



HEALTH QUALITY & SAFETY
COMMISSION NEW ZEALAND

Kupu Taurangi Hauora o Aotearoa

A Window on the Quality of New Zealand's Health Care 2016



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Executive summary

This is the 2016 update of the Health Quality & Safety Commission's inaugural *Window on the Quality of New Zealand's Health Care*, published in December 2015.¹ It brings our measures up to date and examines key issues in the measurement of quality in New Zealand health care.

This document helps the Commission fulfil its statutory responsibility to provide public reports on the quality and safety of health and disability support services.

Part 1 of the document concentrates on measures from the inaugural Window which have shown significant results, and highlights the following key findings:

- There has been a reduction in serious in-hospital falls as measured by falls leading to a fractured neck of femur. This reduction avoided costs in the region of \$3 million in 2015.
- Slightly fewer older people are being prescribed multiple medicines.
- Despite apparent improvements in hand hygiene practice, incidence of *Staphylococcus aureus* infection has increased slightly.
- Patients' reported experience of care has been consistent and generally positive over the last 18 months.
- Premature death, and disability caused by ill health, is similar in New Zealand to most other English-speaking and Western European countries, but per capita expenditure on health care is lower than most.
- Different ethnic groups experience different care for gout.
- Admissions for hypoglycaemia among patients with diabetes are declining and variation in this is reducing.

Part 2 considers the importance and complexities of measuring value in health care. It suggests there is no one simple measure of this, but that a number of different 'lenses' can help give an understanding.

Part 3 looks at how the Ministry of Health's new System Level Measures Framework and the information in this document complement each other.

Part 4 outlines our plans for this document, which will supplement the existing set of measures with 'deeper dives' into specific topics, such as particularly patient groups, diseases or aspects of health services.

1. See www.hqsc.govt.nz/our-programmes/health-quality-evaluation/publications-and-resources/publication/2384/.

Introduction

This is the 2016 update of the Health Quality & Safety Commission's inaugural *Window on the Quality of New Zealand's Health Care*, published in December 2015.² It brings our measures up to date and examines key issues in the measurement of quality in New Zealand health care.

This document helps the Commission fulfil its statutory responsibility to provide public reports on the quality and safety of health and disability support services.

In part 1, we present indicators where significant changes or otherwise noteworthy results were reported in 2015. These indicators cover all parts of the Window framework (Figure 1, page 4). Updating these results less than six months after the first edition means there are limited new data available, however, particularly for international comparison.

In parts 2 and 3 we go into greater depth on key issues relating to the quality of New Zealand health care, which are:

- the measurement of value of the health system
- links between the Window measures and the Ministry of Health's System Level Measures Framework (SLMF).

In part 4 we discuss the direction for the Window from 2017 onwards.

Finally, in part 5 we present all the remaining measures.

This edition of the Window is best read as a companion piece to our first edition, which sets out in detail the underpinning framework used to judge the quality of our health system and the rationale behind it. It also gives more information on the measures used to fill it and measurement methods, such as statistical process control and data sources.

2. See www.hqsc.govt.nz/our-programmes/health-quality-evaluation/publications-and-resources/publication/2384/.



The Window on quality

Figure 1: Measures selected inside a framework, based on the level of the measures and the elements of quality - UPDATE 2016

	Safety	Experience
System measures	Overall harm estimates Adverse events in hospital (academic) 2002 DALYs lost to adverse health events (MoH) 2013	Inpatient experience survey Scores out of 10 for the four domains of patient experience (QSI) 2014 Highest and lowest scoring questions in the patient experience survey (QSI) 2014
	Contributory measures	
Contributory measures	Common individual harms and their avoidance In-hospital falls with fractured neck of femur (QSM) 2014 Compliance with WHO 'Five Moments for Hand Hygiene' (QSM) 2014 <i>Staphylococcus aureus</i> bacteraemia rates (QSM) 2014 Postoperative sepsis (QSM) 2014 Postoperative DVT/PE (QSM) 2014	
	Protecting prescribing risks Polypharmacy among older people (Atlas) 2011 Older people prescribed with an antipsychotic and a benzodiazepine (Atlas) 2011	

Symbols

INTERNATIONAL COMPARISON

Green globe - best (3-5 countries), best or 2nd best (6-7 countries), top quartile (more than 7 countries); **Red globe** - worst (3-5 countries), worst or 2nd worst (6-7 countries), bottom quartile (more than 7 countries); **Yellow globe** - performance between green and red; **Grey globe** - fewer than 3 countries had data.

DIRECTION OF TRAVEL

Green arrow - statistically significant improvement; **Yellow arrow** - no statistically significant change; **Red arrow** - statistically significant deterioration; **Grey arrow** - insufficient data.

VARIATION

Green dots - variation smaller than 1.5-fold between top and bottom; **Yellow dots** - variation 1.5-2-fold; **Red dots** - variation greater than 2-fold; **Grey dots** - no data.

Effectiveness		Equity		Efficiency				
Ultimate outcome measures	Age standardised amenable mortality rates (academic) 2006 	We have taken the approach of looking at a range of measures by different groups rather than one overarching equity measure		Overall cost per capita	DALYs per 100,000 population against per capita expenditure on health care (OECD) 2013 			
	DALYs per 100,000 population (WHO) 2012 							
Coordination of care	Occupied bed-days associated with people aged 75 and over admitted to hospital as an emergency two or more times (QSI) 2014 	Ethnicity		Costs of harm	Estimated cost of in-hospital falls with fractured neck of femur (QSM) 2014 			
	Community follow-up of mental health patients (QSI) 2013 				Childhood immunisation by ethnicity (QSI) 2013 	Costs of uncoordinated care	Estimated potentially avoidable expenditure on hospitalisation of older people with multiple admissions (QSM) 2014 	
Patients receiving recommended medication	People with gout who received allopurinol regularly (Atlas) 2011 				People with gout who received allopurinol regularly by ethnicity (Atlas) 2011 	People with diabetes who received insulin or metformin regularly (Atlas) 2013 	Costs of unwarranted variation	Potentially unwarranted variation in care: grommets 2011-12 to 2014-15
	People with diabetes who received insulin or metformin regularly (Atlas) 2013 				People with diabetes who received insulin or metformin regularly (Atlas) 2013 	People with diabetes tested for HbA1c levels at least once a year by ethnicity (Atlas) 2013 	Costs of unwarranted variation	Potentially unwarranted variation in care: hospital admissions for diabetes 2013; hospital admissions for gout 2011 (Atlas)
		Economic status		Price control				
			Access to health care by income group (Commonwealth Fund) 2013 					



Abbreviations

CLAB = central line associated bacteraemia
DALYs = disability adjusted life years
DVT/PE = deep vein thrombosis/pulmonary embolism
HbA1c = glycated haemoglobin
WHO = World Health Organization

Sources

Academic - Academic study published in peer-reviewed journal
Atlas - Health Quality & Safety Commission Atlas of Healthcare Variation
Commonwealth Fund - Commonwealth Fund comparative study of international health systems
MoH - Ministry of Health published report
OECD - Organisation for Economic Co-operation and Development health statistics
QSI - Health Quality & Safety Commission quality and safety indicator set
QSM - Health Quality & Safety Commission quality and safety markers
WHO - World Health Organization global burden of diseases study

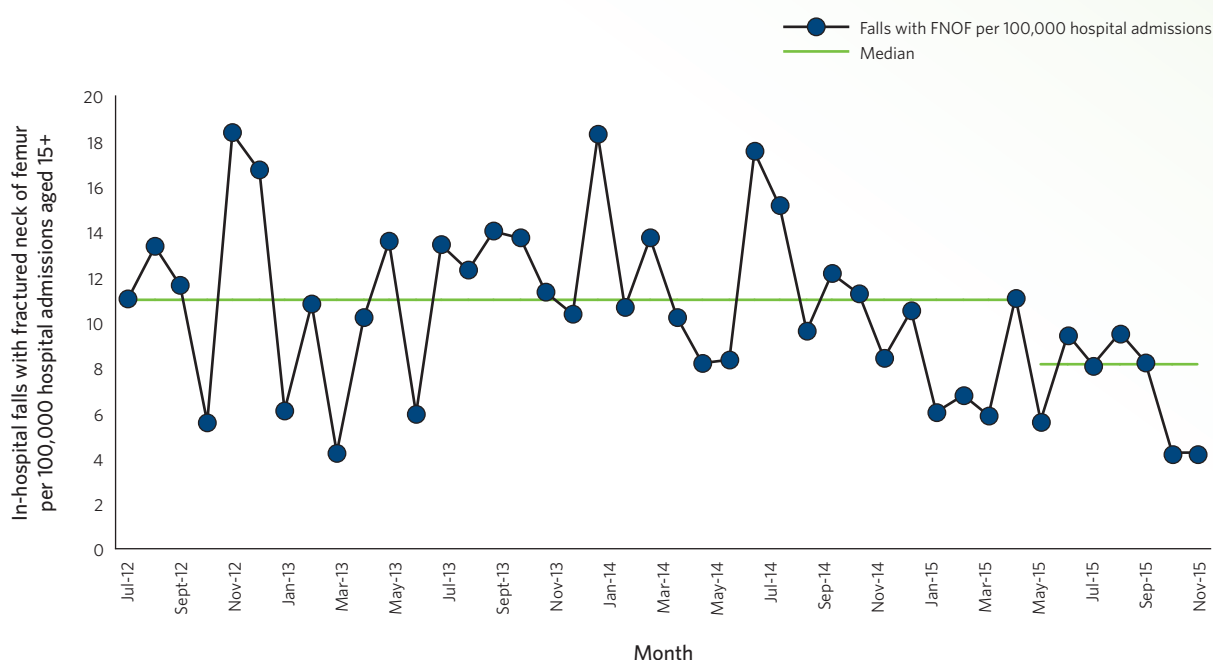
1 What changed in 2015?

This section focuses only on measures where results have changed since the publication of the first Window. Appendix 1 gives fuller results for all measures where updated data are available.

1.1 Safety

1.1.1 Broken hips (fractured neck of femur) after a fall in hospital are decreasing

Figure 2: In-hospital falls leading to a fractured neck of femur (FNOF) in people aged 15 and over, by month, New Zealand, 2012–15



The Commission has run its programme to reduce harm from falls in our hospitals since 2013. In 2015 there was for the first time a reduction in the outcome measure, ie, falls in hospital that led to a fractured neck of femur (broken hip). A broken hip resulting from a fall is an unambiguous, serious (potentially fatal) harm that was affecting two patients a week in hospital. This reduction (of over 35 percent) is statistically significant, and has been sustained throughout 2015. In total, 37 fewer people fell and broke their hips between November 2014 and September 2015 than we would have expected based on the baseline between 2010 and 2012. Box 1 overleaf gives further details about how this was achieved.



Box 1: A national programme to reduce harm from falls

National adverse event reporting identified in the early 2010s that falls, and in particular falls associated with a fractured neck of femur, were the most commonly reported adverse event in New Zealand hospitals. The Commission established a national reducing harm from falls programme in 2012 in response.

Rather than creating a 'bundle' of care practices, the programme has followed the philosophy of applying the right combination of interventions that address the specific risks of the individual, basing these on multiple robust, evidence-based interventions. The programme developed a suite of interactive and evidence-based resources, titled the '10 Topics'³ to build the capability of health professionals. A falls Atlas of Healthcare Variation domain was also developed to show national and local data, and inform and guide local improvement.

The programme established a network of clinical leaders, with a national clinical lead, to influence and guide the practice changes required and drive quality improvement.

Reducing harm from falls is profiled every April under the banner of 'April Falls'. This gives health care providers a reason to refocus on the problem of falls and celebrate and share their successes in reducing associated harm.

The Commission established a quality and safety marker linking measures of implementing process changes with outcomes. The process measure is the percentage of patients aged 75 and older given a falls risk assessment, and the percentage given an individualised care plan. The outcome measure is the number of in-hospital falls resulting in a broken hip, and associated costs to the system. These measures are reported upon nationally each quarter, providing an impetus for changing practice and improving outcomes for older people.

The proportion of patients entering hospital aged 75+ who were assessed for the risk of falling increased from 76 percent at baseline (February 2013) to 92 percent in September 2015.

Likewise, the proportion of patients assessed as at risk of falling who received an individualised care plan also increased from 80 percent (September 2013) to 92 percent in September 2015.

3. See www.hqsc.govt.nz/our-programmes/reducing-harm-from-falls/10-topics/.

New Zealand appears to perform better on this measure than England and Wales or Canada. The recent improvement may point to a growing gap in performance but international comparisons remain somewhat limited by available data.

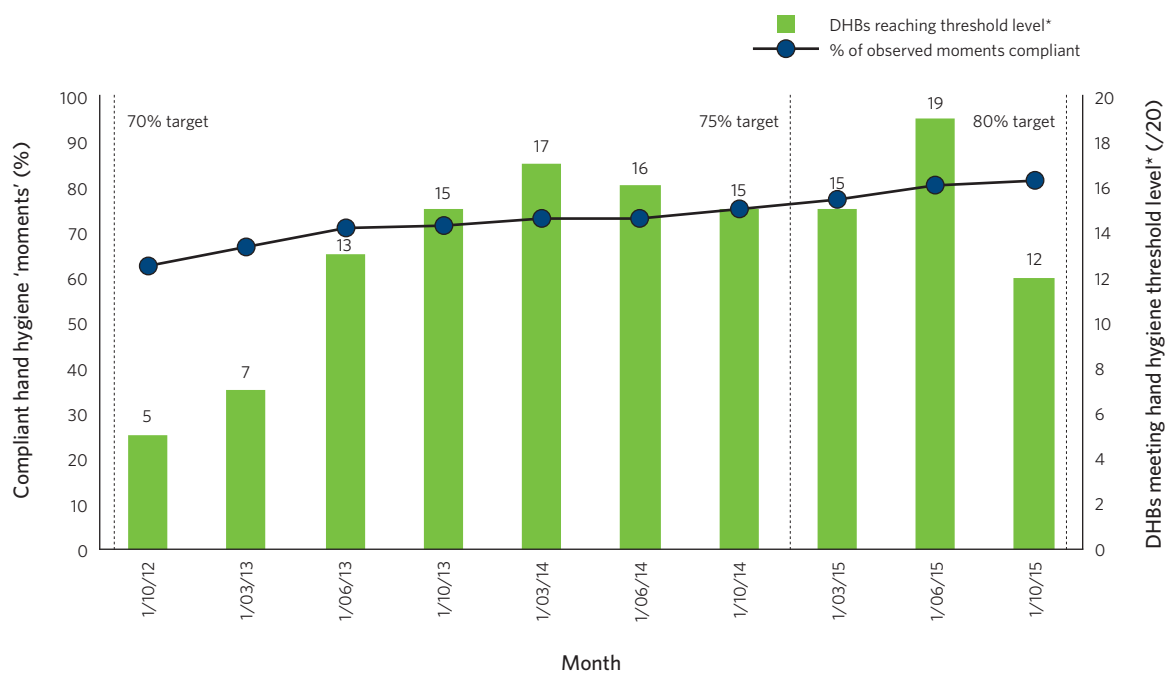
Table 1: In-hospital falls with fractured neck of femur (FNOF) per 100,000 population aged 65 and over, New Zealand and international comparators, 2014

Country	Falls FNOF per 100,000 population aged 65+	Actual recorded falls
New Zealand 2014	15.6	102
(New Zealand 2015)	10.2	69)
Australia	N/A	
England and Wales	17.8	1859
Scotland	N/A	
United States	N/A	
Canada	19.2	1070
Sweden	N/A	

1.1.2 Hand hygiene practice is improving, but Staphylococcus aureus infections are increasing

New Zealand has shown a steady increase in compliance with the WHO’s ‘Five Moments for Hand Hygiene’ since 2012. Over 80 percent of observed potential moments are now complied with, compared with just over 60 percent three years ago.

Figure 3: Overall hand hygiene compliance rate and qualifying DHBs reaching threshold, by month, New Zealand, 2012–15

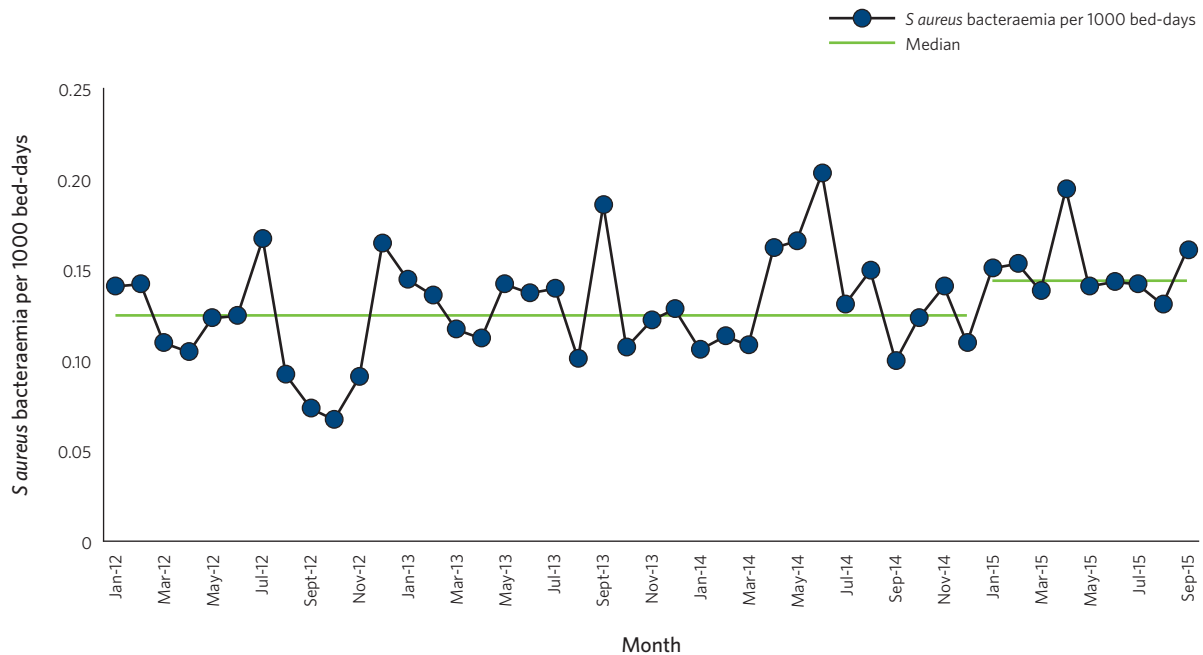


*Note threshold (right-hand axis) increased from 70 percent from October 2012 to June 2014, to 75 percent in October 2014 to June 2015, and 80 percent in October 2015.



There is no evidence this increase in hand hygiene compliance has reduced the selected outcome measure, *Staphylococcus aureus* (*S aureus*) infections. In fact these have increased slightly over the last few months following a long period without change. The reason for this is unclear; a genuine increase in infections may reflect changes in recording practice or an increase in patients at particular risk of infection. Other infections may have improved, but these have not been measured.

Figure 4: *S aureus* bacteraemia per 1000 bed-days, by month, New Zealand, 2012–15



1.1.3 Slightly fewer older people are being prescribed multiple medicines

Prescribing several medicines to one person or prescribing that person the wrong medicines relative to the other medication they are on can increase the risk of adverse drug interactions, falls, admission to hospital and even death.

We first reported on this issue in the Atlas of Healthcare Variation in 2013, and recently repeated this analysis to the end of 2014.⁴

This update shows some change in the proportion of older people receiving multiple medicines, although not all changes are moving in the same direction. Between 2011 and 2014 there were small but significant decreases in the proportion of people aged 65–74 taking 5–7 medicines (17.7 to 16.8 percent), 8–10 medicines (7.1 to 6.5 percent) and 11 or more medications (3.1 to 2.7 percent). These reductions equate to 7000 fewer older people taking five or more medicines. Yet there has been a statistically significant increase in the percentage of people aged 85+ taking 5–7 medicines (29.2 to 30.4 percent).

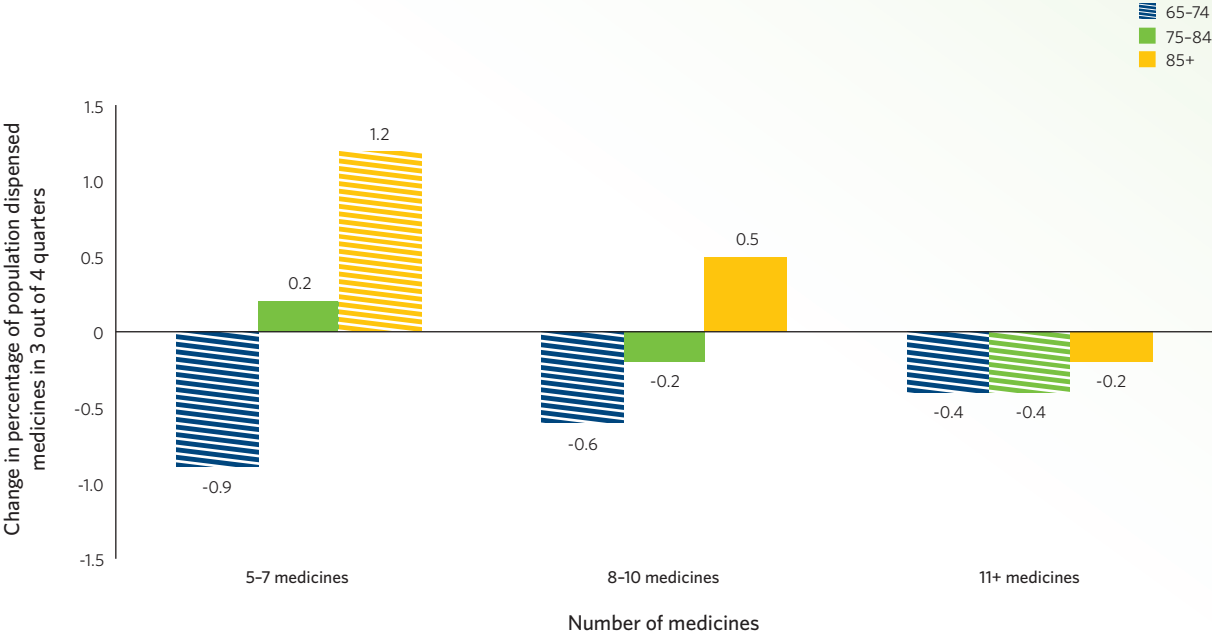
We know the publication of the initial Atlas in 2013 helped those involved with local improvement initiatives to understand and, where necessary, address this issue.⁵

4. See www.hqsc.govt.nz/our-programmes/health-quality-evaluation/projects/atlas-of-healthcare-variation/polypharmacy-in-older-people.

5. Some of these initiatives are described in the Commission publication *Variation and improving services: case studies and key questions*. See www.hqsc.govt.nz/our-programmes/health-quality-evaluation/publications-and-resources/publication/1558.

Understanding the issue is complex. While increasing drug prescription carries risks, prescription of an individual medicine is often clinically justified. What is needed, therefore, is an understanding of how to manage multiple conditions effectively and safely. The choice of the individual person receiving the medication and how to provide the information needed to make this a truly informed choice are vital. Just how complex the issue can be was considered at the Commission-hosted video debate on this issue in 2015.⁶

Figure 5: Change percentage of population dispensed multiple medicines in three out of four quarters, New Zealand, 2011–14



(Hatching indicates a statistically significant shift.)

1.2 Patients' experience of care has been consistent over the last 18 months

The in-hospital patient experience survey has now run six times over 18 months. This is enough time for results to stabilise and, as Figure 6 shows, the results have become quite consistent. Based on a score out of 10 given by respondents, the four domains of communication, partnership, coordination, and physical and emotional needs have remained relatively constant, and similarly constant in relation to each other.

6. See www.hqsc.govt.nz/our-programmes/health-quality-evaluation/publications-and-resources/publication/2363.

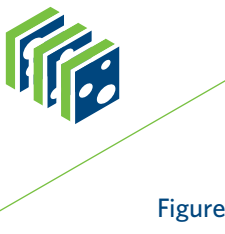
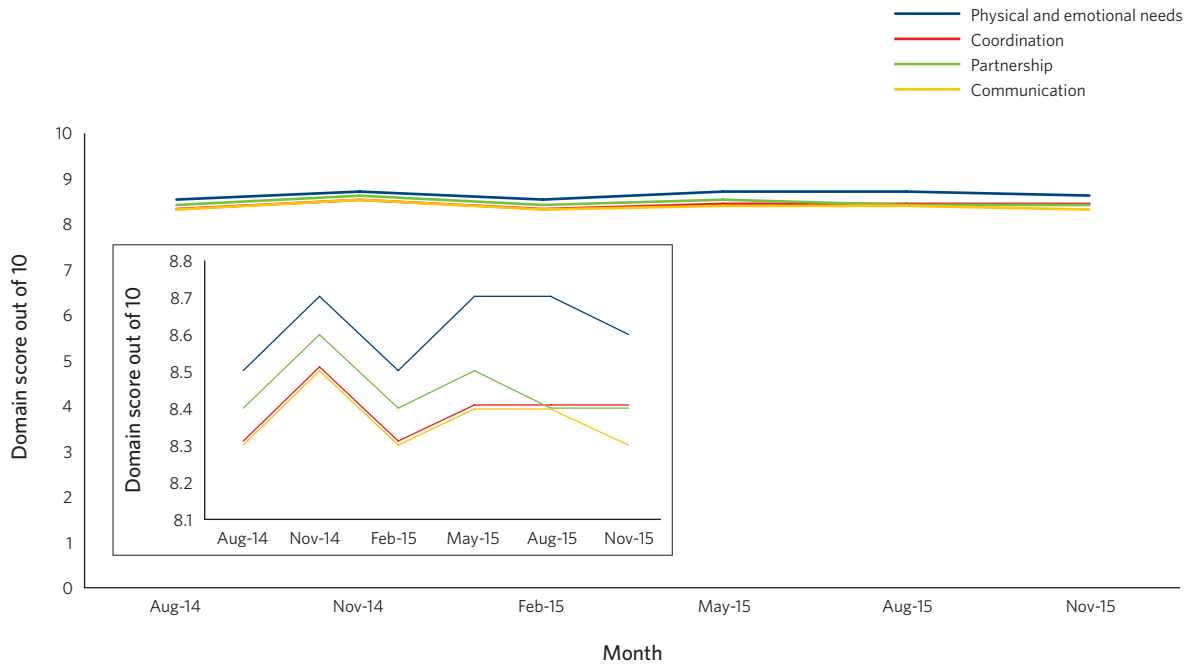
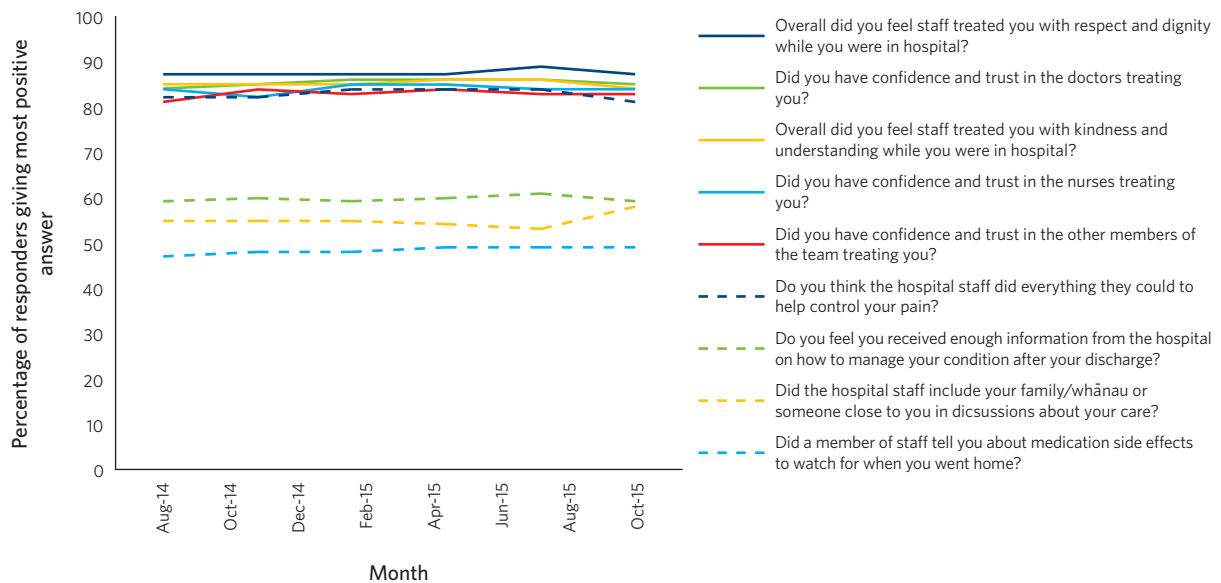


Figure 6: Domain scores for in-hospital patient experience survey, New Zealand, August 2014 to November 2015



Looking at individual questions in Figure 7, the same consistent pattern emerges. The more positive answers are for questions concerning the humanity of care, while the less positive reflect technical aspects of care around communication and involvement of families/whānau. These results suggest most patients entering hospital experience a positive caring culture but need better communication about and coordination of services.

Figure 7: Most and least positively answered questions, in-hospital patient experience survey, New Zealand, August 2014 to November 2015 (percentage of respondents choosing the most positive option)



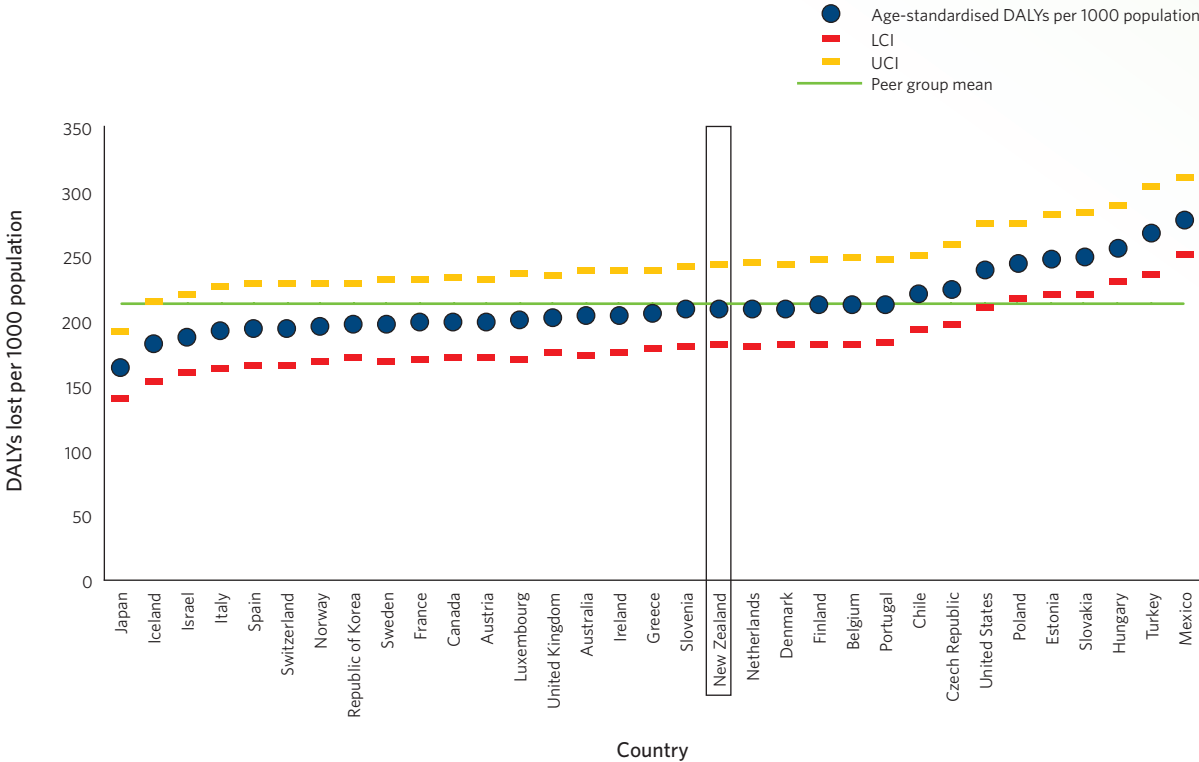
1.3 Effectiveness

1.3.1 Premature death and disability caused by ill health are similar in New Zealand to most other English-speaking and Western European countries

Although health systems produce a range of outcomes, their main purpose is to help people live longer (ie, avoid premature death) and live better (ie, avoid disability related to ill health and disease). An effective health system would therefore be one that minimised premature death and years lived with disability. The disability adjusted life year (DALY) seeks to measure this. A smaller DALY score is positive because it indicates fewer years of life lost or disabled.

The Global Burden of Diseases, Injuries, and Risk Factors Study 2013⁷ uses the DALY as a measure to consider the impact of different diseases and injuries on different countries. However, it also calculates a total 'DALY burden' of ill health for individual countries. This is presented in Figure 8 with 95 percent confidence intervals. In this analysis, New Zealand sits in the middle of this peer group, with a DALY burden statistically consistent with nearly all comparable countries.

Figure 8: Age-standardised DALYs per 1000 population, 2013 (global burden of diseases)



It is not straightforward to identify an appropriate comparison group for international comparisons. This analysis uses the set the OECD uses in its analyses of health data, but these are a diverse group. English-speaking and Western European countries are combined with developed Asian economies and Eastern European countries and the border economies of Turkey, Chile and Mexico. The latter group appears to be distinct, with a significantly higher DALY burden than other nations.

7. See www.thelancet.com/global-burden-of-disease.



In the first Window we presented a WHO calculation of DALYs. This more recent analysis by the Global Burden of Diseases, Injuries, and Risk Factors Study is considered a better estimation, especially as it is age-standardised. Burden of disease is closely age-related (older people suffer a greater burden of disability), so standardising for age is important to ensure fair international comparisons.

Box 2: Disability adjusted life years

Disability adjusted life years (DALYs) measure the gap between the population's current state of health and that of an ideal population in which everyone experiences long lives free from illness or disability. This definition comprises years of life lost (YLL) – based on expected years of life at each age compared with the lowest observed death rates for each age across all countries – and years lived with disability (YLD) – time spent in less than full health.

DALYs are used for a number of purposes including understanding the relative burden of different diseases and conditions within a population. While a very useful summary measure, it is not a perfect measure of the functioning of a health system. DALYs will to some extent reflect the underlying health status of a population and socioeconomic determinants of health. For example, developing nations have both a much higher DALY burden per capita, and a much high proportion of their total burden associated with communicable diseases. Furthermore, some benefits of a good health system, such as services that manage short-term less serious conditions, diagnoses that reassure people they are not seriously unwell, or increased economic productivity, cannot be adequately captured by this measure.

1.4 Equity

1.4.1 Different ethnic groups experience different care for gout

Fairness and equity is an important measure of the quality of a health system. People should get the same quality of care regardless of gender, ethnicity, geographic location and socioeconomic status.

One striking example of apparent inequity identified in the Atlas of Healthcare Variation was in the treatment of gout between different ethnic groups. Using data first published in the Atlas in 2011, we found Māori and Pacific peoples were more likely to have gout, but less likely to be dispensed allopurinol to control the disease and more likely to be dispensed drugs for acute gout flares as a consequence. We noted: '... gout is less well managed in ... the very people most likely to suffer from gout'. We recently updated the Atlas and can see the situation has not improved. Figure 9 shows an increase in prevalence (which may reflect better detection of the disease). In absolute terms this reflects in excess of 20,000 Pacific peoples with gout, around 30,000 Māori and over 100,000 others. Figures 10 and 11 show that, while use of the best controlling medication has increased for all groups, the inequity in control first identified in 2011 remains in 2014.

Figure 9: Gout prevalence by ethnicity, New Zealand, 2011 and 2014

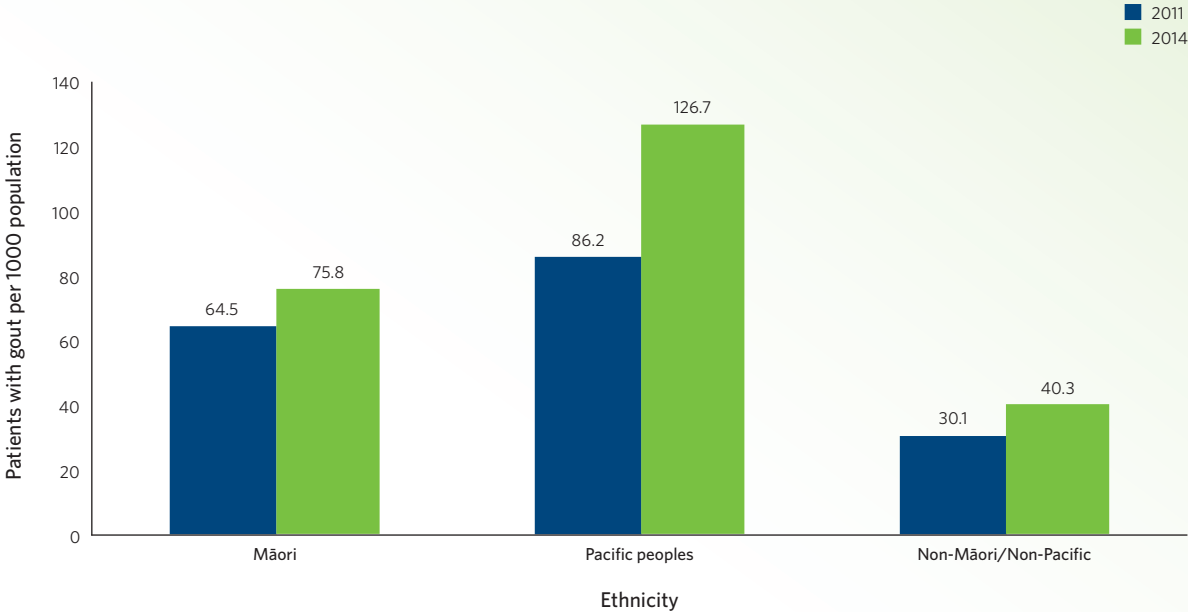


Figure 10: People with gout who received allopurinol regularly, by ethnicity, New Zealand, quarter 2, 2011 and 2014

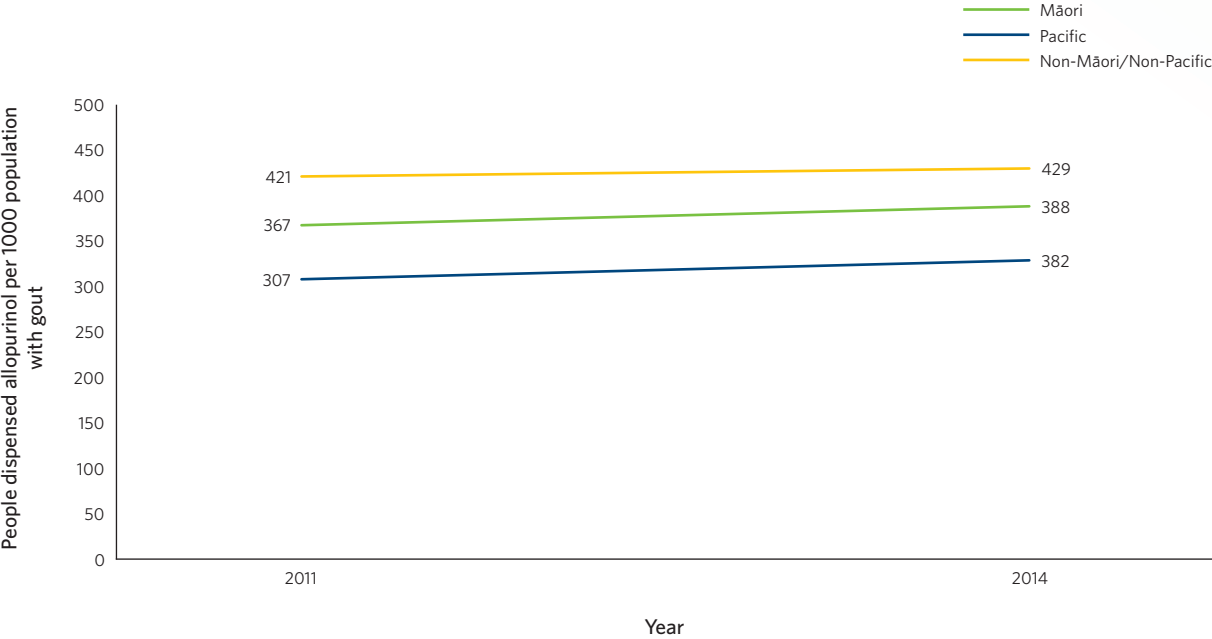
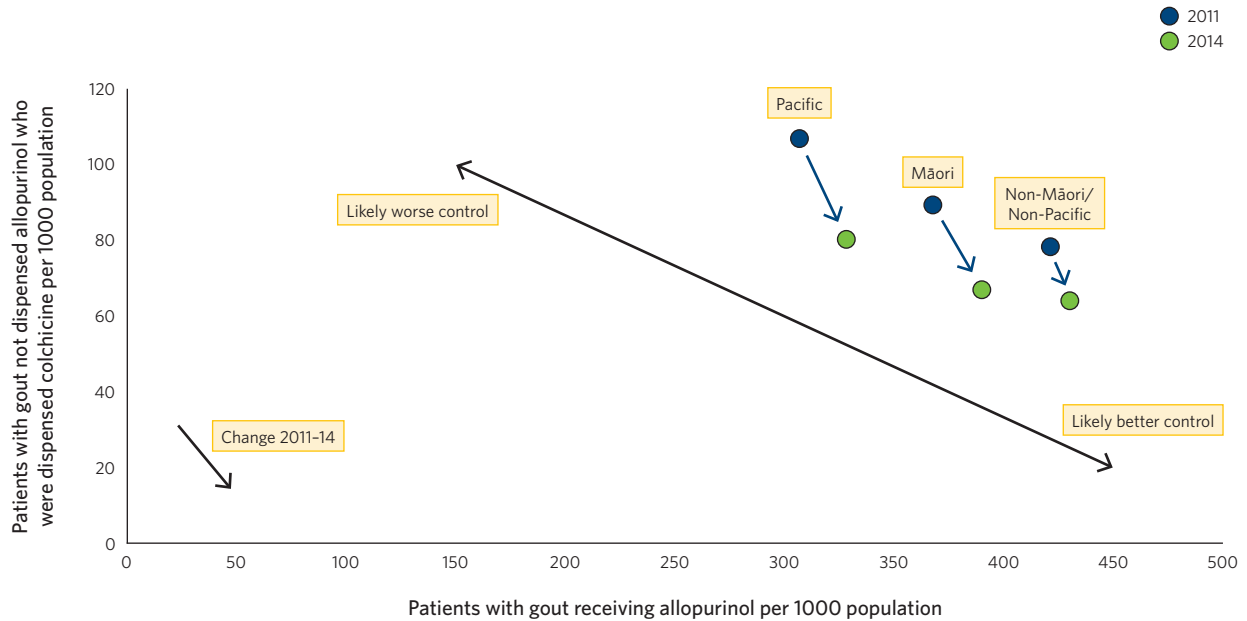


Figure 11 shows patients receiving allopurinol (the best medication for controlling gout) plotted against patients who did not receive allopurinol but did receive colchicine as a medication to control an acute flare. The point is that a high allopurinol rate combined with a low colchicine and no allopurinol rate points to good control and the reverse poor control. The figure shows the situation for both 2011 (blue dots) and 2014 (green dots), demonstrating the change over three years. Rates for all three ethnic groups improved over the three years, but the pattern of inequity remains consistent.



Figure 11: Allopurinol and colchicine dispensing, by ethnicity, New Zealand, 2011 and 2014



This frustrating result caused Dalbeth and colleagues to raise a number of hard questions:

- Do patients still suffer in silence due to the stigma associated with gout?
- Do patients, GPs and practice nurses think it is 'just gout'?
- Do patients prefer taking non-steroidal anti-inflammatory drugs (NSAIDs) intermittently to daily allopurinol, despite the risk of long-term joint damage?
- Are the models of care wrong – how do you engage in effective support for self-management when short consultations are consumed by sorting out treatment of acute gout attacks?
- What's the role of funders and of primary health organisations in engaging with their populations?
- Is it because the extreme pain and inability to work and interact with family associated with gout are not considered a priority problem, despite being closely associated and often comorbid with diabetes and cardiovascular disease?⁸

The Atlas of Healthcare Variations gives clinicians the opportunity to explore and address these questions in their practice.

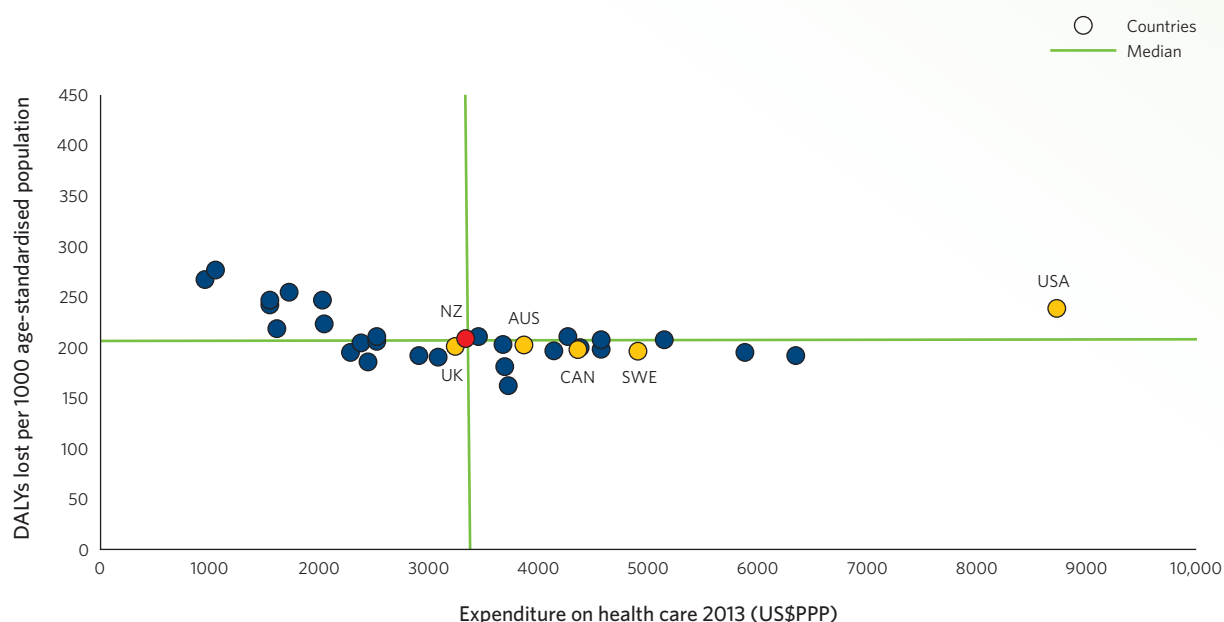
8. Dalbeth N, Gow P, Jackson G, et al. 2016. Gout in Aotearoa New Zealand: are we going to ignore this for another 3 years? *NZ Med J* 129(1429): 10–13.

1.5 Value

1.5.1 New Zealand's DALYs lost per capita versus health care spend per capita is close to the international average

Using the new DALY calculation, New Zealand is almost exactly on the median point for both DALYs lost and per capita expenditure on health care compared with the OECD comparator group used in section 1.3 above. Among the English-speaking and Western European subset of countries, New Zealand has one of the least expensive systems, while maintaining an age-standardised DALY burden in line with similar nations. Interestingly, this suggests that, above around US\$2800 per head, there is little relationship between expenditure on health care and DALYs lost per capita.

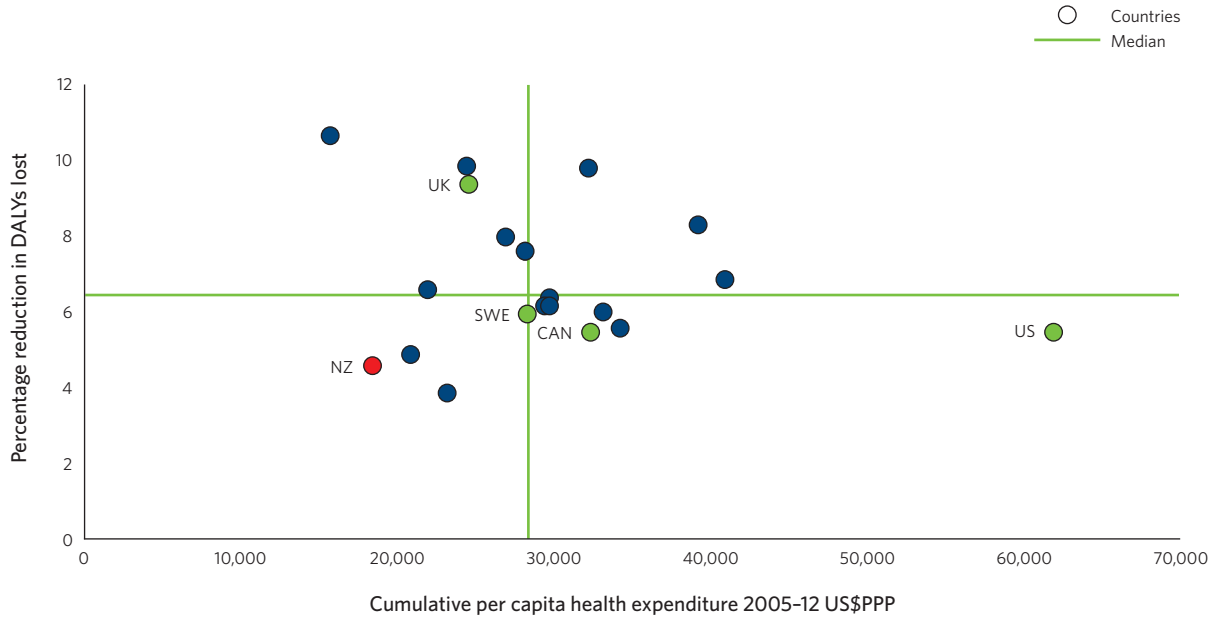
Figure 12: Age-standardised DALYs lost per capita versus expenditure per capita on health care (US\$ purchasing power parity), 2013



It is important not to over-interpret this analysis. The DALY burden of a country, while estimated for a specific year, can be the consequence of decades of conditions which affect population health, including public health and health system performance for years prior to the year being studied. Similarly per capita expenditure on health in any given year reflects decades of decisions about investment in health systems. Recognising this, Figure 13 presents a slightly different measure, looking at the percentage change in DALYs per capita between 2005 and 2013, and cumulative per capita expenditure between 2005 and 2012, for the English-speaking and Western European nations in Figure 12. What this reveals is that, while there is a general reduction in DALYs per capita, there is no relationship between this and total cumulative expenditure during this time period. The variation in reduction is, in fact, not that wide. New Zealand, along with all but four other nations in this analysis, had reductions no different statistically to the peer group average.

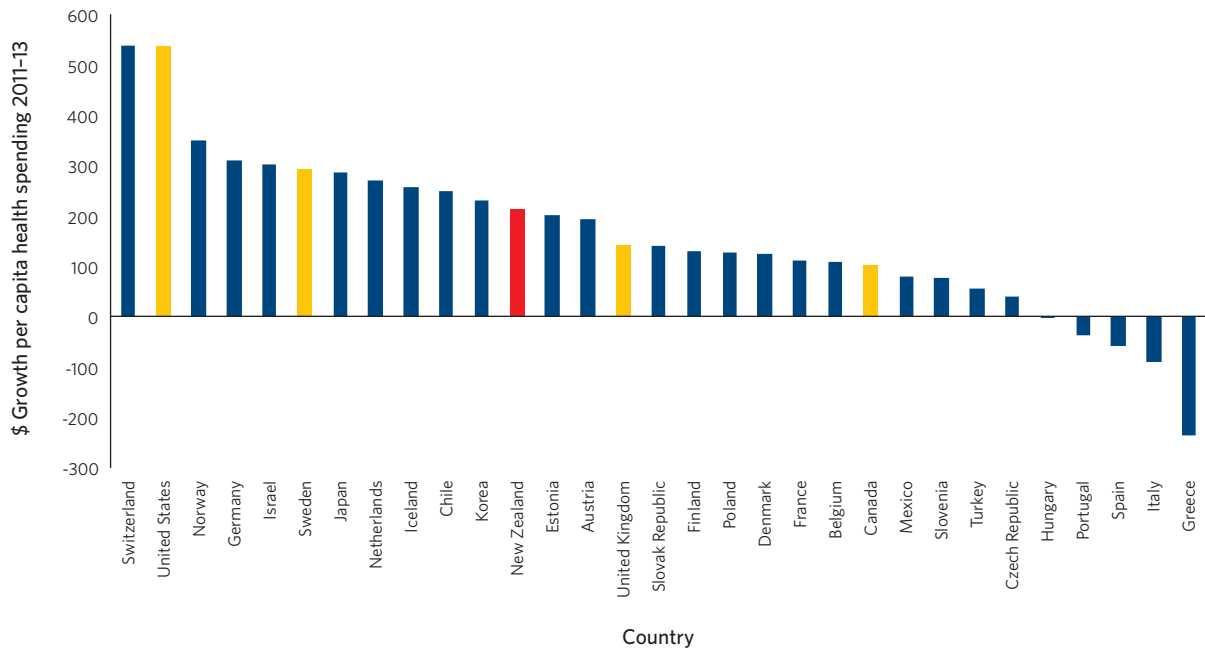


Figure 13: Percentage change in age-standardised DALYs lost per capita 2005-13 versus cumulative expenditure per capita on health care (US\$ purchasing power parity) 2005-12, by country



There was a slightly higher than average increase in expenditure per capita (US\$ purchasing power parity) in New Zealand between 2011 and 2013.

Figure 14: Change in health care expenditure (\$US purchasing power parity), 2011-13



1.5.2 Reducing in-hospital falls with fractured neck of femur has avoided \$3 million in costs

The cost of a fall with a fractured neck of femur is estimated at between \$27,000 and \$150,000 depending upon the outcome (and whether this leads to admission to a residential care home on discharge from hospital).

The significant reduction in these instances in 2015 means costs have been avoided in hospital. We estimate these at \$3.2 million since July 2012.

Figure 15: Cost and expected cost of in-hospital falls with fractured neck of femur, New Zealand, 2012-15



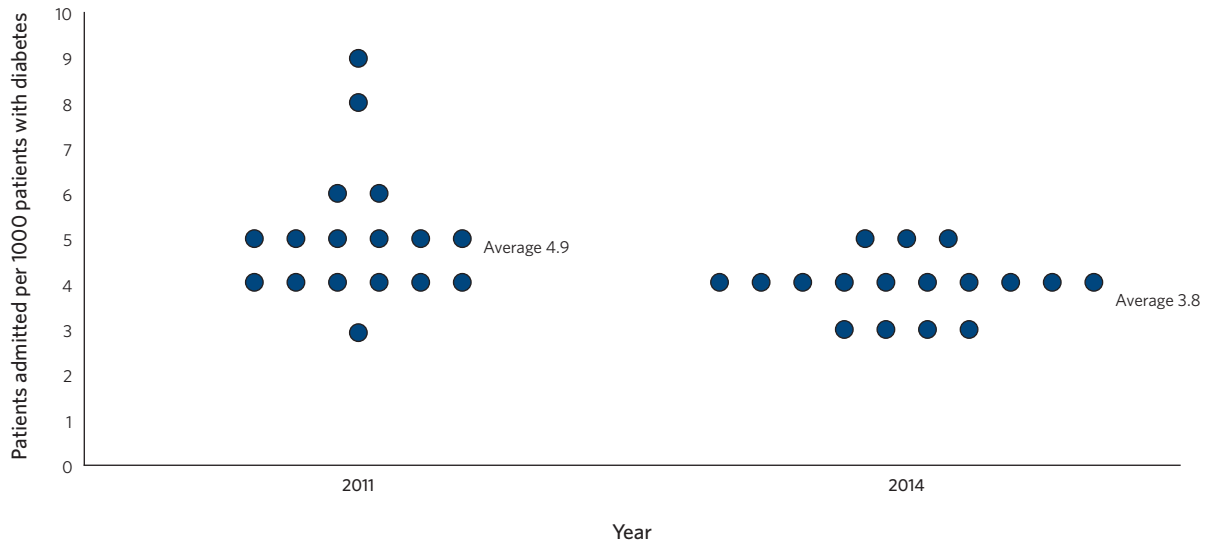
1.5.3 Variation in admissions for hypoglycaemia among patients with diabetes has reduced, bringing down the overall admission rate

Figure 16 below shows the number of patients admitted per 1000 patients with diabetes for hypoglycaemia by district health board (DHB). This should be a rare event, so this is a measure where a higher admission rate is likely to represent a worse outcome, which can be avoided by better care closer to home. Each dot on the graph represents a DHB.

In 2011 there was a near-three-fold variation between DHBs for hypoglycaemia admissions (3.3–8.6 admissions per 1000 patients with diabetes). By 2014 this variation reduced to less than two-fold (3.0–5.3 admissions per 1000). The reduction in variation is reflected in an overall significant reduction in the average admission rate from 4.9 to 3.8 admissions per 1000 patients with diabetes. This is the equivalent of 240 avoided admissions in 2014 compared with 2011, which we estimate would have cost \$370,000 had they occurred. Interpreting what this means for the system as a whole is complex, and discussed further in section 2.



Figure 16: Patients admitted to hospital with hypoglycaemia per 1000 patients with diabetes, New Zealand, 2011 and 2014



(Each dot represents a DHB.)

2 How should we measure the value of a health system?

What does value in health care mean?

We have explicitly labelled one of the five domains of quality used in this report 'value'. The New Zealand Triple Aim refers to 'best value for public health system resources', alongside improved outcomes and experience of care for the individual, and improved health and equity for all populations.

This raises an obvious question: what does value in health care actually mean?

This question is of more than academic interest. The financial pressures on all health systems internationally are increasing, with demographic, epidemiological and technological changes all creating increased demands. This point is widely acknowledged.⁹ What is less frequently considered is the capacity of health systems to not just spend money less wastefully but also *add value* to achieving society's goals.

New Zealand is at the forefront of the investment approach

In many ways, New Zealand is at the forefront internationally of considering social investment approaches¹⁰ for public expenditure. The logic is that spending money upfront to increase individual and societal wellbeing reduces expenditure on partial fixes in the long run. These expensive fixes could range from benefit expenditure to address long-term labour market exclusion, through increased crime and incarceration rates, all the way to increased health care costs, especially associated with acute hospitalisation. Effective health expenditure *should* fit well with an investment approach. A very simple example is effective management of long-term conditions like diabetes or gout, which should not only mean fewer acute events requiring expensive health interventions, but also fewer days off sick and greater productivity for working age adults.

Measuring such a broad definition of value is technically and conceptually complex. To date, we have adopted a range of approaches. These consist of focused attempts to describe eliminating waste in the health system, combined with ways to estimate the benefit of health care to individuals and society, and then giving a value to this.

Patient harm costs money

A useful, though partial, description of a good value health system is one that does not spend large amounts of money putting right the damage it has done to its patients.

The measures of harm we have used for our various improvement programmes have come with costs attached. For example, each case of central line associated bacteraemia in intensive care units (ICUs) has been estimated to cost \$20,000 in additional treatment (such as longer stays in ICU and additional drugs).

We can estimate a baseline of how many of these harms we can expect, measure what the actual numbers are and multiply the 'avoided' harms by their estimated cost. This is a simple method, and is relatively straightforward to understand. It is the approach taken with the fractured neck of femur cost savings shown in Figure 14 above.

9. Merry AF, Hamblin R. 2012. More for less: best patient outcomes in a time of financial restraint. *J Extra Corpor Technol* 44(4): 178–85.

10. See www.treasury.govt.nz/statesector/socialinvestment.



The estimation of the cost of a harm event is not necessarily straightforward. As these harms occurred while the patient was under the care of the health system, any expenditure will be additional to that already being spent. Calculating this *additional* element as opposed to the original cost for any given patients is difficult. While a best estimate of the cost of a fractured neck of femur that does not lead to discharge to aged residential care may be \$47,000, it is not clear this figure will be the *additional* cost for someone already in hospital.

Leaving this complication aside, estimating avoided costs of harm may be the simplest way to estimate the value of a high-quality health system. It is a measure of 'doing things right'. However, a measure of 'doing the right thing' – that is, identifying and assigning a cost to the effects of unwarranted variation – is considerably harder.

Some services may be unnecessary

Inexplicable variations in the health care that apparently similar patients received have been noted since at least the 1930s.¹¹ John E 'Jack' Wennberg's pioneering work between the 1960s and 1990s on unwarranted variation in health care culminated in the Dartmouth Atlas of Health Care and wide discussion of the concept: variations in care inexplicable by differences in patient needs or preferences. Such variation may point to over- and under-provision of particular tests and treatments, or suboptimal organisation of care, leading to the most drastic and expensive interventions being undertaken because of missed opportunities for earlier, cheaper interventions (potentially with greater chance of success).

The Atlas of Healthcare Variation has now considered over 20 different disease and patient groups in detail. While variation in New Zealand's relatively small system is less marked at the extremes than in some larger countries like the USA and UK, two- to three-fold variation is common.

Where appropriate, standardisation of protocols is likely to lead to a narrowing of variation, especially where provision of a service is a result of failing to address an issue earlier. We can see this in Figure 15 in relation to admissions for hypoglycaemia.

In these cases, given an estimate of the cost of providing a service, we can extrapolate an estimation of avoided costs through reduced variation quite simply. However, there are again complications. In this case, we do not know the expenditure required elsewhere in the system to give better care and avoid this 'avoidable' expense. It is entirely possible this might be more than the cost of the avoidable care. This then is more of an estimate of how much of New Zealand's health expenditure was on services that may not have been in the patient's best interest, rather than necessarily calculating a sum which could have been 'saved' to spend elsewhere. This distinction is subtle, but important.

Good health care provides value to those who receive it

Considering what is best for the patient brings us to the more complex calculation of the value of good health and extended life. DALYs (see 1.3 above) and QALYs (quality adjusted life years) have become well established in the last 20 years as a way of considering burden of disease and benefit of treatment, although some controversy over their use remains. The use of cost per QALY as an aid to investment decisions, especially in new pharmaceuticals, is part of health systems globally.

In theory, it should be possible to extend this DALY and QALY approach into the cost of harm so we consider the *value for individuals* of avoiding harms as well as the *cost to the system*. At least some harms have estimates of DALY cost (or QALY benefit). For example, the DALY loss of a fractured neck of femur has been estimated at

11. Glover JA. 1938. The incidence of tonsillectomy in school children. *Proc R Soc Med* 31: 1219–39, cited in Wennberg et al. 1982. Professional uncertainty and the problem of supplier-induced demand. *Soc Sci Med* 16: 811–24.

a minimum of 1.5 DALYs.¹² The value of a QALY gained (or DALY avoided) is widely debated but figures have ranged from \$60,000 to \$200,000.¹³ So again, the calculation of an estimate is possible, but the strength of the underpinning assumptions is questionable – especially estimates of value.

An alternative approach which could be considered is the use of standardised and comparable Patient Reported Outcome Measures (PROMS). This approach seeks to understand the effect of receiving health care on how patients actually live their lives. The tools differ in detail but are used to measure pain, function, ease of undertaking daily activities and so forth, before and after a health care intervention. In theory, these changes should be able to be expressed as QALY gains or losses. Currently PROMS are relatively little used in New Zealand, but are well established and tested in other countries, and could be adopted here as a means of strengthening our tracking of health outcomes.

Every life has value... but it is hard to calculate how much

A related but extended approach is to use the value of a statistical life (VoSL)¹⁴ to estimate the value to society of reducing mortality. This has an intuitive appeal for activities such as the Commission's mortality review committees, which focus on this task. Based on an estimate used by the Department of Transport, the VoSL is valued at \$3.95 million. The first Window reported reductions in child mortality rates calculated by the Child and Youth Mortality Review Committee. These equated to 350 fewer child deaths than the trend since 2010. At \$3.95 million per life, these lives have a value of \$1.3 billion.

On the face of it, this is very good news. However, there are problems with the VoSL approach. The \$3.95 million valuation is based on what some individuals were willing to pay on road improvements to prevent one road traffic death in 1989, adjusted for inflation since then. This approach, known as a 'willingness to pay stated preference method', has been widely used in New Zealand to inform cost-benefit approaches, but has been criticised for a number of reasons. First, the estimates are generally derived from small population surveys, meaning there is often considerable variance around the mean value recorded, thus uncertainty about what the true value of the VoSL is. Second, VoSL estimates capture hypothetical opinions for specific circumstances. So, what someone might be willing to pay for road improvements to save the life of an adult road user might be different to what they would be prepared to pay to save the life of a child.

Simple measures of productivity may mislead or distort

One approach we have rejected is one which at first sight seems a straightforward solution. Number of patients treated per dollar spent may seem attractive, but has a number of problems. What do we mean by 'number of patients treated'? Does it refer to the number of patients, or the number of times they interact with a health system? If we mean the latter, then this sort of measure may reward ineffective and poor value patterns of care. For example, regular re-admission to hospital for short stays would appear to be very efficient when in fact it may reflect poor quality care, which provides poor value for money. In contrast, one continuous package of care provided in the community, which provided both better outcomes and experience for patients, would appear less efficient.

If instead we concentrate on the number of patients per dollar spent we should have to in some way standardise this for the average degree of ill health and need for services of each patient. This is a very complex

12. Johnell O, Kanis JA. 2006. An estimate of the worldwide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int* 17: 1726–33.

13. Neumann PJ, Cohen JT, Weinstein MC, et al. 2014. Updating Cost-Effectiveness – The Curious Resilience of the \$50,000-per-QALY Threshold. *N Engl J Med* 371: 796–7.

14. Wren J, Barrell K. 2010. *The costs of injury in New Zealand and methods for prioritising resource allocation: A background briefing paper to inform the evaluation of the New Zealand Injury Prevention Strategy*. Wellington: New Zealand Injury Prevention Secretariat, Accident Compensation Corporation.



task. Nearly every member of the population interacts in some way with the health services so we run the risk of coming up with a measure not really any different to expenditure per capita. In any case, we do not have all the data required for such calculations, as we do not have counts for the wide range of services delivered in New Zealand. We would also need to standardise for the different types of outputs (eg, a GP visit vs an overnight stay in hospital) and adjust for the complexity of the service. This is also a very complex task. Using the price of individual services would be one way to do this, but that too might reflect inefficiencies in the system (eg, higher prices than are efficient).

Either way, there is the fundamental problem that these sorts of measure will not address the issue of outcomes. Doing a lot of work for relatively little money that does not effectively address the needs of patients and does not provide good outcomes is not good value for money. The Ministry of Health has explicitly recognised this in the SLMF. As the Minister of Health stated: 'We need to move performance measurements from a transactional approach to one based on outcomes.'¹⁵

Hard to do but worth doing

In our opinion, a balanced view of the value of a health system needs to consider both effectiveness of expenditure and the value it provides to individuals and society as a whole. This short essay suggests this is both complex to describe, and technically difficult. It relies on making assumptions, which cannot always be related back to evidence straightforwardly. However, we remain convinced that seeking to describe the value of a health system is worthwhile, and that comparing expenditure against simplistic measures of activity is insufficient to do this.

The Commission will continue to work with experts around the country and overseas to find ways of measuring value, and continue to report it in the Window and other publications.

15. See <https://www.beehive.govt.nz/release/new-health-system-performance-measures>.

3 The Window and the System Level Measures Framework (SLMF)

Simply reporting these sorts of measures is not an end in itself. The purpose of understanding the quality of our health system is to improve it.

The Ministry of Health, linked to its revised New Zealand Health Strategy, is introducing the SLMF, a new health outcome measurement framework. Co-designed with health sector professionals, it seeks to achieve the aims of service quality, improved population health outcomes, a focus on equity of health outcomes, value for money and longer-term financial sustainability.

At its heart is a framework that measures and promotes improvement in the quality of the health system at a local level. Like the Window, the SLMF combines **system-level measures** with **contributory measures**, as shown in Table 2. While the top-level measures are used for judging overall performance and setting milestones for improvement, the contributory measures are designed for local monitoring and improvement. Contributory measures will be selected locally from a nationally agreed set of definitions. This gives local freedom to identify and address locally pertinent issues, while ensuring measurement is robust, consistent and comparable. The Ministry expects local quality improvement plans will be developed making use of these measures.¹⁶

The proposed system-level measures are:

- ambulatory sensitive hospitalisations (ASH) rates for children aged 0–4 years
- acute hospital bed-days per capita
- patient experience of care
- amenable mortality
- youth access to and utilisation of youth-appropriate health services – under development
- proportion of newborns who live in a smokefree household – under development.

16. See <https://www.health.govt.nz/new-zealand-health-system/system-level-measures-framework/system-level-measures-framework-questions-and-answers>.



Table 2: System Level Measures Framework for 2016–17

Ambulatory sensitive hospitalisation (ASH) rates per 100,000 for 0–4-year-olds	Number of babies who live in a smoke-free household at 6 weeks post-natal	Youth access to and utilisation of youth-appropriate health services	Acute hospital bed-days per capita	Patient experience of care	Amenable mortality
(Currently Reported)	(Implementation targeted for 2017–18 financial year)	(Implementation targeted for 2017–18 financial year)	(Currently Reported)	(Currently reported) 'Person-centred care'	(Currently Reported)
<p>'Keeping children out of the hospital'</p> <p>ASH highlights the burden of disease in childhood with a strong emphasis on health equity.</p> <p>There is high variance among priority populations and according to social gradient.</p> <p>Reducing ASH rates requires well integrated, preventive, diagnostic management systems and a well-skilled and resourced workforce.</p>	<p>'Healthy start'</p> <p>A reduction in prevalence of smoking in pregnancy is a priority. This measure will focus attention beyond just maternal smoking to the home and family/whānau environment and will encourage an integrated approach between maternity and primary care.</p>	<p>'Teens make good choices about their health and wellbeing'</p> <p>Early detection and proactive management is vital to youth health, especially to youth mental health.</p> <p>Provision of youth-appropriate services and access by youth is variable.</p>	<p>'Using health resources effectively'</p> <p>A measure of acute demand on secondary care that is amenable to good upstream primary care, discharge planning and transition requiring good communication between primary and secondary care.</p>	<p>'Person-centred care'</p> <p>How people experience health care is a key element of system performance that can be influenced by all parts of the system and the people who provide the care. Integration has not happened until people experience it.</p>	<p>'Early detection and prevention'</p> <p>Deaths under age 75 years ('premature' deaths) from causes classified as amenable to health care (currently a list of 35 causes).</p>
<p>Contributory measures include:</p> <ul style="list-style-type: none"> LMC registration rates New-born enrolment rates Referral rates to LMC Referral rates from LMC to WCTO Breastfeeding rates Core WCTO visits achieved Respiratory initiatives Housing sensitive hospitalisations Immunisations Enrolment with oral health services Caries-free at five years 	<p>Contributory measures include:</p> <ul style="list-style-type: none"> Smokers at first registration with LMC Mothers given cessation support Smoking rates in women 15–40 years Early registration with LMC Early enrolment with PHO WCTO checks rate Mothers smoke-free at two weeks post-natal Breastfeeding rates B4SC rates LMC referral to PHO Newborn enrolment rate Smoking rates 	<p>Contributory measures include:</p> <ul style="list-style-type: none"> Waiting times for youth access to mental health and AOD services Access to and utilisation of Youth One Stop Shop and school-based health services Utilisation and access rates 	<p>Contributory measures include:</p> <ul style="list-style-type: none"> Length of stay Acute readmissions Frequent representations Polypharmacy Flu vaccinations in the elderly CVD risk assessment Smoking rates Admission rates – ASH ED health target 	<p>Contributory measures include:</p> <ul style="list-style-type: none"> E-portal uptake and use DHB inpatient care survey Uptake of primary care patient experience survey Sentinel events in hospital and primary care Access to diagnostics Admissions for drug reactions Quality and safety markers 	<p>Contributory measures include:</p> <ul style="list-style-type: none"> Cancer screening and treatment timeliness Cardiovascular risk management Other chronic disorder management (COPD, diabetes) Injuries (unintentional, self-harm) prevention Smoking rates

Abbreviations

- AOD = alcohol and other drugs
 ASH = ambulatory sensitive hospitalisations
 B4SC = B4 School Check
 COPD = chronic obstructive pulmonary disease
 CVD = cardiovascular disease
 ED = emergency department
 LMC = lead maternity carer
 PHO = primary health organisation
 WCTO = Well Child/Tamariki Ora

The Commission's Window document and Ministry of Health's SLMF are compatible exercises. Both are concerned with assessing and improving the quality of the New Zealand health system. They have similar frameworks for organising information about the quality of care. The individual measures are already very complementary. The scope of the Window can be broadened by inclusion of the system-level measures. The Window already contains a range of well-tested measures (several of which are internationally comparable) that are being used within the SLMF contributory measures library.

While being compatible, the Window and SLMF are distinct exercises reflecting each organisation's statutory role. The Window is a public report that describes a national position. It fulfils the Commission's responsibility 'to provide public reports on the quality and safety of health and disability support services as measured against quality and safety indicators; and any other information that HQSC considers relevant for the purpose of the report'.¹⁷ The SLMF, in line with the Health Strategy's theme of value and high performance, measures the performance of the whole system, and the outcomes for each of the system's component parts. It is a tool to stimulate improvement; (in their 2016–17 Annual Plans, DHBs must commit to provide an improvement plan to meet improvement milestones, set and agreed by their alliance, for each system-level measure).

The Commission's plan to develop the Window to undertake 'deep dives' into specific themes¹⁸ can provide two further benefits for the implementation of the SLMF. First, this work can help to identify or develop more specific measures for services, disease groups and patient groups, which can be used as contributory measures for localities. Second, the process of undertaking a 'deep dive' (ie, considering results by different patient groups and localities, thinking about equity and unwarranted variation, linking measures and using some measures to answer questions raised by others) models the sort of analytic approach implied by the SLMF.

There is a clear link between the Window and SLMF indicator sets. The amenable mortality and patient experience system-level measures are both included within the Window set. Nearly all other measures in the Window fit as contributory measures for the SLMF. Table 3 outlines these links.

17. New Zealand Public Health and Disability Amendment Act 2010 Section 59C.

18. See section 4.



Table 3: Links between SLMF measures and Window measures

SLMF measures	Related Window measures
<ul style="list-style-type: none"> Ambulatory sensitive hospitalisations (ASH) rates for 0–4-year-olds 	<ul style="list-style-type: none"> Childhood immunisation by ethnicity
<ul style="list-style-type: none"> Acute hospital bed-days per capita 	System integration effects: <ul style="list-style-type: none"> Occupied bed-days associated with older people admitted two or more times as an emergency Gout allopurinol Diabetes insulin and metformin HbA1c testing Diabetes and gout hospital admissions Community follow-up of mental health System integration cost measures Polypharmacy measures Adverse events effects: <ul style="list-style-type: none"> In-hospital fractured neck of femur Hand hygiene compliance <i>S aureus</i> rates Postoperative sepsis and deep-vein thrombosis Adverse events cost measures
<ul style="list-style-type: none"> Patient experience of care 	<ul style="list-style-type: none"> Patient experience domain scores Patient experience question scores
<ul style="list-style-type: none"> Amenable mortality 	<ul style="list-style-type: none"> Amenable mortality DALYs DALY against per capita expenditure
<ul style="list-style-type: none"> Youth access to and utilisation of youth-appropriate health services – developmental 	
<ul style="list-style-type: none"> Proportion of newborns who live in a smokefree household 	
	<ul style="list-style-type: none"> Access to health care by income group

Equity is addressed in the SLMF in a similar way to the Window, in that all measures are reported stratified by ethnicity and deprivation (where data allow). Also, the measures have been chosen to reflect areas of health outcome where there are known equity gaps (such as amenable mortality and childhood ASH rate). As data become available, other groups disadvantaged in health outcomes, such as those with intellectual disability or mental health problems, will be included in SLMF reporting, particularly for contributory measures.

4 Future development of the Window

The Window is a statutory responsibility for the Commission

The Window helps the Commission to fulfil its statutory responsibility to provide public reports on the quality and safety of health and disability support services. It is designed to give an accessible view of the quality of our health system.

Getting to this point has taken a number of years

The Window is the culmination of long-standing work the Commission has been doing since its inception to develop appropriate measures of quality of the whole health system. To do this, we had to agree a definition of quality; identify or develop measures which could be derived from available data; agree ways of presenting these results; and interpret what they meant.

The Window has a particular focus on describing quality of care, and does not include broader issues of public health, which are more fully covered in the Ministry of *Health's Health and Independence Report*.¹⁹ Our definition of quality is developed from the definition first made by the Institute of Medicine.²⁰ The framework divides quality into the following categories:

- safety
- patient experience
- effectiveness
- equity
- value
- access.

Advised by experts from across New Zealand, including consumers, we populated our framework with a range of measures, publishing these from 2012 on our website. Over time, we have been able to include new measures, which have been collected for the first time. We have also been able to find international comparators and include new measures from our Atlas of Healthcare Variation.

To date, we have followed a rule of only using pre-existing and currently published measures. The reason for and advantages of this are three-fold:

1. The measures have some provenance. Often they will have been through consultative processes, or had expert groups involved in their design.
2. The debate about the measures concerns how they should be interpreted and acted upon rather than their construction and data sources.
3. Some degree of international comparison is usually possible. In some cases there is widespread use of the measures, but for nearly all some comparisons are possible.

However, this approach means potentially excellent measures have been excluded, or important topics not considered, as appropriate measures are not available. Furthermore, annual publication runs up against the problem that many of the measures change relatively slowly. Only around one-third of the measures published in the first Window show significant change or otherwise noteworthy results this time round.

19. Ministry of Health. 2015. *Health and Independence Report 2015*. Wellington: Ministry of Health. URL: www.health.govt.nz/system/files/documents/publications/health-and-independence-report-2015-oct15.pdf (accessed 26 April 2016).

20. See <https://cahps.ahrq.gov/consumer-reporting/talkingquality/create/sixdomains.html>.



How big a Window do we want?

Several countries are seeking to produce reports on the quality, or some aspect of quality, of their health system. The different approaches they have adopted point to a fundamental question: how comprehensive do we want our report to be?

One approach is to seek to be very comprehensive in a description of quality – effectively, to provide a compendium of potentially useful measures. A good example of this is the bi-annual report of the Netherlands.²¹ This is an excellent reference source, with a comprehensive categorisation of both quality and health care. Its breadth of coverage, however, creates a size (more than 150 indicators reported over 350 pages) that may intimidate the non-expert user. In contrast, the nearest US equivalent to a national report²² is, like the Window, selective in which measures it includes. This creates an easier document to digest, but then raises the issue of how well the inevitably partial sets of measures reflect the whole of the system.

This tension between comprehensiveness and brevity, and the vexed question of how representative any set of measures are of a whole system, lies at the heart of plans for developing future editions of the Window.

How big a view do we wish the Window to take?

To date, the Window has concentrated its measures largely on health services alone, although these cover both primary and secondary care. It has concentrated less on mental health, and not covered aged residential care and disability services.

We would like to extend our view over time, recognising the increasing complexity and integrated nature of health care requires us to take a broader view. The development of Statistics New Zealand's Integrated Data Structure²³ and the adoption of interRAI²⁴ by New Zealand's aged residential care facilities provides new data sources and may support this ambition.

A mixed approach to future Windows

We propose to continue to update the current core set of measures covered in the Window, but supplement this with more detailed explorations into specific services, issues or patient groups. These 'deeper dives' will allow us to explore important issues in greater depth, identify trends of concern or encouragement, add to our detailed knowledge about quality in specific areas, develop measures where none exist and, ultimately, expand the range of measures we include into the core set of indicators published. The 2017 Window will present this deeper dive approach for the first time.

We also propose a more systematic approach to international comparison. At the moment, this is somewhat opportunistic, drawing on what is publicly available through a range of different reports, published for different purposes. We are experimenting with different approaches to improve this. First, we are looking in greater depth about how we can use OECD data, which is becoming more comprehensive. Second, we have started to talk directly with individual countries about the possibility of benchmarking data. We will seek to progress both these approaches over the coming year.

21. See www.gezondheidszorgbalans.nl/English.

22. See www.ahrq.gov/research/findings/nhqrd/index.html.

23. See www.stats.govt.nz/browse_for_stats/snapshots-of-nz/integrated-data-infrastructure.aspx.

24. See <http://interrai.co.nz/>.

5 Other updated data

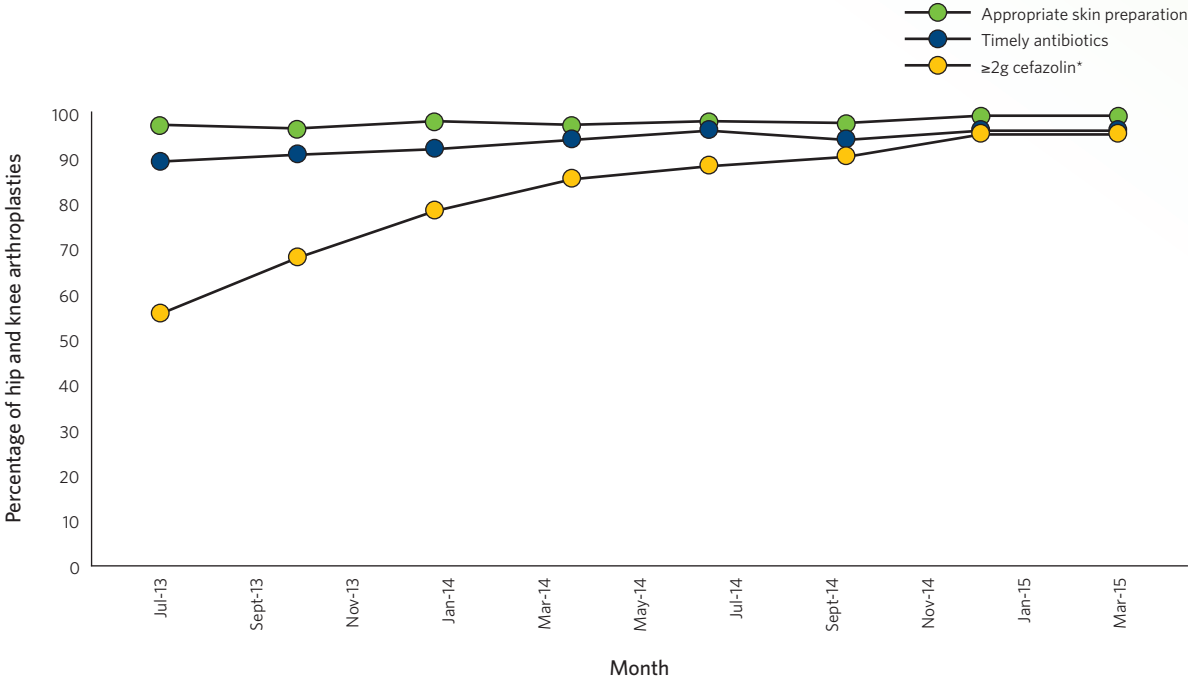
5.1 Safety

Hand hygiene compliance is low by international standards.

Country	%	LCI	UCI	Time period
New Zealand	80.9	80.5	81.3	July–Oct 2015
Australia	83.2	83.1	83.3	July–Oct 2015
Scotland	96	95	97	September 2013
Canada	88 before patient contact 92 after patient contact			Oct–Dec 2015

LCI = lower 95% confidence interval
UCI = upper 95% confidence interval

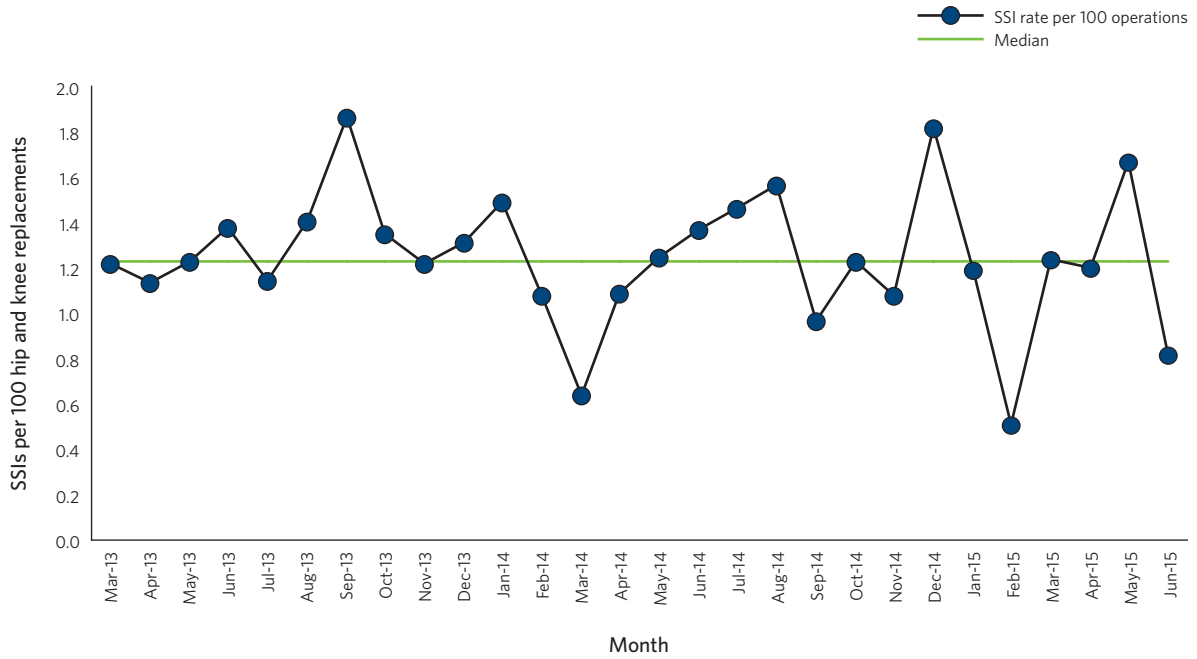
Surgical site infection (SSI) good practice has improved further in 2015.



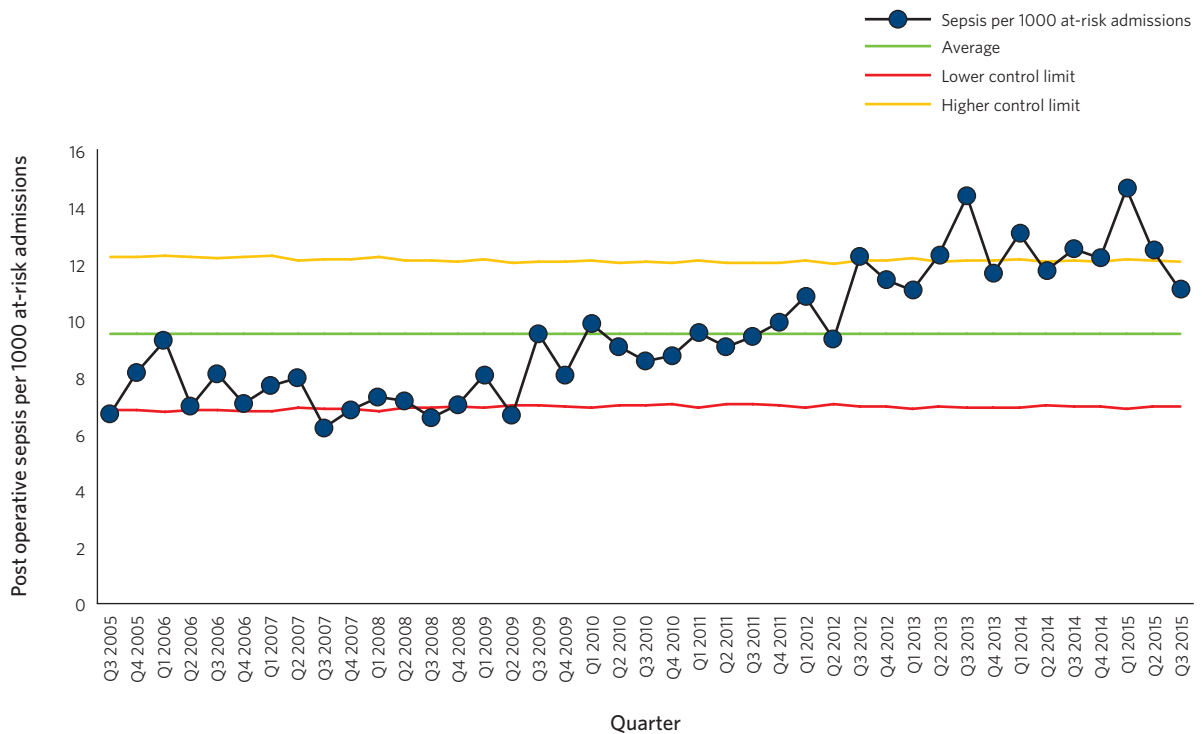
* ≥2g cefazolin is the preferred antibiotic.



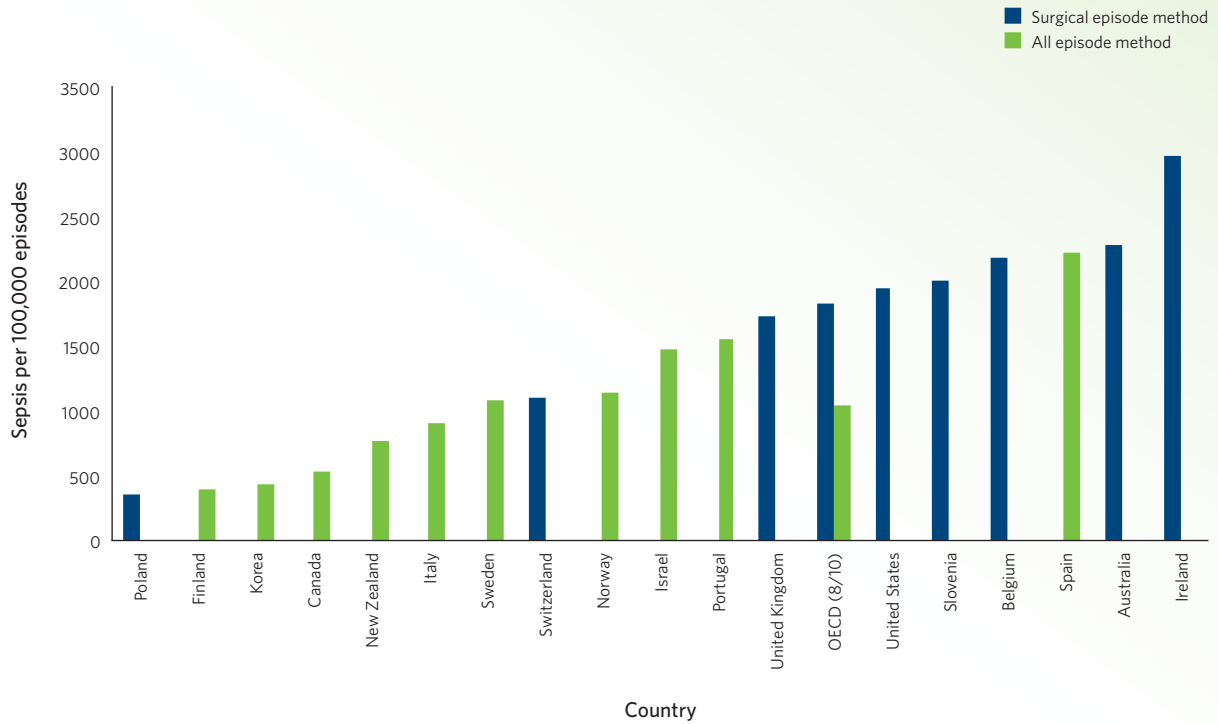
The rates of SSIs per 100 hip and knee replacements has remained constant.



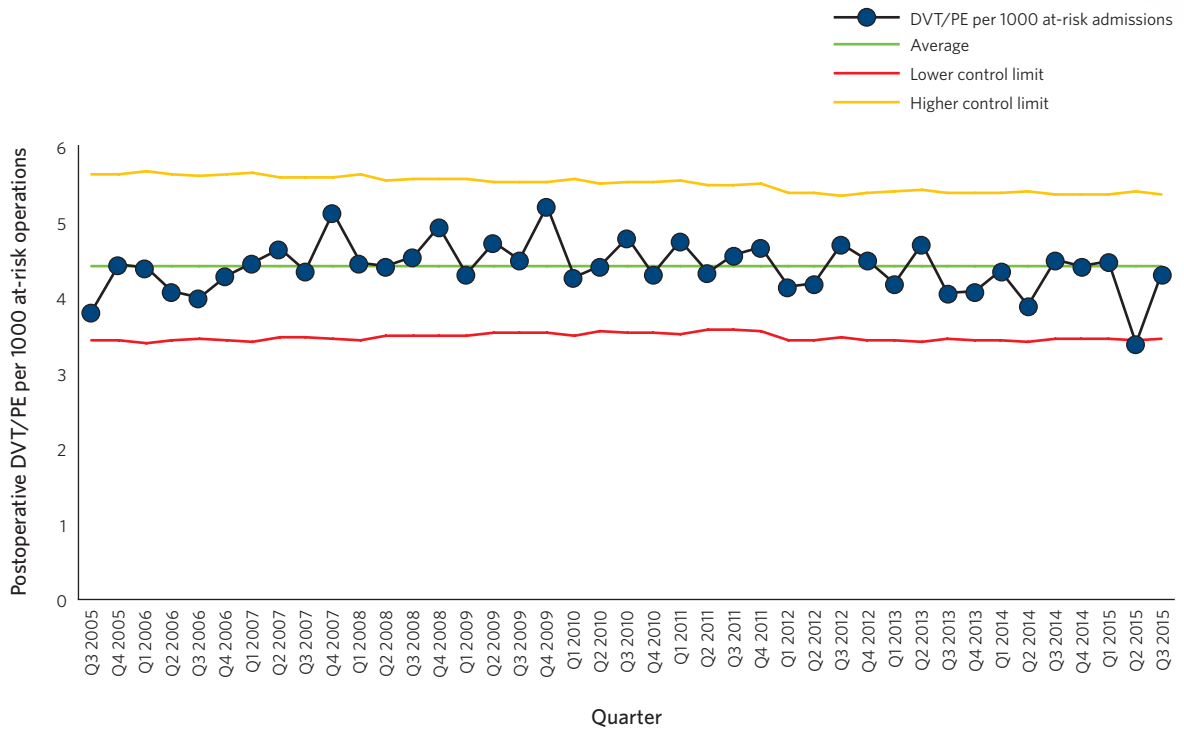
Postoperative sepsis per 1000 at-risk operations has stabilised over the last two years following a long period of increase.



The OECD measured sepsis rates following abdominal surgery in 2013. New Zealand appeared to have a relatively low rate internationally for this measure.

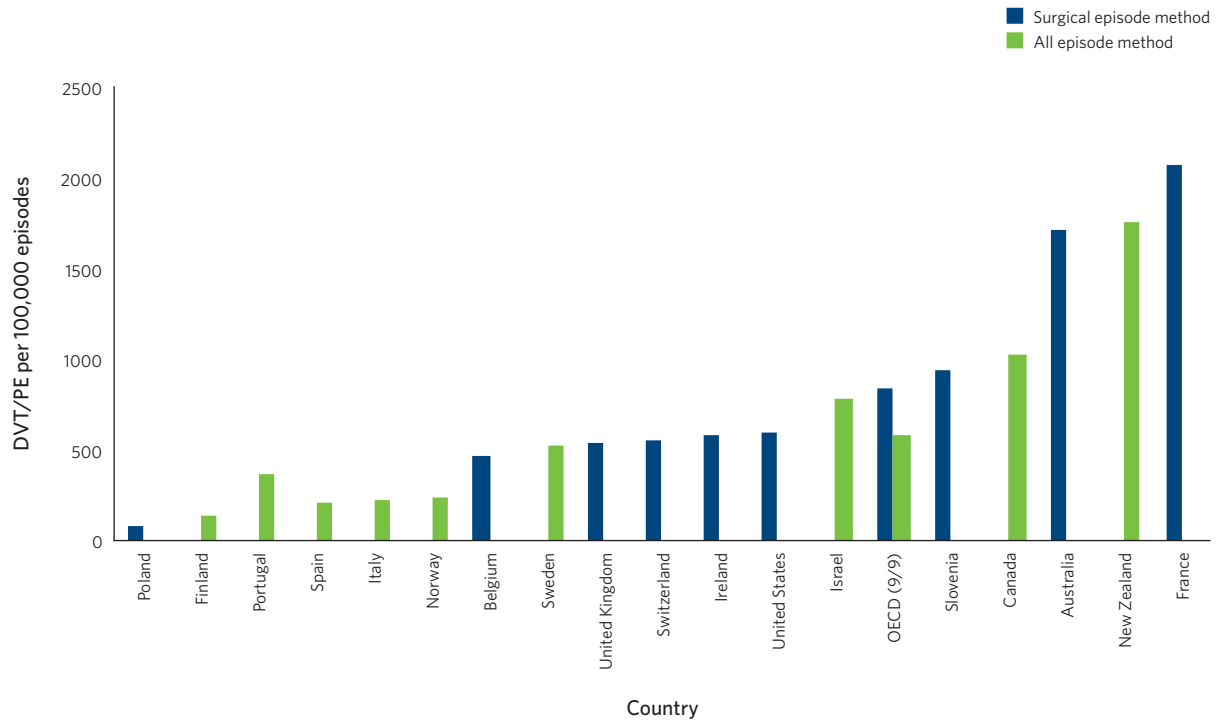


The rates for postoperative DVT/PE per 1000 at-risk operations have remained stable.



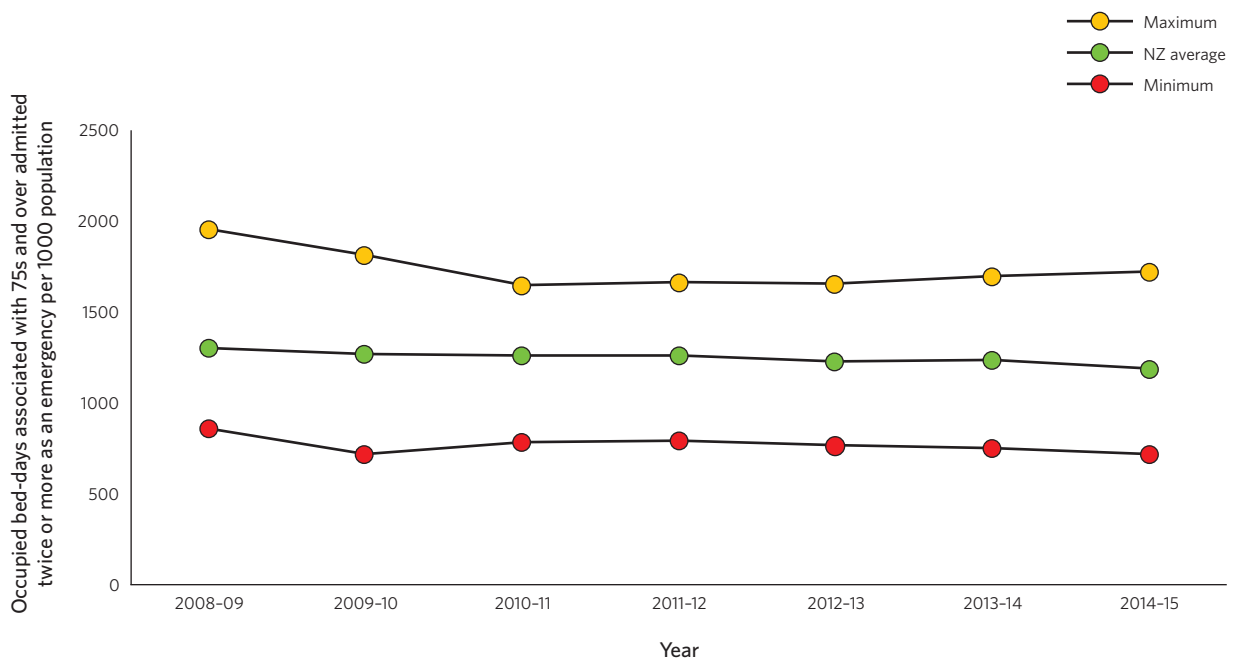


The OECD measured DVT/PE following hip and knee surgery in 2013. New Zealand appeared to have a relatively high rate of DVT/PE. However, for this and postoperative sepsis, international comparisons are notoriously complex. The OECD itself states: 'Caution is needed in interpreting the extent to which these indicators accurately reflect international difference in patient safety rather than differences in the way that countries report, code and calculate rates of adverse events.'

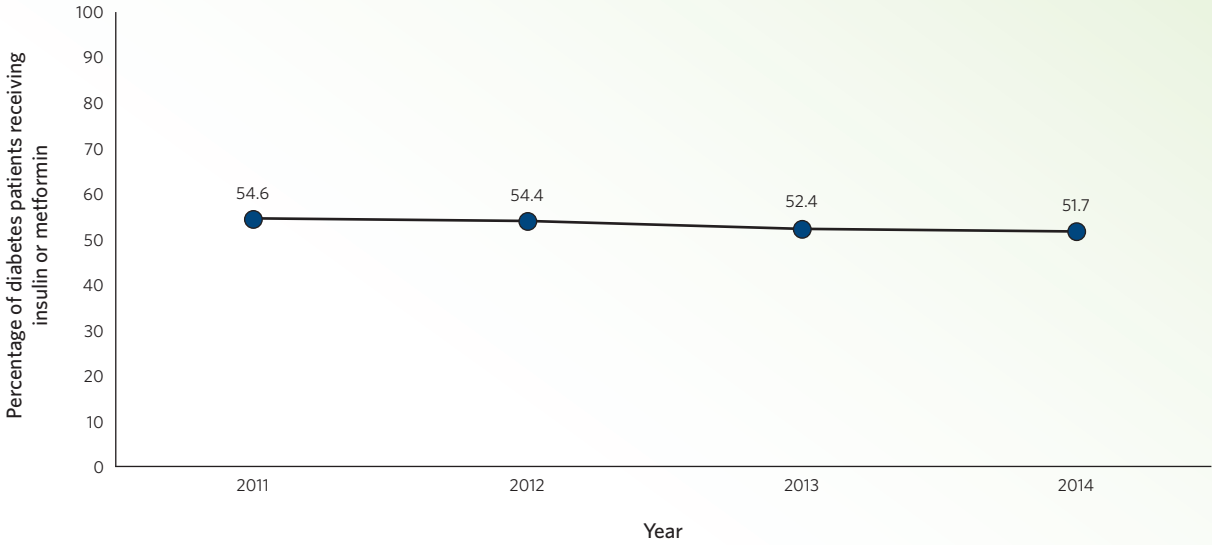


5.2 Effectiveness

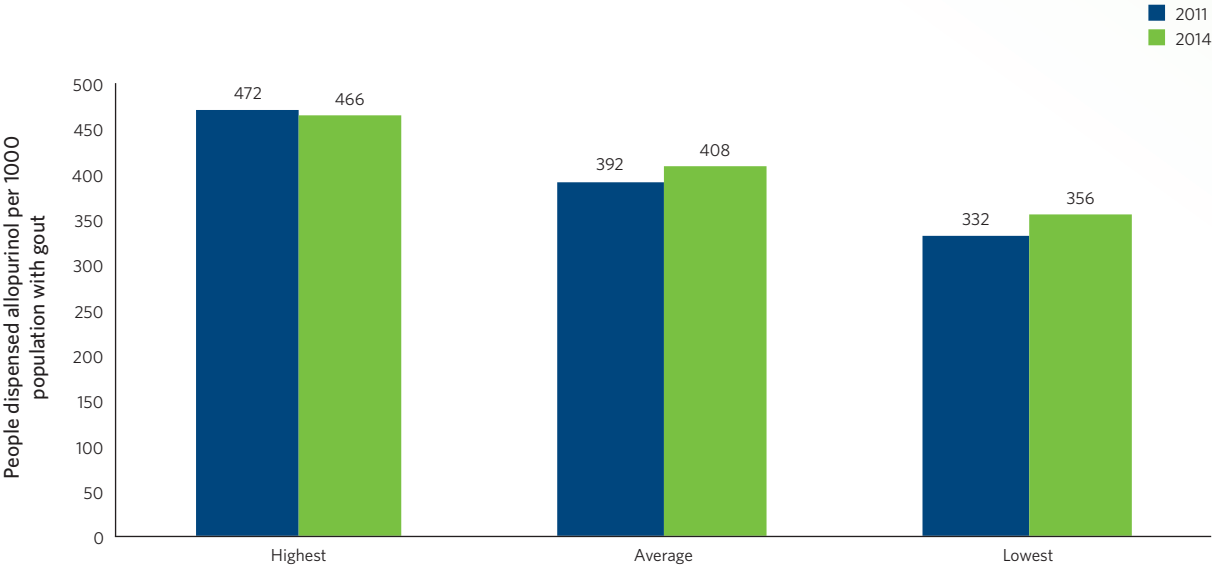
Frequent use of acute hospital services by older people is measured by occupied bed-days associated with people aged 75+ admitted twice or more as an emergency per 1000 population. Rates have been declining continuously since 2011-12. However, the variation between different parts of the country has increased slightly.



The percentage of people with diabetes who receive insulin or metformin has declined slightly.



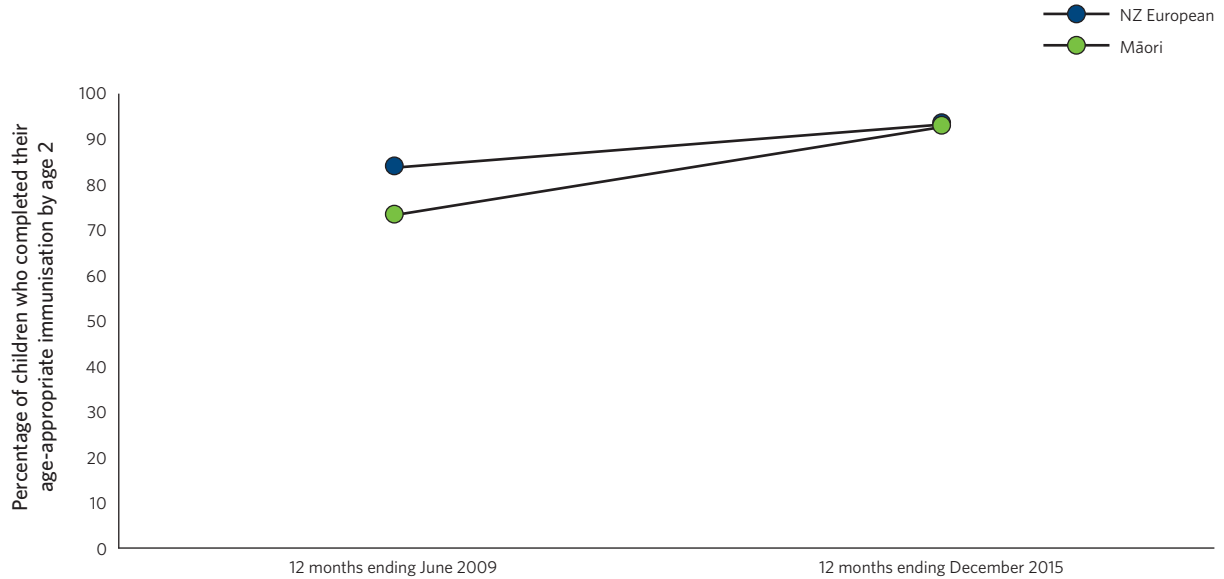
There has been a small but significant increase in allopurinol use to control gout.





5.3 Equity

Not only has immunisation at 24 months increased dramatically over the last five years, but ethnic differences have also been eliminated.

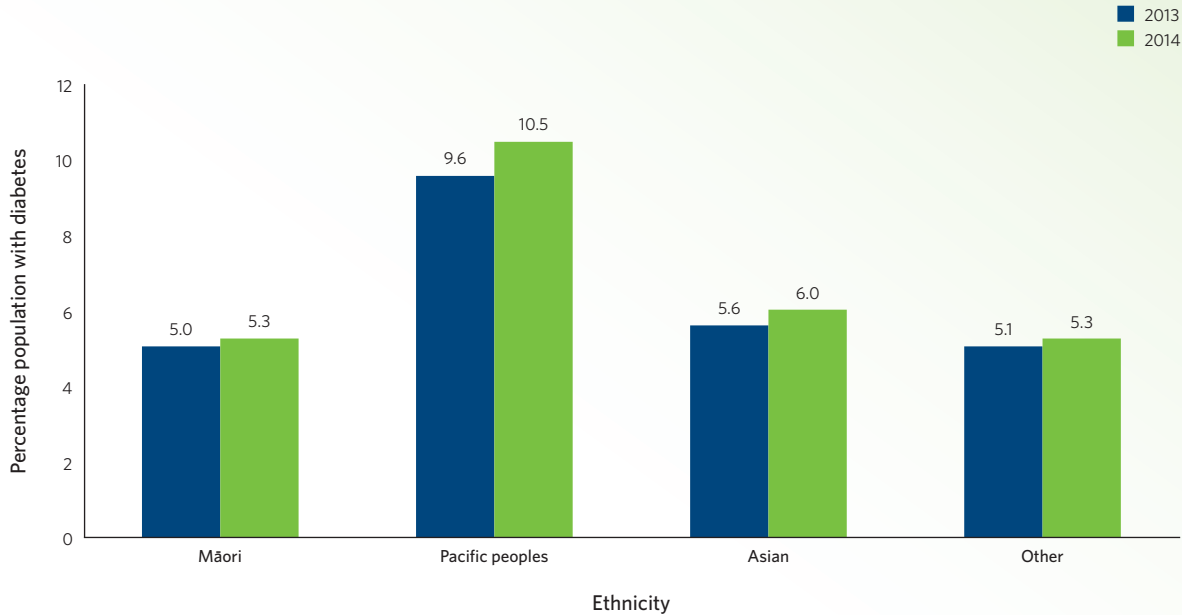


In this, we show a similar pattern to Australia, but the USA has not consistently achieved this.

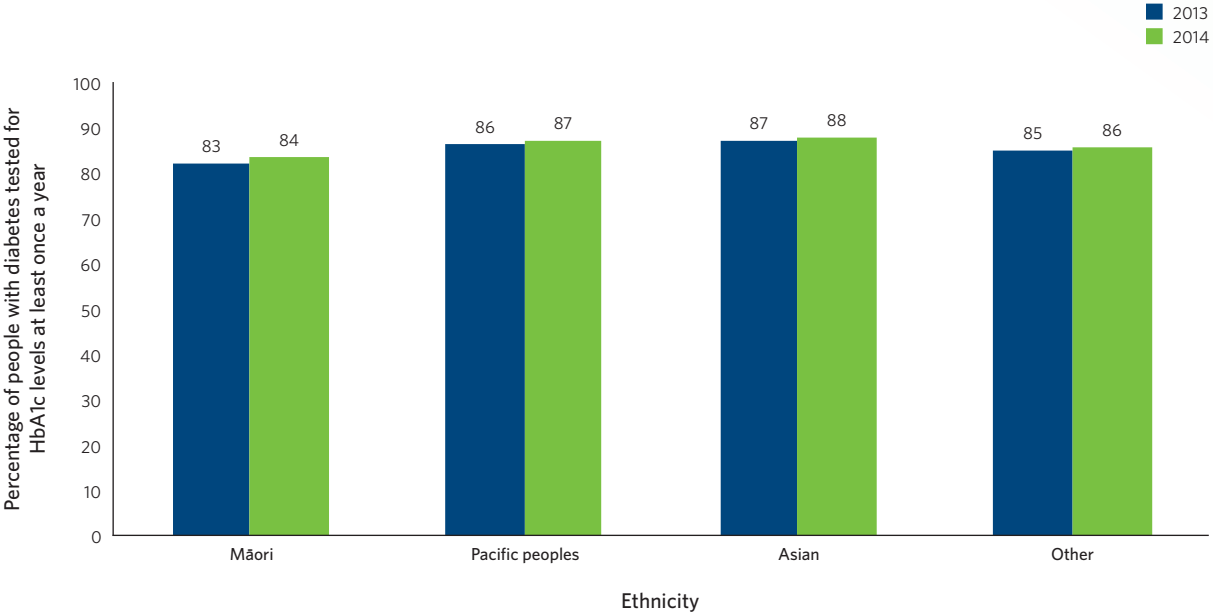
	Majority population (%)	Indigenous/Minority population (%)	Year
New Zealand	93.4	92.7	2015
Australia	93	92	2011-12
USA – MMR	91.1	94.8	2011
USA – DTP	85	72.7	2011
USA – polio	93.9	88.1	2011
Canada	N/A	N/A	

DPT = diphtheria, pertussis (whooping cough) and tetanus
MMR = measles, mumps and rubella

Pacific peoples have nearly twice the diabetes prevalence of other ethnic groups. However, prevalence is increasing in all ethnic groups.



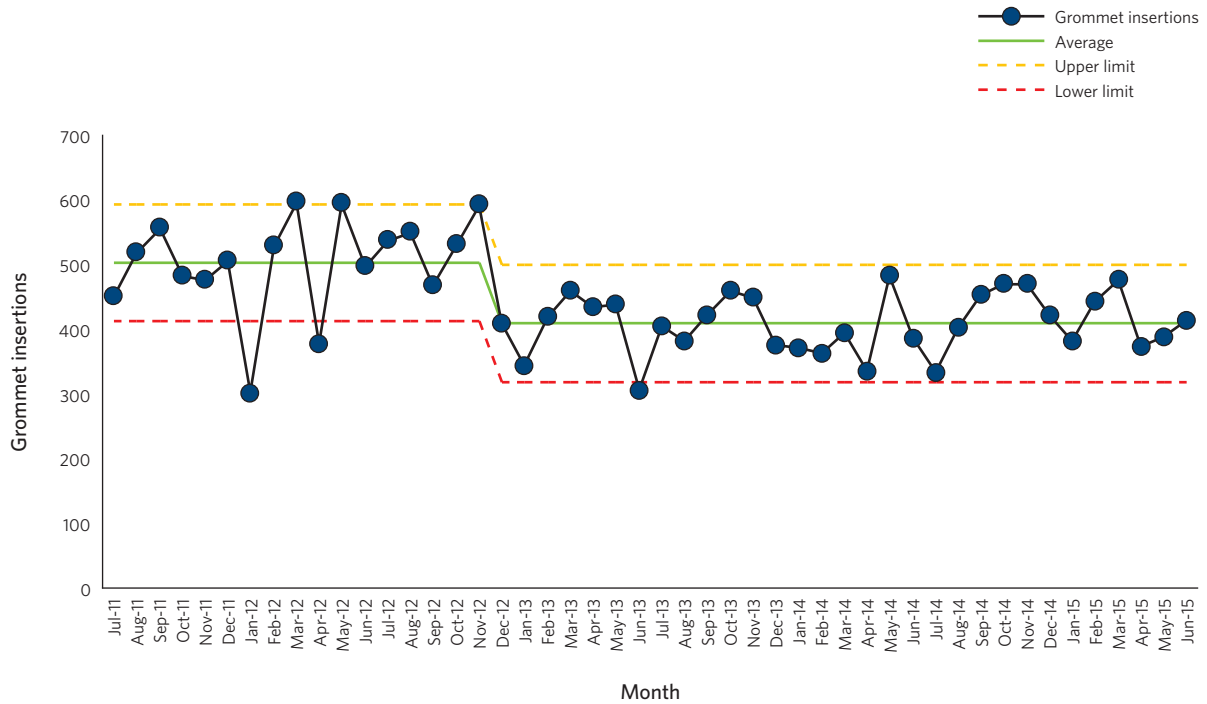
There is very little ethnic disparity in HbA1c testing in people with diabetes.





5.4 Value

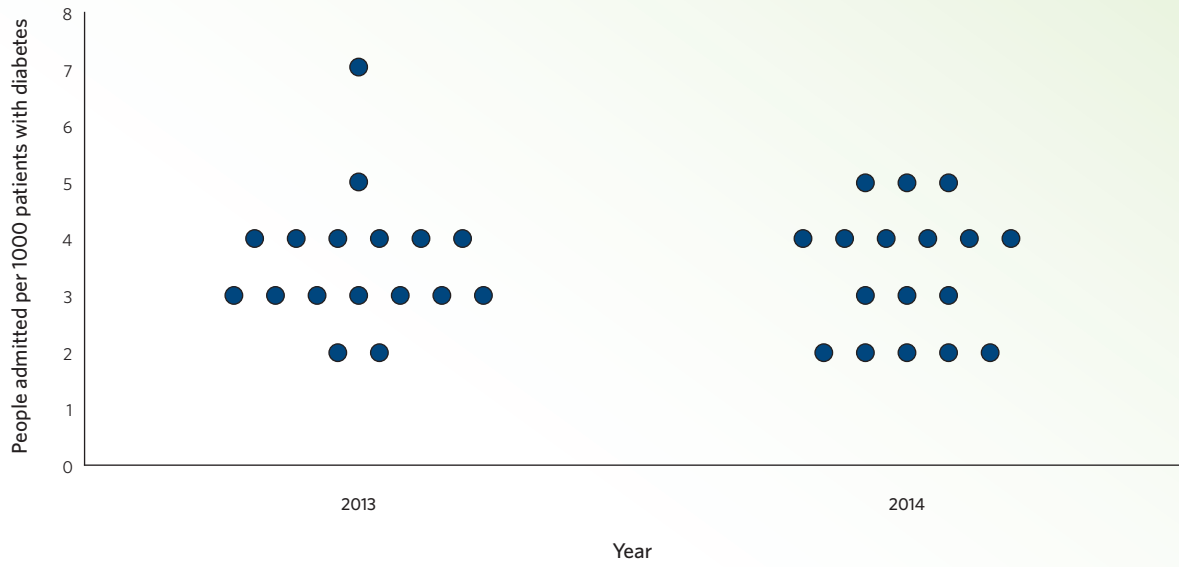
Ventilation tube (grommet) insertions have remained at a lower level since 2013.



Costs associated with frequently admitted older patients have reduced since 2008–09, but reduction in variation could save more.

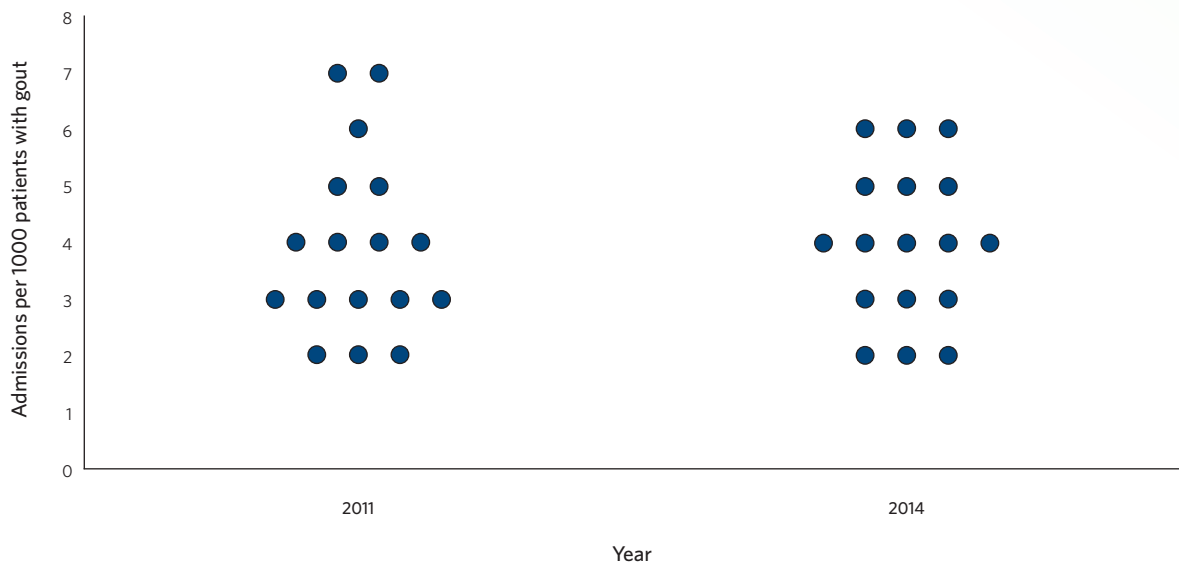
	2008–09	2014–15
Bed-days associated with older people admitted acutely more than once in the year	378	344
Cost of bed-days \$m	291	265
Potential avoidable bed-days if all DHBs in line with lowest DHB ('000)		136
Avoidable cost \$m		105
Potential avoidable bed-days if all DHBs in line with lowest quartile ('000)		71
Avoidable cost \$m		55

Admissions for diabetic ketoacidosis remain varied around the country.



(Each dot represents a DHB.)

Admissions for gout remain varied around the country.



(Each dot represents a DHB.)

