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This Issue in the Journal

Refer prior to biopsy of suspected appendicular soft tissue sarcoma
Robert S J Elliott, Michael Flint, Gary French

Sarcomas are highly malignant tumours that often affect the arms or legs. Diagnosis requires taking a specimen (biopsy) to examine it for cancer cells. If cancerous, modern treatments (over last 30 years) aim to preserve the limb rather than amputate it. Errors during biopsy can make it impossible to save the limb and can increase the risk of cancer spread. This paper demonstrates increased problems occurring if biopsy is done prior to referral to the Middlemore [Hospital] Tumour Service and shows a minimal delay for most patients to be seen.

Laparoscopic adjustable gastric bands and the effect of living in distant towns
Richard Flint, Grant Coulter, Ross Roberts

The success of laparoscopic adjustable gastric bands in loosing weight is believed to be dependent on management of the band adjustments after surgery. Hence it is thought that patients living in towns where there is no surgeon are disadvantaged and will have an unacceptable weight-loss result. This paper reveals that there is no difference in results between those patients who live close to their surgeon and those that live in towns distant from them. Therefore a patient’s place of residence does not need to influence them away from this type of weight-loss surgery.

Developing a tool to monitor potentially avoidable and ambulatory care sensitive hospitalisations in New Zealand children
Philippa Anderson, Elizabeth Craig, Gary Jackson, Catherine Jackson

There have been a number of ‘tools” or indicators used to try and capture the number of hospitalisations that could be prevented if people were able to access primary care in a timely way and receive appropriate care. These have been referred to as Ambulatory Care Hospitalisations (ASH). In New Zealand there had not been a specific list of ASH conditions for children that reflect Primary Care’s ability to influence hospitalisation rates for children. This paper describes how a group of ASH conditions was identified for children. In addition it has been recognised that factors outside the health system (government social and other policies) have a large impact on health outcomes for children. The paper describes the methodology for identifying this group of conditions named Potentially Avoidable Hospitalisations.
Measuring potentially avoidable and ambulatory care sensitive hospitalisations in New Zealand children using a newly developed tool
Elizabeth Craig, Philippa Anderson, Gary Jackson, Catherine Jackson

This study uses a newly developed tool to assess potentially avoidable hospitalisations in the paediatric population using a methodology which takes into account the socioeconomic determinants of health. Strategies which focus solely on improving access to primary care within office hours may have a limited impact on ACSH in children, due to the role socioeconomic factors play in shaping the underlying burden of disease, and the narrow window for intervention which exists for many acute onset infectious and respiratory diseases. There is significant potential for health gain for children as a result of policies and programmes to address the underlying determinants of health. New Zealand needs to consider policies to increase access to primary care for Pacific and Māori children and those living in more deprived areas. Policies should take into account the need for immediate (i.e. same day) and after-hours care in this age group.
Reporting hospital performance—a balancing act between accountability and quality improvement

Mary E Seddon

In this issue of the Journal Chaudhry et al present the case for New Zealand to “join the ranks of health systems that embrace public reporting of quality data in the spirit of full and open transparency, benchmarking and continual improvement.” A fine aim, but is it as simple as following the US and UK lead, and will it improve healthcare services?

An early report out of the RAND made the point that the “US experience of public disclosure is presented in the context of its healthcare system and consumer orientated culture.” It is important to bear in mind some of the key differences in the US compared with New Zealand: patient and doctor autonomy is highly valued and there is at least theoretical choice of hospital (mostly controlled by employers as health insurers); hospitals exist in competitive markets; and due to their billing databases they have better quality and granularity of data (this comes at a cost with administration greater than 20% of the total spend on health, five times the OECD average).

The UK healthcare system is more similar to New Zealand’s, however with primary care commissioning there is also choice of hospital/services. In the New Zealand public health system, patients do not have a choice as to which hospital to attend, therefore the publication of hospital performance data may not be a competitive driver for improvement. So to answer the first question, it appears unwise to simply transfer performance indicators from other countries (tempting though it is).

Public disclosure of healthcare performance data (predominantly hospital or provider performance) has been advocated for two main reasons:

- Accountability/transparency
- As a driver for quality improvement

To review these in turn. It seems that there is a policy appetite in developed countries for transparency and some form of accountability. Although it is stated in terms of accountability to the public, most studies show that the ‘public’ do not search out performance reports, often do not understand them if they do, and make little use of them in their decisions as to where to seek healthcare.

When there is a choice of hospital or doctor, the evidence suggests that the advice of friends and family, the long-term relationship with a doctor, and the proximity of a hospital are more important than report cards of performance. It seems much more likely that the accountability touted is actually accountability to the funders of healthcare. Others have argued that this accountability function is about control including financial control.
Chaudhry et al appear confused as to the purpose of the Health Roundtable work. It is designed to initiate conversations around anonymous data so that organisations can improve, it is not measurement for accountability—one of the main problems is the lack of validity and reliability in routinely coded data—and would not be useful to publicly report.

As Solberg et al said in their seminal article ‘The three faces of performance measurement: improvement, accountability and research’12: “We are increasingly realising how critical measurement is to the QI we seek, yet how counterproductive it can sometimes be to mix measurement for accountability or research with measurement for improvement.” Not only the purpose of the measurement differs, but also what and how it is measured.

For accountability, the purpose is comparison, and to be useful there must be precise and valid data, rigorously risk adjusted, a large sample size and collected over a long period of time. For QI, the measures need to be ‘good enough’ to learn about the process and assess whether improvement has occurred, with iterative learning cycles and it works best when they are confidential to the organisations involved. Without this confidentiality, the risk is a loss of trust in the process: “the problem with measurement is that it can be a loaded gun—dangerous if misused and at least threatening if pointed in the wrong direction.”13

So does the public release of this information lead to better quality of care?

Despite a rapidly expanding report card industry, there is little formal evaluation of the impact of publically releasing such data. A recent Cochrane review found only four high quality studies examining this issue and concluded that “the small body of evidence available provides no consistent evidence that the public release of performance data changes consumer behaviour or improves care.”14

In observational studies, the extent to which report cards promoted improvement in the quality of hospital care was variable at best with organisations often focussing on improving data collection systems rather than the systems of care.6,15

Even the often cited New York State cardiac surgery reporting system noted in the Chaudhry article is not the clear cut success case it first appears. Most of the surgeons with high mortality rates were low volume operators, and following publication most either stopped doing bypass operations, or moved out of state. Secondly there was some data that surgeons stopped offering surgery to high risk patients, and finally cardiac surgery mortality rates were decreasing in other states that did not have report cards.16,17

There are those who argue that performance data, especially with targets attached, actually work against improving quality. “Quality improvement is premised on the value to the patient (customer), local leadership and looking at systems as a whole. Targets do exactly the opposite: they devalue the customer by focussing on an arbitrary number, devalue local leadership by relying on central control and measure isolated silos of activity.”18 Whether public reporting of quality indicators is effective is not only an unanswered question, but in New Zealand it seems to be unasked.

In contrast to the paucity of evidence for the positive effect of public reporting, there is good evidence as to the predictable adverse effects10 with seven well recognised.7
These include tunnel vision (as routinely collected, quantitative data is the focus), myopia (focussing on short term objectives), ossification (unwilling to experiment with new and innovative approaches) and gaming.

Gaming is especially likely if large incentives are attached to the performance targets. This can be seen in the analysis of the 4-hour Emergency Care target in the UK where 98% of units achieved this target. According to mathematicians and queuing experts this result could only be obtained through gaming: making patients wait in ambulances, moving patients (and occasional temporary walls) so the patient was no longer in EC and admitting patients too early.\(^{18}\)

At present the momentum towards the use and public reporting of performance data is increasing more rapidly than our understanding of the consequences of this. New Zealand should be cautious and evaluate the effects of any proposed system.

There are other ways to encourage healthcare improvement and transparency. One of these are the proposed Quality Accounts, which each DHB will produce next year. These are designed to balance the emphasis on financial accounts with a review of quality of care gaps, quality improvement programmes and progress in these areas. These are the place to address the organisation’s performance in patient-centred care (so much more than the patient satisfaction surveys mentioned in the Chaudhry article) with patient stories of their care, and examples of experience-based design. With time these may mature into very useful windows on the good work going on in many of our DHBs.

**Competing interests:** Nil.

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Treating soft tissue sarcomas

Gordon Beadel

The excellent paper in this issue of the *Journal* by Elliott et al from Middlemore Hospital is a timely reminder to us all of the optimal management of these rare tumours (<1% of all malignancies). Soft tissue sarcomas can occur anywhere in the body but more commonly in the limbs.

The vast majority of appendicular or truncal soft tissue masses will be benign and it can be difficult to recognise those which are suspicious of malignancy and require further investigation prior to excision. However any soft tissue lump which has any of the following characteristics should be considered to be malignant until proven otherwise:2,3

- Increasing in size.
- Size >5cm.
- Deep to or tethered to the deep fascia.
- Painful.

These cases all require axial imaging by MRI (most commonly) or CT scan prior to any biopsy or excision being performed. In many cases this may be diagnostic of a low grade fatty tumour (e.g. lipoma, atypical lipoma or well differentiated liposarcoma) or suggestive of other benign tumours (e.g. benign peripheral nerve sheath tumour) and treatment can be appropriately undertaken. The remainder are likely to require a biopsy for a histologic diagnosis prior to definitive treatment.

As the results of Elliott’s paper have shown, a poorly performed biopsy or inappropriate excisional biopsy can result in significantly increased complications, more extensive definitive surgery and overall morbidity for the patient.

The biopsy tract must be carefully planned to ensure that it can be excised with the tumour at the time of definitive resection and does not contaminate neurovascular structures or uninvolved anatomic compartments which as a result may have to be needlessly sacrificed in order to achieve local control. The biopsy must therefore be performed either under the direct supervision of or in consultation with the surgeon who will be undertaking the definitive resection if the tumour is proven to be a sarcoma.

Either open or core biopsy is recommended in order to obtain sufficient representative tissue to reach a histologic diagnosis. Fine needle aspirate analysis of these lumps has been shown to be notoriously unreliable with false negative results and there is no role for this type of biopsy in the routine workup of these lumps.2-5 Core biopsy may be guided by ultrasound or CT scanning in some instances. Core biopsy tracts should always be tattooed so that they can be identified and subsequently excised.
Soft tissue sarcomas are a very heterogeneous group of tumours and reaching the correct histologic diagnosis can be challenging and difficult and often requires the use of special stains and chromosomal analysis. All suspected sarcomas should be reviewed by a pathologist with a special interest in sarcomas and discussed in a multidisciplinary meeting with review of the imaging to ensure that the diagnosis is consistent with the imaging and that a representative tissue sample has been obtained.

Soft tissue sarcomas often occur close to important neurovascular structures, muscles, tendons and joints and therefore treatment is usually tailored to each individual case. The aims of treatment are firstly to minimise the risk of local and systemic recurrence and secondly to optimise functional outcome and quality of life. Surgical resection including the biopsy tract with clear margins with perioperative radiotherapy is the main treatment modality.

Unfortunately the majority of these tumours are relatively chemo[therapy] resistant, but chemotherapy is used for some more chemo sensitive subtypes and to help palliate metastatic disease.

Radiotherapy is often best administered prior to definitive surgical resection. Preoperative radiotherapy uses a lower radiotherapy dose and treats a smaller tissue volume than post operative radiotherapy, but achieves the same reduction in local recurrence. Final function is likely to be better with decreased fibrosis and lymphoedema and possibly a lower long term risk of malignancy, although in the short term there is an increased rate of wound healing problems.

The treatment plan for patients with soft tissue sarcomas is therefore also best formulated in a specialist sarcoma multidisciplinary team meeting so that the various options can be discussed and considered and optimal care provided to the patient. Close communication is required between the treating radiation oncologist and the surgeon to ensure that potentially close margins receive adequate radiotherapy. Timing of surgery in relation to radiotherapy and chemotherapy is also important.

When soft tissue sarcomas occur in more unusual locations a team approach working with other surgical specialties including general, cardiothoracic and urology is employed. Reconstruction of excised tissue is sometimes needed and this may require vascular grafting, nerve grafting and/or tissue flap closure by vascular and plastic surgeons. This team approach ensures that the best possible outcome with regards both local disease control and functional outcome is obtained for the patient.

Following treatment long term follow up of these patients for early detection of local recurrence and/or metastatic disease is important because early detection and intervention may improve the prognosis for some patients.

Readily accessible axial imaging in a timely fashion, especially MRI scanning, is required to appropriately investigate patients with suspected soft tissue sarcoma but unfortunately remains a very limited resource.

National Sarcoma Standards of Care are in the process of being developed by a working group and these will hopefully help to clarify the pathways for these patients and ensure that the resources required to expeditiously investigate, treat and follow up these patients are provided. National audit of treatment outcomes for these patients is also important and again resources to undertake this need to be available.
In New Zealand, Auckland and Christchurch currently provide tertiary referral multidisciplinary units for the treatment of soft tissue sarcomas. Patients with suspected soft tissue sarcomas should be referred to these units with appropriate axial imaging (MRI or CT scan) prior to undertaking biopsy or excision to optimise patient outcomes.²,⁴

**Competing interests:** Nil.

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Refer prior to biopsy of suspected appendicular soft tissue sarcoma

Robert S J Elliott, Michael Flint, Gary French

Abstract

**Aim** Appendicular soft tissue tumours are rare and inappropriate investigation can result in unnecessary loss of limb or life. We reviewed the investigation and referrals of patients to our institution.

**Method** This is a review of prospectively collected data stored in a tumour registry database. We included all patients (126) referred to the service for investigation and management with a primary soft tissue tumour in 2006 and 2007.

**Results** There was a highly significant association (RR=6.2) between pre referral procedures (PRPs) and suffering a complication (P<0.0001) in comparison to non-biopsied referrals (NBRs). Those referred by general surgeons were more likely (RR=2.6) to have undergone PRP (p<0.0017). The median interval between referral and senior author review was 8 days for the PRP group and 10 days for the NBR group (P=0.2574).

**Conclusion** Biopsy of suspected appendicular soft tissue sarcoma should be performed by a tumour specialist or in prior consultation with, to minimise adverse outcomes. There was minimal delay till review by an orthopaedic tumour specialist at Middlemore Hospital and achieving a tissue diagnosis does not expedite this.

Sarcomas of the limbs (appendages) are rare. They represent less than 1% of all malignancy. Benign appendicular soft tissue masses occur 150 times more frequently.\(^1\)

Limb salvage surgery has replaced amputation over the last 30 years, but relies on appropriate diagnostic workup and biopsy technique. It achieves comparable survival but maintains function, and it is thought to be possible in over 90% of cases.

Errors may necessitate amputation or greatly complicate a limb salvaged procedure. These errors include technical issues such as type of biopsy, approach, sample inadequacy, infection and bleeding. Accurate diagnosis should involve a multidisciplinary team including a musculoskeletal radiologist, sarcoma surgeon and a musculoskeletal pathologist.

The risk of incorrect diagnosis is greater in centres that do not employ this approach. Previous studies have highlighted the increased risk of adverse outcomes when invasive investigations are performed without input from a sarcoma surgeon and the associated multidisciplinary team.

New Zealand is a sparsely populated country and has four orthopaedic tumour surgeons which is in keeping with the recommended ratio of 1:1,000,000. Consequently some patients find themselves long distances from tertiary tumour centres. This study reviews the investigation and referrals of patients to the Bone and
Soft Tissue Tumour Service at Middlemore Hospital, and compares the short-term outcomes between those who had undergone an invasive procedure prior to referral and those who had not.

**Materials and Methods**

We reviewed the charts of all patients (126) with a soft tissue tumour referred to the senior authors from 1/1/2006 to 31/12/2007 to allow a minimum 2-year follow-up. The information was stored in a prospective Tumour Registry Database.

Where information was not available in records kept at our institution, the referring institution was contacted. We excluded any patient who had an established diagnosis and treatment instigated by an Orthopaedic Tumour specialist, and those with a known primary malignancy elsewhere as we wanted to focus on primary investigation of masses of unknown origin.

Demographics, symptoms and examination findings were recorded. Data was collected on interval from referral to first letter from tumour service, type of investigations performed prior to referral and those performed subsequent. Biopsy diagnosis and final diagnosis and outcome at 2 years post-presentation was recorded where possible.

Complications were recorded. Broadly these comprised procedural issues such as incorrect biopsy approach, uncontrolled bleeding, infection, wound breakdown and incomplete excision and diagnostic errors such as inadequate sample and incorrect diagnosis by pathologist.

Management under our service involves reviewing plain films and MRI for localised staging with a dedicated musculoskeletal radiologist prior to invasive procedure. Most biopsies are performed open by the tumour surgeon at our institution.

Radiologist biopsies are performed under instruction to avoid contaminating tumour naïve compartments. On occasion the service would request the referring institution perform a biopsy under specific instruction. Systemic staging is performed with a CT thorax.

Biopsied tissue was reviewed with a multidisciplinary team including the musculoskeletal pathologist, radiologist and sarcoma surgeon.

Data was analysed with the Graphpad InStat software program. All P values were two sided. Fisher’s exact test was used for categorical association, and Welch unpaired T-test was used to compare the waiting times between groups given its nonparametric distribution. The establishment of the database and the use of its data for research has received Ethics Board approval.

**Results**

Of the 126 included patients, 35 were primary referrals comprising 34 from general practitioners (GPs) from within the catchment area of our institution and 1 directly from a radiologist subsequent to performing an ultrasound at the request of a GP. The remainder (91) were tertiary referrals from other specialists which included orthopaedic surgeons (55), general surgeons (28), plastic surgeons (5), oncologists (2) and a physician (1). Referrals were received from Whangarei to Invercargill, with the majority (123) being from the North Island.

The majority (20) of the primary referrals did not have any imaging, 6 had plain films, 5 had ultrasound scans (USSs) and 4 had magnetic resonance imaging (MRI).

Of the 91 tertiary referrals 79 presented with a MRI and 1 patient was contraindicated for MRI due to cochlear implants. Localised computed tomography (CT) was performed for 7 patients, 11 had USS, 5 had plain films and 11 had staging CT thorax scans. Four of the tertiary referrals did not have any accompanying imaging.

Thirty-three of the referrals had a histology report resulting from a total of 36 invasive pre-referral procedures (PRPs). All PRPs were tertiary referrals from secondary clinicians.
Two of these patients had an incomplete excision performed by their GP prior to referral to the secondary clinician. Fifteen of these resulted from excisional biopsy, 8 from open biopsy, 7 from needle biopsy, and 3 were from image guided biopsy. The 13 of 15 excisional biopsies had positive margins. Therefore 13 of 33 (39%) resulted from inadvertent excision.

Patients were more likely to have undergone PRP when referred by general surgeons (RR=2.6, p<0.0017) when compared with orthopaedic surgeon referrals (Table 1).

**Table 1. Referral source and rate of pre-referral procedure**

<table>
<thead>
<tr>
<th>Specialty</th>
<th>Referrals</th>
<th>Procedures</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>General surgeon</td>
<td>28</td>
<td>16</td>
<td>0.57</td>
</tr>
<tr>
<td>Orthopaedic</td>
<td>55</td>
<td>12(2) †</td>
<td>0.22</td>
</tr>
<tr>
<td>GP</td>
<td>34</td>
<td>2</td>
<td>0.06</td>
</tr>
<tr>
<td>Plastic surgeon</td>
<td>5</td>
<td>2</td>
<td>0.4</td>
</tr>
<tr>
<td>Oncologist</td>
<td>2</td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Physician</td>
<td>1</td>
<td>1(1)</td>
<td>1</td>
</tr>
</tbody>
</table>

†: (x) is radiology guided procedures

The interval between referral and first review by one of the senior authors was not recordable in 29 patients of which 26 were tertiary referrals. Another patient repeatedly failed to attend her appointment. Of the remaining 96 patients the mean interval was 16 days for all referrals, with a median of 10 and a range of 0 to 215 days.

The patient who waited 215 days had symptoms of swelling for 10 years and had already undergone an MRI suggesting a schwannoma, which it proved to be. Of the 65 tertiary referrals with known interval the median wait was 9 days with a mean of 13 and range of 0 to 110 days.

The patient who waited 110 days had symptoms for 4 years and an MRI which was suggestive of organising haematoma, which it proved to be. The number of days between referral and first review by a senior author was compared between the PRP group and those who were Non-Biopsied Referrals (NBR).

The interval was not known for eight of the 33 PRP group and 18 of the 58 NBR group. The PRP median wait was 8 days, while the NBR group median was 10 days. This is not clinically or statistically significant (two-sided P value=0.2574, Welch unpaired t test).

In the NBR group two patients waited longer than 30 days. A patient with a lipoma waited 40 days whilst another with an organising haematoma waited 110 days; both of which had MRI prior to referral.

The majority of these patients presented with an MRI and there was a trend toward patients with malignancy being seen earlier but this was not statistically significant (P=0.20, Chi-squared) [Figure 1].
There were 21 complications relating to these 36 procedures affecting 18 (55%) patients. There were 13 incomplete excisions, 2 infections, 2 histology reports which differed to subsequent diagnosis following excision, 2 specimens were deemed to be non diagnostic (both blind fine needle aspirates), 1 episode of incorrect approach, and a case where a histology report was not acted upon for 4 months. Seventeen of the 18 patients eventually were found to have malignancy.

Of the 33 referrals with histology on presentation, 28 were diagnosed as malignant. Three patients underwent amputation and one 78 year old patient who had undergone an intralesional excision was recommended an amputation but declined it. There were 5 known deaths at 2 years post referral. One patient required buttonhole excision of the previous biopsy tract that had compromised a tumour naïve compartment.

Biopsy was performed on 47 patients once reviewed by the tumour specialist at this institution. This includes two patients where biopsy was repeated as the histology result was deemed to be non diagnostic. This comprised 34 open biopsies, five ultrasound guided fine needle aspirates (FNAs), three Trucut biopsies and one excisional biopsy. Four other biopsies were performed at the base hospital under the detailed instruction of one of the tumour specialists.

There were four complications affecting four patients of 47 (9%). There was one infection, one case of excessive bleeding, a wound breakdown and a non diagnostic sample.

Of the 47 NBR patients who underwent biopsy once reviewed, 26 proved to be malignant. Ten of these patients were known to have died at 2 years, 2 had local recurrence and 1 had pulmonary metastases. One patient underwent amputation.
A broad spectrum of sarcoma and other malignancies were diagnosed with the most common being malignant fibrous histiocyteoma (12), leiomyosarcoma (9), liposarcoma (8) and synovial sarcoma (5).

The majority of complications occurred in patients who were found to have malignancy. In fact, only one complication in each group (PRP and NBR) occurred to patients who had benign histology.

The NBR group was biased as it had a large number of referrals that proved to be benign. The majority of the PRP group were malignant, hence their referral. Therefore, to compare the rates of complication between the groups, those with benign histology were excluded.

There were 28 malignancies in the PRP group which suffered 20 complications. The NBR group had 26 malignancies with three complications. There was an highly significant association between PRPs and suffering a complication (P=<0.0001). The relative risk of complication was 6.2 (C.I. 2.0–18.4). [Table 2]

<table>
<thead>
<tr>
<th>Referral type</th>
<th>Sarcomas</th>
<th>Complications</th>
<th>Amputations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post procedure</td>
<td>28</td>
<td>20</td>
<td>3(+)*</td>
</tr>
<tr>
<td>Pre biopsy</td>
<td>26</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>P value</td>
<td></td>
<td>&lt;0.0001</td>
<td>0.35</td>
</tr>
</tbody>
</table>

*Amputation recommended but declined.

If inadvertent excision is excluded, the PRP group suffered 7 complications in 15 patients with a relative risk of 4.55 (C.I. 2.1-9.7, P=0.001).

**Discussion**

Biopsy of suspected malignant soft tissue tumour is essential for an accurate diagnosis, and although it is a relatively minor procedure in its own right, has significant complications. This study demonstrated that 55% of patients who had undergone an invasive procedure prior to referral suffered at least one complication. There were 21 complications in 36 procedures at a rate of 0.58 complication/procedure.

By contrast, of the 47 patients biopsied by the musculoskeletal tumour team, the complication rate was 0.09. Errors in diagnosis, non representative samples and biopsy site complications resulting in alterations in treatment or outcome have been shown to be between 2–12 times greater when the biopsy is performed at the referring institution rather than the Orthopaedic Tumour Centre.2-5 This study replicated those results with a relative risk of 6.2.

In 1982, 56.5% of patients referred were pre biopsy in Mankin’s report. Despite this publication and the documentation of unacceptably high adverse outcome associated with biopsy in the referring institution the pre biopsy referral rate fell to 52.8% in their repeat study of 1996. A 2001 paper by the Scandinavian Sarcoma Group reported a 67% pre biopsy referral rate within their series.
In our study 74% of all referrals were pre biopsy. There were two patients who had undergone an invasive procedure by their general practitioners (GP) who proved to have malignancy. The majority of GPs do not perform such procedures.

Including their figures biases our result in favour of increased NBR. Of the tertiary referrals there were 31 PRP patients out of a total of 91, meaning 66% were NBR, showing our practice is comparable to that of Scandinavia.

Unfortunately, despite meticulous planning, surprises in histology will always occur and it highlights the importance of always sending excised tissue for examination. Previous studies have documented inadvertent incomplete excision as comprising 19%-53% of referrals to sarcoma centres. This study showed a rate of 13/91 (14%).

Mankin has previously demonstrated that soft tissue masses are more likely to be biopsied prior to referral than bony lesions and often by non-orthopaedic surgeons. This study has demonstrated a significant difference in referral practice between general surgeons and orthopaedic surgeons. This perhaps reflects the fact that general surgeons encounter tumours on a much more frequent basis and therefore are more willing to perform invasive investigative procedures in aid of diagnosis.

Mankin’s message has been widely disseminated in orthopaedic literature, but the ramifications of a poorly executed biopsy on limb salvage surgery may not be as well appreciated amongst other specialities. Injudicious biopsy or inadvertent excision compromises tissue planes and increases the likelihood of local recurrence. Local recurrence is an independent predictor of mortality.

The New Zealand Guidelines Group (2007) recommended early referral for suspected sarcoma without delay for investigations and that biopsy should be avoided. Ultrasound scan, or MRI where possible, should be requested in the interim.

It has been shown that high volume centres treating sarcomas achieve better outcomes. Limb salvage surgery has become the standard of care over the last 30 years and is achievable in >90% of patients in combination with neoadjuvant and adjuvant therapy. It requires meticulous planning from a multidisciplinary team to ensure margins are clear and reconstruction is functional and safe.

Moffat et al looked at a series of 4025 patients treated in Florida. They defined high volume as being above the 67th centile for number of patients treated for sarcoma. These centres saw an average of 5–24 cases per year (c.f. our institution=27/yr). Their results were significantly better, with significantly less complications in comparison to low volume centres.

The mean number of days from referral to review by the senior author was 16 days, although some patients were subject to delay (up to 7 months). Significant doctor delay (time from first consultation to final diagnosis) has previously been defined as >1 month by Brouns et al (Netherlands) who reported a rate of 27%. We were unable to determine when the patients were first seen by the referring clinician. Instead we calculated the wait till review by a senior author from the time of referral. There were 8 of 96 patients (8%) who waited more than 31 days (32–215 days).

A United Kingdom paper defined doctor delay as >3 months and reported a rate of 19.5%. Under this criterion we had 2 of 96 (2%). Our interval is not comparable with the definition of doctor delay, but interval till review post referral is low with no
significant difference between those presenting with histological sample and those without.

The majority (88%) of tertiary referrals presented with MRI imaging. This is the imaging modality of choice for local staging. Multiplanar images provide information on size, location, substance and relationship to adjacent structures.

MRI can accurately identify benign soft tissue masses but has limited success of 25-50% accuracy when identifying tissue diagnosis of sarcomas.\textsuperscript{13,14} Whilst still needing to proceed to biopsy to achieve diagnosis; MRI has allowed triaging of referrals.

Of the NBR group there were no cases of malignant tumour waiting more than 30 days for review by a senior author. The trend suggesting malignant masses were reviewed earlier was not statistically significant.

This is not a population based study. Referrals to the service are done so on clinician preference basis.

Considerable numbers of patients were lost to follow up so conclusions were not drawn on morbidity and mortality beyond the perioperative period. There were increased amputations in the PRP group, but this was not statistically significant.

The deaths were mentioned to highlight the threat that these tumours pose. The mortality rate would certainly have been higher than what is suggested by these results. The interval between referral and senior author review was not known in 24% of PRP and 31% of NBR group.

**Conclusions**

Patients with malignancy are more likely (RR 6.2) to suffer complications or compromise of local therapy when they undergo an invasive procedure prior to referral to a Specialist tumour centre.

Patients are more likely to have undergone an invasive procedure when referred to the service by general surgeons.

Patients who had a histological diagnosis confirming malignancy were not seen significantly earlier than those who did not.

MRI is the gold standard for localised imaging and no patients referred with MRI who proved to have malignancy waited more than 30 days till review by a senior author.

Any suspected malignant soft tissue tumour of the limbs should be referred to a tumour surgeon from a regional sarcoma multidisciplinary team prior to any invasive procedure. If this is not possible due to geographical difficulties, discussion with a tumour specialist should precede any invasive procedure.

**Competing interests:** Nil.

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Acknowledgement: We would like to pay special thanks to Eileen Isaac, Musculoskeletal Tumour Registry co-ordinator for her help in accessing data.

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References:
Laparoscopic adjustable gastric bands and the effect of living in distant towns

Richard Flint, Grant Coulter, Ross Roberts

Abstract

Aim To investigate whether the results of laparoscopic adjustable gastric bands (LAGB) are adversely affected when patients live in towns distant from their surgeons.

Methods A retrospective observational cohort study was conducted of patients having LAGB at Christchurch, New Zealand between March 2009 and March 2011. Patient demographics, postoperative band adjustments, and weight loss were recorded. The results were compared between those patients living in Christchurch and those that reside outside this region.

Results There were 142 patients (123 female) with 97 (68%) living in Christchurch. These local patients were younger on average (mean age 45.6±11.3 years compared to 49.9±8.9 years; p=0.026) and of lesser size (mean BMI 43.1±7.1 kg/m² compared 55.0±12.3 kg/m²; p<0.001) than those living beyond this region. There was no significant difference in the number of postoperative band adjustments between the two groups (Christchurch mean of 7.8±4.5 adjustments compared to 6.5±4.2 adjustments; (p=0.156) nor in the final volume that the band was adjusted to (Christchurch mean 4.6±1.3 mL compared to 4.1±1.7 mL; p=0.069). There was no significant difference in the weight loss between the groups at 2 years (Christchurch mean 41.4±17.3% excess body weight lost (EBWL) compared to 42.5±15.2% EBWL; p=0.829).

Discussion This current study demonstrates that patients undergoing LAGB in Christchurch are not disadvantaged if they live in towns beyond this region.

Weight loss surgery is recognised as a viable option for those struggling with obesity as it can effect a long-term weight reduction that corresponds with improved health and survival.1 Perhaps the most popular form of surgery for obesity is the laparoscopic adjustable gastric band (LAGB) where a silicone collar is placed around the top of the stomach to partition it into a 30-millilitre (mL) pouch. This induces substantial weight loss that is greater and more durable than dieting alone.2 The success of this surgery is dependent on extent of postoperative management. Serial adjustments of the band over time leads to the so-called green zone, an optimal band volume where hunger and satiety is controlled with little restriction. Too little volume in the band leads to constant hunger that jeopardises weight loss, whereas too much volume leads to significant restriction that paradoxically sabotages weight reduction.

Because of the importance of postoperative band management, many surgeons prefer to restrict the use of LAGB to those patients living in the same town; the argument
being that close proximity and easy access to their clinic is a surrogate for optimal band management.

Since 2009 Christchurch surgeons have offered LAGB regardless of the origin of each individual patient. The aim of this study is to investigate any differences in weight loss between patients who had LAGB and reside in the Christchurch region and those that live elsewhere.

Methods

All patients undergoing LAGB for obesity from March 2009 to March 2011 were selected for the study and identified from a prospective database. Patient demographics (age, gender, weight, and body mass index (BMI)) were sourced from the database, with missing data being recovered from a retrospective chart review. Patient follow-up was also accessed from the database and when required, patients were either called back to clinic or contacted by telephone.

Weight loss at 6 months, 1 year and 2 years from surgery was recorded. The number of band adjustments was recorded along with the final volume that the band was adjusted to. Visits that did not result in alteration of the band volume were not used in the final analysis.

Patients were defined as living in the Christchurch region if they reported that they could drive to the clinic from their home within 50 minutes. This definition was selected from the Canterbury District Health Board’s in-house study that identified time rather than distance as the predominant variable that determined a patients perception of accessibility to health care. In this sense 50 minutes was the maximal travel time patients deemed acceptable to get to medical treatment (data unpublished).

All patients had a comprehensive preoperative workup that involved consults with the operating surgeon, psychologist, dietician and an exercise specialist. A preoperative very low calorie diet (up to 800 kcal/day, OptiFast, Nestle New Zealand) was commenced at least 2 weeks before surgery. Laparoscopic adjustable gastric bands (LapBand AP system, Allergan, Irvine CA) were placed by the pars flaccida approach.

Postoperative band adjustments were scheduled to start 6 weeks after surgery and monthly thereafter until the optimal volume was reached. Dietician and exercise specialist follow-up was continued for at least a year after, and postoperative psychologist consults were scheduled on an as-needed basis.

All descriptive data is expressed as mean ± standard deviation. Weight loss is expressed as percentage of excess body weight lost (EBWL), with the ideal body weight being calculated by the Deitel & Greenstein formula, indirectly based on Metropolitan Life tables. All statistical analysis was performed by InStat version 3.0 software (GraphPad Software Inc., San Diego, USA).

Student’s two-tailed t test (non-paired) was used to analyse all nonparametric data. A power calculation was performed to ensure adequate sample size and guard against a Type II error. A difference of 15% EBWL, a standard deviation of 15%, α=0.05, and power (1-β)=0.95 required a total sample size of 46 (G’Power version 3.1.2 software).

The New Zealand Health and Disability Commissioner Ethics Committee approved this study.

Results

There were 142 consecutive patients (123 female) who had LAGB between March 2009 and March 2011. All patients were from the South Island, with 97 patients living in the Christchurch region and 45 patients travelling from other parts of the mainland. There was a significant difference in the demographics between these two groups; patients from Christchurch were younger on average (mean age 45.6±11.3 years compared to 49.9±8.9 years; p=0.026) and of lesser size (mean BMI 43.1±7.1 kg/m² compared 55.0±12.3 kg/m²; p<0.001). Follow-up was complete for 89% at 6 months, 79% at 1 year, and 70% at 2 years.

There was no significant difference in the number of postoperative band adjustments between the two groups. Patients from Christchurch had a mean of 7.8±4.5.
adjustments compared to those outside of Christchurch who had a mean of 6.5±4.2 adjustments (p=0.156). Nor was there a significant difference in the final volume that the band was adjusted to, despite a tendency for local patients to have more volume (Christchurch patients had mean 4.6±1.3 mL compared to 4.1±1.7 mL; p=0.069).

Weight loss at 6 months was less for those living in Christchurch (mean 24.7±8.9 % compared to 34.2±9.6 excess body weight loss; p<0.001) but became similar between both groups by 1 year (Christchurch patients had mean 37.3±15.4% EBWL compared to 38.1±15.2% EBWL; p=0.816). There was no significant difference in the weight loss between the groups at 2 years (Christchurch patients mean 41.4±17.3% EBWL compared to 42.5±15.2% EBWL; p=0.829). This equated to an absolute weight loss of mean 23.2±9.9 kg at 2 years for those living in Christchurch compared to 24.5±8.4 kg (p=0.447).

Conclusions

This current study demonstrates that patients undergoing LAGB in the South Island are not disadvantaged if they reside in towns distant from their operating surgeon. In this analysis of a single Christchurch practice, patients had a similar number of postoperative visits and volume in their bands as those living locally. Furthermore, weight loss was similar at 1 and 2 years following surgery.

Adjustable gastric bands are arguably the most popular form of weight loss with patients being attracted to its long-term efficacy and favourable safety profile. Integral to its success is the extent of postoperative band management that necessitates frequent clinic visits and serial band adjustments. Hence it is thought that difficult access to the clinic may jeopardise the results.

In a review of the results of Norwich’s LAGB the authors identified distance from the hospital as a reason for reduced attendance, but this did not equate to a reduced weight loss. Likewise, the surgeons in Brisbane intimated (but did not demonstrate) that the vast distances of greater Queensland might have limited the results of their LAGB.

The results of this current study suggest that proximity to the surgeon is not an issue in the New Zealand environment. One explanation may be that Christchurch is a central airline hub with frequent flights to most major towns in the South Island hence time patients have to invest away from their routine activities may be minimal.

Another explanation for the lack of difference in the present study is that issues other than the patient’s location are of higher importance to the result. Other factors that need to be considered are proper patient selection, technically sound surgery, and intensive multidisciplinary follow-up. International guidelines emphasise these points when defining the essentials of a weight-loss surgery practise. The surgeons in this current study use these guidelines to base their practise and oversee a team of dieticians, psychologists, exercise consultants, and practise nurses. Access to the clinic is readily available and virtual clinics have been utilised (using phone or video-link) for those that live in distant towns. As a result travel is reserved for when adjustments are required so reducing the burden of unnecessary journeys.
It should be emphasised that an analysis on the effect of distance as a continuous variable was not attempted in this study which is in variance to other studies on this issue. This is because distance is often used as a surrogate for ease of access. Local, unpublished data from the Canterbury District Health Board has identified the time spent travelling rather than the distance travelled as the main influence of the perception patients have for ease of access. For example a 60 minute airplane flight may be favoured over a 90 minute car trip, despite the differences in distance being considerable.

However, some limitations need to be considered when interpreting the results of this current study. It is conceivable that some of the patients that lived in towns distant from Christchurch had ad hoc adjustments from their local doctor therefore underreporting the burden of postoperative follow-up commitments in these patients. Furthermore there is no discussion of management of complications as the authors are unable to source objective measures of emergency visits for those distant from Christchurch. This would make it difficult to transfer the results of this study to other communities that do not have ready access to local doctors confident in LAGB. Finally there has been no attempt to compare quality of life data between the two groups to determine whether satisfaction rates differ.

In conclusion, the success of LAGB does not appear to be determined by proximity to the operating surgeon. A comprehensive, multidisciplinary approach can overcome the limitations caused by long travel in patients who live in distant towns.

Competing interests: Nil.

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References:

Developing a tool to monitor potentially avoidable and ambulatory care sensitive hospitalisations in New Zealand children

Philippa Anderson, Elizabeth Craig, Gary Jackson, Catherine Jackson

Abstract

**Background** In New Zealand there has been increasing interest in reducing avoidable hospitalisations, particularly from conditions treatable in primary care. To date avoidable hospitalisations in children have been monitored using adult tools which contain many conditions irrelevant to children. Further, New Zealand has large socioeconomic gradients in hospitalisations for many paediatric conditions, suggesting that the social determinants of health also heavily influence avoidable hospitalisations in this age group.

**Aims** (1) To develop a tool to monitor potentially avoidable hospitalisations in New Zealand children which includes the socioeconomic determinants of health within the conceptualisation of “avoidable”; and (2) Within this broader framework, to identify a sub-set of conditions which are amenable to intervention in primary care.

**Methods** Five selection criteria were developed to define Potentially Avoidable Hospitalisations (PAH), and a further two criteria were used to define a subset of Ambulatory Care Sensitive Hospitalisations (ACSH). The principal diagnoses for all acute hospitalisations in New Zealand children (1 month–14 years) during 2003–2005 were then reviewed, and a list of 42 conditions created. This list was sent to 17 health professionals with experience in child health, who were asked to score each condition against the 5 PAH and 2 ACSH criteria.

**Results** Twenty-six conditions contributing to PAH were identified, along with 18 contributing to ACSH. PAH tended to be infectious or respiratory in nature, with hospitalisations for chronic medical conditions or surgical problems being viewed as non-avoidable. While a similar pattern was seen for ACSH, viral infections were viewed as non-ambulatory care sensitive.

**Conclusions** While the tools developed are a considerable improvement on those used to date, the use of diagnostic coding algorithms to monitor ACSH and by inference, the performance of primary care, remains problematic for a number of reasons. Nevertheless, the broadening of PAH to encompass the wider determinants of health, serves to highlight the role Government social and other policies might play in reducing the large burden of avoidable morbidity currently being experienced in this age group.

In New Zealand, as in other developed countries, there has been increasing interest in healthcare efficiency and the reduction of hospitalisations for conditions amenable to early intervention in primary care. In this context, coding algorithms which can be used to monitor ambulatory sensitive conditions in hospital admissions data, have
found favour with those wishing to establish key performance and accountability measures in primary health care.\(^1\)

In New Zealand, the introduction of an ambulatory sensitive hospitalisation (ASH) target for children (0–4 years) in 2007\(^1\) was the stimulus for the current project. Previously, ASH rates had been monitored using coding algorithms developed by Jackson and Tobias,\(^2\) who grouped potentially avoidable hospitalisations into three broad categories: Preventable Hospitalisations (PH) – by means of population based interventions (e.g. tobacco excise tax); Ambulatory Sensitive Hospitalisations (ASH) – preventable by early and effective treatment in primary care; and Hospitalisations avoidable through Injury Prevention (IP) – preventable via injury prevention measures (e.g. seatbelts).

The coding algorithms used however, were based on tools which had been developed for adult populations, and then updated and adapted for use in the New Zealand context. As a result, they contained many conditions irrelevant to children (e.g. stroke, emphysema), or where preventability was assigned with reference to adult treatment protocols (e.g. urinary tract infections).\(^2\)

In addition New Zealand has moderate-high child poverty rates,\(^3,4\) and hospitalisation rates for many common paediatric conditions have large socioeconomic gradients,\(^5\) potentially suggesting that the underlying determinants of health (e.g. housing quality, nutrition, exposure to second hand smoke) are significant drivers of hospitalisations in this age group.\(^6\)

There was some concern that a health sector target focused solely on access to primary care might have created undue expectations regarding the extent to which primary care could achieve significant reductions in acute paediatric hospitalisations. Such a narrow focus might also divert attention from broader policy measures (e.g. housing quality and affordability, family income support, and childcare), which might potentially achieve greater health gains in this age group.\(^7\)

With these issues in mind, the project team set out to develop a tool to monitor avoidable hospitalisations in the New Zealand paediatric population. Specifically, the project aimed to:

- Reframe the current concept of “avoidable” to include policy measures which influenced the socioeconomic determinants of child health. Within this broader framework a sub-set of conditions could then be identified which were amenable to early treatment in primary care. Such an approach aimed to ensure that the role primary care played in preventing hospitalisations would always be seen in the context of broader approaches to address the underlying determinants of child health.

- Combine this concept of “avoidable” with the clinical expertise of child health professionals to develop a coding algorithm which identified potentially avoidable hospitalisations (PAH) and ambulatory care sensitive conditions (ACSH) in paediatric hospitalisation data, as well any data filters required to ensure that these hospitalisations could be monitored in a consistent manner over time.
Methods

Previous key work to develop coding algorithms for potentially avoidable and ambulatory sensitive conditions has relied heavily on expert consensus. The exact process by which this has been done is not well described in the literature with most articles stating consensus by expert panel but not elaborating in detail about the process by which consensus was reached. When details of the panel have been given, the numbers have varied with the maximum number of panellists noted to be 17. For this project a hybrid approach (combining Delphi and Nominal approaches) was adopted, with indicator development progressing as follows:

Developing selection criteria to define avoidable and ambulatory care sensitive conditions—

Drawing heavily on the literature linking Government health and social policies to the socioeconomic determinants of health and to child health outcomes, the authors developed a set of selection criteria to define membership of the potentially avoidable and ambulatory care sensitive categories.

Potentially avoidable hospitalisations (PAH) included those which might potentially be avoided by:

- Government policies which ensured adequate socioeconomic resources were available to families with children (e.g. income support, childcare, assistance for solo parents returning to workforce).
- Central and local government policies which ensured that families with children had access to high quality housing and a safe physical environment (e.g. availability, quality and affordability of state and other housing options).
- Access to timely, appropriate and affordable primary healthcare.
- The implementation of population based health promotion strategies aimed at improving child health (e.g. adult smoking cessation).
- Central and local government policies which ensured that the principles of the Treaty of Waitangi (between indigenous Māori and the Crown) were taken into account when making resource allocation decisions affecting families.

Two different criteria were used to define the Ambulatory Care Sensitive subset. These were:

- Early access to primary care could potentially prevent hospitalisation for this condition (e.g. early and appropriate antibiotic treatment for skin infection).
- If managed appropriately (e.g. early access, adherence to treatment guidelines), the condition could be managed almost entirely in the primary care setting.

Thus by definition, if a condition met the criteria for the Ambulatory Care Sensitive subset, it would also be deemed to be Potentially Avoidable, as a result of it meeting Criterion 3 for PAH.

Data inclusion and exclusion criteria—A number of data inclusion and exclusion criteria were also developed. While some related to unique limitations of the national data collections used, others had wider relevance. These were:

- Only the primary diagnosis was included for coding purposes to prevent double counting or confusion in coding for admissions with multiple contributing diagnoses.
- Coding algorithms included those 29 days–14 years but excluded neonates (due to the differing aetiology of neonatal vs. community acquired infectious diseases and the likely lower threshold for hospital admission in the neonatal age group).
- Age restrictions for some infectious / vaccine preventable diseases (e.g. pertussis was not considered avoidable until >6 months, when the first set of routine vaccinations was complete).
- All acute (immediate) and semi-acute (occurring within one week of referral) admissions were included. Waiting list admissions were excluded on the basis that elective surgery throughput is often more determined by the supply capacity of a hospital than the burden of need in the community. The only exception was dental admissions, an important cause of avoidable morbidity in the paediatric population. In New Zealand hospitals manage dental admissions variably with some admitting children semi-acutely and others drawing them from a waiting list. Because of this variability all dental admissions were included (irrespective of whether they were acute, semi-acute or drawn from the waiting list).
All emergency department (ED) cases were included because of variable paediatric ED assessment procedures around the country.

Injuries and poisonings are important causes of avoidable hospitalisations in children. They were not included in the current project however due to variability in the way different EDs upload minor injury cases to the national dataset.

Iatrogenic causes of childhood morbidity are considered an important (and under recognised) cause of hospitalisation / prolonged hospitalisation. It was felt however, that such cases were likely underreported (either because they were recorded in secondary diagnostic fields or because of regional inconsistencies in reporting).

Using selection criteria to identify avoidable and ambulatory sensitive conditions—In developing a list of candidate conditions for further scrutiny, the principal diagnoses (ICD-10-AM) for all acute and semi-acute hospitalisations in New Zealand children (aged 1 month–14 years) during 2003-2005 were reviewed and the 40 most frequent conditions identified. To this list a small number of rarer conditions were added. These conditions had been identified by a previous project as being important to child health, either because of their severity (e.g. meningococcal disease) or their significant long term costs (e.g. acute rheumatic fever and rheumatic heart disease).

This process resulted in a list of 42 conditions which was then given to a panel of 17 child health professionals (8 Paediatricians, 2 Paediatric Registrars, 2 Public Health Physicians, 2 Public Health Registrars, 1 Paediatric Nurse Specialist, 2 General Practitioners) who were asked to score each condition against the 5 Avoidable and 2 Ambulatory Care Sensitive criteria, using the scale below:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Almost totally unavoidable (e.g. &lt;5% could be prevented by this factor)</td>
</tr>
<tr>
<td>1</td>
<td>Largely unavoidable (e.g. 5–50% could be prevented by this factor)</td>
</tr>
<tr>
<td>2</td>
<td>Partially avoidable (e.g. 51–80% could be prevented by this factor)</td>
</tr>
<tr>
<td>3</td>
<td>Largely avoidable (e.g. 81–95% could be prevented by this factor)</td>
</tr>
<tr>
<td>4</td>
<td>Almost totally avoidable (e.g. &gt;95% could be prevented by this factor)</td>
</tr>
</tbody>
</table>

In order to assist panel members to consider the role socioeconomic resources (e.g. PAH Criterion 1: Government policies which ensured adequate socioeconomic resources were available to families with children) played in the genesis of each condition, hospitalisation rates by New Zealand Deprivation Index (NZDep2001) were provided. The NZDep2001 is a small area index of deprivation which includes 9 variables (reflecting income, employment, communication, transport, support, qualifications, living space and own home) which for most analyses is converted to a decile scale – with decile 1 representing the least deprived 10% of small areas, and decile 10 the most deprived 10% of small areas. Panel members were directed to consider the magnitude of the rate ratio (rate NZDep decile 9–10/decile 1–2) for each condition, when considering the impact family resources might have had on the likelihood of hospital admission.

While most participants had little difficulty with the selection criteria, a number felt that the criterion relating to the Treaty of Waitangi should apply equally to all conditions, potentially reducing its utility as a differential scoring tool. Given that the intention of this criterion was to ensure that the Crown’s obligations under the Treaty of Waitangi (i.e. to ensure equity in outcomes for Māori were taken into consideration) it was decided that ethnic gradients for each condition would be used to score this criterion. Therefore ethnic specific hospitalisation rates were calculated using the Ministry of Health’s level 1 prioritisation algorithm.

This hierarchical algorithm allocates children reporting multiple ethnic affiliations to one of five ethnic groups in the following order: Māori, Pacific, Asian, Other, European (e.g. a child identifying with both Māori and Pacific ethnic groups would be counted as Māori). For each condition rates for Māori, Pacific and Asian children were then compared to those of European children. Scoring was then assigned on the basis of the rate ratio (RR) as follows: RR≥3.0=Score 4; RR 2.5–2.9=Score 3; RR 2.0–2.4=Score 2; RR<2.0= Score 1.

The mean score for each of the five potentially avoidable and two ambulatory care sensitive criteria was then calculated for each condition. If the mean score for any potentially avoidable criterion was ≥2.5 then the condition was considered a cause of potentially avoidable hospitalisation. This cut off
was chosen as conceptually it fell half way between a score of 2 (partially avoidable i.e. 51–80% could be prevented by this factor), and a score of 3 (largely avoidable i.e. 81–95% could be prevented by this factor).

Similarly if a mean ambulatory care sensitive criterion score was ≥2.5 the condition was considered a cause of ambulatory care sensitive hospitalisation. Conditions where the highest mean criteria score was between 2.0 and 2.5 were reviewed by a focus group (consisting of 4 medically qualified health professionals) and category assignment was made by consensus, whereas conditions where the highest mean criteria score was <2.0 were automatically excluded.

A draft list of Potentially Avoidable and Ambulatory Care Sensitive conditions was then constructed and given to panel members for their review. While there was general agreement that the lists were appropriate, the inclusion of croup, epilepsy and urinary tract infections (UTIs) in the ambulatory sensitive group was queried by a small number. After further discussion, an age criterion was applied to urinary tract infections (UTIs) (i.e. only UTIs in children >4 years were considered ambulatory care sensitive).

Fleiss’s Kappa was used to calculate inter-rater agreement between the panel members who scored each of the conditions against the various criteria. The irr package of the R-project statistical software, was used to undertake these analyses.

Ethics approval was not required.

Results

Table 1 summarises the mean scores the 42 conditions on the candidate list received against each of the five Potentially Avoidable and two Ambulatory Care Sensitive Criteria. Similarly, Table 2 and Table 3 summarise the final lists of Potentially Avoidable and Ambulatory Care Sensitive conditions respectively.

### Table 1. Mean scores for each condition against the 5 avoidable and 2 ambulatory sensitive criteria

<table>
<thead>
<tr>
<th>Condition</th>
<th>Avoidable Under Wider Definition</th>
<th>Avoidable by Appropriate Access to Primary Care</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Social Policy</td>
<td>Housing / Physical Environment</td>
</tr>
<tr>
<td>Abdominal/pelvic pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute appendicitis</td>
<td>▲</td>
<td></td>
</tr>
<tr>
<td>Acute URTI NOS</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Acute bronchiolitis</td>
<td>■ ▲</td>
<td>■</td>
</tr>
<tr>
<td>Acute rheumatic fever</td>
<td>▲ ■</td>
<td>■</td>
</tr>
<tr>
<td>Acute upper respiratory infections</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Apnoea/breath holding</td>
<td>▲</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Bacterial meningitis</td>
<td>▲</td>
<td></td>
</tr>
<tr>
<td>Bacterial pneumonia</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coagulation defects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constipation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Avoidable Under Wider Definition</td>
<td>Avoidable by Appropriate Access to Primary Care</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>----------------------------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td></td>
<td>Social Policy</td>
<td>Housing / Physical Environment</td>
</tr>
<tr>
<td>Chronic rheumatic fever (rheumatic heart disease)</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Croup</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Dental (dental caries, pulp, periodontal)</td>
<td>▲</td>
<td>▲</td>
</tr>
<tr>
<td>Dermatitis/eczema</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Epilepsy</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Failure to thrive</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Febrile convulsions</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Gastroenteritis-bacterial/protozoal</td>
<td>■</td>
<td>▲</td>
</tr>
<tr>
<td>Gastroenteritis-other</td>
<td>■</td>
<td>▲</td>
</tr>
<tr>
<td>Gastro oesophageal reflux</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Immune disorders</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Meningococcal disease</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Mental health and behaviour disorders</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neoplasms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritional deficiency</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Otitis media</td>
<td>▲</td>
<td>■</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pertussis</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Skin infection</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Type 1 diabetes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Urinary tract infection</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Vaccine preventable diseases</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Viral pneumonia</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Viral meningitis</td>
<td>■</td>
<td>■</td>
</tr>
<tr>
<td>Viral infection of unspecified site</td>
<td>▲</td>
<td>▲</td>
</tr>
</tbody>
</table>

Note: For each condition, panel members awarded a score of 0-4 for each criterion; ■ = mean score ≥ 2.5, ▲ = mean score 2.2-2.49; ARF= acute rheumatic fever; CRF= chronic rheumatic fever; URTI= upper respiratory tract infection; VPD= Vaccine preventable disease; NOS= not otherwise specified. All conditions that scored ≥ 2.5 were considered avoidable. Conditions where the highest mean criteria score was between 2.0 and 2.49 were reviewed by a focus group and category assignment was made by consensus, whereas conditions where the highest mean criteria score was <2.0 were automatically excluded.
Table 2. Final list of potentially avoidable hospitalisations

<table>
<thead>
<tr>
<th>Condition</th>
<th>ICD-10-AM Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potentially Avoidable Hospitalisations</td>
<td></td>
</tr>
<tr>
<td>Acute bronchiolitis</td>
<td>J21</td>
</tr>
<tr>
<td>Acute rheumatic fever</td>
<td>I00-I02</td>
</tr>
<tr>
<td>Acute upper respiratory tract infection excluding croup</td>
<td>J00-J03, J06</td>
</tr>
<tr>
<td>Asthma</td>
<td>J45,J46</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>J47</td>
</tr>
<tr>
<td>Bacterial meningitis*</td>
<td>G00,G01</td>
</tr>
<tr>
<td>Bacterial/ Unspecified pneumonia</td>
<td>J13-J16, J18</td>
</tr>
<tr>
<td>Constipation</td>
<td>K590</td>
</tr>
<tr>
<td>Chronic rheumatic heart disease</td>
<td>I05-I09</td>
</tr>
<tr>
<td>Croup, acute laryngitis, tracheitis</td>
<td>J04 J050</td>
</tr>
<tr>
<td>Dental (dental caries, pulp, periodontal)</td>
<td>K02,K04,K05</td>
</tr>
<tr>
<td>Dermatitis/eczema</td>
<td>L20-L30</td>
</tr>
<tr>
<td>Febrile convulsions</td>
<td>R560</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>A00-A09,R11, K529</td>
</tr>
<tr>
<td>Gastro oesophageal reflux</td>
<td>K21</td>
</tr>
<tr>
<td>Meningococcal disease</td>
<td>A39</td>
</tr>
<tr>
<td>Nutritional deficiency</td>
<td>E40-E64, D50-D53</td>
</tr>
<tr>
<td>Otitis media</td>
<td>H65-H67</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>M86</td>
</tr>
<tr>
<td>Vaccine preventable diseases</td>
<td>P350,A33,A34</td>
</tr>
<tr>
<td>tetanus neonatorum congenital rubella</td>
<td>A35,A36, A37,A80, B16,B180,B181</td>
</tr>
<tr>
<td>tetanus, diphtheria, pertussis, polio, hepatitis B, measles, rubella, mumps</td>
<td>B05,B06,B26, M014</td>
</tr>
<tr>
<td>Skin infection</td>
<td>L00-L05,L08,L980,J340,H010,H000</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>A15-A19</td>
</tr>
<tr>
<td>Urinary tract infection ≥ 5 years</td>
<td>N10, N12,N300,N390,N136,309</td>
</tr>
<tr>
<td>Viral pneumonia</td>
<td>J12, J100,J110</td>
</tr>
<tr>
<td>Viral / other / unspecified meningitis</td>
<td>A87,G02,G03</td>
</tr>
<tr>
<td>Viral infection of unspecified site</td>
<td>B34</td>
</tr>
<tr>
<td>Not Potentially Avoidable Hospitalisations</td>
<td></td>
</tr>
<tr>
<td>Abdominal/pelvic pain</td>
<td>R10</td>
</tr>
<tr>
<td>Acute appendicitis</td>
<td>K35</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Z511</td>
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<tr>
<td>Coagulation defects</td>
<td>D65-D69</td>
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<tr>
<td>Cystic fibrosis</td>
<td>E84</td>
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<tr>
<td>Epilepsy / Status epilepticus</td>
<td>G40,G41</td>
</tr>
<tr>
<td>Immune disorders</td>
<td>D80-D89</td>
</tr>
<tr>
<td>Inguinal hernia</td>
<td>K40</td>
</tr>
<tr>
<td>Neoplasm- malignant or non malignant</td>
<td>C00-D48</td>
</tr>
<tr>
<td>Type 1 diabetes</td>
<td>E10</td>
</tr>
<tr>
<td>Urinary tract infection &lt; 5 years</td>
<td>N10, N12,N300,N390,N136,309</td>
</tr>
</tbody>
</table>

*Note: Meningococcal meningitis included under meningococcal disease.
### Table 3. Final list of ambulatory care sensitive hospitalisations

<table>
<thead>
<tr>
<th>Condition</th>
<th>ICD10-AM code</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ambulatory Care Sensitive Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Acute rheumatic fever</td>
<td>I00-I02</td>
</tr>
<tr>
<td>Acute upper respiratory tract infections excluding croup</td>
<td>J00-J03, J06</td>
</tr>
<tr>
<td>Asthma</td>
<td>J45, J46</td>
</tr>
<tr>
<td>Bacterial/Unspecified Pneumonia</td>
<td>J13-J16, J18</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>J47</td>
</tr>
<tr>
<td>Constipation</td>
<td>K590</td>
</tr>
<tr>
<td>Chronic rheumatic heart disease</td>
<td>I05-109</td>
</tr>
<tr>
<td>Dental (dental caries, pulp, periodontal)</td>
<td>K02, K04, K05</td>
</tr>
<tr>
<td>Dermatitis/eczema</td>
<td>L20-L30</td>
</tr>
<tr>
<td>Gastroenteritis</td>
<td>A02-A09, R11, K529</td>
</tr>
<tr>
<td>Gastro oesophageal reflux</td>
<td>K21</td>
</tr>
<tr>
<td>Nutritional deficiency</td>
<td>D50-D53, E40-E64</td>
</tr>
<tr>
<td>Vaccine preventable diseases</td>
<td>P350, A33, A34</td>
</tr>
<tr>
<td>tetanus neonatorum congenital rubella</td>
<td>&gt;6 months: A35, A36, A37, A80, B16, B180, B181</td>
</tr>
<tr>
<td>&gt;16 months: tetanus, diphtheria, pertussis, polio, hepatitis B</td>
<td>&gt;16 months: B05, B06, B26, M014</td>
</tr>
<tr>
<td>Dental caries, pulp, periodontal</td>
<td>B05, B06, B26, M014</td>
</tr>
<tr>
<td>Skin infection</td>
<td>L00-L04, L08, L980, J340, H010, H000</td>
</tr>
<tr>
<td>Urinary tract infection ≥ 5 years</td>
<td>N10, N12, N136, N300, N309, N390</td>
</tr>
<tr>
<td><strong>Non Ambulatory Care Sensitive Conditions</strong></td>
<td></td>
</tr>
<tr>
<td>Abdominal/pelvic pain</td>
<td>R10</td>
</tr>
<tr>
<td>Acute appendicitis</td>
<td>K35</td>
</tr>
<tr>
<td>Acute bronchiolitis</td>
<td>J21</td>
</tr>
<tr>
<td>Bacterial meningitis*</td>
<td>G00, G01</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>Z511</td>
</tr>
<tr>
<td>Coagulation defects</td>
<td>D65-D69</td>
</tr>
<tr>
<td>Croup, acute laryngitis, tracheitis</td>
<td>J04, J050</td>
</tr>
<tr>
<td>Cystic fibrosis</td>
<td>E84</td>
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<td>A39</td>
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<tr>
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<td>C00-D48</td>
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<td>Osteomyelitis</td>
<td>M86</td>
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<tr>
<td>Type 1 diabetes</td>
<td>E10</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>A15-A19</td>
</tr>
<tr>
<td>Urinary tract infection &lt;5 years</td>
<td>N10, N12, N300, N390, N136, N309</td>
</tr>
<tr>
<td>Vaccine preventable diseases under relevant age cut offs</td>
<td>≤6 months: A35, A36, A37, A80, B16, B180, B181</td>
</tr>
<tr>
<td>≤16 months: B05, B06, B26, M014</td>
<td></td>
</tr>
<tr>
<td>Viral pneumonia</td>
<td>J12, J100, J110</td>
</tr>
<tr>
<td>Viral / other / unspecified meningitis</td>
<td>A87, G02, G03</td>
</tr>
<tr>
<td>Viral infection of unspecified site</td>
<td>B34</td>
</tr>
</tbody>
</table>

*Note: Meningococcal meningitis included under meningococcal disease.
In general, Potentially Avoidable Hospitalisations tended to be viewed as those arising from conditions of an infectious or respiratory nature, while hospitalisations for chronic medical conditions (e.g. cancer, diabetes) or surgical problems (e.g. appendicitis) were viewed as non-avoidable. While a similar pattern was seen for Ambulatory Care Sensitive Hospitalisations, infectious diseases with a predominantly viral aetiology (e.g. bronchiolitis, viral pneumonia) were more likely to be viewed as non-ambulatory care sensitive (i.e. early treatment in primary care was thought unlikely to change their course significantly).

In terms of inter-rater agreement, analysis of scoring using the five Potentially Avoidable and two Ambulatory Sensitive Criteria suggested only slight agreement between panel members. Because of the large number of missing scores for two raters, they were omitted from analyses. Kappa coefficients (Fleiss) for the 5 Potentially Avoidable Criteria ranged from 0.140 for ‘Primary Care’ to 0.150 for the ‘Health Promotion’ criterion. Kappa coefficients for ‘Ambulatory Care’ ranged from 0.095 for ‘Early Access’, to 0.170 for the ‘Completely Managed in Primary Care’ criterion.

**Discussion**

This is the first time that Potentially Avoidable and Ambulatory Care Sensitive Hospitalisation indicators have been developed specifically for the New Zealand paediatric population. The tools developed represent a significant improvement on those used previously in New Zealand which contained diagnoses inappropriate for children or had failed to take into account age related differences in the aetiology or management of common conditions (e.g. UTIs).

In addition, the broadening of the concept of avoidable to include the policies which shape the underlying determinants of health serves to place the role of primary care in the prevention of acute paediatric hospitalisations within a broader context. While the tools developed are a considerable improvement on those used to date, the use of diagnostic coding algorithms to monitor ambulatory care sensitive hospitalisations and by inference, the performance of primary care, remains problematic for a number of reasons.

Firstly, the extent to which ambulatory care sensitive hospitalisations are actually avoidable remains unclear. One survey of 554 children hospitalised for ambulatory sensitive conditions in the USA noted that only 25% of parents, 29% of primary health care physicians and 32% of hospital doctors felt that their child’s / patient’s admission could have been avoided given improved access to primary care, better attention to preventative medication, or avoidance of known triggers. It is also notable that the level of agreement between parents and primary health care physicians as to whether their child’s / patients admission might have been avoidable (kappa 0.31), was not much higher than the level of agreement seen between panel members when scoring avoidability in the current study.

Secondly, in New Zealand primary diagnoses are assigned at the time of hospital discharge after all relevant investigations have been undertaken. Therefore while at first glance it may appear that 100% of admissions for acute upper respiratory infections should be avoidable, given early access to primary care, in reality such a diagnosis may be one of exclusion, arrived at only after more serious causes of illness
have been ruled out by investigations unavailable in primary care (e.g. lumbar puncture). Therefore any initiatives aimed at reducing such seemingly trivial hospitalisations must be carefully weighed up in order to ensure that patient safety is not compromised in the quest for health service efficiency.

Thirdly, the predominance of acute infectious and respiratory diseases seen in Table 3 is in sharp contrast to the ambulatory care sensitive conditions identified by Jackson and Tobias for older adults where chronic conditions (e.g. angina, hypertension) predominate. Such differences potentially suggest that the window of opportunity available for successful primary care intervention in children (e.g. acute respiratory infections = hours-days) is much briefer than for adults (e.g. antihypertensives to prevent ischemic heart disease= months-years), and as a consequence, a much greater emphasis needs to be placed on providing access to immediate and afterhours primary care.

Fourthly injuries, poisonings and iatrogenic causes of childhood morbidity, which are responsible for a large number of childhood hospitalisations, were not included in the tool as described above. As data quality improves the development of injury and iatrogenic subsets are recommended.

Finally, the complex interrelationships between socioeconomic factors, access to primary care, and hospitalisations for ambulatory sensitive conditions are difficult to untangle. During office hours the majority of children under the age of 6 years in New Zealand receive free primary health. However after hours care is invariably subject to co-payments, and appointments are not always available. Further primary care for older family members (including children > 6 years) usually attracts user charges, with parents often being reluctant to seek free care for their children from practices where they owe debts for older family members. In contrast, secondary care (including attendance at Emergency Departments) remains free for all age groups, thereby creating incentives for families with restricted economic resources to bypass primary care, particularly in the after-hours context.

The inconsistent uploading of emergency department (ED) cases to the hospital admission dataset further complicates this issue by making it difficult to consistently remove “walk in” ED cases from any analysis of avoidable hospitalisations. In New Zealand, an event is recorded as a hospital admission if treatment time exceeds 3 hours, irrespective of the department in which the patient is assessed. While for adults, some analysts exclude from analysis all patients admitted to an ED and discharged alive the same day, for paediatric cases such an approach is problematic. This is because large urban centres tend to assess children presenting acutely in specialist paediatric EDs, while many smaller centres send similar cases to the paediatric ward / assessment unit (where they are assigned an inpatient code). The subsequent filtering out of ED cases thus disproportionately discounts the work of larger urban centres, who manage much of their patient throughput via specialist paediatric EDs. The inclusion of emergency day cases remains controversial however as a number of these children are likely to be from families attempting to access free primary health care via secondary or tertiary hospital services.

In addition, New Zealand has moderate-high child poverty rates, and high rates of household crowding and exposure to second hand cigarette smoke, each of
which are significant drivers for acute infectious and respiratory diseases in children. Therefore, in the context of a funding model which incentivises families to seek after hours care from hospital EDs, an infectious and respiratory disease burden which is being driven by a complex web of socioeconomic causality, and a narrow window for effective intervention, the extent to which ‘ambulatory care sensitive’ hospitalisations can or should be used to monitor primary care performance remains debatable.

The large social gradients evident for many of these conditions also suggests that effective government policies implemented by agencies which sit outside of the health sector (e.g. housing, social welfare) may potentially result in large reductions in childhood hospitalisations for potentially avoidable conditions).

**Conclusions**

This paper describes the development of a tool to measure Potentially Avoidable and Ambulatory Care Sensitive Hospitalisations in the New Zealand paediatric population, using a methodology which includes the broader determinants of health in the conceptualisation of what is *Avoidable*. While policies which ensure early access to effective primary health care are crucial for optimal child health outcomes, the role Government social (e.g. welfare entitlements) and other (e.g. housing, early childhood education) policies play in shaping the underlying determents of health are likely to be as important, in reducing the large burden of avoidable morbidity currently experienced by New Zealand children.

**What is already known?**

Tools which measure avoidable morbidity have been developed to monitor health services performance

The current tools do not capture the role of socioeconomic determinants on health outcomes for children

**What this study adds**

The PAH tool incorporates the broader determinants of health in order to provide information about the potential health gain possible for the paediatric population.

The ACSH tool provides a more accurate reflection of the role of primary care’s ability to impact on hospitalisation rates than previous indicators used for the paediatric population in New Zealand.

**What are the policy implications?**

The PAH tool draws attention to the sectors outside the health system that play an important role in determining health outcomes for children and therefore have the potential to influence government policy in these areas.
Competing interests: No financial interests are involved. This work and any views expressed are solely those of the authors, and not of their employing agencies. No editorial control came from either organisation.

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References:


Measuring potentially avoidable and ambulatory care sensitive hospitalisations in New Zealand children using a newly developed tool

Elizabeth Craig, Philippa Anderson, Gary Jackson, Catherine Jackson

Abstract

Objectives To use a newly developed tool to measure Potentially Avoidable (PAH) and Ambulatory Care Sensitive (ACSH) Hospitalisations in New Zealand children.

To consider whether these tools provide any insights into the role policies or programmes which address the underlying determinants of health (e.g. poor housing, exposure to cigarette smoke, child poverty) might play in reducing hospitalisations in this age group.

Methods All acute and semi acute (<1 week of referral) hospitalisations in New Zealand children aged 29 days–14 years, during 2000–2009 were included, along with all hospitalisations for selected dental conditions. The newly developed PAH and ACSH tools were used to determine category membership, with explanatory variables including age, gender, ethnicity and NZ Deprivation index decile.

Results During 2005–2009, 47.4% of all acute paediatric hospitalisations were considered to be PAH, 34.3% to be ACSH, and 9.7% to be non-avoidable. A further 42.9% were for non-classified conditions. Dental conditions and gastroenteritis were the leading causes of both PAH and ACSH. PAH and ACSH were highest in infants and one year olds, while non-avoidable hospitalisations were more evenly distributed throughout childhood. PAH and ACSH were higher for those from deprived areas and for Pacific and Māori children. Socioeconomic differences for non-avoidable hospitalisations were less marked, with rates being lowest in Māori and Asian children.

Discussion Large social gradients in ACSH suggest that New Zealand needs to implement policies to increase access to primary care for Pacific and Māori children and those living in more deprived areas. With the majority of presentations being for acute onset infectious and respiratory diseases, such policies must take into account the need for immediate (i.e. same day) and after hours access to primary care. The narrow windows of opportunity (hours–days) available for primary care to prevent hospitalisations for ambulatory sensitive conditions also suggests that New Zealand needs to develop policies and strategies to reduce the underlying burden of disease in the community.

In New Zealand there has been increasing interest in avoidable hospitalisations and the extent to which improved access to primary care might lead to a reduction in hospital admission rates. The introduction of a national ambulatory care sensitive hospitalisation (ACSH) target for children led to the development of a new tool to monitor potentially avoidable hospitalisations (PAH) in the paediatric population.
This PAH tool aimed to include the broader determinants of health (e.g. housing quality, child poverty, access to healthcare) in the conceptualisation of what was avoidable, and within this broader framework, to identify a subset of conditions which were amenable to early intervention in primary care (ACSH). The methodology used to develop this tool is described elsewhere.²

The aims of the current study were to use this newly developed tool to explore the distribution of PAH and ACSH in the New Zealand paediatric population, and to consider whether the tool provided any insights into the role government policies to address the underlying determinants of health might play in reducing the burden of avoidable hospitalisations in this age group.

**Methods**

All acute (immediate) and semi-acute (occurring within 1 week of referral) hospital admissions for New Zealand children aged 29 days–14 years 364 days, during 2000–2009 were included in this analysis. As inter-hospital and inter-service transfers (e.g. for seriously ill children transferred from a regional to a tertiary centre for ICU) are counted as separate hospitalisations in the national data collection, this may have led to a small number of presentations being counted twice in this analysis (i.e. the unit of analysis is the hospitalisation event, rather than the number of children).

Waiting list admissions (occurring >7 days after booking) were excluded except for dental admissions, defined as those for dental caries and pulp and periodontal disease. All Emergency Department cases with a treatment time >3 hours were included, while neonates were excluded. The rationale for these inclusion and exclusion criteria are described elsewhere.²

The newly developed ICD-10-AM coding algorithms for PAH and ACSH were then used to determine PAH and ACSH category membership. Analysis was restricted to the primary diagnosis only, in order to avoid double counting when considering which conditions made the greatest contribution to PAH and ACSH during this period. Ethnicity was assigned using the Ministry of Health’s Level 1 ethnicity prioritisation algorithm.³ This hierarchical algorithm allocates children and young people reporting multiple ethnic affiliations to one of five ethnic groups in the following order: Māori > Pacific > Asian > Other > European (e.g. a child identifying with both Māori and Pacific ethnic groups would be counted as Māori).⁴

Socioeconomic status was assigned using the New Zealand Deprivation Index (NZDep2001), a small area index of deprivation.⁵ This index is presented as a decile scale, with decile 1 representing the least deprived 10% of small areas and decile 10 representing the most deprived 10% of small areas. Rates and rate ratios were calculated using the SAS statistical software program, with the New Zealand Estimated (Census) Population used to calculate total, ethnic and NZDep2001 decile specific rates. Ethics approval was not required.

**Results**

**Distribution by primary diagnosis**—In New Zealand during 2005–2009, 47.4% of all acute and semi-acute hospitalisations in children aged 28 days–14 years were for conditions considered potentially avoidable, while 34.3% (72.2% of all PAH) were for conditions considered ambulatory care sensitive. A further 9.7% of hospitalisations were for conditions considered non-avoidable, while 42.9% were for conditions which had not been classified during development of the PAH tool (due to their relative rarity, non-specific nature, or for methodological reasons).

Of hospitalisations for non classified conditions, 45.3% (19.4% of all admissions) were attributed to injuries or poisoning, with the remainder being for other diagnoses. During this period, dental conditions and gastroenteritis were the leading causes of both PAH and ACSH (Table 1). In contrast, cancer / chemotherapy, abdominal/pelvic pain, and acute appendicitis were the leading causes of non-avoidable hospitalisations.
<table>
<thead>
<tr>
<th>Primary diagnosis</th>
<th>Category</th>
<th>Number: annual average</th>
<th>Rate per 1000</th>
<th>% of category</th>
<th>% of all admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dental conditions</td>
<td>√</td>
<td>6132</td>
<td>6.89</td>
<td>21.21</td>
<td>7.27</td>
</tr>
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<td>Gastroenteritis</td>
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<td>5135</td>
<td>5.77</td>
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<td>Asthma</td>
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<td>Constipation</td>
<td>√</td>
<td>800</td>
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<td>2.77</td>
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<td>Otitis media</td>
<td>√</td>
<td>742</td>
<td>0.83</td>
<td>2.57</td>
<td>0.88</td>
</tr>
<tr>
<td>Dermatitis and eczema</td>
<td>√</td>
<td>572</td>
<td>0.64</td>
<td>1.98</td>
<td>0.68</td>
</tr>
<tr>
<td>Urinary tract Infection ≥5 Years</td>
<td>√</td>
<td>418</td>
<td>0.47</td>
<td>1.45</td>
<td>0.50</td>
</tr>
<tr>
<td>Gastro-oesophageal reflux</td>
<td>√</td>
<td>297</td>
<td>0.33</td>
<td>1.03</td>
<td>0.35</td>
</tr>
<tr>
<td>Rheumatic fever / heart disease</td>
<td>√</td>
<td>176</td>
<td>0.20</td>
<td>0.61</td>
<td>0.21</td>
</tr>
<tr>
<td>Bronchiectasis</td>
<td>√</td>
<td>148</td>
<td>0.17</td>
<td>0.51</td>
<td>0.18</td>
</tr>
<tr>
<td>Nutritional disorders</td>
<td>√</td>
<td>58</td>
<td>0.07</td>
<td>0.20</td>
<td>0.07</td>
</tr>
<tr>
<td>VPD ≥6 Months: DTP, Polio, HepB</td>
<td>√</td>
<td>22</td>
<td>0.02</td>
<td>0.07</td>
<td>0.03</td>
</tr>
<tr>
<td>VPD ≥16 Months: MMR</td>
<td>√</td>
<td>9</td>
<td>0.01</td>
<td>0.03</td>
<td>0.01</td>
</tr>
<tr>
<td>Total ambulatory care sensitive</td>
<td>√</td>
<td>28,912</td>
<td>32.47</td>
<td>72.23</td>
<td>34.26</td>
</tr>
<tr>
<td>Acute bronchiolitis</td>
<td>√</td>
<td>4964</td>
<td>5.57</td>
<td>12.40</td>
<td>5.88</td>
</tr>
<tr>
<td>Viral infection of unspecified site</td>
<td>√</td>
<td>3409</td>
<td>3.83</td>
<td>8.52</td>
<td>4.04</td>
</tr>
<tr>
<td>Croup/Acute laryngitis/tracheitis</td>
<td>√</td>
<td>1,054</td>
<td>1.18</td>
<td>2.63</td>
<td>1.25</td>
</tr>
<tr>
<td>Febrile convulsions</td>
<td>√</td>
<td>737</td>
<td>0.83</td>
<td>1.84</td>
<td>0.87</td>
</tr>
<tr>
<td>Viral pneumonia</td>
<td>√</td>
<td>359</td>
<td>0.40</td>
<td>0.90</td>
<td>0.43</td>
</tr>
<tr>
<td>Osteomyelitis</td>
<td>√</td>
<td>223</td>
<td>0.25</td>
<td>0.56</td>
<td>0.26</td>
</tr>
<tr>
<td>Viral / Other / NOS meningitis</td>
<td>√</td>
<td>140</td>
<td>0.16</td>
<td>0.35</td>
<td>0.17</td>
</tr>
<tr>
<td>Meningococcal disease</td>
<td>√</td>
<td>107</td>
<td>0.12</td>
<td>0.27</td>
<td>0.13</td>
</tr>
<tr>
<td>VPD &lt;6 Months: DTP, Polio, HepB</td>
<td>√</td>
<td>55</td>
<td>0.06</td>
<td>0.14</td>
<td>0.06</td>
</tr>
<tr>
<td>Bacterial meningitis</td>
<td>√</td>
<td>49</td>
<td>0.06</td>
<td>0.12</td>
<td>0.06</td>
</tr>
<tr>
<td>Tuberculosis</td>
<td>√</td>
<td>14</td>
<td>0.02</td>
<td>0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>VPD &lt;16 Months: MMR</td>
<td>√</td>
<td>3</td>
<td>0.00</td>
<td>0.01</td>
<td>0.00</td>
</tr>
<tr>
<td>Total avoidable (including ACSH)</td>
<td>√</td>
<td>40,026</td>
<td>44.95</td>
<td>100.00</td>
<td>47.43</td>
</tr>
</tbody>
</table>

**Non Avoidable or Non-Classified**

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Rate</th>
<th>% of all admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total non-avoidable</td>
<td>8180</td>
<td>9.19</td>
<td>9.69</td>
</tr>
<tr>
<td>Not Classified: injury and poisoning</td>
<td>16,381</td>
<td>18.40</td>
<td>19.41</td>
</tr>
<tr>
<td>Not Classified: Other</td>
<td>19,808</td>
<td>22.24</td>
<td>23.47</td>
</tr>
<tr>
<td>Total not classified</td>
<td>36,189</td>
<td>40.64</td>
<td>42.88</td>
</tr>
<tr>
<td>All hospitalisations</td>
<td>84,395</td>
<td>94.77</td>
<td>100.00</td>
</tr>
</tbody>
</table>
New Zealand trends—In New Zealand during 2000–2009, hospital admissions for non-avoidable conditions remained relatively static. Hospitalisations for potentially avoidable and ambulatory care sensitive conditions increased during the early 2000s, but became relatively static after 2002. A further increase in rates was evident for both outcomes during 2007–2009 (Figure 1).

Figure 1. Potentially avoidable, ambulatory care sensitive and non-avoidable hospitalisations in children aged 29 days–14 years 364 days, New Zealand 2000–2009

Source: Numerator-National Minimal Dataset; Denominator-Statistics New Zealand Estimated Population. Note: *Infants <29 days excluded.
**Distribution by ethnicity**—In New Zealand during 2000–2009, hospital admissions for non-avoidable conditions were relatively static for European and Asian children, although rates increased for Maori children during 2005–2008. PAH and ACSH were consistently higher for Pacific and then Maori children, than for European and Asian children. PAH rates increased for all ethnic groups during the early 2000s, and again during 2007–2009, although trends during the mid-2000s were more variable. ACSH increased gradually for Pacific, Maori and Asian children throughout 2000–2009, although rates for European children were more static (Figure 2).

**Figure 2. Potentially avoidable, ambulatory care sensitive and non-avoidable hospitalisations in children aged 29 days–14 years 364 days by ethnicity, New Zealand 2000–2009**

![Graph showing hospitalisations per 1,000 children by ethnicity and condition type from 2000 to 2009.](image)

**Source:** Numerator-National Minimal Dataset; Denominator-Statistics New Zealand Estimated Population. Note: *Infants <29 days excluded.
Distribution by age—In New Zealand during 2005–2009, PAH were highest in infants <1 year, while ACSH were highest in one year olds. Rates for both PAH and ACSH remained elevated during the preschool years, with the higher rates of PAH seen during infancy being, in part, due to the inclusion of bronchiolitis in the PAH but not the ACSH category. In contrast, non-avoidable hospitalisations were more evenly distributed throughout childhood (Figure 3).

Figure 3. Potentially avoidable, ambulatory care sensitive and non-avoidable hospitalisations in children by age*, New Zealand 2005–2009

Source: Numerator-National Minimal Dataset; Denominator-Statistics New Zealand Estimated Population. Note: *Infants <29 days excluded.
Distribution by NZ Deprivation index decile, ethnicity and gender—In New Zealand during 2005–2009, PAH were significantly higher for those living in more deprived NZDep areas (decile 10 vs. decile 1 RR 3.07 [3.01–3.14]). Rates were also significantly higher for Pacific (RR 2.57 [2.54–2.60]) and Māori (RR 1.80 [1.78–1.82]) children than for European children. PAH rates for Asian children were similar to rates in European children (RR 0.98 [0.96–1.00]).

Rates for males were also significantly higher than for females (RR 1.19 [1.17–1.20]). ACSH rates were also significantly higher for those living in more deprived areas (decile 10 vs decile 1 RR 2.87 [2.80–2.94]), and for Pacific (RR 2.40 [2.36–2.43]) and Māori (RR 1.69 [1.67–1.71]) children than for European children.

In contrast, socioeconomic differences for non-avoidable hospitalisations were less marked (decile 10 vs decile 1 RR 1.35 [1.30–1.41]), with hospitalisation rates also being significantly lower for Māori (RR 0.84 [0.82–0.86]) and Asian (RR 0.61 [0.58–0.63]) children, than for European children, while rates for Pacific children were similar (RR 1.01; 0.98–1.04) (Table 2).

Table 2. Potentially avoidable, ambulatory care sensitive and non-avoidable hospitalisations in children aged 29 days–14 years by ethnicity, NZ Deprivation index decile and gender, New Zealand 2005–2009

<table>
<thead>
<tr>
<th>Variable</th>
<th>Potentially avoidable</th>
<th></th>
<th></th>
<th>Ambulatory care sensitive</th>
<th></th>
<th></th>
<th>Non-avoidable</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Rate</td>
<td>RR</td>
<td>95% CI</td>
<td>Rate</td>
<td>RR</td>
<td>95% CI</td>
<td>Rate</td>
<td>RR</td>
<td>95% CI</td>
<td></td>
</tr>
<tr>
<td>NZ Deprivation index decile</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>24.8</td>
<td>1.00</td>
<td>18.5</td>
<td>1.00</td>
<td>7.3</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>24.2</td>
<td>0.97</td>
<td>0.95–1.00</td>
<td>17.9</td>
<td>0.97</td>
<td>0.94–1.00</td>
<td>7.6</td>
<td>1.04</td>
<td>0.99–1.09</td>
</tr>
<tr>
<td>3</td>
<td>28.0</td>
<td>1.13</td>
<td>1.10–1.16</td>
<td>20.5</td>
<td>1.11</td>
<td>1.08–1.14</td>
<td>8.3</td>
<td>1.13</td>
<td>1.07–1.18</td>
</tr>
<tr>
<td>4</td>
<td>30.8</td>
<td>1.24</td>
<td>1.21–1.27</td>
<td>22.9</td>
<td>1.24</td>
<td>1.21–1.28</td>
<td>8.1</td>
<td>1.10</td>
<td>1.05–1.16</td>
</tr>
<tr>
<td>5</td>
<td>36.8</td>
<td>1.48</td>
<td>1.45–1.52</td>
<td>27.1</td>
<td>1.47</td>
<td>1.43–1.51</td>
<td>9.5</td>
<td>1.30</td>
<td>1.24–1.36</td>
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<tr>
<td>6</td>
<td>41.2</td>
<td>1.66</td>
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<td>1.64</td>
<td>1.60–1.69</td>
<td>9.4</td>
<td>1.28</td>
<td>1.22–1.34</td>
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<tr>
<td>7</td>
<td>46.5</td>
<td>1.87</td>
<td>1.83–1.92</td>
<td>33.9</td>
<td>1.83</td>
<td>1.79–1.89</td>
<td>8.9</td>
<td>1.21</td>
<td>1.15–1.27</td>
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<tr>
<td>8</td>
<td>55.4</td>
<td>2.23</td>
<td>2.18–2.28</td>
<td>39.8</td>
<td>2.16</td>
<td>2.10–2.21</td>
<td>10.2</td>
<td>1.38</td>
<td>1.32–1.45</td>
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<tr>
<td>9</td>
<td>67.4</td>
<td>2.71</td>
<td>2.66–2.77</td>
<td>48.2</td>
<td>2.61</td>
<td>2.55–2.68</td>
<td>11.6</td>
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<td>1.51–1.65</td>
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<td>10</td>
<td>76.3</td>
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<td>3.01–3.14</td>
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<td>2.87</td>
<td>2.80–2.94</td>
<td>9.9</td>
<td>1.35</td>
<td>1.30–1.41</td>
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<td>Ethnicity</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>European</td>
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<td>1.00</td>
<td>24.6</td>
<td>1.00</td>
<td>9.7</td>
<td>1.00</td>
<td></td>
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</tr>
<tr>
<td>Māori</td>
<td>59.4</td>
<td>1.80</td>
<td>1.78–1.82</td>
<td>41.4</td>
<td>1.69</td>
<td>1.67–1.71</td>
<td>8.1</td>
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<td>0.82–0.86</td>
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<tr>
<td>Pacific</td>
<td>84.9</td>
<td>2.57</td>
<td>2.54–2.60</td>
<td>58.8</td>
<td>2.40</td>
<td>2.36–2.43</td>
<td>9.8</td>
<td>1.01</td>
<td>0.98–1.04</td>
</tr>
<tr>
<td>Asian</td>
<td>32.4</td>
<td>0.98</td>
<td>0.96–1.00</td>
<td>25.1</td>
<td>1.02</td>
<td>1.00–1.04</td>
<td>5.9</td>
<td>0.61</td>
<td>0.58–0.63</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>41.1</td>
<td>1.00</td>
<td>30.5</td>
<td>1.00</td>
<td>9.0</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Male</td>
<td>48.7</td>
<td>1.19</td>
<td>1.17–1.20</td>
<td>34.3</td>
<td>1.12</td>
<td>1.11–1.13</td>
<td>9.4</td>
<td>1.04</td>
<td>1.02–1.06</td>
</tr>
</tbody>
</table>

Note: NZ Deprivation index decile 1 is least deprived and 10 is most deprived. Ethnicity level 1 prioritised. Rates are per 1000. RR: Rate ratios are unadjusted.
Discussion

The introduction of a national ACSH target for children was the stimulus for the current project, with New Zealand’s existing coding algorithms containing a number of conditions inappropriate for children (e.g. angina), or where preventability was assigned with reference to adult treatment protocols (e.g. urinary tract infections). Further, with large social gradients evident in paediatric hospitalisation data, there was a concern that such a target might place the sole onus for preventing paediatric hospitalisations on primary care, overlooking the potential for health gain achievable via policies and programmes to address the underlying determinants of health (e.g. housing quality, child poverty).

The current study thus aimed to use a set of newly developed PAH and ACSH tools to explore hospitalisations in the New Zealand paediatric population and to consider whether they were able to provide any insights into the proportion which might be prevented by policies and programmes to address the underlying determinants of health (including improved access to primary health care).

In this context, the initial analysis of 2005–2009 hospitalisation data suggested that 47.4% of acute and semi-acute hospitalisations in New Zealand children might be amenable to policy measures to address the underlying determinants of health, while 34.3% might be amendable to improved access to primary care. In interpreting these figures however, it must be emphasised that not all hospital admissions may have been preventable at the individual level (e.g. even in the most affluent areas, PAH rates were still 24.8 per 1,000), with factors such as young age, immunological naivety and the virulence of the infecting organism also potentially playing a role.

Further, the extent to which individual patient and clinician behaviours contributed to these admissions remains unclear, with one US study, which attempted to quantify the extent to which admissions in a group of children hospitalised for ambulatory sensitive conditions might actually have been avoided finding that 71% of primary care physicians, 48% of hospital doctors and 35% of parents could cite parent / patient related reasons as to why the hospitalisation could have been avoided (e.g. by adhering to medications, better outpatient follow up, avoiding known disease triggers), while 48% of parents, 18% of primary care physicians and 37% of hospital doctors could cite physician related reasons (e.g. better education by physicians, better quality of care).

Further, when considering the role Government policies play in reducing avoidable hospitalisations, the multi-factorial nature of the causal pathways leading to social gradients in child health outcomes makes it very difficult to attribute changes in hospital admission rates to any one policy initiative, as most initiatives (even if fully implemented) are likely to only impact on one or two of the relevant pathways, and further, because many such policies are differentially rolled out across the country.

For example, healthy housing projects have been a recent national policy innovation, with one recent New Zealand evaluation of a programme which included house modifications to reduce overcrowding and to improve insulation and ventilation, finding that such interventions reduced acute hospitalisations in children aged 0–4.
years by 11% (hazard ratio 0.89 [0.79–0.99]), and acute hospitalisations in those aged 5–34 years by 23% (hazard ratio 0.77 [0.70–0.85]). The programme however was restricted to one region with a high proportion of families living in significant socioeconomic deprivation, and covered a relatively short time frame.

Similarly, within the health sector, recent policy emphasis has been on ensuring early access to appropriate treatment in primary care. However, the persistence of moderately large social gradients for ACSH potentially suggest that primary health care, as it is currently provided in New Zealand, may be unable to fully buffer the effects of the underlying determinants of health on paediatric hospitalisations for ambulatory sensitive conditions. Reasons for the persistence of social gradients in ACSH potentially include:

- Poorer access to primary care in more deprived areas. Access issues may result from financial constraints or the availability of primary care practitioners in more deprived areas. Such constraints may lead to difficulties with the filling of prescriptions/compliance with medication and to late presentations and more severe disease requiring hospital treatment. There may also be lower health literacy in more deprived areas.

- In the paediatric population, acute infectious and respiratory diseases make up the majority of conditions contributing ACSH, and as a consequence, the window of opportunity available for primary care to prevent a hospitalisation may be relatively narrow (e.g. hours/1–2 days), making access to same day appointments, or after-hours (e.g. evenings or weekends) care of particular importance.

- General practitioners may be more likely to refer children from more deprived areas to hospital because of perceived concerns about the family’s ability to manage the child at home (e.g. medication compliance, transport issues, the ability to recognise deterioration in the child’s condition). Improved access to primary care may thus paradoxically increase hospitalisations for some children, even when these conditions could theoretically be managed in primary care.

- The standard of primary care delivered in more deprived areas may potentially differ from that provided in more affluent areas.

Thus the extent to which Government social and other policies may be able to impact on paediatric hospitalisation rates is likely to be influenced by the effectiveness of the policy intervention itself, the extent to which families are able to access the services provided, the scale of any national level roll out, and interactions between the service providers and the families seeking care.

Such interactions are also of importance when considering ethnic differences in hospitalisation rates, with the higher proportion of Māori and Pacific children living in more deprived areas being likely to only account for a proportion of the differences seen. In this context, there is evidence that ethnicity influences health outcomes, over and above that which might be explained by relative socioeconomic deprivation, with improved access to culturally appropriate services and the
addressing of structural systems issues also potentially being important if ethnic differences in ACSH rates are to be reduced.

Finally, a number of methodological limitations must also be taken into account, when considering the proportion of hospital admissions which might be prevented by policies to address the underlying determinants of health. Firstly, it is important to remember that PAH exhibited moderately large socioeconomic and ethnic gradients during 2005–2009, as the presence of a social gradient was used as a selection criterion in PAH tool development. Thus, for PAH it is not the magnitude of the social gradient which is important, but rather the proportion of paediatric admissions which were deemed to be PAH during the period.

In contrast, ACSH were selected solely on the basis that early intervention in primary care could potentially prevent a hospitalisation, with the inclusion of ACSH in the wider PAH category being on the basis that policies influencing access to primary care were viewed as a subset of a broader suite of policies to address the underlying determinants of health. Thus the social gradients seen for ACSH cannot be explained solely on the basis of the methodology used to develop the ACSH tool, and thus both the magnitude of the social gradient seen and the proportion of admissions deemed to be ACSH are important.

Secondly, the NZ Deprivation Index shares the limitations of all small area indexes of deprivation, in that it measures the average level of deprivation of all households in a small geographical area, and thus the potential for misclassification of individual socioeconomic status remains. Thus the social gradients highlighted above may differ from those seen if individual measures of socioeconomic status (unavailable in the hospitalisation dataset) had been used.

Finally, significant social gradients may have also been present amongst the 42.9% of conditions not classified during PAH tool development (either because they were too non-specific, or because they were relatively rare) suggesting that a number of these conditions may also have been considered to contribute to PAH, had they been scored against the panel of selection criteria.

**Conclusion**

The analysis above suggests that there is significant potential for health gain for New Zealand children as a result of policies and programmes to address the underlying determinants of health, but that the precise proportion of paediatric hospitalisations which might be averted by such measures is difficult to quantify, due to limitations of the currently available tools.

Further, the persistence of moderately large social gradients in hospitalisations for conditions amenable to treatment in primary care suggests that New Zealand needs to consider policies to increase access to primary care, particularly for Pacific and Māori children and those living in more deprived areas, and that these policies should take into account the need for immediate and after-hours care in this age group.

Further, the predominance of infectious and respiratory disease presentations in this age group, and the relatively narrow window of opportunity primary care may have to prevent hospitalisation for such conditions, also suggests that improved access to primary care is not the only policy initiative required, but that policies should also
focus on measures to address the underlying determinants of health (e.g. poor housing, exposure to second hand cigarette smoke, child poverty), with a view to reducing the underlying prevalence of these conditions in the community.

Finally, in the context of New Zealand’s current economic downturn, if the socioeconomic position of children deteriorates further, it is possible that both potentially avoidable and ambulatory care sensitive hospitalisations will increase, and that policy makers will need to evaluate the capacity of primary care to further buffer the effects of worsening socioeconomic circumstances on hospital admission rates.

In this context, interventions aimed at increasing the financial resources available to low income families, improving housing, and addressing cultural barriers in access to services and resources may all need to be considered if we are to begin to mitigate the impacts that adverse socioeconomic conditions have on the health and wellbeing of New Zealand children.

What is already known?

Tools which measure avoidable morbidity have been developed to monitor health services performance

The majority of existing tools do not consider the role socioeconomic factors play in shaping child health outcomes

Primary health care has the potential to prevent hospitalisations for many conditions, if they are identified early and treated in an appropriate manner

What this study adds

This study uses a newly developed tool to assess potentially avoidable hospitalisations in the paediatric population using a methodology which takes into account the socioeconomic determinants of health.

Strategies which focus solely on improving access to primary care within office hours may have a limited impact on ACSH in children, due to the role socioeconomic factors play in shaping the underlying burden of disease, and the narrow window for intervention which exists for many acute onset infectious and respiratory diseases.

What are the policy implications?

There is significant potential for health gain for children as a result of policies and programmes to address the underlying determinants of health.

New Zealand needs to consider policies to increase access to primary care for Pacific and Māori children and those living in more deprived areas.

Policies should take into account the need for immediate (i.e. same day) and after-hours care in this age group.
Competing interests: No financial interests are involved. This work and any views expressed are solely those of the authors, and not of their employing agencies. No editorial control came from any of the organisations.

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Hospital quality-of-care performance measurement and reporting: what New Zealand can learn from the United States and United Kingdom

Mohsin Chaudhry, Robin Gauld, Simon Horsburgh

Abstract

The United States and United Kingdom have both embraced public reporting of hospital quality-of-care data as an important driver of healthcare quality improvement. New Zealand, in contrast, has made limited progress in this area despite the availability of data that could be publicly-reported. We outline the types and sources of data reported in the United States and United Kingdom and suggest that, in the spirit of transparency and patient safety, New Zealand should aim to build similar mechanisms.

Hospital quality-of-care assessment is fundamental to understanding how effective and reliable a particular hospital is in delivering the vital services that are demanded of it. Although concerns about quality of care are probably as old as the art of Medicine itself, it was not until the early 20th Century that true evidence-based methodologies were implemented by some of the pioneers in this field.\(^1,2\)

Today, the assessment of hospital health care quality has taken its place as a core component of any modern day health system and the responsibility is shared, in most cases, by both governmental and non-governmental organisations. Yet, when compared with other health systems focused on improving the quality of care, with public reporting of data an important facilitator of this, New Zealand is lagging behind.

This brief article provides a general overview of the current situation and key players in relation to hospital quality-of-care measurement and reporting in two countries that New Zealand can learn from: the United States and the United Kingdom. It then focuses specifically on the issues most relevant to New Zealand in this difficult but vital field. First, however, a brief introduction to the field of hospital performance in quality of care is useful.

Hospital quality of care

Although the definition of hospital performance in relation to quality of care will vary depending on who is asked, all definitions seem to contain two important components. The first of these is that there must be the provision of a high level of technical care and the second is that patients are treated in a humane, culturally appropriate way which involves them in decisions relating to their treatment.\(^3\)

The traditional components determining overall hospital quality performance include the hospital’s organisational structure, processes, outcomes, patient safety and patient satisfaction. The principal methods of measuring hospital performance for most of these components are via regulatory inspection, third-party assessment, the use of
statistical indicators and internal investigations.\(^4\) Patient satisfaction, on the other hand, can only be gauged through the implementation of some form of survey.

Performance indicators have now become commonplace around the world as objective measures of hospital quality performance. Quality indicator systems can be described as serving two main purposes: as summative mechanisms for external accountability and verification; and as formative mechanisms for internal quality improvement.\(^5\) The former serves to allow for an assurance of the quality of health care while the latter seeks to elicit improvement in the quality of health care. Thus, quality measurement is needed for both of these vital elements and the United States, United Kingdom and New Zealand have various organisations and instruments for these purposes.

**United States**

Quality-of-care measurement in the United States relies on highly intermingled, collaborative efforts that encompass stakeholders in all aspects of the healthcare community. This includes state and federal agencies, healthcare providers, quality experts and organisations, academics, consumers and consumer groups.

The United States Department of Health and Human Services (HHS) is the federal agency responsible for overseeing the country’s matters of healthcare. Two major agencies within this department and related to quality issues are the Centres for Medicare and Medicaid Services (CMS) and the Agency for Healthcare Research and Quality (AHRQ). The latter is simply the research arm of the HHS responsible for building the knowledge base regarding what works in healthcare and for translating this into everyday practice and policymaking.\(^6\)

The National Quality Forum (NQF) is an independent organisation created to develop and implement a strategy for standardising health care quality measurement and public reporting.\(^7\) The NQF brings together stakeholders from throughout the healthcare industry to jointly decide which quality measures meet industry standards and are suitable for reporting. NQF endorsement thus represents the consensus of many health care providers, consumer groups, professional associations, purchasers, federal agencies, and research and quality organisations.

The Hospital Quality Alliance (HQA) is a public-private national collaborative project with the aim of making meaningful, relevant, and easily understood information about hospital performance accessible to the public as well as informing and encouraging efforts to improve quality.\(^8\) It was launched in 2002 and works closely with the CMS as well as other stakeholders in the initiative.

In order to encourage participation in this voluntary program, the United States Congress included a provision of a 0.4% payment premium to participating hospitals.\(^9\) According to officials from the CMS, this has powerfully impacted participation with nearly all of the nation’s 4200 general hospitals today providing data.\(^10\)

The Hospital Compare Website is the major primary source for hospital quality data in the United States and is the brainchild of collaborative efforts between the CMS and HQA.\(^11\) There are a number of quality measures reported on the website (see Table 1), each of which must be backed through endorsement by the NQF.
There are four potential sources of data from which quality measures and performances are derived and presented on the website:\(^{12}\):

- Data submitted to CMS for claims (CMS claims data);
- Data from medical records (submitted by hospitals to the Quality Improvement Organisation (QIO) Clinical Data Warehouse);
- Data from surveys (i.e. the HCAHPS – see below); and
- Data from other organisations (e.g. The Joint Commission).

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey was started in 2002 when CMS partnered with the AHRQ to develop and test a survey for the purpose of gaining an understanding of patients’ perspectives in regard to hospital care.\(^{13}\) It was formally endorsed by the NQF in 2005 and is the first initiative that has allowed for standardised measuring of patient satisfaction, thus providing valid comparisons between hospitals.

The Commonwealth Fund is a private foundation working towards a high performance health system. WhyNotTheBest.org is one of its initiatives which enables tracking and comparison of health care quality amongst US hospitals with an intention of stimulating learning about how to improve health care delivery through comparing performances with peer organisations, against benchmarks and over time.\(^{14}\) The website is a free resource which brings together various measures from the Hospital Compare website as well as from other organisations which hold related data including the Leapfrog Group, Consumers Union and Institute of Medicine.

Some state-specific initiatives have shown benefits, in particular around cardiac surgery with New York State leading the way and others following suit. New York’s Cardiac Surgery Reporting System lists risk-adjusted mortality rates for CABG and heart valve surgery by individual hospital and surgeon, with top-performing hospitals’ and surgeons’ mortality rates around half those of the bottom.\(^{15}\)

### Table 1. List of quality indicators reported by Hospital Compare\(^{16}\)

<table>
<thead>
<tr>
<th>Indicator category</th>
<th>Indicator Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart attack (acute myocardial infarction) and chest pain</td>
<td>Aspirin at arrival (is both an inpatient and outpatient measure)</td>
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<tr>
<td></td>
<td>Aspirin at discharge</td>
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<tr>
<td></td>
<td>Angiotensin Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) for left ventricular systolic dysfunction</td>
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<tr>
<td></td>
<td>Beta Blocker at discharge</td>
</tr>
<tr>
<td></td>
<td>Fibrinolytic medication within 30 minutes of arrival (is both an inpatient and outpatient measure)</td>
</tr>
<tr>
<td></td>
<td>Percutaneous Coronary Intervention (PCI) received within 90 minutes of hospital arrival</td>
</tr>
<tr>
<td></td>
<td>Smoking cessation advice/counselling</td>
</tr>
<tr>
<td></td>
<td>Median time to fibrinolysis (this is only an outpatient measure)</td>
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<tr>
<td></td>
<td>Median time to transfer to another facility for acute coronary intervention (this is only an outpatient measure)</td>
</tr>
<tr>
<td></td>
<td>Median time to ECG (this is only an outpatient measure)</td>
</tr>
<tr>
<td>Heart failure</td>
<td>Evaluation of left ventricular systolic (LVS) function</td>
</tr>
<tr>
<td></td>
<td>Angiotensin Converting Enzyme (ACE) Inhibitor or Angiotensin Receptor Blocker (ARB) for...</td>
</tr>
<tr>
<td>Hospital Process of Care (i.e. Service Standards) Indicator Set</td>
<td></td>
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<tr>
<td>---------------------------------------------------------------</td>
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<tr>
<td>left ventricular systolic dysfunction</td>
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</tr>
<tr>
<td>Discharge instruction</td>
<td></td>
</tr>
<tr>
<td>Smoking cessation advice/counselling</td>
<td></td>
</tr>
<tr>
<td><strong>Pneumonia</strong></td>
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<tr>
<td>Initial antibiotic timing</td>
<td></td>
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<tr>
<td>Pneumococcal vaccination</td>
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<tr>
<td>Influenza vaccination</td>
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<tr>
<td>Blood culture performed in the emergency department prior to initial antibiotic received in hospital</td>
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<tr>
<td>Appropriate initial antibiotic selection</td>
<td></td>
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<tr>
<td>Smoking cessation advice/counselling</td>
<td></td>
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<tr>
<td><strong>Surgical care improvement project</strong></td>
<td></td>
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<tr>
<td>Prophylactic antibiotic received within 1 hour prior to surgical incision (is both an inpatient and outpatient measure)</td>
<td></td>
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<tr>
<td>Prophylactic antibiotics discontinued within 24 hours after surgery end time</td>
<td></td>
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<tr>
<td>Prophylactic antibiotic selection (is both an inpatient and outpatient measure)</td>
<td></td>
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<tr>
<td>Surgery patients with recommended venous thromboembolism prophylaxis ordered</td>
<td></td>
</tr>
<tr>
<td>Surgery patients who received appropriate venous thromboembolism prophylaxis within 24 hours prior to surgery to 24 hours after surgery</td>
<td></td>
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<tr>
<td>Cardiac surgery patients with controlled 6am postoperative blood glucose</td>
<td></td>
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<tr>
<td>Surgery patients with appropriate hair removal</td>
<td></td>
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<tr>
<td>Surgery patients on a beta blocker prior to arrival who received a Beta Blocker during the perioperative period</td>
<td></td>
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<tr>
<td>Inpatients whose urinary catheters were removed within 2 days after surgery to reduce the risk of infection</td>
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<tr>
<td><strong>Children’s asthma care</strong></td>
<td></td>
</tr>
<tr>
<td>Children receiving reliever medication (like albuterol) while hospitalised for asthma</td>
<td></td>
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<tr>
<td>Children receiving systemic corticosteroid medication while hospitalised for asthma</td>
<td></td>
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<tr>
<td>Children and their caregivers receiving a home management plan of care document while hospitalised for asthma</td>
<td></td>
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<tr>
<td><strong>Hospital outcome of care indicator set</strong></td>
<td></td>
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<tr>
<td>30-day mortality rate (risk-adjusted)</td>
<td></td>
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<tr>
<td>30-day readmission rate (risk-adjusted)</td>
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<tr>
<td><strong>Outpatient imaging efficiency indicator set</strong></td>
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<tr>
<td>MRI lumbar spine for low back pain</td>
<td></td>
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<tr>
<td>Mammography follow-up rates</td>
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<tr>
<td>Abdomen CT – use of contrast material</td>
<td></td>
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<tr>
<td>Thorax CT – use of contrast material</td>
<td></td>
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<tr>
<td><strong>Patient safety indicator set</strong></td>
<td></td>
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<tr>
<td>Rate of complications of anaesthesia</td>
<td></td>
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<tr>
<td>Obstetric trauma rate – caesarean delivery</td>
<td></td>
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<tr>
<td>Death in low-mortality diagnosis related groups (DRGs)</td>
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<tr>
<td>Pressure ulcer rate</td>
<td></td>
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<tr>
<td>Death among surgical inpatients</td>
<td></td>
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<tr>
<td>Foreign body left during procedure</td>
<td></td>
</tr>
<tr>
<td>Iatrogenic pneumothorax rate</td>
<td></td>
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<tr>
<td>Central venous catheter-related blood stream infections</td>
<td></td>
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<tr>
<td>Postoperative hip fracture rate</td>
<td></td>
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<tr>
<td>Postoperative haemorrhage or hematoma rate</td>
<td></td>
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<tr>
<td>Postoperative physiologic and metabolic derangement rate</td>
<td></td>
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<tr>
<td>Postoperative respiratory failure rate</td>
<td></td>
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<tr>
<td>Postoperative pulmonary embolism or deep vein thrombosis rate</td>
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<tr>
<td>Postoperative sepsis rate</td>
<td></td>
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<tr>
<td>Postoperative wound dehiscence rate</td>
<td></td>
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<tr>
<td>Accidental puncture or laceration rate</td>
<td></td>
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<tr>
<td>Transfusion reaction rate</td>
<td></td>
</tr>
<tr>
<td>Birth trauma–injury to neonate</td>
<td></td>
</tr>
</tbody>
</table>
Hospital Process of Care (i.e. Service Standards) Indicator Set

<table>
<thead>
<tr>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obstetric trauma rate—vaginal delivery with instrument</td>
</tr>
<tr>
<td>Obstetric trauma rate—vaginal delivery without instrument</td>
</tr>
</tbody>
</table>

Survey of patients' hospital experiences

- Patients who reported that their nurses "Always" communicated well
- Patients who reported that their doctors "Always" communicated well
- Patients who reported that they "Always" received help as soon as they wanted
- Patients who reported that their pain was "Always" well controlled
- Patients who reported that staff "Always" explained about medicines before giving it to them
- Patients who reported that their room and bathroom were "Always" clean
- Patients who reported that the area around their room was "Always" quiet at night
- Patients at each hospital who reported that YES, they were given information about what to do during their recovery at home
- Patients who gave their hospital a rating of 9 or 10 on a scale from 0 (lowest) to 10 (highest)
- Patients who reported YES, they would definitely recommend the hospital

United Kingdom

The centralised United Kingdom health system is a stark contrast to the United States but its system of healthcare quality measurement is not dissimilar. The Department of Health is the governmental department responsible for providing strategic leadership for public health and the National Health Service (NHS).\(^{17}\)

The Care Quality Commission is a non-departmental body of the United Kingdom government established in 2009 and is responsible for regulating all health services in England, including those provided by the NHS.\(^{18}\) All health providers must register with this regulator in order to provide services and registration requires meeting certain government standards of quality and safety.

The CQC checks all hospitals in England to see whether government standards are being met and their findings are shared with the public through their website and via an annual “State of Care” report. Thus, the commission does not really measure performance but rather gives assurance of correct quality of healthcare delivery.

As the entity responsible for hospital quality measurement for quality improvement purposes, Dr Foster is almost unrivaled in the United Kingdom. The Dr Foster unit was established in 2000 at the Imperial College, London, with the aim of converting routinely collected raw health data, which the NHS was awash with, into practical information relating to quality and safety of care.\(^{19}\)

Dr Foster Intelligence is the corporate wing of the initiative and a joint venture with the Department of Health.\(^{20}\) Through Dr Foster Health, the company makes health information, including that of hospital performance on quality of care, available to the general public. Over the years, Dr Foster Health has evolved into the leading provider of healthcare information in the United Kingdom. Specifically, the online Dr Foster Hospital Guide and annual Dr Foster Hospital Guide Publication provide up-to-date information on the quality performance of NHS acute hospitals across a range of performance indicators (see Table 2).\(^{21}\)

The Health Foundation is an independent charity working to continuously improve the quality of healthcare in the United Kingdom. Among other things, it works to
commission research related to improving quality of care as well as lobbying for initiatives that seem to work to be implemented into policy and practice.  

**Table 2. List of quality indicators reported by Dr Foster**

<table>
<thead>
<tr>
<th>Indicator category</th>
<th>Indicator Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedural scorecard indicators</td>
<td>Length of stay</td>
</tr>
<tr>
<td></td>
<td>Relative risk of readmission</td>
</tr>
<tr>
<td></td>
<td>1-year hospital standardised mortality ratio</td>
</tr>
<tr>
<td></td>
<td>3-year hospital standardised mortality ratio</td>
</tr>
<tr>
<td></td>
<td>One-year revision rates for primary hip and knee replacements</td>
</tr>
<tr>
<td></td>
<td>Waiting time – inpatient</td>
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<tr>
<td></td>
<td>Waiting time – outpatient</td>
</tr>
<tr>
<td></td>
<td>Relative risk of inpatient admission</td>
</tr>
<tr>
<td></td>
<td>Mortality rate: hip replacement</td>
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<tr>
<td></td>
<td>Mortality rate: knee replacement</td>
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<tr>
<td></td>
<td>Mortality rate: abdominal aortic aneurysm (AAA) repair</td>
</tr>
<tr>
<td></td>
<td>MRSA rates</td>
</tr>
<tr>
<td></td>
<td><em>Clostridium difficile</em> infection rates</td>
</tr>
<tr>
<td>Accident and Emergency scorecard indicators</td>
<td>Thrombolytic treatment within 30 minutes of arrival at hospital</td>
</tr>
<tr>
<td></td>
<td>Thrombolytic treatment within 60 minutes of calling for professional help</td>
</tr>
<tr>
<td></td>
<td>Primary angioplasty within 90 minutes of arrival at the interventional centre door</td>
</tr>
<tr>
<td></td>
<td>Patients discharged from hospital on secondary prevention medication</td>
</tr>
<tr>
<td>Mortality</td>
<td>1-year hospital standardised mortality ratio</td>
</tr>
<tr>
<td></td>
<td>3-year hospital standardised mortality ratio</td>
</tr>
<tr>
<td></td>
<td>Overall mortality ratio for patients admitted as an emergency</td>
</tr>
<tr>
<td></td>
<td>Deaths after surgery</td>
</tr>
<tr>
<td></td>
<td>Deaths in low-risk conditions</td>
</tr>
<tr>
<td></td>
<td>Deaths in high-risk conditions</td>
</tr>
<tr>
<td>Broken hip repair</td>
<td>Deaths following a hip fracture</td>
</tr>
<tr>
<td></td>
<td>Hip fracture – operation within 2 days</td>
</tr>
<tr>
<td></td>
<td>Hip fracture – length of stay</td>
</tr>
<tr>
<td></td>
<td>Hip fracture – readmitted patients</td>
</tr>
<tr>
<td>Stroke and vascular</td>
<td>Deaths following a stroke</td>
</tr>
<tr>
<td></td>
<td>Pneumonia following swallowing problems</td>
</tr>
<tr>
<td></td>
<td>Stroke – readmitted patients</td>
</tr>
<tr>
<td></td>
<td>Discharge to usual place of residence</td>
</tr>
<tr>
<td></td>
<td>Stroke – length of stay</td>
</tr>
<tr>
<td></td>
<td>Deaths following repair of abdominal aortic aneurysms</td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>Hip replacement – length of stay</td>
</tr>
<tr>
<td></td>
<td>Knee replacement – length of stay</td>
</tr>
<tr>
<td></td>
<td>Hip revisions and manipulations within 1 year</td>
</tr>
<tr>
<td></td>
<td>Knee revisions and manipulations within 1 year</td>
</tr>
<tr>
<td></td>
<td>Planned hip replacement – readmitted patients</td>
</tr>
<tr>
<td></td>
<td>Planned knee replacement – readmitted patients</td>
</tr>
<tr>
<td>Urology</td>
<td>Redo rates for prostate resection</td>
</tr>
<tr>
<td></td>
<td>Prostate resection – readmitted patients</td>
</tr>
<tr>
<td></td>
<td>Bladder removal – length of stay</td>
</tr>
<tr>
<td></td>
<td>Bladder removal – readmitted patients</td>
</tr>
<tr>
<td></td>
<td>Prostate removal – open vs closed</td>
</tr>
<tr>
<td></td>
<td>Kidney removal – readmitted patients</td>
</tr>
<tr>
<td>Cardiac</td>
<td>Deaths following a heart attack</td>
</tr>
<tr>
<td></td>
<td>Heart disease – readmitted patients</td>
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</tbody>
</table>
### New Zealand

The New Zealand health system structure has seen significant reformation and reshuffling over the past few years and hospital performance measurement has not been immune to this. The Ministry of Health (MOH) is responsible for the management and development of the New Zealand health system. In terms of measuring hospital performance, the Health Benchmarking Information (HBI) reports, published quarterly, had featured 15 performance indicators on hospital services for each DHB but were discontinued in 2010 with DHBs now responsible for reporting such measures independently.\(^\text{24}\)

The main mode of national performance measurement by the MOH has now been limited to quarterly DHB performance reports centred on the meeting of Health Targets. Of the six current targets, three relate to hospital performance. These include shorter stays in emergency departments, improved access to elective surgery and shorter waits for cancer treatment.\(^\text{25}\) None specifically measures quality of care although it could be said that several of the targets do broadly relate to dimensions of quality as defined by the Institute of Medicine including that care is safe, timely, effective, efficient, equitable and patient-centred.\(^\text{26}\)

Benchmarking activity is facilitated by the Health Roundtable which is an Australasian based not-for-profit member organisation focused on public hospitals with an aim to collect and analyse data comparing organisations and identifying ways to improve operational practices.\(^\text{27}\) A major way it does this is via the measurement of hospital Key Performance Indicators (KPIs) which are derived from existing hospital inpatient data sets (i.e. the National Minimum Data Set (NMDS) in the case of New Zealand Hospitals).\(^\text{28}\)

Members are from hospital organisations across Australia and New Zealand. The New Zealand chapter of the Health Roundtable includes all 20 of New Zealand’s DHBs and aims to improve systems and processes for the delivery of public healthcare services. The New Zealand Chapter also produces New Zealand-specific reports such as customised KPI reports highlighting comparisons on key topics.\(^\text{29}\) While Health Roundtable data are potentially useful, unlike comparable data collected in the United States and United Kingdom, they are not publicly available and are used only for internal benchmarking.

<table>
<thead>
<tr>
<th><strong>Indicator category</strong></th>
<th><strong>Indicator Name</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Other quality indicators</td>
<td>Outpatient waits</td>
</tr>
<tr>
<td></td>
<td>Day case overstays</td>
</tr>
<tr>
<td></td>
<td>% deaths at each trust which are coded as palliative care</td>
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<td></td>
<td>Ratio of doctors per 100 beds</td>
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<tr>
<td></td>
<td>Ratio of nurses per 100 beds</td>
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<tr>
<td></td>
<td>Obstetric trauma – vaginal delivery without instrument</td>
</tr>
<tr>
<td>Private hospital indicators</td>
<td>Elective hip replacement standardised rate of long length of stay</td>
</tr>
<tr>
<td></td>
<td>Elective hip replacement standardised 28 day emergency readmission rate</td>
</tr>
<tr>
<td></td>
<td>Elective hip replacement rate of revision or manipulation</td>
</tr>
<tr>
<td></td>
<td>Elective knee replacement standardised rate of long length of stay</td>
</tr>
<tr>
<td></td>
<td>Elective knee replacement standardised 28-day emergency readmission rate</td>
</tr>
<tr>
<td></td>
<td>Elective knee replacement rate of revision or manipulation</td>
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</tbody>
</table>
The Health Quality and Safety Commission (HQSC) was formally established in December 2010 and is the governmental agency responsible for assisting public and private providers across the whole health sector to improve service safety and quality. Among other things, the HQSC is charged with:

- Leading and coordinating improvements in safety and quality in health care;
- Identifying data sets and key indicators to inform and monitor improvements in safety and quality; and
- Reporting publicly on the state of safety and quality, including performance against national indicators.

The HQSC aims to establish baseline measures and indicators for assessing the quality of the health system across the whole health sector. Reports on clinical variation and quality and safety indicator progress are to be shared with the sector by 30 June 2012 as the first step in resource development. HQSC also has four mortality review committees which produce annual reports that include some international comparative analyses. Finally, HQSC’s annual Serious and Sentinel Events Report lists cases of serious patient harm reported by DHBs and includes some analysis of these.

The District Health Board Hospital Quality and Productivity (DHB HQ&P) Programme is a recent collaborative initiative by New Zealand’s 20 DHBs with involvement from the Ministry of Health and the HQSC. One of the major initiatives of this programme is the continual development of a robust set of hospital quality and productivity indicators at DHB and service level. Currently, there are 23 indicators including eight related to service standards and seven related to quality. The indicators are derived mainly from the NMDS, which is a national collection of clinically-coded public and private hospital discharge information with unique patient identifiers, and to a lesser extent from the newer National Non-admitted Patients Collections (NNPAC).

Reports on the hospital quality and productivity of New Zealand’s DHBs are being produced quarterly using these data and being used internally as a feedback tool on operational performance. It is important to note that the HQ&P programme will not meet all hospital quality reporting needs and is focussed more around efficiency and productivity measures than quality of care. It focuses only on the quality and service standards that directly relate to, or act as a counter balance to, productivity improvement. Thus, the actual aim is to improve the productivity of hospitals while ensuring that quality and service standards are improved or maintained. The programme is also committed to the development of an agreed framework for a system-wide coordinated approach to performance improvements. Not distinct from this are the goals of minimal duplication of activities and active integration with the Health Roundtable.

The Centre of Methods and Policy Application in the Social Sciences (COMPASS) at the University of Auckland is currently engaged in a project entitled “Improving Health Systems Performance: Enhancing Hospital Outcomes.” This is a three year project funded by the Health Research Council of New Zealand and is being conducted by researchers from the University of Auckland, University of Otago and Victoria University. The project aims to assess the performance of the hospital
sector and is developing indicators from MOH administrative data (i.e. the NMDS but also others like the NNPAC) to describe the quality of care of public hospitals over time. The project has developed a basket of 137 indicators covering such areas as patient safety, mortality, readmission and length of stay. Many are comparable to those publicly reported in the United States and United Kingdom, as listed in Tables 1 and 2.

**Discussion**

As mentioned, currently, the main focus of performance measurement of DHBs and their hospitals is via the quarterly measurement of health targets. However, the focus of these health target reports is the meeting of a target rather than the measurement of quality-of-care performance across a continuum. Also, the current emphasis on the limited variety of health targets is fairly narrow and simplistic in scope. A broadening in the range and scope of quality in care indicators similar to that seen in the United States and United Kingdom could provide a better and broader understanding of the situation in New Zealand Hospitals.

There is a significant discrepancy in public disclosure and reporting of New Zealand hospital quality data when compared with both the United Kingdom and United States. Currently, the data are being used internally and between each DHB for individual and collective quality improvement. However, some of these and other such data may also be relevant to New Zealanders who are the funders and patients of hospital services.

New Zealand’s private hospitals, which play a significant role in delivering elective procedures to private-paying patients as well as services on contract to DHBs, could also be included. This would provide an additional dimension to benchmarking and reporting, as is the case in the United States with its mix of public and private hospitals. The public availability of data could provide benefits to the research community who presently cannot access or analyse Health Roundtable or DHB HQ&P Programme data, could improve public accountability and transparency in the way that WhyNottheBest does by focusing on services delivered in accordance with guidelines and measurement against benchmarks, and, following this, stimulate positive influences on hospital behaviour.

Of course, the limitations of such disclosure must also be considered. First, and the main argument against public disclosure of raw data, is its potential for misinterpretation and misuse. Indeed, the Health Roundtable’s reason for not releasing detailed statistical data is that they believe their data analysis process is not accurate and robust enough and thus the best use of benchmarking data is for internal review and discussion by its members.

Second, it needs to be acknowledged when building public reporting systems that the public may have different views from managers or health professionals about the sorts of data that should be made available and that openness may even create public confusion. For these reasons, the public should be involved in data reporting system design processes. Third, consideration needs to be given to the potential for unintended gaming of reported indicators, which has occurred in the United Kingdom, and the risk of accountability rather than improvement becoming the focus. Fourth, there can be difficulties in capturing important qualitative components of health care.
quality improvement, such as communication, teamwork and leadership, in public reporting systems.

While much more difficult to measure and compare than indicators such as error and readmission rates, these reasons against reporting need to be balanced alongside those in favour. 40 Fifth, to be useful, data for public reporting need to be risk-adjusted so that comparisons are accurate. Yet risk-adjustment is complex and, if not done well, can undermine the credibility of data. 41 Finally, source data need to be accurate which relies on precision of clinical documentation and coding.

Despite these caveats, the government has a role in creating the drive to convert New Zealand health data into meaningful and usable information that can benefit the public and health professionals. If this can be done in the United States and United Kingdom where such data are readily, and in fact immediately, accessible for any major hospital, then it is worth considering how something so commonplace elsewhere in the world could be so difficult to achieve in a much smaller country with a much smaller health system.

With the right political will and some cooperation between the government, Health Roundtable, DHBs and other relevant stakeholders there seems to be no reason why a system of standardised public reporting on quality of care by New Zealand’s hospitals cannot be achieved. A web-based platform similar to the examples of Dr Foster in the United Kingdom and Hospital Compare in the United States could then be created and, with much of the data already collected by Health Roundtable, the HQSC, the DHB HQ&P Programme and COMPASS, at minimal cost. These hospital performance data covering a wide range of areas as well as for specific procedures and conditions should be made available using meaningful and understandable performance indicators open for public scrutiny.

Patient-centred care is perhaps the most important of the dimensions of quality as it is likely that a healthcare system which is patient-centred will also perform well against other dimensions. 42 Patient satisfaction is often gauged through some form of survey, unlike other areas of quality which can be measured through analysis of routine clinical data. The New Zealand Health Strategy committed to the development of a health sector which takes account of community and health service users’ views on quality of care with initiatives that include measuring performance on patient satisfaction. 43

The Patient Satisfaction Survey Guidelines 2000 described the newly proposed Inpatient and Outpatient questionnaires, as well as the best practise methodology that should be used by New Zealand hospitals in order to monitor patient satisfaction accurately and reliably. 44 Despite this, research in 2009 found the majority of DHBs not implementing the survey as required by Patient Survey Guidelines, with shortcomings in collection of data and reporting making the, now discontinued, HBI reports shaky at best. 45 Furthermore, since the discontinuation of the HBI reports, there has not been any form of public disclosure of patient satisfaction data.

With countries such as the United States and United Kingdom now considering patient perspectives as a key driver of quality improvement, it seems imperative that New Zealand embrace this aspect of system performance. In addition to satisfaction surveys, ‘experience-based design’ which involves patients, carers and professionals
co-designing services through extensive use of story-telling and other experiential data, and being promoted in the English NHS, should also be embraced.46

What is evident in both the United States and United Kingdom is the close relationship between governmental bodies, non-governmental organisations and the world of academia in public data reporting. Although the same can be said to some extent for the first two components in New Zealand, the involvement of academia has been comparatively limited. The United States and United Kingdom have measurement systems where academic organisations take large roles. The example of the COMPASS project is clear proof of scope for this in New Zealand.

An active rather than passive approach should be adopted to encourage participation of academia in this vital field. With this, new insightful performance indicators could be developed more quickly, while current methodologies could be constantly fine-tuned. Very importantly, both the public and DHBs would be able to monitor the quality of health care in real time.

With good communication between stakeholders, there would also be less duplication of activities and greater overall efficiency in contrast to the present situation of different groups and agencies with overlapping activities. Finally, New Zealand could join the ranks of health systems that embrace public reporting of quality data in the spirit of full and open transparency, benchmarking and continual improvement.

Competing interests: Nil.

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Myocardial infarction following sclerotherapy in a patient with a patent foramen ovale

Timothy A C Snow, Julian P McEntee, Sally C Greaves, Harvey D White

Abstract
A case is reported of myocardial infarction occurring following sclerotherapy for varicose veins in a patient with a patent foramen ovale (PFO). It is believed that microemboli crossed the PFO as a result of the procedure and caused coronary artery embolisation, resulting in the symptoms, electrocardiographic and biochemical evidence of myocardial infarction.

Case report
A 61-year-old female with a past medical history of osteopenia, varicose veins and a hysterectomy was referred to our department having developed chest pain following sclerotherapy; she had received 10 ml of microbubble sodium tetradeyl foam to her recurrent bilateral lower leg varicosities.

Following the procedure as she walked back to the changing room she developed sudden onset of central chest pain which radiated to her throat associated with light-headedness. Observations were normal and she was given oxygen and glyceryl trinitrate spray by the staff with some improvement of the chest pain.

On arrival at the hospital the pain had eased. Her blood pressure was 140/70 mmHg, pulse 66 bpm and saturations 98% on air. There was a soft systolic non-radiating murmur at the left sternal edge with normal splitting of the second heart sound, clear chest, normal JVP and no pedal oedema. Her initial ECG showed sinus rhythm with a normal axis, at a rate of 60 bpm and isolated T-wave 1 mm inversion in lead V2. However over 24 hours this progressed to widespread deep inversion (deepest 6 mm in V5) (Figure 1) in at least two coronary artery territories. Chest X-ray was normal. Her full blood count and renal function tests were normal. D-dimers were mildly elevated at 740 mcg/L (normal <500 mcg/L).

High sensitive troponin T rose from 151 ng/L (normal ≤14 ng/L) on admission to 222 ng/L after 5 hours thus she was treated as having a non-ST elevation myocardial infarction.1,2 Angiography showed normal coronary arteries with a right dominant system.

The echocardiogram, performed within 24 hours with good imaging, showed normal left ventricular size and function with no regional wall abnormalities associated with a stress cardiomyopathy (Takotsubo). All valves appeared normal. An agitated saline contrast study was negative at rest but upon valsalva manoeuvre a moderate amount of contrast was seen in the left heart consistent with a significant (PFO). This was confirmed by transoesophageal echocardiography as a moderate sized PFO with spontaneous left to right shunting with no atrial septal defect (Figure 2).
The patient was diagnosed as having a non-ST elevation myocardial infarction, thought to have been caused by micro-emboli from her sclerotherapy crossing the PFO and entering the coronary circulation. As this was felt to be related to sclerotherapy, we chose not to start anti-coagulation therapy but commenced her on aspirin and short-term clopidogrel.
She was considered for percutaneous closure of her PFO as an outpatient. On review however, it was felt that due to the clear association with sclerotherapy the aneurysmal nature of her atrial septum, which could increase the likelihood of future device erosion, and the lack of benefit shown for PFO closure by the recently published CLOSURE I trial\textsuperscript{3} that her PFO should not be closed.

**Discussion**

Sclerotherapy is a common and relatively safe procedure for the treatment of varicose veins.\textsuperscript{4} Chest tightness following foam injection is rarely associated (<0.004%) but to our knowledge there have been no cases of proven myocardial infarction or ischaemia. There are however reports of transient ischaemic attacks and strokes post-procedure. These patients have later been identified to have a patent foramen ovale\textsuperscript{5} which is prevalent in approximately 25% of the normal population.\textsuperscript{6} It is believed that micro-emboli had crossed through the defect into the left sided circulation ending in the cranial arteries.

Although to our knowledge there are no previous cases of emboli entering the coronary circulation following sclerotherapy, there are cases of thromboemboli from deep vein thrombosis causing myocardial infarction.\textsuperscript{7,8} It has also been demonstrated that in patients with stroke associated with a PFO that myocardial scars in multiple coronary territories are seen on cardiac magnetic resonance imaging.\textsuperscript{9}

Despite the lack of clinical evidence of embolisation to her other organs, had further imaging been performed areas of microinfarction may have been seen. The prevalence of asymptomatic micro-infarctions in the brain in patients with atrial fibrillation or following carotid angioplasty or endarterectomy is well documented.\textsuperscript{10,11}

**Conclusion**

Chest tightness following sclerotherapy is a rare event. However as demonstrated in this case, the possibility of myocardial infarction caused by paradoxical thromboembolism to the coronary arteries through a PFO should be considered as a potential diagnosis.

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**References:**


A case of subglottic and diffuse tracheal stenoses appearing responsive to macrolide therapy

James G Sanders, Marie-Françoise Jean-Louis

Abstract

We present an atypical case of subglottic stenosis with diffuse tracheal stenoses in a child responsive only to steroid and azithromycin (AZI) therapy. A 12-year-old boy presented with acute biphasic stridor on the background of an 18-month history of progressive shortness of breath, decreased exercise tolerance and snoring. Subsequent laryngoscopy and bronchoscopy revealed granulation tissue in the subglottic area, two circumferential stenoses of the trachea and a number of fibrous bands at the carina and at the aperture if the right main bronchus were seen. A battery of serological and histological investigations did not reveal a specific aetiology. In the acute phase this patient only responded to steroid therapy. In the medium term, repeat laryngoscopies were performed with sharp division of stenotic bands and balloon dilatation.

The patient’s condition was unresponsive to non-steroidal anti-inflammatories, multiple first-line antibiotics, and surgical treatment of the tracheal lesions. However definitive treatment was found with the macrolide antibiotic AZI used for its anti-inflammatory properties.

This highly unusual case of diffuse tracheal stenoses in a child proved to be a management challenge. Definitive treatment was found with the use of AZI. From our literature search this appears to be the first reported case of AZI successfully treating subglottic and tracheal stenoses.

Paediatric subglottic stenosis (SGS) is a condition that can be idiopathic or acquired. There are only a few conditions that can cause diffuse stenoses throughout the trachea and bronchi. We present an atypical case of SGS with diffuse tracheal stenoses in a child responsive only to steroid and azithromycin (AZI) therapy.

The evaluation and treatment of the patient with paediatric SGS is challenging as it has many recognised aetiologies. It consists of a narrowing of the subglottic airway at the level of the cricoid cartilage that forms a complete non-expandable ring, in contrast to the trachea, which has an expandable posterior membranous wall. The acquired form of this condition is the most common in children and has been linked to trauma, infection, allergy, neoplastic lesions, autoimmune and vasculitic conditions, and irritant reactions.

Diffuse tracheal stenoses associated with SGS is a much more rare condition often associated with diffuse tracheal injury or a systemic cause including endotracheal infection, hypersensitivity, autoimmune conditions and severe acid reflux. The signs of subglottic and tracheal airway obstruction are related to the severity of the obstruction. They can be classified as acute and chronic.
Case report

Patient Y, a very fit 12-year-old boy who is a keen rugby player, presented first to the Ear Nose and Throat (ENT) Service in 2002 with symptomatic adenoid hypertrophy for which he had a laryngeal mask airway adenoidectomy. In July 2009 he had an uneventful tonsillectomy and revision adenoidectomy, using an age-appropriate endotracheal tube, for symptoms of recurrent tonsillitis and sleep disordered breathing.

On the 11 March 2010, 8 months later, patient Y presented acutely with dyspnoea, biphasic stridor and intercostal recession on a background of 5–6 months of limited exercise tolerance, noisy breathing and very prolonged feeding time at meals.

Flexible nasolaryngoscopy showed a very inflamed larynx and acutely inflamed subglottic stenosis with a pinhole lumen (Myers-Cotton grade III, see Table 1). After observation in the Intensive Care Unit and treatment with IV augmentin, IV steroids, nebulised adrenaline and saline for 48 hours, his stenosis improved to a Myers-Cotton grade I. At day 5 from his initial presentation he was discharged on a reducing dose of prednisone started at 60 mg daily.

Table 1. Myers and Cotton grading for circumferential SGS

<table>
<thead>
<tr>
<th>Grade</th>
<th>Lumen obstruction</th>
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<tr>
<td>I</td>
<td>0–50 %</td>
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<tr>
<td>II</td>
<td>51–70 %</td>
</tr>
<tr>
<td>III</td>
<td>71–99 %</td>
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<td>IV</td>
<td>100 %</td>
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After stopping prednisone the previous week, patient Y represented acutely with increasing stridor, a hoarse voice and dyspnoea 19 days after his initial presentation. A subglottic narrowing with a 8 mm lumen was seen. He was booked for a semi-urgent laryngoscopy under GA, however he deteriorated on the day of his surgery (day 26) with PA and lateral neck radiographs showing a narrow tracheal lumen confirmed by nasolaryngoscopy to be 4 mm (Myers and Cotton grade III). He was recommenced on high dose IV dexamethasone but failed to improve.

A formal GA laryngobronchoscopy and upper GI endoscopy (see Figure 1–2, Table 2) was postponed until day 34, as he was too unstable to proceed without a very significant risk of requiring an emergent tracheostomy. Histology revealed posterior subglottic epithelial inflammatory infiltrate and intraepithelial eosinophilic infiltrate and inflamed respiratory mucosa at the inferior tracheal band.

Tissue and bronchial lavage cultures were negative for all organisms. His symptoms were considered stable after his airway improved to a 9–10 mm lumen and he was discharged 35 days from his initial presentation on prednisone 60 mg daily, empirical omeprazole 20 mg bd and erythromycin 400 mg qds for 1 week.
During his admissions, an extensive battery of radiological, microbiological, histological and serological investigations was performed. MRI showed subglottic soft tissue thickening but no vascular abnormality or other involvement of the bronchopulmonary system.

Positive results included a non-significantly raised serum IgE (774) and an ANA titre of 1280, not considered significant in the absence of other antibodies. Specific serum IgE demonstrated house dust mite and mild mixed grass allergy.
Over the next 20 days his symptoms remained stable but his subglottic narrowing failed to improve to its original capacity on maximum dose prednisone (60 mg daily) and omeprazole 30 mg bd. His weight gain was now 4.5 kg (increase of 11%), due to steroid therapy. AZI 500 mg 3 times weekly was started 55 days after his initial presentation.

Within 2–3 days Patient Y’s airway improved to 9–10 mm and his steroid therapy was gradually weaned. As an adjunctive therapy balloon dilatation\textsuperscript{1,2} and intralesional steroid injections were performed at day 61 along with oesophageal biopsies which excluded eosinophilic oesophagitis.

Balloon dilatation was repeated on one further occasion a month on. He remained stable on no steroids and AZI alone for 112 days before it was finally stopped. His weight peaked at 15 kg heavier (increase of 37.5%) before regressing. When omeprazole was stopped, laryngeal and subglottic erythema returned but resolved with restarting treatment.

<table>
<thead>
<tr>
<th>Table 2. Theatre visits</th>
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<tr>
<td>Days from presentation</td>
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<tr>
<td>+ 34 days</td>
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<td></td>
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<tr>
<td>+ 47 days</td>
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<td>+ 55 days</td>
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<td>+ 61 days</td>
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</table>

After being off treatment for 4 months, patient Y has returned to all his normal activities including rugby, and has lost a substantial amount of weight following cessation of his steroid therapy. His SGS remains minimal. He suffers laryngopharyngeal reflux currently controlled on omeprazole; dyspepsia was not a symptom at his original presentation. A final diagnosis of non-autoimmune idiopathic subglottic stenosis was made.

**Discussion—azithromycin and inflammation**

AZI, a macrolide, has its antibiotic effect by binding to the 50S ribosomal subunit of susceptible microorganisms, it also blocks dissociation of peptidyl tRNA from ribosomes subsequently causing RNA-dependent protein arrest.
It has been proposed that AZI, used in sub-antibiotic doses, also has an immunoregulatory effect by decreasing mucous production, chemotaxis, expression of cellular adherence molecules, and cytokine production. It is also thought to decrease oxidising species such as the superoxide anion.

An autoimmune cause was considered early on given Patient Y’s positive ANA and serum IgE, however these were not deemed significant and the oesophageal biopsies excluded eosinophilic oesophagitis. Intubation injury from his previous adenotonsillecomy was excluded due to the diffuse nature of tracheal involvement. AZI was considered for its anti-inflammatory properties often described for the treatment of cystic fibrosis, and reported in pharmacology literature.

Prior to the AZI therapy patient Y relapsed at each attempt to wean him off the prednisone. It was cautiously decreased from the 60 mg dose over 77 days. Balloon dilatation was used as an adjunct and it was felt that maximum disease control came from the AZI.

There have been reports of macrolide antibiotics being used in SGS in patients suffering from Chlamydia pneumoniae. We believe this is the first case of idiopathic SGS and diffuse tracheal stenoses, aggravated by laryngopharyngeal reflux, to be successfully managed with the macrolide AZI. It was used in sub-antibiotic dosing, specifically as an anti-inflammatory agent.

Laryngopharyngeal reflux was not the causative factor as 20 days of therapy with a proton-pump inhibitor failed to improve his symptoms. The risk of becoming steroid dependant has been described and in this case AZI has proved beneficial in reducing this risk.

Competing interests: Nil.

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Intractable metabolic acidosis in a patient with colovesical fistula

Toby Pillinger, Mohamed Abdelrahman, Gregory Jones, Francis D'Souza

Abstract

A 58-year-old female presented with urosepsis and faecaluria secondary to a colovesical fistula of diverticular aetiology. A plan was made for surgical repair of the fistula. Preoperatively the patient developed a hyperchloraemic metabolic acidosis, with hyperkalaemia and hyponatraemia. Renal function was normal, and a short synachten test ruled out Addison’s disease. Postoperatively her acid-base physiology normalised in the absence of medical management, demonstrating that surgical intervention was responsible for resolution of the patient’s metabolic acidosis. The mechanisms by which colovesical pathophysiology causes hyperchloraemic metabolic acidosis are discussed. Although diverticular disease is the most common cause of colovesical fistulae, this is the first report of such fistulae causing metabolic acidosis.

Acid-base disturbance is a known complication of urinary diversion into the gastrointestinal tract.1–5 Although diverticular disease is the most common cause of colovesical fistulae, no reports exist of such fistulae causing metabolic acidosis.

We present the first case of a patient with metabolic acidosis secondary to a colovesical fistula of diverticular aetiology.

Case report

A 58-year-old female was admitted with persistent urosepsis and faecaluria. Abdominal CT demonstrated a colovesical fistula at the level of the sigmoid colon (Figure 1). Flexible sigmoidoscopy was limited to 25 cm due to a tight stricture. Flexible cystoscopy and biopsy demonstrated the absence of urinary tract obstruction, ruled out bladder neoplasm and confirmed CT findings of a communication between bladder and bowel.

With no evidence of malignancy, no prior abdominal radiotherapy and in the absence of Crohn’s disease, the fistula was deemed to be diverticular in aetiology. The patient was prescribed prophylactic trimethoprim and prepared for a sigmoid colectomy.

Preoperatively the patient developed hyperkalaemia (5.8 mmol/L) and hyponatraemia (128 mmol/L), in the context of normal renal function (creatinine 50 mmol/L, urea 4.4 mmol/L). An arterial blood gas (ABG) demonstrated a hyperchloraemic metabolic acidosis (pH 7.28, chloride 110 mmol/L, base excess 13.4 mmol/L, anion gap 15.6 mmol/L, lactate 0.5 mmol, glucose 5.6 mmol/L). A short synacthen test excluded Addison’s disease.

A repeat ABG 24 hours prior to the operation demonstrated a recalcitrant metabolic acidosis (pH 7.25, base excess –14.8 mmol/L, anion gap 11.7 mmol/L). One litre of 1.26% bicarbonate solution was infused and plasma pH normalised to 7.36.
The patient proceeded to theatre for a sigmoid colectomy. During the operation the transverse colon was freed from the dome of the bladder at a point of dense adhesion within which a 5 mm hole was found and repaired. A second larger colovesical fistula (15 mm × 10 mm) was found at the sigmoid colon. This was resected and an end colostomy formed along with repair of the bladder defects.

In the postoperative period the patient’s acid-base physiology reversed to a mild metabolic alkalosis (pH 7.48, base excess 0.6 mmol/L). Since this acid-base status persisted and normalised in the absence of bicarbonate treatment we can be confident that repair of the colovesical fistula was responsible for resolution of the patient’s metabolic acidosis.

**Figure 1. Sequential CT segments showing the colovesical fistula**

![Sequential CT segments showing the colovesical fistula](image)

BI (Bladder), Si (Sigmoid colon).

**Discussion**

Two mechanisms contribute to metabolic acidosis in colovesical fistula pathophysiology. Firstly, urinary chloride delivered through the fistula is absorbed in exchange for bicarbonate by a chloride/bicarbonate transporter found in colonic epithelial cells. Bicarbonate is then lost in the stool. Secondly, urinary urea is delivered through the fistula and broken down by colonic bacterial ureases into ammonium ions. The ammonium ions are reabsorbed via a colonic sodium-hydrogen antiporter, as ammonium takes the place of sodium. In summary, the metabolic acidosis occurs due to a net gain of ammonium and chloride ions in association with loss of bicarbonate. This phenomenon is dependent on urine tracking from bladder to bowel, an atypical presentation of enterovesical fistula which usually sees predominant flow in the opposite direction.
We recommend that patients with colovesical fistulae have their acid-base balance monitored preoperatively and corrected appropriately to prevent intraoperative complications.

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**References:**

A mystery wrapped in an enigma: the abdominal cocoon syndrome

Moana Taylor, Michael G Clarke, John Jarvis, Michael Booth

Abstract
Abdominal cocoon syndrome is a rare cause of intestinal obstruction that often presents as an incidental finding at surgery, creating a management dilemma for those unfamiliar with its appearance. Surgical excision of the ‘cocoon’ is the mainstay of treatment. This report describes a 42-year-old patient who successfully underwent surgery in which the fibrous peritoneal membrane was dissected free from the serosal surface of the bowel.

Case report
A 42-year-old man, who was a recent immigrant to New Zealand from Tuvalu, was admitted acutely with a 3-day history of central abdominal pain, constipation and 30 kg weight loss. He had a reduced appetite and abdominal distension, but no associated nausea or vomiting. He was passing flatus. There was no history of fever, dysuria, recent diarrhoea, rectal bleeding or previous abdominal surgery. There was no family history of inflammatory bowel disease or bowel cancer. His past medical history included type 2 diabetes mellitus only.

On clinical examination a non-tender mass was palpable in the right iliac fossa, with an empty rectum. Laboratory results revealed a haemoglobin of 170 g/L, white cell count of 13.9 × E9/L and gamma GT of 89 U/L. Abdominal radiograph did not show any dilated bowel loops and chest radiograph was normal.

With a provisional diagnosis of an inflammatory or neoplastic right iliac fossa mass, a computed tomography (CT) scan was performed (Figure 1). This demonstrated no mass lesion, but multiple dilated small bowel loops with interloop free fluid and no clear transition point. On the basis of a presumed diagnosis of small bowel obstruction, the patient proceeded to surgery.

At surgery the small bowel appeared markedly shortened, measuring 80 cm, with a normal-appearing duodenojejunal (D-J) flexure and terminal ileum (Figure 2). The small bowel mesentery demonstrated marked fibrosis and scarring with extension over the serosal surface of the bowel, creating a fibrous ‘cocoon’ around the entire small bowel. The colon and superior liver surface were also covered by a similar thickened fibrous layer. No obstructing point was identified. Peritoneal washings were taken for histology and microbiology.

A decision was made to close the laparotomy and complete autoimmune, microbiological, cytological and endoscopic investigations, all of which were normal. Parenteral nutrition was commenced and a decision made to proceed to re-laparotomy at day 9.
Figure 1. Computed tomography scan demonstrating what appear to be multiple dilated loops of small bowel with no transition point

Figure 2. Entire length of small bowel contained within a fibrous inflammatory ‘cocoon’
At second laparotomy, the membranous cocoon (Figure 3) was incised and dissected free from the serosal surface of the small bowel and mesentery, using sharp dissection, from the D-J flexure to the terminal ileum.

Prophylactic appendicectomy was performed, as described in other similar cases. Histopathology of the excised peritoneal membrane demonstrated fibrosis with increased vascularity, haemosiderin deposition and mild inflammatory cell infiltrate, consistent with idiopathic sclerosing encapsulating peritonitis.

**Figure 3. Fibrous peritoneal membrane dissected free from the serosal surface of the bowel**

Postoperatively the patient required return to theatre on day 2 for intra-abdominal haemorrhage from a small mesenteric arterial vessel. He subsequently made an uneventful recovery and at 3 months postoperatively is now asymptomatic.

**Discussion**

Abdominal cocoon syndrome is a rare condition, in which the bowel and mesentery become encased in a fibrous membrane.\(^1,2\) The aetiology remains uncertain, although peritoneal dialysis, β-blockers, fungal infection, tuberculosis, cirrhosis, retrograde menstruation and gynaecological infection have all been implicated.\(^2-7\) It is more
commonly reported in females and patients are often from sub-tropical or tropical regions.

Two main types of abdominal cocoon syndrome have been described: sclerosing encapsulating peritonitis (SEP)—idiopathic or secondary; and peritoneal encapsulation: the membrane may originate from the yolk sac during return of the organs intra-abdominally during embryological development.\(^5,8\)

Clinical presentation is often with acute or subacute small bowel obstruction, associated with weight loss, abdominal pain or an abdominal mass. Diagnosis is often made at surgery, although CT imaging may be helpful.\(^9\)

Division ± excision of the fibrous cocoon appears to lead to successful resolution of symptoms.\(^10\) However morbidity and mortality related to this procedure is reported as 38–90% and 60–71% respectively.

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**References:**

Depressed mood associated with gluten sensitivity—resolution of symptoms with a gluten-free diet

Most people associate gluten sensitivity with coeliac disease, a chronic enteropathy of the small intestine, with classical intestinal symptoms of chronic diarrhoea and abdominal pain, as well as weight loss and possible anaemia, osteoporosis and neurological disturbances.\(^1,2\) However, a spectrum of gluten-related disorders exist and recently Dr Fasano and 14 other gastroenterologists, immunologists and neurologists developed a consensus on new nomenclature and classification of these disorders.\(^2\)

The three main forms of gluten reactions are allergic (e.g. ‘bakers asthma’, food allergy and contact urticaria), autoimmune (e.g. coeliac disease, dermatitis herpetiformis and gluten ataxia), and possibly immune-mediated (e.g. gluten sensitivity).

Gluten sensitivity likely involves the innate immune system and symptoms may resemble those associated with coeliac disease, e.g. abdominal pain and diarrhoea, but with a prevalence of extraintestinal symptoms such as muscle cramps, leg numbness, bone or joint pain, weight loss, eczema/rashes, headaches, chronic fatigue, depression and other behavioural changes.\(^2\)

Although specific neurological disorders have long been associated with gluten sensitivity disorders,\(^3\) the effect of gluten on subjective mood states such as depression, anxiety and fatigue is less well established.\(^4-7\)

The association of gluten sensitivity with depressed mood is supported by the following case of an 11-year-old girl who had been on a gluten-free diet since early childhood due to health issues associated with wheat consumption (e.g. constipation and mood swings).

At the age of 10 she travelled overseas and consumed wheat-containing foods daily for 1 week due to a lack of gluten-free options at her destination. One week after returning to New Zealand her overall mood plummeted and she mentioned almost on a daily bases wanting to kill herself, which had never been verbalised prior to this.

Her school teacher overheard her suicidal statements and approached her parents regarding his concern over her depressed condition. Her parents immediately placed her back onto a strictly gluten-free diet and within 1 week her overall mood had improved significantly and suicidal statements were no longer verbalised.

A Profile of Mood States (POMS) questionnaire was completed by the girl during this period. The POMS is a well validated questionnaire for subjective mood with normative data for young men and women.\(^8\) It encompasses six subscales; tension, depression, anger, fatigue, confusion and vigour, from which a total mood disturbance score can be derived. Her total mood disturbance score was calculated before and after returning to a gluten-free diet, and showed a significant drop from a score of 154 to a score of 12.
Depression and anger were the largest scoring subgroup factors (with scores of 44 and 42, respectively) and may have contributed to her suicidal state of mind. These both dropped to a score of 9 following her return to a gluten-free diet. Fatigue, tension and confusion initially scored at 21–26 and dropped to scores of 5–9, and the vigour score rose concomitantly from 0 to 27, after commencing a gluten-free diet.

Corvaglia et al4 reported several cases, previously unresponsive to antidepressants, whereby depressive symptoms improved quickly with a gluten-free diet. Furthermore, research in Finland has shown that commencing a gluten-free diet can alleviate depressive and behavioural symptoms in adolescents with coeliac disease.5

Others have reported improvements in fatigue and anxiety, but not depression, following commencement of gluten free diets.6,7 The lack of response of depression to a gluten-free diet in the latter studies was thought to be related to the reduction in quality of life of coeliac patients.6,7

The youth suicide rate in New Zealand is one of the highest among OECD countries (more than double the OECD average). As such, it is tempting to speculate that mood disorders due to gluten sensitivity in susceptible individuals may be contributing in some cases, and preliminary observations in support of this premise have been reported.9,10

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References:

Why do a significant proportion of UK medical graduates leave the NHS to undertake medical employment in New Zealand?

There have been a number of news reports suggesting that up to a quarter of doctors were leaving England after completing foundation training in the UK.\(^1\) Goldacre et al summarised trends in career destination of graduates in 1974, 1977, 1983, 1988, and 1993. They found that 6–9% of medical graduates trained in Great Britain were working in medicine outside Great Britain.\(^2\)

Moss et al used postal questionnaires to explore the reasons for doctors considering leaving UK medicine.\(^3\) This questionnaire was sent to doctors, who graduated in 1999, during their first postgraduate year.

Of those who were considering leaving the UK but staying in medicine, 65% cited lifestyle choices as a reason and 41% cited working conditions; 78% of those probably or definitely leaving the UK but continuing medicine attributed their decision to lifestyle choices and 32% to working conditions.

An online questionnaire was sent via email to 165 UK graduates in 12 out of 20 District Health Boards from April 2011. In total 54 doctors responded; 21 working as house officers, 29 as registrars and 4 in other posts.

The length of time in postgraduate training in the UK prior to working in New Zealand ranged from 0–12 years, with 70% having worked 1–2 years. The majority of responders, 57%, had worked in New Zealand for less than 1 year with 85% less than 2 years.

Of the 54 doctors who responded, 65% strongly agreed that travel opportunities and opportunity to live in another country affected their decision to move; 43% strongly agreed that the wish to broaden their medical experience was a factor; and 47% and 42% respectively agreed job satisfaction and the chance to work in a chosen field influenced their decision to move. This is supported by a number of comments:

“(I) did not want to be pushed into training programme when I was unsure what area I would like, needed more exposure before this decision could be made!”

“(I) did not know what speciality to apply for in UK. (I) decided to move to NZ with the intention of trying several HO (house officer) runs.”

“(My) main reason for moving is that nowadays you need to go into a training programme after your foundation years of work. I feel you are pressurised to do this and it is difficult to have a secure post without training in Scotland.”

“I think another factor at the moment is that general discontent in the NHS makes working in clinical areas less fun. No one seems to enjoy their work in the NHS! I also think that New Zealand offers an opportunity to work in your chosen field, on a good salary, at a 3rd-year house officer level. It seems very difficult and culturally unacceptable to want to broaden your experience before getting on a training scheme, in the UK—they're missing out!”
The majority of participants felt New Zealand was better for working hours, pay, job satisfaction, job intensity and research opportunities. However one comment stated that “Pay and conditions for House Officers are far in excess of those in the UK. However personal responsibility and professional development is less.”

Only 20% of participants applied to enter a UK training programme in the same year they came to New Zealand. This is important as it suggests the decision to move to New Zealand was not as a result of being unable to get a post in the UK.

New Zealand has much to offer in terms of a medical career as well as travel and lifestyle opportunities. A number of UK medical graduates working in New Zealand felt discontent with the NHS system in the UK and cited this as a reason for leaving the UK. However, the majority of participants questioned intended to return to the UK to re-enter a training programme.

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References:

2. Goldacre, Lambert & Davidson; Loss of British-trained doctors from the medical workforce in Great Britain; Medical Education. 2001;35:337-344.
Accuracy and synchronisation of clocks between delivery suite and operating theatre

At a recent RANZCOG category one emergency ("crash") Caesarean section\(^1\) that the authors were involved in, it became apparent that there was a significant discrepancy in the recorded timings of events, such that the baby apparently was delivered before the woman had arrived in theatre. Clearly this is an issue for the accurate recording of notes. It became apparent that there was an issue of differing times on differing clocks.

This is a significant issue, as any use of these timings for audit (e.g. Caesarean section decision-to-delivery intervals) or medicolegal review (e.g. the Health and Disability Commission) will be compromised. The Health and Disability Commissioner states, “I cannot over-emphasise the importance of good record keeping”.\(^2\) Inaccurate and asynchronous clocks expose healthcare professionals to serious liability concerns and could jeopardise their accountability.

Thus we decided to audit the variance of the times reported on the clocks on delivery suite and in the operating theatre at Palmerston North Hospital.

A prospective comparison of the clocks in delivery suite (staff office, delivery rooms and tea room) and those operating theatres where Caesarean sections are performed. Data was collected on the night of 18 January 2012, between 02:00h and 03:00h. The times of the clocks were compared to one of the author’s iPhone, as the network time is set from Coordinated Universal Time (UTC), set from an atomic clock.

Sixteen clocks were examined. The variation between the time of the reference source and the clocks examined are laid out in Table 1. The results are stated as either faster than, or slower than, UTC.

The slowest clock was 291 seconds behind UTC, the fastest 380 second ahead. The mean average time was 5.25 seconds slower than the reference. There is a maximal difference of 571 seconds (9 minutes and 31 seconds), which was between a delivery room and an operating theatre. Seven clocks (43.75%) were within 1 minute of UTC. No clock was accurate—i.e. showed the correct time.

Our data is comparable with that of a similar study in Great Britain that looked at the times of clocks in a teaching hospital, which suggested that the general accuracy was good, but that the largest variation could produce a time difference of 13 minutes.\(^3\)

It does not seem likely that this is an issue restricted to the hospital where this study was carried out, and anecdotally it would seem to be a truth universally accepted in hospitals across New Zealand.

In an industry where multiple time-critical events occur on a daily basis, and inaccuracies in the recording of those events can lead to disciplinary review and even legal proceedings, it seems curious that there are not rigorous standards and systems in place to ensure accuracy of time recording.
Certainly, having the lack of clock synchronisation apparently tolerated by many healthcare institutions would not be acceptable to many other comparable industries where people’s livelihoods and, indeed, lives depend on the accurate and reproducible recording of time e.g. the aviation industry.

As a result of this audit, the clocks on delivery suite and in operating theatre are currently being replaced with synchronous time pieces.

It should be recommended that the clocks in any healthcare setting should be both accurate and synchronised, especially so in time-critical areas such as delivery suite and operating theatre, and staff should be aware of the possibility of problems related to clock asynchrony and variance.

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References:
1. RANZCOG College Statement C-Obs 14 (November 2009): Categorisation of urgency for Caesarean section.
The clocks of Malta: accuracy of clocks in the Women’s Assessment Unit and Delivery Suite at Waikato Hospital

All those involved in patient care are constantly reminded to write contemporaneous notes, ensuring that we date and time all entries and pay close attention to timing of significant events. This is of particular importance in emergency situations where precise timing of interventions can have a direct impact on patient outcomes.¹

Obstetrics is a specialty where accurate time keeping is essential; timing of birthing stages, decision to delivery time, incision to delivery time and APGAR scores all have to be recorded accurately. Patients and their families also expect an accurate time of birth for both their records and memories.

Staff at Waikato Hospital had expressed concern surrounding the accuracy of wall mounted clocks in both the Women’s Assessment Unit (WAU) and Delivery Suite. At this time all the clocks in these two units were independent, battery run analogue clocks. Staff felt the clocks were so inaccurate it may be adversely affecting patient care.

To investigate their accuracy we undertook an audit of 26 clocks in WAU and the Delivery Suite in 2011. A digital wrist watch was synchronised to Greenwich Mean Time (GMT) and the difference in seconds between this watch and each clock was recorded.

The results showed significant time discrepancies of the clocks in both WAU and Delivery Suite. In one instance two adjacent rooms were 13 minutes apart. The mean difference in time for all clocks was 3 minutes and 23 seconds.

For Delivery Suite clocks only, the mean time difference was 2 minutes and 27 seconds. This was much higher in WAU with a mean difference of 4 minutes and 47 seconds (Table 1). The greatest difference in time from GMT for one particular clock was 12 minutes and 43 seconds (Assessment Room 1).

<table>
<thead>
<tr>
<th>Mean time differences</th>
<th>2011 Clocks vs GMT</th>
<th>2012 Clocks vs GMT</th>
<th>2012 Clocks vs Central Delivery Suite Clock</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>3 minutes 23s</td>
<td>1 minute 5s</td>
<td>52.4s</td>
</tr>
<tr>
<td>Delivery Suite</td>
<td>2 minutes 27s</td>
<td>1 minute 23s</td>
<td>1 minute 19s</td>
</tr>
<tr>
<td>WAU</td>
<td>4 minutes 47s</td>
<td>32s</td>
<td>12.3s</td>
</tr>
</tbody>
</table>

Following these findings, the independent battery run clocks were upgraded so they ran on mains electricity as well as being linked to a central clock displayed in the Delivery Suite handover room. A re-audit was conducted in 2012 to assess whether these changes had improved the accuracy of the clocks. The mean difference in time for all clocks improved to 1 minute and 5 seconds. For Delivery Suite clocks, the
Accurate time keeping is an important part of good patient care. The initial audit in 2011 found significant discrepancies between clocks in WAU and Delivery Suite at Waikato Hospital. Although the mean difference was only 3 minutes and 23 seconds, some clocks were out by more than 12 minutes.

These findings confirmed the suspicions of staff that worked in these departments and raised significant concerns around the timing of critical events. For example, if a patient in Assessment Room 1 was transferred to theatre, the time difference would be more than 10 minutes. Given the nature of obstetric emergencies and the potential for serious complications, time differences between these clinical areas could have a negative impact on patients.

The effect of timepiece variability should not be minimised. Outcomes in emergency situations depend on the precise timing of interventions. Inaccuracies between timepieces not only have an impact on the effectiveness of these interventions but when events are reconstructed from patient records, it blurs the sequence of events, treatments and responses. Further, treatments based on small time intervals are a focus of intense research, an example being neonatal resuscitation.

Many of our current guidelines come from research in the emergency setting. The validity of such resuscitation research has been called into question given the
inaccuracies of times in documentation. As a result many resuscitation councils around the world emphasise the need for use of a standardised time during emergencies.

As the 2012 audit discovered, the upgrades to the clocks have resulted in an overall improvement in their accuracy with many falling within a few minutes of each other. The clocks in WAU were particularly accurate as all were within ±30s of the central Delivery Suite clock. However the results clearly show that discrepancies still exist and the problem is ongoing especially within the Delivery Unit. Even with the recent upgrades, the clocks still need to be regularly checked and manually adjusted so they remain accurate.

Whilst there is still room for improvement, the added cost in changing the system may not be justifiable as it is difficult to say whether the remaining variability would have an impact on patient care. Ideally if cost was no factor, upgrading to linked digital clocks could be a complete solution. At this stage more regular checks of clocks by assigned personnel would further improve clock accuracy.

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References:

Debates on euthanasia: the soul of medicine is on trial

I come from a long line of doctors; since 1905, three generations and seven doctors. From my general practitioner grandfather I have learned the art of attending in medicine. From my physician father I have learned the art of observing. I am a palliative medicine physician for 21 years. I practise the art and science of palliative medicine.

As a palliative medicine physician I care for 400 each year for 21 years who have advanced disease and who have died. I have worked and trained in Ireland, Scotland and United States and have been in New Zealand for the past 4 years. My whole being cries out “do not do this” to the concept of legalising euthanasia in this country.

The 2002 World Health Organization defines palliative care as an approach that improves the quality of life of patients and their families facing the problems associated with life-threatening illness through the prevention and relief of suffering by means of early identification and impeccable assessment and treatment of physical symptoms. Of particular note, it says that palliative care affirms life, regards dying as a normal process and intends neither to hasten nor postpone death.

I am opposed to euthanasia as a doctor and as a palliative medicine physician. ANZSPM Aotearoa (New Zealand branch) of which I am chair represents 86 doctors in New Zealand who practice palliative medicine. We agree with the New Zealand Medical Association (representing over 5000 doctors) in stating that euthanasia—i.e. a doctor deliberately ending the life of a patient—is unethical and illegal. The annual meeting of ANZSPM Aotearoa in Queenstown this year included a discussion on Maryan Street’s (Labour Party Spokesperson on Health) proposed Bill. There was unanimous opposition to the legalisation of euthanasia.

Every day I spend hours with people who are facing death, whose greatest need in my experience is to be truly heard, truly listened to, not abandoned emotionally or physically. People yearn so much to receive care unconditionally. They are sensitive acutely to any sign that others feel they are a burden. When they sense this by a look, a tone, a pause, a lack of a pause, the pace of a conversation, they close down, retreat and their overall suffering increases.

For me the essence of medicine and the therapeutic relationship is listening with particular attention. I have laboured to achieve that over many years as a doctor, honing my skills in several countries, adding to my experience to serve others. Listening is a form of touch; it is an analogous to auscultation of the heart knowing specifically what abnormal heart sounds or murmurs to listen for. Listening in medicine is not to be perceived as an act of benevolence born out of compassion but instead approached as essential clinical skill that is as much science as art.

International literature identifies that the main reason for people supporting euthanasia is not due to intolerable pain but is instead people feeling a burden and loneliness. Euthanasia is not the answer to society’s disease of loneliness. The strongest
predictive factor from the international literature for a wish to hasten death in those with terminal illnesses is hopelessness.\textsuperscript{7}

Euthanasia is not an answer to society’s disease of hopelessness. The word euthanasia disguises a practice which one might abhor if it were given another name and the other name would be “to kill” someone.\textsuperscript{8} Let us take the protective cloak of medicine away in what is this in fact deliberately ending the life of another person. Being treated with dignity is not only about self control, autonomy, independence, maintaining physical function. It is also present when one is honoured and treated with esteem. Caring lovingly for someone is itself an act of dignity and can provide dignity to another.\textsuperscript{8}

My experience has taught me how complex is each person, how individual is their life and death, how again and again people respond to holistic care and attention. The law is there to protect the vulnerable. Maryan Street’s Bill will in fact expose the vulnerable. This is a matter of public safety. Professor of Palliative Medicine Ilora Finlay has stated “the Bill you have before you in New Zealand is the most radical and extreme of any piece of legislation anywhere in the world because basically it is euthanasia on demand. It safe guards our people to the point of being absent.”

This Bill will include anyone who suffers from an irreversible, physical or mental condition that in the person’s view renders his or her life unbearable. This will include a person with diabetes, arthritis, anorexia nervosa, depression. Any person with a chronic illness will be included within the legislation. This runs counters to our efforts to reduce the incidence of suicide not to promote suicide.

Clause 27 of Maryan Street’s Bill requires a medical practitioner who declined to participate to provide alternative source of medical assistance. There is no right to conscientious objection for the doctor. As a result by not participating, a person who commits such an offence will be liable on summary conviction to a term of imprisonment not exceeding 3 months or a fine not exceeding $10,000 or both. So you have a picture of those doctors who are opposing euthanasia, of which there are many, rotating through the prison system.

Based on the statistics for the Netherlands where euthanasia is legal, there would be at least 700 such people euthanised in New Zealand each year. This is clearly not two or three per year. In 2011 in the Netherlands there was increase of 18\% to 3695 people who were euthanized; 23\% of euthanasia deaths are not reported so 4544 is probably the correct estimate. In the Netherlands in 2012 they planned to have six more mobile euthanasia teams anticipating an additional 1000 deaths this way providing a service for those chronic depression, dementia and loneliness, and for those whose request is declined by their physician.\textsuperscript{12}

I visited Nijmegen in the Netherlands for a 1-week course on bioethics including euthanasia several years ago. They showed a documentary with a general practitioner practising euthanasia. My immediate impression was that the doctor was depressed.

S McLeod has written in the \textit{Australian New Zealand Journal of Psychiatry}\textsuperscript{13} that the fatigued, hopeless and despairing doctor confronted by a patient requesting assisted suicide may more subtly encourage the act. Kelly et al.\textsuperscript{14} wrote that clinicians burdened with the care of the very sick were frustrated by therapeutic impotency
struggling to communicate effectively and seduced by the apparent rationality of the
request, may become like their patients, supportive and implicit in quickening death.

Many physicians who have practised euthanasia in the Netherlands said that they
would be most reluctant to do it again. In the US state of Oregon, doctors attending
persons requesting PAS report being intimidated by patients to assist and have been
powerless to influence the decision making process. Oregon doctors reported being
personally damaged by the experience. It appears that the personal and professional
experience of therapeutically killing is discouraging doctors from accepting these
patients on to their books.

Kelly et al draws attention to the complexity of physician response to the care of the
terminally ill, reflecting at times their sense of hopelessness and demoralisation.
Physicians like all other human beings cannot entirely escape their own prejudices and
bias about what constitutes quality of life and a good death and where and whether suffering has meaning.

The goal of medicine is never to give up caring. As a doctor you can harm by a look
or by phrase because of the vulnerability of a person who is ill. Such people are
extraordinarily vulnerable calling for extraordinary compassionate care. We need
skills and knowledge to know how to provide that exquisite competent care.

I have heard Glenn Colquhoun (New Zealand GP and poet) say that medicine is a
spiritual profession and that in the patient/doctor relationship the spirit of the patient
is exposed. In medicine—a science of the purely subjective—we encounter the ache
of being human.

Patelehio writes, “A man who had Alzheimer’s disease and was dying had struggled
for so long. He had endured memory loss for many years. All the while his daughter
had taken very good care of him. One day towards the end of his life she asked him
“do you know who I am?” and he replied “No I don’t know who you are but I love
you.”

The legalisation of euthanasia in New Zealand will hurt the profession of medicine
irrevocably. The soul of medicine is on trial. Euthanasia will expose further the
vulnerable in New Zealand society. Euthanasia will not solve the aching loneliness of
our broken society.

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References:
1. World Health Organization.
   http://www.who.int/cancer/palliative/definition/en/#.UJNvGkVdclQ.email
2. The Australian & New Zealand Society of Palliative Medicine Inc. [website]
   http://www.nzma.org.nz/policies/advocacy/position-statements/euthanasia
Dominion Notes: Cambridge Sanatorium

*Excerpt from Dominion Notes published in NZMJ 1912 March; 11(41):83–87.*

Persistent reports have been circulated recently in the Waikato district and in Auckland, that the Health Department intends to close down the consumptive sanatorium at Cambridge. In answer to the inquiries made at the Health Department Offices, it was stated that there is at present no intention of closing down the Cambridge sanatorium.

Colour has been given to the rumours mentioned by the fact that the sanatorium staff has lately been reduced, and that it at present contains few patients. The reduction, we are informed, is due simply to the fact that a number of hospital boards throughout the Dominion have erected sanatoria, and that in addition consumptive annexes have been established at a number of general hospitals. The appearance of these wards and institutions has lessened the demand for admittance to the Cambridge sanatorium. The staff has been reduced to correspond with the reduction in the number of patients. There is another factor which has a hearing on the reduction in the number of patients.

At all hospitals and similar institutions the number of patients tends to decline during and immediately before and after the Christmas holidays. According to doctors, this phenomenon is to be traced to the fact that the holiday spirit is strong even in the sick and suffering section of humanity. Patients have been often known to postpone operations, or the time of their entering a hospital, until after the holidays. At all events a diminution in the number of patients and inmates is a constant feature in the life of hospitals and institutions of a similar kind during the holiday period.

Whatever may be the effect upon patients of this loyalty to the holiday spirit, it operates as a distinct boon to doctors and nurses for, as a result, they obtain some respite from toil at a time when they naturally value it most highly.

**NZMJ Note:** The Cambridge (or Te Waikato) Sanatorium opened in 1903 and closed in 1922. “During World War One (1914–1918) Te Waikato filled a desperate need in the Waikato to convalescent servicemen.” Source: [http://www.cambridgemuseum.org.nz/Articles/tewaisanart.htm](http://www.cambridgemuseum.org.nz/Articles/tewaisanart.htm)
Proceedings of the Waikato Clinical School Research Seminar, Thursday 6 October 2011

Chlamydia infection, pelvic inflammatory disease, ectopic pregnancy and infertility: cross-national study

Nicole Bender, Björn Herrmann, Berit Andersen, Jane S Hocking, Jan van Bergen, Jane Morgan, Ingrid van den Broek, Marcel Zwahlen, Nicola Low

Objectives: To compare trends of reported chlamydia infections and related complications in countries with similar levels of economic and social development

Methods: Cross-national comparison of routine data from 1999-2008 on rates of chlamydia testing and diagnosis, and rates of hospital diagnoses of pelvic inflammatory disease, ectopic pregnancy and infertility in women aged 15-39 years from Australia, Denmark, The Netherlands, New Zealand, Sweden and Switzerland.

Results: Rates of chlamydia testing were highest in New Zealand. Diagnosed chlamydia rates increased in all countries and were highest in New Zealand. From 1999 to 2008, PID rates decreased in all study countries except New Zealand. The highest ectopic pregnancy rate was found in New Zealand, the lowest in the Netherlands. Ectopic pregnancy rates increased over time in 15-19 year olds in Denmark, the Netherlands, Sweden and Switzerland. Trends in infertility diagnoses were very variable, but highest in Australia and lowest in Sweden.

Conclusions: Trends in chlamydia testing or diagnosis rates did not seem to be consistently related to trends in associated reproductive tract complications. The impacts of Chlamydia control activities are not readily measured by routinely available all-cause complication data. New valid indicators of the long-term impact of chlamydia control activities should be developed.

Publically funded endovenous laser therapy: is it sustainable?

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Purpose: To evaluate the impact of introducing endovenous laser therapy (EVLT) for varicose veins in a public hospital setting with regard to waiting list times, number of procedures and cost effectiveness.

Methodology: Utilising the Waikato vascular unit prospective database of all vascular procedures, all open and endovenous varicose vein procedures were identified and reviewed against the hospital electronic patient records for 2008-2011. The post EVLT ultrasounds were also analysed.
**Results:** Introducing endovenous laser therapy in 2009 significantly decreased waiting times for varicose vein surgery and facilitated treating a larger number of patients within the public sector. In 2008, 44 operations were performed, whilst in 2010 the total number of procedures increased to 110 (59 EVLT vs 51 open). Average waiting periods were reduced after EVLT was introduced (365 days in 2008 reduced to 190 days in 2010).

Procedural success was achieved in 89% of patients treated with EVLT who received follow up duplex studies.

The majority of patients are now treated with EVLT rather than open surgery. The cost of lab-based EVLT is equivalent to open surgery, as personnel and operating theatre costs are reduced, off-setting the cost of endovenous peripherals.

**Conclusion:** Endovenous laser therapy is a feasible intervention for public hospitals. It is comparable to open surgery in terms of cost and efficacy. Success rates are similar to published data, while waiting times decreased and a reciprocal increase in procedural numbers occurred.

**Management of heart failure with preserved and impaired systolic function: the New Zealand Heart Failure Registry**

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**Introduction:** Heart failure with preserved systolic function (HFPSF) is common and to date, there are no evidence based treatment options to improve morbidity and mortality

**Objectives:** The incidence and management of HFPSF is unknown in New Zealand. We report our experience with the New Zealand Heart Failure Registry (NZHFR).

**Methods:** NZHFR is a national, prospective, observational, web-based registry. We compared characteristics, treatments and outcomes of HFPSF and heart failure with impaired systolic function, with EF<50% (HFISF).

**Results:** A total of 1551 patients were enrolled, between July 2006 and Aug 2011 with 1173 patients who had echocardiograms performed are included in this analysis with 90-day follow up data available in 91% (1071/1173). 870 patients had HFISF (mean age 67.6 years, 71% males) with 303 patients with HFPSF (mean age 78 years, 45% males). HFPSF had a higher prevalence of hypertension (62% vs. 49%, P=0.0002) and atrial fibrillation (62% vs. 51%, P=0.0006) and lower prevalence of Ischaemic heart disease (36% vs.47%, P=0.0016). Discharge medications and outcomes are shown in the table.
### Discharge Medications

<table>
<thead>
<tr>
<th></th>
<th>HFPSF</th>
<th>HFISF</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretics</td>
<td>277/287 (97%)</td>
<td>816/839 (97%)</td>
<td>1.000</td>
</tr>
<tr>
<td>ACE-I/ARBs</td>
<td>209/287 (73%)</td>
<td>734/839 (87%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>211/287 (74%)</td>
<td>687/839 (82%)</td>
<td>0.0029</td>
</tr>
<tr>
<td>Aldosterone antagonists</td>
<td>62/287 (22%)</td>
<td>323/839 (38%)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

### Outcomes

<table>
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<tr>
<th></th>
<th>HFPSF</th>
<th>HFISF</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median length of stay</td>
<td>7 days</td>
<td>7 days</td>
<td></td>
</tr>
<tr>
<td>In-hospital mortality</td>
<td>16/303 (5%)</td>
<td>31/870 (4%)</td>
<td>0.232</td>
</tr>
<tr>
<td>Mortality at 90-day follow up</td>
<td>32/270 (12%)</td>
<td>88/801 (11%)</td>
<td>0.738</td>
</tr>
<tr>
<td>Hospital readmission at 90-days</td>
<td>27/270 (10%)</td>
<td>102/801 (13%)</td>
<td>0.279</td>
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**Conclusions:** 1 in 4 heart failure admissions are with HFPSF in the NZHFR. When compared to HFISF, Heart failure patients with preserved systolic function are predominantly elderly and female, more likely to have Hypertension, Atrial fibrillation and Non-ischaemic aetiology and less likely to receive Beta Blockers, ACE-Inhibitors and Spironolactone. No difference is noted in short term mortality or readmissions.

### Allopurinol hypersensitivity syndrome: a retrospective case-control study

**L. Stamp, PB Jones, W. Taylor, J. Docherty, J. Drake, C. Frampton and N. Dalbeth**

**Background:** Allopurinol hypersensitivity syndrome (AHS) is a rare but potentially fatal side effect of urate lowering therapy with allopurinol. Doses above 300mg/day are reportedly associated with AHS, especially in renal impairment, and the allopurinol NZ datasheet includes a guideline for dosing based on creatinine clearance (CrCl). The goal of this study was to show the relationship between AHS and allopurinol dosing.

**Design:** Potential cases of people with gout and AHS between 1998 and 2010 were identified by searches of hospital databases in the Auckland region, Waikato & Lakes, Wellington region, Canterbury and Southland DHBs, the CARM database, and physician recall. Patient records were reviewed and potential cases adjudicated against criteria for AHS. A retrospective case-control design was used; three controls taking allopurinol for gout but without AHS were sought. Matching was based on gender, diuretic use, age, and eGFR. The starting dose of allopurinol, and the dose at the time of the reaction was compared between cases and controls. Receiver operating characteristic (ROC) analysis was used to determine if there was a safer starting dose of allopurinol.

**Results:** From over 7000 potential cases, fifty four were confirmed; 157 well matched controls could be found. The risk of AHS increased according to the starting dose of allopurinol corrected for eGFR. The odds ratio for AHS in the highest quintile of starting dose/eGFR was 23.2 (p<0.01). The median duration of exposure was 30 days.
Ninety-one percent of AHS cases compared with 36% of controls started on a dose of allopurinol at $\geq 1.5$mg allopurinol/eGFR (mg/ml/min).

**Conclusions:** The risk of AHS is reduced by starting allopurinol at or below 1.5mg/ml/min eGFR. In those who tolerate allopurinol, the dose can be increased after 30 days with relative safety.

**Galectin-3 in indeterminate thyroid FNA cytology**

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**Introduction:** The treatment and post-operative management of various types of thyroid nodules depends upon FNA cytologic and histologic criteria. Only a small percentage of thyroid nodules are malignant and majority can be diagnosed with a guided pre-operative FNA. However, a systematic approach to indeterminate lesions classified under the tiered NCI FNA Guidelines scheme is not yet established. We studied the use of galectin-3 for such lesions.

**Materials and methods:** A total of 245 patients had thyroidectomies performed for various indications in the last 5 years at Waikato Hospital. Forty-five thyroidectomies were done for malignant lesions. Sixty-three had preoperative FNAs. NCI categories benign, malignant and suspicious for neoplasm were excluded and only the indeterminate category was included in the study. Eleven cases were found to be indeterminate on FNA. These cases had either retrospective (n=3) or prospective (n=8) Galectin-3 study. Ten had enough sample for IHC, 7 of these proved +ve for Galectin-3, and three were negative. All seven Galectin-3 positive cases were proved on histology to be malignant (papillary carcinoma=6, follicular carcinoma=1). No false positive or false negative cases were found in these Galectin-3 stained cases.

**Discussion:** Galectin-3 has high specificity and sensitivity in papillary and follicular thyroid malignancies. In a small cohort of 10 indeterminate thyroid FNA cases, we found a positive as well as negative predictive value of 1 each. With particular attention to the pattern of staining (cytoplasmic), galectin-3 positivity can be reasonably predictive of anti-apoptotic behaviour in a thyroid epithelial cell. This also enhances the accuracy of reporting of thyroid lesion cytology, which can assist the preoperative planning.

**Conclusion:** Use of Galectin-3 in indeterminate thyroid epithelial lesions is useful in guiding the surgeon regarding operative intervention. By raising the threshold of suspicion for malignancy, the surgeon can prioritise surgical options.
Developing leadership skills: results of an evaluation of a nurse leadership programme

P. Miskelly

In 2007 an in-house nurse leadership programme was established at the Waikato District Health Board (WDHB). Consisting of two separate cohorts (one for Maori, the other for non-Maori), 80 nurses/midwives have attended the six month (one day per month) programme. Engagement with information around best practice, evidence-based learning, change management processes, innovation and scholarship have been an integral part of the learning requirements.

Last year a formal evaluation of the programme was undertaken. The research utilised a mixed-methods approach. A questionnaire was distributed to participants and a 66% response rate received. Focus groups and individual interviews with participants, their clinical nurse managers and the programme facilitators were also conducted.

Research revealed almost unequivocal support from participants for the programme. This presentation outlines two of the major themes revealed from the research (confidence and ‘big picture’) and discusses why succession planning and evidenced-based leadership programmes should be an integral part of any health organisations employment strategy.

How changes to New Zealand’s medicines regulation system will affect us

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Introduction: The Government has resumed efforts to create a joint Australian and New Zealand medicines regulator, which will eventually replace Medsafe. In the present study, we examine key informants’ perceptions of the strengths and weaknesses of the current system, and how joint regulation may affect us.

Methods: We carried out qualitative analysis of semi-structured interviews with 20 key informants who had previously published research or commentary on New Zealand’s medicines system, spoke for interest groups, or held positions that gave them key insights into New Zealand’s medicines system. Informants were purposefully selected to ensure a wide range of views, including five people working in medicine, four in pharmacy, three Members of Parliament from different parties, and two each from PHARMAC and the pharmaceutical industry.

Results: Informants across all sectors praised Medsafe’s processes. Medsafe was seen as effective regulator which ensured the safety and efficacy of medicines without creating unnecessary barriers, and which had a professional relationship with the pharmaceutical industry. New Zealand was also seen to have a world class post-marketing surveillance system.
Informants from several sectors (medicine, the public service and industry) cited concerns about the small pool of expertise in New Zealand, especially in highly specialised areas like biological molecules. This created problems with peer review and potential conflicts of interest. Joint regulation with Australia could potentially solve this, but informants had concerns about loss of autonomy.

**Conclusion:** The changes could potentially improve an already effective regulation system, but concerns about loss of autonomy need to be addressed.

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**Cardiac function in exacerbations of COPD**

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**Background:** Chronic Obstructive Pulmonary Disease (COPD) is an important cause of mortality and morbidity in New Zealand. We have recently shown that elevated levels of cardiac biomarkers (troponins and B-type natriuretic peptides) are strong predictors of early mortality among patients admitted with exacerbations of COPD. The pathophysiological basis for this is unknown.

**Methods:** A prospective study of patients admitted to Waikato Hospital from September 2010 to June 2011 with acute exacerbations of COPD. Patients with clinical diagnosis of heart failure were excluded. NT-proBNP was measured on admission. Echocardiography was performed within 48 hours of admission to assess right and left ventricular function.

**Results:** Eighteen patients were recruited eight patients had elevated levels of NT-proBNP (>220nmol/L) and 10 had low or intermediate levels. Levels of NT-proBNP were positively correlated with both right atrial pressure (rho=0.78, p=0.002) and left ventricular diastolic diameter (rho=0.49, p=0.037) and negatively correlated with measures of biventricular function (tricuspid annular plane systolic excursion: rho= -0.50, p=0.040; left ventricular ejection fraction: rho=-48, p=0.044).

**Conclusion:** In patients with exacerbations of COPD, elevated levels of cardiac biomarkers are associated with both right and left heart dysfunction rather than isolated right ventricular compromise. This study indicates that there may be benefits in treating biventricular failure in this group of patients. Further exploration of potential therapeutic strategies is required.

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**Glutathione modulation mediates the differential effect of methylseleninic acid on the cytotoxicity of cisplatin and radiation on normal and malignana cells in vitro**

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**Background:** Previous preclinical work has demonstrated that selenium (Se) compounds are multi-targeted modulators of the efficacy and toxicity of chemotherapy (CT) and radiotherapy (RT), with improved tumour response rates but
reduced organ-specific toxicity. Intracellular glutathione (GSH) accumulation has been implicated in resistance to platinum-based CT and radiation (RT). Endoplasmic reticulum (ER) stress responses also play a critical role in the response to cytotoxic treatments. Our aim was to evaluate whether the differential effect of the Se compound methylseleninic acid (MSA) on the response of normal and malignant cells to CT and RT was mediated in part by induced changes in GSH and also through qualitatively different (ER) stress responses.

**Methods:** Peripheral blood mononuclear cells (PBMC) obtained from healthy blood donors and malignant THP-1 human leukaemia cells were exposed *in vitro* to varying combinations of MSA, radiation and cisplatin. GSH levels were measured by ELISA, cell viability was assessed using the MTT assay and western blotting was used to evaluate ER stress response protein expression.

**Results:** MSA at both 2.5 and 5 µM increased total GSH levels in PBMC in a dose-dependent manner (*p* = 0.0080 and < 0.0001 respectively). Conversely, in THP-1 cells, MSA significantly reduced total GSH at each concentration (*p* = 0.0050 and < 0.0001 respectively). The cytotoxicity of 8.33 µM cisplatin was significantly enhanced by MSA in THP-1 cells, at both 2.5 and 5 µM MSA compared with cisplatin alone (*p* = 0.0067 and 0.0041 respectively). Furthermore, THP-1 cells were more sensitive to radiation treatment when pre-incubated with MSA (2.5 µM *p* = 0.0143; 5 µM, *p* = 0.0003). MSA was shown to induce ER stress markers in both PBMC and THP-1 cells *in vitro*.

This work was translated into clinical research, where ER stress markers in PBMC from patients with head and neck squamous cell carcinomas were detected in response to Se administration and cisplatin and RT treatment.

**Conclusions:** MSA has opposing effects on GSH levels in normal and malignant cells, consistent with the observed protection of normal cells against the toxicities of CT and RT but enhancing their effects against the malignant cells. This data supports the hypothesis that the modulation of cellular GSH is involved in the differential impact of Se on the toxicity and efficacy of CT and RT in normal and malignant cells. A fuller evaluation of its impact on the ER stress responses is needed.
Topical 0.5% invermectin lotion for head lice

Infestations of head lice (*Pediculus humanus capitis*) lead to social disruption by stigmatising infested children and causing parental anxiety, loss of income because of the need to care for the child at home, and absenteeism from school or day care. Increasing resistance to the first-line treatments (permethrin and pyrethrins) has been noted and alternatives such as lindane and malathion have limitations. Oral invermectin has been reported to be effective in permethrin-resistant cases. This trial concerns the use of topical invermectin. 765 patients were randomised to receive a single application of 0.5% invermectin lotion or a control lotion. The topical invermectin was significantly better with efficacy of louse eradication of 94.9% at 2 days and 73.8% day 15.

Zoledronic acid therapy in men with osteoporosis

Zoledronic acid is a bisphosphonate which has been shown to lower the incidence of fractures in postmenopausal woman when they receive an annual 5mg intravenous dose. This study sets out to define its role in males. The trialists randomly assigned 1199 men with primary or hypogonadism-associated osteoporosis who were 50 to 85 years of age to receive an intravenous infusion of zoledronic acid (5mg) or placebo at baseline and at 12 months. All participants received daily calcium and Vitamin D supplements. The outcome was that over a 24-month period there was a 67% risk reduction for fracture in the zoledronic acid treated subjects. The results were similar in men with low serum testosterone levels. Adverse effects were similar in both groups.

Balance and strength training into daily life activity to reduce rate of falls in older people

This three-arm randomised trial involved more than 300 people aged 70 years or older who had two or more falls or one injurious fall in the past 12 months. Participants were allocated to one of three home taught interventions: the Lifestyle integrated Functional Exercise (LiFE) approach (n=107; balance and strength training and integrated activities into everyday activities) a structured programme (105; exercises for balance and lower limb strength, done three times a week) and a sham control programme (n=105; gentle exercise). The overall incidence of falls in the LiFE programme was 1.66 per person years, compared with 1.90 in the structured programme and 2.28 in the control group. The Lifestyle intergrated Functional Exercise (LiFE), a tailored programme taught over five home visits with two booster visits, showed a 31% reduction in the rate of falls in older people.
Psychosocial intervention in patients with mild Alzheimer's disease

Can multifaceted and semi-tailored psychosocial counselling and support for patients with Alzheimer's disease and their care givers during the first year after diagnosis prevent the emergence of depressive symptoms and improve the quality of life of patients and their care givers and stabilise patients' cognitive function beyond that achieved with well structured support? This question was addressed in the randomised trial to either this intervention or not. The intervention consisted of up to seven counselling sessions, five teaching courses, and additional interventions aimed at both patient the patient and caregiver.

The primary outcomes were cognitive function, depression and quality of life. When reviewed at 12 months the researchers report that the intervention had no significant effect.

BMJ 2012;345:e4693.

Prevention of atrial fibrillation (AF) after cardiac surgery – amiodarone versus beta-blocker

AF following cardiac surgery may result in an increase in postoperative morbidity and mortality. Both amiodarone and beta-blockers have been shown to be superior to placebo in preventing this complication. This meta-analysis was to determine whether amiodarone and beta-blocker are equally effective and safe, or one is superior in preventing POAF. Six trials involving 1033 patients were included the review. The amiodarone group did not significantly differ from the beta-blocker group in AF occurrence (risk ratio 0.77, P=0.11) or length of hospital stay (P=0.86). A sub-group analysis showed that amiodarone was significantly better than propanolol.

These data indicate the occurrence of AF and length of hospital stay after surgery are similar in the amiodarone and beta-blocker groups. There was no difference in postoperative adverse events in two groups.

False Prescriptions (Med10/155P)

Charge

A Professional Conduct Committee (PCC) laid a charge against the Doctor on the basis that she had been convicted under the Crimes Act, and that the offences reflected adversely on her fitness to practise. The Doctor pleaded guilty to both charges and was convicted and sentenced in the District Court.

The charges:

1. Between 28 May 2007 and 30 January 2009 the Doctor committed an offence against section 256(1) of the Crimes Act, by making false prescription forms which she intended to use to obtain Sibutramine capsules.

2. On 15 February 2008 she committed an offence pursuant to section 257(1)(a) of the Crimes Act as she used a document she knew to be forged to obtain Sibutramine capsules.

Finding

The Tribunal found that the convictions reflected adversely on the Doctor’s fitness to practise and they warranted disciplinary sanction. The Doctor made an early guilty plea to the charge.

Background

On 10 November, 2009, the Doctor pleaded guilty in the District Court to two charges of making false documents with intent to use them to obtain property, each offence being punishable by a term of imprisonment not exceeding 10 years.

On 23 December, 2009, the Doctor was convicted of both offences and fined $500 and court costs of $130 for each charge.

At the time of the offending the Doctor was working long hours as a trainee intern in a hospital environment and claimed to be concerned for a risk of harm to patients at the hospital. The forgery offence was committed in advance of what she anticipated to be a difficult time at work and that she would be aided by this drug.

The prescription yielded some 90 capsules. The Doctor said that she “shared around” some of those capsules with others.

Reason for finding

The Tribunal was concerned that the Doctor should consider, in any way, obtaining drugs for a purpose other than that for which they were intended and which may be
contrary to her own health. In addition, the Tribunal considered she may have also jeopardised the health and wellbeing of others by sharing these around.

Another concern to the Tribunal was the passage of time between the creation of the first prescription and its use. A prescription only has a three month validity period and it was of concern to the Tribunal that the Doctor should contemplate using a prescription which had been generated many months earlier.

It was claimed on the Doctor’s behalf that there were no victims of her offending. That was not accepted by the Tribunal. First, there are those persons with whom she shared the drugs who may well not have needed them or who may have been using them for purposes other than their intended purpose. Second, there was the Doctor whose name she used in the forgery to obtain the drugs. His name is now associated with forged documents and the obtaining of drugs improperly. The Tribunal was satisfied that he must be regarded as a victim.

The Tribunal considered that the use of drugs and prescription forms by a medical practitioner to be an important professional responsibility. The Tribunal was satisfied that the use of another practitioner’s name, particularly in circumstances of a criminal offence by forgery and using a forged document were matters of significant professional concern and a breach of standards. The Tribunal considered the obtaining of drugs of this nature by the Doctor showed a significant lack of professional judgement.

The Tribunal was satisfied that sharing these drugs around the others, perhaps also for their unintended purpose, also showed not only a lack of professional judgement but also a concerning breach of professional responsibilities to others and their wellbeing.

 Penalty
When considering penalty the Tribunal took into account several mitigating and aggravating factors.

 Mitigating factors
1. The Doctor’s co-operation with the PCC and her admission of the charges.
2. The finding by the District Court of the “unusual degree of remorse” that Doctor had expressed in relation to her offending and that she accepted responsibility immediately.
3. There was no direct harm to any third party as a result of the offending.
4. It was the Doctor’s first appearance before the Tribunal.
5. The Doctor was not motivated by greed or self-interest, but rather appeared to have shown genuine concern so as to avoid medical errors due to fatigue and impaired concentration.
6. The Doctor was a young medical practitioner with a promising future.
**Aggravating factors**

1. There were inconsistencies in explanations given by the Doctor about her behaviour, which suggested her behaviour was not purely in the interests of her patients.

2. The level of premeditation required to forge the prescription well in advance.

3. Victims of offending – the people with whom she shared the drugs who may well not have needed them, and the Doctor whose name she used in committing the forgery.

The Tribunal was satisfied that there were two areas where the Doctor needed assistance:

1. In relation to her professional responsibilities.

2. In relation to her personal on-going lifestyle skills.

The Tribunal ordered that the Doctor should be suspended for three months. However, the Tribunal further ordered that the suspension should be itself suspended for up to 24 months. At the end of the 24 month period the suspension would lapse unless the Doctor was non-compliant with the conditions of the Tribunal.

The following conditions were imposed on the Doctor’s practice:

1. That there be professional supervision of the Doctor for a period of 24 months to the satisfaction of the Medical Council.

2. That the Doctor undertake ongoing life skills mentoring for a period of 24 months to the satisfaction of the Medical Council.

3. That the cost of meeting these conditions be met by the Doctor.

4. That the person or persons providing the supervision and mentoring should report on a regular basis, to the Medical Council.

The Doctor was censured and ordered to pay $5,000.00 towards the cost of the prosecution by the PCC.

The Tribunal directed that a copy of the decision and a summary of it be published on the Tribunal’s website. The Tribunal further directed that a notice stating the effect of the Tribunal’s decision be published in the New Zealand Medical Journal.

The Doctor was granted name suppression to give effect to the District Court’s order of name suppression.

The full decisions relating to the case can be found on the Tribunal web site at [www.hpdt.org.nz](http://www.hpdt.org.nz)

Reference No: Med10/155P
William (Bill) Rex Morris

Dr William Rex Morris died in London, England on 5 October 2012 aged 85 years. He was born in 1927 in Napier, New Zealand and surprisingly he could recall vivid tales of the earthquake that struck that Hawke’s Bay city when he was only 4 years old. He was educated at Christ’s College in Christchurch.

He graduated BA(NZ) at Canterbury University College before going on to Dunedin to study medicine. He was Senior University Scholar and took his B Med Science before going on to graduate in 1950.

After 2 years as an intern at Christchurch Hospital he became a lecturer in the Otago Department of Anatomy while studying for his MD(NZ).

His career was divided between NZ and UK where he took appointments in Neurology, Rheumatic Diseases and other aspects of Physical Medicine.

After obtaining his diploma in Physical Medicine he returned to NZ as a consultant at in Physical Medicine at Palmerston North Hospital.

After retirement he returned to UK. He was an active member of the Royal Society of Medicine, The NZ Graduates Association and the Dickens Fellowship.

He will be remembered as a compassionate doctor and a loyal friend who was always willing to offer a helping hand in times of stress. Bill never married.

Dr John Hunt (Bill’s friend and NZ colleague) wrote this obituary.