

Diabetes and Cardiovascular Disease

Quality Improvement Plan

2008

Diabetes and
**Cardiovascular
Disease**
Quality Improvement Plan

**Whaia te iti Kahurangi
Seek you the highest peaks**

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MANATŪ HAUORA

Foreword

Mortality from cardiovascular disease (CVD) has decreased appreciably in the last 25 years, but the spectrum of CVD remains the leading cause of death in New Zealand and accounts for much serious morbidity. The incidence of type 1 diabetes is increasing and the prevalence of type 2 diabetes has risen to what has been described as epidemic proportions. The situation is similar to that in other relatively affluent societies and many developing countries but, in New Zealand, rates are especially high among those of Māori, Pacific and South Asian descent.

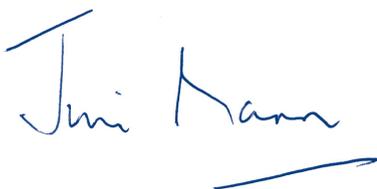
There is some good news! As you read the report, you will appreciate that the quality of care for diabetes and CVD is improving. Indeed, the best of diabetes and CVD care is very good and equal to international benchmarks. There is also evidence that the long-recognised inequalities in care are reducing. However, my personal experience, the experience of health professionals throughout the country and, most importantly, reports from consumers clearly indicate that the picture of improvement is patchy.

Internationally, all countries are struggling with the burden of chronic disease. Early detection needs to be followed by continuing surveillance, appropriate advice and support, availability of appropriate medications and services available to treat acute episodes and complications. An essential co-requisite to risk reduction and disease management is for such services to be provided in an environment that encourages or facilitates healthy lifestyles. Thus the continuum of care straddles public health, primary care and other care settings. A continuous quality improvement cycle is essential to make the necessary progressive improvements.

Determining priorities and ensuring the best use of available resources represent a challenge to governments, those advising them and those responsible for service delivery at the local level. However, reducing diabetes and CVD in our population as a whole and reducing health status inequalities between ethnic groups and among regions are widely accepted priorities in the New Zealand Health Strategy (Minister of Health 2000).

Further improvement in quality of services for diabetes and CVD requires a framework to bring together clinical health management and consumer expertise to examine existing data relating to performance and outcomes and to develop practical recommendations. With the support of the Minister of Health, the Ministry of Health has established an Expert Advisory Group (EAG) to provide advice on diabetes and cardiovascular disease to the Ministry and District Health Boards (DHBs). The advice takes the form of a Quality Improvement Plan, which describes the recommendations that have been prioritised and agreed to by the Ministry and DHBs. This Plan emphasises those aspects that the EAG considers to be of greatest importance and to require immediate implementation. It will be reviewed regularly to take into account new information and possibly set new priorities.

I am grateful for the enthusiasm and effort of members of the EAG and Ministry officials as well as those who have been consulted. All are committed to improving the quality of care and reducing inequalities.



Professor Jim Mann
Chair of the Expert Advisory Group
Diabetes and Cardiovascular Disease Quality Improvement Plan

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Executive Summary

Age-adjusted death rates from cardiovascular disease (CVD) have decreased considerably in New Zealand during the past 30 years. Nevertheless, CVD remains the leading cause of death in New Zealand. Our population is ageing and the prevalence of risk factors such as obesity and diabetes is increasing. Therefore, the total number of cardiovascular events and the total burden of disease are projected to increase. The prevalence of both type 2 and type 1 diabetes has been rapidly rising, with an associated increased need for diabetes-related services.

Within these overall trends are inequalities in the risk of disease, access to, and the quality of care. These result from a complex mix of socioeconomic, ethnic, geographic and service delivery factors. The health system needs to measure, monitor and act to reduce disparities and help people manage their care.

The New Zealand Health Strategy (Minister of Health 2000) recognises the importance of reducing these inequalities to achieve priority health objectives, which include reducing the incidence and impact of CVD and diabetes. Realisation of these and other health-related objectives will require a vigorous and balanced approach across the continuum of population health and clinical care. Environmental change and population health promotion are crucial for improved disease prevention. Modern evidence-based management of CVD and diabetes and those at high risk can offer large benefits for many individuals and communities, providing quality standards can be met and equitable access provided.

The Quality Improvement Plan establishes a framework for continuous quality improvement of clinical services for CVD and diabetes. Expert advice is provided to the Ministry of Health and District Health Boards in terms of specific practical recommendations and actions in priority areas across different clinical care settings. A set of indicators relevant to the priority areas identified is included for all recommendations and actions. Areas considered to be of greatest importance are prioritised for immediate action. There is a strong emphasis on the need for adequate systems and processes to be established in many areas to ensure continuous improvement. This will require pilot programmes, collaboration and the sharing of information.

Initial priority areas

Cardiovascular and glycaemic risk assessment and management

Cardiovascular events (acute coronary syndrome, stroke and TIA):

- patient and treatment delays
- clinical assessment and risk stratification
- revascularisation
- discharge medications
- rehabilitation.

Diabetes:

- kidney disease, from early detection onwards
- foot disease, from early detection to high-risk foot
- diabetic retinopathy, from retinal screening onwards
- improving hospital inpatient services
- type 1 diabetes: initially in children and young people.

During the development of the Quality Improvement Plan other issues were identified for further consideration but not specifically prioritised. These include workforce development, diabetes self-management education, diabetes and pregnancy, type 1 diabetes in adults, continuity with disability services and enhanced community knowledge.

The Quality Improvement Plan will be distributed to all District Health Boards for agreement on priorities. A detailed implementation plan will then be developed to ensure recommendations and actions can be progressed effectively and efficiently in a staged fashion.

Overview

The development of a Quality Improvement Plan (QIP) for cardiovascular disease (CVD) and diabetes will support collaboration between District Health Boards (DHBs) and others in the health sector to improve outcomes in these priority conditions.

Many health services are appropriately provided in different ways at local and DHB levels, consistent with local resources and planning. However, the QIP supports a national framework and sets standards to ensure that the overall quality of care and access for people with CVD or diabetes do not depend on socioeconomic status, ethnicity or geographic location.

Implementing this plan will require leadership by senior clinicians and managers within DHBs, primary health organisations (PHOs) and non-governmental organisations. It will also require a commitment to a process of continuous improvement to improve standards of care for all people, and to reduce inequalities.

Scope

The QIP focuses on the management of individuals with CVD or diabetes and those at high risk. It should be considered as complementary to population health initiatives. Reduction of the incidence and impact of CVD and diabetes will require an integrated and balanced approach across the health continuum from population health to clinical care.

The QIP comprises:

- a review of the CVD and diabetes outcome data regionally, nationally and, where appropriate, internationally (see the final ‘Data Supplements’ section)
- an analysis of the data and identification of quality improvement priority areas in relation to each condition.

The scope of the QIP does not extend to electives (which are nationally planned by the National Waiting Times Project) or public health initiatives included in Healthy Eating – Healthy Action (Ministry of Health 2003).

Aims

The QIP aims to provide DHBs and the health sector with a three-year plan to implement priorities that should be nationally agreed and co-ordinated in order to improve health outcomes and the quality of care for people with CVD and/or diabetes.

The QIP will be reviewed at intervals to coincide with the annual planning cycles of the Ministry of Health (the Ministry) and DHBs. The Ministry will approve the updates after consultation with DHBs and the health sector.

It is envisaged that accountability for maintaining the QIP will be progressively devolved to the health sector within three years.

The QIP and Māori and Pacific peoples

Currently, there are significant disparities between Māori and non Māori in disease rates and outcomes for CVD and type 2 diabetes. The QIP has been designed to reflect the rights and needs of Māori with CVD and diabetes – this includes the right to good health and the right to quality health care.

Priorities for Māori within this document include:

- action to reduce inequalities in risk, incidence and outcomes of CVD and diabetes
- analyses of access and quality issues in service delivery
- collaboration on strategies to improve current services and/or develop innovative models with Māori
- monitoring the effectiveness of care and outcomes by ethnicity.

Although outside the scope of this document, health services must acknowledge and address the broader, contextual issues for Māori including structural and system barriers when implementing the actions outlined in the QIP.

Finally, disparities in CVD and diabetes exist and are becoming more evident for other ethnicities, specifically Pacific and Asian peoples. Inequalities should not be accepted and urgent action is also required to reduce the burden of disease for these population groups.

Context

The New Zealand Health Strategy (Minister of Health 2000) emphasises improving population health outcomes and reducing inequalities in health status between Māori and Pacific peoples and other New Zealanders. It recognises that unequal health outcomes can largely be attributed to the disproportionate burden imposed by chronic conditions, especially CVD and diabetes. The QIP aligns with the following population health objectives in the NZHS:

- reduce smoking
- improve nutrition
- increase the level of physical activity
- reduce obesity
- reduce the incidence and impact of cardiovascular disease
- reduce the incidence and impact of diabetes.

The QIP will also co-ordinate with the following work programmes to ensure that recommendations are consistent and to avoid duplication:

- Healthy Eating – Healthy Action (nutrition, physical activity and obesity)
- national programmes for tobacco control
- National Waiting Times Project (for elective hospital-based interventions)
- implementation of the Primary Health Care Strategy and in particular the PHO Performance Management Programme
- Service Planning for New Health Intervention Assessment (SPNIA).

Complementary to these population strategies is a group of clinical best-practice guidelines related to the management of CVD risk, type 2 diabetes, acute coronary syndromes, stroke and also cardiac rehabilitation. These guidelines collectively provide evidence-based recommendations for the management of people at high risk of CVD and those with clinically manifest disease. Currency of these guidelines, and the national resources required to implement them effectively, will be reviewed regularly using the QIP process.

There are well-recognised inequalities in access to good quality health care, and in health outcomes. These inequalities are most marked for Māori and Pacific peoples, but are increasingly also recognised in relation to diabetes and CVD outcomes in people from South Asia. The inequalities are outlined by ethnicity in the final 'Data Supplements' section, and have been considered as an integral part of each of the recommended priorities. Reducing inequalities must be an integral part of any plan to improve overall CVD and diabetes outcomes in New Zealand.

Why quality?

Quality is the degree to which the services for individuals or populations increase the likelihood of desired health outcomes and/or increase the participation and independence of people with a disability, and are consistent with current professional knowledge. Performance indicators and clinical audit alone are of very limited value without close linkages and feedback to improve relevant systems and processes. In addition to such linkages and feedback, achieving quality improvement requires a commitment to a highly collaborative and constructive team approach that involves all stakeholders. Thus the QIP emphasises the importance of a continuous quality improvement cycle to make the necessary progressive improvements.

The Ministry of Health's key document on improving quality, *Improving Quality (IQ): A systems approach for the New Zealand health and disability sector* (Minister of Health 2003), underlines the importance of quality. It defines improving quality as a commitment to supporting continuous quality improvement by each person who works within the system, by the people who are cared for and supported by the system, and by the system itself.

Process

In April 2006, the then-Minister of Health, the Hon Pete Hodgson, tasked the Ministry of Health with developing a national quality improvement plan for CVD and diabetes. The Ministry sought nominations from national organisations to establish an Expert Advisory Group (EAG) with the best available representation from DHB management, clinical staff and consumers.

The EAG has guided the analysis of national data, and developed a first priority set of practical recommendations to improve outcomes. These recommendations have been refined with input from the wider health sector. This report is the result.

This report is being distributed to all DHBs for their information. All DHBs are asked to indicate specifically which recommendations in this report they agree are priorities that should be progressively included in a national QIP. Input from the wider health sector may also continue to be sought through workshops or specific surveys. The Ministry, in association with the EAG and stakeholders, will then develop a detailed QIP implementation plan so that the agreed priorities are implemented effectively and efficiently.

Cardiovascular Disease

Introduction

Cardiovascular disease (CVD) is a term that encompasses all diseases of the heart and circulation, including stroke. CVD is the leading cause of death in New Zealand, accounting for 40 percent of all deaths in 2001. Of these deaths, 22 percent were due to coronary heart disease, 10 percent to stroke and 8 percent to other vascular causes. Many of these deaths are premature and preventable.

Age-adjusted mortality from coronary heart disease and stroke has declined considerably in New Zealand during the past 30 years; however, the decline has been steeper in Australia and the United States. Moreover, projecting New Zealand's coronary heart disease mortality trends ahead to 2015, the previous decline appears to be levelling off as a possible cohort effect¹ emerges, which is likely to be related to the epidemics of obesity and diabetes.

Large inequalities in risk, outcomes and access to care exist for CVD in New Zealand, as they do for health in general. These inequalities reflect a complex mix of socioeconomic, ethnic and access-related factors. During middle age, the most socioeconomically deprived people (highest quintile) have a CVD mortality three times higher than the most affluent. Coronary heart disease mortality is three to four times higher in Māori than in the general population; for Pacific peoples, mortality is midway between these two groups. Pacific peoples have the highest mortality and hospital discharge rate for stroke. The chance of being dependent one year following a stroke is three times higher among Māori and Pacific peoples than among New Zealand Europeans. Future projections point to a further increase in these relative differences, with an increasing CVD burden falling on Māori and Pacific peoples.

Improving the cardiovascular health of all New Zealanders and reducing inequalities will require a vigorous and balanced approach across the continuum of population health and clinical care. Environmental change and population health promotion are crucial for improved disease prevention. Modern management of CVD and those at high risk can offer substantial benefits for individuals, providing quality standards can be met and equitable access provided.

Coronary heart disease

Coronary heart disease (CHD) can present clinically as angina, myocardial infarction (MI) or sudden death. Acute clinical presentations, which represent a significant burden of disease and place a heavy demand on local and regional clinical services, are now designated acute coronary syndromes (ACS). These acute presentations include unstable angina (UA), ST elevation MI (STEMI) and non ST elevation MI (non-STEMI). This diagnostic classification is important to define eligibility for specific management pathways. Appropriate investigation and intervention for best outcomes require specialist cardiological staff and facilities. In the New Zealand context, close regional co-operation is crucial to ensure that patients outside main centres have access to appropriate specialist care in a timely fashion.

There are several opportunities to reduce the incidence of ACS and improve outcomes after ACS. The options for reducing the incidence of ACS include various population health approaches and systematic implementation of the CVD risk assessment and management guidelines through

1 Here, cohort effect describes variations in diabetes or CVD prevalence among individuals born at a similar time. These individuals may also experience a similar environment in terms of nutrition and physical activity over their lifetime.

primary care. The options for improving outcomes after ACS include pre-hospital care, hospital management, cardiac rehabilitation and long-term secondary prevention. Minimising patient- and system-related delays can markedly improve the potential for successful acute reperfusion to limit myocardial damage. Acute inpatient assessment and risk stratification will guide early clinical decisions related to the most appropriate specific interventions and medical treatments. Cardiac rehabilitation and integration of long-term management through primary care can ensure maximum benefit from secondary preventive measures and substantially reduce the risk of recurrence.

Review of national data for laboratory tests, ACS admissions, intervention rates and outcomes shows some favourable trends but also indicates significant ethnic and regional inequalities (refer to the final 'Data Supplements' section). These inequalities, which reflect a complex mix of contributing factors and barriers to care, present the foremost challenge for quality improvement.

Stroke

A stroke is a devastating event with the potential to impair cognition, motor and sensory function, communication, mood and functional independence.

After the age of 45 years, individuals have a one in four life chance of a stroke. The risk of stroke increases markedly with age – half occur in those aged over 75 years. However, a quarter of all strokes occur in those under the age of 65 years and half in those over 75 years. Stroke is the most common cause of adult disability in New Zealand and imposes a significant burden on carers. Approximately one-third of people who have a stroke will die within the first year of the event, one-third will have a significant residual disability and one-third will make a good recovery.

Improvements in prevention and management can significantly ameliorate the predicted escalating absolute burden of stroke due to population ageing. There is overwhelming evidence that 'organised stroke services' significantly reduce post-event death and disability (long term), reduce length of stay and reduce cost (mainly through less institutional care), as compared with conventional care on general wards. The clearest evidence comes from inpatient units that can provide several weeks of rehabilitation. Mobile stroke advisory teams, now operating in some New Zealand hospitals, have not been associated with improved outcomes.

Currently only about three-quarters of stroke patients are admitted to hospital, often not as an emergency. This shortfall in hospital treatment for the remaining quarter is compounded by the widespread lack of community stroke services. Fewer than half of all hospital services meet basic clinical guideline recommendations and even fewer are part of an organised stroke service. This situation presents a major quality opportunity to develop hospital services to achieve better outcomes.

Over recent years emerging evidence has been translated into more defined clinical guidelines. In particular, these guidelines have related to: the organisation of care through a skilled team approach; the role of acute care in protecting brain function; the importance of secondary stroke prevention as part of sub-acute care; prevention of complications through optimising or maintaining physical conditioning; rehabilitation of motor control, sensory impairment, cognitive and perceptual loss, and communication; the importance of psychological and functional goals; transfer into the community; and quality improvement loops, including sentinel audit information.

The vascular event that causes the damage to cerebral function is ischaemic in approximately 85 percent of cases; about 10 percent are due to primary intra-cerebral haemorrhage. Improved classification and recording of stroke according to diagnosed type, location and extent of vascular loss would enhance alignment with service development indicators and outcomes.

Transient ischaemic attacks (TIAs) are vascular events whose effects last less than 24 hours, most often less than one hour. Although they are not strokes, they are a critical risk factor for subsequent strokes. The use of risk stratification tools for TIAs has the potential to reduce stroke incidence. The concept of risk stratification already underpins the New Zealand approach to targeting prevention. The stroke risk stratification for atrial fibrillation (AF), already included in national CVD guidelines, provides a similar precedent.

The management of stroke has significant implications for the national strategies for disability and the health of older people (Associate Minister of Health and Minister for Disability Issues 2002; Minister for Disability Issues 2000) as well as for the population health objectives that underpin this QIP. Specialised health services for older people (which deliver the bulk of all-aged adult sub-acute and rehabilitation services), general medical services and neurological services, working collaboratively with allied and primary health teams, are required for improved equitable access and effective outcomes.

Cerebrovascular disease is a major independent cause of dementia, interacting extensively with the biological processes associated with Alzheimer's disease. CVD primary and secondary prevention is predicted to be important in ameliorating the national and international 'epidemic of dementia' fuelled by ageing populations. In the medium term, CVD and associated disorders are likely to include a growing focus on dementia prevention as a related health outcome.

Quality improvement priority areas

A range of actions in primary care and across other care settings may be expected to improve outcomes in terms of both reducing the risk of developing CVD and improving immediate and long-term outcomes in those who have experienced an acute cardiovascular event or have chronic CVD. A set of measures or indicators is essential to the implementation of recommended procedures and the evaluation of longer-term clinical outcomes. Some of these indicators may already be nationally recorded. For others, systems will need to be put in place to ensure that they are both recorded and reported.

Table 1, right, summarises the indicators relevant to the priority areas for which recommendations and actions are suggested in primary care and other care settings. The priority areas for initial attention are in bold text.

Table 1: Indicators of quality improvement for proposed priority areas

Setting	Priority area	Measure	
Primary prevention	Risk assessment	Percentage of people who have had five-year CVD risk assessment (any person who has had any previous CVD event is at high risk and requires intensive management)	
	Risk management	Percentage of people identified at risk receiving appropriate management according to established guidelines (effective management requires resources for practice management systems, staff training, and access to counselling and support services)	
		Management measures: <ul style="list-style-type: none"> • smoking cessation • Green Prescription • dietary advice • statin uptake for patients with CVD risk >15% • aspirin uptake for patients with CVD • warfarin use in high stroke-risk AF 	
Treatment of CV events		<i>Acute coronary syndromes</i>	<i>Stroke and TIA</i>
	Patient delay	Time (hrs) from symptom onset to first medical consult	Time (hrs) from symptom onset to first medical consult
	Treatment delay	Time (hrs) from arrival at hospital until start of thrombolysis or PCI	Time (hrs) from admission until imaging CT/MRI ± US
		Percentage of eligible patients given thrombolysis or direct PCI	Percentage of eligible stroke patients given thrombolysis in experienced centres
			Percentage of people assessed by an organised stroke service
	Clinical assessment and risk stratification	Classification of MI (ST or non-ST), UA For all MI patients, assessment before discharge of: <ul style="list-style-type: none"> • left ventricular function • stress testing • coronary angiography 	Classification of stroke and prioritisation of TIA For all stroke patients: specialist neuro-functional assessment (related to needs and personal environment)
	Revascularisation	Percentage of patients receiving PCI before discharge from admitting or receiving hospital	Consideration of need for carotid, cardiac, other vascular, haematological intervention
		Percentage of patients receiving coronary bypass surgery before discharge from admitting or receiving hospital	
Discharge medications	<ul style="list-style-type: none"> • aspirin • statin • beta blocker • aCE inhibitor • clopidogrel • NRT or other smoking cessation aid 	<ul style="list-style-type: none"> • Anti-platelet agent(s), eg, aspirin • blood pressure lowering therapy • statin • warfarin in AF or cardioembolic stroke from valvular disease or recent MI • NRT or other smoking cessation aid 	
Rehabilitation (cardiac or stroke)	<ul style="list-style-type: none"> • referral • attendance • completion 	<ul style="list-style-type: none"> • referral • attendance • completion • environmental rehabilitation/ support (therapeutic and prosthetic intervention, stroke Foundation services) 	

Note: Bold text indicates priority areas for initial attention.

AF = atrial fibrillation; CT/MRI ± US = computed tomography/magnetic resonance imaging, ultrasound; MI = myocardial infarction; NRT = nicotine replacement therapy; PCI = percutaneous coronary intervention; TIA = Transient ischaemic attack; UA = unstable angina

Primary health care

CV risk assessment and management

Justification

Systematic implementation of the *Assessment and Management of Cardiovascular Risk* Guidelines (NZGG 2003) through primary care can provide considerable benefits to many ‘at risk’ people in a relatively short period. This ‘keystone’ approach is soundly evidence-based and links population health with clinical care in the centre of the continuum for heart health improvement.

Age-adjusted mortality for both CHD and stroke has fallen markedly over the past 30 years. The greater part of this reduction can be attributed to population changes in the levels of blood pressure, blood cholesterol and smoking. These changes reflect the combined positive effects of population health promotion and specific treatments, particularly for hypertension. The *Assessment and Management of Cardiovascular Risk* Guidelines (NZGG 2003) for the first time recommend an integrated approach to risk reduction based on assessment of individual absolute risk. This assessment is based on age and gender categories and includes diabetes together with other risk factors. Reduction of high individual absolute risk levels, which may require a number of interventions, is considerably more effective than treatment of single risk factors. Individuals with clinical CVD already have a high risk of future events and should be considered separately for vigorous secondary prevention.

A number of prerequisites for the successful implementation of CV risk guidelines in primary health care are recognised. A team approach supported by practice management systems and appropriate tools is required. Adequate resources and staff training are also important to systematically assess practice populations and to sustain effective management with appropriate cultural fit.

Health outcome sought

- The incidence of CVD is reduced.

Indicator

- Percentage of people in primary health care settings who have had CVD risk assessment according to specific recommendations for age, gender and ethnic groups.
- Percentage of people identified at risk who are receiving appropriate management (lifestyle interventions and medications) according to guideline recommendations.
- Specific management indicators:
 - smoking cessation
 - Green Prescriptions
 - dietary advice
 - statin uptake for CV risk greater than 15 percent
 - aspirin uptake for patients with CV disease
 - Warfarin use for high stroke-risk AF.

Recommendations

- Systematically implement the *Assessment and Management of Cardiovascular Risk* Guidelines (NZGG 2003) through primary health care.

Immediate actions

- Commission rapid review of the *Assessment and Management of Cardiovascular Risk Guidelines* (NZGG 2003) (note: only a modest revision is required).
- Systematically implement updated *Smoking Cessation Guidelines* (Ministry of Health 2007) and monitor their implementation.
- Endorse the PHO Performance Programme, which includes funding for PHO capability planning and improvements in CVD risk assessment and management.
- Review availability of clinical practice nurse training programmes in primary health care and plan for national coverage of PHOs.

Immediate and long-term action

- Systematically implement revised guidelines nationally through primary health care.

Treatment of ACS, stroke and TIA

Access delay: ACS, stroke and TIA

Justification

Early intervention is crucial to provide better outcomes for patients with acute CVD presentations. As the majority of deaths from CHD occur out of hospital, in the first instance, access to a life support unit for initial monitoring and rapid transport to hospital can save lives. Modern care for ACS in particular is highly effective, provided that the patient can be seen at an acute care facility early after the onset of symptoms. Early access to skilled stroke management can reduce damage to the brain and minimise the effects of stroke. Pre-hospital responses incorporate recognition of the nature of the event, reaction, access and transfer systems.

The major component in delayed treatment relates to the time lag from when the patient experiences the onset of symptoms and recognises them until they seek medical care. If this patient delay is reduced through increasing awareness and recognition of symptoms of ACS, stroke and TIA, earlier presentation for appropriate care should follow.

Health outcomes sought

- Survival rate improves and disability is reduced following ACS and stroke presentation.
- Stroke risk is reduced following early presentation of TIA.

Indicator

- Time from first symptom onset for ACS, stroke and TIA to first medical consultation.

Recommendation

- Increase awareness of warning symptoms of ACS, stroke and TIA, particularly in high-risk groups, coupled with systematic CVD risk assessment and management in primary health care, as recommended above.

Immediate actions

- Commission audit of access delay for ACS, stroke and TIA (patient, health professional and ambulance delays) in several regions.

- Commission a review of the evidence of benefits and costs for interventions to reduce pre-hospital delays to diagnosis and effective treatment for ACS, stroke and TIA in the New Zealand environment. Potential interventions include: improving awareness among patients, whānau/families and primary care services of symptoms and the need for emergency medical care; CPR training for the public; improving pre-hospital diagnostic accuracy through rapid screening tools for emergency services; improving uniform ambulance response times; and providing pre-hospital thrombolysis in appropriate ACS situations.
- Promulgate a validated TIA risk stratification tool to primary and emergency services.

Intermediate and long-term action

- Identify the most effective options and implement acute heart attack and stroke action programmes targeting those at highest risk.

Treatment delay: ACS, stroke and TIA

Justification

Following clinical presentation with ACS, there is an urgent need to identify eligible patients with STEMI who may benefit from acute coronary reperfusion achieved through thrombolysis or, in some major centres, through percutaneous coronary intervention (PCI). The benefits of such interventions are substantial but diminish progressively during the hours following symptom onset. A regional approach with close communication and collaboration between peripheral and major centres is important to reduce inequalities in access to specialist care.

For acute stroke presentation, a similar overall benefit may pertain in highly selected patients with cerebrovascular thrombosis confirmed with imaging. In such patients, thrombolysis may be considered if they present very early to specialist centres.

Other active management in the initial hours will provide the optimal conditions for minimising the extent of neurological loss and subsequent complications, while enhancing early recovery mechanisms within the brain. Lack of available organised stroke services is a common reason for delay in specialised management.

Early investigation and risk factor management of high-risk TIA will help to reduce subsequent stroke rates. This approach includes having access to brain imaging, as well as carotid and cardiac imaging.

Health outcome sought

- Survival rate improves and disability is reduced following ACS and stroke presentation.

Indicators

ACS:

- time from arrival at hospital until start of thrombolysis or PCI for eligible STEMI patients
- percentage of eligible ACS patients with STEMI receiving thrombolysis or PCI.

Stroke:

- time of arrival at hospital until CT/MRI ± US imaging for acute stroke patients
- percentage of eligible acute stroke patients given thrombolysis
- percentage of stroke patients assessed acutely by an organised stroke service.

TIA:

- time of referral until clinical management through a TIA specialist clinic or clinical pathway.

Recommendations

- Where patients present with ACS and acute stroke, conduct an emergency room assessment of them immediately.
- Provide immediate thrombolysis in eligible ACS patients with STEMI according to standard emergency room and coronary care protocols.
- Provide immediate access to thrombolysis for suitable stroke patients according to protocols in major centres with specialist staff.
- Provide immediate access to coronary angiography and PCI in major centres where specialist cardiology staff and facilities exist.
- Undertake urgent transfer of patients to an acute stroke unit component of an organised stroke service (or to a designated inpatient area for stroke using protocols for acute stroke management as part of a developing organised stroke service).
- Enable rapid access of designated high-risk TIA patients to an appropriate clinical pathway.

Immediate actions

- Commission an audit of ACS and stroke treatment delay times from hospital arrival (including thrombolysis) in selected secondary and tertiary care centres.
- Implement a more highly structured performance reporting framework for organised stroke service development, including perceived barriers to implementation of individual elements.
- Commission a TIA clinical assessment and management tool.

Intermediate and long-term action

- Ensure systems and processes are in place in all secondary care centres for recording and reporting on indicators.

Clinical assessment and risk stratification: ACS

Justification

Following clinical presentation with ACS, two principal determinants of outcome are the underlying severity of coronary artery disease and the amount of myocardium remaining at risk of ischaemia. Other key determinants are the extent of heart muscle damage and impairment of heart pump function.

Best practice requires cardiological assessment of all of these determinants to guide clinical decision-making related to coronary intervention and medical treatments. Again, a collaborative regional approach is important to ensure best practice. This assessment is often staged so that it is completed following patient transfer and combined with appropriate coronary intervention.

Health outcomes sought

- Symptomatic benefit is achieved.
- Risk of recurrent events is reduced.
- Rate of hospital readmission is reduced.
- Survival rate is improved.

Indicators

- Proportion of patients classified as UA, non-STEMI and STEMI.
- Percentage of MI patients receiving echocardiographic assessment or radionuclide of left ventricular function.
- Percentage of MI patients having exercise stress testing and/or coronary angiography before discharge.
- Percentage of MI patients who are smokers referred for smoking cessation support before discharge.

Recommendations

- Make clinical classification of ACS in the categories of UA (sub-classified high and low risk), non-STEMI and STEMI.
- Routinely assess left ventricular function before discharge using echocardiography.
- Routinely assess severity of coronary artery disease using exercise stress testing and/or coronary angiography before discharge.
- Routinely refer all MI patients who are smokers for smoking cessation support before discharge.

Immediate action

- Review systems and clinical pathways in all secondary care centres for risk stratification and subsequent treatment in ACS, and identify indicators for continuous quality improvement.

Intermediate and long-term actions

- Regularly report on and review pragmatic indicators at DHB, regional and national levels.
- Regularly review systems and resources required regionally to improve standards of assessment.

Clinical assessment and risk stratification: stroke

Justification

Improving ascertainment, classification and outcome information for stroke events is a prerequisite for casemix-adjusted benchmarking of stroke services and clinical outcomes. This benchmarking is important in New Zealand where organised stroke services are still in a developmental phase and both internal and external comparisons are needed. There is overwhelming evidence that organised stroke services are the most important intervention to produce better outcomes. To date, their implementation has been slow and inconsistent. Worse still, in some DHBs resources have been allocated to setting up mobile stroke advisory teams that have proven to be ineffective.

Organised stroke services will provide the mechanism for: accurate clinical assessment; allocation of prioritised clinical pathways extending across secondary, primary and community arenas; and quality development processes. The urgency and feasibility of prioritised management of TIA underline the need for risk stratification tools, accelerated access to clinical pathways and accurate diagnosis of TIA at presentation.

Health outcomes sought

- Significant disability and death rates are reduced.
- Clinical outcomes are improved.

- Readmission rate of stroke patients is reduced.
- Recurrent stroke events are reduced.

Indicators

- Proportion of patients classified as to type, location and extent of stroke.
- Proportion of patients with TIA receiving risk stratification on presentation.
- Proportion of stroke patients receiving organised stroke services.
- DHB performance indicator both facilitates and records sequential progress in implementation of organised stroke services.
- Proportion of stroke services participating in audit or benchmarking processes.

Recommendations

- Each DHB has an organised stroke service according to the recommendations set out in the management of stroke Guideline (Stroke Foundation and NZGG 2003) and all international guidelines.
- Organised stroke services:
 - undertake clinical classification of stroke according to internationally accepted nomenclature
 - extend clinical data sets to facilitate benchmarking and audit
 - improve recognition of stroke presentation through clinical education.
- Facilitate stroke networks through local mechanisms.

Immediate actions

- Develop a ‘component’ or ‘role delineation’ developmental structure within the DHB performance indicator for organised stroke services.
- Review the data collection sets relevant to stroke services.
- Incorporate TIA risk stratification and management in review of CVD Guidelines and clinical practice through stroke services.

Intermediate and long-term actions

- Monitor reporting and review progress.
- Facilitate stroke services networking among DHBs, sharing of protocols and data, horizontal and vertical benchmarking, staff development and training.

Revascularisation: ACS

Justification

Following clinical assessment and risk stratification, optimal patient management is guided by clinical assessment and risk stratification. PCI or coronary artery bypass surgery can be performed as appropriate, considering individual clinical data.

Coronary revascularisation is of proven benefit in improving outcomes in selected high-risk patients. This may necessitate the transfer of such patients to another (tertiary) hospital and requires close regional co-operation.

Health outcomes sought

- Symptomatic benefit is achieved.
- Risk of recurrent events is reduced.
- Rate of hospital readmissions is reduced.
- Survival rate is improved.

Indicators

- Percentage of patients in different ACS categories receiving PCI or coronary artery bypass surgery before discharge from admitting hospital (after hospital-to-hospital transfer).

Recommendations

- Base revascularisation of high-risk ACS patients on cardiological assessment.

Immediate actions

- Review systems and clinical pathways for referral for revascularisation.
- Review options for continuous monitoring of access to timely revascularisation.

Intermediate and long-term actions

- Regularly report on and review indicators at DHB, regional and national levels.
- Regularly review systems and resources required regionally to improve access and standards of care.

Revascularisation: stroke

Justification

Carotid endarterectomy has an established place in the management of patients with ipsilateral carotid stenosis and non-disabling ischaemic stroke or TIA. The intervention criteria usually incorporate the degree of stenosis and surgical outcome data. Ideally, surgery should be carried out within two weeks of the ischaemic event. International evidence suggests that carotid angioplasty and stenting may be considered as an alternative in certain clinical situations.

Further evidence from specialist centres is needed to inform general recommendations about intracranial endovascular surgery or interventional approaches for revascularisation. Selected patients with major middle cerebral infarction, who meet clear inclusion criteria, may benefit from surgical intervention if it is provided within 48 hours of the infarction; these patients should receive urgent neurosurgical referral.

Surgical management of intra-cerebral haemorrhage has been clarified over recent years for selected subgroups of patients. It is included in a range of international guidelines.

Management of haemorrhage, thrombolysis, anti-thrombotic treatment, and blood pressure, and elucidation of vascular, cardiac and haematological causes of stroke all require early imaging. In addition, they all interact with the clinical need for stroke networks, which include both medical and surgical referral paths.

Health outcomes sought

- Disability rate is reduced.
- Risk of recurrent events is reduced.

- Rate of hospital readmission is reduced.
- Survival rate is improved.

Indicators

- Percentage of eligible patients receiving carotid artery surgery within recommended timeframes
- Interdisciplinary access pathways established through regional stroke networks.

Recommendations

- Base access to revascularisation interventions on expert assessment in an organised stroke unit and on established referral pathways.

Immediate actions

- Review referral systems and pathways for revascularisation.
- Include referral systems in a commissioned TIA assessment and management tool.

Intermediate and long-term action

- Establish stroke networks to improve access and standard of care.

Discharge medications: ACS

Justification

A number of cardiovascular medications are highly effective in improving long-term outcomes for patients following presentation with ACS. The substantial benefits provided by these medications are clearly proven from extensive clinical trial data. An analysis of national hospital admissions for patients with CHD in recent years indicates that the majority are readmissions while the number of first admissions is declining. Although many readmissions are unavoidable and can occur despite a high standard of care, a significant proportion is likely to be due to lack of adherence to recommended treatments.

There is considerable potential for improvement in this area to reduce the need for recurrent hospital admissions and to improve patient outcomes. The recommended combination treatments should be carefully individualised and established before discharge, and long-term adherence to treatment should be ensured through primary care follow-up.

Health outcomes sought

- Risk of recurrent events is reduced.
- Rate of hospital readmissions is reduced.
- The need for coronary intervention is reduced.
- Survival rate is improved.

Indicators

Indicators of how well the health outcomes have been achieved are:

- medications listed at discharge
- medications communicated to primary care practitioner
- adherence to discharge medications at six months.

Recommendations

- Establish all ACS patients on treatment with the appropriate individual combination of:
 - aspirin
 - statin
 - beta blocker
 - ACE inhibitor
 - nicotine replacement therapy (NRT) or other smoking cessation aid.
- Record discharge medications and communicate them to the patient’s primary care practitioner to ensure long-term adherence.

Immediate actions

- Review national systems and processes and options to allow reliable recording of discharge medications for ACS patients and communication with PHOs.
- Review options available for reliable determination of adherence to medications at 6 and 12 months post-discharge and linkage with PHOs.

Intermediate and long-term action

- Based on recommendations from the above reviews, implement systems for clinicians to access information about dispensing for their patients, and monitor overall concordance with evidence-based guidelines.

Discharge medications: stroke

Justification

After stroke the risk of further stroke increases by up to 43 percent over the next decade. The overall risk of stroke after TIA is higher, at 20 percent over the first three months. These events are also strong risk markers for other CVD events, with extensive overlap of prevention regimes.

Substantial evidence exists for significant risk reductions through secondary prevention, utilising lifestyle changes and medications. Overseas data and national clinical experience strongly suggest marked under utilisation of these strategies, including delayed or inadequate initiation, inadequate late identification and reduced adherence. Of particular concern is the incorrect assumption of diminishing effectiveness with age – when absolute risk is higher.

If all sectors more strongly emphasise the maintenance of secondary prevention programmes, they can potentially reduce the recurrence and readmission rates and lessen the disability burden. These programmes should be tailored for the individual, especially for the extremely old or frail, for whom the tolerability decreases and the side effects of medications escalate.

Health outcomes sought

- Risk of recurrent CVD events is reduced.
- Rate of hospital admissions is reduced.
- Disability burden, including the need for home-based support and residential care, is reduced.
- Survival rate and quality of life are improved.
- Information on risk factor reduction is disseminated more widely.

Indicators

- Number of patients discharged with a transfer plan incorporating both lifestyle advice and medication information.
- Medications utilised on discharge.
- Medications communicated to the primary care practitioner.
- Medications used at six months after discharge.
- Blood pressure at discharge.
- Blood pressure six months after discharge.
- Number of smokers offered help to quit.
- Proportion of smokers still smoking at six months after discharge.

Recommendations

- Establish all stroke and TIA patients on treatment with the appropriate individual combination of:
 - anti-platelet agent(s) such as aspirin
 - blood pressure lowering therapy
 - statin
 - Warfarin (in high-risk AF or cardioembolic stroke from valvular disease or recent MI)
 - NRT or other smoking cessation aid
 - other appropriate agents such as beta blockers and ACE inhibitors.
- Record discharge medications and communicate them, along with rationale for use, to the patient and the primary care practitioner to increase term adherence.
- In discharge planning, consider appropriateness of medication in terms of: effectiveness, goals of care, treatment targets, co-morbid interactions, and time-unit benefits.

Immediate actions

- Review national systems, processes and options to allow reliable recording of discharge medications, advice on lifestyle change and communication to primary care teams.
- Review options available for reliable determination of adherence to medication and prevention programmes at 6 and 12 months post-discharge.

Intermediate and long-term action

- Incorporate recommendations from the above reviews to implement and network processes for clinicians, including community pharmacists, to improve medication adherence and monitor overall concordance with evidence-based guidelines.

Rehabilitation: ACS

Justification

Cardiac rehabilitation can significantly improve long-term outcomes for patients with CHD. The benefits of a post-discharge cardiac rehabilitation programme include support for necessary lifestyle changes and improved adherence to treatments. Psychosocial wellbeing, which is often overlooked for many patients, is an integral aspect of effective rehabilitation programmes.

Such benefits should be available to all patients. Currently, however, only a minority are referred to a rehabilitation programme, and even fewer attend and complete one. Barriers to attendance

commonly cited include transport and programme timing. At present a home-based approach to cardiac rehabilitation, using a self-directed manual with nurse guidance, is being introduced in New Zealand on a trial basis.

Health outcomes sought

- Physical and psychosocial wellbeing is improved.
- Patients can return to employment.
- Risk of recurrent events is reduced.
- Rate of hospital readmissions is reduced.
- The need for coronary intervention is reduced.
- Survival rate is improved.

Indicators

- percentage of ACS patients referred to a post-discharge cardiac rehabilitation programme
- percentage of patients attending and completing a programme.

Recommendations

- Refer all ACS patients to a cardiac rehabilitation programme before discharge from hospital.
- Provide cardiac rehabilitation programmes in all regions, with sufficient resources to ensure patients are referred and to support their attendance and completion of the programme.

Immediate actions

- Commission a national audit of the availability of Phase 2 cardiac rehabilitation in all regions.
- Ensure systems and processes are in place for consistent recording and reporting on indicators for continuous quality improvement.

Intermediate and long-term actions

- Review national and local data and provide training and resources for programmes where these are lacking.
- Ensure all cardiac patients discharged from secondary and tertiary care are referred to an accessible rehabilitation programme.
- Provide patients with the support they need to attend and complete a rehabilitation programme.
- Review pilot trials of Heart Guide Aotearoa (a joint National Heart Foundation and Te Hotu Manawa Māori home-based approach to cardiac rehabilitation) and consider regional replication.
- Link information from hospitals, PHOs and cardiac rehabilitation providers so that all clinicians involved in patient care can access care plans and share clinical data to improve long-term quality of care and health outcomes.

Rehabilitation: stroke

Justification

Stroke rehabilitation is the treatment that has been overwhelmingly proven to improve long-term outcomes. Rehabilitation is treatment to achieve best possible function for an individual within an optimised environment. It incorporates and augments the ability of the individual to access

neurological, physical and psychosocial recovery mechanisms while preventing complications. Rehabilitation occurs in all settings, not just the hospital. It sets the scene for closer adherence to lifestyle and medication advice; improves carer education, support and information needs; co-ordinates discharge planning to meet physical, social, emotional and financial needs; and links with ongoing community rehabilitation and support networks.

Rehabilitation is an integral part of organised stroke services and pervades the whole of the admission and recovery period in the community. Needs of younger people with stroke can be quite different to those of older people and include problems for children, return to work, pregnancy and so on. Medical co-morbidities and complications are common, especially in the older patient, and the rehabilitation medical team must be familiar with their management and work in a seamless way with other specialist teams.

The cultural, social and health values and perceptions of Māori and Pacific peoples interact significantly with rehabilitation access. Although absolute numbers vary with local demography, all organised stroke services need to work with Māori and Pacific peoples to overcome the barriers to improving the current poor outcomes.

Specialist training and experience are needed for all disciplines, including nursing and allied staff.

Health outcomes sought

- Physical and psychosocial wellbeing is improved.
- Disability is reduced and rate of survival and quality of life are improved.
- Complication and hospital readmission rates are reduced.
- The number of patients requiring institutional care is reduced.
- Longer-term independence in place of choice is enhanced.
- Outcomes for Māori and Pacific peoples are equitable with those of the general population.
- Burden on carers is reduced.
- Long-term cost and negative socioeconomic implications are reduced.

Indicators

- Percentage of patients referred to specialist stroke rehabilitation.
- Percentage referred to community-based stroke services (including clinics).
- Percentage of Māori and Pacific patients completing a rehabilitation programme.
- Proportion of stay within organised stroke service.
- Case-mix adjusted percentage of patients returning to destination of choice.
- Case-mix adjusted functional level on admission and discharge using validated tool.
- Six-month review of function and living arrangements.

Recommendations

- Refer all stroke patients for assessment to a specialist stroke rehabilitation team as soon as possible after admission.
- Incorporate this specialist team as an integral component of the organised stroke services (see the Guideline [Stroke Foundation and NZGG 2003] on components and implementation).

- Complete a multidisciplinary/trans-professional assessment on all stroke patients according to the guideline (Stroke Foundation and NZGG 2003), and update it regularly.
- Providers should ensure all those working with stroke patients have specific training.
- Educational organisations for the core disciplines should include specialised neuro-rehabilitation modules in their curriculum.
- Stroke rehabilitation community programmes, as part of organised stroke services, should work with other services (eg, Stroke Foundation services).

Immediate actions

- The role of rehabilitation must be fully integrated into organised stroke services from the onset of implementation.
- Review workforce and system training needs at a local level.
- Resource basic and advanced teaching programmes utilising existing expertise, including that within the voluntary and non-government sectors.
- Inform health sector management on the specialised skill base that is required.

Intermediate and long-term actions

- Review national health education curricula.
- Provide training and resources for programmes where lacking.
- Ensure all stroke patients discharged from secondary care have access to community rehabilitation.
- Provide patients with the support they need to attend and complete a rehabilitation programme.
- Review pilot trials of culture-based differential approaches to stroke management, especially rehabilitation, and consider regional application as appropriate.
- Link information from hospitals, PHOs and stroke rehabilitation providers so that all clinicians involved in patient care can access care plans and share clinical data to improve long-term quality of care and health outcomes.

Diabetes

Introduction

Addressing diabetes is a well-established health priority for New Zealand, for four major reasons.

1. The prevalence of diabetes is increasing, at an accelerating rate.
2. Diabetes is the major preventable cause of renal failure and dialysis, lower-limb amputation and avoidable blindness (in working age adults).
3. Diabetes is a major risk factor for cardiovascular disease.
4. Diabetes is a major contribution to inequalities in life expectancy, cardiovascular outcomes and diabetes-specific health outcomes for Māori and Pacific peoples and Asian.

The major reason behind the increasing prevalence is the increasing number of adults with type 2 diabetes. According to the latest Ministry of Health estimates (in publication), 125,000 people in New Zealand had diagnosed type 2 diabetes in 2001, and this number is predicted to increase by at least 45 percent to 180,000 by 2011. The relative increase will be greater in Māori, Pacific and Asian populations.

Moreover, only one-third of this increase is associated with increasing obesity. Therefore, even if the public health approaches to reducing obesity embodied in Healthy Eating – Healthy Action (Ministry of Health 2003) are effective, the number of people with diabetes will still increase. As an example, if the proportion of adults who are obese in 2011 is reduced from 27 percent (as presently estimated) to 26 percent, the effect would be only to reduce the number of people with type 2 diabetes from 180,000 to 177,000. The limited nature of this effect has clear implications for planning services for people with diabetes.

Without earlier detection and improved quality of care, the number of diabetes-specific microvascular complications (renal failure, lower-limb amputation, and blindness) will increase as a consequence of increasing obesity and diabetes. Diabetes, especially undiagnosed, may also increasingly contribute to adverse pregnancy outcomes. In addition, the significant improvements in CVD macrovascular outcomes in recent decades will be curtailed or potentially reversed.

It is clear that the expected increase in diabetes complications can potentially be reduced. Indeed, it is encouraging that in recent years stroke, acute coronary syndromes, and lower-limb amputation in people with diabetes have not significantly increased. This trend is consistent with improving access to good quality care and greater use of anti-hypertensive statins for CVD risk management. However, in the absence of major new pharmaceutical or other technologies for improving diabetes control, the success of continuing efforts to ‘stem the rising tide’ of diabetes will largely depend on further improvements in quality and outcomes using the technologies already available.

Future improvements in CVD outcomes, especially in Māori, Pacific and Asian populations, will require improvements in all risk factors, including diabetes as a major CVD risk factor. Likewise, increasing the use of CVD risk assessment will improve diabetes screening and subsequent diagnosis. However, this section does not include priorities for improving CVD outcomes specifically in people with diabetes because the CVD priorities already identified in the previous section will also benefit people with diabetes.

Although type 2 diabetes is increasingly diagnosed in children and is related to obesity, type 1 diabetes is also increasing (for reasons that are not clear). Individuals with type 1 diabetes have

almost a lifetime of exposure to the damage caused by diabetes, and their risks of microvascular complications (blindness and renal failure) are therefore (potentially) substantially greater than for people with an onset of diabetes later in life. The health sector should also respond to the increasing expectations that children should be able to access preschool support at earlier ages (when diabetes control is most difficult to maintain), and to ensure that children have safe options if their carers wish to return to the paid workforce. Developing this response will require more interaction with the education sector – especially teachers and after-school care providers for children with diabetes.

There are inequalities in access, quality of care and outcome for people with diabetes. Māori and Pacific peoples have approximately 2.5 times the risk of developing type 2 diabetes during their lives compared with New Zealand Europeans, and on average develop diabetes 10 years earlier. Complications tend to develop more frequently and at correspondingly earlier ages in these populations, and trends for some complications have not shown as much improvement as for New Zealand Europeans. Each priority in this section includes specific analysis and reference to inequalities, and all indicators should be reported by ethnicity.

Quality improvement priority areas

Diabetes shares many of the challenges for improving outcomes with other long-term conditions. Priority challenges include: enabling information to be used and shared more effectively by clinicians and others to deliver reliable and consistent advice for people with diabetes; aligning the workforce resources and continuing professional training with changing needs; and supporting wider networks of people with the different skills required to develop innovative approaches, evaluate them, and promote their wider adoption. There are existing programmes for all of these priorities, which this Plan does not seek to duplicate, but which must contribute to improving diabetes outcomes.

There are specific priorities to improve the estimates for diagnosed and undiagnosed diabetes as part of the Ministry of Health's support for national systems. These prevalence estimates are important to monitor the effectiveness of screening and public health approaches to risk reduction, as well as ensuring appropriate service planning for those with diabetes. These issues were examined at a workshop, held in August 2007, which was sponsored by the Ministry of Health.

The EAG for this Quality Improvement Plan recognises that diabetes management relies almost entirely on the individual and their family/whānau for day-to-day management. In addition to the resources, information and support provided by consumer organisations and others, it is clear that people with diabetes need high quality diabetes education to support them to self manage effectively. Such education may be given in groups or on a one-to-one basis, using diabetes self-management education (DSME) programmes.

While there is continuing debate regarding the relative merits of the different approaches (which are not mutually exclusive), it is widely acknowledged that structured diabetes education (SDE) to teach and support DSME is effective in improving short-term clinical outcomes and quality of life. In the New Zealand context, it is important that SDE is sufficiently flexible to allow for the needs of different ethnic and cultural groups (notably Māori, Pacific and Asian). Furthermore, it is essential that the education techniques are adequately evaluated and used by those appropriately trained in their delivery. A national stock-take of the SDE that is currently provided to individuals and groups needs examining alongside international best practice with a view to its future effectiveness.

There is also a widespread international move towards chronic care management plans. Structured diabetes education and DSME programmes form part of such chronic care management plans. While appropriate diabetes education is an undisputed essential component of care for people with diabetes, there is currently insufficient evidence to recommend any particular plan or programme. The issue will be revisited as the QIP evolves.

There is a national PHO Performance Management Programme involving DHBs, PHOs and the Ministry of Health, which is considering a number of indicators that relate to diabetes and CVD risk identification and management. The EAG has reviewed several iterations of the PHO Performance Management Programme's work and strongly supports the Programme's focus. Recognising that the PHO Performance Management Programme is actively addressing diabetes and CVD risk identification and management, these areas are not addressed in the following recommendations, in favour, rather, of supporting the work of the PHO Performance Management Programme.

There is a need to train more health workers of all disciplines in diabetes (and cardiovascular disease), both at the primary and secondary care level, as there is a shortage of expertise. Competencies for diabetes nurse educators/specialists (DNE/DNS), practice nurses and dietitians need to be defined and appropriate training and supervisory programmes developed within a multidisciplinary team framework. The role of DNE/DNS has been substantially limited by their inability to prescribe, while the role and potential breadth of competency of expert dietitians may have been underestimated.

The provision of care within primary care is often limited by the lack of expertise. Additionally, there are time pressures and limited opportunities for training. At the primary-secondary interface and within secondary care, staffing provision in all disciplines is very variable between DHBs. These workforce issues will be considered as part of the ongoing implementation of the Plan.

Diabetes is a significant cause of adverse pregnancy outcomes, on which a technical discussion document has been developed and distributed by a sector working party. Women at risk of type 2 diabetes who are planning a pregnancy should be offered screening (with appropriate information) as for undiagnosed type 2 diabetes. All women with diabetes should have access to support for optimal diabetes control in pregnancy. If screening has not occurred, 'at risk' women should be offered screening at first contact with a lead maternity carer. Although it is important that all pregnant women have balanced information about screening for gestational diabetes, the EAG has deferred specific recommendations on this topic until 2008 (when results of a major research study will be available).

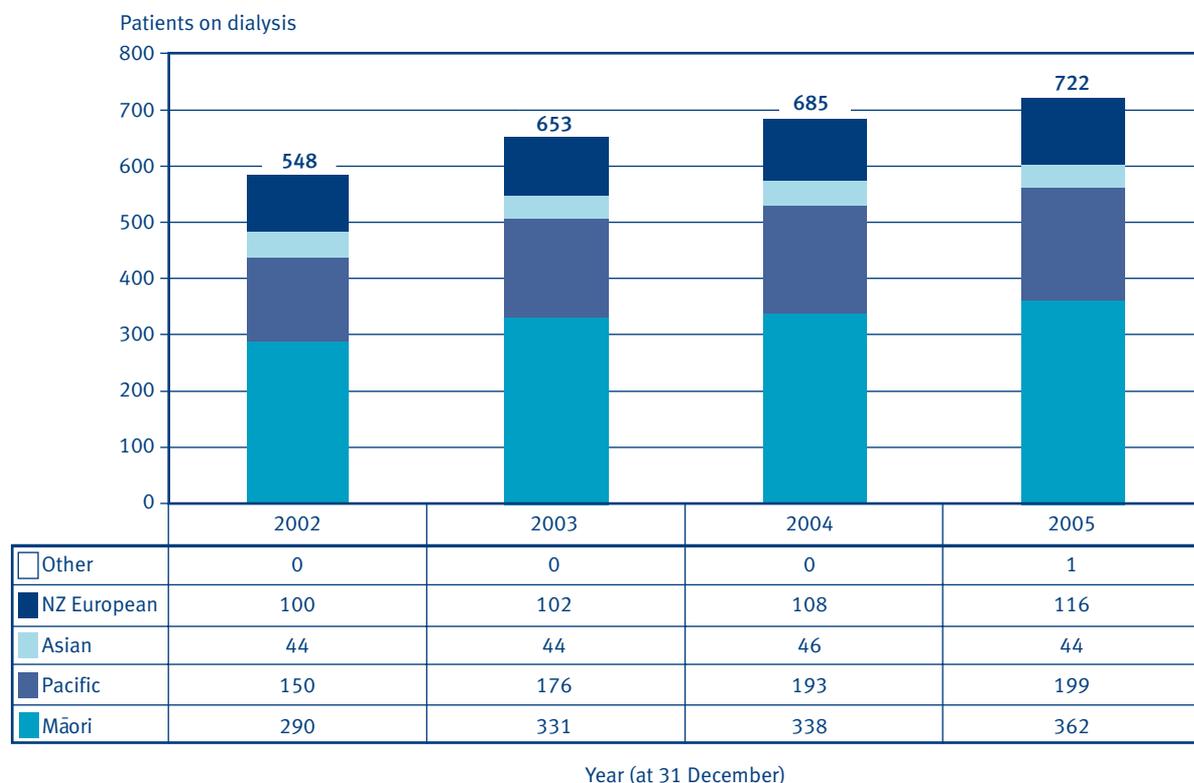
Kidney disease

Justification

Renal failure is among the most debilitating and costly complications of diabetes, leading to end-stage renal failure (ESRF), dialysis, renal transplantation and premature death.

Diabetes was the primary cause of the need for renal dialysis for 722 people at the end of 2005 (and represented 39 percent of all dialysis), with the number having increased progressively in previous years (Figure 1). Moreover, almost all of the recent increase has occurred in Māori and Pacific peoples, and demographic factors suggest this trend will continue.

Figure 1: Renal dialysis with diabetes as the primary cause, (prevalence) 2002–2005



The differences are most marked in the peak age band for dialysis of 55–64 years. At the end of 2005 this age band included 80 Pacific peoples and 136 Māori, but only 32 New Zealand Europeans. (For further analysis, see the final ‘Data Supplements’ section.)

There is convincing evidence that optimal glycaemic and overall management of diabetes reduce the risk of developing early nephropathy, and that early detection and more active management of nephropathy reduce the chance and rate of progression to ESRF. Current guidelines suggest specialist involvement in the management of patients with significant renal impairment, although optimal care models for ‘mid-stage’ nephropathy remain unclear.

Urine albumin:creatinine ratio (ACR) is a screening test for early renal complications, and serum creatinine (and increasingly the derived eGFR) is used for detecting and monitoring early renal failure. The PHO Performance Programme is proposing ACR-based indicators, but the options for further improving the quality of care for the ‘mid-stage’ group with impaired eGFR, and using indicators based on eGFR or progression of eGFR, should be more explicitly developed.

Health outcomes sought

- The number of people requiring renal dialysis with diabetes as the primary cause is reduced.
- Māori, Pacific and Asian populations with diabetes requiring renal dialysis have greater equity with New Zealand Europeans.

Indicators

- Number of people on and starting renal dialysis with diabetes as the primary cause.
- Proportion of people with a serum creatinine test at least annually.
- Proportion of people with diabetes who have microalbuminuria (based on urine ACR) and macroalbuminuria (ACR >25 and 3L).
- Proportion of people with microalbuminuria on ACE inhibitor or A2 receptor blocker.

A recommended additional indicator for further development is the proportion with overt nephropathy (ACR > 30), and/or with eGFR < 60, who have target blood pressure control.

Recommendations

- Improve detection of significant clinical nephropathy using annual serum creatinine testing (with eGFR) in accordance with guideline.
- Increase frequency (three-monthly) of serum creatinine/eGFR in those with eGFR < 60.
- A multidisciplinary team should be involved early and use an effective model of care for those with 'mid-stage' nephropathy/eGFR < 60 who are at high risk of progressing to renal dialysis.

Immediate actions

- Endorse the proposed indicators for the PHO Performance Programme.
- Update the indicators reported by PHOs to local diabetes teams, to include other indicators as identified above.
- Develop and test indicators based on eGFR.

Intermediate action

- Establish and evaluate pilot programmes in selected DHBs for optimal specialist/shared care for people at high risk of progressing to end-stage renal failure and dialysis – focusing initially on DHBs with high Māori and Pacific populations and high rates of renal replacement therapy.

Long-term action

- Roll out proven programmes nationally.

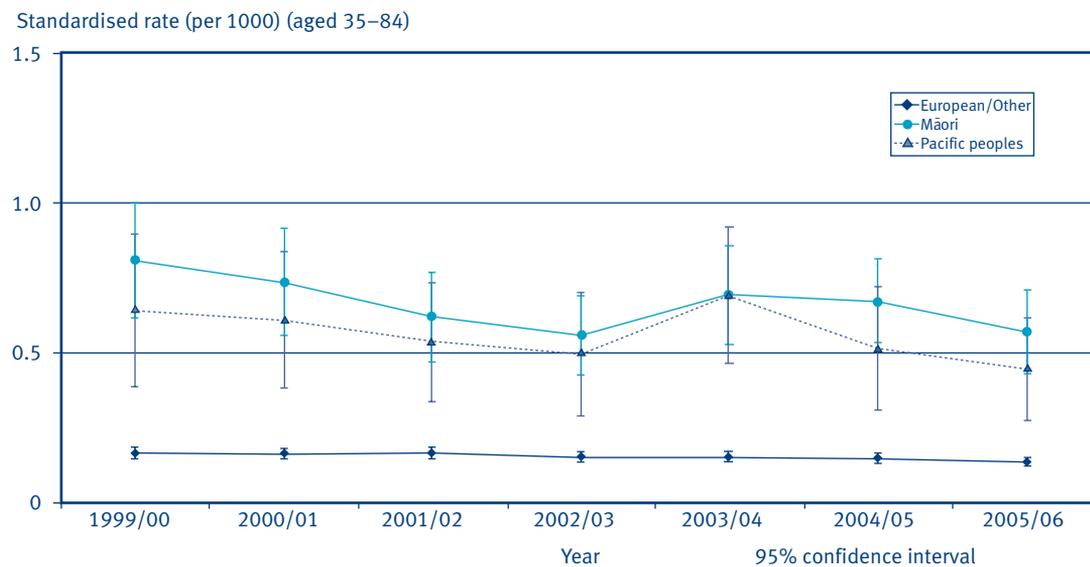
Foot disease

Justification

Diabetic foot disease is the leading single cause of lower-limb amputation in New Zealand. In the 2005/06 financial year people with diabetes had 478 hospital admissions that involved one or more lower-limb amputations. These included 111 below-knee and 81 above/through-knee amputations (the balance involved toe and forefoot amputations). These diabetes-related amputations represent approximately half the total lower-limb amputations in New Zealand (other causes include trauma and peripheral arterial disease in people without diabetes).

In recent years the number and rates of diabetic lower-limb amputations have remained relatively stable, with a trend to improvement. However, Māori and Pacific peoples have disproportionately high rates compared with New Zealand Europeans (Figure 2). In the 2005/06 financial year, 83 Māori and 20 Pacific patients with diabetes had an amputation admission (compared with 8 Asian and 334 'Others'), and the peak age band for Māori and Pacific peoples was 60–69 years compared with 70–79 years for New Zealand Europeans.

Figure 2: Amputation rate for patients with diabetes, 2005/06 – age-standardised on New Zealand population



Diabetes foot complications are a result of macrovascular disease (peripheral arterial disease, often associated with smoking) and microvascular disease (neuropathy and local tissue changes). Typically foot ulceration occurs and may require skilled care to promote healing, and continuing attention to avoid recurrence. However, gangrene and/or infection may occur and lead to amputation and often require prolonged hospital stay and orthotic/community follow-up. Screening for high-risk feet and early referral to podiatry, orthotics (including total contact casting) and wound care specialists and to vascular surgeons are all important in reducing amputation risk.

Publicly funded podiatry services are still variable. Some areas in New Zealand appear to have no publicly funded services, and in some areas podiatrists work in isolation from other diabetes services.

Health outcomes sought

- Number of diabetic lower-limb amputations (especially double amputees, above-knee [AKA] and below-knee [BKA] amputations) is reduced.
- Māori and Pacific lower-limb amputation rates are more equitable with those of New Zealand Europeans.

Indicators

- Lower-limb amputation, defined by amputation level (minor, BKA, AKA).
- Proportion of people with ‘high-risk’ feet.

Recommendations

- In primary care patient management systems (PMS), implement support for screening and triage of ‘high-risk’ feet during diabetes annual reviews.
- Review, and where appropriate increase, access to specialised podiatry and foot care services (including total contact casting and pulse doppler assessment) for ‘high-risk’ feet.

Immediate action

- Review criteria for ‘high-risk’ and ‘medium-risk’ feet in guidelines, and develop evidence-based clinical pathways.

Intermediate action

- Establish and evaluate pilot programmes for optimal care in selected DHBs.

Long-term action

- Roll out proven and established programmes.

Eyes

Justification

Diabetic retinopathy (DR) can be detected by systematic retinal screening (RS), and significant retinopathy can be treated (eg, with laser) to reduce the risks of progression to sight threatening retinopathy and blindness. It is not yet possible to monitor the impact of DR on blindness or vision loss nationally, but extrapolation from overseas studies suggests that 70 people become blind in New Zealand each year as a result of diabetes.

Screening with appropriate follow-up is generally considered to be cost-saving (not just cost-effective) to a comprehensive health funder. Such savings arise because blindness is so often associated with the need for residential care in the older age group, and also because eye surgery is expensive and relatively ineffective.

As with all systematic screening programmes, it is important that all eligible people with diabetes are enrolled, that prompted recall occurs reliably in accordance with evidence-based guidelines, and that referral for specialist diagnosis and treatment is appropriate and timely. These requirements should be included in a quality assurance programme.

Nationally access to retinal screening in New Zealand is equitable, and slowly improving, for people who have an annual diabetes review each year as part of the Get Checked programme. However, retinopathy in Māori and Pacific peoples should be more common as a result of poorer average glycaemic control and there has been no empirical confirmation that this greater frequency has been the reality in recent years.

There is already a National Service Framework (Tier 3) DR Screening Service Specification. The *National Diabetes Retinal Screening Grading System and Referral Guidelines* were published in 2006 and should be progressively implemented.

Health outcome sought

- Rates of avoidable vision loss and blindness are reduced.

Indicators

- Proportion of eligible people with diabetes who have retinal screening at least every two years (the default interval in the guidelines).

Recommended new indicators that should be considered are:

- waiting time from referral to laser treatment
- number of patients developing blindness in the long term (an outcome indicator is urgently needed).

Recommendations

- Improve initial referral and follow-up for retinal screening.
- Progressively implement a national quality assurance programme – based on the guidelines – that includes appropriate standards for training, competency assurance, technical quality and follow-up.
- Update the information technology (IT) systems used by retinal screening services and primary care to allow screening results to be communicated using a structured message so that the results can be saved and tracked in PMS (as with laboratory results).
- Link the information in PHO, retinal screening and hospital ophthalmology databases to improve the management of screening and treatment services and to facilitate clinical audit.

Immediate actions

- Continue to support the implementation of a national quality assurance programme overseen by the existing steering group.
- Evaluate the benefits and costs of a specific purchase unit for diabetes argon laser treatment to monitor access and waiting times to laser.
- Scope the enhancements required to IT systems to implement electronic messaging for reports, and develop a standard message specification.
- Scope the IT and associated changes to allow PHO, retinal screening and ophthalmology services to share information in accordance with the Health Information Privacy Code.

Intermediate actions

- Pilot the enhanced IT systems in one or more DHBs.
- Ratify and publish the IT and associated standards and service specifications required for national uptake of improved systems.

Hospital inpatients with diabetes

Justification

People with diabetes tend to have more hospital admissions, stay longer and cost more, and they are more likely to be readmitted. There is good evidence of improvement in many of these measures, and of reduced readmissions, with use of diabetes inpatient specialist nurses (DISN).

Diabetes was the direct cause of 778 admissions for diabetic ketoacidosis in the 2005/06 financial year, and these admissions cost just over \$2 million. Over the five previous years these admissions had increased by 25 percent.

Inpatient treatment of diabetes and its complications make a significant contribution to ambulatory sensitive hospitalisations (ASH). Improvements in ASH for people with diabetes should include specific attention to improving inpatient care, discharge planning and effective follow-up to reduce readmission.

Health outcomes sought

- Rate of ASH admissions for diabetes-related causes is reduced.
- Excess length of stay for inpatients with diabetes is reduced.
- Objective and perceived quality of care for inpatients with diabetes is improved.

Indicators

- Number/rate of admissions in people with diabetes with:
 - a diabetes-specific event (diabetic ketoacidosis [DKA], hypoglycaemia)
 - any ambulatory sensitive hospitalisation (later split by diagnosis).
- Length of inpatient stay for people with diabetes (compared with non-diabetic patients for specific diagnoses/groups).
- Readmission rates (compare with non-diabetes where relevant).

Recommendations

- Review the existing differences among DHBs in inpatient services for people with diabetes to see if there are associated differences in length of stay or readmission rates.
- Specifically consider diabetes in practical research to reduce ASH.

Immediate action

- Commission a review of the evidence for interventions, with analysis of New Zealand data on hospitalisation rates and costs, to identify the best opportunities to improve outcomes and costs in people with diabetes.

Intermediate action

- Pilot proposals from DHBs for reducing ASH admissions, excess length of stay and readmissions in people with diabetes.

Type 1 diabetes: children and young people

Justification

Type 1 diabetes in children and young people has been increasing at the same relative rate as for type 2 diabetes in New Zealand and other developed countries – for reasons that are not yet clear. What is clear is that the lifetime risk of complications, including premature death, is highest in people who develop diabetes early in life. Good control in early life also appears to have lasting benefits in terms of fewer complications as adults (White et al 2001).

Type 1 diabetes in children inevitably has a major impact on family life and on a child's education. The ability to participate in sport and academic development are compromised by poor diabetes control well before physical symptoms become apparent (Jacobson et 2007). The Ministry of Education has developed specific policies for children with special needs. It recognises that teachers need good information and advice from health professionals to develop the competence and confidence to care for children with diabetes in the classroom and beyond.

This impact is not just in school aged children, however, because increasingly children under five years of age are developing type 1 diabetes. This trend in younger children places enormous demands on parents and carers, who understandably require more advice and support from their child's diabetes team than would be required for older children.

In older adolescents (age 15–19 years), there is a marked increase in the rate of hospital admission for DKA. In the five years to the 2005/06 financial year, the number of admissions increased from 100 to 193 per year. This increase should be investigated further, and services for this age group reviewed.

While type 2 diabetes was rarely seen in New Zealand children and young people 15 years ago, it is now the underlying cause of up to 15 percent of those attending some New Zealand paediatric/

adolescent diabetic clinics. If we follow United States trends, the proportion could reach 40 percent. Its prognosis is likely to include very premature cardiovascular and microvascular disease. It should be managed by expert teams.

Health outcomes sought

- Rate of avoidable admissions in people with diabetes aged under 25 years, particularly with DKA, is reduced.
- Diabetes control associated with reduced long-term complications is improved.

Indicators

Indicators of how well the health outcomes have been achieved are:

- distribution of HbA1c values by age group
- admission rates for diabetes in people aged under 25 years, and specifically for DKA.

Recommendations

- Enhance the information system used to support clinical care, applied research and clinical audit.
- Provide more clarity for children and their carers about the range of services that are available, and ensure that these services are nationally consistent.
- Improve the support provided by diabetes nurse specialists for teachers, in association with the development of specific provision by the Ministry of Education for children with special medical needs.
- Make specific provision for a structured hand-over from paediatric to adult care.

Actions

- Scope the enhancement of the existing Starship database and agree on a strategy for progressively aligning this database with other information systems used for continuing care, clinical audit and applied research.
- Develop a service specification for children and young people with diabetes. This specification should include particular provisions for the children, their families/carers and their teachers.
- Review the workforce and other requirements to deliver the services in the new specification.
- Commission an updated health technology assessment of the cost-effectiveness of insulin pumps and associated technologies.

Adults with type 1 diabetes face many similar issues to children and young people, yet their needs have received little attention in comparison with adults with type 2 diabetes.

Implementation

The Diabetes and Cardiovascular QIP will be jointly implemented by the Ministry of Health and DHBs through a consultation process with District Health Boards New Zealand.

DHBs will prioritise the recommendations following consultation, and these will be implemented over a three-year period. The EAG will review the QIP at regular intervals.

Data Supplements – National Outcome Data and Contextual Information

This section presents the latest available data on CVD risk assessment and management, ACS, stroke and diabetes. Its purpose is to provide background information and the context for the recommendations in the Quality Improvement Plan.

The data come from a number of sources, and the detailed methods for analysis are not presented here. Further details can be obtained from the Ministry of Health on request.

Prevention of CVD: CVD risk assessment and management

Public health approaches to preventing CVD are being implemented under the *Healthy Eating – Healthy Action Strategy* (Ministry of Health 2003). These approaches are complemented by personal health approaches for the assessment and management of absolute cardiovascular risk, which have a specific evidence-based guideline published in December 2003 by the New Zealand Guidelines Group (NZGG 2003).

The NZGG Guideline specifies that cardiovascular risk assessment (CVRA) requires a fasting lipid group test and, in people without an established diagnosis of diabetes, a serum glucose test. The other standard lipid tests ('cholesterol total', 'serum triglycerides – fasting only' and 'Lipoproteins, electrophoresis, serum') are not routinely used for CVRA and represent only 2 percent of all lipid tests.

Until more detailed CVRA information is available, CVRA uptake can be assessed using lipid tests, almost all of which are likely to be undertaken by a community laboratory. There is a national data warehouse for laboratory tests performed by all community laboratories. In 2006 approximately 93 percent of the records had a National Health Index number included with the laboratory code for each test performed.²

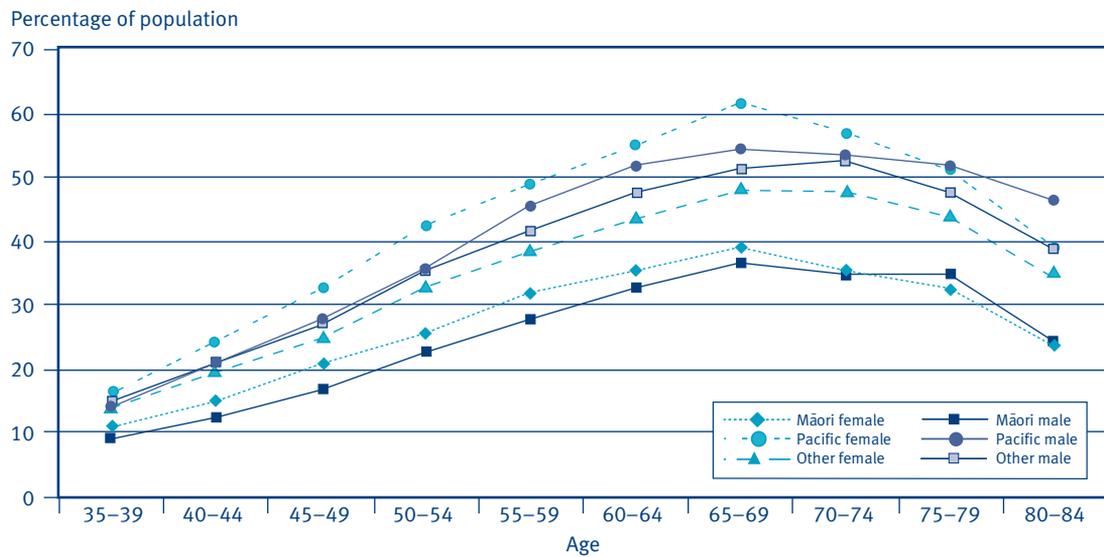
In the year from 1 November 2005 to 31 October 2006, there were 724,596 individuals who received a total of 983,839 fasting lipid group tests. Within these figures, 648,679 individuals aged 35–84 years received 892,668 tests.

The proportion of people in the DHB population (based on the census projection) who have had one or more fasting lipid group tests are presented as an indication of CVRA activity. Using this methodology, the major inequity of access appears to be for Māori, with relatively good uptake in Pacific peoples (Figure 3). Efforts to improve access to CVRA should therefore be targeted towards Māori.

There is a similar pattern for the 1.04 million serum glucose tests performed in community laboratories each year.

² The data warehouse does not include the result of the tests nor the reason why a given test was ordered (eg, for CVD risk assessment or monitoring lipid targets on treatment).

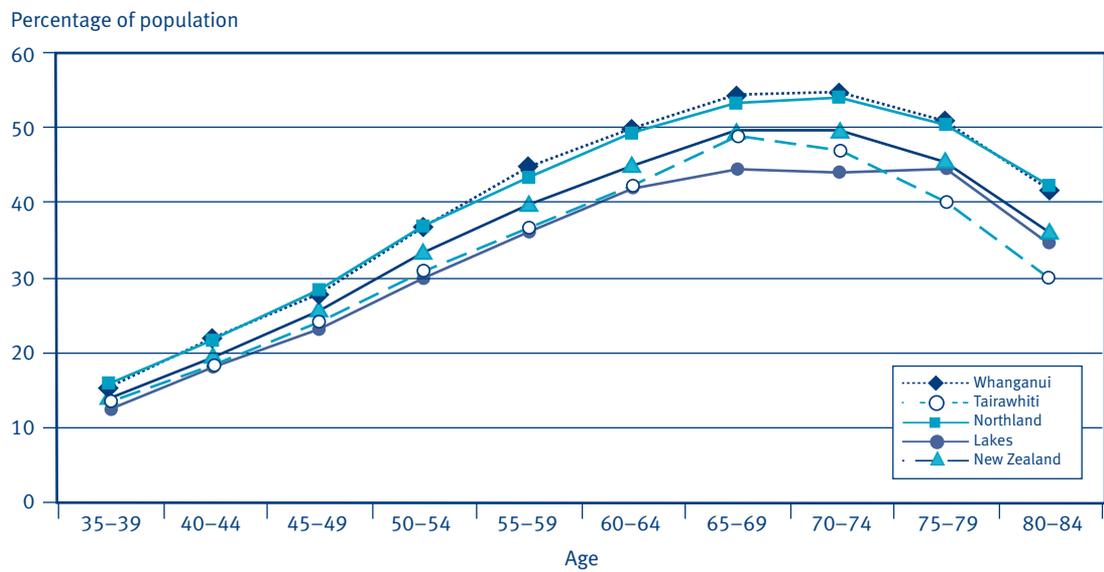
Figure 3: Proportion of individuals with 1+ fasting lipid tests as an indicator of CVD risk assessment, November 2005 – November 2006



Although nationally Māori appear to have inequitable access to CVRA, several DHBs (eg, Tairāwhiti) deliver equity of access to CVRA for Māori in their community. Their success demonstrates that equity of access is an achievable target if services are appropriately delivered.

The four DHBs that have populations with the lowest life expectancy and greatest inequality in life expectancy, however, are closely comparable with the national average in access to CVRA (Figure 4). This suggests that the relatively low life expectancy in these four DHB regions may be explained by differences in effective management of CVD risk factors (including smoking, diabetes, blood pressure and lipids) rather than by poor access to risk assessment.

Figure 4: Differences in fasting lipid tests for all ethnicities among DHBs that have populations with lowest life expectancies, November 2005 – November 2006



This review of access to CVRA supports the priority that the PHO Performance Programme has assigned to improving CVRA uptake in PHO-enrolled populations (especially for Māori), and then effectively managing those with high risk.

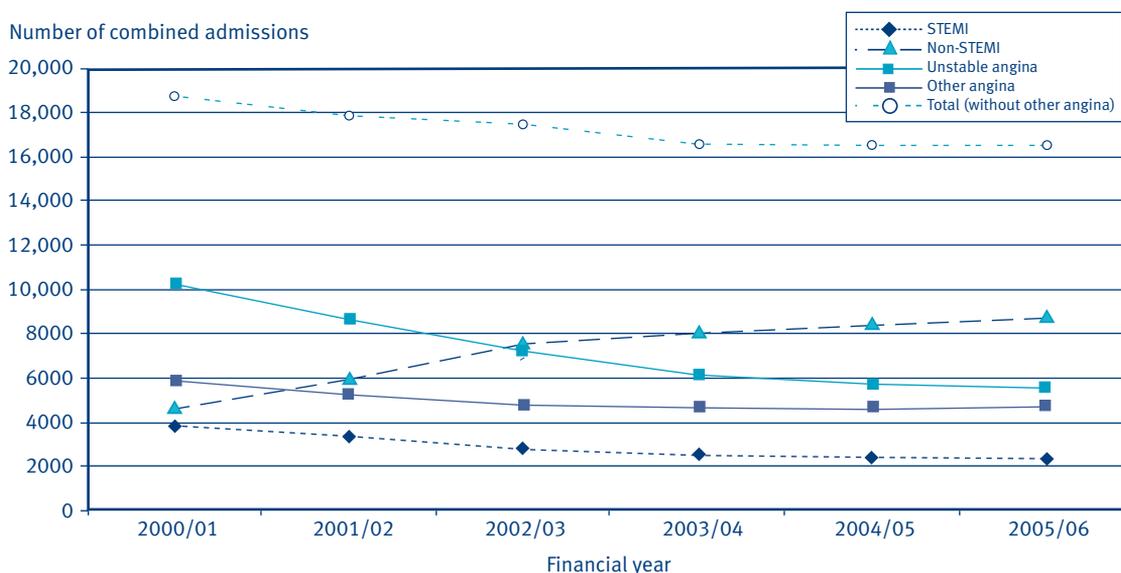
Acute coronary syndromes

Background

The total number of ACS patient admissions increased in the 1990s, but it has fallen slightly in recent years (Figure 5). The overall decline in admissions is consistent with changes in age-standardised ischaemic heart disease mortality reported recently in the *New Zealand Medical Journal* (Tobias et al 2006). These trends have occurred despite an ageing population and an increasing number of readmissions. Improved primary prevention (specifically statins, smoking cessation, nutrition and physical activity) and secondary prevention (during and after a cardiovascular event) are clearly important.

An initial decline in STEMI admissions since 2000 has now reached a plateau (Figure 5). The changing pattern of UA and non-STEMI suggests that coding may have taken time to adjust to the changing diagnostic criteria for ACS. If the increase in the number of non-STEMI is a real trend, then it would have an impact on the number of invasive procedures indicated in most guidelines, and potentially confound 30-day and one-year mortality trends. More work would be required to clarify these apparent changes.

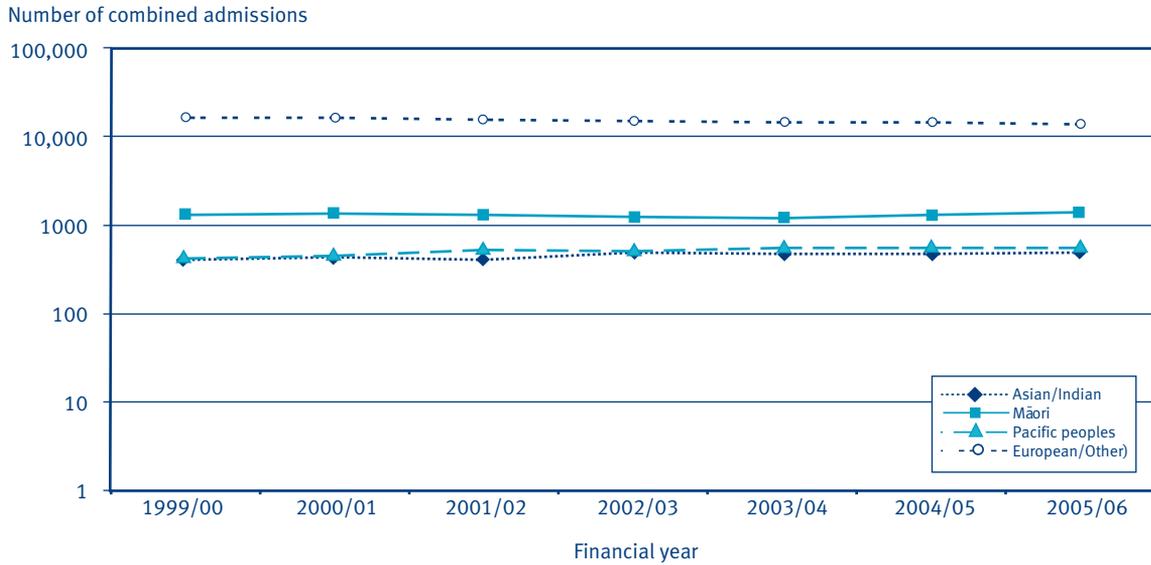
Figure 5: Acute coronary syndrome admissions (UA, STEMI, non-STEMI, with ‘other angina’ as a related condition), 2000/01–2005/06



In the late 1990s the number of admissions for Māori and Pacific peoples was increasing more rapidly than for other New Zealanders. Since then the number of ACS admissions has not fallen in Māori, Pacific and Asian populations (Figure 6).³

3 Note that the vertical axis is a logarithmic scale to illustrate trends in all groups.

Figure 6: Acute coronary syndrome admissions (all ACS, except 'other angina': I201 I208 I209), 1999/2000–2005/06

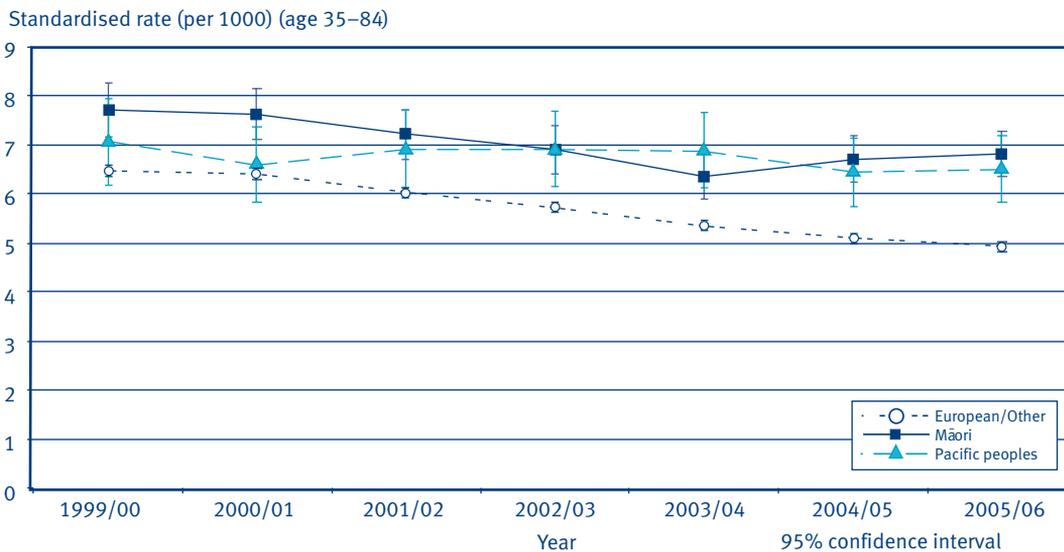


ACS risk and trends by ethnicity

Age-standardised rates should be used to compare ACS incidence by ethnicity. These rates are based on the number of people with one (or more) ACS admissions in each year.

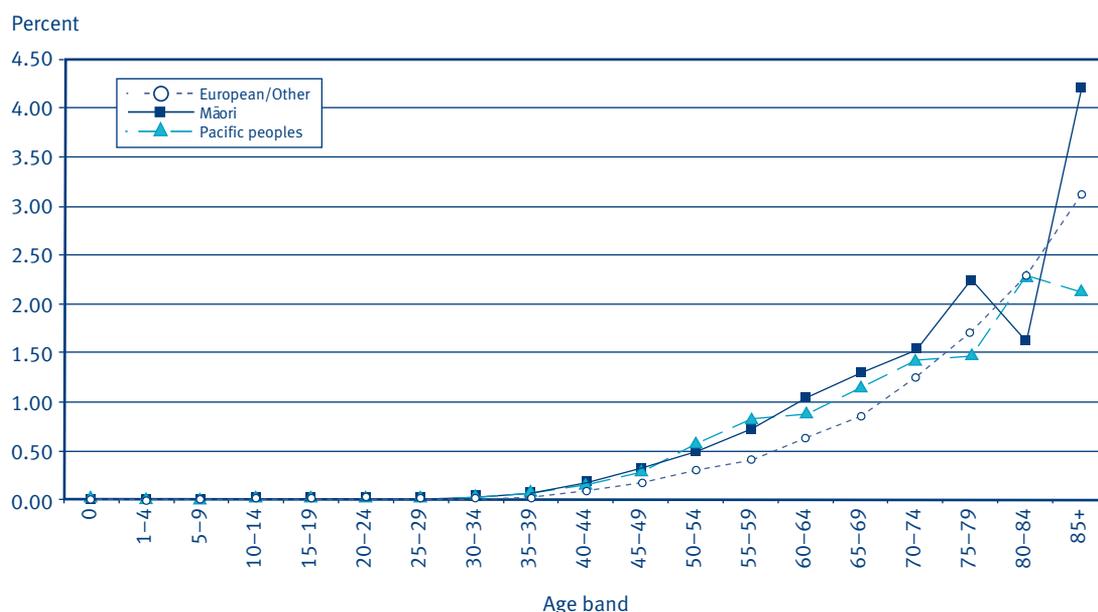
There is no statistically significant difference in these ACS rates between Māori and Pacific peoples. However, in recent years New Zealand Europeans and other ethnicities have experienced significantly lower rates when compared with Māori or Pacific peoples (Figure 7).

Figure 7: Acute coronary syndrome admission rates, 1999/2000–2005/06 – age-standardised on New Zealand population



As a consequence, in the 2005/06 financial year the proportion of people who experienced one (or more) ACS admissions was slightly higher for Māori and Pacific peoples than New Zealand Europeans and other ethnicities at almost all ages (Figure 8).⁴ These differences are likely to be associated with known differences in obesity-related risks (diabetes and metabolic syndrome) and smoking, as well as with differences in access to and the quality of risk assessment and management. The most important comparison for individuals, however, is absolute (not relative) difference in the rate of ACS (as displayed in Figure 8), which was less than 0.5 percent in any age band in the range from 35 to 79 years old.

Figure 8: Acute coronary syndrome incidence by age and ethnicity, one (or more) admissions, 2005/06



Treatment of ACS: revascularisation

Revascularisation is a major objective during hospitalisation for treatment of ACS (UA or MI) and can be achieved with angioplasty/stents, PCI or coronary artery bypass graft (CABG). This review highlights the proportion of patients who had revascularisation procedures – PCI or CABG – during the initial episode of hospital care.⁵

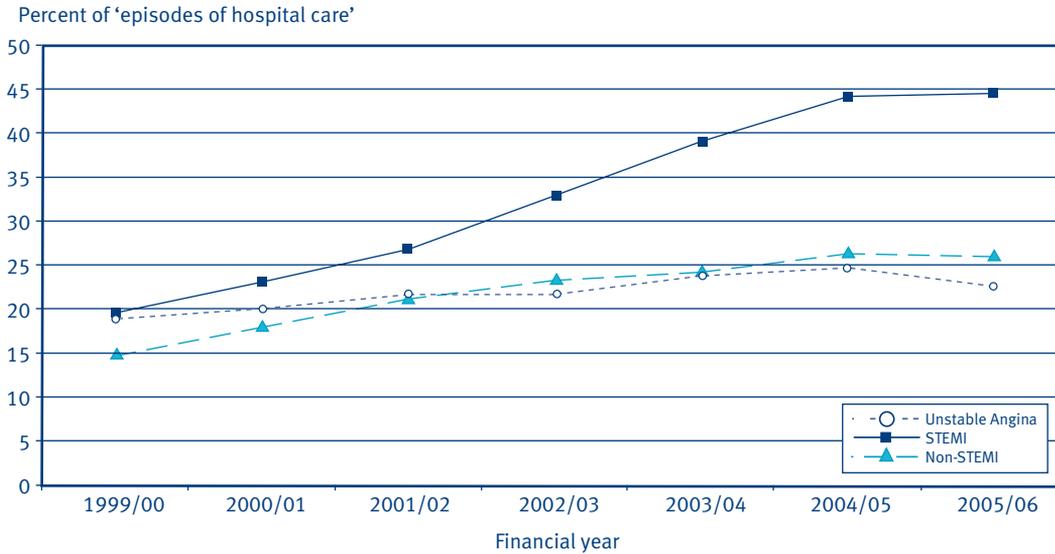
For STEMI, the proportion of patients who receive revascularisation procedures (Figure 9) has increased markedly. This pronounced increase is evident for all ethnicities.

Māori were less likely to have a revascularisation procedure for STEMI in the 2005/06 financial year, but this tendency is in part a consequence of regional differences. Within each region, equity for Māori is generally good.

4 Note that there are few Māori and Pacific peoples with ACS over the age of 80 years so these rates have a wide confidence interval.

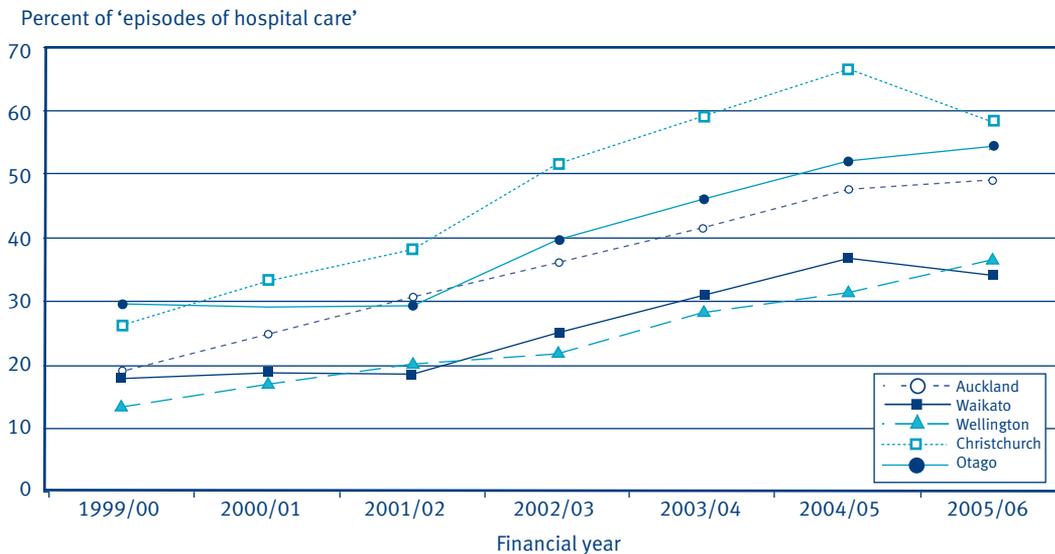
5 There are no consistent national data about thrombolysis before or during hospital admission for ACS.

Figure 9: Revascularisation procedure rate (angioplasty, CABG), 1999/2000–2005/06



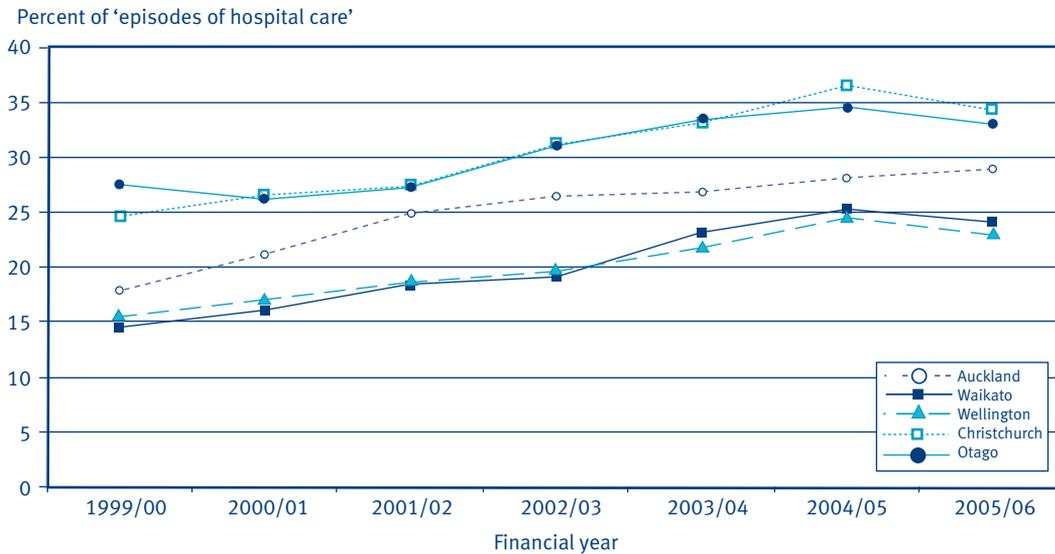
There are regional differences in intervention rates (Figure 10). The regions are grouped by the networks for cardiology services (so, for example, Nelson-Marlborough is included with the Wellington region).

Figure 10: Revascularisation rate trends by region for STEMI (angioplasty, CABG), 1999/2000–2005/06



The proportion of all ACS patients with revascularisation procedures also demonstrates regional differences (Figure 11).

Figure 11: Revascularisation rate trends by region for all acute coronary syndromes (angioplasty, CABG) – UA, STEMI, non-STEMI, 1999/2000–2005/06



The timing of angioplasty in an ‘episode of hospital care’ is determined by the access to a catheter facility in the first admitting hospital and, for secondary hospitals, by the delays in referral and transport to the appropriate tertiary centre. For angioplasty provided during the continuous episode of care (ie, excluding elective and ‘acute arranged’ angioplasty after discharge), there have been progressive increases in immediate angioplasty (day of admission) for all financial years from 1998/99 onwards (Figure 12). This trend may be due to an increase of STEMI patients taken straight to a catheter facility as soon as they present to hospital.

In the 2005/06 financial year there were 3710 angioplasty procedures in the initial episode of hospital care for people admitted with ACS. Of this total, 27.5 percent were undertaken on the day of admission, 19.5 percent on days 1 and 2, and 17.6 percent on days 3 and 4 (Figure 13).

Figure 12: Timing of angioplasty after acute coronary syndrome – days from admission to angioplasty during initial ‘episode of hospital care’, 1999/2000–2005/06

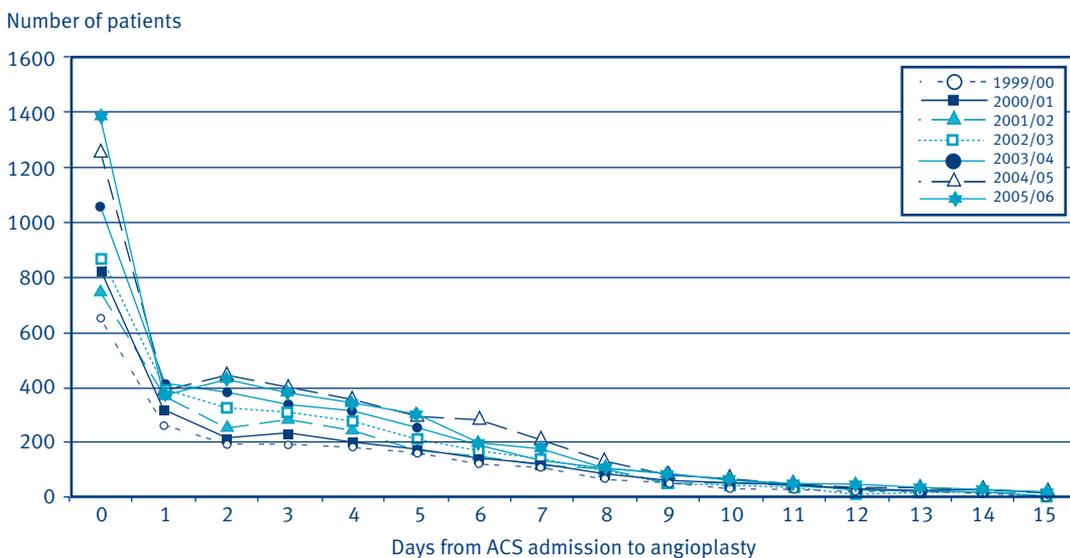
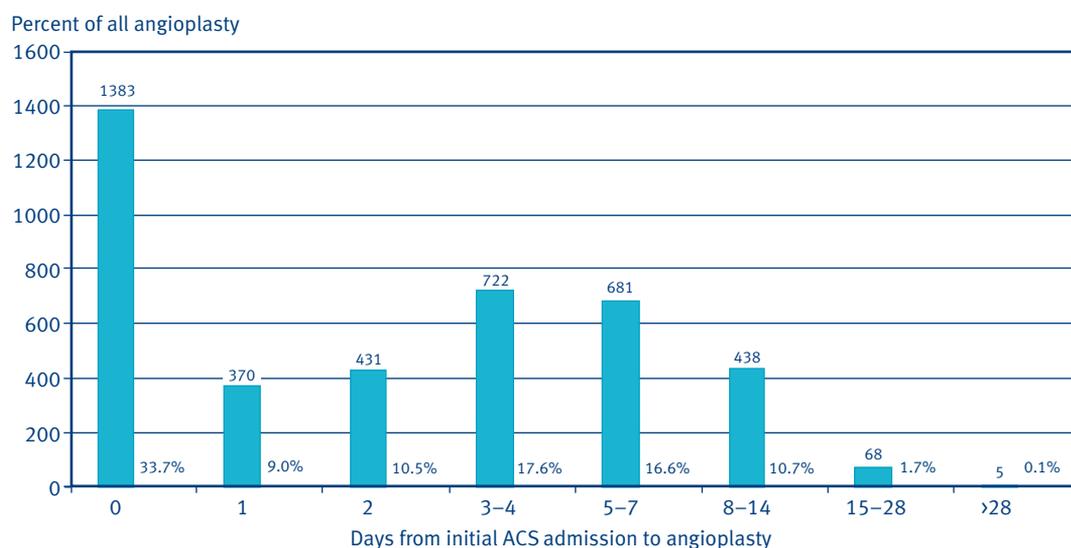


Figure 13: Time to angioplasty after acute coronary syndrome – days from admission to angioplasty during initial ‘episode of hospital care’, 2005/06



Survival after ACS

It is not possible to establish from the ICD-10 coding system the patients who were admitted for treatment of their first ACS. The most consistent approximation is to select those patients who have no preceding ACS admission in a fixed period (five years in this analysis) before their admission. This method reduces the impact of people with recurrent ACS, for whom mortality is likely to increase with the number of ACS events.⁶

In addition the implementation of troponin and the progressive changes in coding UA and non-STEMI make it potentially misleading to report mortality with this methodology for these types of ACS. The diagnostic criteria for STEMI have remained more consistent, and therefore only survival after STEMI is presented in this review.

During this period there have been several improvements in access to immediate angioplasty programmes, increased in-hospital CABG, cardiac rehabilitation, statin prescribing after ACS and access to smoking cessation. It is not possible to infer which changes have contributed to observed changes in survival.

The absolute number of Asians with STEMI is fairly low (80 in the 2002/03 year, with 12 deaths within one year), making rates unreliable for this group. In addition, given that Māori and Pacific peoples would be expected to have a younger average age at ACS than New Zealand Europeans, their ‘all-cause’ survival should be better. In reality, however, there has been a trend to improvement for Pacific peoples and New Zealand European/Others but not for Māori (Figure 14) since the 2002/03 financial year.

One-year mortality is remarkably similar among regions (Figure 15).

⁶ These people are, however, an important subgroup, despite being excluded from this analysis.

Figure 14: Survival rate one year after STEMI for different ethnicities (for people with no ACS in previous five years), 1999/2000–2004/05

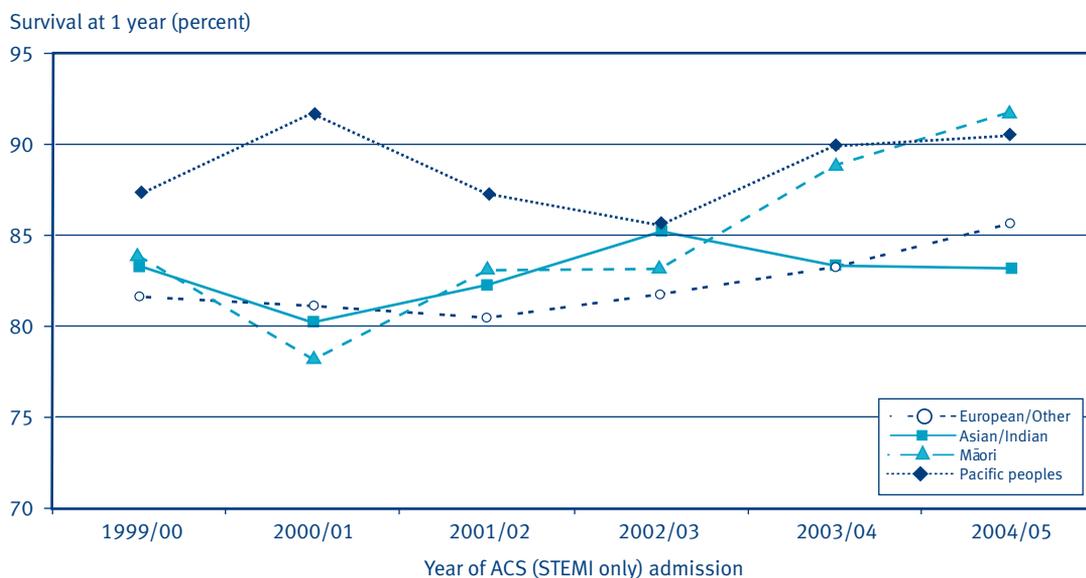
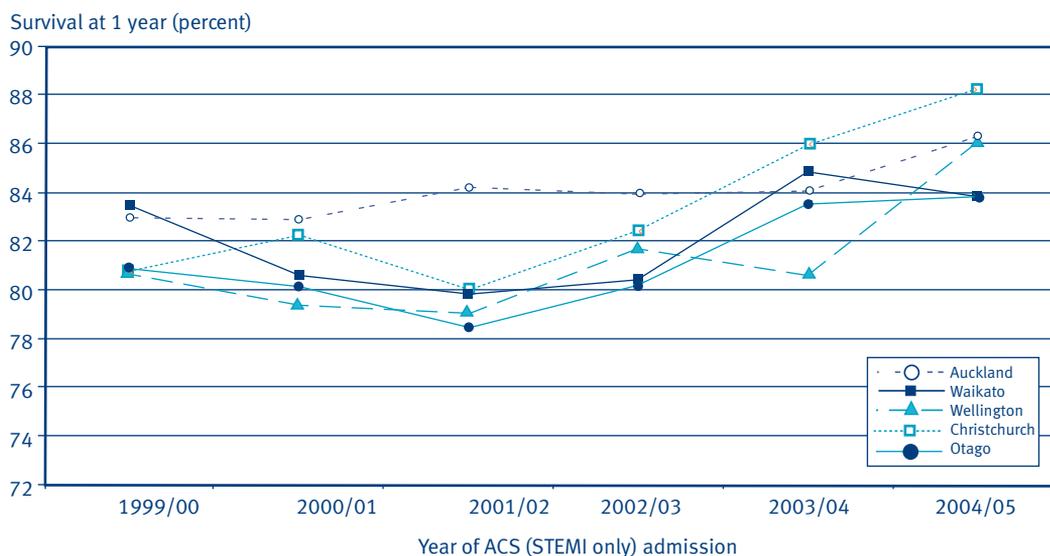


Figure 15: Survival rate one year after STEMI (for people with no ACS in previous five years), 1999/2000–2004/05



Stroke

Data ascertainment

Comparable national data for stroke, stroke services and stroke outcome are sparse relative to such data for CHD and diabetes. The lack of organised stroke services containing specialist staff, not only to deliver services but also to facilitate the documentation and collection of relevant data, is a major underlying cause. Lack of current robust clinical classification and agreed extended data sets contributes to this situation as well. The framework for data collection needs to develop in parallel and iteratively with the development of organised stroke services.

Implementation of organised stroke services

Stroke is a major health problem in New Zealand. There is overwhelming evidence that the most important intervention that can improve outcomes for people with stroke is the provision of organised stroke services, a core component of which is an inpatient stroke 'unit'. Organised stroke services prevent one death or serious disability for every 18 managed patients as compared with conventional approaches in general wards. Benefits have been demonstrated beyond 10 years after stroke, and cost savings should ensue from reductions in hospital length of stay and in numbers requiring rest home or private hospital care.

The first priority for DHBs is to set up organised stroke services with a team of experts in stroke and stroke rehabilitation. The definition of an organised stroke service and its key components are set out in the 2003 guidelines (Stroke Foundation and NZGG 2003) and all other international guidelines.

Guidelines to assist DHBs in the delivery of organised stroke services (including the key components of such a service) accompanied the introduction of the relevant performance indicator as part of DHB accountability documents.⁷ Currently DHBs are required to report annually (in the third quarter) on this indicator, as follows.

Numerator (data source DHB) – the number of people who have suffered a stroke event who have been admitted to organised stroke services and remain there for their entire hospital stay.

Denominator (data source DHB) – the number of people who have suffered a stroke event.

A partial achievement rating will be obtained by demonstrating how the DHB is developing capability to measure this indicator and ensuring they have organised stroke services

An achieved rating will be obtained by being able to measure this indicator to show how well the organised stroke service is accessed.

An outstanding performer/sector leader will be obtained by demonstrating an increased percentage of people receiving organised stroke services since 2005/06.

Only some DHBs have organised their stroke services to any extent, and others are in development. Few DHBs meet all the criteria for organised stroke services set out in the Stroke Foundation and NZGG guidelines. Understandably, smaller DHBs, in particular, appear to be having difficulty in incorporating the guidelines into their organisational planning processes.

The level and organisation of stroke services at a particular hospital or within a region will depend to some extent on the number of people with stroke admitted per year. This number will vary according to population and demography and a simple formula to estimate it is available from the Stroke Foundation. The organised stroke service specification has a suggested configuration for DHBs of various sizes that acknowledges likely constraints and identifies key elements of the service. These elements are capable of being structured into a 'role delineation model'. This can be used for sequential stock-take audits to display and encourage developmental service implementation for each DHB, as appropriate.

A recent modelling in the Australian setting suggested that improved access for eligible stroke patients to effective acute care and secondary prevention, together with improved primary prevention, would be cost-effective and produce health-related benefits.

⁷ Mobile stroke advisory teams do not fall within the definition of organised stroke services, but may be an interim developmental option.

Stroke networks

An initiative from the Stroke Foundation in recent years has been the promotion of stroke networks, providing an environment for clinical staff, as well as planning and funding staff, from DHBs at different stages of development of their stroke services to meet and share ideas.

These networks have had a significant impact through helping initiate implementation of stroke services, especially at smaller DHBs, and providing tertiary-level support for some services (eg, thrombolysis in the northern region). They have also contributed by promoting the distribution of protocols and systems implementation templates for various aspects of inpatient services, which avert the need to ‘reinvent the wheel’ at each DHB.

The local value of these networks in building capability and capacity is likely to continue for several years while services develop. Facilitative support for establishing informal networks and their development into more formalised networks, according to regional and local needs, should be a priority for the Ministry of Health and DHBs. Regional co-ordination of service delivery at a structural level is not envisaged.

Audit

Formalised retrospective clinical audit is demanding of resources and requires a tool that is suited to New Zealand requirements, with adequate cover of both acute and rehabilitation aspects. An audit of New Zealand stroke rehabilitation services in 2003 found that ‘the organisation and type of rehabilitation services available for people with stroke were not consistent with best practice or accepted guidelines’.

A modification of the Royal College of Physicians’ (UK) audit package or linking through the Australasian networks to the National Stroke Foundation (Australia) audit resources are options on which agreement could be sought through the clinical networks of the Stroke Foundation of New Zealand. In 2007, the National Stroke Foundation (Australia) produced audits of both acute and rehabilitation services that could be used for comparison and as a baseline methodology.

Intensity and efficiency of rehabilitation

Information from an international study of six rehabilitation facilities in the United States of America (USA) and one in New Zealand, covering 1300 consecutive stroke admissions, showed a higher intensity of rehabilitation in the United States (US).

The US patients were slightly more disabled but younger and more independent prior to the stroke. During the rehabilitation admission, the US patients received more therapy time. These inputs also tended to have a relatively higher intervention focus, with proportionately less ‘assessment’. In the study as a whole, ‘higher level’ activities were associated with better outcomes whatever the state of the patient. At hospital discharge, 22 percent of the New Zealand patients went to institutional care versus 13 percent for the US patients.

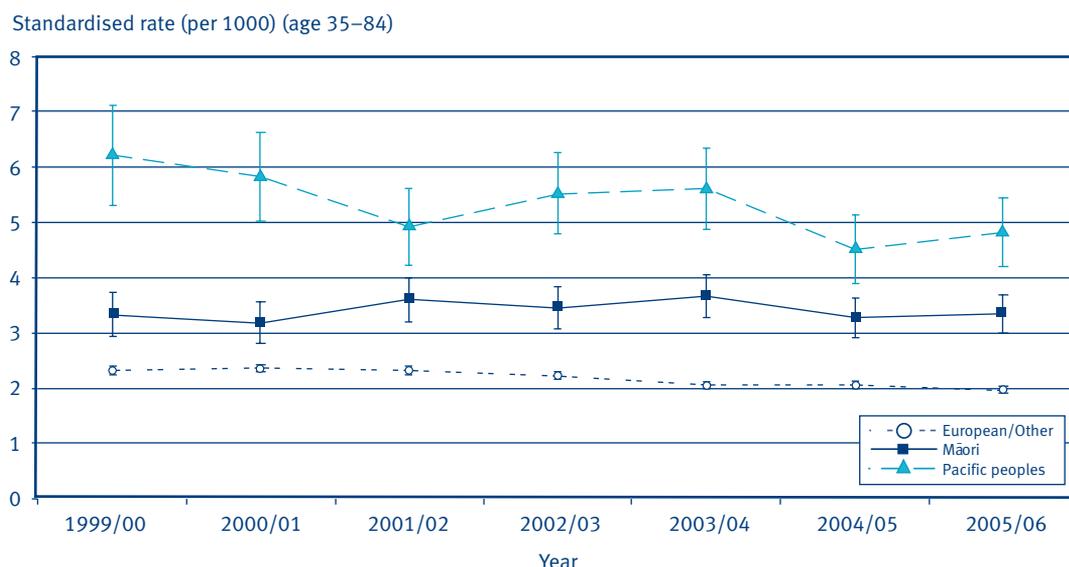
One explanation of these data is that resourcing intensive therapeutic inpatient rehabilitation, combined with an emphasis on higher level activities, may lead to shorter length of stay and fewer patients discharged to institutional care. Other explanations, and contributing factors, are possible, especially as they come from an observational study involving only one New Zealand centre. However, staffing on most New Zealand stroke rehabilitation units is well below that contained in overseas rehabilitation medicine guidelines. This may reflect traditional staffing structures within specialist health services for older people.

If more intensive therapy is confirmed as conferring outcome benefit, this will have workforce implications, including flexibility of staffing and skill-mix training for those delivering neuro-rehabilitation.

Inequalities in the incidence of stroke

The age-standardised incidence of stroke is significantly higher in Māori and, especially, Pacific peoples (Figure 16).⁸ Without more effective CVD risk management in the community, the absolute number of stroke events will rise as these populations gradually age, especially given that the age-related incidence is skewed towards younger ages relative to the wider population. In combination with worse outcomes after stroke for Māori and Pacific peoples, it is predicted that a higher burden of stroke will fall on these communities unless there are more effective interventions based on prevention and treatment. Information about the impact of stroke on the growing Asian populations in New Zealand is dependent on the refinement of data-set collection.

Figure 16: Stroke admission rate, 1999/2000–2005/06 – age-standardised on New Zealand population



Relevance of risk factor management to stroke

Increased uptake of CVD risk assessment and management for major risk factors, including atrial fibrillation, are important for improved primary and early secondary prevention. This responsibility does not sit solely within the primary sector.

Overseas studies show that increased use of preventative treatments and major reductions in pre-morbid risk factors have been associated with a 40 percent reduction in the age-specific incidence of major stroke over two decades. The confirmatory linked lessons arising from such studies are that CVD risk assessment and management are as relevant to stroke prevention as to ACS and should be strongly considered for older patients (other than those managed with a palliative approach), who often receive the greatest absolute benefit.

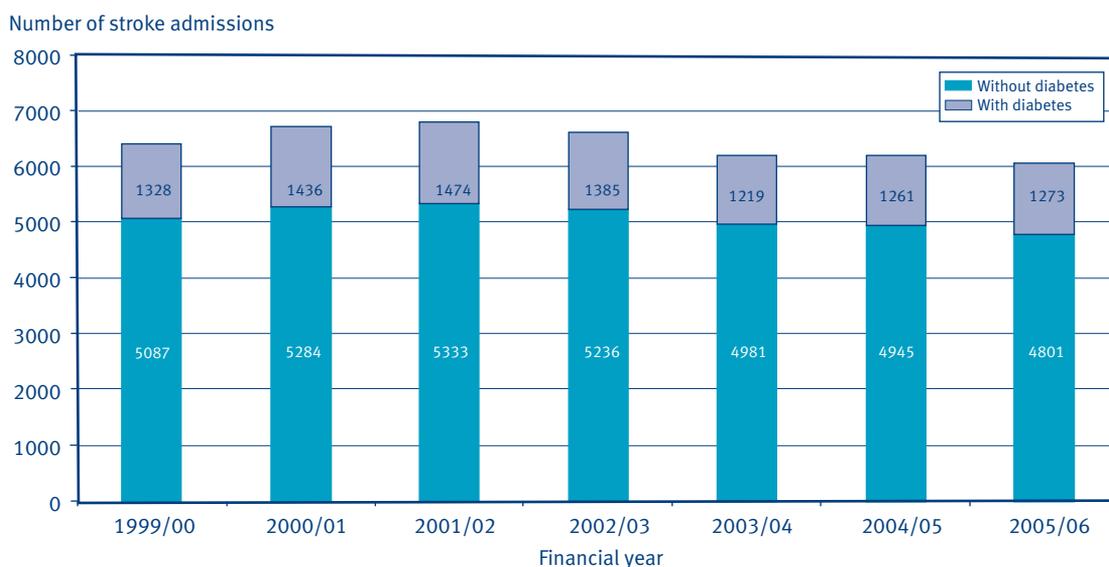
Hypertension is a major risk factor for stroke and is particularly important in type 2 diabetes. Type 2 diabetes is associated with a long-term increase in which relative stroke risk is doubled or trebled, even after correction for other risk factors. Recent overseas research suggests that

⁸ These rates are based on admission to hospital.

there is a twofold, short-term risk within five years of diagnosis and that this relative risk, which is often unrecognised, may be more marked in younger patients. This finding would support early aggressive management of CVD risk factors at all ages.

The steady proportion of stroke admissions that are recorded as having diabetes suggests that CVD risk management in people with diabetes may have improved enough in recent years to initially reduce, and then maintain, the number of people with diabetes admitted with stroke (Figure 17). This reduction has happened in spite of the escalating prevalence of type 2 diabetes associated with obesity and the ageing population. During this period, improvements in the quality of CVD care been demonstrated in people with diabetes who access the Get Checked programme, but these improvements will need to continue or diabetes will again contribute to an increasing number of strokes.

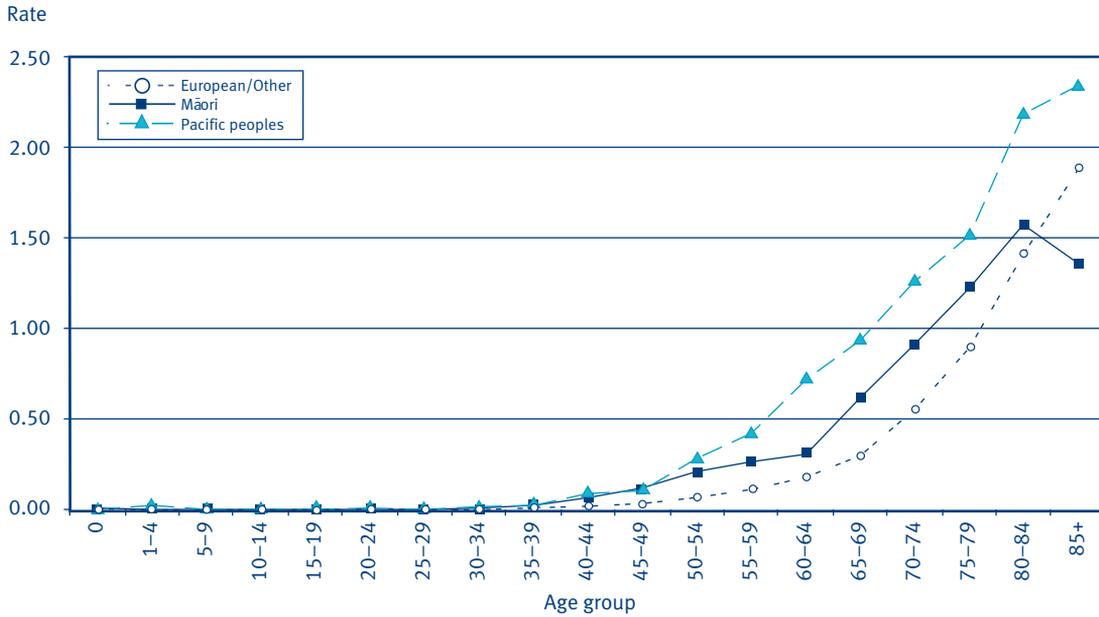
Figure 17: Number of stroke admissions with diabetes, 1999/2000–2005/06



The absolute risk of stroke increases markedly with age (Figure 18), especially for Pacific peoples at younger ages (see also Figure 8 for comparable data for ACS). As the population ages, age-related changes in risk factor and co-morbidity prevalence will have a complex interactive influence on both stroke rates and outcomes. The contribution of stroke to death (third leading cause) and disability (largest cause of adult disability) indicates the potential impact of organised stroke services on the health of older people.

Implementation of organised stroke services spans personal health and disability sectors which, together with the primary sector, have roles in CVD prevention. Stroke forms a major clinical workstream for specialised health services for older people (with service specific guidelines), which deliver the bulk of all-aged sub-acute and rehabilitation stroke services. Their expertise in older presentation, rehabilitation, continuum of care, complications and consequences is highly relevant.

Figure 18: Stroke rate of patients with one or more strokes, 2005/06

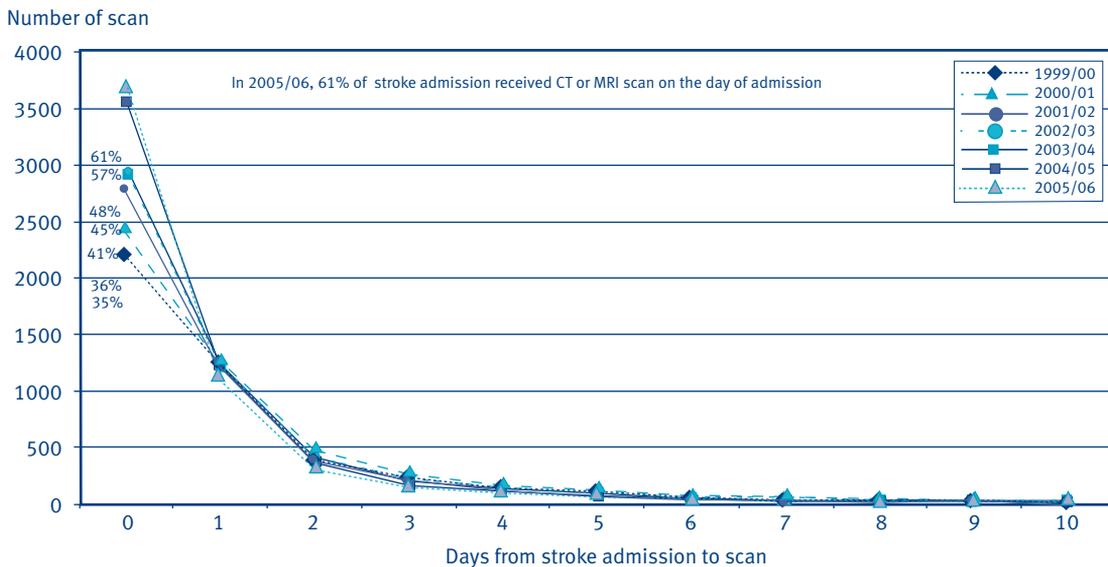


Delays in access to treatment of stroke and TIA

Non-presentation, delayed presentation, and lack of urgency and intensity of medical management continue to be areas for ongoing improvement in order to gain the well-established benefits of early active management and institution of secondary prevention. Ways to secure these improvements are the subject of public information campaigns by the Stroke Foundation.

Earlier imaging after stroke has improved (Figure 19) but few other data sets are collected.

Figure 19: Timing of CT or MRI scan (brain) after stroke, 1999/2000–2005/06



The importance and feasibility of urgent prioritised clinical management of transient ischaemic attacks have only recently been fully appreciated. Information on this approach needs to be incorporated into data collection for assessment of outcomes.

Transient ischemic attack assessment tool

About 15–20 percent of stroke patients have a preceding TIA. Over the last few years, new evidence has highlighted that the risk of stroke after a hemispheric TIA is greatest in the first few days. Thereafter the risk lessens but is still as high as 10 percent by 30 days, and 20 percent by 90 days. Prognostic models using stroke risk predictors are starting to be employed to stratify risk and prioritise access to investigation and evolving optimal management.

The existing slow response of services to this clinical presentation is becoming an area for urgent quality improvement, with the potential to prevent a significant number of strokes with appropriate early treatment. Recent data indicate that half the risk in the first month applies in the first two days. Thus, given that the *Management of Stroke* guidelines (Stroke Foundation and NZGG 2003) recommend that all patients with a TIA or minor stroke who are not admitted to hospital should have a specialist assessment (by someone knowledgeable about stroke) within 14 days (preferably within 7 days), there is a need to review this recommendation, taking into consideration the benefits of more aggressive management.

Stroke expert opinion now favours treatment of people with a TIA, or minor stroke with certain features, in an analogous fashion to people with UA. A combined tool has been validated in the United Kingdom and United States, in different cohorts. This tool allows the triage of people with TIA into a high-risk group who should be immediately admitted to hospital and a lower-risk group who need urgent outpatient assessment, prophylaxis and investigation.

It would be advantageous to develop this stratification tool for the New Zealand environment and promote its use, with recommendations for ensuing assessment. These measures should have the dual effect of limiting unnecessary bed days for some people with TIA and preventing some strokes in high-risk people. Preliminary results from international trials indicate that early treatment within the first 24 hours of a TIA reduces the incidence of stroke.

Based on a generally accepted figure of \$50,000 per new stroke in direct (DHB-funded) health services, a relatively low number of strokes need to be prevented to justify some intensification of services for people with TIA. Akin to organised stroke services, many of the general components already exist (eg, radiology, surgical services, cardiological services, stroke-interested physicians). What is required is simply to make them work together in a timely and seamless fashion.

Distribution of simple risk score information would increase awareness among the public and health professionals of both TIA symptoms and the need for urgent medical attention.

Diabetes

This section presents the latest available data on diabetes. Data have been sourced from the national Get Checked system. Get Checked is a programme that entitles people who have been diagnosed with diabetes to have a free annual review of key tests with their doctor or nurse and plan treatment for the year ahead. One limitation of the data is that they represent an annual slice, not a longitudinal cohort, therefore individuals' outcomes cannot be tracked over time.

The Get Checked system was specifically designed to support active performance management, and the use of targets.

The three indicators used for national targets are:

1. **diabetes detection and follow-up** – number of people with diabetes having annual check divided by the expected number of people with diagnosed diabetes
2. **diabetes management** – percentage of people in Get Checked with good or satisfactory diabetes control (HbA1c < 8 percent)
3. **retinal screening uptake** – percentage of people in Get Checked who have had their eyes screened in the last two years.

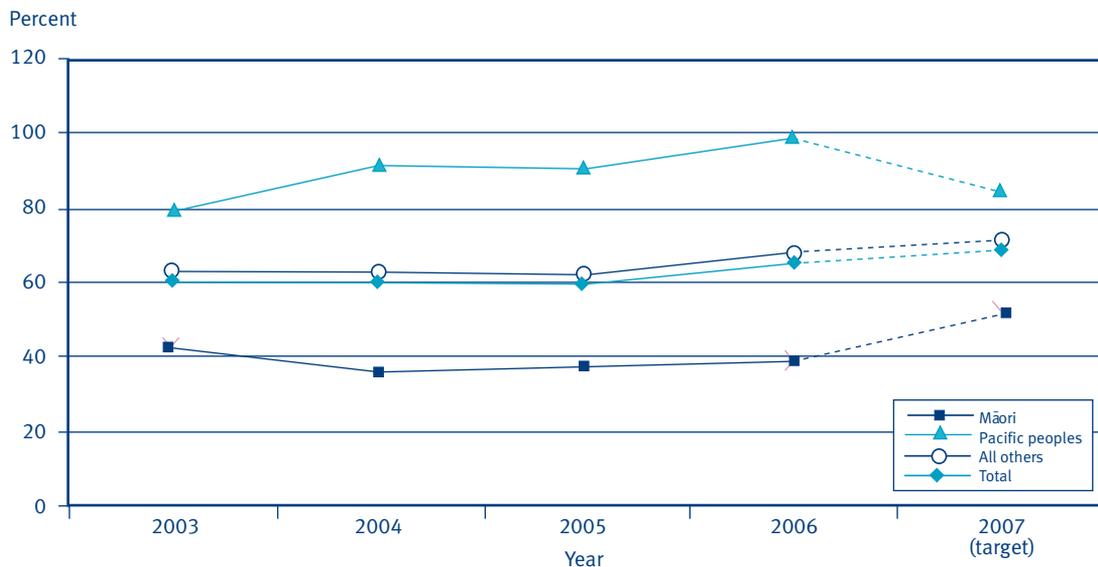
The indicators are important in their own right as a cause of disability or death, but they also probe a wider range of aspects of performance. For example, retinal screening is important in reducing avoidable blindness, but it also reflects the extent to which services usually provided from hospitals are integrated with primary health care.

Diabetes detection and follow-up

The indicator of diabetes detection and follow-up (Figure 20) is the proportion of people with diagnosed diabetes who have a free annual check each year. It is a measure of systematic delivery of care.

This indicator has reached a dynamic equilibrium, with persisting inequity for Māori.

Figure 20: Diabetes detection and follow-up rates for Get Checked, as percentage of expected number by year, 2003–2007



There remains substantial variation among DHBs for this indicator. In 2006 the best overall result by a DHB was 88 percent, and the lowest result was 44 percent.

The estimated number of people with diagnosed diabetes is the denominator for this indicator. The actual number has increased (especially ‘all other’ ethnicities) by more than the Ministry of Health’s mathematical model predicted (the model was only based on increasing obesity and demographic changes). This difference may be, in part, a consequence of better diabetes detection (improved screening and diagnosis), but the Ministry is updating estimates used as the denominator for this indicator.

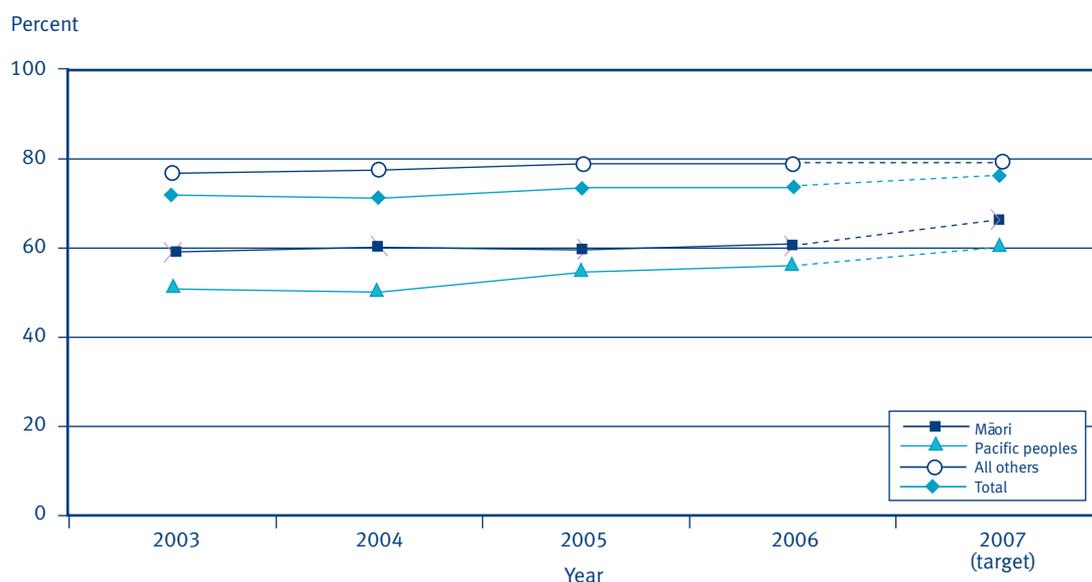
There is a small ethnicity bias that makes a small difference to the apparent inequity for Māori. One option to correct this bias is to use the PHO database to estimate the number of Māori people in the PHO-enrolled population. This approach is feasible because PHO enrolment is now over 94 percent.

Diabetes management

The diabetes management indicator (Figure 21) is defined as the proportion of people in Get Checked each year with good or satisfactory diabetes control. It reflects the effectiveness of care (for people who access Get Checked).

Nationally there is an encouraging trend to improved equity for Pacific peoples, and perhaps for Māori. The best-performing DHB overall in 2006 was Taranaki DHB, with 82 percent on this indicator for ‘Total’; it has also sustained an improvement in equity for Māori since 2003.

Figure 21: Diabetes management – HbA1c less than or equal to 8 percent (satisfactory or better control) by year, 2003–2007 for people in Get Checked

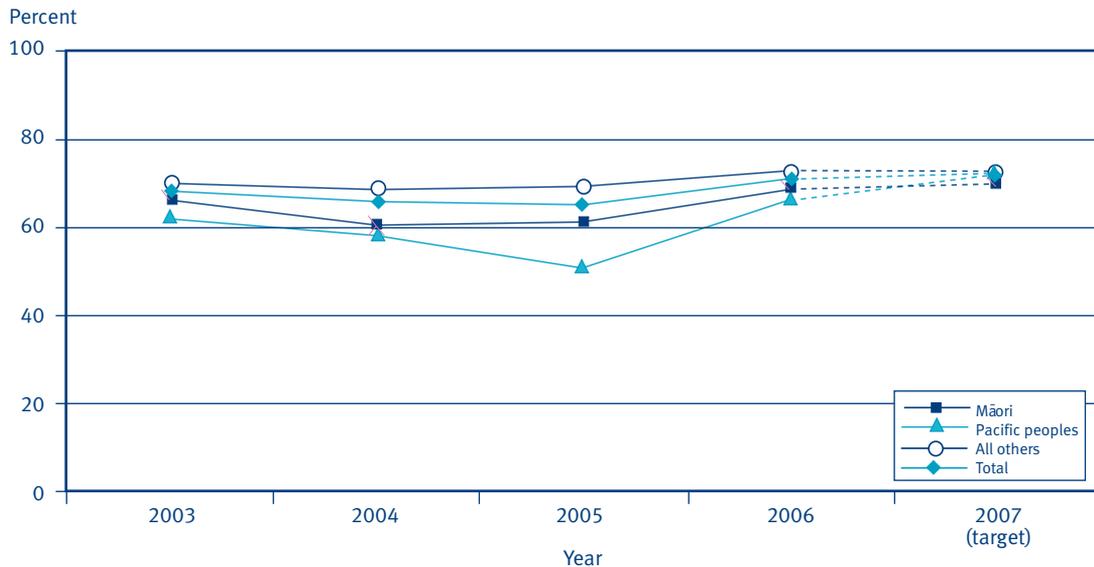


Retinal screening

The retinal screening indicator (Figure 22) is the proportion of people in Get Checked who have had their eyes screened to detect the early signs of diabetes complications in the preceding two years. Screening, followed by laser treatment if required to prevent avoidable blindness, is widely accepted as cost-saving for a comprehensive health service.

A significant contribution to the limited performance on this indicator has been poor data quality. There has been good overall progress, and encouraging DHB support, for implementing a consistent grading system with specific referral criteria, the *National Diabetes Retinal Screening Grading System and Referral Guidelines* (Ministry of Health 2006).

Figure 22: Retinopathy screening – percentage with eyes screened within preceding two years, 2003–2007

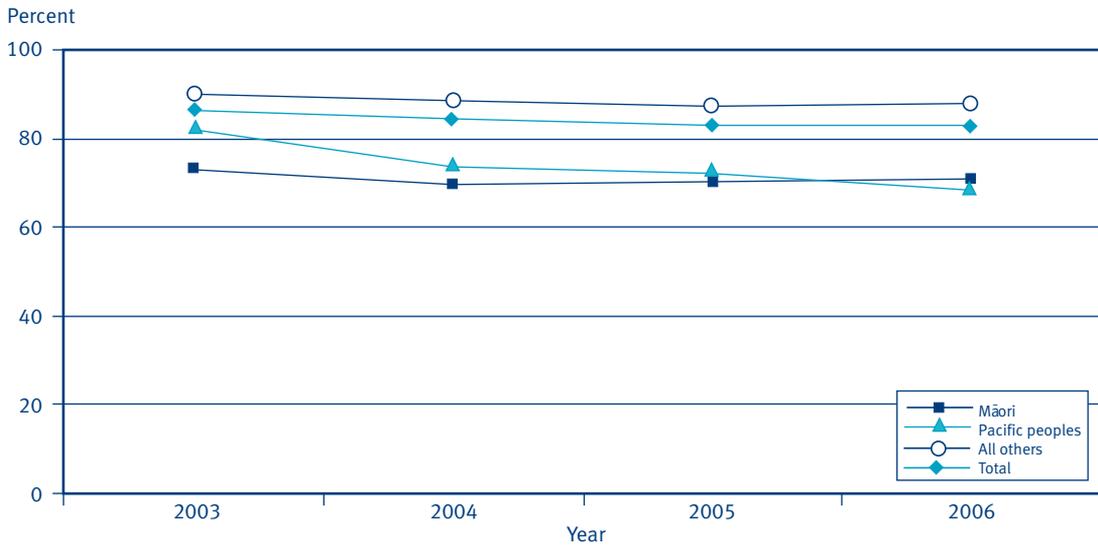


Cardiovascular risk factor control

The quality of cardiovascular care for people with diabetes in Get Checked has been improving markedly over the last six years. In 2001 only 60 percent of Māori had a lipid test reported in the preceding year (compared with 78 percent as a national average). Of the Māori who had a lipid test, 20 percent had seriously raised cholesterol over 9 mmol/l (compared with 5 percent for all ethnicities) and only 6 percent were on a statin (compared with 12 percent for all ethnicities). By 2005 Māori were more likely to have had a lipid test, less than 1 percent had a seriously raised cholesterol, and 55 percent were on a statin (higher than for ‘all other’ ethnicities). Māori and Pacific peoples in Get Checked programmes are also more likely to be on ACE inhibitors than ‘all other’ ethnicities.

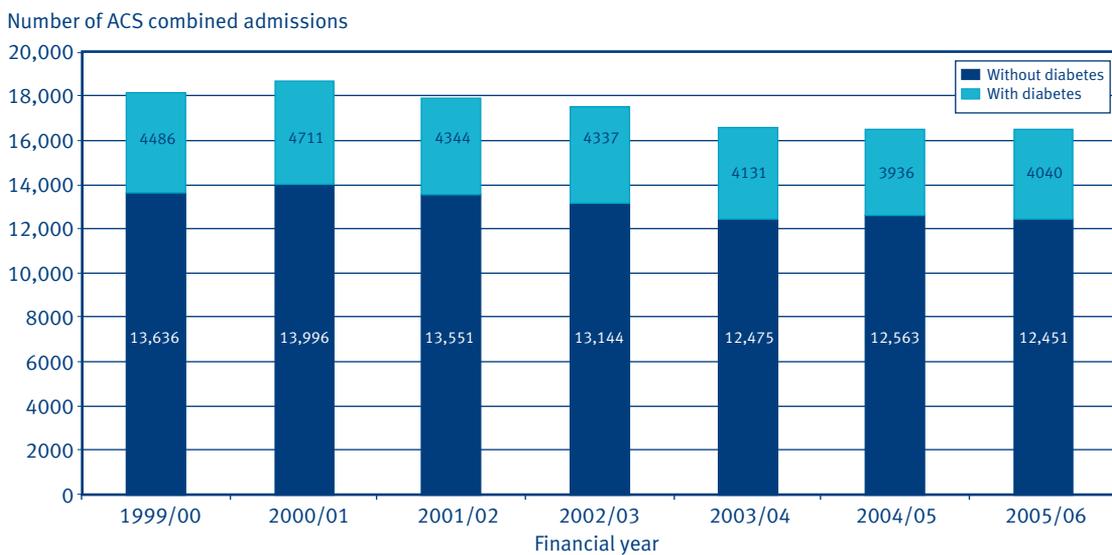
The proportion of Māori who are smokefree has fallen in the last five years (Figure 23).

Figure 23: Percentage of Get Checked participants who are smokefree by year, 2003–2006



Improvements in overall CV risk factor management are entirely consistent with the falling number of people admitted for ACS with diabetes coded in the discharge record (Figure 24). This trend is occurring in spite of increasing numbers of people with diagnosed diabetes in the older population most at risk of ACS.

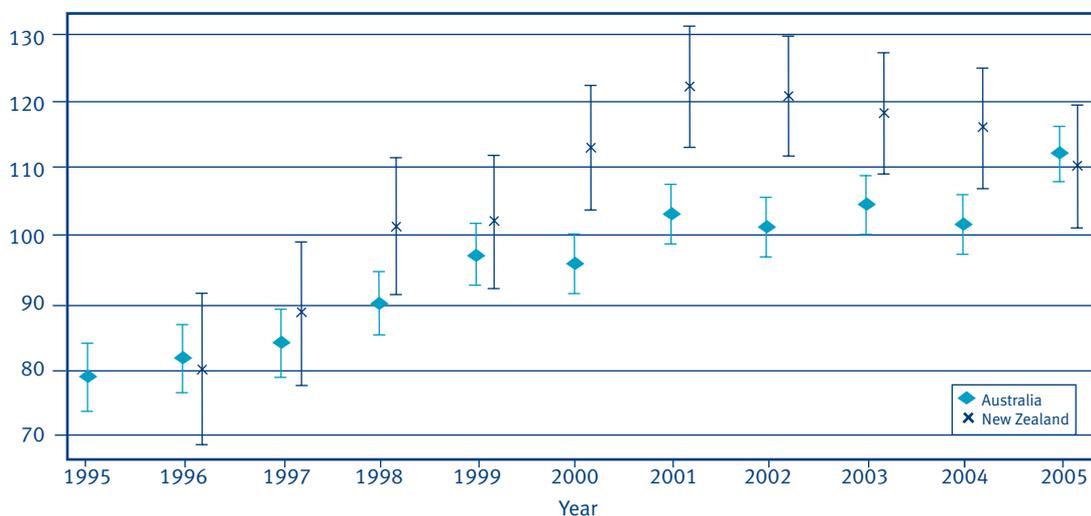
Figure 24: Acute coronary syndrome admissions, 1999/2000–2005/06



Kidney disease

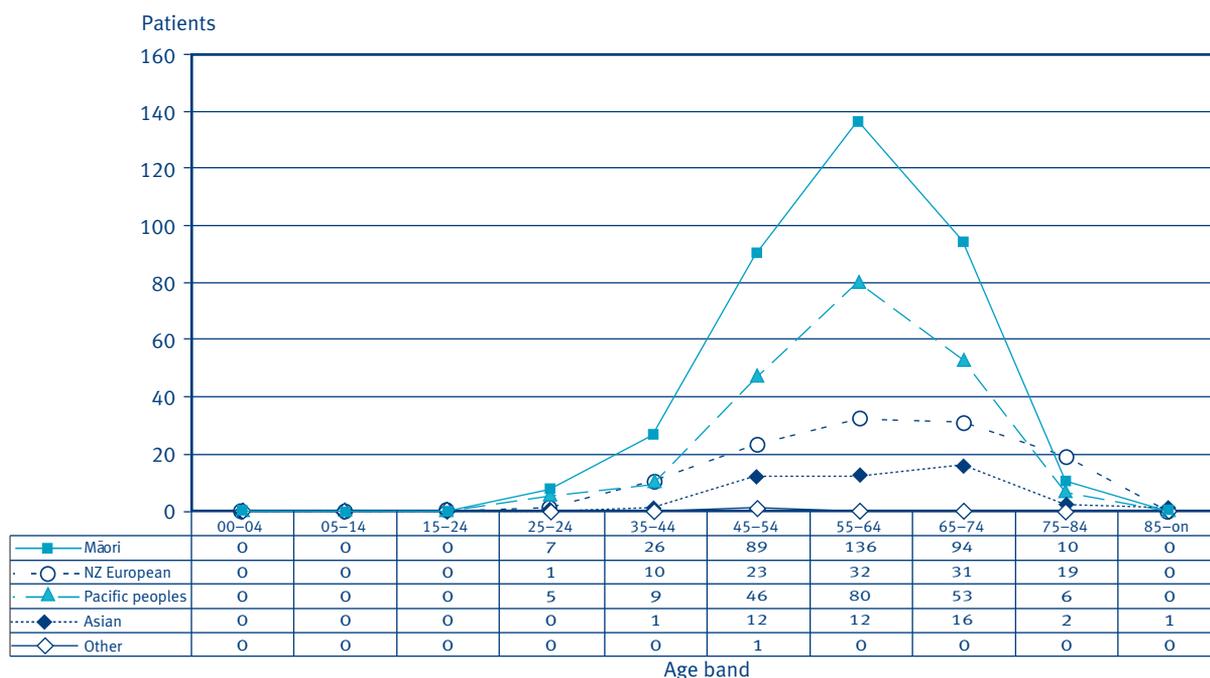
There is encouraging evidence that the number of new people beginning renal dialysis may be starting to fall in New Zealand (Figure 25). While prevalence rates for dialysis caused by diabetes are reported, however, the incidence rates are not.

Figure 25: Rates for new patients starting renal dialysis (Australia and New Zealand), 1995–2005



The major challenge facing New Zealand is the substantial excess burden of dialysis in Māori and Pacific peoples (Figure 26).

Figure 26: New patients starting renal dialysis by age and ethnicity, 2005



At the peak age of 55–64 years for Māori, the 136 people starting renal dialysis were equivalent to 410 new patients per 100,000 people. The rates (per 100,000 people in the New Zealand population) for Pacific and ‘all other’ ethnicities were respectively 567 and 12. Clearly the combination of an increased risk of diabetes and an increased risk of renal failure in people with diabetes will have a huge effect on Māori and Pacific communities as their populations age.

This effect is entirely consistent with the proportion of people with the early signs of renal damage (microalbuminuria) and overt nephropathy. Some PHOs report that more than 40 percent of Māori and Pacific peoples in the Get Checked programme have microalbuminuria (on a single test). The early use of ACE inhibitors in approximately 63 percent of Māori and Pacific peoples with diabetes

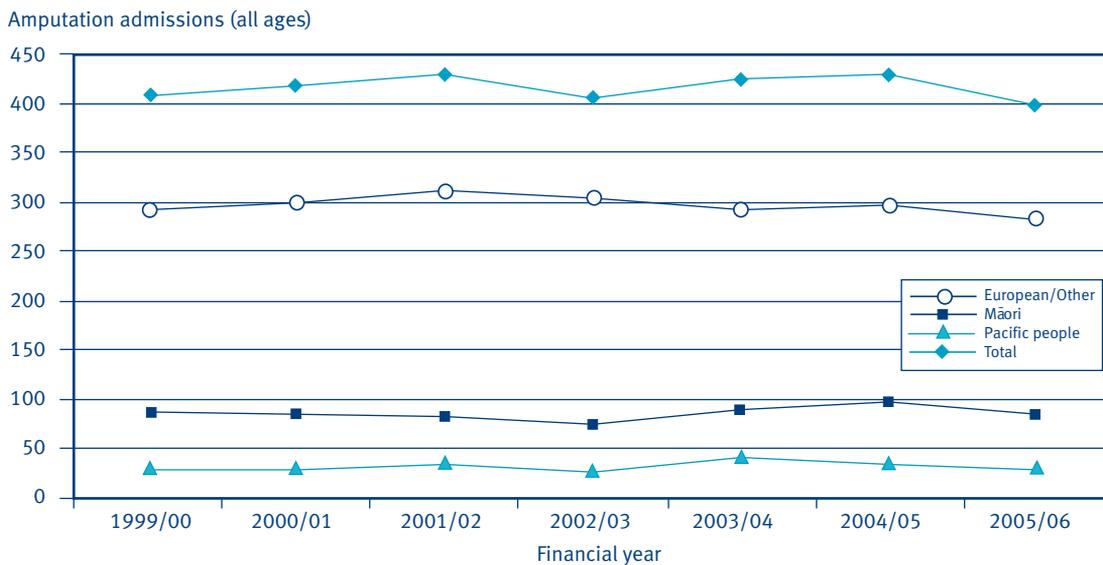
is appropriate, but PHOs have reported that often the proportion of people with microalbuminuria on ACE inhibitors is little higher (and could improve). In addition, these people should have intensive blood pressure control (regardless of CVD risk) if the progression towards renal failure is to be minimised.

It is relatively straightforward to address these opportunities within the PHO Performance Programme as it develops.

Foot disease

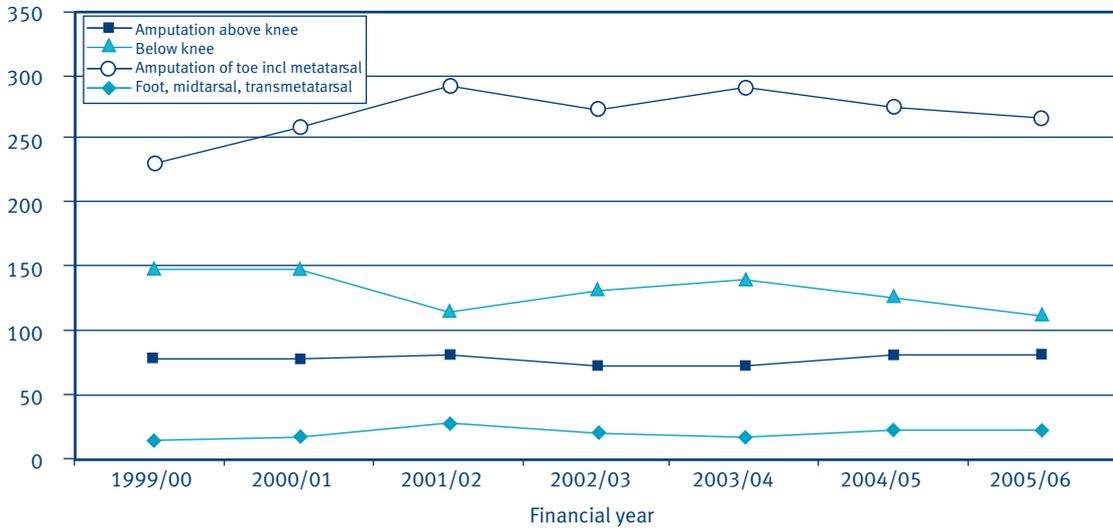
The number of admissions with one or more diabetic lower-limb amputations has remained stable in recent years (Figure 27).

Figure 27: Amputation admissions in people with diabetes (all ages), 1999/2000–2005/06



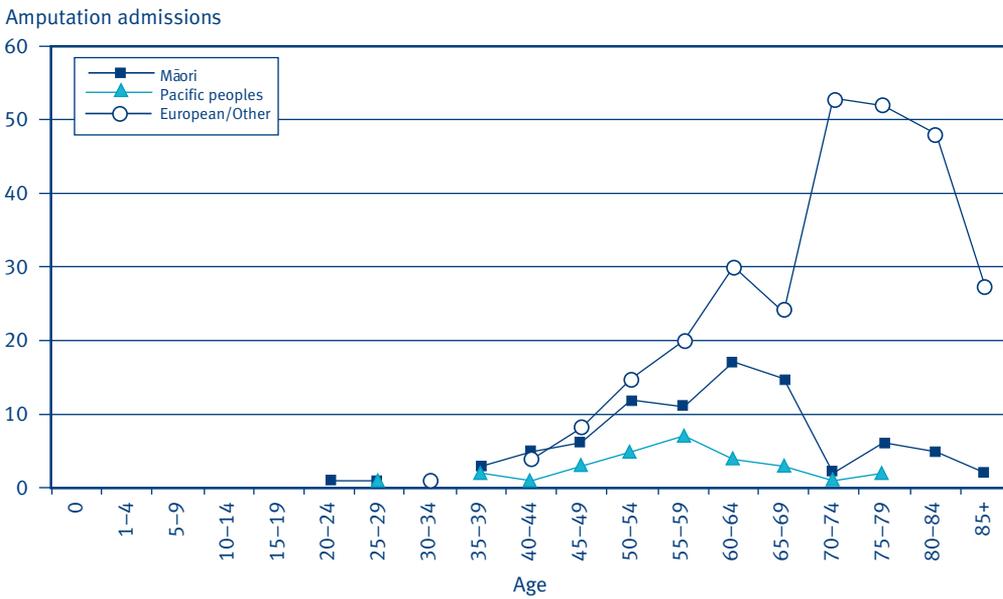
The overall trend hides the current slight reduction in the number of admissions for relatively major amputations (below- and above-knee combined) and the increasing proportion of relatively minor toe amputations (Figure 28). The additional impact of above-knee amputations on fitting artificial limbs reinforces the importance of preserving the knee joint wherever possible, and placing extra focus on reducing above-knee amputations.

Figure 28: Amputation level in people with diabetes (all ages), 1999/2000–2005/06



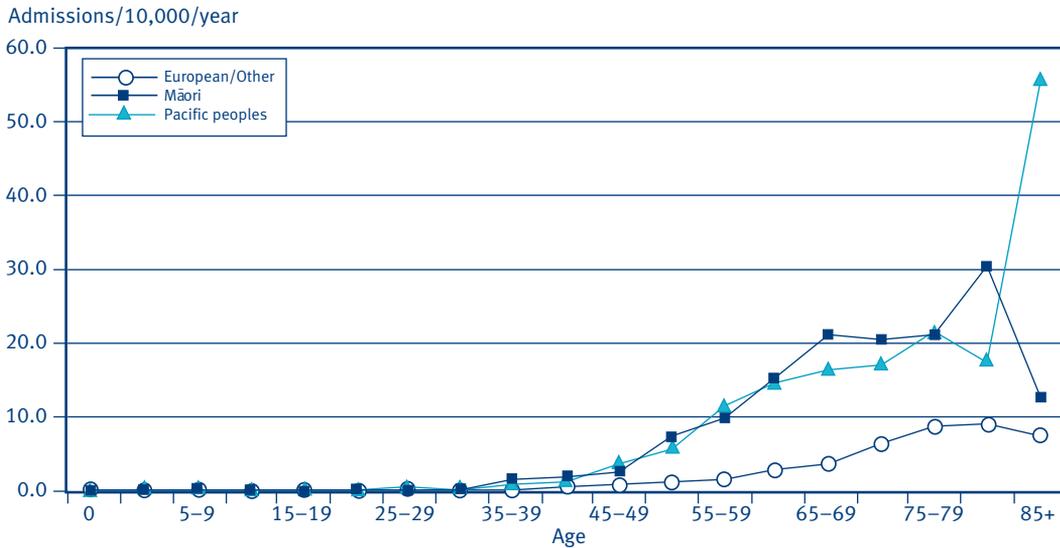
In New Zealand Europeans and other ethnicities, however, a substantial proportion of these amputations are in the elderly (Figure 29). Clearly, all amputations have a major impact on quality of life, but the impact on younger Māori and Pacific peoples is greater.

Figure 29: Amputation admissions in people with diabetes by age



The age-standardised rates for comparing ethnic groups are provided in the QIP priority for foot disease, but in middle ages the rates are substantially higher in Māori and Pacific peoples (Figure 30).

Figure 30: Amputation admission rate in people with diabetes, 2003/04–2005/06 (three years)

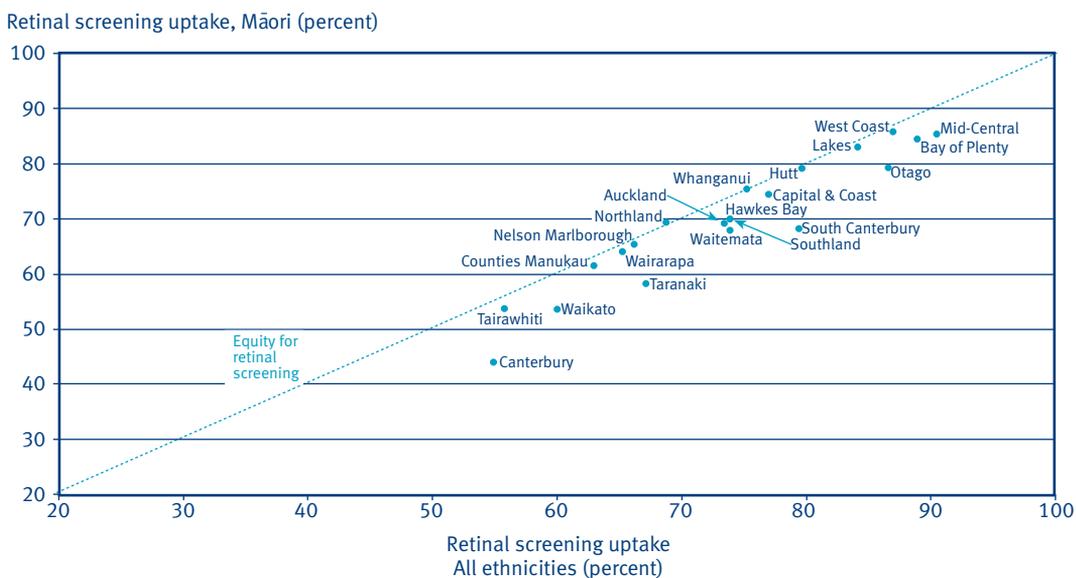


Eyes

As with any screening programme, including cervical screening, screening for early asymptomatic retinal damage from diabetes can be associated with harm as well as benefits. To maximise the benefits of any screening programme, the entire system for preventing avoidable loss of vision – including timely access to good quality screening, appropriate diagnosis and then treatment – should be optimised.

The international consensus is that, in a system that is functioning well, retinal screening is cost-saving for a comprehensive health funder. It is equally clear that in functional systems more than 85 percent of people access retinal screening, and few DHBs in New Zealand can demonstrate this outcome (Figure 31).

Figure 31: Percentage of Get Checked participants with retinal screening access for all ethnicities, and for Māori specifically, 2006



In some situations, it is possible to be confident that screening is effective by tracking overall outcomes. However, as in other countries, New Zealand has no system for monitoring diabetes-attributable loss of vision.

In addition, because there are no specific diabetes codes for ophthalmology specialist (first specialist or follow-up) appointments, it is not possible to assess the access or timeliness of access to specialist diagnosis.

In the 2006/07 financial year, 4295 argon laser appointments were recorded in the national outpatient database, but in this time some DHBs were not contributing data so this total is clearly an undercount. In addition, only an estimated 80–90 percent of argon laser treatments are associated with diabetes complications, so it is not currently possible to monitor waiting times from referral to laser treatment (potentially the most effective ‘downstream’ indicator that treatment is occurring appropriately). Relatively small changes could enable these data to be included in the Waiting Times project.

The major cost impact for comprehensive health funders that is associated with avoidable loss of vision relates to residential care costs. However, these costs also cannot be quantified from existing data sources.

Appendix 1:

Methods for Assessing Acute Coronary Syndrome

Hospital admissions for ACS are coded using the following ICD-10 classifications. The records are forwarded using the National Minimum Data Set (NMDS) for hospital admissions (including private hospital admissions).

The ICD classification I22.*n* (Subsequent Myocardial Infarction) does not code as either STEMI or non-STEMI. Fortunately this group only represents about 150 admissions each year (1 percent of the total ACS), and these admissions have been included with non-STEMI.

In a significant number of ACS admissions to a secondary hospital, the patient is then transferred to a hospital with a cardiac catheter facility. As a result, the number of ACS patients is overcounted because a single patient in one 'episode of hospital care' is then counted twice. This practice also complicates interpretation of the proportion of ACS patients that have a coronary angiogram, angioplasty or CABG. For this reason, the data combine the admissions for a patient discharged from one hospital and admitted to another on the same day, or the day after (to allow for overnight transfers).

Ethnicity presented in this summary is from the hospital record. Ethnicity coding has improved in recent years to become progressively more concordant with ethnicity recorded in the census and death certificates. In the data, ethnicity groupings follow those suggested in the New Zealand Guidelines Group evidence-based guideline on *The Assessment and Management of Cardiovascular Risk* (and therefore include Asian as a group).

After ACS admission, the 30-day and one-year mortality is established by linking the date of combined admission in the hospital record and mortality databases. In cases where a patient had more than one ACS admission in the year, the date of the first admission is used.

Data can also be analysed by DHB of domicile or by hospital facility/DHB as appropriate, by score on the Index of Deprivation (NZDep) of domicile, and by 'rurality' or distance from hospital. Obviously the usual domicile may not always be the place where the patient was when the ACS developed.

Glossary of Terms

Access	The ability of people to reach or use health services. Barriers to access may be influenced by: (1) a person's locality, income or knowledge of services available; (2) the availability or acceptability of existing services.
Acute coronary syndrome (ACS)	Unstable angina (UA), ST elevation myocardial infarction (STEMI) and non-STEMI
Albumin:creatinine ratio (ACR)	A measure of renal function used in diabetic renal disease
Amputation	The removal of a body extremity by trauma or surgery, eg, below-knee amputation (BKA), above-knee amputation (AKA)
Antiplatelet agent/ drug	Agent that acts against or destroys blood platelets, eg, Warfarin, Clexane. Blood platelets help blood clotting.
ANZDATA	Australia and New Zealand Dialysis and Transplant Registry (http://www.anzdata.org.au/)
Beta blocker	A drug that antagonises the effects of the sympathetic stimulation, thereby producing a slower heart rate, lower blood pressure and reduced heart muscle contraction leading to lessened oxygen demands of the heart muscle and hence decreasing angina pectoris
Blood pressure	<p>Pressure exerted on the walls of blood vessels and especially arteries when the blood is driven by force from the main pumping chamber of the heart (the ventricle). It is usually measured on the radial artery in the arm using a sphygmomanometer.</p> <p>Blood pressure is reported either as the systolic blood pressure over the diastolic blood pressure, eg, 120 / 80 mmHg, or as the systolic blood pressure alone, eg, 120 mmHg.</p> <p>Systolic blood pressure: maximum blood pressure following contraction of the left ventricle of the heart.</p> <p>Diastolic blood pressure: minimum blood pressure during filling of the heart with blood.</p>
Cardiovascular disease (CVD)	<p>The group of disorders of the heart and blood vessels, which includes:</p> <ul style="list-style-type: none"> • hypertension (high blood pressure) • coronary heart disease (heart attack) • cerebrovascular disease (stroke) • peripheral vascular disease • heart failure • rheumatic heart disease • congenital heart disease • cardiomyopathies.

Cholesterol	A white, tasteless, fat-like substance found in animal fats, oils, bile, brain tissues, milk, egg yolk, nerve myelin, liver, kidneys and adrenals. Mostly synthesised in the liver and normally present in the blood, cholesterol plays an important role in many bodily functions such as producing steroid hormones, insulating nerve fibres and forming bile acids. A high level of blood cholesterol is one of the risk factors for heart disease.
Cohort effect	Variations in diabetes/CVD prevalence among individuals born at a similar time. These individuals may also experience a similar environment in terms of nutrition and physical activity during their lives.
Diabetes	A chronic disease that occurs when the pancreas does not produce enough insulin or, alternatively, when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood sugar. Hyperglycaemia, or raised blood sugar, is a common effect of uncontrolled diabetes and over time leads to serious damage to many of the body's systems, especially the nerves and blood vessels (WHO). Also see type 1 and type 2 diabetes.
Diabetic retinopathy (DR)	<p>The presence of typical retinal microvascular lesions in an individual with diabetes. Microaneurysms, haemorrhages, hard exudates, intraretinal oedema, cotton-wool spots, new vessels and fibrous tissue comprise the clinical features of diabetic retinopathy. However, none of these individual lesions is specific for diabetes as each may occur in other disease processes such as hypertension, hyperviscosity, retinal vascular occlusions, inflammation and radiation.</p> <p>It is the pattern, symmetry and evolution that characterises the appearance as diabetic retinopathy. Diabetic retinopathy is first evident ophthalmoscopically as non-proliferative retinopathy, which is characterised by microaneurysms, dot, blot or flame haemorrhages, hard exudates, intraretinal oedema, cotton-wool spots, intraretinal microvascular abnormalities and venous beading. The proliferative stage of diabetic retinopathy is characterised by the growth of abnormal new vessels and fibrous tissue in response to retinal ischaemia, and the development of pre-retinal or vitreous haemorrhage.</p> <p>If new vessels appear on or within one disc diameter of the disc margin, they are known as new vessels on the disc. Leakage from the capillaries in the macula results in retinal thickening or macular oedema, defined as thickening located within two disc diameters of the centre of the macula. When this is present within, or close to, the central macula, it is often collectively termed clinically significant macular oedema (CSMO).</p>
District Health Boards (DHBs)	The New Zealand Public Health and Disability Act 2000 established 21 District Health Boards. DHBs are responsible for assessing the health and disability needs of communities in their regions, and managing resources and service delivery to best meet those needs.
Early detection	The detection of disease prior to the development of symptoms, or as soon as practicable after the development of symptoms
Effectiveness	The extent to which a specific intervention, procedure, regimen or service, when implemented, does what it is intended to do for a defined population
eGFR	A blood test that measures how much blood an individual's kidneys are filtering (estimated glomerular filtration rate)
End-stage renal failure	The final phase of kidney disease; treated by dialysis or kidney transplantation
Equity (in health)	Fairness

Evaluation	Assessment of a service or programme against a standard. An evaluation can be: (1) formative (informs the development and improvement of a programme); (2) an assessment of the process (describes the programme and helps to explain why it produces the results it does); (3) an outcome evaluation (an assessment of the ultimate effects of a programme).
Evidence-based guidelines	Clinical practice guidelines based on a systematic review of scientific data and publications
Evidence-based practice	Practice based on scientific evidence that demonstrates effectiveness
Gangrene	The death of body tissue, most often caused by a loss of blood flow, especially in the legs and feet
Get Checked	A system specifically designed to support active performance management, and the use of targets. The three indicators used for national targets are: 1. diabetes detection and follow-up – diabetes with annual check / expected diagnosed 2. diabetes management – percentage of people in Get Checked with good or satisfactory diabetes control (HbA1c < 8%) 3. retinal screening uptake – percentage of people in Get Checked who have had their eyes screened in the last two years.
Gestational diabetes mellitus	Development of diabetes or elevated blood glucose in women during pregnancy. It usually regresses spontaneously in the post partum period.
Glycaemic control	Regulation of blood glucose
Grading of diabetic retinopathy	Assessment systems developed to differentiate the severity of diabetic retinopathy. Grading will allow comparison among different groups of patients, or of the condition of the same patient examined at different times.
Green Prescription	A health professional's written advice to a patient to be physically active, as part of the patient's health management
HbA1c	A laboratory value that reflects the average blood glucose over the previous two to three months. It is the most accurate measure of glycaemic control.
Health promotion	The process of enabling people to increase control over and improve their health. It is a comprehensive social and political process.
Health status	A description and/or measurement of the health of an individual or population
Hypertension	A systemic disease characterised by abnormally elevated blood pressure. It is associated with an increased risk of many diseases, including vascular events, as well as with early mortality.
Hypoglycaemia	A low level of blood glucose. Associated with an elevated level of insulin in insulin-dependent diabetics, it can lead to performance changes, but is not always symptomatic.
Incidence	The number of new disease cases
Insulin	A hormone that helps the body use glucose (sugar) for energy. The beta cells in the pancreas (in areas called the Islets of Langerhans) make the insulin. When the body cannot make enough insulin on its own, a person with diabetes can inject insulin made from other sources.
Intervention	A programme or series of programmes

Ketoacidosis	A serious condition caused by an accumulation of ketoacids in the blood resulting from the body deriving energy from non-glucose sources during hyperglycaemia. Usually seen in type 1 diabetes, ketoacidosis can lead to coma if not immediately treated with insulin.
Lipid	Some forms of fat
Macrovascular complications	Diabetes complications from large blood vessel disease, including coronary heart disease, stroke, peripheral vascular disease and hypertension
Microvascular complications	Diabetes complications from small blood vessel disease, including retinopathy (damage to eye), nephropathy (damage to kidneys), neuropathy (damage to nerves)
Monitoring	The performance and analysis of routine measurements aimed at detecting changes
Morbidity	Illness
Mortality	Death
Nephropathy	A renal complication of diabetes. This form of microangiopathy, which is similar to diabetic retinopathy, is initially manifested by microalbuminuria, which may progress to macro-proteinuria and end-stage renal failure.
Objective	An expected result from an activity or programme
Ophthalmology	The field that deals with people with eye problems or diseases
Optimal treatment	Treatment known to provide the best outcome based on current knowledge
Orthotics	The field concerned with the application and manufacture of orthoses, devices that support or correct human function.
Outcomes	The anticipated overall effects of an intervention or programme, especially in relation to whether the overall programme goal has been achieved
Pacific peoples	A diverse range of peoples from the South Pacific region (eg, Tongan, Niuean, Fijian, Cook Islands Maori, Samoan and Tokelauan) living in New Zealand, who have migrated from those island nations or identify with them because of ancestry or heritage
Percutaneous coronary intervention	Encompasses a variety of procedures used to treat patients with diseased arteries of the heart.
Population health	The health of a population, measured by health status. Populations may be defined by locality, biological criteria such as age or gender, social criteria such as socioeconomic status, or cultural criteria such as whānau. A population health approach aims to maintain and improve the overall health outcomes of entire populations and reduce inequalities in health between different groups.
Prevalence	The level of disease or other health-related condition present in the population at a given time
Prophylactic	Relating to use of medical procedures or treatments to prevent or defend against a disease
Protocol	A defined programme for treatment
Public health	The science and art of promoting health, preventing disease and prolonging life through organised efforts of society

Public health services	Services offered on a population basis, which include all programmes, interventions, policies and activities that improve and protect the health of individuals and the community. Public health services intervene at the population or group level, as distinct from individual personal health services.
Rate	In epidemiology, the frequency with which a particular type of health event (eg, diabetes) occurs in a defined population
Risk factor	An aspect of a person's condition, lifestyle or environment that increases the probability that a disease will occur
Serum creatinine test	A test that measures the amount of creatinine (a breakdown product of creatine, which is an important part of muscle) in the blood
Stakeholders	Organisations/groups with a direct interest and involvement in aspects of CVD and diabetes control
Statins	A class of drugs that lowers the level of cholesterol in the blood by reducing the production of cholesterol by the liver. Statins block the enzyme in the liver that is responsible for making cholesterol.
Strategy	A course of action to achieve targets
Support and rehabilitation	At the broadest level, the provision of the essential services to meet the physical, emotional, nutritional, informational, psychological, sexual, spiritual and practical needs throughout a person's experience with diabetes/CVD
Surveillance	The ongoing assessment of an individual for the purpose of instituting appropriate intervention to reduce their risk of death from a specific cancer. Also, the continuous collection of data for public health decision-making.
Thrombolysis	The breakdown (lysis) of blood clots by pharmacological means. It works by stimulating fibrinolysis by plasmin through infusion of analogues of tissue plasminogen activator, the protein that normally activates plasmin.
Transient ischaemic attack (TIAs)	A brief episode of reduced blood flow to the brain. Symptoms are 'stroke-like' – with temporary blurring of vision, slurring of speech, numbness, and muscle weakness common features – and last less than 24 hours. TIAs are not included in the definition of stroke even though they have a common cause. TIAs may be the precursor of a stroke; therefore patients who have had a TIA require urgent assessment and treatment.
Triglycerides	A form of fat in food and the body consisting of glycerol plus three fatty acids. A high level of blood triglycerides is a risk factor for heart disease and stroke and is usually raised by being overweight and by excess alcohol.
Whānau	Extended family, including kaumātua, pakeke, rangatahi and tamariki. The whānau is recognised as the foundation of Māori society.

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