of admission information, linking admissions wherever they occur, through the subjects' National Health Index. This prevents the potential undercounting of readmissions, and improves the validity of the rate.

In conclusion, readmission rate as an indicator of the quality of care has widespread use both internationally and nationally. In New Zealand it is one of the tools employed in hospital benchmarking, and is also calculated internally by some hospital departments as a measure of quality. This project applies this rate to a subset of the population, to provide specific information about the standard of hospital care available in New Zealand for the elderly.

Although not statistically significant, the results suggest that the risk of readmission/death within 30-days of discharge for the elderly of this study population is likely to have increased between 2000/01 and 2003/04. The report also notes that men, those aged 80 years and over, NZ Māori, and possibly Pacific people have a higher risk of readmission/death within 30 days of discharge.

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THE NEW ZEALAND MEDICAL JOURNAL
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# Lymph node infarction and its association with lymphoma: a short series and literature review

Rajpal Singh Punia, Neerja Dhingra, Rajan Chopra, Harsh Mohan, Sandeep Chauhan

**Abstract**

**Aims** Lymph node infarction is an extremely rare phenomenon. An infarcted lymph node can proceed, or occur simultaneously with, lymphoma. In the present study we review the literature on lymph node infarction and describe our experience of such cases.

**Methods** Six cases of lymph nodes with a diagnosis of lymph node infarction were archived from the records of the Pathology Department. Clinical information of the patients was obtained from the case records. Haematoxylin andeosin stained sections were reviewed.

**Results** A diagnosis of non-Hodgkin lymphoma was made in 5 of the 6 patients. The diagnosis was made concurrent to the lymph node infarction in 2 cases while in 3 cases the diagnosis was made on subsequent follow up biopsies. The aetiology of lymph node infarction could not be established in one case.

**Conclusion** The pathologist should be cautious when examining an infarcted lymph node. Though all patients might not develop lymphoma, they require a close follow-up and repeat biopsies to detect the subsequent development of lymphoma.

Lymph node infarction, a syndrome of spontaneous coagulative necrosis of lymph nodes is a rare phenomenon because of its abundant vascularity. The condition was first described in man by Davies and Stansfeld way back in 1972.[1] It can be due to various non-neoplastic and neoplastic conditions. An infarcted lymph node can proceed, or occur simultaneously with, lymphoma. The incidence of lymphoma in patients with lymph node infarction varies from as high as 89% to as low as 32% in various studies.[2–4] In the present short series, we review the literature on lymph node infarction and describe our experience of such cases.

## Methods

From the archives of the Pathology Department (Government Medical College and Hospital, Chandigarh, India), cases of lymph nodes with a diagnosis of lymph node infarction were retrieved. Cases studied dated from1998 to 2007. All the cases showed areas of coagulation necrosis with loss of cell nuclei but with well preserved cell outlines, occupying a substantial part or whole of the lymph node. Clinical and follow-up information of the patients were obtained from the case records.

Hematoxylin and eosin (H&E) stained sections were studied. In addition, results of ancillary histochemical and immunohistochemical stains were noted wherever available.

Cases with well recognised infectious aetiologies of lymph necrosis (such as tuberculosis, syphilis, lymphogranuloma venereum, leishmaniasis, or cat-scratch disease) were excluded from the study, as were the cases showing only focal necrosis, which is known to be associated with drug associated intranodal microvasculitis, systemic lupus erythematosus, and other idiopathic vasculitic conditions.

## Results

A total of 3938 lymph node biopsies were received during the study period (1998–2007). These included isolated lymph node biopsies as well as nodes removed as part of resection specimens for other pathologies. Out of these only 6 cases were associated with lymph node infarction. The clinical features and pathologic findings of these cases are as follows (Table 1):

**Table 1.Clinical profile of cases**

| Case no. | Age (years)/sex | Site | Interval between first biopsy and final diagnosis | Final diagnosis |
|---|---|---|---|---|
| 1 | 26/M | Cervical, axillary | 1 month | NHL—Diffuse mixed small and large B cell type |
| 2 | 36/M | Axilllary | 6 months | NHL—Diffuse large B cell type |
| 3 | 51/M | Cervical | Concurrent | NHL—Diffuse large B cell type |
| 4 | 30/M | Posterior triangle neck | 4 months | NHL—Diffuse mixed small and large B cell type |
| 5 | 35/M | Mesenteric | Concurrent | NHL—Diffuse large B cell type |
| 6 | 42/F | Cervical | 24 months | Reactive lymphoid hyperplasia |

NHL=non-Hodgkin lymphoma.

**Clinical profile—**Cases were distributed over an age range of 26 to 51 years, the mean age being 38.75 years. There were five male patients and one female patient. In five of the six patients, the affected lymph nodes were of the head and neck region while in one patient, mesenteric nodes were involved. Two patients (cases 1 and 2), underwent fine needle aspiration prior to the biopsy. However, the smears showed only necrotic material and a definitive diagnosis could not be established.

**Pathologic findings—**Nine lymph node biopsies were received from the six patients. The excised lymph nodes were enlarged in size. Cut sections showed widespread necrosis visible to the naked eye in four biopsies. Microscopic examination of the H&E stained sections revealed poorly stained ghost-like cells (Figure 1). There was no evidence of nuclear karyorrhexis or histiocytic infiltration of the necrotic areas. However, histiocytic infiltrates and vascular granulation tissue were seen surrounding the areas of infarction necrosis.

Reticulin stain demonstrated the residual reticulin framework within the necrotic areas. Stains for fungi and acid fast bacilli were negative. The necrotic areas were thus typical coagulative lesions of ischemic type. In five of the six patients a diagnosis of non-Hodgkin lymphoma was made (Figure 2). The diagnosis was made at the same time as the lymph node infarction in two cases (cases 3 and 5), while in two cases (cases 1 and 4) lymphoma was diagnosed on the second biopsy and in one case (case 2) on the third biopsy.

In the latter three cases, the initial biopsies exhibited extensive necrosis without any viable areas sufficient to render a diagnosis. All the five cases were diagnosed as B-cell lymphomas, three were of diffuse large cell type, while the other two were of diffuse mixed small and large cell type. The lymphoma cells were positive for the

immunohistochemical stain CD 20 but were negative for CD 3. The aetiology of lymph node infarction could not be established in one case. Subsequent lymph node biopsy of this case showed reactive follicular hyperplasia; this patient was alive with no evidence of lymphoma 2 years after initial presentation.

**Figure 1. Photomicrograph showing complete infarction of the lymph node showing eosinophilic cell ghosts (H&E stain, ×100)**

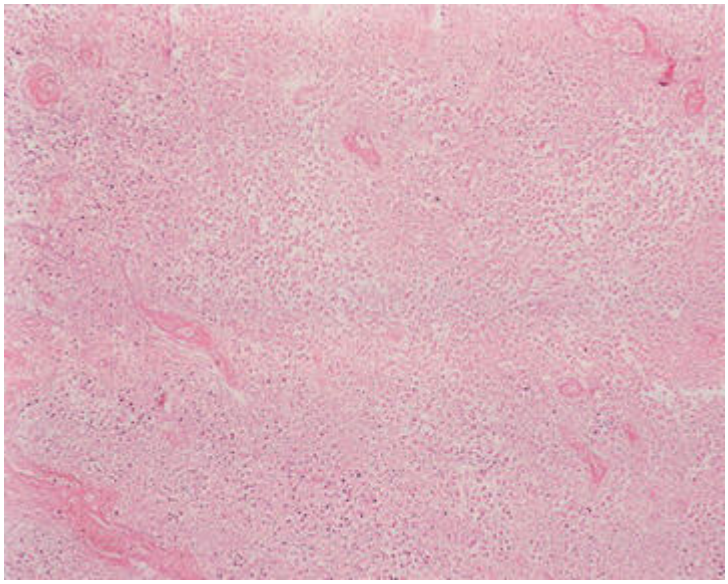
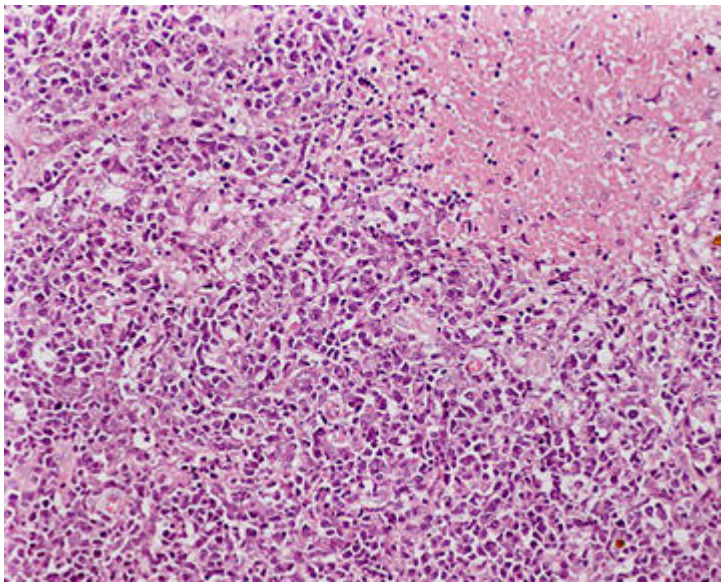


**Figure 2. Photomicrograph showing a focus of infarction associated with non-Hodgkin lymphoma (H&E stain, ×200)**



## Discussion

Lymph nodes constitute a substantial component of the immune system strategically located in various areas of the body. They serve as areas of antigen retention and a site of immunologic education and expansion of lymphocyte populations. As part of this normal function, they react to both endogenous and exogenous substances with a variety of specific morphological and functional responses.[5]

Spontaneous infarction of lymph nodes, first described by Davies and Stansfeld is a rare occurrence.[1] It is characterised by diffuse coagulation necrosis with loss of cell nuclei but, early on, with well preserved cell outlines. It has been estimated that one case of lymph node infarction will be encountered in every 450 lymph node biopsies.[3] The reason for the apparent rarity of lymph node infarction may lie in the abundance of the vascular supply and in the well- developed anastomoses. The phenomenon has been reported in association with various neoplastic and non-neoplastic conditions.

The non-neoplastic conditions associated with infarction are polyarteritis nodosa, viral infections, cholesterol atheromatous embolism, thrombosis, gold injections, intestinal volvulus, postmediastinoscopy, and mononeuritis multiplex. Hemorrhagic infarction of hilar lymph nodes has also been reported recently in association with heart lung transplantation. Some cases of lymph node infarction may occur due to vascular compromise or other undetermined causes.[6–8] Lymph node infarction may also follow fine-needle aspiration biopsy.[4]

The neoplastic lesions most commonly associated with infarction are lymphoma and metastatic tumors.[2,4] The most frequent association is with lymphoma, even when not apparent at the time of initial presentation; subsequent biopsy will reveal lymphoma in a large number of patients.[2,3,4,9–12]

The anatomical distribution of these lesions in our study is similar to the other reports showing that majority of the affected nodes were in the head and neck region.[3,9] In cases where lymphoma manifests itself subsequent to infarction, it invariably does so within 2 years.[2,3] In our patients the diagnosis of lymphoma was made concurrent to nodal infarction in two cases and within a span of 6 months in the other three cases.

Some authors have suggested a pre-lymphomatous potential of lymph node infarction but it is still a matter of debate.[2,3,11] The incidence of lymphoma in patients with infarcted lymph nodes ranges from as high as 89% to as low as 32% in various studies.[2-4] Cleary et al[2] reported the occurrence of lymphoma in 16 (89%) of 18 patients with lymph node infarction while Maurer et al[3] found the occurrence of lymphoma in 20 (39%) of 51cases. Two of the patients in the latter report developed Hodgkin's disease. These authors found a high incidence of large cell lymphomas in such patients as was also seen in three of our five cases.

The incidence of lymphoma in patients of nodal infarction in our series was 83.33% (five of the six cases). All these patients developed non-Hodgkin lymphoma; there was no case of Hodgkin's disease.

The present short series highlights the diagnostic approach in a case of lymph node infarction. The pathologist should be cautious when examining an infarcted lymph

node so as not to miss the correct diagnosis. If the cause of infarction is not apparent in the initial biopsy, the clinician should be alerted. Though all patients might not develop lymphoma, they require close follow-up and repeat biopsies to detect the subsequent development of lymphoma.

Further larger studies are needed to clarify the relationship between infarction and lymphoma.

**Competing interests:** None known.

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# Sentinel lymph node biopsy experience in Taranaki: a prospective audit in a provincial New Zealand hospital

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**Abstract**

**Aim** Sentinel lymph node biopsy has been rapidly incorporated into the management of early stage invasive breast cancer. The aim of this study was to review the adoption of sentinel lymph node biopsy at a provincial centre in New Zealand and compare markers of performance against established standards.

**Methods** The Taranaki Breast Database was created in 2002 and prospectively records data from all breast cancer patients in the Taranaki area. Data on all patients undergoing sentinel lymph node biopsy were retrieved and the results reviewed.

**Results** Between October 2002 and August 2007, 152 sentinel lymph node biopsies were undertaken in 151 patients. The initial 49 patients (training set) also underwent routine axillary clearance as part of an initial audit on the accuracy of sentinel lymph node biopsy. A sentinel node was identified in 97% of patients (93% including the training set) and a mean of two nodes per biopsy were removed. Metastatic nodal disease was identified in 40 of 152 (26%) of biopsies of which nine were micrometastases. In the training set there was a false negative rate for nodal spread of 5% (two of 40) and a 92% negative predictive value.

**Conclusions** The performance of sentinel lymph node biopsy in Taranaki is comparable to international centres. Adoption of this technique as routine may spare many Taranaki women the morbidity of axillary clearance, without jeopardising safety.

Axillary lymph node status is considered the most important prognostic factor for patients with early stage breast cancer.[1] While axillary clearance is accepted as the gold standard in detection of metastatic nodal disease, sentinel lymph node biopsy (SLNB) is increasingly adopted as an alternative approach. Early research suggests that SLNB is a reliable method of predicting lymph node status, and may spare women the morbidity associated with axillary clearance.[2,3] Nonrandomised studies of SLNB followed by axillary clearance have demonstrated that one or more sentinel lymph node can be identified in more than 90% of patients with invasive breast cancer, with a false negative rate of less than 10%.[4,5]

In an era of increasing centralisation of surgical services, little published data exists on adoption of SLNB in peripheral centres. In Taranaki, a provincial New Zealand centre, SLNB techniques have been employed since 2002. This study aims to provide a prospective comparison of SLNB in Taranaki with established standards.

## Methods

**Eligibility and study design—**All patients in the Taranaki region, with early stage operable breast cancer, confirmed histologically or radiologically, and requiring axillary staging as part of their surgical management are eligible for SLNB. Major exclusion criteria include tumour size greater than 5.0 cm in diameter, palpable axillary lymph nodes, failure to give consent, and previous axillary surgery. The initial training set (49 patients) has provided information about outcome measures. These 49 patients were included in the final data analysis (152 SLNB). Written informed consent was received from all patients prior to surgery.

**Surgery and patient management—**Sentinel node identification was performed by either the blue dye or scintigraphic techniques, or a combination, depending on surgeon preference and available equipment. All patients preparing for sentinel node biopsy received a Technetium 99 antimony colloid subcutaneous injection either the day of, or the day prior to surgery. The time between injection and surgery was at least 3 hours. Nuclear medicine staff identified the sentinel node on lymphoscintiscan and marked its location on the skin. In the operating room, 2 ml of patent blue dye in 0.5 ml aliquots were injected immediately after the induction of anaesthesia.

Prior to June 2006 four peritumoural injection sites were used both for technetium and blue dye injections (51 patients). Since June 2006, injection sites have been periareolar. SLNB was performed prior to tumour resection or mastectomy, and nodes that were hot (at least 10 times background activity), or blue were removed. Wide local excision or mastectomy was then performed in the usual manner. In a single case, the sentinel lymph node was sent as a frozen section for immediate cytological examination. This patient underwent immediate axillary clearance for a positive SLNB. If no sentinel lymph node was identified, an immediate axillary clearance was undertaken.

Patients in the training set underwent immediate axillary clearance (level I and II nodes). Patients in the non-training set underwent axillary clearance only if the SLNB was positive or not obtained. All patients were otherwise treated identically.

**The Taranaki Breast Cancer Database—**This computerised database was established in 2003 as a collaborative effort of the specialist breast care nurse, general surgical consultants, and information systems staff. It is a data storage system which categorises data on patient characteristics, risk factors, diagnostic methods, tumour characteristics, axillary status, surgical procedures, and adjuvant therapy. All patients in Taranaki with histologically or cytologically confirmed breast cancer are entered into the database on a prospective basis. Confidentiality is maintained at all times.

**Pathological aspects—**Each sentinel LN is submitted in its entirety in approximately <5 mm portions per cassette. Each cassette specimen is then sectioned into five levels (3 micron width) to be examined. One of these levels is stained with a pancytokeratin AE1/AE3, the others with haematoxylin and eosin (H&E).

## Results

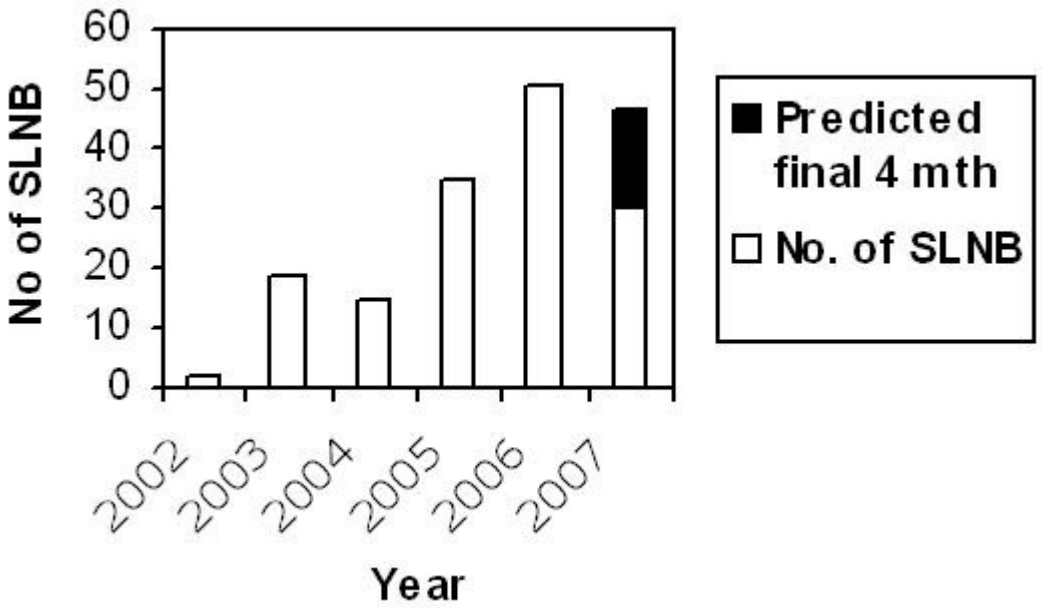
Between October 2002 and August 2007, 152 SLNB were undertaken in 151 patients. Of these, almost half were performed by one surgeon (Table 1).

### Table 1. Sentinel lymph node biopsy (SLNB) by surgeon between October 2002 and August 2007

| Surgeon | Number of SLNBs | Proportion of SLNBs |
|---|---|---|
| A | 78 | 48% |
| B | 48 | 29% |
| C | 20 | 12% |
| D | 18 | 11% |

From initiation in 2002, the number of SLNB performed per year has steadily increased. This trend seems to have reached a plateau in 2006, with around 50 SLNB per year (Figure 1).

**Figure 1. Number of SLNBs per year performed in Taranaki**




The overall identification rate for SLNB was 92.7%. When analysed separately, the identification rate for non-training cases was 97.1%, and for training cases was 83.7%, indicating a sharp increase in identification rates pre and post training. An average of 2.0 nodes per SLNB were removed, with a range of 0–15.

In 70 (46%) cases, surgical technique involved preoperative lymphoscintigraphy and intraoperative use of the gamma probe alone. In 8 (5%) cases blue dye alone was used. These cases occurred when a functional gamma probe was not available, or when nuclear medicine staff were unavailable to perform lymphoscintigraphy. In 74 (49%) cases both blue dye and lymphoscintigraphy with intraoperative use of the gamma probe were employed.

Of the 152 SLNBs attempted, 141 were successfully identified with 11 failures (7.2%). Of the 141 successful biopsies, 40 (26.3%) were positive and 100 (65.8%) negative for nodal malignancy. The positive biopsies can be further subdivided into 9 biopsies positive for micrometastases only, and 31 positive for macroscopic malignancy. One specimen was lost prior to histological examination.

The test performance measures for SNB are available for the training case data and are summarised in Table 2. They indicate a sensitivity of 75% (6 of 8), a false negative rate of 5% (2 of 40) and a negative predictive value of 92% (23 of 25). Individual surgeon test performance is demonstrated in Table 3. The lost SLN was picked up from theatre, but never arrived at the labaratory. An internal investigation was conducted but failed to locate the node.

**Table 2. Test performance measures for sentinel lymph node biopsy in Taranaki (training cases only, n=40)**

| Sentinel node status | Axillary lymph node status | | |
|---|---|---|---|
| | Cancer | No Cancer | Total |
| Positive | 6 | 9 | 15 |
| Negative | 2 | 23 | 25 |
| **Total** | **8** | **32** | **40** |

**Table 3. Individual Taranaki surgeon test performance**

| Surgeon | A § | B | C | D |
|---|---|---|---|---|
| Training cases † | 18 | 20 | 10 | 1 |
| Mentored cases ‡ | – | 5 | 4 | 4 |
| SLNB identification rate | 89% | 75% | 90% | 100% |
| SLN not identified | 2 | 5 | 1 | 0 |
| SLN lost | 1 | 0 | 0 | 0 |
| No. of false negatives | 1 | 1 | 0 | 0 |
| Positive axillary clearance | 4 | 3 | 0 | 0 |
| False negative rate (% of positive axillae) | 25% | 33% | 0% | 0% |
| False negative rate (% of total cases) | 5.5% | 5% | 0% | 0% |

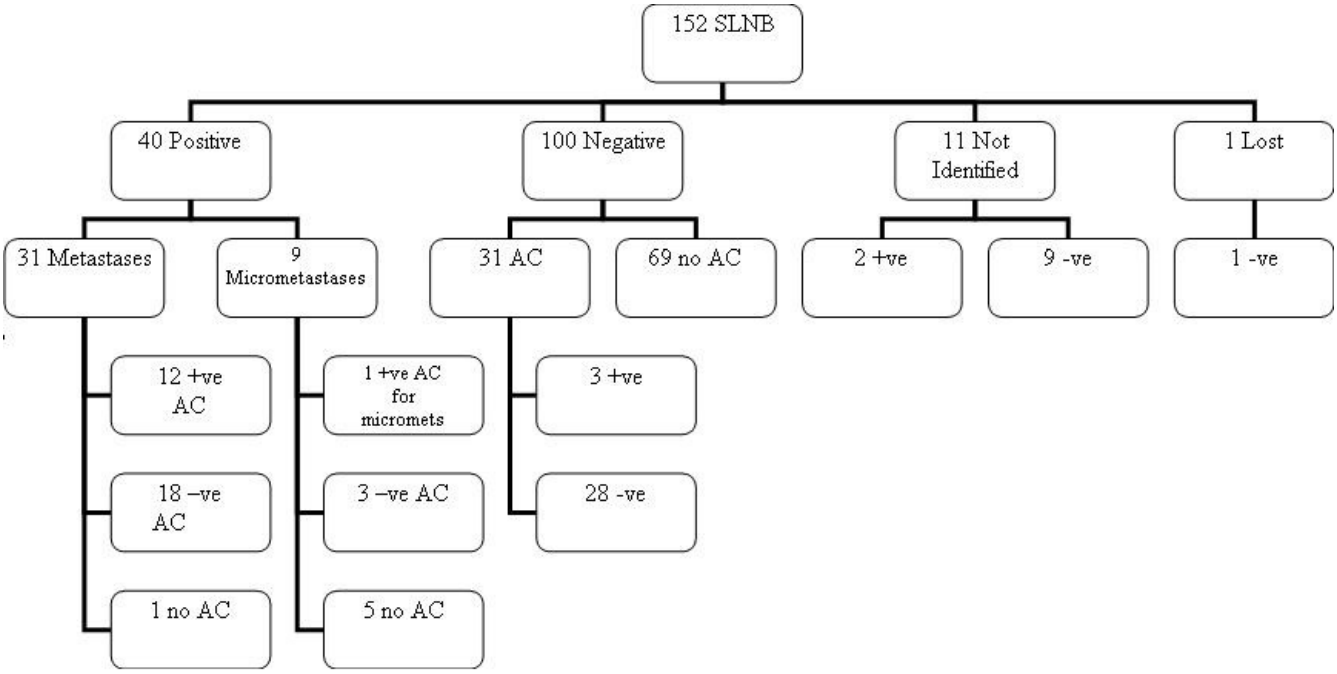
† Cases where SLNB was combined with routine axillary clearance; ‡ cases performed under mentor guidance from Surgeon A; § surgeon A attended a formal training course in 2002; SLNB=sentinel lymph node biopsy; SLN=sentinel lymph node.

Of the 152 cases of SLNB, axillary clearance was performed in 77 (50.7%). This includes the 49 training cases who underwent routine axillary clearance. The indications for axillary clearance are summarised in Figure 2. An average of 13 nodes were removed (range 1–25) with an average of 5 positive nodes (range 0–17).

Eighteen (23.4%) of 77 axillary clearances were positive: 1 for micrometastases only and 17 for invasive metastases. Results are summarised in Figure 2. One patient had a positive SLNB (two of six nodes) but declined further surgical treatment.

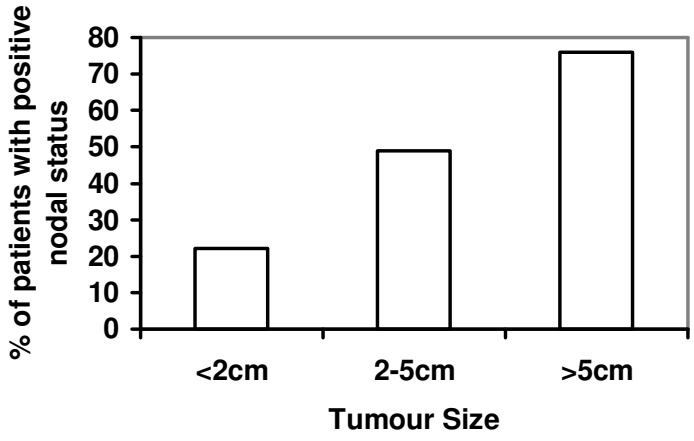
Average tumour size was 2.8 cm. 86 patients (59%) had tumours ≤2.0 cm, 57 patients (39%) had tumours >2.0cm but ≤5.0cm, and 4 patients (3%) had tumours >5.0 cm. Of the four patients with tumours >5.0 cm, all were reported to have tumours estimated at <5.0 cm in preoperative radiological reports. Increasing tumour size correlated with an increased likelihood of positive nodal status (Figure 3).

**Figure 2. Indication and results for axillary clearance performed following SLNB in Taranaki between 2002 and October 2007**




AC=Axillary clearance; SLNB=sentinel lymph node biopsy; micromets=micrometastases; +ve=positive; –ve=negative.

**Figure 3. Predicting nodal status based on tumour size**




Histology results showed a predominance of invasive ductal cell carcinoma, with or without an *in situ* component, (n=114 cases [81%]). Invasive lobular carcinoma was diagnosed in 16 (12%), ductal cell carcinoma *in situ* alone in 9 (6%). Single cases of

adenomyoepithelioma, medullary carcinoma, and invasive papillary carcinoma were also reported.

Using the modified Bloom-Richardson cytological grading system, tumour grade was reported for 147 cases. Of these, 65 (44%) were diagnosed as grade 1 tumours, 44 (30%) grade 2, and 38 (28%) grade 3.

Of the nine patients with SLNB positive for micrometastases only, six had micrometastases >0.2 mm, two had micrometastases ≤0.2 mm and one did not have size stated in the pathology report. Management of micrometastases is summarised in Table 4.

**Table 4. Management of micrometastases in Taranaki compared to American Society of Clinical Oncology (ASCO) guideline recommendations[6]**

| Patient | Size of micrometastases (mm) | Axillary clearance performed | Axillary clearance recommended |
|---|---|---|---|
| 1 | 1.5 | Yes | Yes |
| 2 | 0.9 | No | Yes |
| 3 | 0.5 | No | Yes |
| 4 | 1.5 | Yes | Yes |
| 5 | <0.2 | No | No |
| 6 | 0.28 | Yes | Yes |
| 7 | 0.6 | No | Yes |
| 8 | Size not stated | Yes | – |
| 9 | 0.2 | No | No |

**Note:** For patients 2 and 3, management decisions were made prior to the publication of ASCO guidelines. For patient 7, the decision not to proceed to axillary clearance was multifactorial, and included patient age, comorbidities, and reluctance for further surgery.

Ten patients who underwent SLNB had ductal carcinoma *in situ* (DCIS) alone on final histology results. Of these 10 patients, 6 underwent mastectomy. Of the remaining 4, 2 underwent wide local excision (WLE) for known DCIS with a possible invasive component on biopsy, and 2 underwent WLE for DCIS only on biopsy.

## Discussion

Taranaki is a provincial New Zealand centre staffed by four general surgical consultants, who serve a population of just over 100,000. All four surgeons regularly perform SLNB as part of management of patients with early stage breast cancer.

151 patients underwent 152 SLNB over a period of almost 5 years. The numbers of SLNB increased steadily over the first 3 years after introduction of the technique, and now seems to be levelling off at around 50 procedures per year. This equates to one SLNB per 2000 population.

Initial patient accrual was slow, with potential patients being managed by any of the four general surgeons who adopted the technique at differing dates throughout 2002 and 2003. The introduction of SLNB at Taranaki followed the attendance of one general surgeon, Surgeon A, at a formal SLNB training course in 2002. Adoption of the technique by the remaining three surgeons was mentored by Surgeon A.

None of the remaining three surgeons attended a formal course in the technique as recommended by the ASCO Guidelines for SLNB in early stage breast cancer.[6] However, prior research has failed to identify a statistically significant difference in false negative rates among surgeons who have undertaken a formal training course and those who have not.[7]

The use of mentoring, proctored cases and formal training in accredited continuing medical education courses is thought to reduce the personal case experience necessary to achieve optimal results, but this effect has yet to be quantified.

Accumulated data from many multi-centre trials continues to support the need to perform 20 cases of SLNB in combination with axillary dissection, or to perform 20 SLNB procedures with mentoring, as being necessary to minimise the risk of false-negative results.[5,7]

Among the four surgeons at Taranaki, the number of SLNB in combination with routine axillary clearance (AC) performed as test cases was highly variable (Table 3). Surgeons C and D, who performed fewer training cases, and did not attend formal training, are shown to have higher identification rates and lower false negative rates. However, this may represent a biased figure due to the small numbers of cases and of positive axillae for these surgeons.

There are two key parameters to successful SLNB: the successful identification rate and the false negative rate. Identification rate is defined as the proportion of patients in whom a SLN is identified and removed. For SLNB to be a useful test, it is essential that a SLN is identified in the majority (>90%) of patients. The overall successful identification rate in Taranaki is 93%. In non-training cases, the successful identification rate is 97%. This exceeds acceptable standards. It also identifies an expected initial learning curve.

The false-negative rate is defined as the proportion of patients with axillary nodal metastases who have a negative SLN biopsy. An acceptable false negative rate has been previously defined as 10% or less.[4,5] However, there is a problem with this calculation when a predetermined false negative rate of 10% is set, as there is no way of predicting the percentage of node positivity. If 25% of 40 cases are node-positive (10 cases), then a surgeon with only 1 false negative would have a false negative rate of 10%. However, a surgeon who has 50% node positivity in 40 cases (20 cases) will have the same false negative rate (10%) with 2 false negative cases.

To remove this bias, the false negative rate can be calculated as a percentage of the total number of patients rather than as a percentage of the positive axillae. This issue was addressed in the statement from the Consensus Conference Committee in Philadelphia.[8] This method of calculating false negative rate as a percentage of total cases was used in the ALMANAC trial validation phase, which assessed whether surgeons were competent to proceed to the randomisation phase.[9]

The false negative rate in Taranaki is 5% when calculated as a percentage of total cases. If calculated as a percentage of positive axillae, the false negative rate is 25%. The latter is an unacceptably high false negative rate, however (as explained above) it may represent significant bias.

A recent meta-analysis including more than 8000 patients showed that the reported false negative rate ranged from 0.0% to 29.4% across studies.[10] The false negative rate was significantly lower in the 23 studies that included >100 patients compared with the 46 studies that included <100 patients (p=0.007). Twenty-one studies (36.2%) reported a false negative rate >10%.

Janis, P et al[11] show that unobtainably large numbers of SLNB cases are required to make any reliable conclusions regarding the quality of SLNB. They calculate that it will take 750 patients with 300 tumor-positive basins to establish with 95% certainty that a surgeon who has a nonidentification rate of 5% and a false-negative rate of 5% indeed has these capabilities within a range of 0% to 7%. Therefore Taranaki's high false negative rate when calculated as a percentage of positive axillae may be secondary to bias due to small sample size and a small number of positive axillae.

We have chosen to accept the false negative rate of 5% as a percentage of total number of SLNB as a more accurate indicator of patient safety. This false negative rate is within established acceptable standards.

The inclusion and exclusion criteria for consideration of SLNB used in Taranaki may have affected test performance. In Taranaki, patients with tumour diameters up to 5.0 cm, including those with multifocal or multicentric disease, are included for SLNB. Many of the seminal reports on SLNB, including the recent Australasian Sentinel Lymph Node versus Axillary Clearance I (SNAC I) trial, only included patients with tumours <3.0 cm diameter and excluded patients with multicentric or multifocal disease.[12]

Currently accepted test performance standards, against which Taranaki's test performance measures have been compared, were set based on results from these early reports. Increasing evidence suggests that SLNB for tumours up to 5.0cm diameter (including multifocal and multicentric disease) is feasible with similar test performance measures as smaller, unifocal disease.[13,14] Indeed, the SNAC II trial, which follows on from the SNAC I trial has extended its inclusion criteria to include tumours >3.0 cm and those with multifocal or multicentric disease.

Initial reports of SLNB in breast cancer were based on a technique involving peritumoural injection of either radioactive colloid or blue dye. Subsequent experience has shown that subdermal,[15] intradermal,[16,17] and subareolar[18,19] routes of injection are associated with greater success and a comparable false negative rate to that associated with the peritumoural route. If indeed the same SLN is "sentinel" to the entire breast, then this SLN can be identified in cases of multicentric cancer by subareolar or intradermal injection.

Several small nonrandomised series in which such a approach was evaluated have demonstrated that the test performance of SLNB in multicentric or multifocal disease is similar to that for women with unifocal disease, suggesting that the technique can be applied in this setting.[20–22] Taranaki has chosen to include tumours up to 5.0 cm diameter and those with multifocal or multicentric disease for consideration of SLNB based on current literature. Although this may have affected the test performance measures, evidence suggests that including larger or multicentric tumours should not effect these.

Sentinel lymph node biopsy technique in Taranaki may have also affected both identification and false negative rates. There is now a substantial amount of evidence suggesting that the use of blue dye and radioactive colloid in combination as opposed to either method on its own, increases identification rates while minimising false negatives.[6,23] In Taranaki, the majority of SLNBs were performed using a single method only. Although this does not appear to have adversely affected the identification rate, it may be a contributing factor to the high false negative rate.

It remains unclear whether isolated tumour cells or micrometastases represent an adverse prognostic indicator and whether AC should be carried out on all cases. Likewise, there is insufficient data to determine whether the presence of isolated tumour cells or micrometastases should be a factor in treatment decisions. McCready et al[24] suggest that metastasis is found in nonsentinel nodes in approximately 10% of patients with isolated tumour cells in the SLN and in 20–35% of patients with micrometastases in the SLN.

Some studies have demonstrated an adverse effect on survival in patients positive for micrometastatic disease, others have not.[25–27] The definition of micrometastases and detection methods throughout the literature have varied. There are no clear New Zealand guidelines on the management of axillary micrometastases in patients with early stage breast cancer. ASCO guidelines recommend routine AC in patients with micrometastases >0.2 mm but ≤2.0mm until further studies are completed.[6]

Definitive data from randomised trials is needed to decide if axillary dissection is needed when the SLN is positive. Two large prospective clinical studies, NSABP-32 and American College of Surgeons trial Z0011, are hoped to definitively resolve questions regarding the optimal surgical management of patients positive for micrometastases and isolated tumour cells.[28,29]

In Taranaki, all patients are discussed at a multidisciplinary meeting involving surgical, oncology, radiation therapy, and radiology specialists and further management decisions are made based on current evidence in association with individual patient factors.

Another area of ambiguity is the use of SLNB in patients with a histological diagnosis of DCIS alone. A positive SLN has been reported in 6% to 13% of patients with DCIS.[30] Although it is well established that nodal status for invasive disease is prognostically important, the clinical relevance of a positive SLN in patients with DCIS remains undetermined.

New Zealand guidelines for the use of SLNB in DCIS are inconclusive. ASCO guidelines recommend considering SLNB for patients with DCIS when a mastectomy is indicated or when immediate reconstruction is planned, as axillary staging by SNB is essentially impossible if an invasive tumour is found.[6] Although an invasive component will subsequently be found in 10–20% of cases diagnosed by core biopsy as DCIS alone, they do not recommend SLNB for patients with DCIS undergoing breast conserving surgery. However, some experts argue that SLNB in patients with DCIS undergoing breast conserving surgery will help identify those with unrecognised invasive disease, and suggest that SLNB in those with high grade, or large areas of DCIS is warranted so as to avoid a second operation on the axilla if invasive cancer is found.[27]

Size >4 cm has been shown to be a predictor for invasive breast cancer in patients with an initial diagnosis of DCIS alone.[31] In Taranaki, treatment was in accordance with ASCO guideline recommendations in all but two cases of DCIS who underwent SLNB. In those two cases, the area of DCIS histologically was 40 mm and 50 mm respectively, indicating a high risk of unrecognised invasive disease. Management of both cases was discussed at the multidisciplinary team meeting.

The performance of SLNB in Taranaki is comparable to international centres. This is despite a lack of statutory training requirements. This article highlights the need to adhere to recommended protocols when introducing a new technique in order to provide non-biased test performance measures. In the case of SLNB, this involves at least 20 cases either followed by routine axillary clearance, or with mentor supervision. For cases of micrometastases and ductal carcinoma *in situ*, further evidence is required to determine optimal management.

Adoption of SLNB in early stage breast cancer as routine in Taranaki has been achieved with results equivalent to internationally established standards. This may spare many Taranaki women the morbidity of axillary clearance, without jeopardising safety.

**Competing interests:** None known.

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# Functional outcome of surgery for fractures of the ankle

Keith Winters

**Abstract**

**Background:** Ankle fractures are a common injury treated in New Zealand with variable functional outcomes.

**Methods:** Details of all patients undergoing operative fixation of malleolar fractures at Hutt Hospital were obtained from theatre databases for a 12-month period. These patients were then followed up after 1 year for clinical review and asked to complete a questionnaire.

**Results:** Sixty-two patients enrolled in the study: 27 men and 35 women. Average OMA score 16 months after surgery of 79.4. Weber A fractures averaged ankle function score 90.0, Weber B fractures 80.8, and Weber C fractures 76.3. Two patients (3%) reported 'poor' results, 11 (18%) reported 'fair' results, 29 (47%) gained 'good' results, and 20 (32%) attained 'excellent' results. Functional outcome was worse in the elderly.

**Conclusion:** Patients who sustain ankle fractures have significant functional impairment even after 1 year.

Operative fixation of ankle fractures make up almost a third of the orthopaedic trauma workload at Hutt Hospital. In 2006, over 2500 patients were hospitalised nationwide with ankle fractures, and it remains the third most common fracture presenting in public hospitals in New Zealand.[1] Management of these injuries usually follow the guidelines of the AO Group, who recommend open reduction and internal fixation of all fracture-dislocations.. Despite this, patients still suffer from significant morbidity which impacts on their work and lifestyle.

## Methods

This retrospective study was performed to evaluate the functional outcome of patients following surgery for ankle fractures. All patients who underwent operative fixation of ankle fractures between June 2001 and June 2002 were eligible to participate. The names were obtained from the theatre logbook and admission records. All the operative records, follow-up clinic notes, and radiographs were reviewed. The information gathered included patient demographics, the type of fracture sustained, the cause of the injury, the surgeon involved, and operating times. The fracture type was based on the AO (ASIF) Muller Classification, and was divided into A, B, or C depending on where the fibula was fractured.

Patients were excluded if they were less than 16 years old, if the fracture was more than 10 days old, or if the fracture involved the tibial plafond.

The enrolled patients were then assessed in fracture clinic after 1 year and asked to fill out a questionnaire based on the ankle scoring system of Olerud and Molander[3] (OMA). There are nine questions: the first three deal with primary complaints like pain, stiffness, and swelling; the next four questions cover the ability to perform simple tasks, like stair-climbing, running, jumping, and squats; and the final two concern the patient's situation in everyday life, like returning to work and the use of ankle supports.

Points were allocated depending on the answer to generate a total score. A score of 91–100 was considered 'excellent', 61–90 'good', 31–60 'fair', and less than 30 'poor'. The author found that this system correlated favourably with the patient's own subjective evaluation on a linear analogue scale, as well as with radiographic and clinical findings on follow-up.

The information was entered into a Microsoft Excel spreadsheet and analysed with the Kruskal-Wallis test using Epi-info by the Public Health Department at Wellington Medical School. The results were considered statistically significant if $P<0.05$.

## Results

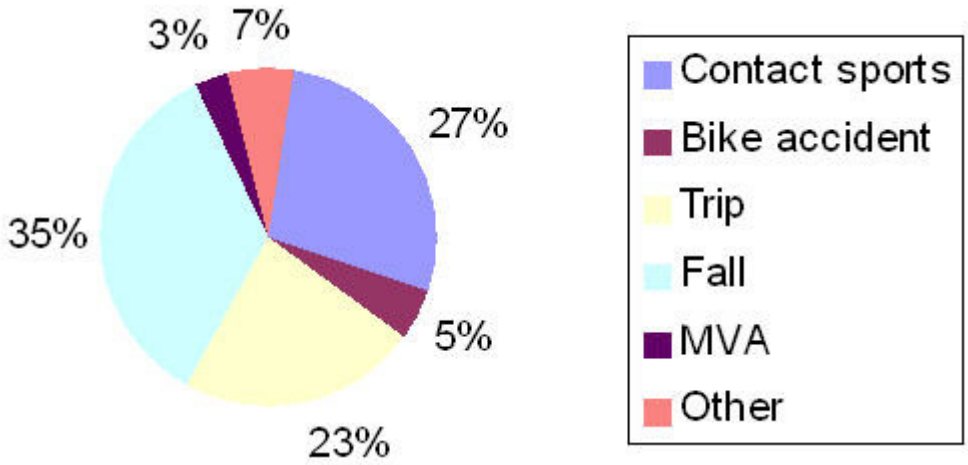
A total of 67 patients were initially included in this study but 5 were lost to follow-up thus leaving 62 for review. Of those lost to follow-up, 2 could not be contacted despite best efforts through their addresses stated on the hospital database, electoral mailing list, or through their family doctor. One died and 2 were visitors to New Zealand at the time of injury.

The average time for follow-up was 16 months (range from 11 to 18 months).

Of the remaining 62 patients surveyed, 27 were men and 35 women. The mean age was 40.7 years with a range of 16 to 85 years. The mean age of the women was over a decade higher at 46 years compared with 33.8 years. There were 48 (77.4%) Caucasians, 11 (17.7%) Polynesians (Māori and Pacific Islanders), and 2 (3.2%) Others.

The single most common cause of ankle fracture was tripping while walking or running (22 cases), followed by 17 from contact sports like rugby, and 14 after a fall from a height. Motor vehicle and biking accidents and miscellaneous group made up the remaining 9 cases. (Figure 1)

**Figure 1. Cause of ankle fracture injury**




MVA=motor vehicle accident.

The OMA scores are displayed in Table 1. The overall OMA score was 79.4 (range from 25 to 100).

Men averaged OMA scores of 83.3 compared to the female average of 77.7.

When the patients were separated into four age groups, scores were found to be higher in the young adults with OMA scores of 92.4 and lower in the retirement group with an average score of 54.3.

**Table 1. Demographic information**

| Variables | Number | % | OMA score mean | SD | P value |
|---|---|---|---|---|---|
| **Sex** | | | | | 0.11 |
| Males | 27 | 43.5 | 83.3 | 20.5 | |
| Females | 35 | 56.5 | 77.7 | 19.8 | |
| **Age** | | | | | <0.0001 |
| 15–30 | 23 | 37.1 | 92.4 | 10.6 | |
| 31–45 | 19 | 30.6 | 82.6 | 13.4 | |
| 46–60 | 6 | 9.7 | 85.7 | 6.5 | |
| >60 | 14 | 22.6 | 54.3 | 20.9 | |
| **Ethnicity** | | | | | 1.00 |
| Caucasian | 49 | 79.0 | 79.7 | 21.0 | |
| Polynesian* | 11 | 17.7 | 81.4 | 18.5 | |
| Others | 2 | 3.2 | 85.0 | 7.1 | |

*Comprising Māori and Pacific Islanders.

There was no significant difference in OMA score between sexes and ethnicity. The score did deteriorate with advancing age, and was significant to a p value less than 0.0001.

Three major fracture types were identified (Table 2). AO B fractures were the most common injury undergoing surgery with 38 cases, followed by AO C with 19 cases, and AO A with 5 cases (Figure 2). Weber A fractures had the best OMA score with an average of 90, although all three fracture types had a ‘good’ outcome.

**Table 2. OMA scores of fracture types**

| Fracture type | Number | % | OMA score mean | SD | P value |
|---|---|---|---|---|---|
| AO A | 5 | 8.1 | 90.0 | 12.2 | |
| AO B | 38 | 61.3 | 80.8 | 18.8 | |
| AO C | 19 | 30.6 | 76.3 | 23.9 | |
| | | | | | 0.05 |

Overall, 79% of patients achieved a ‘good’ to ‘excellent’ outcome; all patients with AO A fractures, 81.6% of AO B fractures, and 68.4% of AO C fractures achieved a ‘good’ to ‘excellent’ outcome.

The outcome for fracture types is displayed in Figure 3. Two patients had a ‘poor’ outcome, 11 patients a ‘fair’ outcome, 29 patients a ‘good’ outcome, and 20 reported an ‘excellent’ outcome.

**Figure 2. Fracture type undergoing surgery (N=62)**

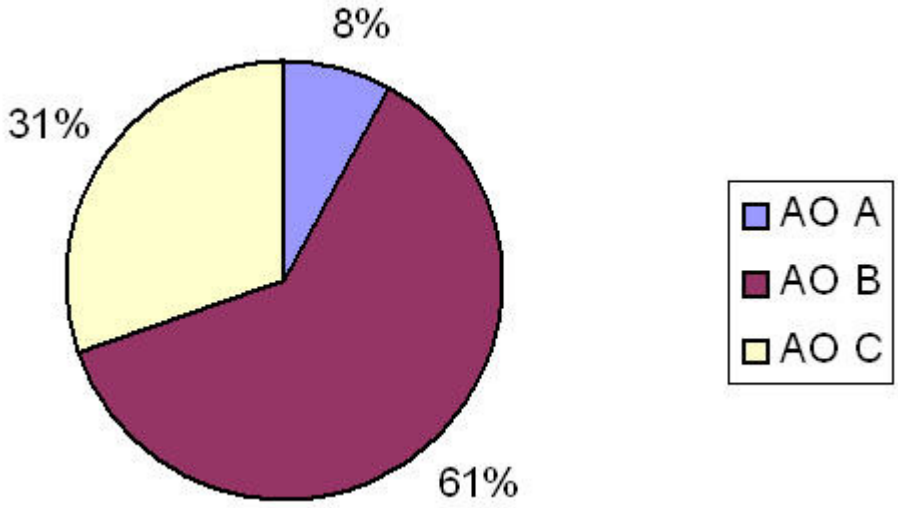
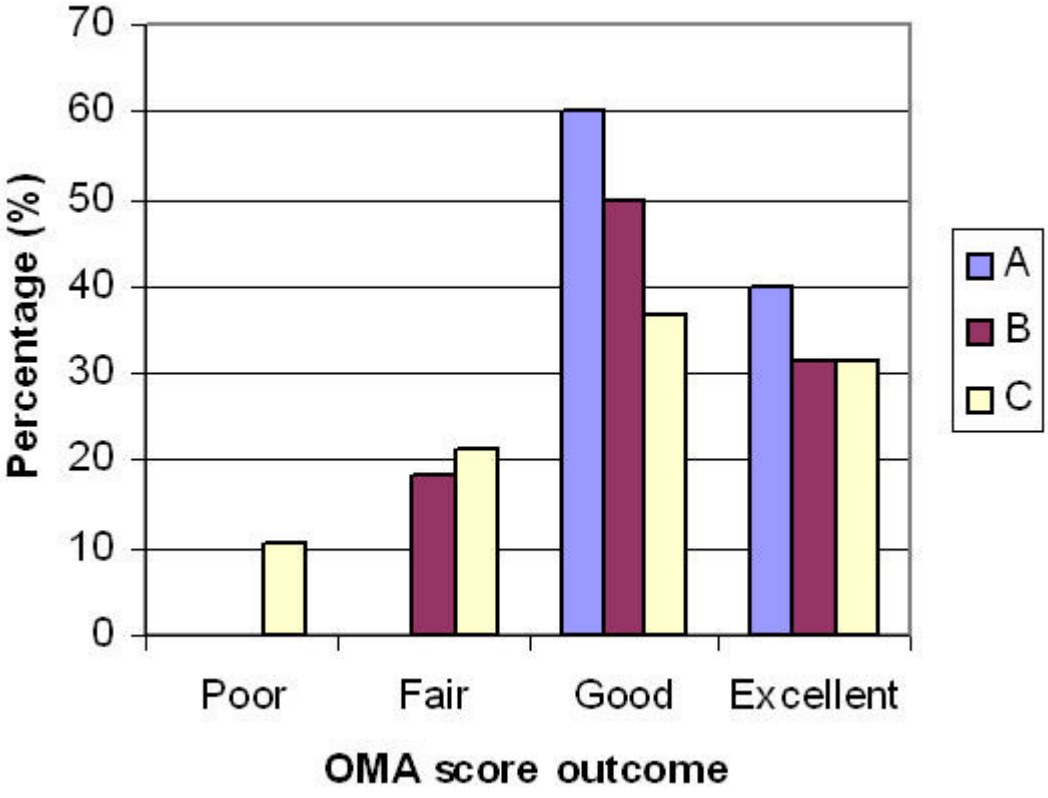



**Figure 3. Function outcome for the different fractures**




Fifteen of the patients had a diastasis screw inserted. Nineteen or 30.6% of the patients had some hardware removed prior to the assessment.

## Discussion

It is widely accepted that operative fixation of unstable ankle fractures yields predictably good outcomes. The aim of surgery is to reduce the talar dislocation and anatomically reconstruct the ankle mortise. This usually follows AO principles and involves plating of the fibular and screw fixation of the tibial malleolar fractures. An additional diastasis screw is often employed if the syndesmosis is disrupted.

Danis and Weber[2] classified ankle fractures according to where the fibula was fractured in relation to the syndesmosis. The force required and therefore severity usually increases as one progresses down the classification system from Weber A to C. This was certainly supported by our findings, with a statistically significant decrease in the OMA score.

In this study almost 80% of patients achieved a 'good' to 'excellent' outcome. This compares favourably with other studies reviewed, which reported 'good' to 'excellent' results in 53–87% of cases.[4–9] These studies used different ankle scoring systems, so the results may not be directly comparable however.

Interestingly, similar numbers of men and women suffered ankle fractures, and their perceived functional outcome was no different. However men presented over a decade earlier. This is hardly surprising, as they have a higher involvement in contact sports and are more likely to take risks.

The study also showed the elderly did poorly following an ankle fracture. The OMA scores were almost half of those of the young adult, even when adjusted for fracture type. Pagliaro and Michelson reported higher complications and poorer functional outcome in the geriatric group. These findings may relate to increased comminution and poor bone quality affecting accurate reduction or the existence of pre-morbid osteoarthritis.

**Competing interests:** None known.

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# The validity of readmission rate as a marker of the quality of hospital care, and a recommendation for its definition

Juliet Rumball-Smith, Phil Hider

**Abstract**

**Aim** To perform a review of relevant literature regarding the use of readmission rate as a marker of the quality of hospital care, summarise its validity, and recommend a definition for its use.

**Methods** Literature search was performed on the Embase and Medline databases, with relevant articles extracted and reviewed.

**Conclusions** Readmission rate as a marker of the quality of hospital care has been used both internationally and nationally, although its validity has only been partially substantiated. While prone to confounding, it remains a valuable indicator due to its ease of collection and its ability to be able to be combined with other variables. Although the definition of readmission rate varies in the literature, it may be defined as 'the number of patients who experienced unintended, acute readmission or death within 30-days of discharge from the index admission, divided by the total number of patients discharged alive within the reference period'.

The need for quality assessment and improvement in the health care system has gained increasing significance both internationally and in New Zealand.[1] Numerous criteria exist for evaluating quality in hospital services, using various indicators, including readmission rate. This rate reflects the impact hospital care has had on the patient's condition up to the point of discharge, and also represents the efficiency of the service; inpatient hospital care being a primary source of expense in the health system, and repeated admission representing a potential source of wasted resources.[2]

Readmission rate is collected easily by hospital information systems, and can readily be combined with information from other databases to assess the potential impact of different variables, and control for confounders.[3] However, there is no agreed definition of readmission rate in the literature, with researchers and states employing multiple time periods, and failing to acknowledge subjects who died following discharge.

## Methods

A literature search was undertaken on the Medline (1966–2008) and Embase (1988–2006) databases. Search terms included: 'quality of health care', 'quality indicators, health care', 'patient readmission', 'readmission', 'rehospitalisation', 'readmit$', 'new zealand'. Searches were limited to English language material and articles with abstracts available.

## Discussion

**Quality in health care—**Quality in health care may be defined as 'the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge'.[4p4]

Campbell maintains that quality can be viewed as having two simple domains, suggesting that quality of care for an individual can be defined as 'whether individuals can *access* the health structures and processes of care which they need, and whether the care received is *effective*'.[5]

However, the emphasis placed on the quality of health care by the medical profession, the consumer, and the state, is relatively recent. Adverse events and incidents of 'quality failure' are now widely publicised. Consumers may have higher expectations of the health care they receive, and be less trusting of their provider to deliver error-free care. Health care providers need to account for resources and ensure value and efficiency of services. Funders also want to ensure that providers are meeting their expectations, and are performing adequately compared to others.

**Readmission rate as an indicator of the quality of health care—**Quality indicators are only one of the tools in the 'quality toolbox', but are indispensible in the assessment, monitoring, and improvement of the quality of patient care. Quality indicators explored in the literature include hospital multi-stay rate, length of inpatient stay, hospital mortality rates, and complication rates.[6,7]

The Maryland Hospital Association's Quality Indicator Project use over 15 measurable, discrete performance indicators upon which value can be placed to describe quality.[7] The wider international community has embraced the concept of quality monitoring; hospital accreditation programmes feature in over 36 countries using various indicators to ensure a minimum standard of quality.[8]

Readmission rate has been used as a quality indicator in various psychiatric, surgical and medical clinical specialties.[9–11] It is popular as a quality indicator amongst researchers and management, for the following reasons:

- Some early readmissions are avoidable. The proportion of preventable readmissions is widely variable in the literature, ranging from 5% to 50%, however it is agreed that the readmission rate includes a significant fraction of events of ill-health that could have possibly been avoided.[12–16] Thus, the rate represents an opportunity for savings in both dollars and time, as well as the obvious benefit to the individual.[11] One early study discovered that 13% of the inpatients in the United States use more than half of all hospital resources through repeated admissions.[14]
- It is data that is routinely collected by most hospitals and can be compared within and between institutions. This makes it a relatively easy, fast, and inexpensive indicator to calculate.
- Ability to be part of multivariate analysis. The combination of readmission rate and ethnicity for example, may highlight groups that are represented disproportionately and allow the development of hypotheses. Readmission rate may be able to be analysed by residential address, presence of lifestyle risk factors, or place of work. There is significant potential for future research in this area.[3]
- It is an indicator that 'transcends the inpatient wall'[17p68], and provides information about standards of care provided during the admission. It assumes that provided the patient had appropriate care while admitted, was discharged

in a stable condition, and had access to outpatient treatment and resources, readmission would not occur.[9,18]

**Validity of readmission rate as an indicator of the quality of hospital care—**Are those who are readmitted more likely to have experienced lower quality care? And conversely, are those who receive substandard care more likely to be readmitted?

Ashton et al. performed a significant meta-analysis of 29 comparative studies, including both hospital chart and database analyses, and in each study, process-of-care elements were examined in relation to 31-day readmission rate. The authors classified the datasets according to these elements, denoting the quality of care received as being either 'substandard', 'normative' or 'exceptional', when compared to accepted clinical standards of care.

After review of 13 studies, an odds ratio of readmission of 1.24 (95%CI 0.99–1.57) was calculated for those patients who received substandard as opposed to normative care. Sixteen studies were assessed to calculate a summary odds ratio comparing care of relatively low quality ('substandard' and 'normative' classification) relative to care of higher quality (studies classified as 'exceptional') was 1.55 (1.25–1.92), representing an increased risk of early readmission of between 25%–92% for those who experienced lower or normative quality of care.

This article represents substantial evidence for the validity of this indicator, yet is limited by the relatively few studies used to develop the odds ratios. However, this reflects the criteria for inclusion defined by the authors, such that the studies assessed were ostensibly homogeneous and provided robust results.[16]

Further information can be gained from cohort studies and case-control studies. Weissman et al reviewed over 1700 admissions in a case-control study, assessing the rate of 31-day readmission for patients hospitalised with pneumonia and congestive heart failure in four states of the US-trained physicians reviewed clinical records and compared the care delivered to patients subjectively, and against explicit clinical criteria. They discovered there were 'significant but relatively small, differences in initial quality of care between patients who subsequently experienced related adverse readmissions and those who were not readmitted'.[19p500], findings that were present after control for demographic and clinical variables, and hospital characteristics. Ashton also performed a case-control study of over 2000 patients who had diabetes, obstructive lung disease or heart failure, reviewing quality of inpatient care and 14-day readmission rate.

Chart review was used to ascertain quality of care, according to specified process-of-care criteria. After adjustment for demographic variables and clinical severity, they discovered a similar significant association between substandard care and subsequent unplanned readmission. This study was conducted within US Veterans Affairs Hospitals, and as such may not be able to be generalised to patients who experience financial restrictions in access to hospital care.[20]

However, there are few studies that have examined the second question, the issue of 'false negatives' in the calculation of readmission rate. This proportion represents those that receive substandard care, but due to other factors (such as death, or recovery) are not readmitted. This data is very difficult to extract, as they do not enter again into the hospital recording system, and it may be difficult to access information

about the health of those in the community. Although many studies ignore the contribution of these false negatives to the validity of the readmission rate, it must be acknowledged that the validity of the rate has not been proven in this respect.[21]

There are other threats to the internal validity of this rate. Given that the rate is made up of a numerator (those that are readmitted to hospital within a given time period) and a denominator (total number of patients discharged alive within a reference period), intervening variables, confounders, demographic, and clinical factors may impact on both these figures.

Intervening variables can be defined as those that are 'interposed in time in the causal sequence between the proposed independent and dependent variables'.[18p1539] The most significant intervening variable for readmission rate is death in the community within the reference period, as a result of substandard care.

The impact of this variable is two-fold. Firstly, these patients are technically not eligible to be readmitted, so the overall denominator used to calculate readmission rate is artificially inflated by these absent subjects. Secondly, a patient that receives substandard care but dies in hospital or the community, or has a longer initial admission due to this quality breach, will not change the readmission rate despite substandard care.[13]

A confounding factor is defined as 'a third variable that indirectly distorts the relationship between two other variables'.[22] The literature discusses the following confounding factors with regards to readmission rate:

- **Disease progression:** Despite optimal care, deterioration of clinical condition will increase readmission rate. In some studies, disease progression is further investigated, and readmissions due to this factor coded as 'unpreventable' and excluded from analysis.[23]
- **Post-discharge care:** The quality of community care acts as an 'inverse confounder', in that readmission may be prevented by exceptional community care and vice versa.[24] Discharge destination may also impact on the rate: for example, hospice patients are likely to be discharged 'early', and are unlikely to be readmitted.[24] Patients who reside in nursing homes may be less likely to be readmitted as health care is more accessible.[18,25]
- **Readmission hospital:** Readmissions may occur at other hospitals and be missed from the numerator.[18]
- **Ability to pay:** Uninsured patients may be more likely to be discharged prematurely in health systems where there is a personal financial cost to hospital care. Similarly, different payment schemes, such as stay-based reimbursement systems may act as confounders by providing incentives to decrease length of stay but increase the number of admissions.[18]
- **Self-discharge:** Subjects who leave hospital against medical advice cannot be assumed to have completed the treatment protocol as designed by their health professionals, thus may leave the hospital in a lesser clinical state from that intended.[18]

- **Demographic variables:** Age, ethnicity, marital status, gender, and socioeconomic status may influence readmission rate. Whilst Ashton and Wray (1996) are not convinced these factors have been proven 'confounders', preferring to call them 'moderator variables', numerous studies have investigated the implication of individual patient variables such as age [26; 27], gender [27; 28], and even personality [29] on readmission rate.
- **Clinical variables:** These factors have a greater effect on readmission rate than their demographic counterparts. Different disease processes are associated with higher risks, with diagnoses such as heart failure and diabetes increasing the risk of readmission, and medical patients being more likely to be readmitted than surgical subjects.[28] Similarly, an increasing number of comorbidities and worsening severity of initial illness are associated with an increased risk of readmission.[18,30] The recurrence of chronic medical conditions, and worsening functional status also act to increase readmission rate.[15,27]

The external validity of a quality indicator refers to its generalisability; its ability to yield comparable results over time, and at homogeneous but differing institutions. The public acceptance of the validity of readmission rate is demonstrated by its broad use. Governments and private health purchasers such as US company Blue Cross Blue Shield use it as an indicator of quality.[31] The New Zealand Ministry of Health has recently added readmission rate to its performance monitoring project.[32] However, while these institutions may use the rate to detail trends over time and monitor progress, there is limited external validity due to the multiple definitions of readmission rate employed among institutions and researchers.

## Definition of readmission rate

**'Readmission':** Chambers and Clarke define readmission as 'the next subsequent admission of a patient as an immediate (that is, emergency or unplanned) admission … within a defined interval of a previous (index) discharge taking place within a defined reference period'.[33p301] Ashton and Wray (1996) recommend obtaining information on the frequency of death after discharge, and state that the preferable outcome variable is "death at home or readmission within n days". If death is the worst possible result of poor quality care, then those subjects who die within the time period should be included as part of the readmission indicator. In practice, the number of these patients is small and may change the overall indicator by a negligible amount only. However, if they are not included in the analysis then the result may be biased and produce an indicator that is an under-estimate. Accordingly, it is advised that the indicator be revised to 'readmission or deaths' of subjects within the specified time period.

**Population:** The rate is calculated by dividing the numerator ('readmissions') by the 'corresponding number of patients discharged (alive) within the reference period'.[33p301]

**Time period:** Researchers in quality have employed various time periods over which readmission may occur, with intervals of between 2 weeks and 12 months used.[34] As mentioned above, this variation threatens the external validity of this indicator, and makes comparison between institutions and populations difficult.

This author recommends the use of a 30-day time period:

- A rapid review examining Medline studies in the last 10 years relating readmission rate as an indicator of quality noted that of 74 studies that defined the readmission rate in the abstract, 43% used a 1-month time period. The second most common period was 1 year or greater (19%), although these studies tended to be reviewing specific outcomes from treatment interventions.
- The 30-day or 1-month period has been used by the government bodies of Canada, Australia, the United Kingdom, and New Zealand, to assess the quality of their health services.[22,35–37]
- Analyses of the timing of readmissions demonstrate an early peak within a few weeks of discharge, which tapers off over subsequent weeks and months. Tsai et al (2001) observed that 45.7% of readmissions occurred within 5 days of discharge.[38] Thus, the time period needs to be long enough to include all the information from this peak, but not so extensive that it includes data from admissions unrelated to the quality of the index stay.
- Heggestad states that a longer time frame is associated with the inclusion of higher numbers of 'false positives', or unrelated admissions.[34] Given the numerous factors that can impact on readmission rate, it is logical to choose a shorter time frame to minimise the influence of issues such as disease progression. Theoretically, if readmission rate is an indicator of quality of inpatient care, then the longer the time frame, the less meaningful the relationship between the two admissions. It is logical to formulate a definition that includes the data from the early peak of readmissions following discharge, but encompasses the minimum of readmissions that may be unrelated to quality issues. Some authors recommend using a 60-day interval to yield the highest possible capture of preventable readmissions, however, this must be balanced against an increasing false positive rate.[34,39]

The general consensus of the literature seems to be that a one-month time period provides a logical balance.[14] This assumption is supported by another common indicator used to address inpatient quality, 30-day mortality rate.

## Conclusion

This literature appraisal was intended to provide background information on this indicator, as such this article does not offer the same quality of information as a systematic review. However, the review notes that 'readmission rate' has some demonstrated internal validity and is widely used in the measurement of the quality of hospital care. It is important to recognise the limitations of this measure, and minimise the influence of possible confounding variables by way of methodological and statistical techniques. Similarly, the adoption of a consistent definition of this rate by researchers will add to its external validity and improve its generalisability. This author recommends the use of the following definition: 'the number of patients who experienced unintended, acute readmission or death within 30-days of discharge from the index admission, divided by the total number of patients discharged alive within the reference period'.

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# Acute care surgery: can New Zealand afford to wait?

Savitha Bhagvan, Ian Civil

**Abstract**

Until about two decades ago, the provision of emergency surgery was implicitly linked to all aspects of surgical care in all surgical specialties. While this remains true in the smaller surgical specialties, in the larger specialties the development of subspecialisation has eroded the comprehensive nature of acute care provision. In general surgery, the numerically largest of the nine surgical specialties, the greatest challenges in provision of acute care exist. Availability of appropriately trained general surgeons to deliver generic acute and trauma care has reached crisis point. An attempt is being made in the Western World to remedy these problems. Recognising that it is increasingly difficult to span the knowledge and skill mix necessary to manage all aspects of acute care in general surgery as well as a subspecialty practice, the concept of acute care surgery has been born.

To look at the status of acute care surgery in Australia and New Zealand, we conducted a PubMed search on all articles matching the words *emergency*, *acute care*, and *general surgery*, and reviewed any papers relevant to Australasia. Of the 270 papers found, 4 papers were relevant to Australia and New Zealand. These studies outline the advantages of an acute care model in dealing with emergency surgery and delineate few disadvantages. Whether a new training paradigm, "acute care surgery" will benefit patients, the health services, and the surgeons in New Zealand and elsewhere remains to be seen. Allowing the current trend towards inadequate numbers and training of surgeons to deliver acute care to continue is unacceptable.

William S Halsted, the creator of modern surgical training said, "Every important hospital should have, on its resident staff of Surgeons, at least one who is well and able to deal…with any emergency that may arise…".[1]

Until about two decades ago, the provision of emergency surgery was implicitly linked to all aspects of surgical care in all surgical specialties. While this remains true in the smaller surgical specialties, in the larger specialties the development of subspecialisation has eroded the comprehensive nature of acute care provision. In general surgery, the numerically largest of the nine surgical specialties, the greatest challenges in provision of acute care exist. Availability of appropriately trained general surgeons to deliver generic acute and trauma care has reached crisis point.[2]

Over the last century, the advancement of medical science has expanded the knowledge of disease such that it is no longer possible to know "everything about everything". Additionally, the conflicting demands of audit and medicolegal pressure and the relatively generous nature of reimbursement for elective subspecialised operative procedures have meant that acute care has become increasingly unattractive.

Apart from the physical demands of acute care, the difficulties in maintaining professional skills in broad acute care (including trauma) have increased significantly

over recent years. Development of techniques like laparoscopy and sentinel node sampling have required surgeons to spend considerable time(at the expense of time and effort available for maintaining broad general skills and expertise) training in new techniques that have developed since they obtained Fellowship. As surgeons subspecialise, it is therefore natural for them to be less inclined to provide treatment outside their area of expertise.

With a busy elective subspecialised practice surgeons become increasingly reluctant to provide general on call cover. Emergency calls interfere with their regular schedule, cut into their elective operative time and increase the chances of litigation when complications arise. To avoid disruption of elective operating, there is a tendency for emergency surgery to be put off until after hours, resulting in limited nursing and anaesthetic staff having to cope with the problems of delayed treatment of sick patients.

Any delay in treatment has obvious adverse effects on patients' outcome. Their length of stay is increased which leads to cancellation of elective lists due to lack of hospital beds. Delay also results in some conditions such as acute diverticulitis and cholecystitis becoming more emergent whereas they could have been dealt with relatively easily in the semi-urgent setting.

Compounding these effects which relate to surgical subspecialisation there is a shortage of surgical workforce. A survey by the Royal Australasian College of Surgeons found that one-third of current active Fellows expected to retire from active emergency call work in the next 5 years (1120 Fellows) and 76% of this group were also intending to retire from operative practice in the next 5 years (852 Fellows).[3] Internationally there has also been a steady decline in the number of applicants for surgical training.

Not only is there an absolute shortage of surgical workforce occasioned by an increased workload and early retirement, there is also a relative workforce shortage due to the implementation of safe working hours. This leads to a vicious cycle of providing inadequate care to both elective and emergency surgical patients.

An attempt is being made in the Western World to remedy these problems. Recognising that it is increasingly difficult to span the knowledge and skill mix necessary to manage all aspects of acute care in general surgery as well as a subspecialty practice, the concept of acute care surgery has been born. In some countries this development has been linked to the increasingly non-operative nature of general trauma surgery and the availability of subspecialty-trained trauma surgeons with an inadequate case load.

Trauma surgery has lost much of its glory of the post-war and baby-boomer eras and has become predominantly a non-operative specialty, even in countries like the United States (US) where there was previously a substantial penetrating trauma case load and its associated operative work. Better automobile safety, decreasing interpersonal violence and use of interventional radiology to control bleeding has led to decreased operative experience for trauma surgeons—with orthopaedics, neurosurgery, and radiology more involved in the active treatment of the patient.

A survey of operative experience of surgeons practicing in Level I and II American College of Surgeons verified trauma centres in the US revealed that more than a half

of the trauma directors at 79 Level I facilities performed less than 50 trauma operations per year and more than 70% of the other trauma panel surgeons performed even fewer operations per year.[4]

Trauma surgeons, who are trained to work with limited resources on critically injured patients, are seen as doctors who make decisions during resuscitation and critical care, who work antisocial hours, and operate less.[5] This has led to dissatisfaction among trauma surgeons, a fact not lost on young trainees. Utilisation of trauma surgeons' training in the treatment of acute non-traumatic surgical emergencies would be practical.

The integration of emergency general surgery with trauma varies throughout the world. Europe is a heterogeneous region where there is little uniformity as to who provides emergency surgery.[6] Many hospitals have adopted a model of emergency and trauma surgery and others are trying to change to comply with European Union guidelines.

The situation in the US is guided to a large extent by insurance and malpractice issues. There, more acute patients are being referred to tertiary centres due to lack of patient insurance. The rate of litigation is increased with complications and this in turn is increasing the insurance premium for surgeons. There is a reluctance to decrease revenue generating elective practice to provide acute services. To counter this, the American College of Surgeons has proposed a curriculum for training of acute care surgeons which involves a surgical residency followed by a 2-year fellowship.[7]

The trainees are expected to rotate in orthopaedics, neurosurgery, trauma, critical care, and vascular surgery. These surgeons are expected to provide basic emergency care in these sub specialities. Although this appears to be a practical solution to the problems of treating acute surgical emergencies in the US, it needs to be critically analysed to see if it would translate to better patient care in other areas of the world.

Issues relevant to accreditation for provision of orthopaedic and neurosurgical treatment, transfer of care to other specialities for more definitive management of injuries, and continuity of care need to be resolved. The training of acute care surgeons in this model should not interfere with the training of orthopaedic, neurosurgical, or general surgical trainees.

The workforce shortage and resource constraints in Australia and New Zealand with regard to emergency surgery are more pronounced.[8] The dilemmas facing emergency surgical care and indeed trauma care in Australia and New Zealand and the rest of the world are also very different. The concept of trauma surgery as a specialty has not been as widespread here as in the US and most abdominal trauma surgery is performed by general surgeons on call.

To look at the status of acute care surgery in Australia and New Zealand, we conducted a PubMed search on all articles matching the words emergency, acute care and general surgery, and reviewed any papers relevant to Australasia. Of the 270 papers found, 4 papers were relevant to Australia and New Zealand.

In 2005, Treacy et al[9] audited the results of general surgeons providing emergency neurosurgical treatment at Royal Darwin Hospital. Between January 1992 and June

2004, 305 neurosurgical procedures were performed which included craniotomies, burr holes, frontal lobectomies, elevation of fractures, and ventricular drains. Their outcomes for extradural haematomas (EDH) and chronic subdural haematomas (SDH) were comparable to international standards. Their worst outcome was with acute SDH and intracerebral haemorrhage. Worst outcomes were also associated with delay of more than 4 hours to treatment, lower Glasgow Coma Scale score, and worse Acute Physiology and Chronic Health Evaluation (APACHE) and Simplified Acute Physiology (SAP) scores.

Although there is no mention of the training and seniority of the surgeons involved in these cases, the authors conclude that it is reasonable for general surgeons to undertake emergency neurosurgical procedures, when access to a neurosurgical unit is remote. This model of acute and trauma surgery has some similarities with the US model and clearly has a role when the provision of specialty services is remote.

Professor Michael Ardagh (Emergency Medicine Specialist at Christchurch Hospital) authored a paper in the *New Zealand Medical Journal*[10] regarding an acute care strategy for New Zealand. Even though the paper took an Emergency Medicine perspective, it has some relevance to general surgery. Of the various principles outlined by Ardagh to improve the quality of care, providing appropriate staffing and resources was key.

At the RACS Annual Scientific Congress in Christchurch, 2007,[11] Parasyn et al presented a paper on the acute care surgical service provided at the Prince of Wales Hospital, Sydney. A roster of eight general surgeons was constructed to provide emergency surgical care, with a dedicated theatre and a ward with four beds.

Patient data and theatre utilisation was prospectively collected and compared between 52 weeks with this service and 52 weeks without. They found that the theatre utilisation during the day increased from 55% to 70% after introduction of acute care service. There was a 15% reduction in acute operating after hours. There was more efficient use of theatre with high staff satisfaction. To date this has been the most organised study analysing the feasibility of acute care surgery in Australia and New Zealand.

Michael Hollands has also analysed the possibility of combining acute care surgery and trauma surgery.[5] He emphasised the similarities between trauma and acute non-trauma surgical emergencies. Both groups of patients have multisystem problems and both require surgeons with a wide variety of operative skills; the ability to make appropriate decisions is crucial in both areas.

By combining the two branches, Hollands emphasised the provision of adequate operative experience to trauma surgeons and utilisation of their ability and training to care for acute surgical patients. Hollands emphasised the need for adequate training and also stressed the importance of group practice with good handover of the patients at the end of the shift. This model also provides guaranteed time off work for educational and other non-clinical activities.

The definitive test for feasibility of acute care surgery is its success in clinical application. Regrettably there are very few studies relevant to this regard. A study looking at an acute care surgery model in the treatment of acute appendicitis was conducted in University of Pennsylvania, which showed that there was a statistically

significant improvement in the delivery of care for these patients.[12] An audit of an emergency surgical care model in the University of California showed shorter Emergency Department stay, improved patient satisfaction, improved professionalism and resident supervision and overall quality of care.[2]

This latter study also showed that the waiting period for appendicectomy was reduced. Although both these studies are in small patient populations and are limited by various factors, they do show a trend towards better quality of patient care.

Unfortunately there is not much in the literature on the downside of developing a discipline of acute care surgery. Most descriptions of the problems that might be faced are more relevant to the US system. The American College of Surgeons is facing stiff resistance from the other specialities regarding incorporating orthopaedics, vascular surgery, and neurosurgery into acute care surgery. It is felt that considerations of service infrastructure, resident staffing, and the decreased role of community hospitals have not been adequately explored.[13] The benefits of this new branch are perceived to be accrued at the cost of individual time and investment in recruiting additional faculty.[14]

The problems faced in Australia and New Zealand for the introduction of acute care surgery are of a different nature. Here, initiatives have been limited to acute general surgical emergencies, without other speciality involvement. The problems of litigation and insurance are not as major a factor in patient management but the difficulties involved in credentialing surgeons in multiple specialities is just as real. However the problems that exist in the delivery of acute surgical services are significant and demand a solution. The provision of 24-hour emergency surgical and anaesthetic cover with adequate ancillary services like ICU and radiology is important.

Training in acute care surgery is provided to all trainees but maintenance of those skills requires support and incentives. In smaller hospitals, there is a recognised need for the “rounded” specialist and the surgeon is likely to be a generalist and maintain those skills. In larger hospitals there is a greater likelihood that generalized skills are not maintained and emergency services suffer both in quality and quantity of delivery.

The current crisis in emergency and trauma care is not acceptable. Many potential solutions are possible but all require that attractiveness of the positions to be reflected in training opportunities, lifestyle, practice environment, and reimbursement.

Whether a new training paradigm, “acute care surgery” will benefit patients, the health services and the surgeons in New Zealand and elsewhere remains to be seen. Allowing the current trend towards inadequate numbers and training of surgeons to deliver acute care to continue is unacceptable.

**Competing interests:** None known.

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# Multiphasic cerebral demyelination

John W Young, John N Fink

Acute disseminated encephalomyelitis (ADEM) is a disorder of central nervous system demyelination. Unlike multiple sclerosis (MS), ADEM is considered a monophasic illness. However recurrent episodes of ADEM are more common than previously thought.[1] These patients meet accepted diagnostic criteria for clinically definite multiple sclerosis[2,3] but defining recurrent episodes of ADEM as MS is controversial.

We present a case of recurrent demyelination and discuss differences between ADEM and MS.

## Case report

A 23-year-old Caucasian woman presented, without prior illness, to another hospital in April 2002 with a 2-week history of headache, nausea, urinary dysfunction, progressive leg weakness, and numbness. Examination revealed bilateral ankle clonus and moderate leg weakness in a pyramidal distribution. Tendon reflexes were symmetrically brisk in the legs with extensor plantar responses. Sensation was impaired up to a level consistent with T6. The cerebrospinal fluid (CSF) contained 142 white cells per microlitre, 80% lymphocytes, protein 1.29 g/L, glucose 2.8 mmol/L, and oligoconal banding.

CSF cytology and polymerase chain reaction (PCR) were negative for tuberculosis, herpes simplex, varicella zoster, and enterovirus. Serological investigations were normal. Spinal and cerebral magnetic resonance imaging (MR) reported T2 hyperintensity in the upper thoracic cord and both thalami.

She was diagnosed with transverse myelitis and administered oral dexamethasone. Four weeks later she developed nausea, nystagmus, and ataxia. Spinal MRI reported resolution of the high thoracic cord lesion. Cerebral MRI reported extensive bilateral T2 hyperintensity involving putamina, caudate nuclei, thalami, white matter of cerebral and cerebellar hemispheres, midbrain, pons, and medulla. (These outside MR images are not available).

She was diagnosed with acute disseminated encephalomyelitis and administered intravenous methylprednisolone. Her symptoms resolved but 2 weeks later her nystagmus returned with headache and deteriorating vision. She was administered oral prednisolone with a 6-month tapering course.

When reviewed at our hospital in July 2002 her only neurological deficits were right optic disc pallor, mild weakness of right hip flexion, and mild urinary urgency.

She remained well until January 2005 when she presented with the first of five further episodes of neurological disturbance (Table 1). In October 2006 her neurological deficits were bilateral optic disc pallor, mild increase in lower limb tone, mild left

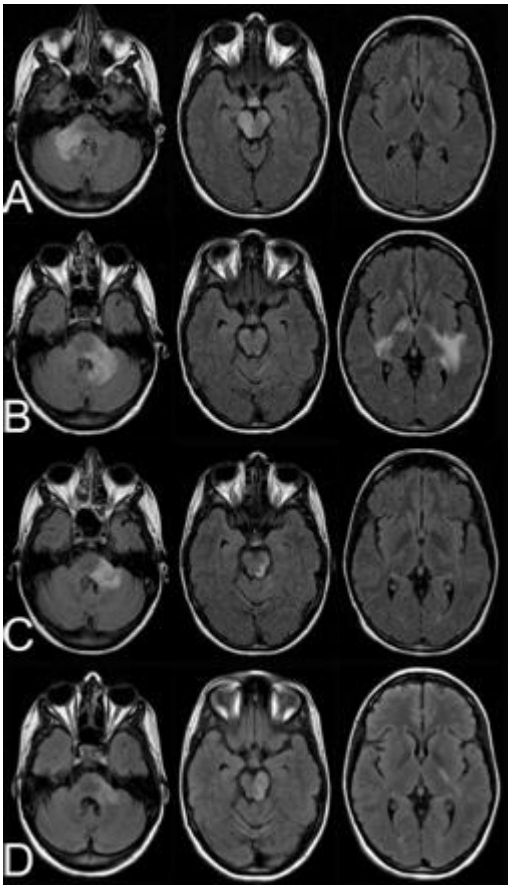
sided cerebellar incoordination, and incomplete bladder emptying requiring intermittent self-catheterisation.

Cerebral MRI scan performed at our hospital are presented (Figure 1). Visual evoked potentials in June 2006 demonstrated a right latency of 118.6 msec and a left latency of 157.3 msec (<113.0 msec).

**Table 1. Summary of clinical presentations with recurrent CNS demyelination**

| Date | Symptoms | CSF protein g/L | CSF glucose mmol/L | White cell count (% lymphocytes) | Oligo clonal bands |
|---|---|---|---|---|---|
| April 2002 | Headache, nausea, paraparesis, sphincter dysfunction, T6 sensory level | 1.29 | 2.8 | 142 (80) | +ve |
| May 2002 | Nausea, ataxia, nystagmus | 0.6 | | 36 (100) | |
| June 2002 | Headache, nystagmus, visual impairment | 0.3 | 2.1 | 22 (100) | |
| January 2005 | Facial sensory change, ataxia | | | | |
| February 2005 | Headache, nausea, ataxia, bilateral optic neuritis, bilateral INOs, paraparesis | 0.94 | 2.6 | 30 (87) | –ve |
| December 2005 | Headache, nausea, ataxia, paraparesis, sphincter dysfunction, lethargy | | | | |
| May 2006 | Headache, bilateral optic neuritis, facial sensory change, lethargy | 0.56 | 3.1 | 6 (100) | –ve |
| August 2006 | Headache, ataxia, vertigo | | | | |

**Figure 1. Serial cerebral MRI; FLAIR sequences, transverse plane**




**(A)** January 2005: bilateral asymmetric hyperintensity in the cerebral peduncles, pons and right cerebellar peduncle. No gadolinium enhancement.

**(B)** February 2005: resolution of the right cerebellar peduncle abnormality with the development of diffuse abnormality in the left cerebellar peduncle and pons and diffuse abnormality of the deep white matter of the posterior temporal lobes extending into the internal capsules.

**(C)** December 2005: persistent abnormality of the left brainstem with resolution of the cerebral white matter abnormality.

**(D)** May 2006: more abnormality in the left cerebral peduncle and posterior limb of the left internal capsule.

## Discussion

ADEM is a predominantly monophasic demyelinating illness associated with antecedent illness or vaccination.[4] There are increasing reports of further demyelinating events after initial ADEM; in one series 21% of patients experienced a second event.[5]

The terms recurrent (RDEM) and multiphasic (MDEM) were proposed for patients with more than one episode of ADEM.[6] RDEM is defined as repeated demyelination reproducing the original clinical syndrome and MDEM as bouts of demyelination anatomically different from the initial episode. Patients with MDEM have two neurological events disseminated in time and place and would also meet Poser and McDonald diagnostic criteria for clinically definite MS.[2,3]

Contributing to the confusion is the difficulty in differentiating ADEM from the first demyelinating event of MS. However patients with ADEM commonly have a preceding infection and prominent fever, headache, meningism and alteration of consciousness.[4,5]

Bilateral optic neuritis can be a feature of ADEM but is uncommon in MS.[4,7] CSF examination in ADEM often demonstrates a lymphocytic pleocytosis with transient oligoclonal banding and may not be helpful.[5,7] MRI lesions of ADEM tend to be larger and more confluent, affect grey as well as white matter, and have poorly defined margins compared with the sharp margins of MS plaques.[7,8]

Follow-up imaging often demonstrates resolution in the appearance of the initial lesions of ADEM.[8] To distinguish between MDEM and MS a recent consensus statement identifies ADEM by the prerequisite of encephalopathy, as defined by behavioural change or alteration in consciousness.[9] Lethargy was a feature of some of our patient's recurrences but not documented as part of her original presentation.

This case highlights an area of controversy within recurrent demyelinating disease. It cannot be assumed that disease-modifying treatment for relapsing-remitting MS will be effective for MDEM and further study in this area is required.

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THE NEW ZEALAND MEDICAL JOURNAL
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# A rare complication of wireless capsule endoscope

Esra Venecourt-Jackson, Ishy Maharaj

As a novel investigative tool, the introduction of wireless capsule endoscopy (CE) less than a decade ago has already proven to be a major milestone in gastrointestinal (GI) medicine. It is the most major breakthrough since flexible endoscopy first made possible direct visualisation of the upper and lower GI tracts more than three decades ago. However the small intestine remained the "dark zone" of the GI tract until CE finally opened it to direct visualisation.

As with any new investigative tool, the indications for capsule endoscopy have gradually broadened, and so has knowledge about its limitations, contraindications, and complications with increasing worldwide utilisation. This case illustrates a rare complication of capsule endoscopy.

## Case report

A 72-year-old Caucasian female was admitted to North Shore Hospital, Auckland in January 2007 with malaena and a low haemoglobin. She was on maintenance treatment with warfarin (since 2005) for cardiac disorders which included ostium primum and ostium secundum atrial septal defects repaired in 1991, a St Jude's mitral valve placement in 2005 for severe mitral regurgitation, paroxysmal atrial fibrillation, and sick sinus syndrome with pacemaker insertion in 2003. Her other regular medication included frusemide, cilazapril, spironolactone, aspirin, and pantoprazole. She was investigated for intermittent dysphagia involving the upper oesophagus in November 2006 when barium studies demonstrated a Zenker's diverticulum.

Gastroscopy performed the day after admission excluded a source of bleeding in the upper GI tract. The endoscopist noted the presence of a Zenker's diverticulum and of a hiatus hernia. No cause for GI bleeding was found at colonoscopy performed a few days later but transported blood was found in the colon, pointing to bleeding from the small bowel. The presence of diverticula was noted. Intermittent bleeding persisted, requiring repeated blood transfusions. Therefore capsule endoscopy was performed. However no images were demonstrated when the study was analysed, indicating that the capsule had not entered the small bowel.

Subsequent X-rays of her chest and neck demonstrated that the capsule had in fact lodged in the Zenker's diverticulum. Attempted endoscopic removal of the capsule was unsuccessful. The capsule was removed a few days later under general anaesthesia by an ENT surgical team. Repeat CE after endoscopic placement of the capsule into the duodenum was offered but she declined because she had concerns about the possibility of lodgement lower down in the GI tract. CT enteroclysis was therefore performed but failed to demonstrate any pathology to explain her obscure GI bleeding. Fortunately she thereafter stopped bleeding spontaneously and bleeding has not recurred for over a year since discharge from hospital.

**Figure 1. Barium swallow study showing Zenker's diverticulum**

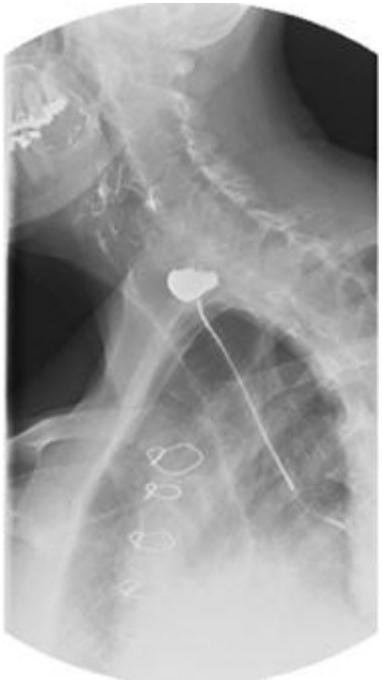
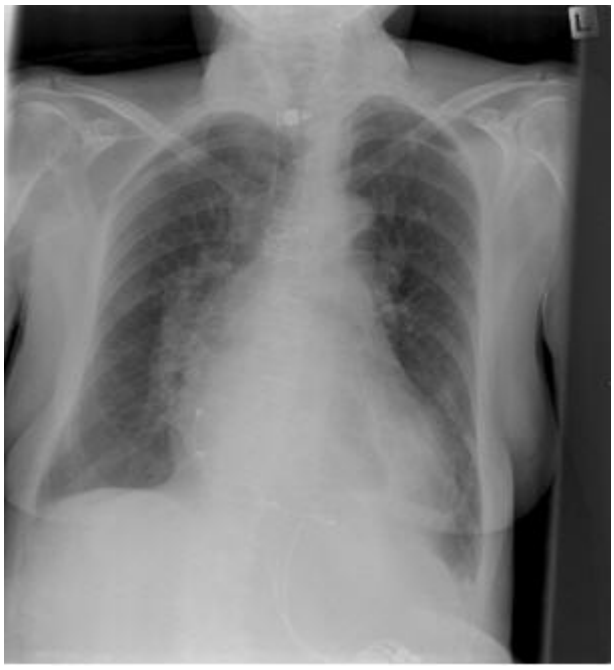


**Figure 2. Chest X-ray showing capsule lodged in Zenker's diverticulum**



## Discussion

While obscure GI bleeding remains the principal indication for capsule endoscopy, it is proving to be useful in the diagnosis and follow-up of varied gastrointestinal disorders, especially small bowel Crohn's disease.[1] Other indications include detection of small bowel tumours, surveillance for tumours in patients with familial adenomatous polyposis and Peutz Jeghers syndrome, diagnosis of coeliac disease, gastroesophageal reflux disease, and Barrett's oesophagus since the introduction of PillCam ESO, site of bleeding in patients with portal hypertension in whom gastroscopy is normal, and imaging of the colon (with the development of PillCam colon).

Progressive technological refinement, longer battery life and rising worldwide utilisation are some of the factors leading to increased sensitivity and accuracy of diagnosis using this new tool. At the same time there has been a parallel increase in knowledge about the contra-indications and complications of this procedure.

The main contraindication for capsule endoscopy is suspected or known gastrointestinal obstruction or stricture.[2] Other contraindications include motility disorders (achalasia, intestinal pseudo-obstruction) and swallowing disorders. Relative contraindications are cardiac pacemakers and implanted cardiac defibrillators (although there is some information about the safety of CE in patients with these cardiac devices—see ref 3 and 4).

Patients with higher risk of capsule retention include those with chronic NSAID use, extensive Crohn's disease, abdominal radiation injury, prior major abdominal surgery, and prior small bowel resection.

A very rare complication of capsule endoscopies is aspiration into the bronchial tree. Less than 10 cases have been reported so far. The average risk of capsule detention is 0.75%, the risk in suspected Crohn's disease 1%, known Crohn's disease 5%, obscure GI bleeding 1.5%, and suspected small bowel obstruction 21%.[5]

This case illustrates a rare complication of capsule endoscopy, namely capsule retention in a Zenker's diverticulum. A literature search indicates that this is the first documented case of this complication in New Zealand.

A few reports are documented from other parts of the world. A case in Minnesota USA[6] describe a 73-year-old man with a history of symptomatic Zenker's diverticulum was investigated using capsule endoscopy. Unfortunately the capsule became lodged in the diverticulum. It was removed endoscopically and reinserted using an over-tube placed in a Savory dilator, thus allowing the study to be completed.

In a letter to the editor[7] the issue of whether Zenker's diverticulum is a contraindication for wireless endoscopy was addressed. The authors also presented a case of a 73-year-old female in whom the capsule became lodged in the Zenker's diverticulum. They also recommended that in these patients endoscopic guidance should be employed to place the capsule directly into the stomach using a conventional endoscope and a polypectomy snare.

Another case was recorded in Norway[8] of a 74-year-old female undergoing capsule endoscopy as investigation for melaena and severe iron deficiency anaemia. As she was known to have a 3 cm Zenker's diverticulum, the capsule was fixed to the outside of a paediatric endoscope using an external polypectomy snare. The capsule was then passed into the stomach, confirmed by retroflexed viewing.

The risk of retention in the oesophagus could be minimised by making efforts to exclude swallowing and motility disorders. If suspected, these disorders should be investigated before capsule ingestion is attempted.

In the upper GI tract, capsule retention can occur at the cricopharyngeus, bronchial tree, Zenker's diverticulum, peptic stricture of the oesophagus, achalasia, oesophageal-jejunal anastamosis, pylorus, and duodenal bulb. In patients suspected or known to have these disorders, endoscopic placement of the capsule beyond the stomach will allow this valuable tool be used in individuals with these relative contraindications. Similarly the risk of capsule retention in the small bowel could be significantly reduced by use of the AGILE Patency capsule prior to performing PillCam endoscopy in patients with possible stricture and/or bowel obstruction. This capsule will dissolve if retained in a stricture or will be deformed or fragmented when excreted if it has passed a stricture. PillCam passed uneventfully in patients in whom the AGILE Patency was excreted intact.

This simple procedure helps physicians determine that the PillCam capsule will pass down the gastrointestinal tract without being retained.[9] Recent studies of the AGILE patency procedure demonstrate positive predictive value of 100% for confirming free passage of the PillCam capsule.[9,10]

## Conclusion

Capsule endoscopy is an exciting new tool in the investigation of the GI tract. With increasing worldwide utilisation, indications for capsule have broadened steadily since it was first introduced for the investigation of obscure GI bleeding and so has awareness of possible contraindications and complications, techniques to decrease the risk of these complications, and methods of dealing with them should they occur.

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# Acute gastric dilatation and bilateral parotid swelling

Ramesh Pandey, Abrar Maqbool, Narayana Jayachandran

## Clinical details

A 32-year-old lady presented to the emergency department moaning in pain. She complained of sudden onset severe abdominal pain 2.5 hours after eating her evening meal. She was nauseous but had not vomited. Her bowels had opened earlier in the day and her last menstrual period ended 5 days earlier.

On examination, she was emaciated, body mass index (BMI) 15, and in severe distress. Her abdomen was significantly distended and tense (Figure 1). She was also subsequently noted to have significantly swollen but non tender bilateral parotid glands. Investigations revealed hypokalaemia (2.3 mmol/L), hypochloraemia (93 mmol/L), and metabolic alkalosis (bicarbonate 45 mmol/L).

A computer tomography (CT) scan of her abdomen revealed a markedly distended stomach (10cm×20cm×36cm) extending from the diaphragm to just above the pubis (Figure 2); no obvious gastric outlet obstruction was demonstrated.

**Figure 1. A lady with acutely distended and tense abdomen secondary to massive gastric dilatation**

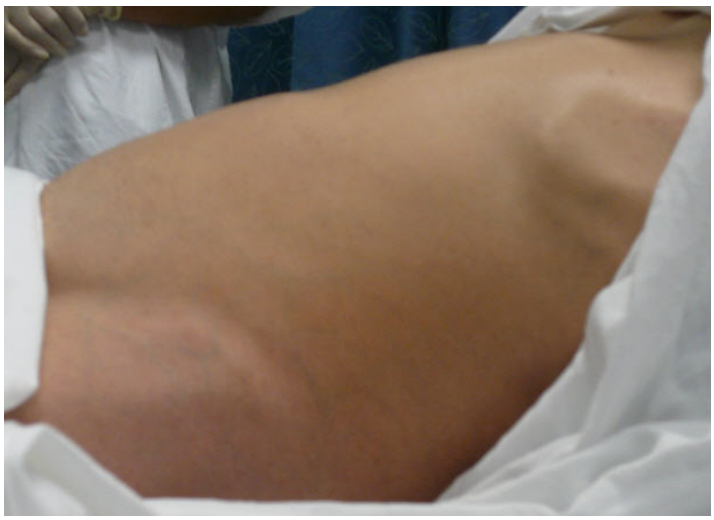
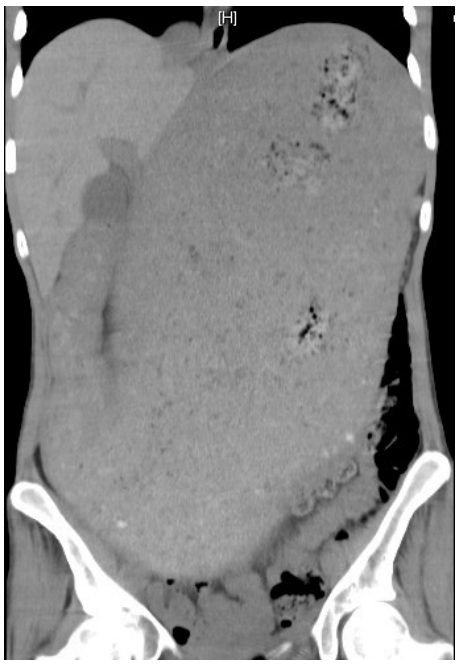


**Figure 2. CT scan showing the massively dilated stomach extending from below the diaphragm to above the pubis**




*What is the diagnosis?*

## Answer

*Massive gastric dilatation secondary to a binge episode in bulimia nervosa.*

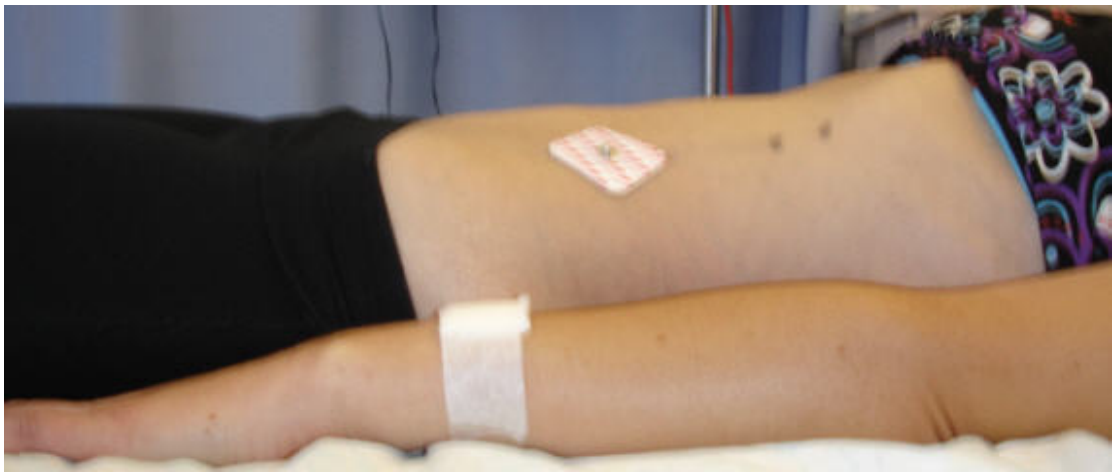
She was fasted. A nasogastric (NG) tube was inserted and over 3L of opaque yellow fluid was aspirated in total. Her stomach distension resolved (Figure 3). Her hypokalaemia was corrected via intravenous (IV) potassium supplementation.

She had a number of clinical and biochemical features associated with bulimia nervosa (BN). She also had a past medical history of BN.

## Discussion

Non tender bilateral and sometimes unilateral parotid swelling is a known complication of BN. A high index of suspicion may avert a laparotomy. Close medical monitoring and psychological intervention is required to prevent a recurrence.

**Figure 3. Abdominal distension resolved after conservative management**



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# A familiar syndrome

Rahmi Cubuk, Nuri Tasali

## Clinical details

A 25-year-old lady presented with pain and a focal swelling on the right anterior wall of the thorax. She was admitted to the orthopaedics clinic and the physical examination showed no additional abnormality.

A magnetic resonance imaging (MRI) scan was performed, with fat-saturated T2-weighted coronal and axial images taken (Figure 1A, 1B).

**Figure 1A**

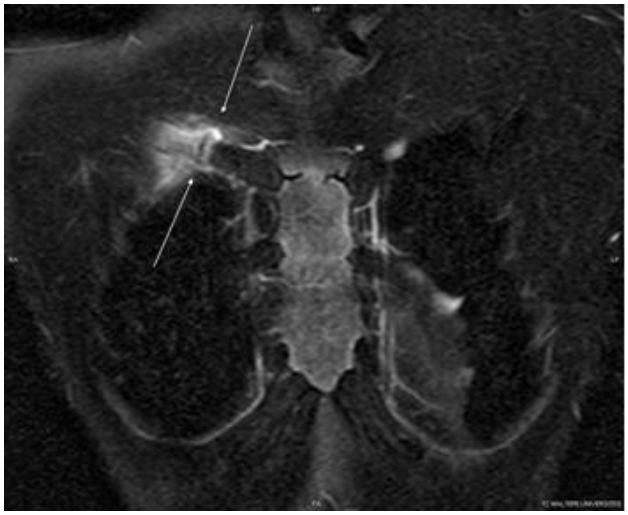
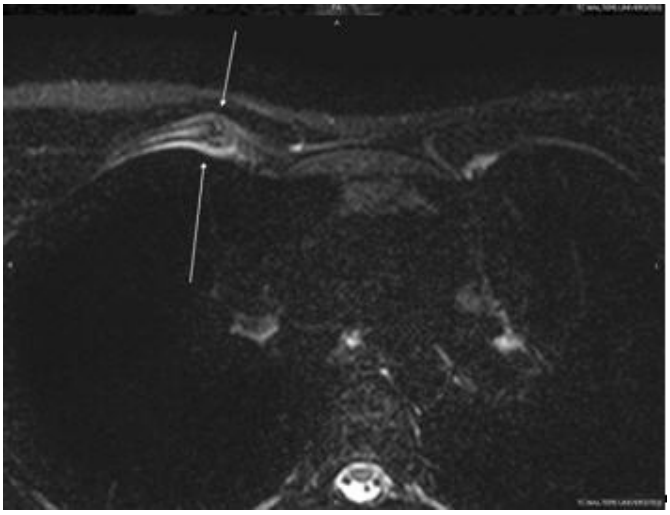


**Figure 1B**



*What is the diagnosis?*

## Answer

There are periarticular inflammatory changes on fat-saturated T2-weighted coronal (Figure 1A) and axial (Figure 1B) MR images (arrows). There were no sign of articular or bony destruction except from the focal bone marrow oedema close to the articular surface.

The diagnosis of costochondritis of the second costochondral joint (*Tietze's syndrome*) was made.

## Discussion

Tietze's syndrome is characterised by isolated swelling and tenderness of a costochondral junction. Although the aetiology of the disease is unknown, it has been suggested that recurrent microtrauma of the anterior chest wall may be implied in the development of characteristic degenerative changes involving single or multiple upper costochondral junction.

The syndrome described by Tietze has been more commonly found in older people than previously reported and it seems to be no sex or side prevalence. Because of the benign nature of this disease and its excellent prognosis, the treatment is usually symptomatic.

The disease generally resolves in 12 weeks. However, it can often be a chronic condition. Pain is often exacerbated by respiration.

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# New Zealand Medical Journal Discussion

*Published in NZMJ 1909;7(29):15–17.*

Dr. Talbot drew attention to the frequency with which papers, which had never been read before a meeting of a Division or of the Branch, were published in the Journal. It was felt that occasionally papers were written by members merely with a view of advertising themselves, and if those papers were not read before a meeting there was little or no opportunity for criticism. But apart from that aspect, the reading of a paper before a meeting was usually followed by an interesting discussion, which in turn tended to an increased interest in the work of the Association. He had been instructed by the Canterbury Division to bring this matter before the meeting, and would presently move a resolution, embodying the views of his Division.

Dr. Stevenson (Canterbury) thought a Division should be given some opportunity of expressing its opinion of a paper before it was published, otherwise there might be a danger of worthless papers appearing in the Journal.

Dr. Guinness (Auckland) thought the question of what papers should be published and what should not might very well be left to the discretion of the Editor.

Dr. J. B. Purdy (Wellington) said some of the papers which were not read might be of great value to the Editor. In England papers were censored before they appeared in the Journal.

The President was of the opinion that the question of publication could safely be left in the hands of the Editor. It was somewhat premature, he felt, to set a limit to the publication of papers, when the Editor's chief cause of complaint was that there were not sufficient papers coming forward.

Dr. J. W. Williams (Gisborne) pointed out that if they adopted a hard and fast rule that every paper must be read before publication, members in isolated districts would be precluded from sending anything to the Journal at all, although they might have some very interesting material to contribute.

Dr. Talbot said if members in outlying districts would send their papers to the Secretaries of their Divisions, they could be read and discussed before publication. He desired to compliment the Editor upon the efficient manner in which the Journal had been conducted since it had been under his charge.

On the motion of Dr. Talbot, it was resolved: "That it be a recommendation to the Editor that papers read before meetings of the Branch or of Divisions be given preference in the New Zealand Medical Journal." On the motion of Dr. Guinness, it was further 'resolved: "That all papers, read before meetings of the Association, together with the recommendation of the Divisions thereon, be forwarded to the Editor of the Journal, for publication or otherwise at his discretion."

Dr. Fell (Editor of Journal), after thanking the members for their continued confidence in him, said he should like some direction as to whether he should publish papers or

other matter sent to him by medical men in New Zealand who were not members of the B.M.A.

After discussion it was, on the motion of Dr. J. R. Purdy, resolved: “That it be an instruction to the Editor that papers contributed by members only be published in the Journal.”

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## Disease mongering, the worried well, and the pharmaceutical industry

'Disease mongering'—not an expression I had heard before I sighted this paper. The authors give a list of such conditions. They include mild forms of depression and anxiety, social anxiety disorder, intermittent explosive disorder, attention deficit disorder, irritable bowel syndrome, restless legs, low bone density, erectile dysfunction, premature ejaculation, and female sexual dysfunction. All familiar, except from the intermittent explosive disorder—the mind boggles!

Anyway, this entertaining paper has a serious side—it is that clinicians, or some clinicians, are more than willing to go along with the concept—which others regard with suspicion and mutter about medicalising healthy people and treating them with unnecessary medications.

Internal Medicine Journal 2008;38:858–61.

## Elective repeat caesarean delivery and neonatal outcomes

This report is from the US where caesarean delivery is a big deal—1.3 million caesarean deliveries performed annually in the US; 40% of these are repeat procedures. This feature and the importance of the timing of the surgery are the subjects of this paper.

Over 13,000 elective procedures were evaluated and the outcomes of the delivery at 37, 38, and 39 weeks were compared. The rates of adverse respiratory outcomes, mechanical ventilation, newborn sepsis, hypoglycaemia, admission to the neonatal ICU, and hospitalisation for 5 days or more were increased by a factor of 1.8 to 4.2 for births at 37 weeks and 1.3 to 2.1 for births at 38 weeks. The message seems to be explicit.

N Engl J Med 2009;360:111–20.

## Prognosis of those with severe deficiency of alpha 1 antitrypsin (AAT)

AAT is glycoprotein produced in the liver and released into the circulation. One of its important functions is protection of lung tissue against degradation by neutrophil elastase. Emphysema is the major complication, particularly in smokers. But what about the non-smokers?

In this report from Sweden, 568 non-smokers with severe AAT deficiency (homozygous PiZZ) were followed over a 16-year period. 93 (16%) of them died, mostly from emphysema or hepatic cirrhosis. However the mortality rate in this non-smoking cohort was no higher than the general Swedish population.

Thorax 2008;63:1091–5.

## Community-acquired pneumonia (CAP) and prior statin use

CAP is a leading cause of death in the Western world so any new insights are worth considering. This paper from Edinburgh looks at CAP outcome in the light of prior statin usage. The authors observe that CAP is an inflammatory illness and in-vitro studies that statins have anti-inflammatory properties in sepsis.

Their study involved 1007 patients with CAP and included 257 patients taking a statin and often other cardiovascular drugs. Their results showed a reduced 30-day mortality and reduced risk of development of complicated pneumonia from community-acquired pneumonia in patients pretreated with statins. The results were significant (p-0.01 and 0.006 respectively) and the researchers feel that confounding factors have been eliminated. Interestingly, they were able to demonstrate, in the statin cohort, reduced C-reactive protein levels on admission and at day 4 which suggests a potential in-vivo anti-inflammatory effect of statins.

The American Journal of Medicine 2008;121:1002–7.

## Electrocardiography in suspected angina

Data relating to the investigation of over 8000 patients attending 6 chest pain clinics in Great Britain is evaluated in this paper, after a median follow-up period of 2.46 years. The aim was to assess whether resting and exercise electrocardiograms (ECGs) provide superior prognostic value to that obtained from the clinical history in ambulatory patients with suspected angina.

If either resting or post-exercise ECG were abnormal, the message is clear. However, normal ECGs do not exclude the diagnosis. The authors conclude that that the “basic clinical assessment encompasses nearly all the prognostic value of resting ECGs and most of the prognostic value of exercise ECGs.

As suspected a good clinical assessment is very important.

BMJ 2008;337:1271–75.

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# Overshooting the mark: subclinical hyperthyroidism secondary to excess thyroid hormone treatment may be more prevalent than we realise

Hypothyroidism is one of the most common endocrine disorders, the treatment for which is lifelong thyroid hormone replacement therapy with thyroxine. Adult replacement doses range from 50–200 mcg daily, the appropriate dose being that which produces a thyroid stimulating hormone (TSH) concentration within the normal range (0.3–4 umol/L).

The half-life of thyroxine is approximately 7 days meaning that once thyroxine has been commenced or the dose changed it takes at least 5 weeks for a new steady state to be reached. The majority of patients with hypothyroidism are managed in primary care with their general practitioners checking their TSH concentration at least annually. It is unclear how well thyroid function is controlled in these patients.

As part of a recent study undertaken in our department, thyroid function tests were measured in patients with known hypothyroidism who were taking thyroxine. Of the 68 people who had TSH concentration measured, 24 (35.3%) had concentrations outside of the reference range. Furthermore, of these 24 patients, 16 (66.7%) had suppressed TSH concentrations thus indicating an excessive thyroxine replacement dosage.

Our findings are in keeping with other studies that have shown that overtreatment with thyroxine occurs in a substantial proportion of patients.[1–3] TSH suppression or elevation in association with normal free thyroid hormone concentrations and in the absence of symptoms is termed subclinical hyper- or hypothyroidism, respectively.

The clinical importance of subclinical thyroid disease has been debated. Some studies have reported an association with subclinical hyperthyroidism and increased morbidity in certain populations: increased bone loss and subsequent risk of fractures in postmenopausal women, and, in the elderly population, increased risk of atrial fibrillation, adverse effects on cognitive function, and overall mortality risk.[2,4,5] Likewise subclinical hypothyroidism has been associated with increased cardiovascular risk in some studies[6,7] but not others.[8,9]

Although there remains insufficient definitive clinical trial data supporting associations of subclinical thyroid disease with symptoms or adverse clinical outcomes, current best practice for patients receiving thyroxine is to try and achieve a TSH concentration within the normal range.

Our findings suggest that abnormal TSH concentrations are common in patients receiving thyroxine. General practitioners should be aware of this finding and should attempt to avoid subclinical thyroid disease in their patients. Patients should have their TSH concentrations checked at least annually to determine that they are receiving the appropriate thyroxine dosage and if a dose alteration is made the TSH

concentration should be repeated approximately two months later to ensure it is within the normal range.

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# Paratene Ngata

*East Coast GP, Maori Health Advocate, Public Health Champion*

An outstanding worker for the betterment of Maori health and a tireless campaigner against violence, Dr Paratene Ngata is remembered as a man always prepared to push the boundaries and accept change. The career of the man known to all as Dr Pat saw him receive the highest honours available to a general practitioner but family say he asked to be remembered for his anti-violence stance.

Following a public disclosure 25 years ago, he sought to break the cycle of violence in which his family had been raised.

Until 3 years ago, he never missed a single weekly session of *Men For Change* and continued to run anger management courses, refusing to be deterred even if not all the men involved did finally change.

His medical career saw him being made a fellow of the Royal New Zealand College of General Practitioners last year, an award held by only 25 doctors in New Zealand.

His contribution to Maori health was recognised when Te Ora, the Maori general practitioners group, awarded him their Marire Goodall Award.

Ngati Porou Hauora gave him an achievement award in 2000 and the same year the Public Health Association made him their champion for services to Maori, community, and public health. He is one of only two Maori to be so honoured. In 2004 he was made an Honorary Doctor of Laws by Otago University.

The eldest of 12 children of Paraone Ngata and Mere Maurirere, he spent his early years raised by his grandparents Peter Komaru Tumaurirere and Ruth Walker at Mangatuna. His iwi affiliations are Te Aitanga a Hauti, Ngati Porou and Ngati Ira.

His passion for all things Maori and courage to push boundaries and challenge accepted views came from his grandparents. Peta Komaru actively cultivated mischief among his mokopuna and Pat Ngata's immense sense of fun, nonsense and humour grew from this. His early education was at Whakaangiangi School in the Awatere Valley at Te Araroa, where his parents lived, and then at Mangatuna Native School.

He spent 5 years at St Stephens near Auckland where Apirana Mahuika, one of his teachers, encouraged him to study medicine. He went to Otago University where he completed his degree.

At Otago he met Ngaroma Francis, who was completing a physical education degree, and the couple married in 1970, the year he graduated. After graduation he worked as

a house surgeon at Wanganui Hospital and National Women's Hospital, where he completed a Diploma in Obstetrics in 1974. He then spent 10 years as a general practitioner in Opunake and Whakatane.

His growing interest in public health issues affecting Maori took him to Wellington where he completed a Diploma in Public Health in 1983 and worked for the Department of Health as a medical officer.

In 1984 he played a leading role, together with his friends Eru Pomare and Mason Durie, in the Hui Whakaoranga—described by the former Director General of Health as the most important Maori health initiative since the days of Apirana Ngata (his great grand uncle) and Peter Buck.

After serving as director of the Midland Regional Health Authority from 1991 to 1995, he moved to Gisborne where he joined his uncle Herewini in general practice. In 1996 he moved to Uawa, ostensibly to retire, but remained in practice until shortly before his death. He played a big part in the establishment of Ngati Porou Hauora, for which he worked at Uawa. His contribution to that community was recognised when the district's Coastguard rescue vessel was named after him.

Dr Ngata is survived by his wife Ngaroma and their four sons, Heremaia, Rerekohu, Anaru and Haimona, and three grandchildren.

This obituary under the heading '*Dr Pat' remembered as a toiler for Maori health* first appeared in *The Gisborne Herald* on 15 January 2009 and was written by John Jones. We thank them for allowing us to republish it.

Footnote: Dr Ngata, who died on 12 January 2009 at the age of 62, was a long-time and valued member of the NZMA (only resigning late last year after his lung cancer diagnosis). Around 1500 people attended his funeral at Tolaga Bay, East Coast.

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# Desmond John Woods

*CBE, FRCP(E), FRACP, DCH( Lond); 1917–2008*

Dr Desmond (Des) Woods died in Auckland aged 91. For 16 years, 1960–76, he was the only consultant paediatrician in private practice in the Manawatu, New Zealand.

Born in Waihi, he was educated at Thames High School and at Auckland University where he studied accountancy while working as a clerk in the Public Works Department. He wanted to study medicine but during the Depression that was not possible without private means.

He served in the 21st Battalion where he saw action as an infantryman throughout the North African campaign and in Italy as an officer where he was nearly killed by shell fire in the last weeks of the war.

The opportunity to compete to gain entry to Otago Medical School was offered to returned servicemen by the NZ Government and he graduated with distinction 1952, aged 35. In 1955 he joined the RNZN as a Surgeon Lieutenant on a 3-year commission so that he might spend time on postgraduate study leave in the UK.

He specialised as a paediatrician through the Royal College of Physicians (Edinburgh) in 1958. His particular clinical skill lay in the early diagnosis and treatment of rare syndromes in children and in detecting inborn errors or metabolism in newborn babies.

During his 16 years as a consultant in Palmerston North Hospital's Premature Baby Unit he examined most of the Manawatu's newborn infants each week, diagnosed disease and disability, and routinely saved the lives and mental ability of rhesus babies through his multiple exchange transfusions.

He became a principal point of paediatric referral for GPs in the central North Island. He was also simultaneously the senior consultant paediatrician and neonatologist at the Palmerston North Public Hospital's premature baby unit and the Director of the Manawatu Child Health Clinic.

His last appointment was in Auckland where he was the Medical Superintendent of the Mangere Hospital and Training School for intellectually handicapped children from 1976 to 1984. He fostered and took an active part in the introduction of new skills and innovative training regimes. This world-class training enabled many

intellectually and physically handicapped young people to live safely and productively in the community rather than being institutionalised. He also ensured that Mangere Training School offered respite care to allow parents short breaks from the daily needs of their children.

In 1984 Des was made a life member of the Paediatric Society of New Zealand. In 1985 he was made a CBE, for his services to the health of New Zealand's children. He retired in 1989 but continued part-time work at the naval hospital and with the Auckland Blood Bank. His wife Frances died in 1992.

Des is survived by his 5 children and 11 grandchildren.

Dr Woods' son, Desmond Woods LCDR, RAN (Deakin, ACT, Australia), wrote this obituary.

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# Jill Juanita Calveley

*Mb ChB, OSM (5 September 1942–30 December 2008)*

Dr Jill Calveley died suddenly, without warning, in her sleep presumably during or after a seizure; she had suffered from idiopathic grand mal for the previous year. She had not allowed the illness to reduce or restrict her work; visionary work that will have national value in respect of chronic disease management and the integration of care in all long-term conditions.

Jill was more than a respected colleague and friend; she was to me an inspirational force in my life, Jill's grasp of the issues, her visionary forward thinking, that experience, and her quiet unassuming determination has already influenced medical planners, funders, and politicians.

Her achievements must continue to completion.

Her early life was in Ashburton, then Methven High School finishing in Timaru Girls High where she excelled in physics and mathematics (attending the boy's high for these subjects).

Jill graduated from Otago Medical School in 1966 having married Steve Calveley (a 5th year medical student) in her final year. Whilst a house surgeon in Balclutha Hospital in 1968, Jill diagnosed the first case (for 15 years) of diphtheria; she recognised the "grey adherent membrane".

In 1975 she and Steve set up the Kumeu Medical Practice, and for many years they provided rural medical and obstetric services to West Rodney patients. The three children were educated at home in their primary school years, Jill's innovative talents complementing her GP medical skills. Dr William Ferguson a 5th year student during this time, eventually succeeded in the Kumeu practice; he writes:

> Jill and Steve both shared a radical vision for that time of empowering patients through the provision of a knowledge resource we were to develop in the practice, to diagnose and care for themselves. Jill exhibited a patient-centred focus and concern that was utterly devoid of pretensions. She was immensely practical in her approach to solving problems for people. As a young medical student it was not possible to spend even 1 hour in her presence without having some preconception, traditional view, or ideology exposed, dissected out, and then held up to the clear lens of her humanity and practicality. This was always done with her disarming and infectious humour, which usually also ensured you hardly even knew she was operating on you!

Jill's practical abilities were recognised with a major Rotary award, the Paul Harris Fellow Medal in 1984 and later in 2007, the Queen's Service Medal (QSM)—her pioneering work in the disability sector has been immensely valuable.

She was a strong advocate for people with disabilities: after researching therapies in Germany, she became founding director of Ambury Park (horse riding for the

disabled), and later, assisted in setting up Rehab Plus in Auckland Hospital. She was a Waitemata-appointed director for DISAC from inception in 2001 to present.

Latterly Jill worked full time for Harbour Health PHO; here she found a kindred and caring support for her two visions; promoting mental health services in the community and integrating long-term condition services within primary care.

Jill Calveley—dedicated mother/educator, innovative health researcher, compassionate general practitioner, and determined advocate for the disability sector—will be sorely missed by family, friends, and colleagues, yet her intellectual and important clinical research work will continue. Her three boys, Hugh, Peter, and Chris are testament to her devotion as mother and skilled doctor educator.

Dr Lannes Johnson (Chief Medical Officer, HealthWest PHO, Waitakere City) wrote this obituary and Jill's family supplied the photograph.

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# Ivor Graham Marsh

*25 May 1923–9 October 2008*

Ivor Marsh died in Kerikeri after a long struggle with Lewy Body Disease. He was an astute, good doctor, with an old school 'completeness' to his life. He was a keen teacher of medicine, a pilot, and highly skilled with his hands; he built model steam engines, much of the furniture in his house, radio controlled gliders, and boats. He taught himself to sketch, and also acted in repertory theatre. He loved literature and music and had a quick mind with an ability to make a sharp analysis of the human plight.

Ivor was born in Gosport, England, the only child of Robert Arthur Marsh (an engineer in the Royal Navy) and Bluebell Beatrice Savage. He attended Portsmouth Grammar School, and in 1940 joined the Royal Air Force and, after a year of engineering at Glasgow University, he was posted to the 299 Squadron 38 Group for the duration of World War 2.

In 1946 he attended King's College in London and King's College Hospital where he qualified MB BS. It was during this time that he met and married Betty Bradley who was nursing at King's College.

In 1953 Ivor came to New Zealand as a medical officer with the Royal New Zealand Air Force and this included some flying duties. In 1957 he left the Air Force, and began work and study at National Women's Hospital in Auckland before gaining his Diploma of Obstetrics (Auckland University). This led to a post as Registrar at Kawakawa Hospital in Northland including obstetric and anaesthetic duties. At the same time he established himself as a General Practitioner in the town.

Bill Maloney, his only colleague in Northland at that time, recalls him as a 'godsend to the North, initially a somewhat formidable person but modest and highly compassionate, thinking nothing of two-hour drives in the night to his predominantly Māori practice who treasured him'. Later he moved to Dargaville to join the Maurice Matich practice. Once again he was in the skies, flying down the Poutu Peninsula once a week for an afternoon surgery. Phillip Barham, also in that practice remembers his 'utter honesty and integrity.'

Ivor's five daughters made education a priority and in 1967 he moved back to Auckland to practice in Three Kings. In the following years he became intensely involved in undergraduate medical training. With the opening of the Auckland Medical School he became one of a small band of General Practitioners that began to teach medical students the art of General Practice as a specialty in its own right.

Students were almost continuously in his rooms. He was also active in postgraduate training for General Practice and initiated innovative ideas like employing trained actors to assist with examination of prospective GPs.

In his teaching at University, Ivor became an astute observer of the doctor-patient relationship. This culminated in an article in the Journal of the Royal College of General Practitioners in 1980 titled 'Teaching about learning in a consultation'. He was a strong advocate for accurate diagnosis being essential for good patient care and, in this article proposed 'diagnosis…is a lesson given by the patient to the doctor. The patient teaches the doctor about himself, (and) his illness.'

About this time I spent a year working with Ivor and his empathy with his patients left a strong and permanent impression on my own practice. Psychosocial medicine was his special skill, but he was always proud of his practical medical skills—hospital staff recount how he once arrived with a collapsed patient already intubated!

In 1982 Ivor's contribution to General Practice was recognised with election to Fellowship of the Royal New Zealand College of General Practitioners. The College subsequently awarded him a medal for 'academic excellence' in 1983.

In 1982/3 he worked as Assistant Professor in the Department of Public Health, King Faisal University, Saudi Arabia before retiring from full time practice in 1985. He then moved with Betty to a small farm in Waimauku where they spent fulfilling years breeding Angora goats and gardening (and some locum practice for a further 10 years). He continued to build model steam engines (this included machining and lathing every component), which were used to pull carriages and passengers at the model railway track at Panmure.

Ivor was humane. His meticulous approach to everything had the downside of frustration with imperfection. He could be pessimistic in his view of the world. He had a 'take it or leave approach' with his patients—a firmness which could engender annoyance or intense loyalty. His wife Betty was a hugely caring nurse and lifelong helpmate, and his partner in medical practice. She provided the essential balance to his life, and later nursed him in his last illness.

It was not chance that took him back to the North in his last year or so. This was the coastal paradise where he loved sailing and the territory where he had been happiest in a busy rural practice. Recently he recalled those years with the reflection 'I think we made a difference!'

He is survived by his wife Betty and their daughters Anne, Bridget, Ruth, Ngaire, and Jane.

Graham Davison, an Auckland geriatrician, wrote this obituary and Ivor's family supplied the photograph.

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# Palliative Care: a patient-centered approach

Edited by Geoffrey Mitchell. Published by Radcliffe Publishing (Oxford, UK), 2008. ISBN 9781857757392. Contains 184 pages. Price £24.95

This book is a breath of fresh air. It addresses an issue that is very topical and close to the heart of those who work in General Practice and Palliative Care. Patients with chronic advanced illness, whether or not they receive or require the input Specialist Palliative Care Services, deserve and benefit from medical treatment that is delivered with a "patient-centered" approach.


The book provides a unique intellectual framework to help GPs gain an insight into what patient-centered care really is. It does this in a way that adds value to the care provided by practitioners who are already skilled in family medicine. Certain critical aspects are emphasised, such as a need to understand the profound effect that loss and grief have on the illness process, the importance of finding a "common ground" with patients to enhance the patient/clinician relationship, and the need to specifically engage with the family unit when dealing with patients at the end of life.

The book also explores how the seemingly contradictory concepts of health promotion and palliative care come together. Positive outcomes from this collaboration include the promotion of wellbeing both in individuals and in communities and a gradual improvement in the general level of understanding around illness, death, loss, and care.

The section on symptom management is by no means comprehensive, but is up-to-date and practical. The section on the pathophysiology of advanced illness is interesting and informative. The book also covers the transition from curative to non-curative treatment and explains how palliative care can be promoted as "active total care" and therefore introduced in a positive and meaningful way. This will undoubtedly be a useful guide to many who struggle with finding the right time to discuss palliative care with patients and families.

In truth this book is not just for GPs, but is applicable to all who aspire to both provide and promote the very best care for dying patients.

Kate Grundy
Palliative Medicine Physician and Clinical Director
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Christchurch