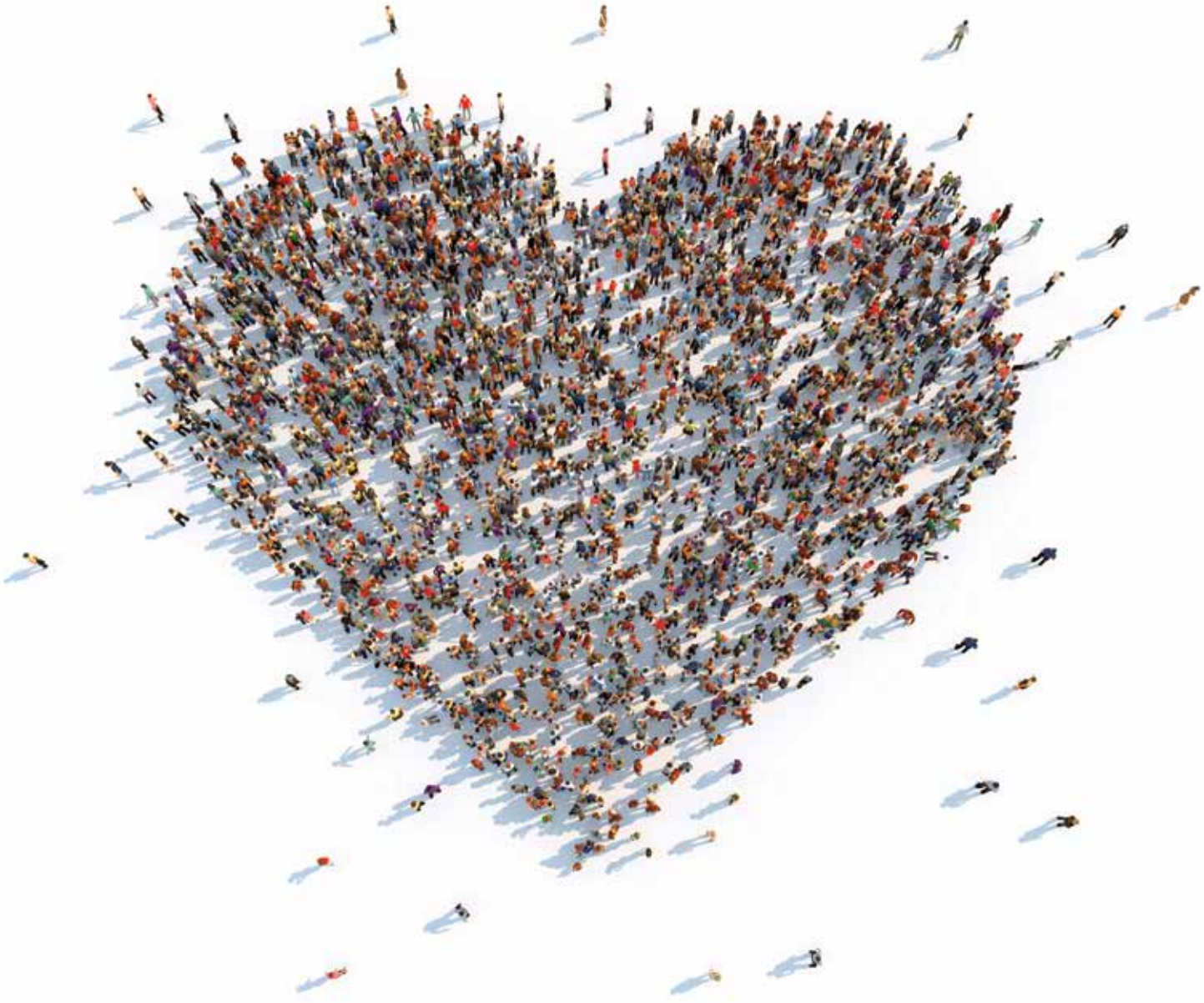
Baker IDI
HEART & DIABETES INSTITUTE

CHANGE OF HEART

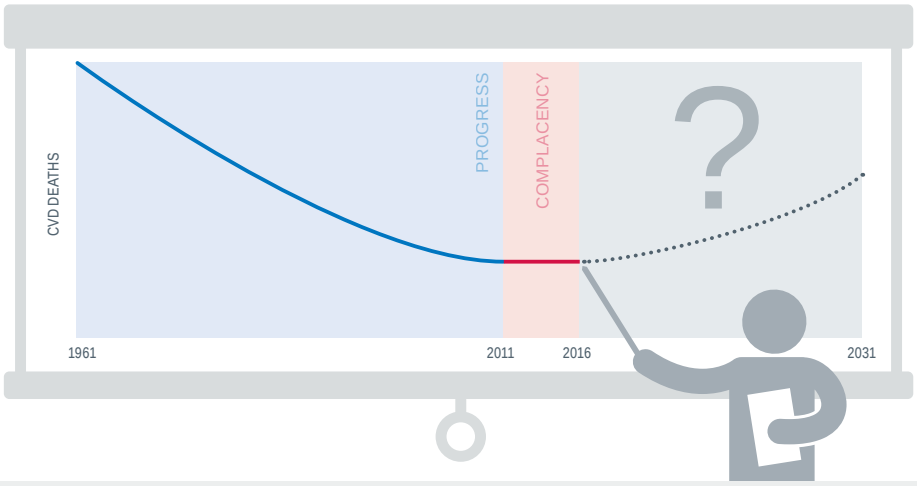
TIME TO END CARDIOVASCULAR COMPLACENCY



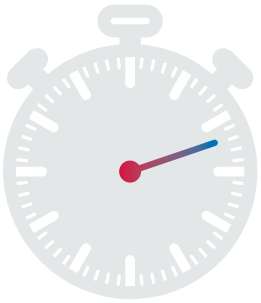
THE RESURGENCE OF AUSTRALIA'S NUMBER 1 KILLER

ACHIEVEMENTS IN PREVENTING LOSS OF LIFE FROM CARDIOVASCULAR DISEASE OVER THE LAST 50 YEARS ARE AT RISK OF BEING LOST

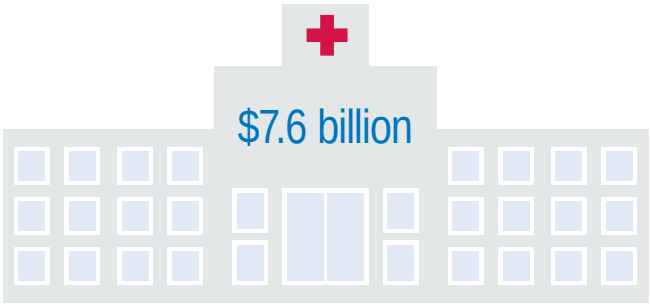
HUGE GAINS MADE IN CARDIOVASCULAR HEALTH ARE NOW IN JEOPARDY AS THE DECLINE IN THE DEATH RATE FROM CVD HAS FLATTENED OVER THE LAST 5 YEARS IN THE USA



WE ARE LIVING LONGER BUT CARDIOVASCULAR DISEASE REMAINS OUR BIGGEST KILLER AND MOST EXPENSIVE DISEASE



1 LIFE LOST EVERY **12 MINUTES**



WE ARE FACING A TIDAL WAVE OF 'DIABESITY'

'DIABESITY' = TYPE 2 DIABETES + OBESITY

KEY CARDIOVASCULAR DISEASE RISK FACTORS ARE NOT BEING SUCCESSFULLY TREATED

CHOLESTEROL

50% WELL TREATED

50% NOT WELL TREATED

BLOOD PRESSURE

32% WELL TREATED

68% NOT WELL TREATED

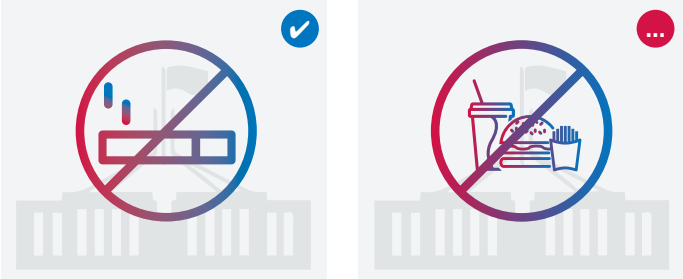
TYPE 2 DIABETES

55% WELL TREATED

45% NOT WELL TREATED

A CHANGE OF HEART NEEDS LEADERSHIP

REGULATION TO CHANGE CONSUMPTION, JUST LIKE WE ACHIEVED WITH TOBACCO SMOKING



A CHANGE OF HEART NEEDS NEW RESEARCH

Research into better prevention, treatment and care

A CHANGE OF HEART NEEDS HEALTH PROFESSIONALS

SUPPORT FOR BETTER DIAGNOSES AND NEW TOOLS FOR BETTER PATIENT CARE

BETTER BLOOD PRESSURE MEASUREMENTS

ABSOLUTE RISK ASSESSMENT

IDENTIFY RISK GROUPS

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A CHANGE OF HEART NEEDS MORE EFFECTIVE TREATMENTS

DRUG DEVELOPMENT

LIFESTYLE RECOMMENDATIONS

HOLISTIC DISEASE MANAGEMENT PLANS

FOREWORD

TRENDS: THE FUTURE AS A MIRROR TO THE PAST

Advances in medicine and public health have helped to control the epidemic of atherosclerotic disease (coronary heart disease and stroke), which peaked about 50 years ago. However, cardiovascular disease (CVD) remains the leading disease in Australia — accounting for 19% of the burden of disease.[1]

Moreover, failure to continue steps to control the causes of CVD could create a resurgence of the problem. There is evidence that this is exactly what is happening — recent overseas data show that over the past five years, death rates from coronary heart disease and stroke have not reduced as much as before. The increasing prevalence of type 2 diabetes and obesity (known as 'diabesity') suggest that it is possible that some of the achievements of the past 50 years may be lost.

The huge gains made in cardiovascular health are now in jeopardy as the decline in the death rate from CVD has flattened over the past five years.

CONTROL OF RISK FACTORS FOR CARDIOVASCULAR DISEASE

The burden of CVD is strongly linked to well-established risk factors (high blood pressure, high cholesterol, high blood sugar levels, and smoking). Australians who are not being treated or who are not being treated properly for abnormal cholesterol, high blood pressure and type 2 diabetes are a growing concern. Changes are needed on how risks for CVD are managed in primary care — in many cases, this requires using existing therapies more effectively, and in other cases, novel therapies may help to increase the number of people who are treated successfully.

Atherosclerosis starts developing when a person is young, so prevention should begin early in life with a whole-of-population approach. Population-level interventions that should be considered include the control of dietary salt, energy intake and physical inactivity. In addition, changes to health policy, taxation, regulation and urban planning should also be part of a multifaceted approach to tackling CVD. Strategies for the primary prevention of CVD include interventions to modify risk factors such as smoking and improving diet, controlling cholesterol and high blood pressure through medication, and managing the combined effect of risk factors (absolute CVD risk) rather than treating individual risk factors. Technological advances mean that modern imaging can also play a role in helping to identify individuals at risk of CVD.

Too many Australians with risk factors for cardiovascular disease, such as high blood pressure or type 2 diabetes, remain untreated or not treated to recommended targets. Attention is especially needed to better control risk factors among vulnerable groups, particularly in the Aboriginal and Torres Strait Islander community.

THE NEW EPIDEMICS OF CARDIOVASCULAR DISEASE

The ageing Australian population adds a new dimension to the burden of CVD. In the past half century, the life expectancy of an Australian when they are born has increased by more than 10 years. The growing number of the old (>70 years) and very old (>85 years) are prone to four important and expensive types of CVD — heart failure, atrial fibrillation, stroke and aortic stenosis. The costs of being in hospital for these diseases are an important contributor to the overall cost of CVD. The contribution that atrial fibrillation and heart failure make to the overall burden of all disease in Australia now appears to be growing.

Advances in treatment — both drugs and procedures — will help to reduce hospital admissions of people diagnosed with CVD. However, with more old and very old Australians needing care, new challenges, such as evaluating and caring for people who are frail, have cognitive impairment or are sick with more than one disease, need to be considered. Additional research is needed to know how to best manage these conditions.

We are unprepared for either a resurgence of atherosclerotic vascular disease or an increase in CVD burden from the epidemics of old age. A national CVD Policy would provide a consistent approach across Australia. At the moment, prevention programs are available state-wide in some states of Australia, and only through some public hospital programs or Private Health Funds.

Atherosclerosis and heart attack in middle age are being taken over by the new epidemics of CVD including atrial fibrillation, which is projected to increase by 60% over the next 15 years, and heart failure, which is already a leading cause of hospitalisation in Australia.

THE FINANCIAL COST OF CARDIOVASCULAR DISEASE

Of all disease groups that contribute to Australia's healthcare expenditure, CVD continues to be the most costly. The direct costs of illness, being absent from work, family stress and premature death lead to an enormous social and financial burden on our economy. CVD has a higher level of economic burden than any disease group in Australia. The ageing population and the ongoing epidemic of chronic cardiovascular conditions such as coronary heart disease, atrial fibrillation and heart failure, will lead to increases in allocated expenditure for hospital-admitted patient services over the coming decades. Controlling admission and readmission is an important way to control hospital expenditure.

CVD is already the most costly disease group in the country. Expenses for CVD are already increasing, and when combined with the new epidemics of old age, the strain on the hospital system will be immense. Not treating CVD successfully will cause hospital admissions to increase, and put a strain on the healthcare budget.

WHAT THIS MEANS FOR AUSTRALIA

With increasing life expectancy and an ageing population, more people will require hospital admission. Challenges will arise when integrating CVD care with frailty, cognitive impairment and the management of multiple diseases.

Growing rates of 'diabesity' and public complacency could undermine half a century of achievements for cardiovascular health. More investment in prevention and research is critical to better identify those at risk of CVD earlier and to enhance the diagnosis and management of people with CVD.

As CVD is already the most costly disease group in Australia, investment in the prevention of CVD is critical. This includes the provision of Medicare funding for well-established and effective assessments, such as 24-hour blood pressure monitoring. More research is also essential to better manage CVD, to investigate the role of aspirin in primary prevention, to improve the identification of people in the early phases of CVD, and to provide more effective prevention and management options for potentially deadly conditions such as rheumatic heart disease.

The purpose of this report is to summarise the current and future importance of CVD in the Australian community, and to serve as a call to action for policy-makers.

CALL TO ACTION

A ‘Change of Heart’ is needed to prioritise cardiovascular health among the community, health professionals and government. We must not be complacent; the fight against CVD is far from over. We propose:

- A national CVD strategy.
- Implementing the recently-developed national diabetes strategy.
- Active development of public policies by government such as fat taxes, sugar taxes, and more restrictive smoking regulations.
- Wider use of the absolute risk calculation and 24-hour blood pressure measurement to guide treatment.
- Developing disease management programs that include frequent follow-up of people with established CVD and sufficient time during appointments to discuss questions with patients and provide patients with encouragement.
- New lipid-lowering therapies should be considered for statin intolerant people and people (especially in secondary prevention) who fail to attain their targets for treatment.
- Wider access to and more sophisticated delivery of cardiac rehabilitation programs.
- Effective anticoagulation for atrial fibrillation.
- A nationwide effort to reduce readmission of heart failure patients to hospital.

WHAT IS CARDIOVASCULAR DISEASE?

Cardiovascular disease (CVD) is a term used to describe multiple conditions affecting the heart and blood vessels. CVD is the most common cause of death and disability, especially among people with diabetes. The most common types of CVD are atherosclerosis (coronary heart disease, peripheral arterial disease and stroke), heart failure and atrial fibrillation.

ATHEROSCLEROSIS

Atherosclerosis is a slow developing disease that may start in childhood and progresses with age. With atherosclerosis, lipids are deposited on the inner lining of the walls of arteries and form plaques because of reactive inflammatory changes. Acute crises due to atherosclerosis are due to clotting of blood on these plaques, leading to a blockage in the vessel and a critical reduction of blood supply to the heart muscle (causing angina or heart attack) or to the brain (causing stroke).

Coronary heart disease

Also known as coronary artery disease, ischaemic heart disease or atherosclerotic heart disease (Figure 1). This may present as an acute myocardial infarction (heart attack) or angina. A heart attack usually follows the sudden blockage of an artery supplying blood to the heart muscle. This is a potentially life-threatening event that often results in permanent damage to an area of the heart muscle and limits the heart's ability to work. Attempts are often made to open the artery mechanically ('stenting') or by dissolving the blood clot responsible for the event ('lysis').

Chronic stable angina

This is a generally non-life-threatening chronic condition in which episodes of chest pain occur as a consequence of mismatch between supply and demand of oxygen, often due to physical exertion. Unstable angina is a dangerous and less predictable form of angina that is due to a blood clot that does not fully block an artery. Stenting rather than clot dissolution is often required, and other treatment is similar to that for a heart attack.

Stroke

A blockage of blood supply in to a part of the brain causes stroke, which leads to those parts not getting the nutrients it needs (Figure 1). The blockage could be because of a plaque rupturing in a blood vessel that directly supplies the brain or because of a blood clot that formed somewhere else in the circulatory system, for example in the heart during atrial fibrillation. The consequences of stroke will depend upon the part of the brain that is affected. If a large vessel is blocked, it may lead to severe disability or it could be fatal. The blockage of smaller blood vessels may have a less critical impact and there is a good chance of recovery.

Peripheral arterial disease

This is atherosclerosis in the limbs. Like atherosclerosis that affects the blood vessels leading to the heart or brain, peripheral arterial disease could provoke a severe, immediate crisis (blocking an artery leading to the possibility of limb amputation) or a chronic condition (reducing blood flow to limbs causing pain during activity). Atherosclerosis and the same issues may occur with blood vessels to abdominal organs such as the intestine.

HEART FAILURE

Damage to the heart muscle may be severe enough to prevent it from functioning properly as a pump, a disease known as heart failure. When this is due to a heart attack, the heart failure can occur suddenly. However, heart failure is increasingly due to other processes that gradually cause damage to heart muscle, such as high blood pressure or diabetes. Damaged heart valves cause the heart to stretch, remodel and work harder, and over many years the heart becomes gradually weaker and works less effectively. Symptoms of heart failure include shortness of breath, swelling in the legs or ankles, chronic fatigue, and a reduced capacity to be physically active.

ATRIAL FIBRILLATION

Atrial fibrillation is the most common type of irregular heartbeat.[2] Atrial fibrillation causes the heart to work inefficiently so it can reduce the person's ability to exercise and may lead to heart failure. Atrial fibrillation makes the blood flow inside the heart somewhat irregular, which can cause blood clots to form there. Consequently, atrial fibrillation carries a risk of stroke.

VASCULAR DEMENTIA

Dementia is characterised by slow thought, confusion, problems with memory and concentration (including word-finding), mood and personality changes, falls, incontinence and hallucinations. When these symptoms occur in combination with reduced brain blood-flow, this is described as vascular dementia — a subcategory of which is multi-infarct dementia (due to multiple small strokes). The speed of onset of vascular dementia is variable, as is its severity. The risk factors for vascular dementia are the same as for atherosclerosis.

VALVULAR HEART DISEASE

The most common cause of heart valve disease is degenerative, with aortic stenosis providing an increasing problem as the population ages. Rheumatic valve disease (a sequel of acute rheumatic fever) remains a serious problem in the Aboriginal and Torres Strait Islander* community, although it is extremely uncommon in the remainder of the Australian population.

* From here after the term Aboriginal will be used to refer to Aboriginal and Torres Strait Islander people.

LIVING WITH CARDIOVASCULAR DISEASE

CVD affects more than 3.7 million people in Australia – a number similar to the population of Melbourne. Of these, 1.2 million suffer from disability because of CVD.[3]

In addition to causing early death, CVD has a major impact on the health of Australians. CVD limits quality of life because it reduces the ability to be physically active. This loss of ability could be because of weakness from a stroke, shortness of breath from heart failure, or other symptoms, such as angina, that limit physical activity. CVD is associated with depression and emotional problems due to the stress of chronic disease. The direct costs of illness, being absent from work, family stress and premature death lead to an enormous financial burden on our economy. Both the indirect economic costs of impaired health and the direct economic costs of disease can be measured.

THE BURDEN OF CARDIOVASCULAR DISEASE IN AUSTRALIA

CARDIOVASCULAR DISEASE

Based on self-reported data from 2014–15, the prevalence of CVD (i.e. the percentage of the population who had ever developed CVD) in Australia was estimated to be 5% across the population (aged two years or over), increasing to 34.2% in those aged 85 years and over.[3] Of the total 159,052 deaths in 2015 in Australia,[4] CVD was the number one cause of death, accounting for 45,392 deaths — equivalent to the capacity of the Allianz Stadium (Sydney Football Stadium). In that year, coronary heart disease led to 19,777 deaths, while cerebrovascular disease accounted for 10,869 deaths.[4]

Deaths from either coronary heart disease or stroke are more common in men than women. Together, these two conditions kill one Australian every 12 minutes.

CORONARY HEART DISEASE

In 2014–15, 643,000 adults (aged 18 years and over) in Australia had coronary heart disease. This is about 4% of the population. More men than women suffer from coronary heart disease (5% vs. 3%) after adjusting for differences in age. Coronary heart disease is also related to older age, and in 2014, the prevalence of coronary heart disease ranged from 1% in those aged 34–44 to 18% in those aged 85 or over.[3] National incidence data on coronary heart disease in Australia are only available from hospital and death data. These data show that in 2012 the age-standardised rate for acute heart events in men was 558 per 100,000, compared with 266 per 100,000 in women. Like other types of CVD, rates of acute heart events increase with age.[5]

STROKE

The Survey of Disability Ageing and Carers estimates that the prevalence of stroke (i.e. the proportion of people who had previously had a stroke) in 2015 for all ages was 1.7%. Stroke increases with age and occurs at much greater rates in older people. The prevalence of stroke was 15% in those aged 85 years and over, and was 5% in those aged 64–75 years.[6] In 2011, the incidence of stroke (i.e. the number of strokes occurring in that year) was 154 per 100,000 people.[5]

PERIPHERAL ARTERIAL DISEASE

Peripheral arterial disease affects 3–6% of the adult population.[7] The main symptom of this disease is pain in the legs when walking (claudication), but this is only present in about 10% of peripheral arterial disease patients. Half of the patients with peripheral arterial disease lack any symptoms so this disease is under-diagnosed and under-treated. However patients have a poor prognosis whether they have or don't have symptoms. Recognition of the presence of atherosclerosis, based on these symptoms, could lead to the treatment of atherosclerosis that would reduce death. Even though people with peripheral arterial disease who suffer symptoms have a worse prognosis than people with coronary or cerebral vascular disease, many studies show that their risk factors are less intensively treated.

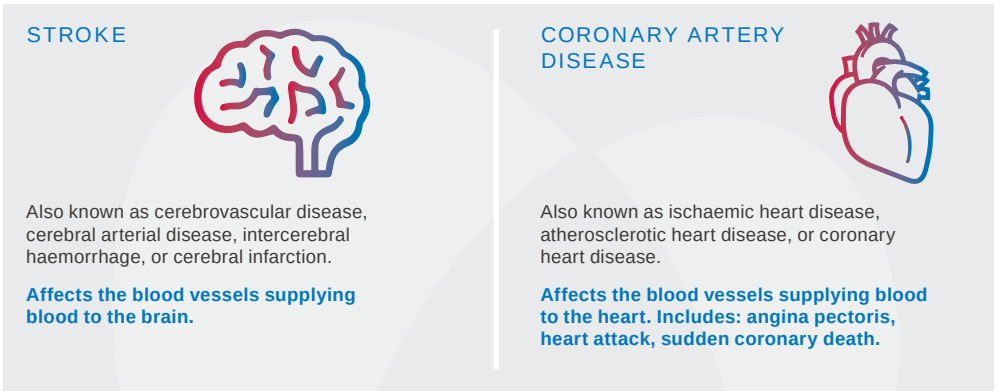


Figure 1: The main types of cardiovascular disease: stroke and coronary artery disease.

ATRIAL FIBRILLATION

Atrial fibrillation is the most common cause of sustained abnormal cardiac rhythm. The prevalence of atrial fibrillation is estimated to be 14.6 per 1,000 in men and 13.6 per 1,000 in women in those aged 35 and above in Australia.[8] These findings are consistent with predictions (based on overseas studies), which suggest approximately 330,000 people in Australia (1%) suffer from atrial fibrillation.[2] In those aged 35 years and older, the incidence of atrial fibrillation was 2.0 per 1,000 person-years (a measure of incidence), with greater incidence rates among men than women.

The incidence and prevalence of atrial fibrillation is rising (Figure 2), largely due to the epidemic of 'diabesity'. It is likely that the size of the problem has been underestimated because one type of atrial fibrillation, paroxysmal atrial fibrillation, is difficult to identify.

Patients with atrial fibrillation have a higher likelihood of heart failure (increased three-fold), but while the direct effects of atrial fibrillation affect wellbeing, the effects rarely pose a risk to survival. The major problem is stroke. Over a third of patients with ischaemic stroke have atrial fibrillation, and their strokes are more severe.[9] In other stroke sufferers, atrial fibrillation is the likely cause but is not apparent at the time of stroke. Patients with atrial fibrillation are five times (varying from 2.5–7 times) more likely to suffer a stroke than those without atrial fibrillation. A review in 2008 proposed that the economic cost of atrial fibrillation in Australia was $1.25 billion per year, or $5,000 per year for each atrial fibrillation patient. 64% of the costs for atrial fibrillation arise from subsequent heart failure and stroke.[10]

HEART FAILURE

In Australia, the prevalence of heart failure in 2014–15 as reported by the Australian National Health Survey was 0.5%,[3] but surveillance studies show many cases are undiagnosed.[11] Among those with heart failure in Australia, approximately two-thirds are over 65 years of age. The prevalence of heart failure is 4.8% in people over 45 years of age.[3] The incidence of new cases of heart failure is approximately 30,000 per year, about 0.4% of people >45 years.[12] Hospitalisation due to heart failure in Australia was estimated to cost $840 million, leading to a total direct cost of >$1 billion. This estimate was based on a model that considered the cost per patient and the estimated incidence of heart failure.[13] Heart failure accounted for around 3,541 deaths in 2015.[3] Among people admitted to hospital with heart failure, approximately 25–30% are readmitted or die within 30 days of discharge.[14,15] The readmission rate may be as high as 50% at six months post-discharge.

Projected number of adults (55 years and older) with atrial fibrillation in Australia between 2014 and 2034

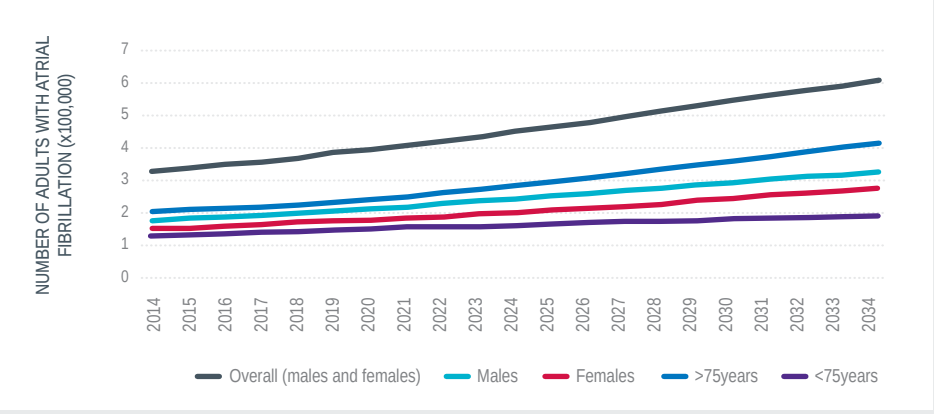


Figure 2. Increasing prevalence of atrial fibrillation. Curves show the projected numbers of people in different age groups with atrial fibrillation.

Source: Ball J, Thompson DR, Ski CF, Carrington MJ, Gerber T, Stewart S. Estimating the current and future prevalence of atrial fibrillation in the Australian adult population. Med J Aust 2015;202:32-5. 2 © Copyright 2015 The Medical Journal of Australia – reproduced with permission.

TRENDS OF CARDIOVASCULAR DISEASE OVER TIME IN AUSTRALIA

Over the past half century, CVD and coronary heart disease death rates have declined steadily in most developed countries. More recently, however, several studies have reported a slowing of this decline among younger age groups in several countries.[16-21] CVD incidence has also declined but to a lesser extent.

Trends in cardiovascular disease mortality

There has been a dramatic decline in the death rate from CVD, which at its peak in the late 1960s and early 1970s caused more than half of all deaths. In that era, it was not uncommon for Australians to die of heart attacks in their 50s or 60s.

If the death rates for CVD had not fallen, the number of deaths from CVD would have been more than four times higher than the actual number in Australia today.[22] About 70% of the increase in life expectancy achieved over the past 40 years is because of the reduction in deaths from CVD.

In general, for CVD, coronary heart disease and stroke, the steepest declines have been observed in the older ages (65–74 and 75 years plus) but the declines have slowed over time. Figure 4 shows the declines in coronary heart disease deaths over time by sex and age from 1990–2013.

Deaths from stroke have fallen 75% since the early 1960s. Figure 5 shows declines in stroke deaths from 1990 to 2013. Declines in deaths from ischaemic stroke (caused by blockage of arteries) have been greater than with haemorrhagic strokes (due to bleeding in the brain). [23]

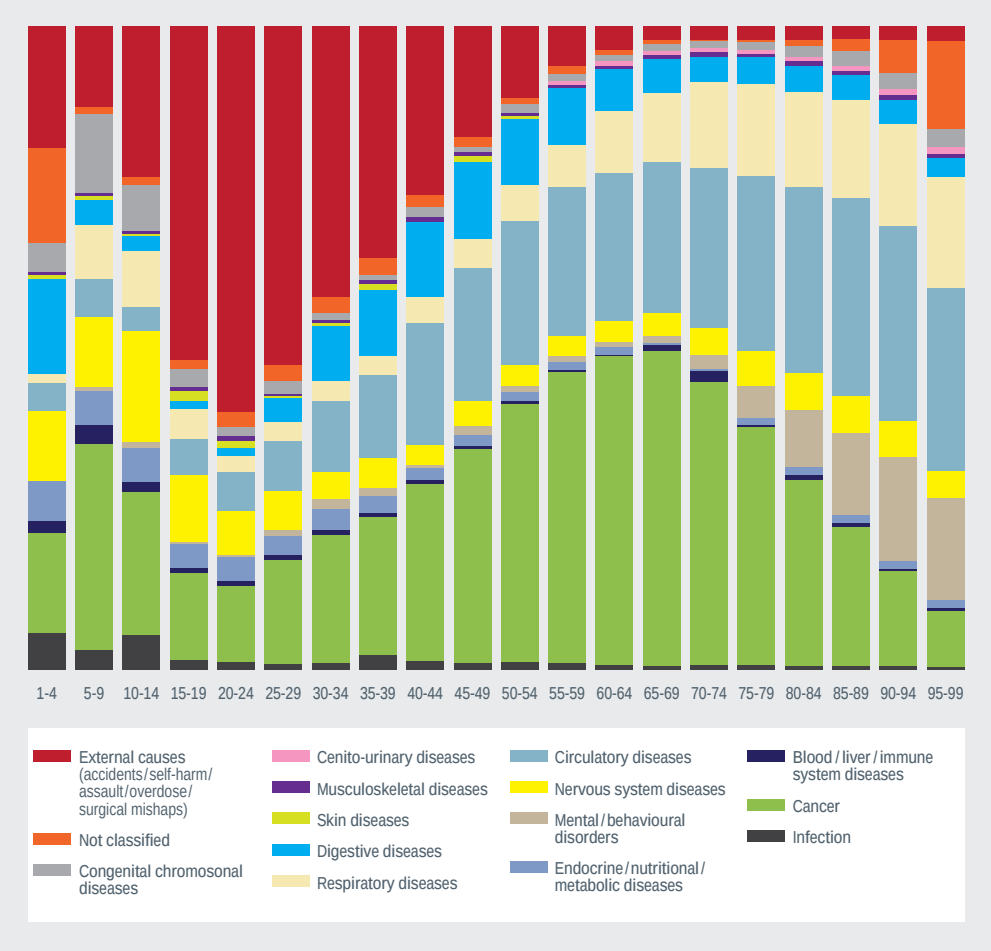
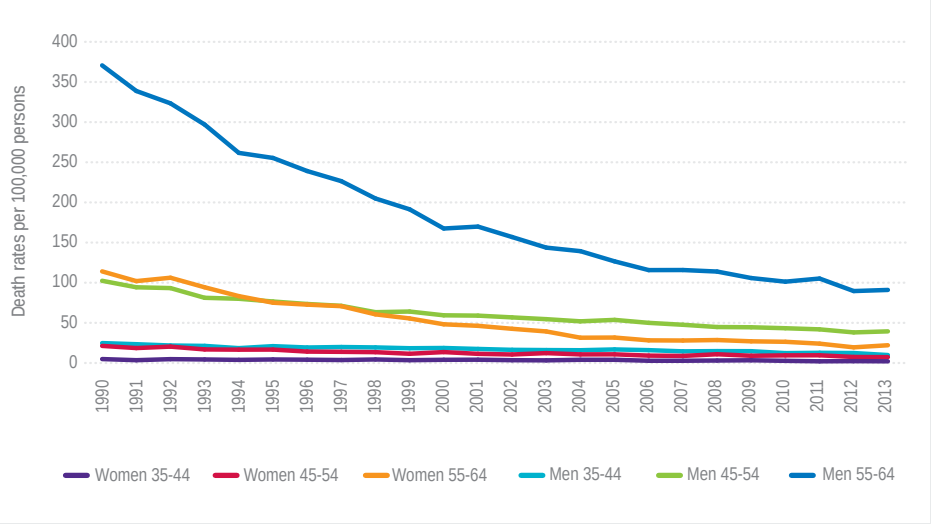


Figure 3. Causes of mortality across the lifespan. Mortality from cancer peaks in the 7th decade but deaths of circulatory aetiology are fairly constant through middle age and progressively increase with age.

Source: Office for National Statistics deaths by underlying cause, published November 2015.

A. Younger age-groups



B. Older age-groups

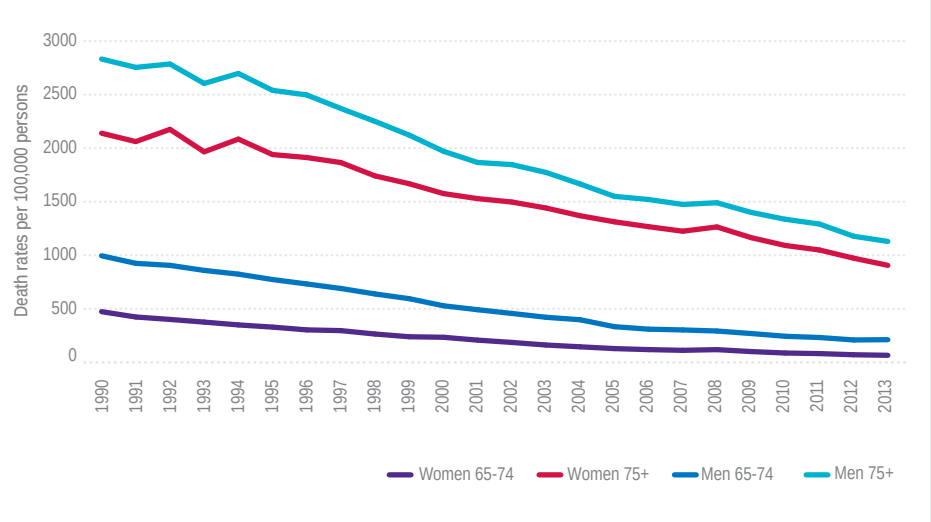


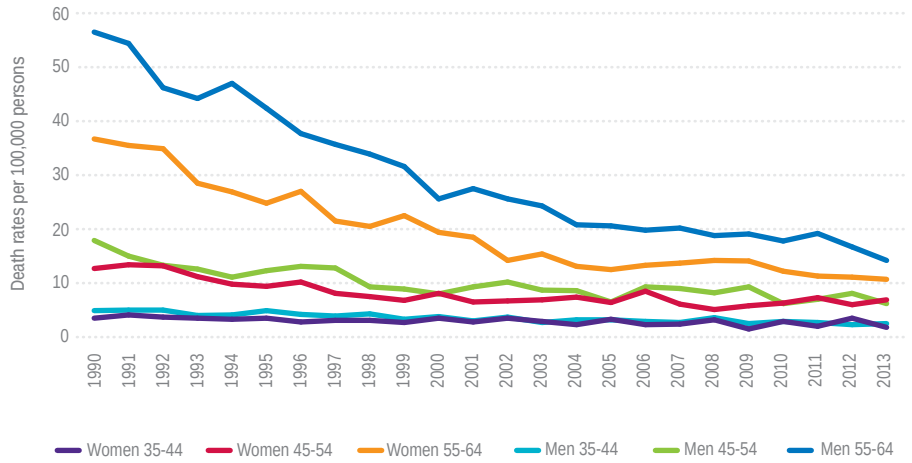
Figure 4: Age-specific death rates per 100,000 from ischaemic heart disease/coronary heart disease from 1990–2013 in Australia in A) younger age-groups and B) older age-groups.
Notes: Ischaemic heart disease refers to coronary heart disease and is defined according to the International Classification of disease, 10th revision (ICD-10) codes I20-I25, and codes 4100-4149 in ICD9 and ICD-8.

Source: Australian Institute of Health and Welfare.

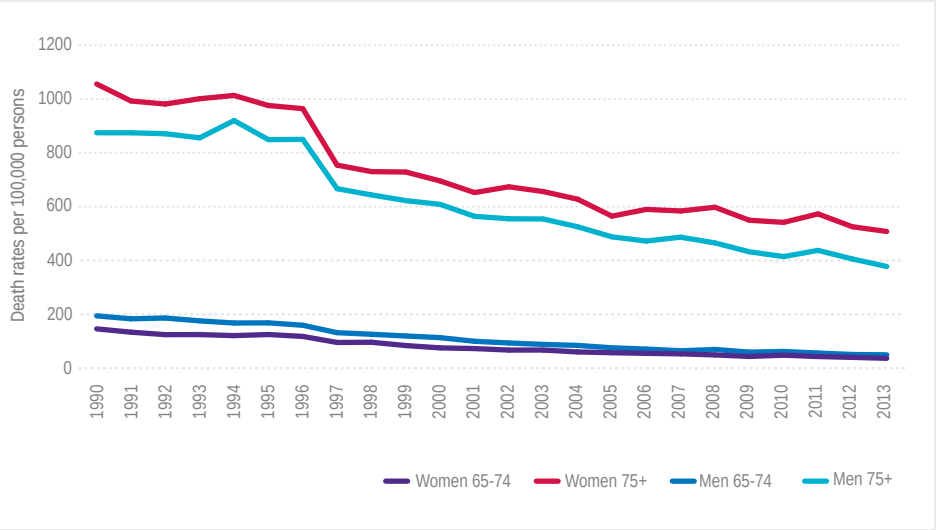
Figure 5: Age-specific death rates from stroke from 1990–2013 in Australia in A) younger age-groups and B) older-age groups.

Notes: Stroke is defined according to the International Classification of disease, 10th revision (ICD-10) codes I60-64. Source: Australian Institute of Health and Welfare.

A. Younger age-groups



B. Older age-groups



Death due to heart failure has been declining over time in Australia.[23] However, it should be noted that heart failure death data are difficult to assess accurately, because heart failure is more commonly listed as an associated cause of death rather than as the underlying cause.

Trends in incidence and prevalence of cardiovascular disease, **coronary heart disease, stroke, heart failure and atrial fibrillation**

In Australia, the age-standardised incidence of adult acute coronary events declined from 534 per 100,000 population to 406 per 100,000 between 2007 and 2012.[5,24] Over the same time period, the incidence of stroke (all events) in Australia decreased from 176 to 136 per 100,000 population.[5]

Explaining the decrease in coronary heart disease

Understanding the factors that have driven the decline in CVD deaths is essential to ensuring the downward trend continues. The evidence suggests that about 50% of the decline is due to the use of better treatments (such as bypass surgery and the use of aspirin) for people with established CVD, with most of the remainder being due to improvement in risk factors (blood pressure, cholesterol and smoking) throughout the whole population.[25,26] Improvements in risk factors has been achieved partly through public health measures such as anti-smoking campaigns, and partly through the use of medications (e.g. for blood pressure and cholesterol). Worryingly, the improvements in some cardiovascular risk factors are being offset by rises in the prevalence of type 2 diabetes and obesity.

POPULATION-BASED PREVENTION OF CARDIOVASCULAR DISEASE — WHERE WE ARE FAILING AND WHAT WE COULD DO

Measures to reduce the risk of developing CVD need to focus on the main modifiable risk factors (Figure 6).

EARLY AGE PREVENTION

An underlying principle of population health is that shifting the risk of the population as a whole is required to achieve meaningful reductions in the number of people with a chronic disease.[27] This is because the greatest total burden of events is within the large group at intermediate risk, rather than being restricted to the high-risk group. A small improvement in the level of a risk factor across the whole population can have a greater overall impact than the effect of larger changes in individuals identified as being at high risk. These population-level interventions might include the control of dietary salt, energy intake, and inactivity. These steps need to include not only health policy changes but also taxation, regulation and urban planning. It is increasingly recognised that individual choices are heavily influenced by social environments. Thus, the significant reduction in smoking seen over the past 40 years was heavily dependent on taxation and regulation, while education about individual risk played a lesser role. Successful disease prevention needs to incorporate both population-level and individual-level approaches.

Primordial prevention refers to steps at a very early age that will avoid the development of risk factors. Because atherosclerosis starts in youth, primordial prevention should start early in life, and needs a whole-of-population approach. This involves making healthy food affordable and readily available, promoting physical activity and reducing sedentary behaviour and smoking. It also needs to have a focus on healthy pregnancy, as there is good evidence that maternal health and lifestyle has a major long-term influence on the offspring's health.

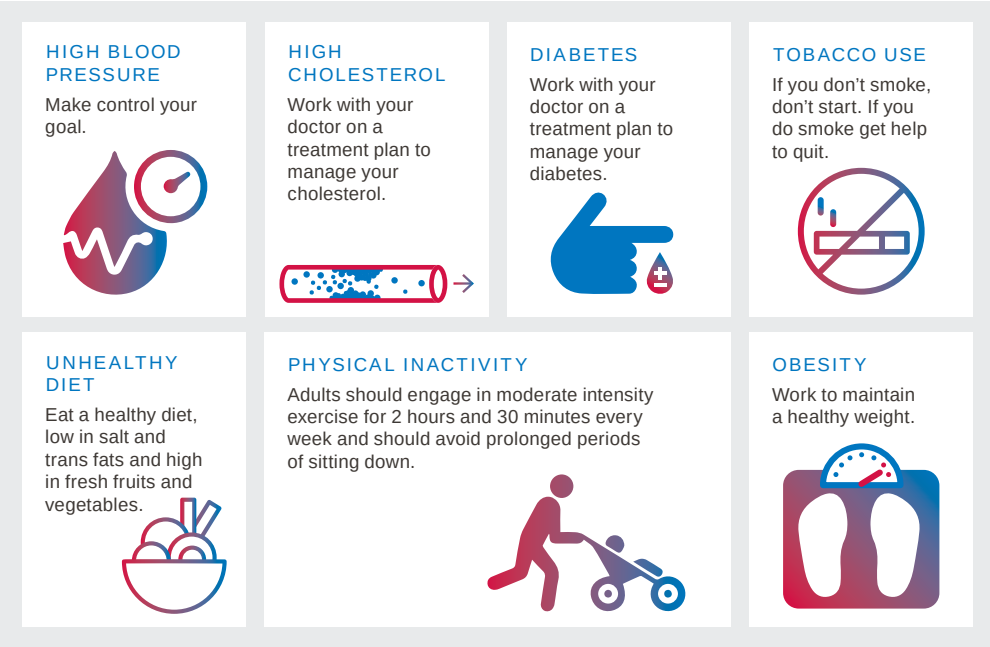


Figure 6: Risk factors for heart disease and stroke, and solutions for management.

Smoking

Smoking is an important modifiable risk factor for CVD. In Australia, smoking prevalence has decreased from highs of around 49% (72% in men and 26% in women) in 1945 to 14.5% in the current era, where it varies by locality.[3,28] More men than women smoke, and smoking prevalence generally decreases with increasing age. Much of the decline in coronary heart disease deaths since the 1960s can be attributed to fewer people smoking, but ongoing tobacco use — especially in social groups with a high prevalence of its use (e.g. Aboriginal Australians and those with mental health conditions) — remains an important modifiable risk factor for CVD.

Action on smoking is always the highest-priority lifestyle intervention. There have been decades of success in reducing smoking, including some ground-breaking steps internationally (e.g. plain packaging). However increasing use of e-cigarettes raises the possibility of subsequent transition to conventional smoking. Health professional advice, nicotine replacement therapy and medication are effective interventions for stopping smoking,[29 30 31] but there may be barriers to people accessing these interventions.

What we could do for smoking prevention

- Prevention – increase the legal smoking age.
- Treatment – create incentives for access to smoking cessation programs.

Diet and obesity

Weight is a risk factor independent of diet and physical activity. A weight control discussion is important in many medical consultations, and should be within the skill-set of all clinicians. It is often neglected.

The Australian Bureau of Statistics has concluded that most Australian adults are receiving energy intake from nutrient-poor food choices, with only 7% taking the recommended intake of vegetables.[32] Medicare statistics show the number of dietitian referrals is less than would be expected with the current incidence of type 2 diabetes. Referral of some people to allied health providers may enhance their health literacy and improve self-management.

Improving dietary intake has also been shown to be effective in reducing CVD risk. In general, increasing wholefoods is beneficial, and trials have shown that adhering to a Mediterranean diet [33] is beneficial with respect to cardiovascular risk. While the DASH (Dietary Approaches to Stop Hypertension) trial showed that a diet rich in fruit and vegetables and low-fat dairy foods could be used as the first treatment option for high blood pressure.[34]

Although there is evidence of cardio-protection from modest alcohol consumption, alcohol intake contributes to weight gain and high blood pressure. Lowering salt in manufactured foods would reduce an important driver of high blood pressure. While there are many sources of excess calorie intake that could be targeted for control. Sugar-sweetened beverages are unique in the sense that they have no nutritional value but may contribute a significant proportion of total calories. A can of soft drink per day translates to a weight gain of about 2kg per year, and a meta-analysis showed that consumption of soft drink had an association with a greater incidence of type 2 diabetes, independent of adiposity.[35] The health consequences of sugar-sweetened beverages are particularly a problem in Aboriginal and other disadvantaged communities.

What we could do to encourage healthy eating

- Diet and the obesity epidemic are clearly ongoing topics of research and policy development, and there are no simple solutions. A sugar tax is being considered or being introduced in other countries, and has been shown to be effective in reducing sugar-sweetened beverage consumption.[36] This warrants further discussion in Australia. A tax on sugar-sweetened beverages could be used to improve access to, and reduce the cost of healthy choices. The increased price from such a tax would also discourage buyers from purchasing these drinks over other drink options.

Activity

Lifestyle-based intervention is key to the prevention of type 2 diabetes and many trials have now been conducted which show the effectiveness of chronic disease prevention and management programs for those at high risk of type 2 diabetes. Lifestyle-based intervention can reduce the risk of developing type 2 diabetes by up to 60% among those at high risk.[37] A longer follow-up of one such type 2 diabetes prevention trial in China has shown that lifestyle-based intervention has a benefit in the longer term for reducing death rates.[38] While the community, health professionals and governments are essential in providing resources, self-management (which emphasises the patient's role in managing their condition) is a core component of disease prevention and management. Self-management is important because the diseases of relevance are slow in progression and long in duration.[39] Although, for CVD prevention in those with type 2 diabetes, lifestyle-based intervention does not have a clear benefit,[40] it has been shown to be beneficial in the prevention of coronary disease in the general population.[41]

Rewarding behaviour change

Changing lifestyles and patterns of behaviour is difficult, especially in the primordial and primary prevention settings, where the individual looks and feels well. There is developing evidence of the ability of incentive-based programs to alter behaviour. A study of over 300,000 participants in a health plan and related health promotion program showed a decrease in the prevalence of inactive members over five years, with fewer hospital admissions in members who remained highly active than those who remained inactive.[42]

What we could do to encourage physical activity

- All arms of government, from urban planning to departments of health need to consider access to 'activity-friendly' environments.
- Research is needed on the benefits of incentive programs for encouragement of activity.

INDIVIDUAL PREVENTION OF CARDIOVASCULAR DISEASE — TREATMENT GAPS AND RESPONSES

PRIMARY AND SECONDARY PREVENTION

Primary prevention is concerned with preventing the onset of disease. It involves interventions that reduce the levels of risk factors. Primary prevention of CVD is achieved via lifestyle changes or the use of medication. Secondary prevention seeks to reduce the impact of a disease once it has developed. It may target the prevention of either the recurrence of an episode of disease or the progression from early disease to more advanced disease. In both cases, it involves steps to halt or slow the progress of disease, including medical therapy as well as personal strategies to prevent recurrence. After an acute presentation (e.g. heart attack or stroke), secondary prevention is a part of programs to return people to their original health and function (rehabilitation) and to prevent long-term problems. For CVD, it focuses on those who have already had an event, such as a heart attack or stroke.

HYPERTENSION

The 2014–15 National Health Survey[3] reported that 4.1 million adult Australians had high blood pressure — equivalent to the entire populations of Western Australia and South Australia. It is likely that another 2 million were on treatment and controlling their blood pressure. High blood pressure was slightly more prevalent in men (24.4%) than women (21.7%), and also increased with age.[3] The significance of high blood pressure is underpinned by the fact that in Australian general practice, high blood pressure was the most frequently managed problem during 2013–14 (8.7 per 100 patient encounters).[43]

The benefits of controlling blood pressure have been demonstrated in a wide variety of populations and with most of the major classes of blood pressure-lowering drugs.[44] Reduction in the rate of stroke, and to a lesser extent heart attacks, has been shown for people with high and with 'normal' blood pressure, in younger, middle-aged and older adults, and for those with and without established CVD.

The treatment gap

Among Australian adults with high blood pressure, more than two-thirds (68%, representing 3.1 million adult Australians) were either not taking any treatment or were on treatment but not achieving adequate blood pressure control.[45] Controlling blood pressure is an important aspect of controlling risk, irrespective of the contributors of risk (Figure 7). Among the total population, men were more likely to have uncontrolled or untreated high blood pressure than women. The proportion of Australians with uncontrolled or untreated high blood pressure increases with age.[3] Non-treatment is also associated with workforce participation, infrequent general practitioner visits, dissatisfaction with recent medical care, high total cholesterol, moderate-level physical activity and lower body weight.[46] As high blood pressure is the greatest contributor to the burden of CVD (accounting for 42% of the total burden[47]), managing high blood pressure well is an important target when trying to reduce coronary heart disease and stroke.

One of the challenges of blood pressure management has been accurate measurement of blood pressure. The 'white coat' effect often leads to over-estimation of actual blood pressure in the clinic, which in turn risks over-treatment or — in response to the risk of this phenomenon — reluctance to increase therapy. Twenty-four hour ambulatory blood pressure measurement correlates better with end-organ disease and outcome than does blood pressure measured at the doctor's surgery. In the UK, 24-hour ambulatory blood pressure measurement is recommended as a routine part of care, but remarkably, in Australia, it is not subsidised by Medicare.

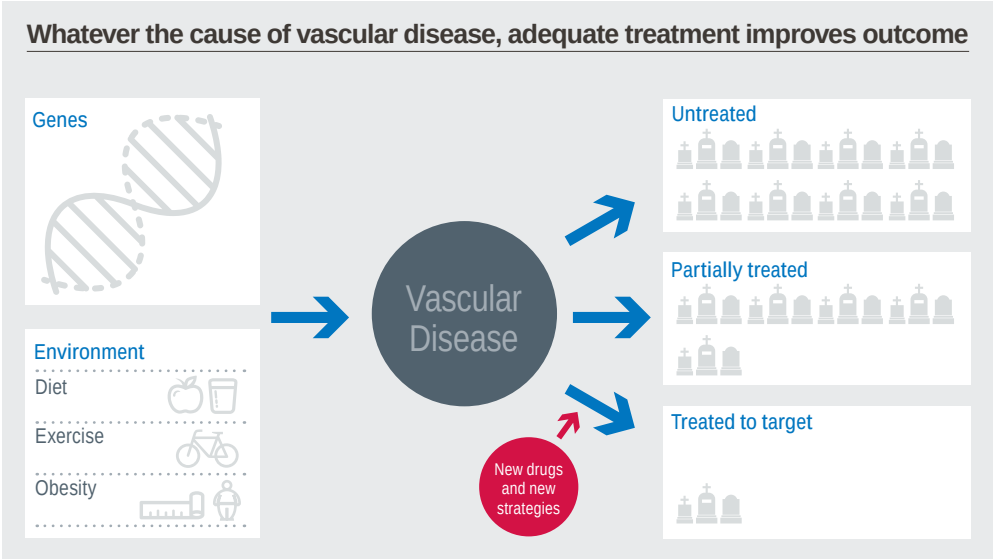


Figure 7. Importance of treatment to target in controlling risk. Vascular disease is multifactorial, and reduction of mortality is achievable from adequate control of multiple risk factors.

CHOLESTEROL AND OTHER LIPIDS

Abnormal or high total cholesterol is a major risk factor for coronary heart disease and stroke. In Australia in 2011–12, 32% of Australians aged 18 years or older had high total cholesterol (≥5.5 mmol/l) which equates to 5.6 million people aged 18 and older.[45] High cholesterol is more common in women than men (37% vs. 29%). Abnormal levels of HDL-cholesterol (good cholesterol) were present in 23%.

Almost two-thirds (64%) of the population has at least one abnormal blood lipid reading (total cholesterol, LDL-cholesterol, HDL-cholesterol or triglycerides).[45] Given that the 2010 Global Burden of Disease study demonstrated that high total cholesterol was the second greatest contributor to the total burden of heart disease (36% of the total burden [48]), failure to treat lipids (or treat them well) is an important modifiable [48] contributor to CVD.

The evidence supporting the reduction of cholesterol by statins for the prevention of CVD arises from many trials which have been conducted in both primary and secondary prevention populations since the 1990s. Reducing LDL-cholesterol using statin therapy reduces the risk of major vascular events and vascular death by about 20% for each 1 mmol/l reduction in LDL-cholesterol achieved. From this work, we also know that statins prevent CVD in those with or without pre-existing CVD. The effectiveness of this treatment is not related to the baseline cholesterol level of the patient.[49] More recently, trials have confirmed similar benefits in people with intermediate CVD risk.[50]

Two other classes of cholesterol-lowering drugs are available. Ezetimibe is helpful for people who fail to attain target levels on statin therapy, and studies show that ezetimibe can also prevent CVD events.[51] The PCSK9 inhibitors are even more potent than statins in lowering cholesterol. Whilst it is anticipated that they will have a profound effect on CVD, the experience with this category of medications is just beginning.

The treatment gap

Despite the availability of these treatments, Australians are not managing their cholesterol levels well. About 50% of Australians with abnormal blood lipids (dyslipidaemia) were not receiving treatment — and this percentage increases with age.[45] Even among those who are receiving treatment, many are not treated to targets that are known to be effective. There is a variety of reasons for this, including people who do not have any symptoms not using a treatment, inadequate time in primary care to discuss, encourage and follow up on the use of treatment, intolerance of statins and inadequacy of therapies.

DIABETES

As in many other parts of the world, diabetes mellitus has become one of the most common non-communicable diseases in Australia. Since the 1980s, the prevalence of diabetes in Australia has doubled. In 2014–15, 5.1% of the Australian population (1.2 million people) had some type of diabetes, an increase from 4.5% in 2011–12.[3] One million people (4.4%) had type 2 diabetes in 2014–15, up from 840,000 people (3.8%) in 2011–12.[3] A further 158,900 people (0.7%) had type 1 diabetes in 2014–15, up from 113,400 people in 2011–12 (0.5%). Diabetes is slightly more common in men than women and the rate increases with age. Of people aged 75 years and over, almost one in five (18.4%) had diabetes in 2014–15.[3] For every four people with diagnosed diabetes in Australia, there is one person who has diabetes but is unaware of it.

A related condition is pre-diabetes, which affects nearly 1 in 6 adults (more than 2 million individuals). Pre-diabetes is a condition whereby blood glucose levels are higher than normal but not high enough to be diagnosed as diabetes. The treatment for pre-diabetes involves the same lifestyle changes that are recommended for people diagnosed with type 2 diabetes.

The treatment gap

Data from the Australian Health Survey suggests that among those people with diabetes, only 55% are attaining target HbA1c levels (a measure of blood sugar control) of <7.0%.[45] Among those with diabetes, 29%, 54% and 70% achieved LDL-cholesterol, HDL-cholesterol and triglyceride treatment targets, respectively.[45] In addition to maintaining a healthy lifestyle, there are numerous efficacious medicines now available to lower blood glucose levels within acceptable ranges. Maintaining good control of blood glucose levels among those with diabetes delays the development of diabetes complications such as heart attacks, stroke, eye disease and kidney disease.

ASPIRIN

Aspirin use decreases the occurrence of heart attack by 25–33% and significantly reduces the occurrence of cardiovascular emergencies, but use of aspirin has no significant effect on non-fatal stroke.[52,53] The benefits of aspirin have to be balanced against the risk of gastro-intestinal and intra-cranial bleeding. If the risk of a CVD event is not high enough, there is no evidence of net benefit.

Therefore, aspirin is recommended in all those who have already had a CVD event (secondary prevention), but for primary prevention, it is recommended only in individuals with a 10-year risk of CVD that is greater than 10%.

Nevertheless, others suggest aspirin has only modest benefit in people without clinical CVD and that this benefit is offset by its risk.[54,55] Trials of aspirin use for the prevention of CVD in older populations are underway.

ABSOLUTE RISK ASSESSMENT

The prevention of CVD is centred around the lifestyle measures discussed above, as well as the use of medicines. Given the cost of drugs, and their potential for side-effects, drug selection needs to be based on accurately identifying and targeting individuals at risk.

In recent decades there has been a move away from managing isolated CVD risk factors, such as high blood pressure and high cholesterol, towards assessment and management of these factors collectively through the estimation of absolute CVD risk. The adoption of this approach, in preference over treating individual risk factors has a number of benefits: it is more cost effective, it avoids providing medication to low-risk people, and it identifies those who are most likely to benefit from treatment. Absolute risk is estimated by CVD risk calculators derived from studies such as the Framingham study, and have been calibrated to an Australian population. Several guidelines have described categories of risk for which treatment is warranted. A recent description of nearly 10,000 respondents to the Australian Health Survey showed that about 20% of those aged 45–74 years (projected to be about 1.4 million people) were at high risk of a future CVD event, and most (projected to be approximately 1 million people) were not receiving guideline-recommended therapy for elevated blood pressure or cholesterol.[56] The implication is that there would be potential health gains from treatment according to absolute CVD risk.

The development of modern imaging has allowed the recognition of disease before symptoms appear, allowing better targeting of individual people for intervention.

MULTIFACTORIAL, MULTIDISCIPLINARY DISEASE MANAGEMENT

About 20% of Australians now live with multiple chronic diseases. The complexity of their treatment and the involvement of multiple health professionals (including multiple general practitioners) contributes to avoidable hospital admissions. Responses to this problem in overseas jurisdictions has led to the concept of the ‘Medical Home’ or ‘Health Care Home’, which has been considered in Australia.[57] A fundamental problem of the management of multiple and complex diseases is the loss of continuity of care, and whether this is best addressed by identifying a ‘home’ practice, or perhaps better, a ‘home’ practitioner, remains to be finessed.

POTENTIAL BENEFIT OF BETTER PRIMARY PREVENTION

We lack modelling to quantify the benefit of additional risk factor control in Australia, but data from England between 2000 and 2007 may be informative.[58] During this interval, systolic blood pressure and total cholesterol decreased in both men and women, and it was estimated that 20,400 deaths prevented or postponed were attributable to reductions in blood pressure and cholesterol. The decline in blood pressure was responsible for 13,000 deaths prevented or postponed, of which 1,800 came from medications and 11,200 deaths prevented or postponed from population-wide changes. About 19% of the total mortality reduction through the time period was attributed to increases in the uptake levels of treatments for high blood pressure and raised cholesterol.[58]

What we could do to better control risk factors

- Steps to encourage calculation of absolute CVD risk.
- Develop disease management programs to facilitate frequent follow-up with sufficient time during appointments to facilitate discussion and provide encouragement.
- Access to a new class of cholesterol-lowering drug, the PCSK9 inhibitors. These are more potent than statins in lowering cholesterol. The experience with these agents is just beginning.
- Provide access to a more effective process for 24-hour blood pressure measurement. There is currently no Medicare payment for this service. Its provision could be integrated with other aspects of risk assessment from pathology services.

SECONDARY PREVENTION

As mentioned above, secondary prevention of CVD aims to prevent the progression of disease. The medical aspects of secondary prevention include the use of aspirin, statins, angiotensin converting enzyme inhibitors, and beta blockade in people with established CVD. Using these treatments needs to be supported by also modifying behavioural risk factors, psychosocial care, education and support for self-management (including adherence to prescribed medicines). Secondary prevention approaches should be evidence-based and multidisciplinary. These processes involve more than exercise training, although this is of clear value in cardiac rehabilitation for both coronary artery disease[59] and heart failure.[60] Such systems are coordinated systems of care which involve individual assessment, modification of risk factors with medication, exercise programs, education, behaviour modification strategies and supported self-management. Cardiac rehabilitation is currently under-used, but has been shown to reduce readmissions, and to improve quality of life, symptoms, lipid levels and survival rates.[61] Both cardiac rehabilitation and multidisciplinary congestive heart failure management are cost effective.[62] [63] Because the greatest barrier to rehabilitation is failure to refer the patient, the direct access of people to COACH (a coaching program for the prevention of coronary heart disease, heart failure and primary prevention for those at high risk of cardiovascular disease) may provide many of the benefits through web-based education.[64] The approach to this is inconsistent across Australia, with availability state-wide in some states (e.g. Queensland), and access through public hospital programs in some and through Private Health Funds in others.

Technology may also be used to prompt appropriate behaviour,[65] as well as for monitoring, although the benefits of the latter have recently been questioned.

What we could do to better secondary prevention

- Wider use of 24-hour blood pressure measurement.
- Use of nurse practitioners to use algorithms to increase treatment to target.
- Adoption of the ‘Health Care Home’ concept.

INTERVENTIONS FOR AND TREATMENT GAPS IN SYMPTOMATIC DISEASE

THERAPY FOR CORONARY ARTERY DISEASE

The death rate from acute heart attacks is now about one quarter of what it was in 1980.

Early trials of different treatments, thrombolysis and beta blockade were followed by trials of statins, antiplatelet agents, ACE inhibition and revascularisation. In the course of this process, a number of seemingly-rational (but actually harmful) interventions — such as use of anti-arrhythmic drugs, or routine use of oxygen — have been stopped. Australian guidelines for the management of acute coronary syndromes[66] largely follow international guidelines.

Advances in treatment have been based on a better understanding of how atherosclerotic plaques form and rupture, and how blood clots form. This understanding of how blood clots form has been pivotal in planning interventions to stop blood clots (Figure 8).

A heart attack is caused by a sudden blockage in one of the arteries of the heart, which is usually caused by a blood clot. After a heart attack it is essential to open the blocked artery and restore blood supply to the heart as soon as possible, preferably within 90 minutes. This process is called reperfusion. In 2010, timely treatment was achieved in only 23% of Australians with a heart attack involving vessel blockage.[67] Improving this will require attention to be focussed on the performance of the health system as a whole including ambulance and emergency department response. Timely treatment also requires consideration of how to educate the population to ensure that people respond appropriately to a heart attack.

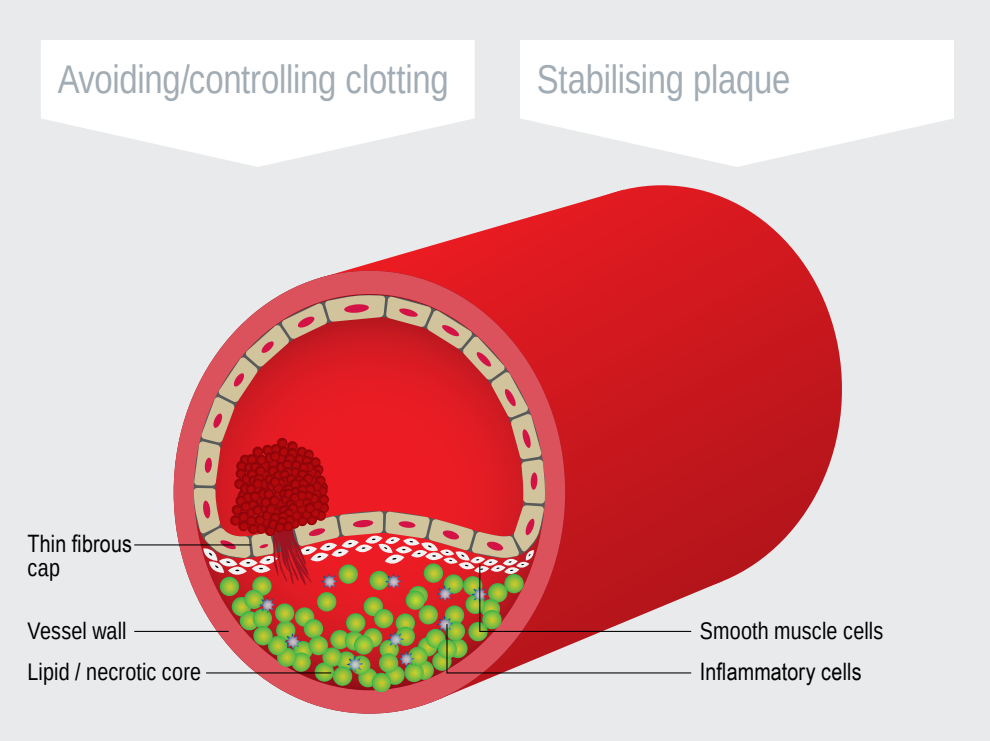


Figure 8. Blockage of an artery results from rupture or erosion of the plaque, causing a blood clot to form, which blocks the vessel. Therapy requires controlling clotting and stabilising plaque.

The most recent picture of treatment derives from the SNAPSHOT ACS study of 4,398 people (mean age 67 years, 40% women) presenting with chest pain, of whom one-third had heart attack and 21% unstable angina or other forms of cardiac chest pain.[68] Angiography was performed in 71% of heart attack patients, with stenting procedures in 43%. Use of 4–5 guideline-recommended medications was reported in approximately 60% of cases. The death rate was 4.5% in hospital and the recurrent heart attack rate was 5.1%. But there were substantial regional variations, and significant variations in care and outcomes by hospital classification and jurisdiction were evident after adjusting for patient risk and other variables (Figure 9).

Treatment gaps in acute coronary syndrome

Acute coronary syndrome continues to be a major event in the lives of many Australians. In 2009–10, there were 55,219 and 34,037 hospitalisations for heart attacks and unstable angina, respectively.[69]

The provision of prompt revascularisation and appropriate medicines upon discharge is an important 'process of care' target in acute coronary syndrome. Previous work by the National Prescribing Service on discharge management of acute coronary syndromes was successful in increasing the uptake of management plans, use of guideline-based medications, referral to secondary prevention and cardiac rehabilitation programs. The current gaps in prescribing in Australia are unmeasured, but the Get With the Guidelines program in the USA has shown that many acute coronary syndrome patients eligible for intensive lipid-lowering therapy were not discharged on appropriate treatments.[70]

In addition to early reperfusion and revascularisation, and initiation of secondary prevention, the management of acute coronary syndrome extends to cardiac rehabilitation. This process, which involves both exercise training and education, is accessed by only 30% of eligible patients and the key driver of uptake is referral.[71]

Provision of (A) investigations and revascularisation and (B) guideline-recommended therapies, among patients with a discharge diagnosis of acute coronary syndrome, by enrolling hospital classification*

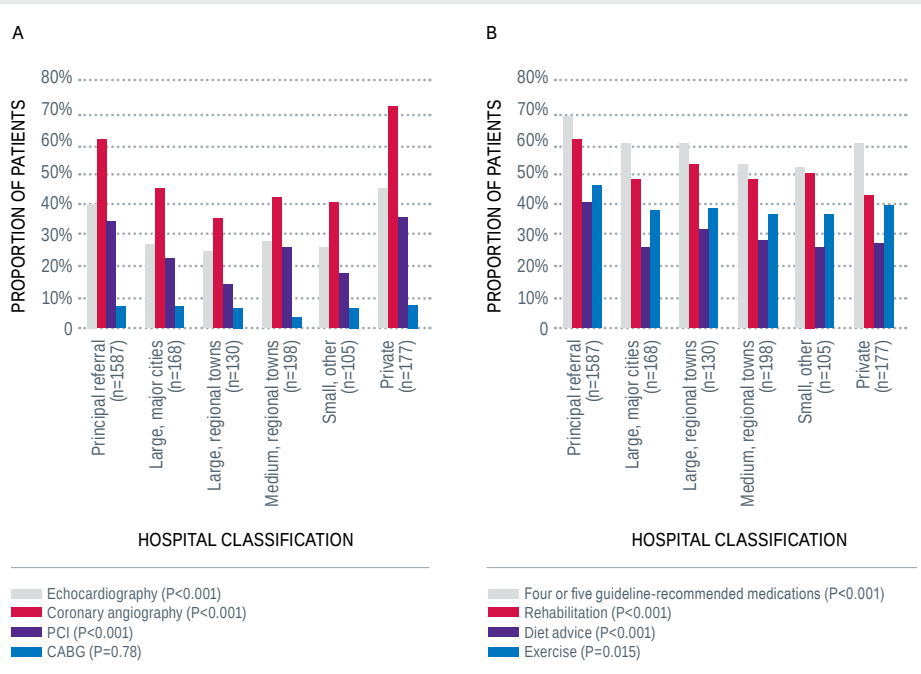


Figure 9: Variations in the care of acute coronary disease in relation to hospital site and circumstances.

Source: Chew DP, French J, Briffa TG, et al. Acute coronary syndrome care across Australia and New Zealand: the SNAPSHOT ACS study. Med J Aust 2013; 199 (3): 185-191. 68 © Copyright 2013 The Medical Journal of Australia – reproduced with permission.

What we could do to better manage acute coronary syndrome

- Development of a registry could provide quality and safety indicators for acute coronary syndrome. The National Heart Foundation has previously recommended this.[72]
- Cardiac rehabilitation services are accessed by only 30% of eligible patients[71], and the key driver of uptake is referral. Online cardiac rehabilitation is an option.
- Education — in a study of 454 cardiologists and 1,452 general practitioners, online educational interventions on acute coronary syndrome management improved adherence to guidelines.[73]

THERAPY FOR HEART FAILURE

For all stages of heart failure, treatment goals include management of the disease causing the heart failure; lifestyle changes (dietary including salt and alcohol restriction, weight control, physical activity and smoking cessation); symptom control (mainly with drugs); and attempts to prevent or delay progression of the heart failure and reduce death. The most common causes of heart failure are high blood pressure, type 2 diabetes and coronary heart disease. There is evidence that control of each may slow disease progression.

Because of the complexity of the multi-drug regimens required to treat heart failure, concurrent diseases and the frequent presence of cognitive impairment in these elderly people, a disease management program is considered to be an important part of the care of many of these people. State and Territory guidelines have incorporated disease management programs in their policies or are piloting initiatives such as the NSW Integrated Care Strategy, Queensland Health Integrated Care Innovation Fund (ICIF) and the Victorian Government HealthLinks trials. However, the intensity of these interventions is variable and efforts to calibrate this to the level of these patients' risk would be desirable.

The combination angiotensin receptor blocker/neprolysin inhibitor, now included in the American and European heart failure guidelines,[74] has been recently recommended by the Pharmaceutical Benefits Advisory Committee. This agent produced a 20% reduction in cardiovascular death or hospitalisation compared to enalapril alone. Over three years, the use of this agent would give a 22% reduction in hospital admissions compared with enalapril. The resulting incremental cost-effectiveness ratio was $45,017 per quality-adjusted year of life saved.[75]

Treatment gaps in heart failure

The decrease in rates of hospitalisation and death due to heart failure is attributable to the effectiveness of medical therapy. Nonetheless, the number of people not treated to target doses remains high.[76]

Despite advances in heart failure care, readmission rates after heart failure have increased. In the decade from 2003–04 to 2013–14, the number of heart failure hospital separations increased by 26%, many attributed to the readmissions.[77] Readmission is a serious health economic problem.[78] The causes of readmission are mixed. They include failure to adequately control the problem at the initial admission; not correcting the causes of the heart failure (leading the whole process to recur); not addressing other diseases that are affecting the patient; insufficient support when moving from the hospital back to the community; inadequate resources (including general practitioners and pharmacy); difficulties in self-management and social deprivation. Many of these causes are preventable.[79]

What we could do to better manage heart failure

- Develop a national strategy to reduce hospital readmission.
- Establish uniform criteria for disease management programs.
- Access to new drugs, e.g. the new combination angiotensin receptor blocker/neprolysin inhibitor.

THERAPY FOR ATRIAL FIBRILLATION

There are no Australian guidelines regarding the management of atrial fibrillation (although there are guidelines about catheter ablation of atrial fibrillation), but guidelines have been produced by international bodies. Treatment goals for atrial fibrillation include preventing the process of blood clots forming in the heart (e.g. causing strokes when they are dispersed through the body), control of heart rate, control of heart rhythm, and detection and treatment of the underlying illness that is driving the atrial fibrillation (e.g. thyroid disease).

There have been important evolutions in treatment options over the last few years. A family of new (non-warfarin) oral anticoagulants have become available that are as effective as warfarin for the prevention of blood clots in the majority of atrial fibrillation which is not caused by heart valve diseases. Unlike warfarin, they do not require monitoring with regular blood tests, nor is their effect modified by diet and other medical therapy in the way that the effects of warfarin are modified. Since these agents became available, the overall rate of anticoagulation therapy in Australia has increased, and the use of warfarin has decreased.[80]

Although the medical literature has focussed on topics such as how and when to control the heart rhythm,[81] or 'ablation therapy' to control the problem in selected people with troublesome symptoms from atrial fibrillation, there is emerging evidence that lifestyle changes to improve weight and exercise may have an independent effect on atrial fibrillation, and may obviate the need for these procedures.[82]

Treatment gaps in atrial fibrillation

There are two treatment gaps in atrial fibrillation. The first treatment gap relates to controlling the rapid pulse-rate associated with the condition and the second to stroke prevention. The limiting feature in stroke prevention in atrial fibrillation is prescription of anticoagulants, the downside of which is risk of bleeding. It is estimated that 40% of people with atrial fibrillation are not taking anticoagulants — with roughly equal contributions from undiagnosed atrial fibrillation and failure to treat in diagnosed atrial fibrillation.[83] Among eligible people with heart failure and atrial fibrillation, Eapen et al reported that a third were not prescribed anticoagulation on discharge from heart failure hospitalisation.[84] There are no Australian data on this topic. Clinical scores are available to predict thromboembolic and bleeding risk, but have not been widely adopted. Opportunities for improvements in atrial fibrillation care include atrial fibrillation screening and improving the adequacy of anticoagulation. 30% of cases of atrial fibrillation are diagnosed incidentally and many people with atrial fibrillation present with a complication — usually stroke.

What we could do to better manage atrial fibrillation

- Develop a national strategy to detect asymptomatic atrial fibrillation and reduce incident atrial fibrillation.
- Education about the use of anticoagulants in primary care.

ADULT CONGENITAL HEART DISEASE

About 3,000 babies per year are born in Australia with congenital heart disease, and there are almost 60,000 adults and children living with the disease. The excellent outcomes of operative interventions for congenital heart disease and the unchanging birth prevalence of these problems means there are now more adults than children living with congenital heart disease. However, the legacy of congenital lesions in these adults leads them to have excess mortality compared to the general population, with most deaths of cardiovascular origin and almost half due to arrhythmias or heart failure. Many of these problems are treatable, so these figures might be different if adults with congenital heart disease remained engaged with the health system.

A regional congenital heart disease registry would help to inform public health challenges including lack of knowledge of risk factors, prevalence across the lifespan and long term outcomes. A more robust means of transitioning from adolescent to adult care for people with congenital heart disease may help to reduce the number of adults failing to receive cardiac follow-up and experiencing delays in treatment.[85]

What we could do to better manage adult congenital heart disease

- Improve the transition of care from paediatric to adult health systems to prevent loss to the system.
- Develop clinical and research registries to inform health care provision of lifetime continuum of care.

CARDIOVASCULAR DISEASE WITHIN THE ABORIGINAL AND TORRES STRAIT ISLANDER POPULATION

EPIDEMIOLOGY

In 2014, it was estimated that there were 746,815 Aboriginal people in Australia, accounting for 3% of the total Australian population.[86] Aboriginal people have much lower median age (21.8 vs. 37.6 in 2011, see Figure 10 for population distribution) and generally worse health compared with non-Aboriginal people. Approximately 20% of the Aboriginal population live in *Remote and Very remote* areas. The Aboriginal population is projected to exceed 900,000 by 2026.[86]

BURDEN OF DISEASE

The levels and impacts of CVD are much greater in Aboriginal compared to non-Aboriginal people. Cardiovascular conditions are more prevalent across all age groups among the Aboriginal population, especially in the younger age groups (Figure 11).[87] The National Aboriginal and Torres Strait Islander Health Survey (in 2004–05) showed chronic heart-related conditions to be 20% more common in Aboriginal males and 30% more common in Aboriginal females compared with their non-Aboriginal counterparts. Compared with other Australians, Aboriginal people have three times the risk of a major coronary event and twice the risk of death from coronary heart disease.[88,89] Although Aboriginal people have higher levels of smoking, type 2 diabetes, physical inactivity, obesity and excessive alcohol consumption, these differences in CVD risk factors do not fully account for the gap in death risk between Aboriginal and non-Aboriginal Australians.

Mortality

After age-standardisation, the death rate of Aboriginal people (9.8 per 1,000) was nearly twice the rate of their non-Aboriginal counterparts, partly due to their higher CVD prevalence. CVD is the leading cause of death among Aboriginal people (26% of total deaths), followed by cancer (20%) and external causes (15%). Although CVD death rates have declined for all Australians in recent years and the mortality gap between Aboriginal and non-Aboriginal Australians has been reduced, CVD death rates are still approximately 1.5 times greater in Aboriginal Australians compared to non-Aboriginal Australians.

Figure 10. Population distribution of Aboriginal and non-Aboriginal populations in Australia (2011). Source: Australian Bureau of Statistics 2012.

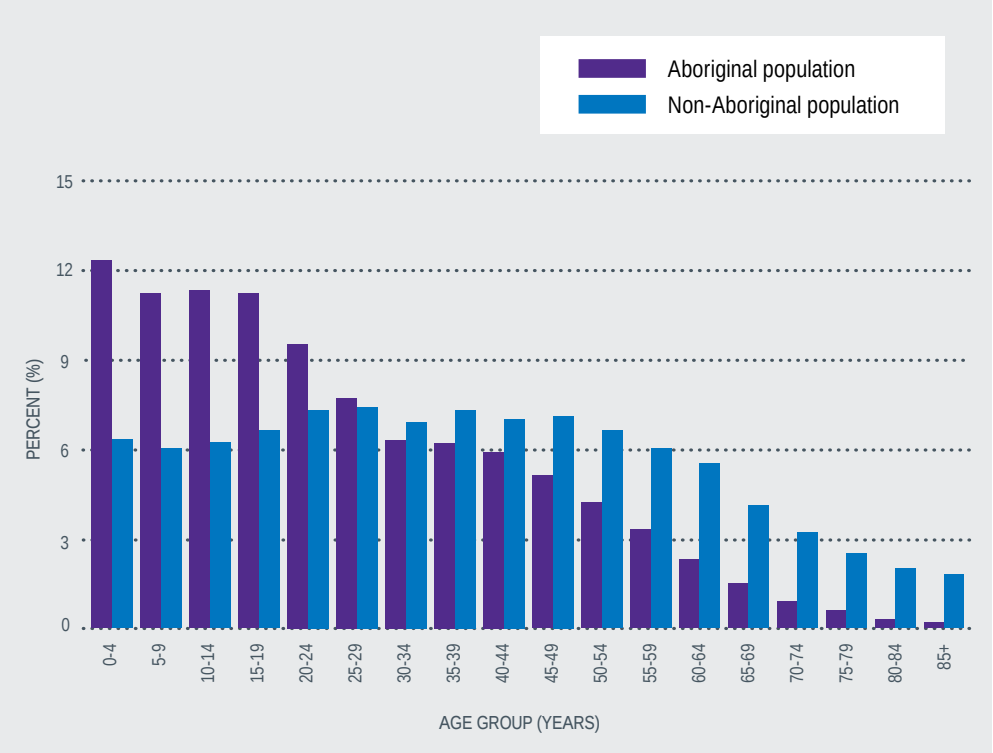
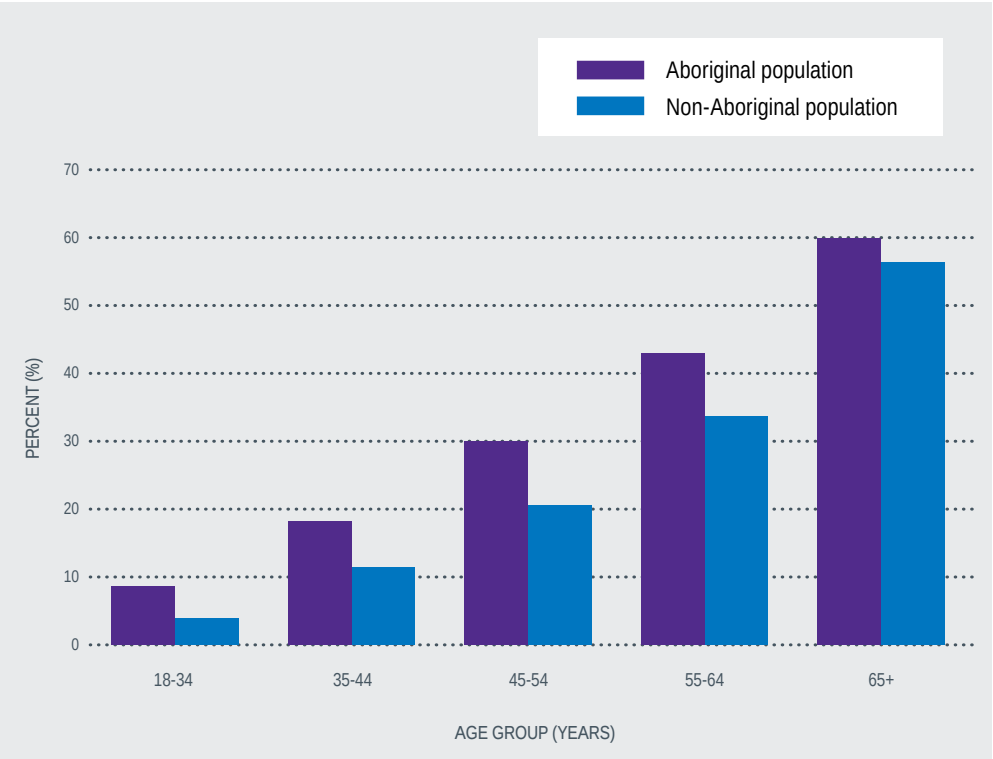


Figure 11. Prevalence of CVD in Australia (2011–13), by Aboriginal status and age. Sources: Analysis of unpublished data from the 2011–12 Australian Health Survey and the 2012–13 National Aboriginal and Torres Strait Islander Health Survey by Australian Institute of Health and Welfare.



Coronary heart disease is the most common cause of death from CVD among Aboriginal people and the rate of death from coronary heart disease for Aboriginal Australians was double that for non-Aboriginal people in 2010 (179 deaths per 100,000 vs. 89 deaths per 100,000 population). The imbalance of coronary heart disease deaths is greatest among the 25–34 year age group in both men and women.[90]

Hospitalisations

There is nearly double the rate of hospitalisation among Aboriginal people compared with that of their non-Aboriginal counterparts.[91]Over a decade from 2004–14, hospitalisation rates for CVD decreased by 15% among non-Aboriginal people but increased by 12% among Aboriginal Australians. CVD contributes to this disparity: hospitalisation rates for CVD were 1.4 times greater for Aboriginal males and 1.8 times greater for Aboriginal females.[88] Of all hospitalisations of Aboriginal people with CVD as the principal diagnosis, coronary heart disease is the leading cause, contributing to more than 40% of the episodes (Figure 12). The disparity in hospitalisation rates is highest for rheumatic heart disease, with a five-fold and eight-fold greater risk for Aboriginal males and Aboriginal females, respectively than for their non-Aboriginal counterparts.[88]

Coronary heart disease

Coronary heart disease is the most common form of CVD amongst Aboriginal people, and the greatest contributing factor to premature and avoidable deaths in this population. The age-adjusted death rate after heart attack is approximately 1.5 times higher for Aboriginal people.[88] After age-standardisation, Aboriginal adults are almost twice as likely to have coronary heart disease as their non-Aboriginal counterparts. The greatest disparity in coronary heart disease is among younger age groups (five times greater in the 18–34 year old group). Coronary heart disease accounts for 14% of the gap in the burden of disease between Aboriginal and non-Aboriginal communities.[92]

Heart failure

Risk factors of heart failure, particularly high blood pressure, diabetes and coronary heart disease, are common and may occur at a younger age amongst Aboriginal people. Consequently, the burden of heart failure is greater in the Aboriginal population compared to other Australians. Age-standardised data show the prevalence of heart failure to be increased 1.7-fold, hospital discharges ≥3-fold and death rates >2-fold in Aboriginal compared with non-Aboriginal Australians.[93] These findings may still underestimate the true burden of heart failure in the Aboriginal population because of the large number of undiagnosed cases.

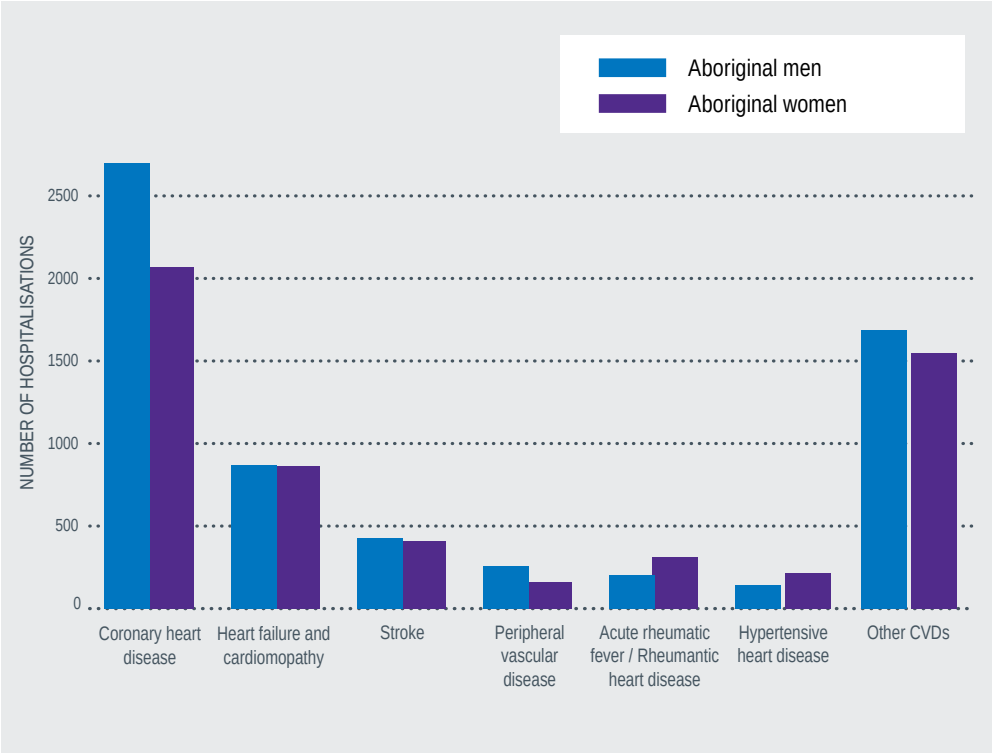


Figure 12. Major causes of hospitalisation for CVD among Aboriginal people (2013–14).

Source: National Hospital Mortality Database, Australian Institute of Health and Welfare.

Cerebrovascular disease

Compared with other Australians, the Aboriginal population suffers from a much greater burden of both fatal and non-fatal cerebrovascular events, and at a younger age (59 vs. 74 years old).[94] Indeed, most cerebrovascular disease (80%) occurs before 65 years of age in the Aboriginal population compared with only approximately 34% for their non-Aboriginal counterparts.[95] After adjusting for age, cerebrovascular disease is twice as common among Aboriginal people as among other Australians, with twice the rates of death and hospitalisation.

Rheumatic heart disease

Rheumatic heart disease is a complication of acute rheumatic fever, itself representing a complication of group A Streptococcal infection, characterised by damaged heart valves and associated cardiac structures. Rheumatic heart disease is now very rare among non-Aboriginal Australians, but remains a common condition among Aboriginal people. Rheumatic Heart Disease Australia is the national co-ordination unit supporting the control of rheumatic heart disease in Australia. Although contributing a small proportion to overall mortality, the rate of rheumatic heart disease in Aboriginal people is among the highest in the world. Rheumatic heart disease is rare amongst non-Aboriginal Australians.

Treatment gaps in cardiovascular disease in the Aboriginal population

Gaps in prevention and treatment of CVD play an important role in the approximately 10 year difference in life expectancy between Aboriginal and non-Aboriginal Australians.[96]

Prevention of cardiovascular disease

Modifying CVD risk factors is the key to prevention of CVD, and especially so in the Aboriginal population because of the burdens of smoking, physical inactivity, high blood pressure, obesity, abnormal blood fats, diabetes and renal disease. However, under-screening for CVD risk factors is a major problem in this population.[97] Modifications should be made to assessment tools for estimation of absolute CVD risk in the Aboriginal population,[98] as current methods underestimate the risk in this population.[99] The substantial lack of use of health care services by Aboriginal people may result from both inadequate access and insufficient capacity.[100]

Treatment of cardiovascular disease

Although recommendations for medical therapy for individuals at high risk or with a past history of CVD are similar for all Australians, there are lower thresholds for prescribing medications for Aboriginal people in recognition of their higher CVD risk. For example, cholesterol lowering drugs are available for Aboriginal people through the Pharmaceutical Benefits Scheme at a lower threshold than for non-Aboriginal people. The National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand's joint position statement on lipid management recommends statin therapy for Aboriginal people with LDL-cholesterol above 2.5 mmol/L after lifestyle modification.[101] Early treatment of high blood pressure is also recommended for Aboriginal people.[102]

There are substantial prescribing gaps for Aboriginal people with high risk of CVD.[97] Aboriginal people are also disadvantaged by lower intervention rates after being hospitalised.[88] Of CVD admissions during 2006–08, only half of Aboriginal people had a procedure performed, compared with almost three-quarters of their non-Aboriginal counterparts. For people diagnosed with acute coronary syndrome, non-Aboriginal people were approximately twice as likely to receive coronary angiography and revascularisation than Aboriginal patients, after accounting for intervention needs.[88] Aboriginal stroke patients were less likely to be treated in a stroke unit and assessed within 48 hours by allied health professionals.[94] They were also less likely to receive aspirin within 48 hours and to be discharged on antithrombotic medication for ischaemic stroke.[94]

Provision of culturally appropriate healthcare services is an important aspect of successful delivery of prevention and treatment in the Aboriginal community. Aboriginal Medical Service-based cardiac rehabilitation programs have high levels of attendance.[102] Important initiatives are under way to close the gap in CVD, including identification of what needs to be done in the document 'Better Cardiac Care for Aboriginal and Torres Strait Islander People',[103] but the disease burden is great and much needs to be done.

ECONOMIC IMPACT OF CARDIOVASCULAR DISEASE

COST OF CARDIOVASCULAR DISEASE TO AUSTRALIA

According to data on healthcare expenditure reported by the Australian Institute of Health and Welfare, CVD has the highest level of economic burden of all disease groups in Australia (Figure 13).[104]

The estimated expenditure for CVD in the healthcare sector in 2008–09 was AUD$7.6 billion. This amounts to 12% of total allocated healthcare expenditure in Australia.

Cost of cardiovascular disease by healthcare sector

The largest proportion of CVD expenditure was attributed to hospital-admitted patient services (58.6% or AUD$4,460 million in 2008–09). This was followed by prescription pharmaceutical agents (21.7%) and out-of-hospital medical expenses (19.7%).

Cost of cardiovascular disease by specific disease

The two most expensive CVDs are coronary heart disease and stroke. As the most common form of CVD with the greatest rates of hospitalisation and death, coronary heart disease ranks the highest in expenditure (25% of total CVD expenditure). Stroke accounts for 8% of total CVD expenditure — >90% of costs are for inpatient services. The lifetime costs of treating the ischaemic and intracerebral haemorrhagic strokes that occurred in Australia in 2004 were approximately AUD$2,000 million, about 30% of which was attributed to the first year post stroke.[105] Because of the cost of caring for disability, the balance between investment and return for various health system interventions (Figure 14) are more favourable over a long term horizon.

Changes in cardiovascular disease expenditure over time

The inflation-adjusted total expenditure for CVD increased by 48% during 2000–09. This annualised growth-rate of approximately 6% is similar to other disease groups, and has kept CVD expenditure relatively stable (approximately 12% of total healthcare expenditure). Hospital admissions had the biggest increase in CVD healthcare expenditure (by 55%), partly reflecting repeated admissions. Given the high rates of rehospitalisation for heart failure and atrial fibrillation, this figure can be expected to increase in the coming years.

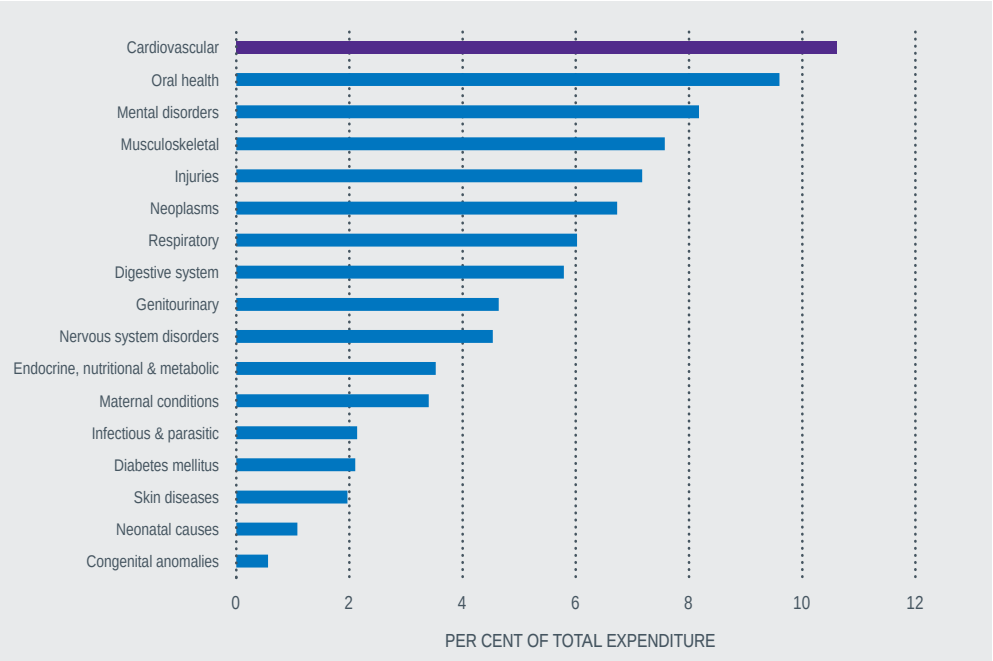
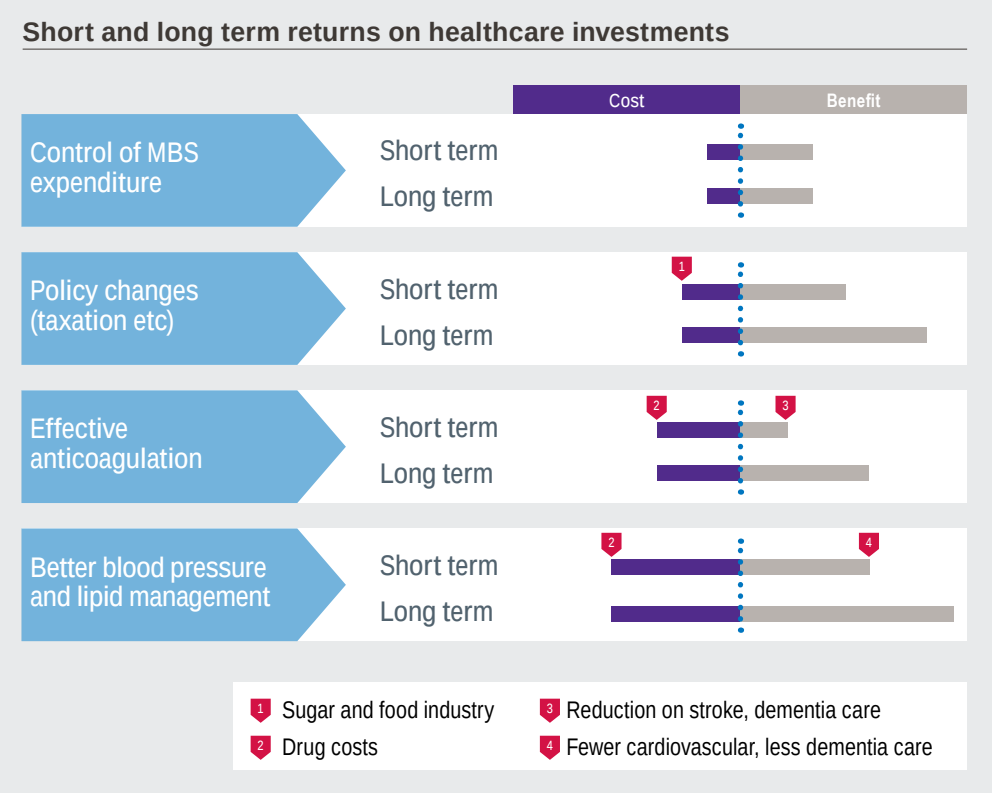


Figure 13. Healthcare expenditure by disease group in Australia 2008–09.

Source: Disease Expenditure Database, Australian Institute of Health and Welfare.

Figure 14. Short- and long-term returns on healthcare investments. Most involve both short- and long-term costs (mainly in medications but also economic costs of policy changes). However, the long term returns of reduced CVD (especially disability from stroke) are greater.



COST OF TREATMENT INERTIA TO AUSTRALIA

The ageing population and the ongoing epidemic of chronic cardiovascular conditions such as coronary heart disease, atrial fibrillation and heart failure, will lead to increases in allocated expenditure for hospital-admitted patient services over the coming decades. Controlling admission and readmission represents a significant component of controlling hospital expenditure in the coming years.

The average cost for each CVD hospital separation was almost AUD$10,000 for males and nearly AUD$9,000 for females.[104] Contributing largely to these costs are the high rates of short-term readmission from people with chronic cardiovascular conditions such as coronary heart disease and heart failure (25–30% at 30 days and over 40% at 90 days post discharge).[14,15] While these readmissions are usually considered preventable, they require more effective disease management, and targeted interventions should be developed on the basis of risk.

Also contributing to the increase in costs is the increased utilisation of medical procedures and tests for CVD patients (Figure 15). Over 20% of these tests are considered to be inappropriate or rarely appropriate.[106,107] Containing overutilisation may reduce the economic burden from CVD in Australia.

Rate of transthoracic echocardiography, transesophageal echocardiography, stress echocardiography and single-photon emision computed tomography in Australia from 2002 to 2013

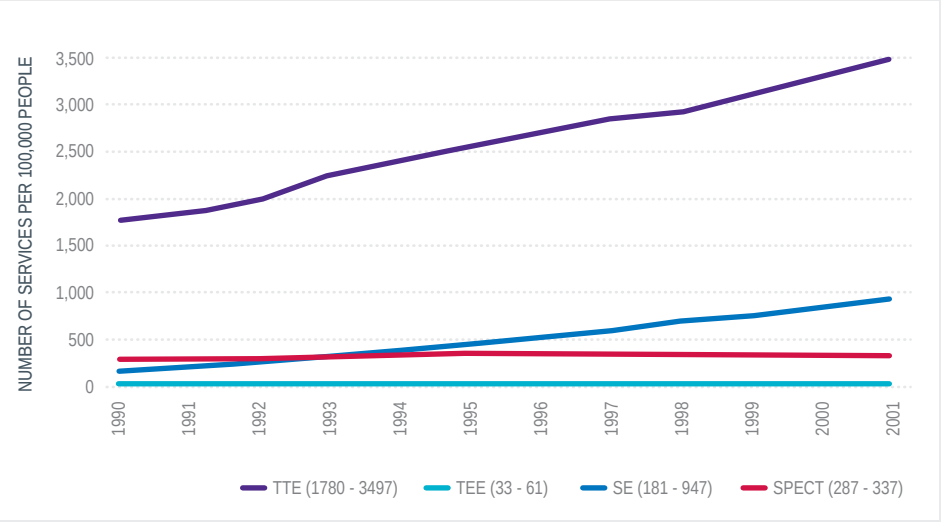


Figure 15. Utilisation of imaging tests in Australia during 2002–2013.

Source: Fonseca R, Otahal P, Wiggins N, Marwick TH. Growth and geographical variation in the use of cardiac imaging in Australia. Intern Med J 2015; 45:1115-27. 107 © Copyright 2015 International Medical Journal – reproduced with permission.

ROLE OF RESEARCH

CVD research has provided an enormous return on investment to date, with a benefit-to-cost ratio of 6.1 (cancer research is second-highest at 2.7). The reduction in the CVD death rate from acute CVD over the past few decades is a direct result of effective research. Research into CVD is essential to curb the rising economic and health costs to our society.

National funding into CVD research is a fraction of that provided for cancer research, despite the two being the leading health burdens. Over the past five years the NHMRC has allocated $932.80 million to cancer research (23% of the NHMRC budget) and only $601.10 million on CVD research (14% of the budget); a gap of $332 million over five years. Yet Australian CVD research is of high quality, being 29% more highly cited than Australian oncology papers. However, there were 60% more applications on oncology than CVD topics, reflecting lower national capacity in CVD research. In addition, there are fewer CVD charities and less State government support for this sector.

We cannot expect to change outcomes by doing ‘more of the same’. If we are to change practice, then change needs to be evidence-based. This observation pertains to not only health services and translational research, but also to discovery research to identify new treatments to address problems where current treatments are inadequate.

The response to several of these challenges is constrained by an evidence-base that is insufficient. Additional research could inform the following:

1

- How to better manage people suffering from the cardiac diseases of old age — including how to quantify frailty, cognitive impairment and the presence of multiple diseases.

2

- How to better identify people in the early phases of CVD — including the coronary calcium score (for coronary heart disease) and testing for asymptomatic cardiac dysfunction (for heart failure and atrial fibrillation).

3

- Better characterisation of people with different types of heart failure — especially the relatively new entity of heart failure with preserved ejection fraction. Effective treatments are more likely in response to well-characterised disease entities.

4

- Role of aspirin for primary prevention.

5

- More effective prevention and management of rheumatic heart disease, based on the development of a vaccine and better identification of patients in the early stages.

RECOMMENDATIONS

The ongoing personal and economic burdens of CVD are unquestionable, as is the likelihood of its growth in the coming years. Despite the advances of the past half century, epidemiologic changes have given us a moving target — atherosclerosis in middle age is being supplanted by heart failure, atrial fibrillation and valve disease in older age. The cost of ignoring these challenges will be increasing health costs and more strain on the hospital system.

Despite the current and future burdens, interventions are achievable in a number of areas, and could have favourable effects on outcomes:

1. GIVE CVD PATIENTS THE SERVICES THEY NEED

- Encourage the active management of CVD patients through chronic disease management programs; the government's recently announced 'Health Care Home' trial involving 65,000 patients is a good first step.
- Make sure that people hospitalised with heart failure leave the hospital with a nurse-led, multi-disciplinary disease management plan to minimise the risk of readmission, especially those at the highest risk.

2. HELP PEOPLE MAKE GOOD CHOICES

- Introduce public policies that reduce obesity and encourage healthy behaviour: tobacco taxes have already had very positive impact on reducing smoking.
- Consider taxes and other policies to reduce the consumption of trans fats and sugar.
- Consider incentives to encourage people to exercise and eat well.

3. GIVE THE RIGHT PEOPLE ACCESS TO THE BEST THERAPY

- Promote the effective control of risk factors like cholesterol and high blood pressure.
- Encourage 24-hour blood pressure measurement.
- Take more steps to encourage effective anticoagulation for atrial fibrillation.
- Use absolute risk assessment to target therapy to those most likely to benefit.
- Support the use of newer, more effective medicines for heart failure, high cholesterol, diabetes and stroke prevention.
- Provide education regarding their risk factors — for example using the COACH program — with the assistance of nursing and allied health staff.
- Recognise that some people are at greater risk of CVD, including the Aboriginal community, residents of rural and remote and poorer areas and people with mental illness and chronic inflammatory diseases.

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Baker IDI
HEART & DIABETES INSTITUTE

Baker IDI Heart and Diabetes Institute

Baker IDI Heart and Diabetes Institute (Baker IDI) is an independent medical research institute with a mission to reduce death and disability from CVD, diabetes and related disorders. Baker IDI is one of the few institutes in the world where the work of world-leading clinicians and research staff spans the spectrum of chronic disease from obesity to type 2 diabetes and CVD, and ranges from benchtop to bedside to population. The Institute is acutely aware of the need to meet the challenge of CVD in Australia. As such, Baker IDI is a founding institutional member of the Australian Cardiovascular Alliance, the peak leadership body for the advancement of research into heart, stroke and vascular disease. Baker IDI understands the need to stimulate discussion and build consensus on the continuing importance of CVD in Australia. This report compiled by Baker IDI summarises the current key issues relating to CVD in Australia.

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