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This Issue in the Journal

A telephone advice line does not decrease the number of presentations to Christchurch Emergency Department, but does decrease the number of phone callers seeking advice

D Graber, M Ardagh, P O'Donovan, I St George

What effect would a national telephone advice system have on an emergency department? We report the experience of the Christchurch Emergency Department after the launch of the pilot programme for Healthline. During a six-month study period, Healthline had little overall effect on the Christchurch ED census and appeared to refer patients with acuity similar to referrals of the general ED population. It substantially decreased the workload of ED nursing staff charged with answering calls for advice.

Problems with damp and cold housing among Pacific families in New Zealand

S Butler, M Williams, C Tukuitonga, J Paterson

Studies show that exposure to damp, mouldy and cold housing can significantly increase risk of illness. Mothers of over 1000 Pacific infants in New Zealand were interviewed regarding their housing environment. Thirty seven per cent of the mothers reported that their homes had dampness/mould problems, and 53.8% reported problems with cold housing. This study found damp and cold housing were related to maternal depression and asthma. Factors associated with a greater likelihood of having housing problems can be used to inform prevention initiatives.

Complications of endoscopic retrograde cholangiopancreatography

D Lal, M Lane, P Wong

An audit was undertaken at Auckland Hospital Gastroenterology and Hepatology Department to look at the type and rate of complications engendered by a technically complex endoscopic procedure called endoscopic retrograde cholangiopancreatography (ERCP). This procedure is indicated in certain diseases that lead to problems with drainage of the liver, bile duct and pancreatic glands. This study confirms the rate of ERCP complications at Auckland Hospital is consistent with internationally accepted norms for the period of study.

Transport services under stress: patient air transfers due to industrial action in Christchurch

P Dzendrowskyj, D Bowie, G Shaw

In December 2001, industrial action at Christchurch Hospital caused a significant reduction in inpatient numbers and necessitated the transfer of patients to distant hospitals around New Zealand. This put transport facilities under considerable

pressure and caused stress to the patients, families and healthcare professionals involved. This paper discusses the logistical aspects of patient air transfers and makes recommendations for hospital staff dealing with a similar situation.



Improvement in outcome of rectal cancer in New Zealand

Frank Frizelle, Editor

Colorectal cancer is a major health issue within New Zealand. A recent report on international epidemiological trends in colorectal cancer established that New Zealand non-Maori women have the highest age-standardized rate for both colon and rectal cancer for women in the world. New Zealand non-Maori males have the fourth highest age/gender-standardized incidence of colon cancer and the second highest of rectal cancer.¹ A study published last year in the NZMJ of 524 patients with rectal cancer operated on in the early 1990s by general surgeons in four New Zealand hospitals found a crude five-year survival rate of 63% with a local recurrence at five years of 26%. The permanent stoma rate was 37%, and 30-day mortality was 2.9%.² These results will have been improved upon today with lower local recurrence rates. Much emphasis is placed on the possible roles of screening, pre-operative staging, peri-operative radiotherapy, the operative technique with total mesorectal resection and colon pouches, adjunctive chemotherapy, and follow up. Improvements in outcome often are so small with each step that they are hard to see; as such, it is interesting to reflect upon results from 70 years ago.

Recently Mr Pat Cotter, a retired general surgeon from Christchurch, uncovered some research his father had undertaken while a surgeon at Christchurch Hospital on the outcome of patients with colon and rectal cancer before 1933. This research was never published as far as I am aware. These data must represent one of the earliest audit studies of outcome of patients with colorectal cancer in New Zealand, if not Australasia. They reveal a much less favourable situation than today and show us just how far we have come.

In a series of 61 consecutive cases of rectal cancer operated on by surgeons at Christchurch Hospital prior to 1933 the outcome was abysmal. The demographics of the patients presenting with the problem are similar to those of today, except they are perhaps a little younger. Of the 61 patients studied by Mr W Cotter, there were 42 male and 19 female, with an average age of 61 years (the youngest was 25). Four of the 61 patients were under 40 years old. The length of time patients had suffered symptoms was also similar, ranging from one month to four years, as were the symptoms themselves: 35 patients with rectal bleeding, 31 patients with diarrhoea, 24 with pain, 12 with constipation, 8 with loss of weight. A mass was felt on rectal examination in 58 patients and seen on rigid sigmoidoscopy in every case.

The management of these patients was vastly different from today. In only nine patients (15%) of the 61 was surgery attempted. Three of these nine patients died during surgery. Three had an abdominal perineal resection with an immediate operative mortality of one; four had a perineal excision with an operative mortality of two; a further two had an abdominal excision. Of those who survived the operation, three died within one year, one died within two years, one was not traced and one was thought to be cured. These were remarkably adventurous operations for their time,

when considered in the historical context of operations for rectal cancer being performed around the world.

Mr W Cotter also reviewed 100 consecutive cases of colon cancer (56 female, 44 male), with an average age of 62 years (youngest 31 years and eight cases under 40). Twenty six cases presented with large bowel obstruction. Of the 100 cases, surgery was undertaken in only 28 patients, resulting in the immediate death as a result of attempted surgery in 11 (39%). In the remaining 17, recurrences occurred in 10, three were lost to follow up, and four may have been cured. Of those cured patients it is interesting to see the following recorded:

- Case 1. Died 4.5 years after surgery from cardiac disease
- Case 2. Still alive at 3 years
- Case 3. Still alive (2 years), has recurrence in wound
- Case 4. Died after 4.5 years from prostatic hypertrophy

The operations undertaken were Mikulicz type in eight cases with one operative death and one cure; right hemicolectomy in five cases with two operative deaths; left hemicolectomy in six with four operative deaths; and formation of stoma in nine cases with four operative deaths.

As one would have hoped there has been considerable progress in the management of these diseases over the last 70 years. However, improvement in survival is not due to advances in surgical technique only, but is also a result of other aspects that help determine outcome. The most significant advances in the surgical management of patients in the last one hundred years have been in regard to the non-operative components of surgical care ie, anaesthesia, antisepsis and asepsis.

Surgeons were once regarded as 'savages with knives' and the surgeon's ability was really considered a significant factor in outcome. A surgeon's fame rested on his dexterity, precision and speed. However, good surgical outcome is the result of multiple factors that are independent of the surgeon, including anaesthetics, intensive care, medical, nursing and paramedical support, and a culture in search of excellence. Just as all credit for success is not correctly attributed to the surgeon, nor should all credit for failure rest on a surgeon's shoulders. These days the expertise of the surgeon is less important than ever, with a growing realisation that it is the systems in which we work that lead to best outcomes.

I wish to thank Mr P Cotter for making me aware of the remarkable research undertaken by Mr W Cotter 70 years ago.

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Giving emergency advice over the telephone: it can be done safely and consistently

Geoffrey Hughes

Triage is said to have originated with a surgeon named Larrey, who was in Napoleon's Imperial Guard. Military triage evolved later, in the Crimean War of 1853 to 1856 and then with the French in the First World War. Outside the military or mass-casualty setting, today the term is most commonly linked with the process that occurs when a patient arrives at an emergency department (ED). Triage is defined as the process used to sort patients into groups according to the severity of their illness or injury and their need for urgent medical and nursing care.¹ It is not used as a discriminator to indicate that the patient is seeking treatment in the wrong place. There are two types of triage decision. The first (and the more commonly understood) is the allocation of a triage category. The second (and often forgotten as a form of triage) is whether to admit the patient to hospital, discharge them or transfer them from the ED. The first is a nursing responsibility. The second is a medical responsibility and occurs much later in the process.

Patients in Australasia are triaged (categorised) using the Australasian Triage Scale, being placed in one of five categories.¹ Although it is now several years old and is an established part of ED practice, some hospital managers and planners of healthcare believe that patients in triage categories four and five (to be seen in one and two hours respectively) are 'inappropriate' visitors to the ED and should be calling on their GP. Hopefully this myth is close to being dead and buried.

The allocation of a triage category is an important and difficult skill in the repertoire of a modern ED. It is in fact a core process in the service provided. Undifferentiated patients arrive at the same time as those who have had some form of pre-diagnosis by either a paramedic or general practitioner. Done properly by a skilled, experienced and appropriately trained nurse it has a huge and beneficial impact on patient care and departmental patient flows. Done badly by an untrained and inexperienced nurse it is a recipe for disaster.

As well as initial triage the triage nurse has many other roles. These include feedback about waiting times to the patients in the waiting room, liaising with colleagues in the department or hospital, and speaking to general practitioners, paramedics and clerical staff. Another function is answering the phone to enquiries from the public. The public uses the triage nurse as a source of information, advice, and wisdom on the whole range of human suffering. Giving advice over the phone is difficult and stressful, be you doctor or nurse, a senior or a junior. Maybe as you get longer in the tooth and more experienced you become more anxious about it because you understand how fraught with risk telephone advice is. The main reason for this is that decisions are made without an examination or visual assessment of the patient. Although a working differential diagnosis can frequently be made on history alone and by asking the right questions, all of us feel more comfortable if we can actually see the patient. Visual clues are so useful. Once the phone is put down we are left

with a big cloud of uncertainty. Did we give the right advice? Has the patient taken our advice? Has the patient collapsed? Will we get a letter from the Health & Disability Commissioner? Was that earache really otitis media or is it meningitis? Was that headache really migraine? Should we ring the patient back? A pragmatic approach may be to ask all patients to call an ambulance and come to the ED but clearly this is undesirable for one and all.

Be that as it may, telephone advice is here to stay. The public wants it. Can it be done in a safe, consistent and accessible manner? Standardization of questions is one way forward. Decision-support software and binary-chain algorithms seem to be the answer.

A paper in this issue of the NZMJ, from the Christchurch ED, reports that an independent telephone advice line (using decision-support software and binary-chain algorithms) established as part of a national pilot in New Zealand in May 2000, Healthline, did not decrease the number of presentations to the Christchurch ED. It did, however, decrease the number of phone calls to the department from patients seeking advice.²

This is consistent with findings from overseas, most notably the United Kingdom. NHS Direct, the UK national telephone advice line, was launched in March 1998 as a pilot and later expanded to a national service in November 2000. A post-implementation audit in 2002 reports a consumer satisfaction rate of over 90%, a good clinical safety record, and evidence that it reduces demand on other health services provided outside of normal working hours. Half of its running costs are offset by encouraging better use of NHS services and finally it adds value by offering reassurance and reducing anxiety to the callers.³

An evaluation of Healthline here in New Zealand concludes the service was successfully established and implemented in the pilot regions of Northland, Gisborne/East Coast, Canterbury and the West Coast.⁴ The report also finds that the service met most of the original specifications set by the Health Funding Authority (as it then was) and the Ministry of Health.

Healthline is found to be confidential, reliable and perceived by the public as safe, with the caveat that it tends to be used by younger adults and people on behalf of children, rather than by older adults. This is likely to change with time. Extremely high levels of satisfaction have been reported, especially in the majority who have been significantly affected by the Healthline nurse advice given. It is simple, quick, comprehensive and has the potential to improve quality, increase cost effectiveness and reduce unnecessary demand on other health services. The Christchurch paper confirms this latter point, with the reduced numbers of incoming calls to the department.² This alone will have a positive impact on EDs and resource utilisation, as well as decreasing stress for staff who answer the call.

The Ministry of Health has recently announced that it has decided to move towards establishing a free 24-hour health information and advice telephone service for all New Zealanders.⁵ This will be a national Healthline service and should be up and running next year. The evidence suggests that it will be a benefit to both the general public and the nation's health services.

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A telephone advice line does not decrease the number of presentations to Christchurch Emergency Department, but does decrease the number of phone callers seeking advice

David Graber, Michael Ardagh, Paul O'Donovan and Ian St George

Abstract

Aim To describe the effect of a pilot national telephone advice service (Healthline) on a public hospital emergency department.

Methods We prospectively gathered information from the Christchurch Hospital Emergency Department (ED) computer- and non-computer-based information systems, for a six-month period during the operation of Healthline. We compared the data with five earlier periods when Healthline was not running. In addition, Healthline collected and analysed data from call log information.

Results There was a small increase (1.1%) in ED attendance during the study period. Patients referred by Healthline had a similar triage distribution to the general ED population, but a lower admission rate (29% vs 47%). Telephone calls to the ED dropped dramatically during the study period.

Conclusions Healthline had little effect on overall ED census and appeared to refer patients with similar acuity to the general ED census. It decreased the workload for ED nursing staff charged with answering advice calls.

In May 2000, a 24-hour, 7-day-a-week telephone advice line (Healthline) began service for Canterbury and three other pilot regions of New Zealand. The service was supported by the Ministry of Health, which contracted private providers to deliver it from a Wellington-based call centre. The cost to run the pilot for the four regions for two years was \$7.5 million, which included set-up, capital, and operating expenses. Healthline uses decision-support software in the form of binary-chain logic algorithms. The algorithms are designed to help the registered nurses taking the calls to rule out important conditions (however rare), and stop at the condition that cannot be excluded; they thus set the level and timing of the intervention. There are over 570 symptom-based algorithms, and over 1200 self-care instructions. The algorithms are able to triage patients safely to appropriate care, while at the same time providing comprehensive, automated call documentation and reporting for analysis, risk management and quality improvement.¹

Christchurch Hospital is the tertiary referral centre for the Canterbury region, serving a population of approximately 412 000. Its emergency department (ED) is the only one in the region; it was thus well placed to study the effect of a new telephone advice service on emergency care.

Although there have been reports of locally-based telephone advice services,² and of the overall results of regional systems,³ the effect of independent telephone advice lines on emergency medicine has not been specifically assessed in Australasia in the

peer-reviewed medical literature. Telephone advice services range from limited arrangements covering individual general medical practices to large-scale systems with integrated appointment capabilities, such as the Northern California Kaiser Permanente system in the USA with 50 000 calls a day (personal communication, Moore D, Permanente Medical Group, April 2001). The proliferation of telephone advice in the USA is mostly driven by managed care systems, which will not share their experiences in a non-proprietary manner. The peer-reviewed literature focuses on the safety of such systems⁴ or the appropriateness of ED referrals made through them,⁵ but there is little information on the overall effect of independent advice systems on emergency care. An analysis of the United Kingdom National Health Service's 'NHS Direct' demonstrated a small and insignificant effect on the use of emergency departments and ambulance services.⁶

The aims of this study were to determine if Healthline significantly changed the ED census at Christchurch Hospital, if the acuity of the referrals through Healthline was similar to those of the general ED population, and if Healthline affected the number of telephone advice calls answered by ED nursing staff.

Methods

This was a prospective review of clinical records.

Using encounter logs generated by the information system in the Wellington call centre, Healthline collected full clinical records on all callers, including their answer to the question, 'What would you have done if Healthline had not been available?' The answer was recorded as the 'intent' of the caller. Healthline gathered data on age and sex, and the clinical rationale for referral of patients to the ED. The anonymous nature of this information precluded direct cross-checking of individual cases, but served as an independent body of data with which to compare hospital-derived statistics.

These data on individual patients who had contacted Healthline were faxed in standardized format to the ED before the patients' arrival, to allow staff to anticipate patient needs. The fax took the place of the usual general practitioner (GP) referral letter. In addition, logs of the faxed notes were transmitted weekly from Healthline to the ED during the study period.

We examined a six-month study period from August 2000 to January 2001 and compared data with monthly ED census data from the same six-month periods over the preceding five years (when Healthline was not running), using a computerised patient registration and tracking system (Patient Management System, © Sun Microsystems). We extracted triage codes and admission/discharge destinations. The ED censuses before and after Healthline were evaluated by Poisson regression using the PROC GENMOD procedure in SAS/STAT® Version 8 (SAS Institute Inc., Cary, North Carolina, USA).

Referral acuity was assessed by examination of the proportions of patients admitted and their triage categories according to the Australasian Triage Scale. This scale categorises patients according to their urgency for emergency care, from category 1 (most urgent) to category 5 (least urgent).⁷ The triage breakdown and the proportion admitted for those referred by Healthline were compared with all other ED patients.

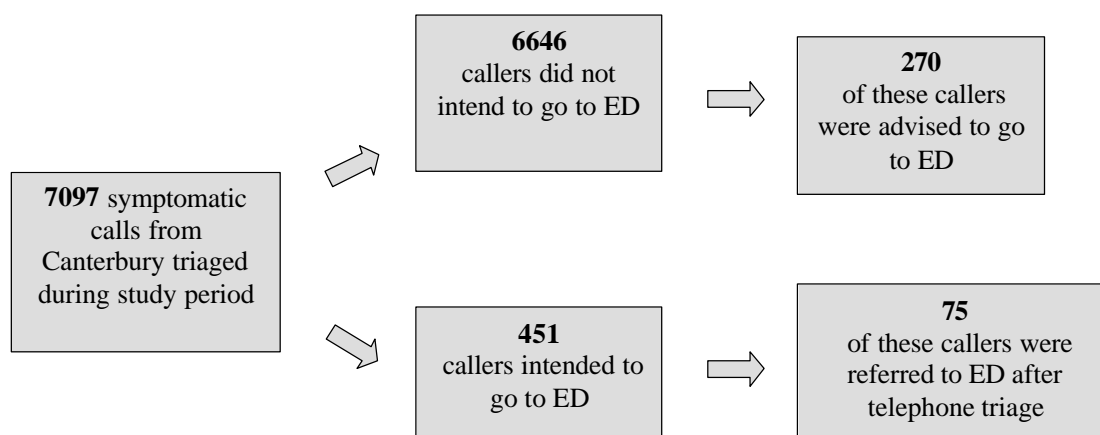
The Christchurch ED nurses provide telephone medical advice. Call logs were examined and volumes tabulated from January 2000 to January 2001 – ie, for six months before and six months after the start of the Healthline service. When Healthline started, callers to the ED were presented with a phone menu, which encouraged those seeking medical advice to select a number that would transfer them to Healthline. Those seeking advice related to a recent ED visit were encouraged to make a selection that would allow direct contact with ED staff. Callers who did not wish to be transferred to Healthline had the option of speaking with a member of the departmental nursing staff. Direct transfer to the Plunket line or the National Poisons Centre was also available. This phone menu system was in place about six weeks after the launch of Healthline.

Results

During the study period Healthline received 10 238 calls from the Canterbury region, of which 7097 callers were seeking symptom triage. Of those calls, 5% (345 patients) were referred to the Christchurch ED, either by private transport or by referral to the ambulance service. Healthline data on intent show that of the 451 (6%) callers who would have called an ambulance or gone direct to the ED, only 75 (17%) were advised to do so after triage; on the other hand, of the 6646 (94%) callers who would not have called an ambulance or gone direct to ED, 270 (4%) were advised to do so. These data suggest that approximately 106 fewer patients (1.5% of 7097), would have gone to the ED as a direct consequence of ringing Healthline, if all patients had followed Healthline's advice. Figure 1 summarises the caller intent and call outcome details.

Figure 1. Healthline caller intent and outcomes, 1 August 2000 to 31 January 2001

1. Total number of calls from Canterbury during study period: **10 238**
2. Total number of callers referred to Christchurch ED (by any means): **345**
3. Total number of calls from Canterbury wanting symptom triage: **7097**
(excludes those wanting general health information or non-clinical information)
- 4.



5. Difference in ED attendance if all patients followed Healthline advice:
451 intending to go to ED - 345 actually referred = **106**

Healthline transmitted details by fax of patients due to arrive by private transport in 97% (230/237) of referrals. Healthline was not able to arrange a notification system when a patient was referred to the ambulance for transport to the ED. Thus, the ED received advance notification and patient information details in 67% of all Healthline

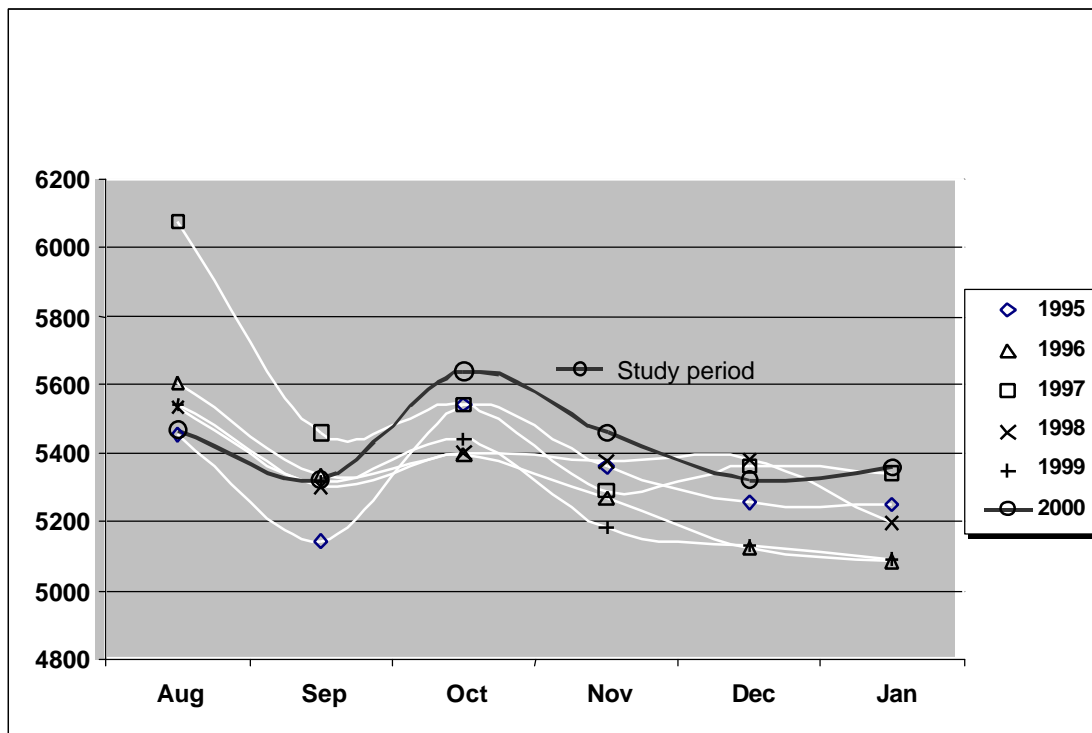
referrals (230/345) prior to arrival. Of the patients arriving by private transport, records of triage categorisation were available in 76% (179).

Sixty per cent of those referred were female, and 74% of calls were made outside the hours of 8am to 5pm; 31% of the callers triaged to the ED were referred to an ambulance for transport.

The symptoms triggering calls included chest pain (21%), paediatric (0–12 years) problems (16%), abdominal problems (15%), adult trauma (13%), and range of less-frequent problems including respiratory symptoms, syncope, palpitations, gynaecological symptoms, and psychiatric issues.

Figure 2 compares the six-month study period total ED census with the same six-month period over the preceding five years.

Figure 2. Monthly emergency department (ED) census 1 August 2000 to 31 January 2001 compared with same period for previous five years



During the study period there was a small but significant ($p = 0.04$) increase in ED attendance of 1.1% when compared with the periods of the preceding five years.

The mean admission rate for 1995–1999 was 40%; for 2000, it was 47% ($p < 0.01$). During the 1995–1999 periods, a mean of 8.6% of all patients were allocated triage category 1 or 2; during the year 2000 study period, 9.5% were allocated category 1 or 2 ($p = 0.48$).

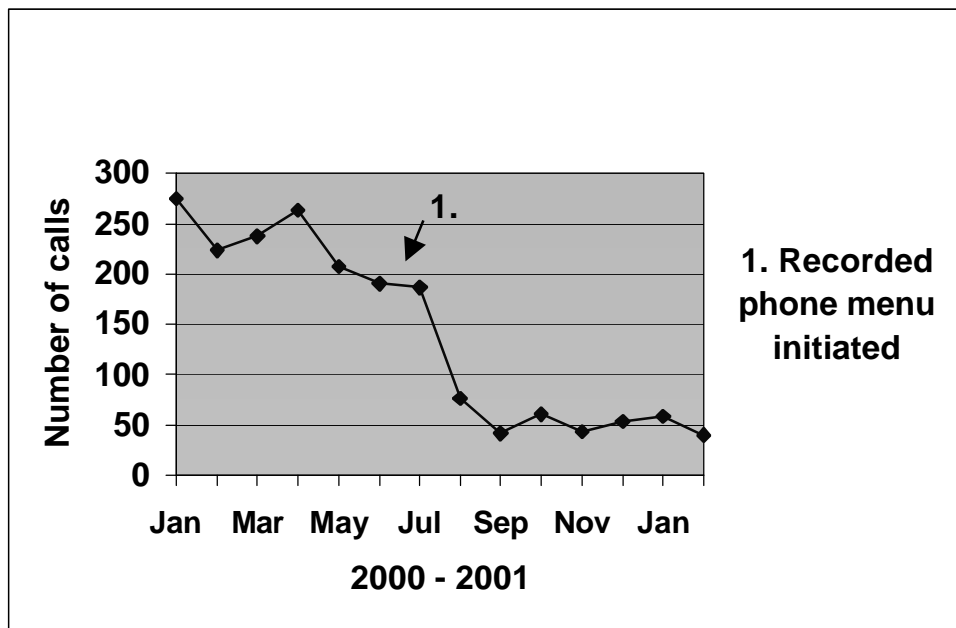
Table 1 compares the triage categories and admission rates of Healthline-referred patients against the entire population of ED patients during the study period.

Table 1. Acuity markers in Healthline-referred vs all emergency department (ED) patients

	Triage category					Admission rate
	1	2	3	4	5	
Healthline ED patients (n = 179)	0%	5%	54%	35%	6%	29%
All ED patients (n = 38 301)	1%	9%	42%	42%	6%	47%

Figure 3 shows the effect of Healthline on calls direct to the ED requesting advice.

Figure 3. Emergency department patient advice call volume



Discussion

We were most interested to know if the introduction of the Healthline system would noticeably decrease ED utilisation, or, as some feared, result in a large increase in patients who otherwise would not have presented to the ED. In one authors' experience, the initiation of a telephone advice service may be accompanied by increases in inappropriate referrals to EDs as a result of poorly refined algorithms: in a USA-based programme, direct participation of an emergency-medicine doctor in a telephone advice system was necessary to limit a large number of inappropriate visits.

The volume of calls to Healthline from Canterbury was between 50 and 60 a day, but the number of patients sent to the ED as a result of the calls averaged only two a day. Although the patient intent data from Healthline suggests up to 106 fewer ED presentations may have resulted from patients accessing the service, this represents an average of less than one patient a day. As the usual ED census is 180 a day, and the daily variation can be considerable, Healthline is unlikely to make a measurable difference to ED presentations.

The call rate from the service population was lower than to some other advice systems^{3,8} but similar to the rate of calls made to NHS Direct in the UK.⁶ Concerns about increased or decreased numbers of presentations to the ED appear to be groundless. However, it is possible that as the public becomes more familiar with the service a 'learning effect' may transpire and change this conclusion.⁹

The triage category comparisons suggest the acuity of Healthline referrals is similar to those of the general ED population, although the difference in admission rates may suggest lower acuity in the Healthline group. The lower percentages of patients presenting in the first two triage categories following Healthline referrals are not unexpected, as many of those more ill patients will contact the ambulance service directly, rather than seek telephone advice.

The acuity of Healthline referrals is likely to be higher than reported here. Healthline was unable to provide any notification for ambulance patients, so the data for many of these patients (which are likely to have had greater acuity) were missed from analysis. Admission rates are likely to be underestimated in the Healthline group for the same reason.

In summary, although these figures suggest Healthline referrals were generally of lower acuity than those for other ED patients, there is no proof that this is the case. We would expect the inclusion of ambulance-derived data to raise the acuity of referrals over that observed.

This population was demographically similar to those reported in previous studies with respect to female preponderance and percentage of calls taken after hours, but there were, inexplicably, fewer children presenting.^{3,4,6}

Members of the nursing staff appreciated the deferral of the majority of advice calls to Healthline, saving them time and avoiding documentation issues. In fact, this was the most important impact of the Healthline service: one nurse was freed from answering the telephone and was able to work elsewhere in the ED.

In conclusion, this study demonstrates little effect of an independent telephone advice line on overall ED census, but lower workload for those ED nursing staff usually charged with answering advice calls.

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Problems with damp and cold housing among Pacific families in New Zealand

Sarnia Butler, Maynard Williams, Colin Tukuitonga and Janis Paterson

Abstract

Aims To describe reported problems with damp and cold housing among Pacific families in New Zealand and their associations with two facets of maternal health, namely postnatal depression and asthma.

Methods The data were gathered as part of the Pacific Islands Families: First Two Years of Life (PIF) Study in which 1376 mothers were interviewed when their infants were six weeks old. Mothers were questioned with regard to problems with dampness or mould and cold housing, facets of maternal health (assessed using the Edinburgh Postnatal Depression Scale), and asthma.

Results Over one third of the mothers (37%) reported that their homes had dampness/mould problems, and over half reported problems with cold housing (53.8%). Damp and cold housing were significantly associated with a number of variables including large household size, state rental housing, and financial difficulty with housing costs. Damp and cold housing were also both significantly related to maternal depression and incidence of asthma.

Conclusions Efforts to reduce problems with damp and cold housing are needed to improve maternal health. To this end, advice regarding the importance of home heating and ventilation may be beneficial.

Several studies have shown that exposure to damp, mouldy and cold housing can significantly increase the risk of a number of respiratory symptoms including the common cold and asthma, in addition to non-respiratory problems such as fatigue and poor concentration.¹⁻⁵ However, the link between poor housing and mental health is not as well documented as the association with physical health.

A study by Kearns, Smith and Abbott highlighted that Pacific households reported living in worse housing than Maori or European households.⁶ Pacific people were also more likely than other groups to have symptoms of asthma, colds and flu. The authors acknowledged that other social and economic deprivation factors were likely to be operating in conjunction with housing issues to contribute to the health problems reported.⁶ Other research supports the association between deprivation, ethnicity and health, with the prevalence rates of asthma being higher in more deprived regions of the country and higher in Maori and Pacific adults than other New Zealanders.⁷ Tukuitonga proposed that poor housing conditions coupled with inadequate nutrition and a sedentary lifestyle have contributed to many of the health problems experienced by Pacific peoples.⁸

In view of the concern about poor health and housing conditions faced by many Pacific families, questions examining housing problems were included in the first assessment of the Pacific Islands Families: First Two Years of Life (PIF) Study. The

purpose of the present study was to examine problems with dampness/mould and cold housing and any associations with postnatal depression and asthma among mothers of the PIF cohort.

Methods

Data were collected as part of the PIF Study, a longitudinal investigation of a cohort of 1398 infants born at Middlemore Hospital, South Auckland, during the year 2000. Middlemore Hospital has the largest number of Pacific births in New Zealand and its patient population is representative of the major Pacific ethnicities. All potential child participants were selected from live births at Middlemore Hospital where the child had at least one parent who identified as being of a Pacific Island ethnicity and also a New Zealand permanent resident. All procedures and interview protocols had ethical approval from the National Ethics Committee.

Approximately six weeks after the birth of their child, the mothers were visited in their homes by Pacific interviewers, fluent in both English and a Pacific language. Once eligibility criteria were confirmed and informed consent was gained, mothers participated in one-hour interviews concerning the health and development of the child and family functioning. These interviews were carried out in the preferred language of the mothers. Detailed information about the cohort and procedures is described elsewhere.⁹

As part of the interview protocol, mothers were asked to what extent ('not at all', 'to some extent', 'a great deal') their homes had problems with dampness/mould and cold. Postnatal depression was assessed with the Edinburgh Postnatal Depression Scale (EPDS), a self-report instrument for which a score above 12 is widely used to indicate probable depressive disorder.¹⁰ The reliability coefficient of the EPDS for biological mothers in the PIF Study was 0.86. Mothers were also asked whether they had any of a range of health problems, including asthma that had been diagnosed by a doctor or for which the mother was currently taking medications.

Maternal and socio-demographic factors expected to influence reports of dampness/mould and cold housing problems, and relationships between these problems and depression and asthma, were assessed by univariate and multivariate logistic regression procedures.

Results

The cohort was made up of 87.1% of all eligible Pacific births that occurred in the period from 15 March to 17 December 2000. Of the 1376 mothers of the cohort (1.7% gave birth to twins), 47.2% self-identified their major ethnic group as Samoan, 21% as Tongan, 16.9% as Cook Islands Maori, 4.3% as Niuean, 3.4% as Other Pacific (includes mothers identifying equally with two or more Pacific groups, equally with Pacific and non-Pacific groups, or with Pacific groups other than Samoan, Tongan, Cook Island or Niuean), and 7.2% as non-Pacific. The mean (SD) age of mothers was 27 (6.2) years; 80.5% were married or in de facto partnerships; 33% were New Zealand-born; and 27.4% had post-school qualifications.

Problems with housing dampness or mould were reported by 509 (37%) and problems with cold housing by 740 (53.8%) mothers. Since only 376 (27.4%) mothers who reported dampness/mould to be a problem also reported that their homes were cold, the two problems were treated separately in analyses.

Table 1 lists variables examined for potential association with dampness/mould problems. For the categories within each variable the numbers and percentages of mothers who reported dampness/mould problems are shown, along with their respective univariate odds ratio (95% CI).

Table 1. Numbers and univariate odds ratios (OR) of problems with dampness in the home by selected variables

Variable Category	n	(% within category)	OR	(95% CI)
Maternal variables				
Age				
<20 years	30	(27.0)	1.00	
20–29 years	263	(36.6)	1.56	(1.00–2.43)
30–39 years	198	(39.7)	1.77	(1.13–2.80) [†]
40+ years	17	(38.6)	1.70	(0.81–3.55)
Born in NZ				
Yes	175	(38.6)	1.00	
No	334	(36.3)	0.91	(0.72–1.14)
Social marital status				
Partnered	419	(38.0)	1.00	
Non-partnered	90	(33.5)	0.82	(0.62–1.09)
Ethnicity				
Samoan	187	(28.8)	1.00	
Cook Island	75	(32.8)	1.21	(0.87–1.67)
Niuean	33	(55.9)	3.14	(1.83–5.40) [‡]
Tongan	142	(49.1)	2.39	(1.80–3.19) [‡]
Other Pacific*	23	(48.9)	2.37	(1.31–4.31) [§]
Non-Pacific	49	(49.5)	2.43	(1.58–3.73) [‡]
Education				
No formal qualifications	186	(34.8)	1.00	
Secondary school qualifications	164	(35.4)	1.03	(0.79–1.33)
Post-school qualifications	159	(42.3)	1.37	(1.05–1.80) [†]
English fluency				
No	188	(35.9)	1.00	
Yes	321	(37.8)	1.08	(0.86–1.36)
Years in NZ				
0–2	27	(26.5)	1.00	
3–5	61	(35.9)	1.55	(0.91–2.66)
6–10	55	(37.4)	1.66	(0.96–2.88)
>10	365	(38.4)	1.73	(1.09–2.73) [†]
Cultural alignment				
Low NZ low Pacific	91	(36.8)	1.00	
High NZ low Pacific	176	(40.5)	1.17	(0.84–1.61)
Low NZ high Pacific	162	(36.2)	0.97	(0.71–1.35)
High NZ high Pacific	75	(32.2)	0.81	(0.56–1.19)
Other variables				
Household income (annual)				
>\$40 000	67	(41.6)	1.00	
\$20 001–40 000	269	(38.0)	0.86	(0.61–1.22)
\$0–20 000	157	(34.4)	0.73	(0.51–1.06)
Unknown	16	(34.0)	0.72	(0.37–1.43)
Household size (persons)				
2–4	96	(33.9)	1.00	
5–7	254	(36.7)	1.13	(0.84–1.51)
8 or more	159	(40.2)	1.31	(0.95–1.80)
Housing tenure				
Owned or mortgaged	79	(31.9)	1.00	
Private rental	115	(34.8)	1.14	(0.81–1.62)
State rental	218	(44.6)	1.72	(1.25–2.37) [‡]
Other	97	(31.7)	0.99	(0.69–1.42)

Financial difficulty with housing costs				
No/slight difficulty	364	(32.6)	1.00	
Moderate difficulty	59	(51.3)	2.18	(1.48–3.21) [‡]
Great difficulty	83	(63.8)	3.65	(2.50–5.34) [‡]

*includes mothers identifying equally with two or more Pacific Island groups, equally with Pacific Island and non Pacific Island groups, or with Pacific Island groups other than Tongan, Samoan, Cook Island Maori or Niuean

[†]p <0.05; [‡]p <0.001; [§]p <0.01

NB: For some variables total participant numbers may be lower than 509 due to missing data.

To adjust for potential confounding effects all variables in Table 1 were simultaneously entered into a multiple logistic regression model. When controlling for the effects of all other variables, factors that were significantly associated with housing dampness or mould problems (p <0.05) were Niuean, Tongan, and non-Pacific ethnicity, a household size of eight or more people, state rental housing, and financial difficulty with housing costs.

Table 2 lists variables examined for potential association with cold housing.

Table 2. Numbers and univariate odds ratios (OR) of problems with cold in the home by selected variables

Variable Category	n	(% within category)	OR	(95% CI)
Maternal variables				
Age				
<20 years	47	(42.3)	1.00	
20–29 years	394	(54.8)	1.65	(1.10–2.47)
30–39 years	271	(54.2)	1.61	(1.06–2.44) [†]
40+ years	27	(61.4)	2.16	(1.06–4.42) [†]
Born in NZ				
Yes	220	(48.5)	1.00	
No	520	(56.5)	1.38	(1.10–1.73) [‡]
Social marital status				
Partnered	590	(53.3)	1.00	
Non-partnered	150	(55.8)	1.10	(0.84–1.44)
Ethnicity				
Samoan	379	(58.3)	1.00	
Cook Island	91	(39.4)	0.47	(0.34–0.63) [§]
Niuean	36	(61.0)	1.12	(0.65–1.93)
Tongan	157	(54.3)	0.85	(0.64–1.12)
Other Pacific*	26	(55.3)	0.89	(0.49–1.61)
Non-Pacific	51	(51.5)	0.76	(0.50–1.16)
Education				
No formal qualifications	319	(59.6)	1.00	
Secondary school qualifications	243	(52.5)	0.75	(0.58–0.96) [†]
Post-school qualifications	178	(47.2)	0.61	(0.46–0.79) [§]
English fluency				
No	335	(63.9)	1.00	
Yes	405	(47.6)	0.51	(0.41–0.64) [§]

Years in NZ				
0–2	61	(59.8)	1.00	
3–5	103	(60.6)	1.03	(0.63–1.71)
6–10	82	(55.8)	0.85	(0.51–1.42)
>10	493	(51.7)	0.72	(0.48–1.09)
Cultural alignment				
Low NZ low Pacific	104	(41.9)	1.00	
High NZ low Pacific	214	(49.1)	1.34	(0.98–1.83)
Low NZ high Pacific	300	(67.1)	2.83	(2.05–3.89) [§]
High NZ high Pacific	117	(50.2)	1.40	(0.97–2.00)
Other variables				
Household income (annual)				
>\$40 000	71	(44.1)	1.00	
\$20 001–40 000	383	(54.0)	1.49	(1.06–2.10) [†]
\$0–20 000	265	(58.0)	1.75	(1.22–2.51) [‡]
Unknown	21	(43.8)	0.99	(0.52–1.89)
Household size (persons)				
2–4	141	(49.8)	1.00	
5–7	368	(53.1)	1.14	(0.87–1.50)
8 or more	231	(58.0)	1.39	(1.03–1.89) [†]
Housing tenure				
Owned or mortgaged	108	(43.5)	1.00	
Private rental	182	(55.0)	1.58	(1.14–2.21) [‡]
State rental	296	(60.4)	1.98	(1.45–2.70) [§]
Other	154	(50.3)	1.31	(0.94–1.84)
Financial difficulty with housing costs				
No/slight difficulty	577	(51.6)	1.00	
Moderate difficulty	64	(55.2)	1.15	(0.79–1.70)
Great difficulty	96	(73.8)	2.64	(1.76–3.98) [§]

*includes mothers identifying equally with two or more Pacific Island groups, equally with Pacific Island and non Pacific Island groups, or with Pacific Island groups other than Tongan, Samoan, Cook Island Maori or Niuean

[†]p <0.05; [‡]p <0.01; [§]p <0.001

NB: For some variables total participant numbers may be lower than 740 due to missing data.

To adjust for potential confounding effects all variables in Table 2 were entered simultaneously into a multiple logistic regression model. When controlling for the effects of all other variables, factors that were significantly associated with cold housing (p <0.05) were mother's age being between 20 and 29 years, a household size of eight or more people, rental housing (state or private), and reporting great financial difficulty with housing costs. The odds of reporting problems with cold housing were significantly reduced for Cook Islands mothers compared with Samoan mothers; mothers with post-school qualifications compared with mothers with no formal qualifications; mothers fluent in English; and mothers who, relative to others in the study, demonstrated lower levels of alignment with both New Zealand and their Pacific cultures.¹¹

Ninety nine mothers (7.2%) reported having asthma and 16.3% were identified by the EPDS as being probable cases of depression. In multivariate analyses that controlled for maternal age, ethnicity, education, marital status, birthplace, number of years lived in New Zealand, and household income, damp/mouldy housing was significantly associated (p <0.01) with maternal asthma (adjusted OR = 1.82; 95% CI = 1.18–2.83), and probable depression (p <0.05; adjusted OR = 1.40; 95% CI = 1.02–1.91). Cold housing was also significantly associated (p = 0.02) with asthma (adjusted OR = 1.73;

95% CI = 1.10–2.71) and probable depression ($p < 0.01$; adjusted OR = 1.57; 95% CI = 1.14–2.15).

Discussion

Thirty seven per cent of mothers reported that their homes were damp. While this figure is in line with international findings that show dampness rates varying from 30–37% in Canada and Great Britain,^{1,12} to 60% in Taiwan,¹³ it is elevated compared with the 26% dampness rate reported by Auckland public housing applicants in another New Zealand study.⁶ Cold housing, reported by 53.8% of our mothers, also appears to be a significant problem. Cold and damp are often related and it is possible that participants who report cold housing are experiencing the combined effects of low temperature and high humidity.² While reliance on subjective measures of housing problems used in this study could be criticised on the basis of a lack of precision and an increased risk of reporting bias, several studies have demonstrated that questionnaire methods are a good indicator of the presence of housing problems and that respondents often underestimate the existence of problems in their homes.^{14,15}

Several studies have linked damp/mouldy and cold housing with respiratory illness,^{1–5} with some studies demonstrating a dose-response relationship and more severe asthma occurring as dampness levels increased.¹⁵ Studies have also found associations between poor housing conditions and mental health.^{3,4}

While the effects were small, significant links were found in the present study between cold and damp housing and two facets of maternal health. Multivariate analyses revealed that mothers who reported problems with dampness/mould and cold were at greater risk of having asthma and of having postnatal depression. As many Pacific people do not have a regular general practitioner or use preventive medication,¹⁶ estimates of asthma in the PIF Study are likely to be conservative, especially given that the measurement was based on diagnosis and medication rather than the presence of symptoms.

The underlying mechanisms of how cold and damp housing adversely affect health are not clear. Cold indoor temperatures encourage condensation,¹⁷ and it is known that viruses, bacteria, fungi and dust mites tend to flourish in damp conditions.^{18–20} An allergic reaction to fungi or dust mites is believed to be the most likely mechanism for triggering respiratory symptoms, although toxic mechanisms might also play a part.^{21,22} Allergen exposure, while associated with asthma, may not have an aetiological role in the development of asthma.²³

Concerns about the ill effects of damp conditions on the health of household members, a reluctance to host guests to a damp and mouldy home, and the financial burden of property damage may explain emotional distress.³ However, it is also possible that depressed mothers may be more inclined to report housing problems.

In multivariate analyses, five factors were associated with damp/mouldy housing problems and eight with cold housing. If knowledge of risk factors are to be used to inform prevention efforts, attention should be directed to factors that are amenable to change. In this regard, reducing household size, improving standards of state rental housing and providing high-risk groups with information to minimise dampness and cold housing should be of priority for housing and health agencies working with

Pacific families. Factors that are not amenable to change, such as age and ethnicity, can be used to target specific groups.

A number of authors suggest that a reduction in dampness in the home, such as with the provision of good home heating, would help alleviate symptoms of poor health.^{4,15,24} Others advocate increased ventilation, use of dehumidifiers or air conditioning,²⁵ extraction fans, and good insulation to minimise accumulation of moisture.²⁶ Specific measures to reduce mould growth and concentrations of house dust mites may also be beneficial, particularly for asthma sufferers. Some solutions are fairly simple while procedures such as installation of insulation come at considerable expense.

As it has been suggested that few New Zealand homes are heated to the recommended temperature range,²⁷ further research is required to ascertain whether cold and damp housing problems are more endemic among Pacific peoples and the Auckland region or more widespread across New Zealand households. Meanwhile, it is essential to initiate strategies to prevent respiratory disease, as it imposes a high social burden and cost on society.¹⁹

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Complications of endoscopic retrograde cholangiopancreatography

Dinesh Lal, Mark Lane and Philip Wong

Abstract

Aim The aim of this prospective study was to audit all endoscopic retrograde cholangiopancreatographic (ERCP) procedures performed between July 1999 and November 1999, in particular to determine the spectrum and rate of complications.

Methods An audit data sheet was designed with 100 variables on which the endoscopist recorded all the relevant details of the procedure, from patient demographics to overall success of the procedure. Data were collected at the time of ERCP and before discharge. Any complications within 30 days of ERCP were also recorded.

Results Of 210 consecutive patients audited, successful diagnostic and therapeutic ERCP was performed in 93% with an overall complication rate of 9.5%. The incidence of pancreatitis was 4.76% and haemorrhage 2.38%. No severe complication or procedure-related mortality occurred.

Conclusion The most common complications of ERCP were pancreatitis and haemorrhage.

The Department of Gastroenterology and Hepatology at Auckland Hospital provides a diagnostic and therapeutic endoscopic retrograde cholangiopancreatographic (ERCP) service for patients within its catchment area in addition to serving the Northland Base Hospital (Whangarei). ERCP was first introduced in 1968,¹ and since then has evolved from a purely diagnostic to therapeutically challenging procedure with inherent risks of life-threatening complications. Although ERCP is an indispensable endoscopic procedure it is important to have ongoing prospective audit of the procedure as a tool of quality control. Wong et al in Auckland have previously published outcomes of ERCP for the treatment of choledocholithiasis.² However, to date there are no published data on the spectrum and rate of ERCP complication in New Zealand. The aim of this prospective study was to audit all consecutive ERCPs performed over a five-month period, and in particular to determine the spectrum and rate of complications.

Methods

An ERCP audit data sheet was designed for all patients undergoing ERCP at Auckland Public Hospital between July and November 1999. This data sheet held information on approximately 100 patient variables including patient demographics, referral source, indication for ERCP, relevant investigation before ERCP, episode number (if the ERCP was being done for the first, second or third time, etc), and other details of the therapeutic procedure.

The audit sheet was to be filled by the endoscopist at the time of generating the ERCP report, which usually was just after the procedure. In addition to the above information, the endoscopist was asked to record information regarding the names and dosages of drugs used during the procedure, and the

therapeutic procedures undertaken, including sphincterotomy, stone extraction, stenting and stricture dilatation.

Overall success of the procedure was graded by the endoscopist as complete or failed. Final diagnosis and any immediate complications were also noted on the audit sheet.

Patients were informed via a notice in their ERCP information sheet (usually sent to patients with notification of their appointment date and time) that there was a possibility they may be contacted within a few weeks of the ERCP by telephone regarding any major complications they may have suffered after their procedure.

ERCP was defined as a therapeutic procedure where endoscopic sphincterotomy or drainage procedure was carried out alone or in combination.

Severity of complication was graded as mild if the complication resulted in the patient staying in hospital for 1 to <4 days, moderate for 4 to 10 days, and severe for >10 days or if the patient required ICU admission, or surgical or invasive radiological intervention.

Pancreatitis was defined as significant abdominal pain post-ERCP requiring IV analgesia and amylase greater than one and a half times the normal.

Significant bleeding was defined as clinical evidence of haemorrhage requiring blood transfusion and not minor endoscopic bleeding only.

All patients, not already on antibiotics, with cholestatic liver function tests and suspected biliary obstruction received prophylactic antibiotics. The standard antibiotic protocol was a combination of amoxicillin and gentamicin given intravenously. Patients already on antibiotics continued treatment and additional antibiotics were administered to ensure adequate coverage of gram-negative organisms. ERCP-related complications were noted by contacting patients who lived outside the Auckland Public Hospital area via telephone 30 days after the procedure. If a patient in the Auckland Hospital area is admitted with an ERCP-related complication the endoscopist performing the procedure or the Gastroenterology Department is routinely informed. However, the medical records of all patients who had undergone ERCP, living within Auckland Hospital region, were reviewed more than 30 days after the procedure to ensure reporting of complications was not missed.

All data were entered on an Excel spreadsheet and relevant analysis derived.

Results

A total of 210 patients were audited and complete data were available. Demographic characteristics are shown in Table 1.

Table 1. Age, sex and other characteristics of patients under study

	n	%
Sex		
Male	102	49
Female	108	51
Average age	56	
Inpatient	147	70
Outpatient	63	30
Referral source		
Gastroenterology Department	32	15
Liver transplant	22	10
Medical service	29	14
Surgical service	67	32
Northland Base Hospital	42	20
Oncology	5	2
Other	13	6

Sex distribution for ERCP was similar. The youngest patient undergoing the procedure was six, while the eldest was 92.

Thirty per cent of the ERCPs were performed as outpatient or day-stay procedures. Twenty per cent of patients were referred from Whangarei and Kaitia hospitals.

Auckland Hospital, as a provider of tertiary services, received a significant number of complex cases from outside the region from as far south as Napier. All ERCPs were performed by one of three different primary endoscopists.

Indications in patients presenting for ERCP are listed in Table 2. Choledocholithiasis was the most common, followed by pancreatitis. Three patients presenting with cholestatic liver function tests were found to have primary sclerosing cholangitis.

One third of all ERCPs were performed on patients who had previously undergone at least one ERCP procedure.

Table 2. Indications for ERCP

Indication	n	%
Cholestatic liver function test	43	20.48
Choledocholithiasis	54	25.71
Pancreatitis	46	21.90
Malignant biliary obstruction	24	11.43
Stent occlusion/change	38	18.10
Pancreatic pseudocyst	3	1.43
Sphincter of Oddi dysfunction	2	0.95

As shown in Table 3, ERCP was unsuccessful in 7% of patients. The predominant cause of failure was inability to reach papilla secondary to either gastric outlet obstruction or Billroth II gastrectomy. The success rate of ERCP was 93%.

Table 3. Diagnostic and therapeutic features of ERCP

	n	%
Attempted ERCP	210	100
Failed ERCP	15	7
Diagnostic only	54	26
Therapeutic	141	67

A total of 20 complications were recorded (Table 4); all except one occurred in the setting of therapeutic intervention. The one patient who had a complication after diagnostic ERCP developed mild post-ERCP pancreatitis. The most common complication was pancreatitis, followed by haemorrhage and cholangitis.

Table 4. Complication types post-ERCP

Complication	n	% therapeutic (n = 141)	% total (n = 210)
Pancreatitis	10 (1 in diagnostic)	6.38	4.76
Haemorrhage	5	3.55	2.38
Cholangitis	4	2.84	1.90
Drug reaction	1	0.71	0.48
Total	20	13.48	9.52

Notably, there was no severe ERCP-related complication or procedure-related death.

The severity of the complications suffered is shown in Table 5. Of the nine patients who had mild complications, five were due to pancreatitis, two due to haemorrhage, and one each to cholangitis and drug reaction.

Table 5. Complications of ERCP by severity

Severity	n	% therapeutic (n = 141)	% total (n = 210)
Mild (1 to <4 days)	9 (1 in diagnostic)	5.67	4.29
Moderate (4 to 10 days)	11	7.80	5.23
Total	20	13.48	9.52

The aetiology of complications is shown in Table 6. Pancreatitis was the most common moderate complication and although not shown in the tables the frequency of moderate-to-severe complication rate for different endoscopists were similar. Two of the three patients who developed cholangitis had malignancy-related biliary stricture and one patient had choledocholithiasis.

Table 6. Aetiology of moderate complications of ERCP

Complication	n	% therapeutic (n = 141)	% total (n = 210)
Cholangitis	3	2.13	1.43
Haemorrhage	3	2.13	1.43
Pancreatitis	5	3.55	2.38
Total	11	7.80	5.24

Discussion

An overall ERCP complication rate for Auckland Hospital of 9.5% is quite acceptable with moderate-to-severe complication being only 5.2%. All of our moderate-to-severe ERCP-related complications were in therapeutic ERCs at a rate of 7.8%. This is similar to the British survey (10%) reported by Tanner¹ and is supported by the study by Loperfido et al in which there was a fourfold higher complication rate in the therapeutic than in the diagnostic ERCP group.³

Our moderate pancreatitis rate of 3.5% in the therapeutic group is consistent with the commonly quoted international rates,⁴⁻⁶ as was our moderate haemorrhagic complication rate.⁵ It is important to note that none of our patients developed severe pancreatitis or had pancreatitis-related deaths.

All three of our moderate cholangitis complications received adequate antibiotic prophylaxis (gentamicin and amoxicillin) and ERCP in one of these cases was technically complete and performed by an experienced endoscopist.

It is important to note, however, that although none of our patients developed a severe complication requiring ICU admission, interventional therapeutic radiological procedure or surgery, or resulting in procedure-related death, this may not be true in an audit of a larger number of cases over a longer period of time.

In summary, this audit of 210 patients attending Auckland Hospital over a five-month period revealed an overall ERCP-related complication rate of 9.5%, a moderate complication rate of 5.2%, and none of the patients developed severe complications or died as a direct result of the procedure. Pancreatitis was the most common complication (4.76%) and our complication rates are within internationally acceptable norms.

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Transport services under stress: patient air transfers due to industrial action in Christchurch

Peter Dzendrowskyj, David Bowie and Geoffrey Shaw

Abstract

Aims On 2 and 3 December 2001, widespread industrial action by nursing staff in the five public hospitals in Christchurch resulted in a minimal number of nurses being available for inpatient care. The major hospital affected was Christchurch Public Hospital. Mass transfer of patients (and relatives) occurred, by road to local, private nursing homes, and by air to hospitals throughout New Zealand. This caused disruption at both a local and national level. This paper discusses the process by which air transfers took place and the lessons learnt from the experience.

Methods The reduction of inpatient numbers in this tertiary referral hospital was necessary in anticipation of a full withdrawal of labour by the nursing staff. All patients identified as potentially transferable were individually assessed as to the risk of remaining in an understaffed hospital versus that of transfer. The Intensive Care Unit (ICU) coordinated the triage of patients and organised air transfers. All elective work was suspended. Following strike action, all patients transferred were returned to Christchurch as rapidly as possible.

Results Eighty four patients were identified for air transfer. Eight were unfit for transfer and, of the remainder, 43 were transferred with their relatives in a six-day period before the industrial action began. This required the services of all medical air transport facilities within New Zealand, placing the aeromedical retrieval services under considerable stress. The hospital was reduced to 20% capacity at strike commencement (from 650 beds to 148). Intensivists performed nursing duties in the ICU.

Conclusions Two days of strike action resulted in 15 days of local and national disruption. Central coordination of all aero-medical transfer services, hospital teams, ambulance and social services was essential. The provision of 'family packages' was useful in assisting with the marked disruption experienced by patients and relatives.

Air transfers are a common method of transporting patients around New Zealand and transport facilities have expanded to cope with the numbers of patients requiring transfer. The mass transfer of patients generally only occurs in times of civil emergency,^{1,2} in military conflict,^{3,4} or in the event of a major disaster,^{5,6,7} where government involvement and national emergency situation planning come into play. Industrial action occurring in a hospital is a significant event causing disruption, stress and financial difficulties to those involved.^{8,9} In December 2001, the transport facilities of the whole of New Zealand were stretched to the limit as patients were transferred around the country in response to industrial action in one tertiary referral hospital, without the aid of national emergency procedures.

Throughout the latter half of 2001, industrial unrest among nursing staff in Canterbury District Health Board culminated in industrial action taken over a 50-hour period over 2 and 3 December, when minimal nursing staff were available for duty in the hospital.

All district health board hospitals (five) were affected, in particular, Christchurch Hospital (650 beds). There was only one full-time nurse available to staff the ICU, which contains sixteen beds. The only staff available to perform nursing duties were a combination of senior nursing management, doctors, hospital managers, and nurses attending from out of the region. With the exception of the nurse specialists, none of these staff was familiar with surroundings and procedures.

With negotiations at an impasse, an eight-point contingency plan was instituted.

1. Elective admissions, outpatients and elective surgery were cancelled one week before the industrial action. However, emergency admissions were still admitted and operated upon.
2. Local nursing homes, GPs and tertiary referral hospitals throughout New Zealand were contacted, with a view to transferring patients out of Christchurch Hospital.
3. All patients who could potentially be transferred out of the hospital were identified and individually assessed as to the appropriateness of transfer.
4. Patients were divided into:
 - those fit for local transfer (mainly medical patients, able to be cared for by local nursing homes and transferred by road);
 - those requiring distant transfer (mainly critically ill and surgical patients, requiring transfer by air to distant hospitals);
 - those unfit for transfer.
5. Transfers of patients commenced six days before the proposed industrial action.
6. During the industrial action, all patients admitted to hospital were to be assessed as to the appropriateness of transfer to distant sites.
7. After the industrial action, all patients transferred out of Christchurch Hospital were to be returned as quickly as possible.
8. When all patients were returned, services could resume normal activity.

Methodology for air transfers

Two intensive care doctors were released from clinical duties, initially to transfer patients. As the workload increased, they coordinated the overall transfer process as well. In addition, one non-clinical coordinator was involved.

Patients were transferred out of, and then back into, Christchurch Hospital over a fifteen-day period, commencing six days before the strike.

All the suitably trained aeromedical teams of New Zealand were contacted; Christchurch, Wellington, Auckland and Dunedin air transfer services were all actively involved.

A designated individual contacted all hospitals throughout New Zealand, several times a day, in order to discuss possible transfers.

Other hospitals in the health board were contacted daily regarding potential transfers. In addition, each medical and surgical team in Christchurch Hospital supplied a list of proposed patient transfers. There was initial apathy and disbelief amongst staff that industrial action would indeed proceed, and that a negotiated settlement could not be reached.

A number of issues were considered for each patient before they could be designated suitable for transfer (Appendix 1).

On the morning of transfer, hospitals and receiving teams were re-contacted, pilots and weather updates were obtained and ambulances were booked to transfer patients to and from the airports.

Results of transfer planning

Prior to industrial action All patients requiring tertiary care facilities (medical, surgical, neonatal and critically ill patients) were assessed for air transfer.

Medical patients considered suitable for residing in local rest or nursing homes for the 50-hour period of industrial action were transferred by road.

Of the 84 patients initially referred by departmental teams for air transfer:

- 43 patients were transferred by air. The number of transfers per medical specialty can be seen in Table 1. As expected, the majority of patients transferred were critically ill (intensive care and post-surgical patients), as these were the patients most in need of tertiary medical care.
- 15 went by road to local nursing homes or were discharged from hospital.
- 8 were deemed 'unfit for transfer' due to medical or social reasons (Table 2).
- 18 remained on wards in Christchurch Hospital during the industrial action, or went home temporarily.

A further two patients were transferred during the strike period, making a total of 45 patients transferred by air as a result of the industrial action.

Table 1. Patients transferred by specialty

Specialty	No of patients
ICU	11
Surgical	9
general	7
orthopaedic	1
gynaecology	1
Paediatric	4
surgical	2
paediatric oncology	2
Cardiothoracic	4
Neonatal	4
Haematology	2
Neurosurgical	2
Medical	2
Surgical HDU	2
Spinal	2
Medical HDU	2
Antenatal	1
TOTAL	45

HDU = high dependency unit

Table 2. Patients deemed ‘unfit for transfer’

1	17-year-old female with encapsulated splenic haematoma post-trauma
2	23-year-old female with metastatic carcinoma of breast with poor pain control
3	31-year-old female ventilated and ionotrope dependent on ICU with necrotizing fasciitis having hyperbaric O ₂ therapy
4	37-year-old female with community-acquired pneumonia on non-invasive ventilation
5	56-year-old male with empyema and broncho-pleural fistula with two chest drains in situ
6	64-year-old male with fibrosing alveolitis not responding to therapy
7	83-year-old male with acute subdural haematoma
8	86-year-old male with acute on chronic subdural haematoma with Glasgow coma scale 7/15

Patients were transferred throughout the country, causing national disruption. The majority of patients were transferred to Dunedin Hospital, (a 45-minute flight and 45-minute road transfer away), but all the major centres (and some minor centres) were involved (Figure 1). All available transfer teams were involved in the flights, with Christchurch performing the majority of transfers (Table 3).

Figure 1. Destinations of patients transferred by air

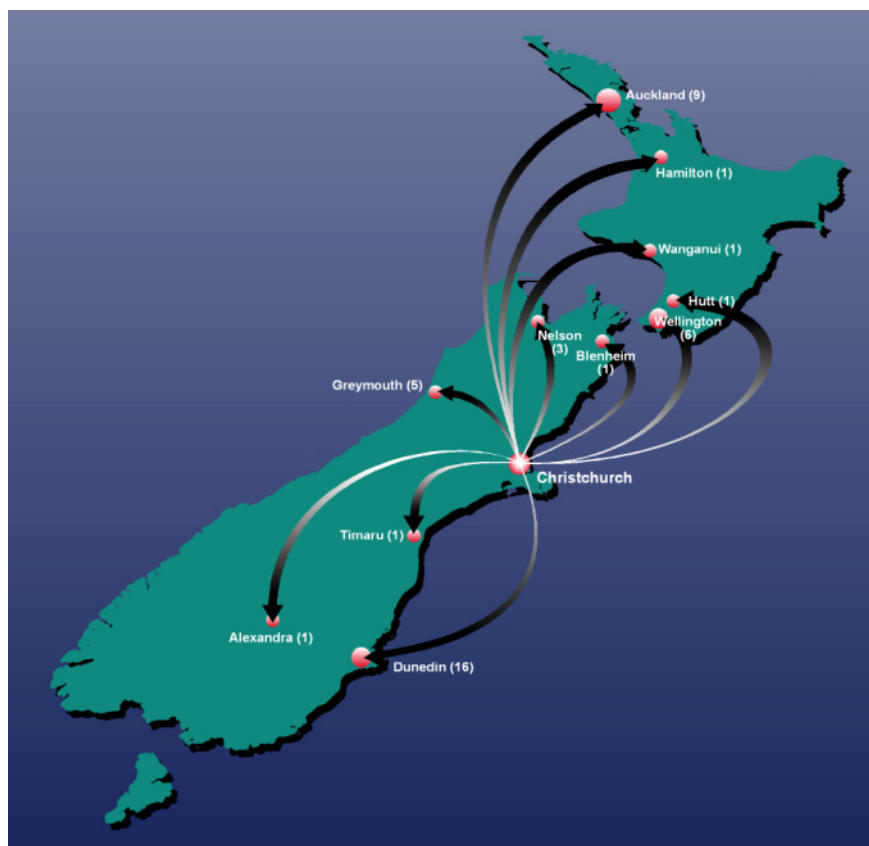


Table 3. Air transfers out of Christchurch by air transfer team

Christchurch	27
Wellington	10
Auckland (PAA)	5
Dunedin	1
Waikato	0
Commercial flight	2
Total	45

PAA = Pacific Air Ambulance

On a normal day an average of one patient is transferred by air to or from Christchurch. This number increased to over 12 a day at peak activity during the industrial action. At several times during this period, every available aero-medical team in New Zealand was in the air simultaneously with Christchurch patients. These teams also had their ‘normal’ emergencies to contend with.

Christchurch Hospital occupancy decreased by four fifths during the industrial action: from a capacity of 650 beds to 148 (Figure 2). All specialties were affected, especially general surgery – typically there are approximately 140–150 general surgical patients in the hospital at any one time, and this number fell to just 12 (Figure 3).

The non-emergency workload for ambulances more than doubled during the period of the strike (Figure 4).

Figure 2. Patient numbers in Christchurch Hospital during and around the time of industrial action

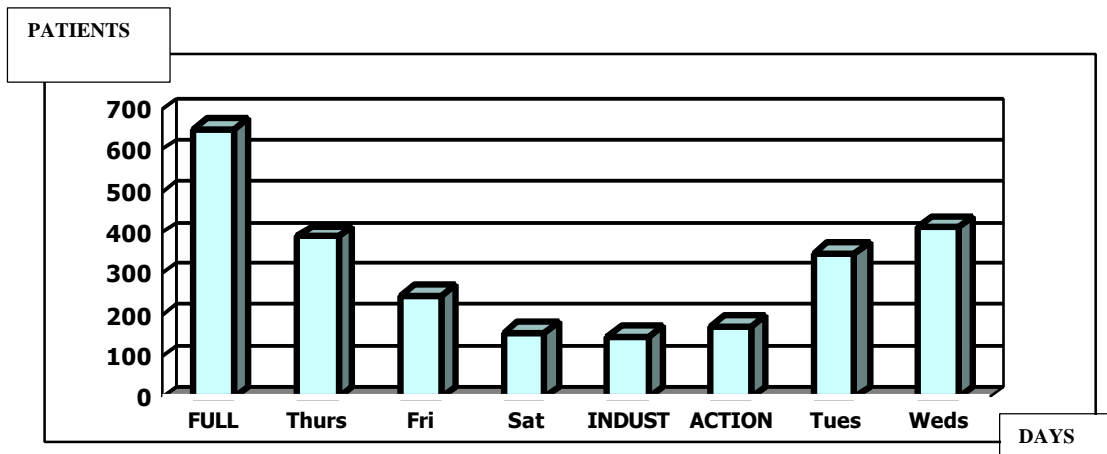


Figure 3. Number of patients per specialty remaining in Christchurch Hospital at start of industrial action (yellow bars), compared with typical day in September 2001 (blue bars)

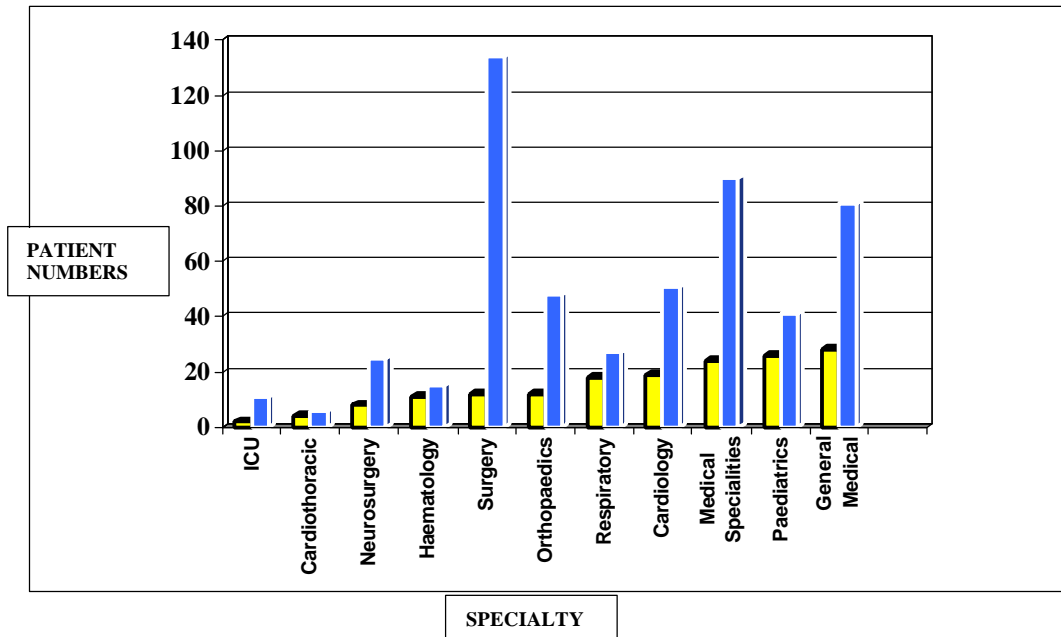
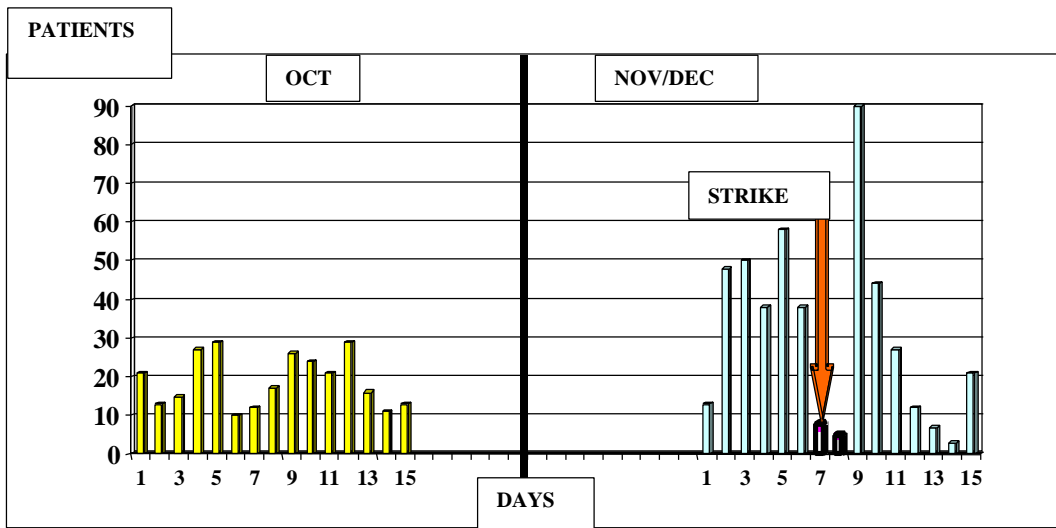


Figure 4. Additional non-emergency road transports around Christchurch, due to industrial action, compared with typical days in October 2001



During the industrial action All high-risk patients, including those unfit for air transfer, were transferred to a modified high dependency unit (HDU).

The coordinators visited every hospital ward twice a day. Patients whose condition had deteriorated were considered for transfer.

Each new admission to the HDU was assessed and discussed with the ICU coordinators. All potential transfers were seen and assessed. If the risks of staying outweighed those of transfer, the patients were moved.

Intensive care There were two patients in the ICU at the start of industrial action, increasing to six by the end (with one transfer out).

The Intensive Care Nurse Manager was available for nursing duties. In addition, there were three nurses, unfamiliar with the department, who volunteered their help.

Two intensive care specialists and a number of registrars were involved in nursing duties and bedside care of critically ill patients. This included the washing and turning of, and administration of medication to, ventilated patients. At times, nursing care of patients was compromised because of a lack of trained staff.

After industrial action Patient transfers back into Christchurch commenced immediately after the termination of industrial action; however, the clinical situation of many patients had altered and, in several cases, deteriorated.

Re-assessment of all the patients previously transferred was necessary. Away teams, when retrieving patients, assessed other Christchurch patients in that hospital at the same time. Comprehensive telephone handover also occurred, in order to ensure patient stability for transfer.

It took six days to return all patients to Christchurch. Weather conditions were frequently poor and hampered transfers, particularly across the Southern Alps. Yet again, all the available air retrieval teams in New Zealand were utilised (Table 4).

Table 4. Air transfers back into Christchurch by air transfer team

Christchurch	29
Wellington	5
Auckland (PAA)	4
Dunedin	3
Waikato	0
Commercial flight	5
Total	46 (1 antenatal became 1 postnatal + 1 neonatal)

PAA = Pacific Air Ambulance

The additional ambulance road transfers during the period immediately after industrial action tripled (Figure 4).

Normal hospital services did not fully resume until seven days after industrial action. The strike action caused fifteen days of hospital-wide disruption.

Discussion

There was initial hospital-wide reluctance from medical, nursing and management staff to transfer patients. Once it became clear that contract negotiations were failing, the transfer of patients became a priority and proceeded at a rapid pace, swamping transfer facilities.

On average, one patient a day is transferred in or out of Christchurch Hospital by air. At peak transfer periods during the strike, twelve to fifteen air movements a day

occurred, using every appropriate aircraft in New Zealand. We had estimated that the maximum number of patients who could be moved by air in any single day was 12. This was based on several variables, including pilot hours, weather, clinical status and severity of illness of individual patients, concurrent emergency transfers, and aircraft capacity, and included using all hospital-based transfer services in New Zealand (including the Metroliners based in Auckland and Wellington). Both road and air transfer services were stretched to the limit, with St John Ambulances having to draft in extra vehicles from out of the region.

The successful transfer of so many patients depended on reasonable weather conditions, patient load, and the goodwill of colleagues.

Every patient was assessed individually, and the benefits of transfer were balanced against the risks of remaining in a severely understaffed hospital. To date, no proven direct medical adverse events secondary to air transfer occurred. However, we have not yet been able to assess the psychological and emotional effects on patients, their families and staff. In addition, we have been able to assess neither the effect on morale nor the effect on inter-specialty relationships within the hospital.

There was added workload and stress on: social services, clerical staff, medical and surgical services, outpatient services, local GPs, nursing homes and other hospitals. This had not been adequately appreciated in the contingency planning that took place before the strike. In retrospect, extra staff should have been drafted in to help with the cancellation of outpatient appointments, photocopying and transfer of medical notes and X-rays, and aiding families affected by transfer.

This was a dispute that had a knock-on effect nationally, with other major hospitals cancelling elective surgery in order to accommodate Christchurch patients.

The cost of transferring and accommodating patients and relatives is estimated at over \$300 000. However, the cost of cancelling elective services and outpatient appointments, and the subsequent increase in hospital waiting lists is not known and seems impossible to estimate at present.

Recommendations

Should a similar situation ever occur in this, or any, hospital there are a number of recommendations that may be helpful:

1. Contingency planning should begin as soon as possible. Elective surgery should be cancelled one week in advance of the proposed action.
2. There should be on-site coordination among road ambulances, air ambulances and staff. Senior ambulance and medical staff should liaise closely. A dedicated area set aside for the transfers, with several telephone lines, should be available. There were competing priorities for transport facilities, and the presence of an overall coordinator helped with triage of patients and to avoid congestion.
3. Dedicated teams, with flight experience, should oversee the safe transfer of patients and be able to assess, liaise with and transfer each patient and their relatives, also keeping good records of the transfers.
4. For each patient, a checklist should be completed (see Appendix 1). This includes:

- patient factors: consent, IV access, cardio-respiratory stability, relatives being fully informed and flying with patient (if possible);
 - administrative factors: notes and X-rays present and transfer letter written; receiving hospital, team and ward all informed.
5. Social services should be immediately involved in planning stages, in particular to ensure the streamlined transfer and accommodation of relatives. This proved a major issue – patients were often transferred at short notice and there was frequently a delay before relatives followed, with accommodation available for them on arrival at the distant site. A dedicated team of social workers is necessary.
The extended family dynamics that exist in New Zealand (the whanau), give rise to a unique situation in the transfer of patient relatives. In one instance, the transfer of a terminally ill patient necessitated the transfer and accommodation of twenty two of their close relatives by commercial flight to a distant city.
 6. The formation of ‘family packages’ was particularly helpful. These were made up of taxi coupons, helpful telephone numbers, a small amount of cash (on occasions, patients were transferred late at night at short notice) and pens and paper. This gesture was much appreciated by relatives.
 7. A central database informing the transfer teams of the availability of beds around the country would help. It took one person several hours a day to work out the possible hospitals available for transfer and then to plan the appropriate transfer.
 8. Involvement of the military was considered and if the situation had worsened beyond civilian resource capabilities this would have been actively explored.
 9. The presence of a ‘central control’ with a single contact number is vital to provide a point of contact, to liaise with all teams and have an overall picture of the progress of events across several hospital sites.

Summary

The industrial action at Christchurch Hospital necessitated what we believe to be one of the largest recorded hospital transfers of civilian patients not due to a civil emergency. A literature search reveals only one other recorded mass transfer of patients due to industrial action anywhere in the world. During this strike patients were moved to another hospital 12 km away, not to distant areas of the country.⁹

In total, there were 91 air movements and an estimated 445 road movements in a fifteen-day period around the strike, causing a marked increased workload to transport services.

There were no documented medical adverse events directly attributable to the air transfers.

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Appendix 1. Checklist for inter-hospital transfers

1. **Transfer team informed** *Tick:*
2. **Patient details:** **NAME:** _____
 HOSPITAL NO: _____
 DOB: _____
3. **Diagnosis:** _____
4. **Name of informed sending specialist in ChCh** _____
5. **Ward in Christchurch Hospital** _____
6. **Name of informed receiving specialist** _____
7. **Name of informed receiving hospital** _____
8. **Name of informed receiving ward** _____
9. **Discharge summary completed (incl. current medication)** *Tick:*
10. **Notes and X-rays** *Tick:*
11. **Family informed** *Tick:*
12. **Clinical status**
- **Cardio-respiratory stable?**
 - **IV line needed and checked?**
 - **O₂ dependent?**
 - **On going treatment:**



One name to rule them all, one name to find them: Lord of the Rings and ‘seated immobility thromboembolism (SIT) syndrome’

Richard Beasley, Patricia Heuser and Matt Masoli

In 1954, Homans reported that venous thromboembolism (VTE) may occur after prolonged sitting in a number of situations including at the theatre, and during aeroplane flights and car travel.¹ Since this report, attention has focused primarily on the risk of VTE associated with prolonged air travel, with ‘traveller’s thrombosis’ now recognised as an important complication of long-distance air travel, particularly in persons with additional risk factors.^{2,3} More recently, we reported a case in which immobility associated with sitting for prolonged periods at a computer represented the major risk factor for a life-threatening VTE.⁴ The term ‘eThrombosis’ was used to describe this condition. It was suggested that, with the widespread use of computers in relation to work, recreation and personal communication, the potential burden of eThrombosis may be considerable. In this regard, it has been surprising that there has been only one published case report of eThrombosis,⁴ or indeed one published case of VTE due to cramped seating at the theatre.¹ In this report we present a case in which both being seated in cramped conditions at a picture theatre and repeated, prolonged sitting at a computer were recognised as two risk factors for the development of a proximal, lower-limb deep vein thrombosis (DVT).

Case report

A 53-year-old woman reported developing sudden onset severe pain in her right leg within 30 minutes of leaving the theatre. She had sat in cramped conditions in a provincial picture theatre for three hours watching the film ‘The Lord of the Rings: The Two Towers’. The following morning the pain had persisted and was associated with swelling of her right leg, and as a result she sought urgent medical review. A right, superficial femoral vein and popliteal vein thrombosis was diagnosed by Doppler ultrasound. No investigations of associated pulmonary embolism were undertaken due to the lack of respiratory symptoms. She received low-molecular-weight heparin and concomitant oral warfarin therapy, which was continued for a six-month period. In terms of relevant past medical history, she experienced a right, proximal, lower-limb DVT when aged 26, associated with oral contraceptive use. This DVT fully resolved with anticoagulant therapy, confirmed by a follow-up ultrasound. Further enquiry revealed that she often undertook prolonged computer use in which she would sit for two to three hours at a time without getting up.

Discussion

This case represents the second report in the medical literature of a DVT associated with sitting in cramped conditions at a theatre. The risk was probably also increased through the frequent, prolonged computer use in which the patient would sit for two to three hours at a time. Regardless of the relative contribution of the different situations in which the seated immobility occurred, this case does illustrate the

potential risks associated with prolonged sitting in cramped conditions. This situation is similar to that associated with long-distance air travel, of which 'traveller's thrombosis' is now a well-recognised outcome.^{2,3}

To encompass the wide range of situations in which prolonged sitting may lead to a VTE, we have coined the phrase 'seated immobility thromboembolism (SIT) syndrome'. The SIT syndrome would include immobility associated with long-distance travel (air, train and road), prolonged computer use at work or in recreation, other forms of employment or recreation that involve sitting for prolonged periods, and other situations such as being seated in cramped conditions at the theatre.¹⁻⁵ One name to rule them all, one name to find them (modified from Tolkien JRR, *The Lord of the Rings*, Allen & Unwin (London), 1954). Hopefully, the use of SIT as the acronym for this condition will encourage recognition of seated immobility as a risk factor for VTE and the implementation of measures to reduce its occurrence. Pending further research it would seem prudent to advise all persons who sit for prolonged periods, regardless of the situation, to undertake frequent foot exercises while seated, not to cross their legs when seated and to stand up and walk around regularly if possible.

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Making a diagnosis of pulmonary embolism – new methods and clinical issues

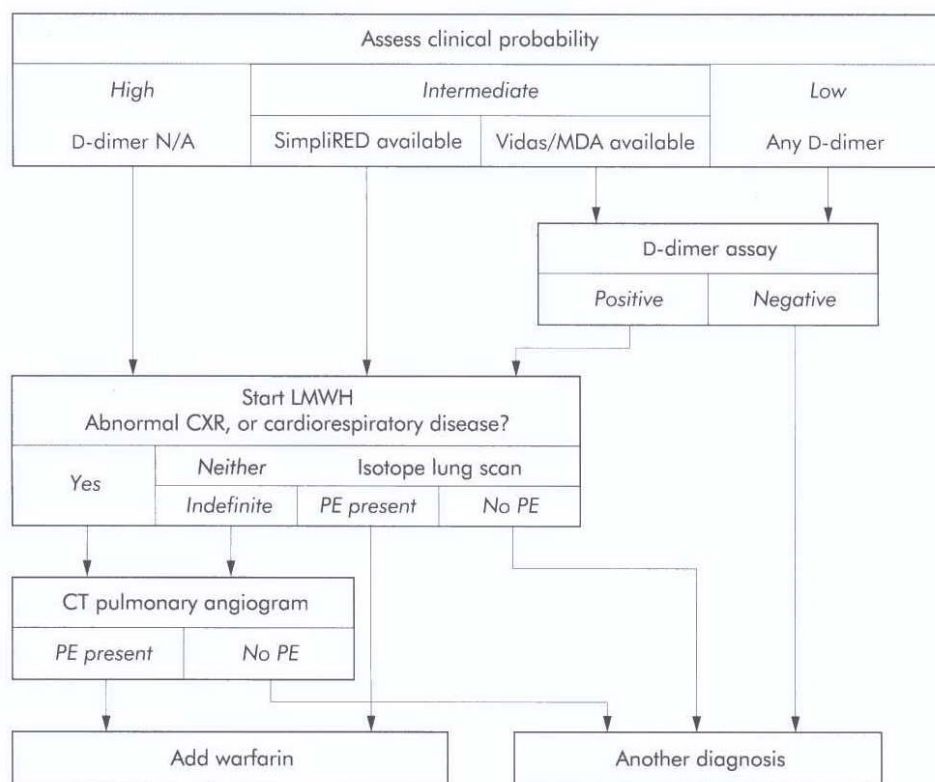
Stephen Iles, Lutz Beckert, Martin Than and Ian Town

Diagnosing pulmonary embolism (PE) can be difficult. Problems may arise not only because symptoms and signs can be non-specific or occult, but because in assessing the accuracy of any diagnostic test for PE there is no universally accepted reference standard.¹ There is a widespread, historical perception amongst doctors that the natural history of undiagnosed and therefore untreated PE encompasses a mortality rate of up to 30%.² The consequences of missing PE and the ease of recalling prior serious cases may lead to an overestimation of the probability of disease. This lowers the threshold for initiating investigation and has been described as the availability heuristic in cognitive psychology.³ Paradoxically, post-mortem studies have demonstrated that PE may also be missed if not suspected,⁴ and so PE is both under-diagnosed and over-investigated. The latest approaches and the clinical issues relevant to the investigation of those with possible PE are discussed.

The clinical approach to testing for PE

International and local evidence-based guidelines guide the clinician along the appropriate investigative route.^{5,6} Many published diagnostic algorithms exist, but the basic steps are similar in each. They acknowledge the importance of combining clinical judgement with imaging whilst recognising the limitations of each test. The steps are: an initial assessment of pre-test probability in conjunction with D-dimer measurement; then appropriate imaging, with additional testing if the result is inconclusive. As an example, the diagnostic algorithm suggested by the recently revised British Thoracic Society guidelines are shown in Figure 1.⁶

Figure 1. Management of suspected non-massive pulmonary embolism with isotope lung scanning available on site



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1. Assessing the pre-test probability of PE

Bayes' theorem states that post-test probability depends on the likelihood ratio of the test result and the pre-test probability. Hence, investigating those with suspected PE requires an initial assessment of clinical probability be made before testing. Clinicians are able to assess the pre-test probability of PE using their clinical judgement and taking into account findings in the history, examination, and results of basic investigation such as arterial blood gas measurements. Predisposing factors for PE are well known and found in the majority of those with PE (Table 1).⁶

Simple clinical scores have been derived from large cohorts of patients investigated for PE in order that the pre-test probability of PE can be categorised into low, moderate or high in a standardized way (Table 2).^{7,8} These clinical scores, termed the 'Geneva' and 'Wells' scores, have not yet been prospectively validated and were derived from selected populations. The Geneva score is disadvantaged by the need to obtain arterial blood gas measurements on air, and the Wells score has a high inter-observer variability.⁹ There is continued interest in deriving and validating such a clinical score that could be widely applied, as the determination of the pre-test probability of PE remains the cornerstone of the investigative approach.

Table 1. Major risk factors for PE⁶

Category	Comments
Surgery	Major abdominal/pelvic surgery Hip/knee surgery Post-operative intensive care
Obstetrics	Pregnancy Puerperium Caesarean section
Lower-limb problems	Fracture Varicose veins
Reduced mobility	Hospitalisation Institutional care
Malignant disease	Abdominal/pelvic Advanced metastatic
Miscellaneous	Previous proven venous thromboembolism (VTE)

Minor risk factors include: cardiovascular risks (eg, congestive cardiac failure and central vein catheters); oestrogens (eg, oral contraceptive or hormone replacement) and miscellaneous (eg, obesity, long-distance travel and thrombotic disorders).

Table 2. The Geneva and Wells pre-test probability scores^{7,8}

Geneva score	Points value*
Criterion	Points value*
Age	
60–79 years	+1
≥80 years	+2
Previous DVT or PE	+2
Recent surgery (<4 weeks ago)	+3
Heart rate >100/minute	+1
PaCO₂:	
<35 mmHg	+2
35–39 mmHg	+1
PaO₂:	
<49 mmHg	+4
49–59 mmHg	+3
60–71 mmHg	+2
72–82 mmHg	+1
Chest X-ray:	
Band Atelectasis	+1
Elevation of hemidiaphragm	+1

*Total score: <5 indicates a low probability of PE; 5–8 indicates a moderate probability of PE; >8 indicates a high probability of PE. DVT = deep vein thrombosis

Wells score	Points value*
Criterion	Points value*
Clinical signs of DVT	+3
Alternative diagnosis less probable than PE	+3
Heart rate >100/minute	+1.5
Immobilization or surgery <4 weeks ago	+1.5
Previous DVT or PE	+1.5
Haemoptysis	+1
Cancer	+1

*Total score: <2 indicates a low probability of PE; 2–6 indicates a moderate probability of PE; >6 indicates a high probability of PE. DVT = deep vein thrombosis

2. D-dimer

D-dimer is a by-product of endogenous fibrinolysis of clot that when measured has a high sensitivity but a low specificity for the diagnosis of PE. Therefore, the D-dimer test is most useful in helping to exclude PE in the presence of a negative result, particularly when combined with a low clinical probability score or when the respiratory rate is less than 21 breaths/minute.^{10,11} However, a small number of false negatives means that the D-dimer test is not recommended as the sole exclusionary investigation. The low specificity prohibits the use of a D-dimer measurement in making the diagnosis of PE through a positive result.

3. Imaging

VQ scanning, CTPA or lower-limb ultrasound can be used as the initial imaging step depending on chest X-ray appearances and the resources available at the hospital.

(a) VQ scanning A definitive result is more likely to be found in those without a history of airways disease or parenchymal abnormalities on the chest radiograph. The Prospective Investigation of Pulmonary Embolism Diagnosis (PIOPED 1) study found that determining prior probability influenced the likelihood of finding PE for any given ventilation perfusion (VQ) scan result. The investigators demonstrated that normal or near-normal VQ scans effectively excluded PE and that high probability scans made PE very likely; however, such results were found in a minority.¹² Bayes' theorem guides the clinician as to the appropriate next step: normal or near-normal VQ scans are sufficient to exclude PE, whatever the pre-test likelihood of PE. Low probability scans in combination with a low pre-test probability make the post-test probability of PE very low. High probability scans provide the predictive power to establish the diagnosis in the context of reasonable suspicion of PE. All other results have insufficient predictive power to rule PE in or out and further testing is recommended.

(b) Leg ultrasound Compression ultrasonography of the leg veins is useful as an initial imaging investigation in those with suspected PE if unilateral leg symptoms are present. However, a negative scan does not exclude PE and further lung imaging is warranted in these cases. Also, in those without leg symptoms the utility of ultrasound is limited, as only 5% of those screened were abnormal in one series.¹³

(c) Computerized tomography pulmonary angiography (CTPA) and venography As with many new tests, CTPA was initially heralded as a highly accurate and rapid method of diagnosing PE, validated in large tertiary centres with expertise and equipment. Early reports showed a sensitivity and specificity of greater than 95%, but later studies demonstrated that CTPA was only 70% sensitive in detecting small (segmental or smaller) PE.¹⁴ The clinical significance of smaller PE is still debated. Although CTPA may miss smaller PE, a recent study has shown a good outcome in those not anticoagulated after a negative CT and normal lower-limb ultrasound.¹⁵ Consequently, the most recent British Thoracic Society guidelines advocate CTPA and suggest withholding anticoagulation in those with a negative scan provided that it is of sufficient quality with good visualization of the pulmonary arteries.⁶ CTPA is available 24 hours a day, expedites the diagnosis and is indeterminate in fewer than 10% of those tested. It is disadvantaged by a large radiation dose and is relatively

contraindicated in those with renal impairment. The addition of contrast venography to CTPA promises a 'one-stop' diagnostic test for the lower limbs and chest. The utility of the combined test remains to be assessed in the forthcoming PIOPED 2 trial.¹⁶

4. Additional testing if required

All of the above imaging modalities have limitations of which the clinician needs to be mindful when drawing conclusions about the absence of PE. Moderate probability VQ scans and negative leg ultrasound have insufficient negative predictive value to exclude PE. The same applies for a low-probability VQ scan in the presence of moderate or high pre-test probability of PE. Further imaging is therefore warranted in these cases. The local availability of tests determines which to use but they include the first-line investigations mentioned, together with conventional pulmonary angiography and, more recently, magnetic resonance angiography. Magnetic resonance angiography is the newest method and continues to be evaluated.¹⁷

Which test should be used first?

If the clinician has different tests to use, which is the most appropriate? The initial step is assessment of the probability of PE followed by D-dimer test. This approach is used for triage of low-risk patients who need no further investigations for PE. VQ scanning is recommended in those with a normal chest radiograph and no prior lung disease if facilities exist at the investigating centre, as this approach is cost effective.¹⁸ However, when a rapid evaluation of the pulmonary arteries is required out of hours, or when parenchymal abnormalities are evident on the radiograph, CTPA is suggested. CTPA is recommended as cost effective when incorporated into a diagnostic algorithm and combined with other tests such as D-dimer, but not yet as a stand-alone test.¹⁹

New tests create new clinical issues

CT technology is advancing rapidly. Multi-detector scanners with greater and faster data acquisition will shortly replace the first generation of single-detector spiral CT scanners. Thus, with improved imaging smaller PE may be detected that would otherwise not be discovered. And so a new clinical problem arises: what is the risk-to-benefit ratio of anticoagulation in those with sub-segmental PE, no other clot burden and no ongoing risk factors for venous thromboembolism? We may soon uncover the pathophysiology of other diseases, such as pneumonia, in which small, localised thrombi may be autolysed by endogenous mechanisms. Pulmonary emboli that were never previously discovered may not need to be treated.

With CTPA, direct visualization of clot in the main pulmonary trunk or branches is possible. In the normotensive patient with large pulmonary clot burden, should we be considering more aggressive treatment? Treatment for thrombolysis in those with shock and massive PE is contained in guidelines for the treatment of PE,¹⁹ but new evidence suggests a benefit in those with sub-massive PE also.²⁰ Many of the clinical questions surrounding the management of patients with suspected PE are amenable to research both locally and internationally. The Canterbury Respiratory Research Group is currently participating in a variety of such studies. Despite the complexities of the clinical issues in the diagnostic approach to PE, sufficient evidence now exists to guide the clinician. To this end, the most recent guidelines by the British Thoracic

Society serve as an up-to-date and useful tool for both senior and junior clinicians faced with this common diagnostic challenge.⁶

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Lignocaine neurotoxicity following fibre-optic bronchoscopy

Karl Rodins, Michael Hlavac and Lutz Beckert

A 70-year-old man was referred to the Respiratory Service at Christchurch Hospital for investigation of haemoptysis by bronchoscopy. The patient had ischaemic heart disease and atrial fibrillation. His medications included atenolol, frusemide, allopurinol, captopril, Mylanta and warfarin (INR 3). He had history of neither seizure activity nor other diseases of the central nervous system. Morphine 10 mg IM and atropine 0.6 mg IM were given 60 minutes prior to the procedure. No short-acting benzodiazepine was used.

The following regimen for local anaesthesia of the airway was used. Fifteen minutes prior to the procedure the patient received lignocaine 5 ml 4% (200 mg) via a nebulizer. Thereafter, 10 ml 4% lignocaine gel (400 mg) was applied within the nasal passage. At the beginning of the bronchoscopy, 10 ml of 4% lignocaine (400 mg) was applied to the vocal cords. Two applications of 10 ml of 1% lignocaine (200 mg) were then made to the right and left upper lobes. In total, the patient received 1200 mg of lignocaine.

The procedure was uncomplicated. Oxygen saturations were maintained above 95% using 2 l/min of oxygen via nasal prongs. Bronchial washings were taken; no cause for the haemoptysis was identified. The total time taken to complete the bronchoscopy following intubation was 10 minutes.

About five minutes following the procedure, the patient became drowsy and experienced a generalized tonic-clonic seizure. The seizure lasted about two minutes and was self-limiting. Thirty minutes after this event, the patient's prolactin level was 823 mIU/L (normal range 80 to 350 mIU/L). The patient was observed for 24 hours and discharged without any further treatment. He remained well six weeks following this episode.

His lignocaine level was 32.7 $\mu\text{mol/l}$ 30 minutes following the procedure. Lignocaine is potentially toxic at levels greater than 30 $\mu\text{mol/l}$. The lignocaine level may have been as high as 40 $\mu\text{mol/l}$ at the time of the seizure. According to the 'Adverse Drug Reaction Probability Scale',¹ this patient *probably* had a seizure secondary to lignocaine toxicity through mucosal absorption. Nebulization and absorption through the mucosa is a potent form of drug delivery used in therapeutic settings.

Morphine is a useful drug to minimize the cough reflex and sedate the patient, but it also lowers the seizure threshold.² Seizures have also been particularly noted on the withdrawal of narcotic drugs.³

The 1200 mg of lignocaine used equates to 16 mg/kg although some would be suctioned out or swallowed. Little of the swallowed lignocaine would be absorbed. There is also no correlation between doses of lignocaine and peak concentrations.^{4,5} Neurotoxicity may begin with plasma concentrations of 5–6 g/l.⁶ However, in a series of 12 patients receiving on average 622 mg lignocaine, no patients exceeded the toxic concentration.⁴ In a position paper on fibre-optic bronchoscopy in adults published by

the Thoracic Society of Australia and New Zealand,⁷ the maximal dose of lignocaine suggested was 512 mg.⁵ This is far less than the doses of lignocaine used in our institution.

Although neurotoxicity through mucosal absorption is a rare complication following a bronchoscopy, this case highlights that topical lignocaine should be used sparingly.

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The disease of the mind

This extract is taken from the Presidential Address by SA Gibbs MB CM Edin, given at the Annual Meeting of the British Medical Association (New Zealand Branch) and published in the New Zealand Medical Journal 1903, Volume 3 (9), p1-13

The whole trend of modern medicine and surgery is in the direction of the prevention of disease, or of its arrest in the earliest stage possible, and, with this object in view, in cases of general or infectious disease provision has been made for the voluntary treatment and isolation of such cases as cannot be treated at home, or for the compulsory treatment of such cases as are a danger to the community; but the same facilities are not granted in cases of the disease of the mind.

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Pulmonary embolism with cavity formation, spontaneous pneumothorax, and high-output air leak in a patient with non-small-cell lung cancer

A 49-year-old man with a non-small-cell lung cancer (right lung) suffered a pulmonary embolism in the left lower lobe with cavity formation, complicated by spontaneous pneumothorax (Figures 1 and 2). A tube thoracostomy was performed and a high-output air leak was observed. Subsequent attempts to seal the leak using chemical pleurodesis, a flap of pleura, and by ligating the open bronchioles (Figure 3) failed. The patient died while the use of an omental patch was being considered.

Figure 1. Perfusion lung scan showing the pulmonary embolism in the left lower lobe (yellow arrow, posterior and lateral views)

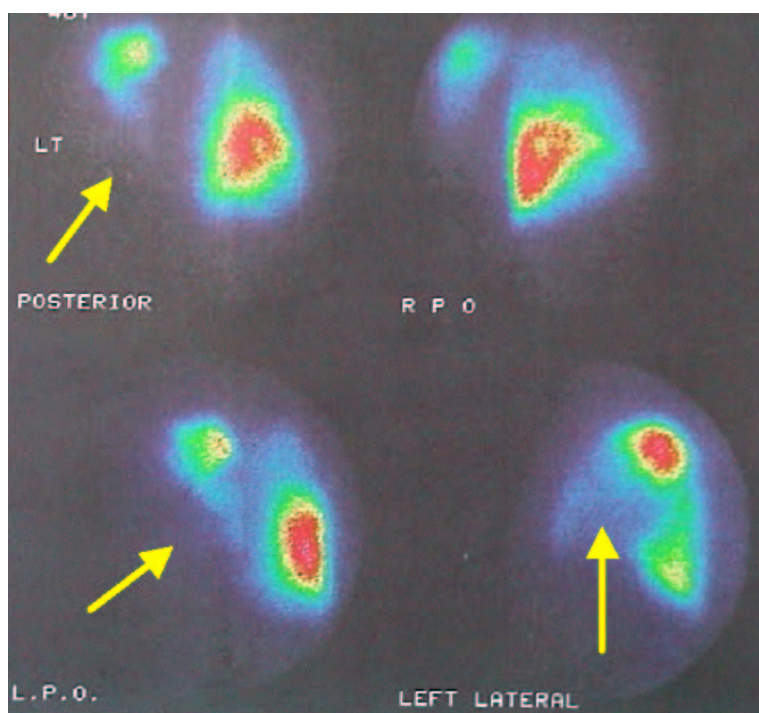


Figure 2. Chest CT scan showing a cavity within the pulmonary infarct; the communication of this cavity with the pleural space is clearly visible (red arrow indicates thoracocentesis tube and point of entry; yellow arrow indicates pneumothorax; green arrow indicates communication of the cavity with the pleural space; blue arrow indicates cavity)

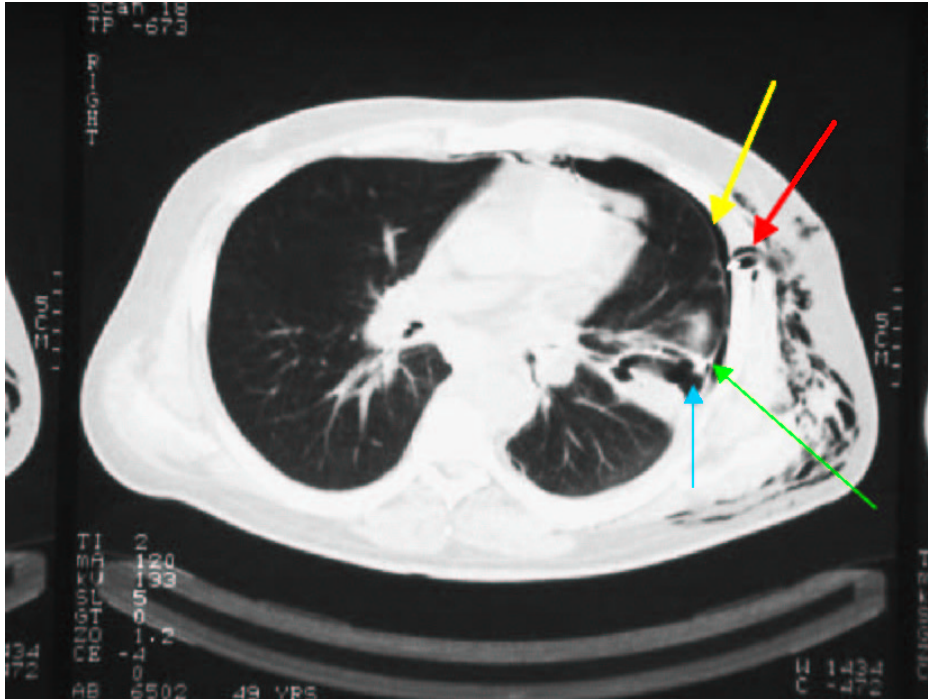
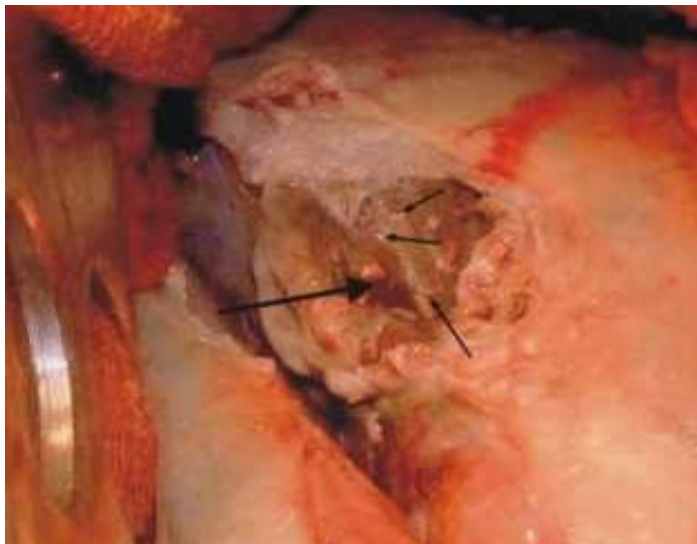


Figure 3. Many open, small bronchioles (approximately 1 mm diameter) were evident at surgery (small arrows) within the cavity (large arrow)



We are grateful to G Pavlakis, K Siafakas, D Gorgogiannis and GH Sakorafas of the Department of Oncology, Hellenic Air Force Hospital, Athens, Greece, for this issue's Medical Image.



How Americans became the fattest people in the world

A new book, Greg Critser's *Fat Land* attempts to focus attention on a new health crisis: the growing prevalence of obesity and poor physical fitness in the United States. During the past several years, both the popular media and the medical literature have drawn attention to the growing numbers of overweight persons. The prevalence of obesity has risen from 12 per cent of adults in 1991 to more than 20 per cent in 2001. Obesity rates for adolescents between the ages of 12 and 19 have tripled in the past 25 years, increasing from 5 per cent to the current 15 per cent.

Fast-food marketing efforts also aligned to change the way, and the amount, we eat. As Critser explains, once the staples used to make fast food became cheaper, marketers induced consumers to buy and eat more of them. French-fry vendors in the 1970s noticed that even though consumers 'scrape and pinch around the bottom of the bag for more and eat the salt,' fear of looking 'piggish' kept them from buying two bags. Consumer reluctance to go back for seconds was overcome by increasing portion sizes, and 'super-sizing' was born. A serving of McDonald's fries 'ballooned from 200 calories (1960)...to the present 610 calories.' Satiety expanded to meet the larger portions. Critser cites research showing that our appetites are not fixed; when presented with more food, we learn to clean our larger plates. Between 1977 and 1995, average daily food intake increased by almost 200 calories.

N Engl J Med 2003;248:2161-2

More about screening

The belief that early detection is the key to survival has been greatly strengthened by the high public profile of screening programmes for cancers affecting women. It is not surprising that, even though the evidence for this conviction is disputed, the demand for screening has spread to our increasingly health-conscious male patients.

Controversies about the benefits of mammography rage on. While some epidemiological studies indicate that routine mammography screening does save lives, others dispute this. Some believe that the benefits of prevention are bought at too high a cost and that resources would be better spent on treatment.

A study published last month suggests that cervical smears do save lives, but at a price higher than can be measured in monetary terms (Raffle A, et al. *BMJ* 2003;326:901-4). For every death prevented, 1000 women endure an adult lifetime of regular smears – and one of these women still dies from undiagnosed cervical cancer despite having smears. Of these 1000 women, some 150 endure the distress and anxiety of an 'abnormal' smear report and 80 are referred for further specialist treatment. Although more than 80% of cases of high-grade dyskaryosis and high-grade dysplasia do not progress to invasive cancer, all are currently treated surgically.

As the authors of the cautionary study of the cervical smear programme point out, if men continue to pursue their demands for screening test of dubious value, 'the net

result will be major iatrogenic harm from invasive investigations and treatments’.

Lancet 2003;361:1836

And still more...

The blood test that measures prostate specific antigen (PSA) to detect prostate cancer often produces false positive results and should be repeated at least once before an invasive biopsy is performed, a new study says.

‘We recommend having the findings confirmed by repeating the test after waiting at least six weeks,’ said Dr James Eastham, a surgeon in the department of urology at the Memorial Sloan-Kettering Cancer Center in New York and lead author of the study.

‘Even if the repeat test shows an elevated level, prostate cancer will only be discovered in about one quarter of men who undergo biopsy...A single, elevated PSA level does not automatically warrant a prostate biopsy,’ he said.

Concentrations above 4.0 ng/ml can signal prostate cancer, but not always – sometimes a rise in PSA is due to another cause, and sometimes cancer can occur without a rise. About a fifth of aggressive prostate tumours are found in men with normal PSA concentrations.

False positive results are common, because cancer is not the only cause of raised PSA concentrations. Inflammation can increase them, as can recent ejaculation. And the enlargement of the prostate that occurs normally with age brings a gradual increase. The new study indicates that natural fluctuation can also lead to high results of the test.

BMJ 2003;326:1231

Battle looms over claims that several key types of adult stem cell are really the same

Scientists at biotech giant Genzyme say that many supposedly different kinds of adult stem cells – which hold enormous promise for treating disease – are in fact indistinguishable.

Because adult stem cells are present in everyone, they are easier to obtain than the embryonic stem cells taken from 10-day-old embryos, and far less controversial. Until recently, however, it was thought they had only limited potential.

That changed last year, when *New Scientist* revealed that Catherine Verfaillie of the University of Minnesota had discovered ‘multipotent adult progenitor cells’, or MAPCs, apparently capable of giving rise to all tissues in the body, just like embryonic stem cells.

Another promising kind of adult stem cell is Osiris Therapeutics’ mesenchymal stem cell. MSCs have only been shown to make a handful of tissues such as bone, cartilage, fat and muscle, but have a remarkable property: they seem to cause little or no immune reaction when transplanted.

But according to Ross Tubo of Genzyme, the MAPCs and MSCs are one and the same. Put the properties of the two kinds of cell together and all of a sudden you have a non-controversial, highly versatile source of adult stem cells that can, in theory, be transplanted to anyone. This truly would be the ultimate stem cell.

New Scientist, 17 May 2003

Antioxidant vitamins in prevention of cardiovascular disease – no support from trials

Antioxidants have been associated with reductions in cardiovascular events. Supplementation with tocopherol (vitamin E) and β carotene, or both, in observational studies, but not clinical trials, has been suggested to inhibit the atherogenic process. Deepak Vivekananthan and colleagues did a meta-analysis of randomised trials of these two compounds to assess their effect on long-term cardiovascular morbidity and mortality. Vitamin E provided no benefit in overall mortality, cardiovascular death, or cerebrovascular accident. β carotene led to a small but significant increase in all-cause death, and a small increase in cardiovascular death. The researchers find the β carotene results especially concerning since the doses that produced this effect were within the range commonly used in over-the-counter preparations. The investigators also do not recommend the routine use of vitamin E to reduce cardiovascular risk.

Lancet 2003;361:2017–23



Prostate cancer screening stretches services and offers little benefit to patients

It is a pity that you did not commission an editorial on prostate screening from someone with expertise in epidemiology and screening rather a urologist. Peter Davidson's recent editorial (<http://www.nzma.org.nz/journal/116-1176/474/>) offers a very rosy picture of the benefits of PSA screening.¹ The studies he mentions are discussed at length in the superb review of prostate screening written by John Durham for the NZ Guidelines Group and offer scant evidence for the efficacy of screening.²

Even if prostate screening had any benefit, our local urology service struggles to provide a very basic service (through no fault of our excellent urologists here) and could hardly cope with the increase in workload to which screening would invariably lead. A 73-year-old patient presented to me in December 2001 with a large prostatic tumour causing retention with overflow incontinence. He had to wait nine months (spent in nappies!) for a transurethral prostatectomy and orchidectomy.

Paul Corwin
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Response

The editorial mentioned was written to supplement the excellent paper by John Durham on GP practice and knowledge around the topic of prostate cancer and screening.¹ The intention of the editorial was to fill some of the gaps in knowledge identified by Durham.

I am not an advocate of widespread, organised screening, but I am an advocate of men having a choice as to whether or not they be tested for prostate cancer. In the absence of randomized controlled trials of the effect of prostate screening we need to look at the best evidence available. The four studies mentioned all suggest a beneficial effect on mortality from prostate screening. There is one study that suggests no effect.² All of these studies have been criticised and none are randomized controlled trials, therefore I believe it reasonable at this time to conclude '...there is no proof that prostate cancer screening will reduce mortality, there is also no proof that it will not.' I am certain that even 'someone with expertise in epidemiology and screening' would

struggle to disagree with this statement and do not believe it to be painting an overly rosy picture.

The fact remains, however, that prostate cancer kills virtually as many men every year as colonic and rectal cancers combined. It is, therefore, an important health issue. Those who would oppose the attempted detection of prostate cancer weigh the uncertain benefits of screening against the real morbidity from detection and treatment of the disease. It is the burden of health professionals to present all the facts surrounding prostate cancer and prostate cancer screening to their patients and to provide those patients with sufficient knowledge to make an informed choice in this area.

I sympathise with the plight of Paul Corwin's patient. The woes of a chronically and systematically under-resourced public health system should not, however, impact on the right of an individual to be or not to be tested for prostate cancer.

Peter Davidson
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Public understandings of bacteria, antibiotics and resistance

Resistance to antimicrobials is a source of concern both nationally and internationally.¹ It is widely acknowledged that patient expectations are a major factor in unnecessary antibiotic prescribing.² Patients may not understand what antibiotics do and do not do, the concept of resistance, or the importance of adhering to dosage instructions.^{1,3-5} We investigated how bacteria and related issues are portrayed on New Zealand television. The media are an important source of lay ideas about health and illness.

We viewed 313.5 hours of video-taped television, covering all days of the week and all five free-to-air national TV channels (TV1, TV2, TV3, TV4 and Prime TV). This consisted of a systematic random sample of 19 days (6:30am–11.00pm) of television between 15 November 2001 and 30 May 2002. We identified and recorded every mention of the words: 'bacteria', 'virus', 'germ', 'bug', 'resistance' or 'resistant', and 'immunity'.

We found 42 mentions of these key words. Almost all mentions of bacteria, germs, viruses or bugs were negative (32 out of 34). The advertisement for Blis K12 Throatguard was a notable exception to this, explicitly stating that 'not all bacteria are bad'. In most of the 32 instances the message was that all microbes are bad and should be killed (eg, 'Only the 3M Scotch-Brite StayFresh sponge actually kills germs in the sponge...because germs don't belong in your sponge').

The UK Standing Medical Advisory Committee Sub-Group on Antimicrobial Resistance⁶ argues that people should be urged to cherish their natural microflora: the normal bacteria that inhabit our bodies, that are probably protective against invasion by pathogens, and that can be killed when people take antibiotics. This seems contrary to understandings of bacteria and 'germs' commonly presented on New Zealand television.

Advertisements for dietary supplements frequently claimed to boost immune function. This was also described as resistance to infection. These uses of terms like 'immunity' and 'resistance' (as properties of healthy humans) seem to be well understood. There was only one mention of resistance as a property of a microbe (MRSA). We are not sure whether bacterial resistance to antibiotics (as understood by scientists and the medical profession) is commonly understood in the community.

Many lay people seem to believe that over-use of antibiotics compromises the immune system.⁷ We suggest that many people may (mis)understand this to be 'antibiotic resistance'. For example, Newstalk ZB on 29 May 2002, in announcing PHARMAC's campaign about the sensible use of antibiotics, reported Dr Peter Moodie as saying 'If too many are taken the body can become resistant to them and that could pose problems when they are really needed.' Clearly, the reporter has misunderstood Dr Moodie's comments about resistance.

We suggest that many people see antibiotic resistance as an attribute of humans, not bacteria. This may have important implications. This kind of resistance cannot be

spread from person to person, so people may not understand that their individual use of antibiotics has implications for others: their family, friends and neighbours.

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Ernst Karl Willi Wilzek

Ernst was born on 6 September 1917 in Stolp imp Pommen, Germany (now part of Poland), to a Polish father and a German Jewish mother. In the mid-thirties, with the Nazis in power and the rise of anti-Semitic activity throughout Germany, Ernst decided to leave Germany.



He came to New Zealand with the help of the Society of Friends (Quakers). Ernst's mother, Hedwig, was gassed in the Ravensbruck concentration camp towards the end of the war.

Ernst was initially unable to attend university in New Zealand as a foreign student. In 1941, he enrolled as a science student, gaining a BSc in 1943. In 1946, he entered medical school and completed his medical degree at the School of Medicine at Otago University. During this time as a student Ernst was very active within the Jewish refugee community. Ernst did some translation for philosopher Karl Popper, who was also a refugee in New Zealand at the time.

After gaining his medical degree, Ernst travelled extensively throughout the world and worked in hospitals in the United States and England. He specialised in many fields of medicine, including tuberculosis, psychiatric medicine, and obstetrics. He also spent some time as a ship's surgeon on a South African cruise ship.

In 1962, Ernst worked as Chief Medical Officer for a gold-mine hospital in Ghana, West Africa. He gained extensive knowledge in tropical medicine and surgery, as the hospital was the only one in the region and serviced expatriates and miners along with the local villagers. Ernst married his Ghanaian wife, Beatrice, in 1964 and became a first-time father at the age of 49 with the birth of his daughter in 1966.

The family moved to New Zealand in 1972 after Ghana became politically unstable. Ernst planned to retire but instead bought a practice in Mangere, Auckland. Ernst worked sole charge in what was a very busy practice and, for a period of time, one of the few medical practices in the area. He was very popular with his patients, with his easy-going manner and sense of humour. Ernst reluctantly retired in 1991 (at the age of 73) due to the early stages of dementia.

Ernst suffered a stroke and heart attack on 22 December 2002 and died 10 days later on 2 January 2003. His wife Beatrice, daughter Joana, and grandson Anton survive him.

We are grateful to Joana Wilzek for this obituary



The rise and fall of a scientific genius: the forgotten story of Royal Raymond Rife. Part one: Rife's rise (video)

Written, produced and directed by Shawn Montgomery. VHS NTSC or PAL formats US\$29.95 plus postage.

Shawn Montgomery has produced a fascinating video documentary woven from restored audio tapes, records, photographs and current interviews. The production quality is high given the technical problems he undoubtedly overcame and the story that unfolds is intriguing. There are a few repetitions of information, but these are minor distractions. He raises the twisting, turning questions that surround all those associated with heresy, quackery or unrecognised genius, from Galileo and Semmelweiss to Issels and Milan Brich.

Royal Raymond Rife, 'genius scientist', trained for six years at the Carl Zeiss Optical Company in Germany and became the inventor of powerful microscopes, leading to the discovery of a revolutionary therapy for viral diseases.

Rife reasoned that if he was going to find a cure for diseases such as cancer it was important to be able to see the live virus that caused the disease. The first of several highly advanced microscopes was built in 1920. Noting that certain microorganisms absorbed different frequencies of light, he invented a system of rotating prisms to stain the specimen with light.

Extrapolating from this resonant effect of light, he experimented with electromagnetic radio waves and discovered that for each type of virus there was a particular frequency that would cause its disruption.

He subjected test animals in his laboratory to lethal doses of pathogenic germs and reported that he could invariably save their lives by subjecting their bodies for a few minutes to the electrical energy of the properly chosen frequency. These experiments and subsequent clinical therapies were heralded by his supporters to demonstrate the medical technology for the next century!

Montgomery presents a good mystery without a clear answer. At least not for me, since I've seen only the first video volume, Rife's Rise. I presume the sequel, Rife's Fall, may well cast a critical light on Rife's discoveries within the context of modern biomedical understanding or orthodoxy. One gets the impression, however, that is not the way this story eventually plays out. In the absence of the video sequel, one can go to Google and search for Royal Raymond Rife. There you will find a rich assortment of conspiracy theorists and their various attempts to explain how Rife's ingenious discoveries (including optical microscopic identification (magnification x 31 000) of living viruses and 'silver bullet', EMR-frequency therapy for polio, most tumours and viral infections, protozoan, bacterial and fungal diseases, stiff muscles, headaches, motion sickness and 'prostrate') have been suppressed by the medical/pharmaceutical establishment. What is missing is a logical and objective analysis of why.

Of course most of this is not scientifically assessed in the first volume. That is not intended to imply that the last chapter in the long-recognised relationship between viruses and malignancy has been written. Although we have an ability to define the linear and sequential relationships between oncogenes and aberrant DNA, our contemporary view of the temporal and spatial controls determining functional gene behaviour in the natural history of malignancy is at best myopic. Nevertheless, in the absence of bona fide substantiation, the FDA currently forbids any medical claims regarding Rife's therapies.

This is a good story and I hope I get to see the sequel if the counter-arguments are included.

Randall Allardyce
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Cataract surgery

Andrew Coombes and David Gartry. Published by BMJ Publishing Group, 2003.
ISBN 0-7279-1201-1. Contains 232 pages. Price GBP 60.00

This textbook on cataract surgery contains multiple colour pictures and excellent drawings. It is designed for ophthalmology registrars in training and for general ophthalmologists updating their knowledge.

The book is comprehensive in its scope. It is clearly written and up to date. It is an exceedingly practical book and an excellent training manual for our registrars. It is also a useful book for other disciplines and allied health professionals to dip into to understand the complexity of modern cataract surgery. It would be particularly useful for anaesthetists and anaesthetic registrars and there is a good section on local anaesthetic technique.

This has been an easy book to review. Put simply, it should be owned by every registrar in ophthalmology in Australia and New Zealand and they should use this as their core reference for learning cataract surgery. The authors have comprehensively mastered their brief and are to be applauded for it.

Mark Elder

Associate Professor in Ophthalmology
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