4 Management and treatment

This chapter discusses the diagnosis, management and secondary prevention of the major forms of heart, stroke and vascular disease — coronary heart disease, stroke, heart failure, peripheral vascular disease, abdominal aortic aneurysm and hypertension. Rehabilitation after a cardiovascular event is also discussed. The management of rheumatic heart disease is considered in Section 6.1 on Indigenous Australians.

4.1 Management of heart, stroke and vascular disease

Coronary heart disease

The management of patients with coronary heart disease aims to reduce mortality and morbidity and improve quality of life. To reduce mortality, strategies should identify and treat patients at high risk of heart attack[5] or sudden death, and give emergency treatment to those suffering a heart attack (and subsequent myocardial infarction) or unstable angina. For those with more stable symptoms, there is a wide range of tests to confirm the diagnosis, guide management and assess prognosis. Options for treatment include medical therapy (mostly pharmacological), coronary bypass surgery and coronary angioplasty. The form of treatment is guided by the severity of symptoms, the extent of any damage to the heart muscle and the availability of expertise and facilities.

In 1993–94, coronary heart disease accounted for the greatest component of the total national cardiovascular health care bill and costs were greatest for the over 65 age group. Hospital costs comprised 62 per cent of the total (AIHW 1998b).

The standard of treatment for coronary heart disease in Australia is already high, and continues to improve. Estimates of potential further gains from the most effective use of available treatments are referred to later in this chapter and discussed more fully in Chapter 5.

Testing and diagnosis

Coronary angiography is currently the 'gold standard' for diagnosis of coronary heart disease, and is required before either coronary bypass surgery or coronary angioplasty is performed. Combined with assessment of left ventricular function, coronary angiography helps to classify patients according to risk (NHF 1996a). It is not used for screening because of its expense, limitations in access and potential for complications (an approximate risk of death, stroke or heart attack of 3 in 1,000). Data from 1995–96 show that the average length of stay for patients undergoing coronary angiography in Australia was four days (AIHW 1997b), and is likely to shorten with a current strong trend towards day-case angiography.

5 See footnote 3 on page 30.

Indirect non-invasive tests include resting electrocardiogram (ECG), exercise stress ECG, rest and stress nuclear perfusion (SPECT thallium or sestamibi scans) and blood pool imaging, rest or stress echocardiography, and continuous ambulatory (Holter) electrocardiography. These carry less risk for the individual than invasive tests, but have neither high sensitivity nor specificity for the diagnosis or prognosis of coronary heart disease, making them inappropriate for screening in people without symptoms.

Data from the AIHW for 1994–95 show peak use of cardiac testing in the 65–75 year age group, with a slightly lower rate in the 60–65 group. Because of demographic changes over the next 10 to 20 years, there will be a significant increase in the number of people in older age groups undergoing testing. There is also variation in rates of testing across Australia. Patients in rural or remote areas have to travel long distances for consultations with specialist cardiologists for assessment. Access in the future might be facilitated by the use of telemedicine, with infrastructure and funding mechanisms to enable rural doctors to contact cardiologists and transfer their patients for appropriate investigation and treatment.

Emergency treatment

Over 70 per cent of coronary deaths in males and 55 per cent of coronary deaths in females occur before the victims reach hospital (Chambless et al 1997). Immediate treatment can avert death and minimise damage to the heart. A recent Australian report showed that 50 per cent of heart attack patients delay seeking treatment by more than six hours (Dracup et al 1997). Examination of an Australian public health campaign designed to reduce patient delay (Heart Week 1989) showed that it was ineffective (Bett et al 1993) and further research is required to develop effective methods for reducing this delay. In addition to patient delay, efforts are being directed at improving bystander cardiopulmonary resuscitation (CPR) and providing public access to defibrillation and quick response coronary care ambulances.

Mortality after heart attack remains significant despite major improvements in the use of coronary care units, drugs such as aspirin and thrombolytic therapy, and coronary angioplasty. It is estimated that for every hour delay before thrombolytic therapy is given for heart attack, 1.6 lives are lost for every 1,000 patients treated (Fibrinolytic Therapy Trialists' Collaborative Group 1994). A recent Australian study showed that the proportion of patients with heart attack seen by a doctor within 10 minutes of arrival at hospital was only 26 per cent, and only 40 per cent received thrombolytic therapy within one hour of arrival (Palmer et al 1998). Delays were much higher if a junior doctor evaluated the patient. This information has significant resource implications for the staffing of emergency rooms.

There is an increasing trend in Australia towards using stent implantation for the acute treatment of heart attack, based upon early studies showing improved outcomes (Suryapranata et al 1998). Currently, coronary angioplasty with stenting is usually considered for patients who cannot be given thrombolytic therapy or who are in early onset cardiogenic shock (Berger et al 1997; Antoniucci et al 1998).

Unstable angina has a lower rate of mortality than heart attack, but in the first year after diagnosis, the combined rate of death and non-fatal infarction approaches 10–15 per cent, with most events occurring in the first six weeks. Admissions to hospital for definite or suspected unstable angina considerably

outnumber those for heart attack, and lead to many referrals for coronary angiography (AIHW 1997b). Examination of treatment strategies therefore has major cost implications. The introduction of casemix funding in Victoria in 1993 was not associated with reductions in length of stay, time spent in the coronary care unit or adverse complications in patients with unstable angina, although there was a modest reduction in investigation costs (Kerr et al 1998).

Appropriate triage and risk stratification of patients facilitates appropriate use of coronary care and other hospital beds and can shorten hospital stay. Outcome data are necessary to document the clinical and cost-effectiveness of various treatment approaches, including the use of chest pain triage protocols, intermediate intensity cardiac nursed areas adjacent to coronary units, and guideline-based referral for angiography and revascularisation. Australian practice guidelines recommend early angiography in patients with high risk clinical features, but local data on implementation of 'best practice' or a mechanism for continued reappraisal of treatment strategies are not available (NHMRC 1996b).

Pharmacological treatment

There is good evidence for the use of drugs in the treatment of coronary heart disease. Information about a number of these drugs in the secondary prevention of coronary heart disease is given in Section 4.2.

The main *thrombolytic therapies* are streptokinase, tPA and reteplase. The efficacy and effectiveness of thrombolytic therapy in limiting the size of myocardial infarction and improving long-term survival and other outcomes have been shown conclusively (GUSTO-1 Investigators 1996; ISIS-2 Collaborative Group 1993). The main drawback is serious bleeding, particularly intracranial haemorrhage (Berkowitz et al 1997). Streptokinase is less costly than tPA but in the GUSTO study tPA was more effective than streptokinase (GUSTO Investigators 1997).

Aspirin, alone or in combination with thrombolytic therapy, has been shown to reduce mortality in patients with heart attack and to reduce both mortality and heart attack rates in unstable angina (Goldstein et al 1996). Aspirin should be prescribed to all patients with heart attack or unstable angina, unless contraindications are present (see trend to increasing use in Table 4.1).

Beta blockers are used to treat patients with angina or hypertension and those with a previous history of heart attack. Trials have shown that the size of myocardial infarction can be limited and survival increased by treatment with beta blockers (Beta-Blocker Pooling Research Group 1988; Yusuf et al 1988a). Long-term treatment can reduce mortality and prevent further events. Beta blockers should be prescribed to all patients with heart attack, unless contraindications are present (see trend to increasing use in Table 4.1).

Calcium channel blockers are effective in reducing blood pressure and angina (Krickler 1987). There is no evidence that their routine use prevents death or heart attack, although some studies using the longer acting forms suggest a survival advantage (DAVIT Investigators 1990). There is also evidence that short-acting dihydropyridine derivatives can have deleterious effects (Furberg et al 1995). Diltiazem has an adverse prognostic effect on post-infarct patients with heart failure or a reduced ejection fraction (Goldstein et al 1991).

Management and treatment

Angiotensin converting enzyme (ACE) inhibitors are currently used widely in the treatment of hypertension and heart failure and have been shown to prevent the progressive enlargement of the heart following myocardial infarction (Pfeffer et al 1992). They also reduce mortality if given early during a heart attack (GISSI-3 Study Group 1996; ISIS-4 Collaborative Group 1995) and improve longer term survival (Latini et al 1995). ACE inhibitors should be prescribed to most patients with heart attack and all patients with heart failure, unless contraindications are present (see trend to increasing use in Table 4.1).

Nitrates effectively relieve and prevent symptoms but there is no evidence that long-term use reduces mortality. Use during heart attack has not been shown to reduce mortality (GISSI-3 Study Group 1996; ISIS-4 Collaborative Group 1995).

Hormone replacement therapy has been identified in observational studies to be associated with lower rates of coronary heart disease in post-menopausal women (Stampfer et al 1991). However, a recent large randomised trial in post-menopausal women with coronary disease showed no overall cardiovascular benefit over four years of follow-up (Hulley et al 1998).

Table 4.1: A comparison of heart, stroke and vascular drug treatments in hospitals, 1985 and 1991–1993

Drug treatment during hospitalisation	1985 (%)		1991–1993 (%)		Estimated annual change (%)	
	Males	Females	Males	Females	Males	Females
Aspirin	35.10	29.70	85.70	76.50	6.77	6.18
ACE inhibitors	2.00	2.60	30.80	32.60	4.49	4.59
Thrombolytic therapy	6.00	1.60	44.80	39.10	5.18	4.96
Beta blockers	53.40	40.60	70.10	56.70	1.84	1.83
Calcium channel blockers	40.40	39.10	37.40	40.20	–1.49	–0.80
Nitrates	81.10	71.40	86.20	78.10	0.66	0.36

Source: Perth and Newcastle MONICA data.

As shown in Table 4.1, in Australia there has been a rapid increase in the use of aspirin, thrombolysis, beta blockers and ACE inhibitors from 1985 to 1991–1993.

A Commonwealth-initiated review of the cost-effectiveness of $400 million Pharmaceutical Benefits Scheme (PBS) expenditure/year demonstrated that expenditure on ACE inhibitors could be justified when considered across diseases such as hypertension, congestive heart failure and after a heart attack, but that expenditure on calcium antagonists across hypertension and angina was less well supported.

Invasive procedures and cardiac surgery

Coronary bypass surgery (also known as coronary artery bypass grafting or CABG) reduces mortality in patients with left main artery disease (Chaitman et al 1981) or multivessel disease and impaired ventricular function (Mock et al 1982). Newer methods of treatment such as less invasive procedures with patients not on cardiopulmonary bypass (Benetti et al 1991) or with limited thoracotomies (Calafiore et al 1996) may reduce discomfort and length of stay in hospital but cannot be used for all patients.

Valve replacement surgery,[6] most commonly aortic and mitral, is indicated for symptomatic valvular heart disease or progressive left ventricular dysfunction. Mitral valve repair is increasingly being used to treat selected patients with mitral regurgitation, and catheter-based, non-operative balloon mitral valvotomy is used for treatment of most patients with mitral stenosis.

Coronary angioplasty (also known as percutaneous transluminal coronary angioplasty or PTCA) leads to greater relief of anginal symptoms in patients with single and double vessel disease (Folland et al 1997; Parisi et al 1992), as well as sustained improvement in quality of life scores (Folland et al 1997), compared with medical therapy. Overall, with longer follow-up, costs tend to approximate those of patients treated with anti-anginal drugs (Parisi et al 1992). Use of the intravenous platelet receptor blocker abciximab (Reopro) has been shown to enhance the safety of coronary angioplasty in either low or high-risk patients (EPIC Investigators 1994; EPILOG Investigators 1997) and its widespread use will carry significant early cost implications.

Coronary angioplasty can also be used for the treatment of heart attack. Several studies have demonstrated benefits of coronary angioplasty over thrombolytic therapy (Grines et al 1993; Zijlstra et al 1993; Gibbons et al 1993; GUSTO Investigators 1997), and it has a particular role in patients who cannot have thrombolytic therapy or who have severe heart failure or cardiogenic shock.

Stent implantation reduces early coronary closure and early complications following coronary angioplasty, as well as reducing the rate of reblockage of coronary arteries in medium to long-term follow-up (Fischman et al 1994; Serruys et al 1994). Outcomes are also improved by the addition of newer and more effective antiplatelet therapies (EPISTENT Investigators 1998). Further trials using early stenting for heart attack (Suryapranata et al 1998) have suggested early benefits when compared with coronary angioplasty alone. If corroborated, these studies may make early stent implantation the treatment of choice for heart attack, with major potential implications for resources.

The treatment of multivessel coronary disease with stents is currently being investigated overseas and within Australia. Multivessel angioplasty was performed in only 8 per cent of procedures in Australia in 1994. If this technique is found to be safe and effective, it is likely that the rate of coronary angioplasty and stenting will increase significantly, removing some pressure from coronary bypass waiting lists. There is an urgent need to support registries to gather long-term data on outcomes and provide evidence of efficacy of coronary angioplasty and stent treatment strategies.

Rates of bypass surgery and coronary angioplasty. There is wide variation between the States in rates of bypass surgery and coronary angioplasty (NHF 1996a; 1996b). States with low rates of surgery and coronary angioplasty usually have more limited access to facilities, cardiac surgeons and interventional cardiologists in their public hospitals. The current NHF cardiac surgical registry data are limited to procedural numbers and perioperative mortality. Other complications such as stroke, and follow-up data on health outcomes, are not available. The data are not up to date and, in addition, are likely to contain inaccuracies which are inherent in the compilation of historical data. Newer methods of registry management are being assessed.

6 Valve surgery pertains particularly to rheumatic heart disease and heart failure but is placed in this section for convenience.

Management and treatment

An increasing number of patients who have had previous bypass surgery are presenting with recurrent pain and occluded grafts. These will place an increasing burden on the hospital system and their management is often difficult or complicated, with re-operations carrying an operative mortality of 7.7 per cent (NHF 1996b). Coronary angioplasty or stenting and palliative medical therapy may be used in selective cases. Further research into risk profile reduction or other strategies for prolonging graft survival need to be evaluated.

NHF registry data (NHF 1996a) show that stents were used in 9.2 per cent of cases in 1994. Unpublished industry data suggest that the level of stent implantation in 1998 exceeded 70 per cent of all coronary angioplasty procedures. A national coronary angioplasty database committee is currently investigating electronic transmission of data so that rapid reporting of procedures and their outcomes can be obtained (see Section 7.2 on information management). There is an urgent need to support such registries to gather long-term data on outcomes and provide evidence of efficacy of coronary angioplasty and stent treatment strategies. It seems unlikely that acute coronary angioplasty can be performed cost-effectively outside major metropolitan hospitals but studies are required to demonstrate that outcomes are worse in the areas with the lowest bypass and coronary angioplasty rates.

The social and work-related outcomes for heart attack, coronary bypass surgery and coronary angioplasty patients are important and the percentage of eligible patients returning to the workforce within six months is an important indicator. Waiting times to receive cardiac services carry significant social and economic costs and are often critical in determining whether the patient returns to work at all.

The *implantable cardiac defibrillator (ICD)* has emerged as the most effective tool in preventing sudden cardiac death in people at high risk of life-threatening dysrhythmia (Garrat 1998). Its use is likely to expand significantly, becoming an important item on hospital budgets. The AVID trial (AVID Investigators 1997) demonstrated a clear survival benefit of the ICD over best drug treatment in patients with cardiac arrest or hypotensive ventricular tachycardia. The MADIT trial (Moss et al 1996) showed that the benefit extends to patients with impaired ventricular function (ejection fraction <0.35) or asymptomatic non-sustained ventricular tachycardia after heart attack.

In Australia in 1995–96, implantable cardiac defibrillators were used at an age-standardised rate of 2.4 in males and 0.8 in females per 100,000 population, with a total of 297 procedures performed (AIHW 1997b). International usage of the ICD ranges from 0.4 implants per 100,000 population in the United Kingdom to 8.9 implants per 100,000 population in the United States (Garrat 1998). A steep rise in ICD use in Australia is likely to occur as the indications of ICD implantation are extended to post-infarct patients as defined in the MADIT trial. A rate of implantation similar to the 1996 US rate (8.9/100,000) is likely and has major cost implications.

There is a rapid growth in development of *new technologies* in revascularisation, ensuring that recommendations are out of date within two years. Some new technologies with potential to reduce morbidity and mortality are coated stents; use of irradiation within stents; minimally invasive coronary bypass surgery; surgery without the use of cardiopulmonary bypass; biological modulation of vein grafts to increase graft longevity; biological modulation of restenosis after

angioplasty; and biological techniques to induce formation of new blood vessels to overcome occlusion. These new technologies must be evaluated in studies to show appropriate cost-effectiveness.

Potential gains from acute management of coronary heart disease

Along with estimates of the cumulative effects of risk factor reduction on coronary heart disease risk discussed in Chapter 3, the University of Newcastle is also assessing the potential effects of treatment on risk of death during an acute event. Estimates, summary data and the assumptions on which the estimates are based are given in Chapter 5. Results indicate that the use of aspirin, ACE inhibitors and thrombolytic therapy significantly reduces the risk of death during an acute event. Earlier use of thrombolytic therapy improves its benefits, and beta blockers can also improve outcomes in this context.

Key points — Management of coronary heart disease

- Although prompt aspirin and reperfusion therapy have been shown to be highly effective, too few eligible patients with heart attack receive them. In addition, too few patients with unstable angina receive aspirin and heparin.
- Half of all patients with heart attack take more than six hours to seek treatment.
- Early angiography and revascularisation are not available in all hospitals, which may affect the outcomes of their patients. Conversely, potential overuse of early angiography and revascularisation in hospitals with facilities may increase costs without improving outcomes. The collection of outcome data for acute coronary syndromes would help to resolve these points.
- There is regional variation in use of cardiac surgery and coronary angioplasty in Australia, with limited access to facilities and specialists causing long waiting times in some States.
- The demand for angioplasty is likely to increase as it may become the preferred emergency treatment for heart attack, and is currently indicated in early onset cardiogenic shock or when thrombolysis is contraindicated.
- The availability of Australian data on short and long-term outcomes following cardiac surgery and coronary angioplasty would help to clarify the roles of each intervention in various patient groups.

Stroke

The management of individual patients with stroke is influenced by the stroke's cause, type and severity. All patients with suspected acute stroke should be clinically assessed to confirm the diagnosis, the lesion location, the likely pathology and cause and the stroke's functional effects. In Australia, about 80 per cent of patients presenting with acute stroke are admitted to hospital. Acute inpatient care for patients with stroke should be organised and undertaken within dedicated units by a multidisciplinary stroke service (Stroke Unit Trialists' Collaboration 1997a; 1997b).

Management and treatment

Testing and diagnosis

The clinical diagnosis of stroke requires considerable expertise, particularly in the first few hours when the history may be unclear because the patient is unconscious or confused. In about 15 per cent of patients initially diagnosed with stroke, an alternative (and often treatable) problem becomes apparent (eg epilepsy, brain tumour, subdural haematoma, hypoglycaemia, encephalitis) (Warlow et al 1996).

Computerised tomography (CT) scanning of the brain can be used to support clinical diagnosis of stroke. Its main role is to distinguish between the major stroke types — cerebral infarction, cerebral haemorrhage and subarachnoid haemorrhage. It is essential that all patients with acute stroke undergo CT brain scanning as soon as possible, preferably within 48 hours and no later than seven days after the stroke. Approximately 80 per cent of patients with suspected acute stroke had a CT scan in Perth during 1989–90 (Anderson et al 1993a) and 90 per cent in Melbourne during 1997 (Donnan et al 1997).

Emergency treatment

Stroke is now recognised as a medical emergency. Emergency treatment of stroke is critical to limit damage to the brain, and prevention of complications and recurrent stroke events is also important. In many States, ambulance services have stroke registered as a priority one service.

The emergency treatment of acute stroke encompasses early access to organised care in a stroke unit, which includes appropriate nursing and allied health care, general medical care, and specific medical and surgical therapy.

Stroke units

Stroke units have a coordinated approach to the management of stroke, with staffing by a multidisciplinary team of experts. Early access to rehabilitation is an important component of care.

A meta-analysis of all existing randomised trials of management within stroke units compared with general wards found that specialised units reduce the odds of death and dependency after stroke by about 29 per cent (Stroke Unit Trialists' Collaboration 1997a; 1997b). The effect appears to be most evident during the early post-stroke phase and is independent of severity of the stroke at entry. This care is associated with a reduction in complications such as pressure sores and contractures, urinary tract infection, aspiration pneumonia, venous thrombo-embolism and depression. Studies have also shown that stroke unit care improves aspects of long-term quality of life for stroke patients (Indredavik et al 1998).

There were approximately 20 stroke units or services in Australia in 1998. Each treated between 300 and 600 patients a year, representing only about 25 per cent of the total burden of acute stroke.

Pharmacological treatment

Aspirin is the only antiplatelet agent proven to be effective in the treatment of acute stroke. When given within 48 hours of the onset of an ischaemic stroke, it reduces early recurrent ischaemic stroke by about 28 per cent. Treating 1,000 patients with aspirin prevents about five recurrent strokes and nine non-fatal strokes or deaths in the first few weeks, and about 13 dead or dependent patients at several weeks or months follow-up. Early aspirin therapy also reduces the risk of

death and dependency at one to six months after stroke (CAST Collaborative Group 1997; International Stroke Trial Collaborative Group 1997).

Anticoagulants (ie heparin and heparinoids) have not been shown to be effective in the treatment of acute ischaemic stroke, even in patients with atrial fibrillation. Data from 16 randomised trials in more than 20,000 patients indicate that anti-coagulation for acute ischaemic stroke is not associated with an overall reduction in death or disability because any decrease in recurrent ischaemic stroke is offset by an increase in haemorrhagic stroke (Hankey 1998).

Thrombolysis is being used increasingly in the United States in line with the United States Food and Drug Administration recommendations, but in Australia and other countries it is still regarded as an experimental treatment.

A statistical overview of twelve randomised trials of thrombolysis using tPA, streptokinase or urokinase within three to six hours of onset of ischaemic stroke, indicates that thrombolysis is associated with an excess *early hazard* of early symptomatic intracranial haemorrhages and early deaths but an *overall net benefit* of fewer people being dead or dependent at one to six months after stroke (Wardlaw et al 1997). This result was confirmed by the second European Cooperative Acute Stroke Study (ECASS II) (Hacke et al 1998).

Neuroprotective therapies to prevent death of brain cells in the ischaemic stage of an acute stroke are also being assessed. In general, the results of trials have been disappointing, with no clear proof of benefit (Read et al, in press).

Surgery for stroke

Decompressive suboccipital craniectomy can be a life-saving treatment for cerebellar haemorrhage or infarction, when swelling compresses the brainstem (Warlow et al 1996). The relative risks and benefits of surgical evacuation of other haemorrhages remain uncertain and are the subject of two current randomised trials in the United Kingdom, Germany and the United States (Hankey & Hon 1997).

Key points — Management of stroke

- There is too little community understanding of the nature of stroke, its warning signs and what steps need to be taken for urgent stroke management.
- Low levels of knowledge about the management of acute stroke exist among general practitioners, general physicians and even neurologists.
- Emergency transport to hospital is poorly coordinated and triage of stroke patients once they arrive in hospital emergency areas is slow.
- An inadequate number of patients receive established effective therapeutic approaches of early use of aspirin and management in a stroke unit.
- There are currently insufficient stroke units to meet national needs.
- Although a number of promising acute-phase treatments are being investigated, the key issues in acute stroke care relate to general medical/nursing and early rehabilitation.
- The current poor access to nursing homes creates blockages within stroke units, preventing effective management of new cases.

Heart failure

Heart failure is mainly a disease of older people. The rate of hospital admissions for heart failure is increasing rapidly, and hospitalisation accounts for approximately two-thirds of the total cost for heart failure treatment. Despite pharmacological treatment, the prognosis of patients with heart failure is poor. A recent Australian report showed a mortality of 33 per cent at one year despite 68 per cent of patients being treated with ACE inhibitors at discharge (Lowe et al 1998).

Comprehensive specialist management programs for heart failure have been set up in only a few centres. They incorporate a systematic approach to drug therapy and patient education and provide regular contact with the medical advisor which improves patient compliance for both clinic attendance and therapy. A recent Australian report showed that a single home visit by a nurse and a pharmacist following a hospital admission for heart failure, significantly reduced the number of unplanned re-admissions (Stewart et al 1998).

Testing and diagnosis

As well as clinical examination of symptoms and signs, diagnosis of heart failure involves assessment of ventricular and valvular function, usually by echocardiography. Assessment by a cardiologist is usually appropriate for imaging and for diagnosis of coronary or valvular disease.

Pharmacological treatment

Extensive clinical research shows that *ACE inhibitors* relieve symptoms and improve prognosis (eg SOLVD Investigators 1990). Despite clear benefits, these agents are underused in clinical practice (Stafford et al 1997) and the doses given are persistently lower than those proven to be effective in clinical trials.

Angiotensin II receptor antagonists have shown comparable effects to ACE inhibitors in several short-term studies (Dickstein et al 1995; Pitt et al 1997) but long-term studies are not available. They may be particularly valuable in patients who are intolerant to ACE inhibitors.

Beta blockers, including bisoprolol (CIBIS-II Investigators 1999) and the vasodilating drug carvedilol (Packer et al 1996) have been shown to improve morbidity and mortality in patients with class II or III heart failure who have been stabilised on medical therapy, although the results of clinical trials have not been generally adopted.

Diuretics and *digoxin* are given to relieve symptoms but do not improve survival.

Invasive and surgical procedures

Cardiac transplantation programs, usually reserved for patients younger than 60–65 years, have had excellent results in Australia (Keogh & Kaan 1992). Application is severely limited by donor shortage and also by resource issues (to a lesser degree). However, this treatment is not applicable to most patients with heart failure. Other surgical procedures such as cardiomyoplasty and myocardial reduction surgery are under evaluation.

Key points — Management of heart failure

- Proven therapies such as ACE inhibitors and beta blockers are underused in clinical practice.
- Many heart failure clinics are based on referral for transplantation, which include only a small fraction of older patients with heart failure. Funding mechanisms should facilitate coordinated 'shared' care of heart failure patients.

Peripheral vascular disease

Peripheral vascular disease is caused by atherosclerosis affecting the lower limbs. The clinical spectrum includes asymptomatic disease, claudication (leg pain precipitated by walking) and limb-threatening ischaemia (rest pain, ischaemic ulceration and gangrene).

Testing and diagnosis

Ankle brachial index (ABI) is useful for initial assessment and in the monitoring of patients with peripheral vascular disease. It can be performed by general practitioners and is useful in remote and rural settings. The ABI is capable of identifying subjects with early atherosclerosis who are also at increased risk of coronary events (Fowkes et al 1998).

Duplex scanning is used to assess the extent of disease and confirm clinical findings. It has limited use once intervention is needed although it can be used to monitor outcome of intervention. Use of duplex ultrasonography has increased tenfold in the last decade. This represents a substantial cost increase, only partly offset by reduced use of invasive diagnostic radiological procedures.

Contrast angiography is usually limited to cases requiring surgical or radiological intervention and is generally performed as a hospital day case by a specialist radiologist or vascular surgeon.

Emergency treatment

Emergency surgery or thrombolysis for peripheral vascular disease is indicated in cases of acute limb-threatening ischaemia due to arterial thrombosis or embolisation. The incidence of emergency surgery is falling due to a fall in embolic disease.

Pharmacological treatment

Innumerable drugs have been studied for the treatment of claudication, but no drug has been found effective enough to be recommended as standard practice. Anticoagulant drugs and, to a lesser extent, thrombolysis are used in selected cases. Cessation of smoking is very important.

Invasive procedures and surgery

In general, patients with ischaemic rest pain, ischaemic ulceration or gangrene need some form of invasive treatment, with many requiring more than one procedure. Treatment of claudication is less intense as it is often a chronic and stable condition.

Management and treatment

Balloon angioplasty is widely used for treatment of claudication, but symptoms can recur due to re-stenosis (this occurs in about 50 per cent of cases over one to two years) (Gordon et al 1994). Stents are increasingly being used, especially in iliac artery disease, although few data are available on their effectiveness.

Bypass surgery (eg aorto-bifemoral bypass, femoro-politeal bypass) is generally indicated for more severe disease. These are major procedures performed by vascular surgeons and often require access to an intensive care unit.

Amputation remains an all too common endpoint in patients with peripheral vascular disease, especially those aged over 80 years. Nevertheless, in Western Australia the incidence of amputation has tended to fall for all ages apart from those aged 80 years or more (Mattes et al 1997). It is unclear whether this is due to improved overall management of peripheral vascular disease or to a fall in the incidence of severe peripheral vascular disease.

Key points — Management of peripheral vascular disease

- The role of duplex ultrasonography in patients thought to have peripheral vascular disease should be reviewed, in particular the possibility that more selective use of this technology, in conjunction with greater specialist consultation, could result in better, more cost-effective care.
- More data are needed on outcome following amputation as there may be scope for improving care through increased use of shared care, involving general practitioners and other community-based services.

Abdominal aortic aneurysm

The basic tenet of management in abdominal aortic aneurysm is diagnosis and elective surgery before rupture. Abdominal aortic artery aneurysms are five times more common in males than in females and prevalence increases steadily from about 60 years of age.

Testing and diagnosis

Abdominal ultrasound is of proven sensitivity, specificity and cost-effectiveness for assessing the majority of cases (Pleumeekers et al 1998) with many abdominal aortic aneurysms detected as incidental findings when ultrasound scans are performed for other reasons. The role of ultrasound in population screening is unclear at present but a randomised controlled trial is underway in Western Australia. CT (and magnetic resonance imaging [MRI]) scanning is used in selected cases, usually in pre-operative assessment rather than primary diagnosis. Small abdominal aortic aneurysms (3–5 cm in diameter) are at low risk of rupture and should be monitored by ultrasound scans at 6 to 12 monthly intervals with a view to surgery when the aneurysm diameter exceeds 5 cm.

Emergency treatment

Most abdominal aortic aneurysms are asymptomatic and may therefore present with rupture. About 40 per cent of these patients die before admission to hospital and less than 20 per cent survive more than 30 days after the event (Semmens et al 1998). There is often considerable morbidity within the group surviving emergency surgery.

Invasive procedures and surgery

Elective surgery for abdominal aortic aneurysm of a significant size is standard practice (Magee et al 1992). Case fatality for elective surgery varies but should be below 5 per cent (Semmens et al 1998). The incidence of elective procedures has risen steadily over the last two decades due primarily to increased diagnosis (Semmens et al 1998). The role of surgery in the management of abdominal aortic aneurysms with diameters between 4 cm and 5 cm is currently being assessed in two trials (UK Small Aneurysm Trial Participants 1995).

Endoluminal stenting, a minimally invasive method of treating abdominal aortic aneurysm, has been developed over the last five years and is currently under evaluation worldwide including by active groups in Sydney and Perth. It is not currently standard practice (Thompson et al 1997). While the method is expensive, this may be partly offset by shorter stays in hospital and reduced morbidity.

Key point — Management of abdominal aortic aneurysm

- The role of population screening and of stenting for abdominal aortic aneurysm is currently being assessed in Australia and overseas. No major changes in the overall management of abdominal aortic aneurysms should be considered until further information is available from these studies.

Hypertension

Hypertension has been described previously as a risk factor (see Section 1.1) however it is also treated as a cardiovascular condition.

The prevalence of hypertension rises with age. Isolated systolic hypertension in particular has a high prevalence in older people. Overall, approximately one in six Australian adults have hypertension. Even in those being treated with drugs, a significant proportion still have high blood pressure (DHSH 1994b). Untreated, hypertension can lead to stroke, cardiac disease, renal failure, dementia, prematurity and blindness. Even in the case of mild hypertension, treatment lowers the incidence of stroke by 38 per cent and that of coronary disease events by 16 per cent (MacMahon & Rodgers 1994).

Testing and diagnosis

Sphygmomanometry is usually performed in a doctor's clinic. Blood pressure levels can vary markedly throughout the day and a single reading may differ from the patient's average blood pressure level as assessed by ambulatory blood pressure monitoring. Clinic blood pressure levels are generally higher than those taken in the home environment. In some patients, blood pressure levels are only elevated when measured in the clinic ('white coat' hypertension).

While routine use of *ambulatory blood pressure monitoring* in clinical practice has not been advocated, it may provide additional information to assist diagnosis and management decisions in patients with labile blood pressure, isolated systolic hypertension or orthostatic hypertension (AHTAC 1997a).

Use of *echocardiography* to assess the degree of left ventricular hypertrophy is not routine but can be a guide to the severity of hypertension and importance of treatment, reflecting blood pressure level during the previous three months. It can be

repeated in order to monitor progress. This measurement correlates well with the risk of long-term complications such as stroke. However, use of echocardiography should not be considered as routine in all patients with hypertension.

Treatment

Lifestyle measures such as weight reduction in those who are overweight, physical activity programs or reduction in excessive alcohol intake may alone be enough to treat high blood pressure. However, in many cases, drug treatment is also necessary. The level of blood pressure at which treatment is commenced depends on the presence of associated disease eg diabetes, renal or other risk factors.

The principal drug classes used for treatment of hypertension are diuretics, beta blockers, ACE inhibitors and calcium antagonists. Centrally acting drugs and direct acting vasodilators are used less frequently. In practice, associated comorbidities often dictate rational therapy, as about half the hypertensive population has other conditions that can be treated by the same agents used to treat hypertension, or which should be avoided because of these other conditions. Examples are use of beta blockers in patients with co-existent angina, and ACE inhibitors or diuretics in patients with heart failure. In a small proportion of patients, investigations uncover a treatable cause of hypertension (DHSH 1994b).

Key points — Management of hypertension

- There is a need for more effective diagnosis and treatment to reduce blood pressure to acceptable levels.
- Patient compliance with lifestyle measures and drug therapy is a frequent problem because those with hypertension rarely have symptoms.

4.2 Secondary prevention and rehabilitation

The term secondary prevention is used to describe interventions in people who have experienced a cardiovascular event (eg heart attack or stroke) and who are therefore at risk of another event. Rehabilitation aims to help patients return to an active life. Long-term management involves modification of risk factors, which has an even greater potential for preventing cardiovascular events in those with heart, stroke and vascular disease than in those without, and continuing medical treatment to reduce risk factor levels and control symptoms. While aspects of rehabilitation begin during the hospital stay, most rehabilitation occurs after discharge.

Secondary prevention and outpatient rehabilitation should be available to all patients in Australia who have had heart attack, coronary bypass grafts, coronary angioplasty, stroke or other heart, stroke and vascular disease (NHF 1998a). This section discusses effective strategies in secondary prevention and rehabilitation for each condition.

Discharge planning

Evidence has shown that effective discharge planning is essential to ensure a smooth transition between management in hospital and return to usual activities. The following principles have been identified as important by consumers:

- timely delivery of post-hospital service;
- provision of clearly worded written information;
- discussion of the discharge process with the patient and patient consultation throughout the development of the discharge plan (Sullivan 1994);
- discussion of discharge with family and carers before it occurs; and
- referral to outpatient rehabilitation.

Secondary prevention

Coronary heart disease

The following secondary prevention strategies have been found to be effective.

Reduction of risk factors (ie cessation of smoking, increasing physical activity, lowering cholesterol, controlling blood pressure and modifying diet) is particularly important (Scandinavian Simvastatin Survival Study Group 1994; Sacks et al 1996; Smith et al 1997; Metz et al 1997; LIPID Study Group 1998).

Aspirin has a clear role in the continuing treatment of acute coronary syndromes. Long-term antiplatelet treatment has been shown to reduce the incidence of both heart attack and coronary death (Antiplatelet Trialists' Collaboration 1994). Significant benefit has also been shown with new antiplatelet drugs such as ticlopidine and clopidogrel in particular clinical situations.

Data from pooled studies suggest that early intervention and long-term treatment with *beta blockers* following a heart attack significantly reduce the risk of patients suffering death, cardiac arrest or another heart attack (Teo et al 1993; Yusuf et al 1988b).

ACE inhibitors should be considered for all patients with heart attack within 24 hours of the onset of symptoms and therapy continued for five to six weeks unless contraindicated (GISSI-3 Study 1996; ISIS-4 Collaborative Group 1995). In patients with signs of left ventricular dysfunction, therapy should be continued for at least three years. Large scale randomised trials are currently being conducted and should give some insight into whether all patients should be treated long term (Hennekens et al 1996; ISIS-4 Collaborative Group 1995).

Cholesterol-lowering agents, such as HMG-CoA reductase inhibitors (statins), are used in both primary and secondary prevention of coronary heart disease. In primary prevention, cholesterol lowering has been shown to reduce coronary heart disease events (Shepherd et al 1995). However, lipid-lowering agents have been shown to have a greater absolute effect in the secondary prevention of coronary heart disease (Scandinavian Simvastatin Survival Study Group 1994; Sacks et al 1996; LIPID Study Group 1998). The LIPID study of the HMG-CoA reductase inhibitor, pravastatin, was conducted among 9,014 patients in Australia and New Zealand. It showed a significant reduction in mortality, heart attack, stroke and

need for coronary bypass surgery/ coronary angioplasty in patients with previous heart attack or unstable angina and a representative 'average' range of cholesterol levels (4.0–7.0 mmol/L) at baseline (LIPID Study Group 1998).

Potential gains from secondary prevention of coronary heart disease

People with a history of symptomatic coronary heart disease account for only a small proportion of the community in the younger age groups, but this increases to over 20 per cent of males and 9 per cent of females aged 70–79 years, and to 35 per cent of males and 20 per cent of females aged 80 years or over. More importantly, nearly 60 per cent of deaths from coronary heart disease and 35 per cent of non-fatal heart attacks occur in patients with a previous admission for heart, stroke and vascular disease. These figures illustrate the potential of secondary prevention to reduce the impact of coronary heart disease in those who have had a coronary event.

Chapter 5 (see Table 5.1, page 102) summarises the evidence for the effectiveness of prevention and treatment strategies to reduce coronary risk in various groups of people. The estimates of cumulative risk factor reduction given in Chapter 5 indicate that lifestyle modification and optimal medical treatment for people with established coronary heart disease confer a significant benefit.

Key points — Secondary prevention of coronary heart disease

- A number of therapies have been shown to be beneficial in secondary prevention among patients with known coronary heart disease. However, there is probably underutilisation and inappropriate use of these therapies.
- Although some agents (eg HMG-CoA reductase inhibitors and ACE inhibitors) are relatively expensive compared to other cardiovascular agents, their benefits are conclusively established and appropriate analyses show that they can still be very cost-effective.

Stroke

Strategies shown to be effective in the secondary prevention of stroke and transient ischaemic attack (TIA) include reduction of blood pressure, antiplatelet therapy, anticoagulant therapy and carotid endarterectomy. Guidelines for the use of anti-coagulants, antiplatelet therapy and the application of carotid endarterectomy have been outlined in the NHMRC *Clinical Practice Guidelines: Prevention of Stroke* (NHMRC1997a). Other promising strategies include cessation of smoking and lowering of cholesterol by means of diet and HMG-CoA reductase inhibitors.

Blood pressure reduction. The prevalence of high blood pressure in people with symptomatic cerebrovascular disease (TIA and stroke) is about 50 per cent, which is about 2.5 times greater than in the general population (Jamrozik et al 1994). Reducing diastolic blood pressure by 5–6 mmHg and systolic blood pressure by 10–12 mmHg for several years leads to a 28 per cent reduction in stroke (INDANA Project Collaborators 1997). This relative risk reduction is likely to be the same for patients with TIA or stroke regardless of whether or not they have high blood pressure (MacMahon & Rodgers 1994). Most trials of blood pressure reduction and stroke incidence have used diuretics and beta blockers. There is a non-significant trend towards a lower incidence of stroke with diuretics than with beta blockers (MacMahon & Rodgers 1994).

Tobacco smoking. The prevalence of smoking among people with TIA or stroke is about 30 per cent (Jamrozik et al 1994). Smoking is associated with at least a 15-fold increased risk of all stroke and a two-fold risk of ischaemic stroke (Shinton & Beevers 1989; Donnan et al 1993).

Cholesterol reduction. The prevalence of cholesterol levels over 6.5 mmol/L in people with TIA or stroke is about 40 per cent (Hankey et al 1991). The relationship between total cholesterol and all-cause stroke risk remains to be clarified (Rodgers et al 1996; Qizilbash et al 1992). In the absence of large randomised trials of cholesterol-lowering therapy in patients with TIA or stroke, it is necessary to rely on data from trials in different populations (eg symptomatic coronary heart disease and high cholesterol) that suggest that lowering cholesterol over a few years with statin drugs reduces stroke risk by about 24 per cent (Bucher et al 1998; LIPID Study Group 1998).

Antiplatelet therapy is appropriate for about 75 per cent of people with TIA or stroke, and is associated with a 22 per cent reduction in non-fatal stroke, non-fatal heart attack or vascular death (Antiplatelet Trialists' Collaboration 1994), irrespective of the patient's age, gender and blood pressure.

The most widely studied antiplatelet regimen is 'medium-dose' aspirin. The only single antiplatelet agent which has been shown to be more effective is clopidogrel, which has recently been licensed in Australia. For patients with ischaemic stroke, the annual rate of subsequent ischaemic stroke, heart attack or vascular death was 7.7 per cent if treated with aspirin and 7.2 per cent if treated with clopidogrel (CAPRIE Steering Committee 1996). Ticlopidine may be marginally more effective than aspirin but its use is limited by the risk of neutropenia and thrombocytopenia, and by its cost (about $2000 per patient per year). When licensed, clopidogrel will almost certainly replace ticlopidine.

Combined dipyridamole and aspirin may also be more effective than aspirin alone. An analysis of the second European Stroke Prevention Study (ESPS-2) and four previous studies comparing aspirin plus dipyridamole with aspirin alone showed that the combination therapy was associated with a 15 per cent relative risk reduction in the composite outcome event of stroke, heart attack or vascular death compared with aspirin alone (van Gijn & Algra 1997; Diener et al 1996).

Anticoagulant therapy is the treatment of choice for about 20 per cent of patients with TIA or stroke who have high-risk sources of embolism from the heart to the brain (Hankey et al 1991; Petersen et al 1989).

People with atrial fibrillation have an increased risk of stroke of about 5 per cent per year. Those with a history of previous TIA or stroke have a risk of about 12 per cent per year (European Atrial Fibrillation Trial Study Group 1993). The risk is even higher if the fibrillating patient with stroke is elderly and has a history of high blood pressure or diabetes (Atrial Fibrillation Investigators 1994).

For people with TIA or ischaemic stroke and atrial fibrillation, warfarin reduces the risk of stroke by about 70 per cent, from 12 per cent to 4 per cent per year, with a 0.5–0.8 per cent risk of major haemorrhage. Aspirin reduces the risk of stroke by about 20 per cent, from 12 per cent to 6 per cent per year. Low-intensity, fixed-dose warfarin plus aspirin is ineffective compared with adjusted-dose warfarin (Atrial Fibrillation Investigators 1994). The cost-effectiveness of warfarin needs to be balanced against the additional costs of regular checks of the degree of anti-coagulation in the blood, extra visits to doctors, and the risk of major haemorrhage (Asplund et al 1993).

Management and treatment

Carotid endarterectomy is indicated in about 10 per cent of people with TIA or stroke, who have had a recent non-disabling carotid ischaemic event and have severe carotid stenosis, and are fit and willing for surgery (Hankey et al 1991). Carotid endarterectomy carries a small but important risk of stroke but this is highly variable depending on the surgeon and patient (Rothwell & Warlow 1996; 1997). Continuing independent prospective audit of the perioperative complication rate of carotid endartectomy should be standard practice.

Carotid endarterectomy does more harm than good in people with mild (0–29 per cent) or moderate (30–69 per cent) symptomatic carotid stenosis. However, for patients with severe (>70 per cent) symptomatic carotid stenosis it reduces the two-year risk of ipsilateral stroke from as high as 26 per cent to as low as 9 per cent (Hankey & Warlow 1994).

About 80,000 Australians aged 50–80 years have asymptomatic carotid stenosis. Carotid endarterectomy for >60 per cent carotid stenosis reduces the five-year risk of ipsilateral stroke from about 11 per cent to 5 per cent (Asymptomatic Carotid Atherosclerosis Study Group 1995).

Carotid angioplasty and stenting is presently a promising but experimental procedure (Bettmann et al 1998). The risks and benefits of carotid and vertebral artery angioplasty and stenting are being compared with carotid endarterectomy and with best medical therapy alone in ongoing trials.

Potential gains from secondary prevention of stroke

Among the 40,000 strokes that occur each year in Australia, about one-third occur in people who have had a previous TIA or stroke (Anderson et al 1993a; 1993b). These 14,000 strokes are potentially preventable through effective secondary prevention strategies (Hankey 1997).

Potential gains from improved stroke management are discussed in Chapter 5.

Key points — Secondary prevention of stroke

- Use of antiplatelet and anticoagulant therapy and lowering of blood pressure in patients with TIA or stroke are likely to have the greatest impact on secondary prevention of stroke.
- Aspirin, diuretics and warfarin (in patients with atrial fibrillation) are the most cost-effective pharmaceutical agents to prevent recurrent stroke in patients with TIA or stroke.
- If the effect of cholesterol-lowering statin drugs on the incidence of stroke among people with coronary heart disease can be replicated among people with TIA and stroke, then this strategy will also make an important, although costly, contribution to secondary prevention of stroke.
- Carotid endarterectomy for asymptomatic carotid stenosis is expensive and nowhere near as effective as the other strategies. Screening for asymptomatic carotid stenosis should be discouraged at this stage unless there is evidence of subgroups with asymptomatic carotid stenosis who are likely to benefit.
- The perioperative complication rate of carotid endartectomy should be audited prospectively by all surgeons performing the process.

Peripheral vascular disease and abdominal aortic aneurysm

As both occlusive peripheral vascular disease and abdominal aortic aneurysm share many of the same risk factors as coronary heart disease, the same primary and secondary preventions should be of benefit. As the major cause of death in patients with peripheral vascular disease is coronary heart disease, increased identification and treatment of high cholesterol and high blood pressure should improve overall long-term outcome. Continued smoking is a concern, as it causes progressive disease and contributes to failure of treatment.

The need for rehabilitation following amputation for peripheral vascular disease is an issue. Rates of referral for limb prostheses are probably increasing, especially in older people. Clinicians estimate that about 50 per cent of amputees are not suitable for prosthetic limb fitting and a large proportion of these patients lose their independence and become residents of nursing homes. This is increasingly a problem among those over 80 years of age.

As further aneurysmal disease after successful surgery for abdominal aortic aneurysm is rare, secondary prevention strategies are generally dictated by the extent of comorbid occlusive arterial disease. Formal rehabilitation is not standard practice. In general, quality of life appears to be very good after elective surgery for abdominal aortic aneurysm.

Rehabilitation

Cardiac rehabilitation

The WHO (WHO 1993) and the NHF (NHF 1998a) recommend that all patients with coronary heart disease be referred to cardiac rehabilitation services. The aims of cardiac rehabilitation are to maximise physical, psychological and social functioning to enable patients to live productively and with confidence and to assist and encourage behaviours that may minimise the risk of further coronary cardiac events and conditions (NHF 1998a). Cardiac rehabilitation services should involve the patient's cardiologist and other medical practitioners who retain overall responsibility for the patient's management (NHF 1998a).

In the short term, cardiac rehabilitation enhances recovery and reduces disability, allows earlier return to work and reduces inappropriate readmission to hospital (AHCPR & NHLBI 1995). Long-term programs reduce subsequent cardiac events (O'Connor et al 1989) and reduce the risk of sudden death and overall cardiac mortality after heart attack (Kallio et al 1979; Hedback et al 1993). The most substantial benefits of cardiac rehabilitation services include: improvement in exercise tolerance, symptoms and blood lipids; reduction in cigarette smoking; improvement in psychological well being and reduction of stress; and reduction in mortality (AHCPR & NHLBI 1995).

Limited evidence relating to cost-effectiveness suggests that multifactorial cardiac rehabilitation services for patients following heart attack: are similar in cost-effectiveness to coronary bypass surgery for left main disease (Oldridge et al 1993); result in lower rates of hospital re-admission (Levin et al 1991); reduce visits to emergency department and length of stay of re-admissions (Bondenstam & Breikss 1995); and reduce costs of hospital stay (Ades et al 1992).

Management and treatment

Throughout Australia, cardiac rehabilitation services are available at three levels — inpatient, outpatient and maintenance, as outlined in Table 4.2.

Table 4.2: Phases of cardiac rehabilitation

	Inpatient (phase I)	Outpatient (phase II)	Maintenance (phase III)
Duration	Length of hospital stay.	Up to 12 weeks.	Continuing.
Services provided	In hospitals following an acute cardiac event (eg heart attack, angina or heart failure) or following a procedure (cardiac surgery, coronary stenting, coronary angioplasty).	Following admission to a hospital or following specialist follow-up. May be hospital, home, community health centre or outreach based. Group setting preferable.	Preferably in a community setting by trained personnel, for people who have previously completed an outpatient program.
Aims	Alleviate immediate concerns, raise awareness of risk factors and lifestyle change, organise discharge planning and follow-up.	Provide information and skills for behaviour change, optimise adjustment to condition, modify risk factors, prevent further events.	Encourage maintenance of healthy behaviours, provide ongoing support, prevent further cardiac events.
Content	Physical activity program, counselling, education about management including medications and risk factors.	Interactive education, individually tailored physical activity, counselling, risk factor management.	Group physical activity, educational updates, group support, long-term risk factor management.

The recent NHF *Directory of Cardiac Rehabilitation Programs* (NHF 1998b) suggests substantial growth in availability of cardiac rehabilitation services in Australia. National and State standards and guidelines for cardiac rehabilitation are described in Section 4.3.

Key points — Cardiac rehabilitation

- Rates of participation in cardiac rehabilitation programs are less than desirable, with not all patients eligible for cardiac rehabilitation offered a place even when a program is available and accessible (Bunker et al, in press). Routine referral is not standard practice and a proportion of patients who are referred do not attend.
- Services are not available or accessible to all patients with heart disease, especially those in remote or rural Australia. Rural and remote services need to be coordinated and the shortage of allied health staff acknowledged. Programs need to be made more accessible and more attractive to some population groups (eg Indigenous people, women, people of culturally and linguistically diverse background and low income groups).
- Reduced length of hospital stay has implications for the delivery of inpatient cardiac rehabilitation and outpatient services are limited for people who return to work early.
- Linkages between formal programs and broader community facilities are less than optimal and do not address opportunities for supportive lifestyle health promotion.
- Development of rehabilitation modules suitable for shared-care strategies with general practitioners and other health professionals are required to increase availability of rehabilitation programs.

continued

Key points — Cardiac rehabilitation (continued)

- A lack of formal accreditation of cardiac rehabilitation services allows programs to emerge that do not always comply with recommended national guidelines. National and State policy standards have significant resource implications that have not been addressed.
- The limited information regarding rates of attendance at cardiac rehabilitation programs would be improved if a standardised data collection tool were available.

Stroke rehabilitation

Rehabilitation after a stroke aims to maximise functional outcome and minimise handicap (Stroke Australia Task Force 1997). Approaches to rehabilitation include preventing complications; remediation or treatment to reduce neurological deficits; assistance in adapting to residual disabilities; and long-term maintenance of function. Rehabilitation should begin as soon as diagnosis of stroke is confirmed and should continue during management in the acute hospital, rehabilitation hospital and community rehabilitation services through to long-term community integration. There should be early and repeated assessment, referral to formal rehabilitation as early as possible, goal directed management and a coordinated and consistent approach as the patient moves between settings. Specific problems such as falls (46 per cent of people with stroke fall during their stay in hospital and 73 per cent fall at least once within six months of discharge from hospital) (Forster & Young 1995) and recovery of arm function (only 42 per cent of those with moderate initial motor loss and 16 per cent of those with severe motor loss in the arm regain full function at three months after stroke) (Parker et al 1986) should be taken into account.

Current services available for rehabilitation after a stroke vary, but include combinations of the following:

- *Inpatient rehabilitation in the acute setting*. Rehabilitation is initiated in the acute hospital setting by members of the interdisciplinary team. However, the amount and frequency of services available in the acute setting are often limited.
- *Inpatient rehabilitation in the post-acute setting*. In Australia, 43 per cent of stroke survivors have inpatient rehabilitation (Shah & Bain 1989). Intensive involvement by patients and their family or carers in the rehabilitation process, together with the interdisciplinary team, optimises functional recovery. An important goal is to prepare the patient for a successful return to community living.
- *Domiciliary rehabilitation services and community rehabilitation services (day hospitals)*. These interdisciplinary services are often used to improve functional recovery and successful integration after a patient who has suffered a stroke returns home. They are usually less intensive, with one to two sessions per week. Of people attending Victorian Community Rehabilitation Centres, 16 per cent had stroke listed as their primary diagnostic category (Smith & Laffy 1998).

Recently, rehabilitation at home has been investigated in Australia and overseas as an alternative to inpatient rehabilitation. This involves intensive therapy provided by an interdisciplinary team in the home. Preliminary studies indicate that home

rehabilitation and inpatient rehabilitation achieve similar functional outcomes, with no significant differences in strain on the carer at 12 months after stroke (Rudd et al 1997). It is important to monitor strain on the carer in the short term following the patient's discharge from hospital.

Key points — Stroke rehabilitation

- Available services vary greatly between geographical areas, with clustering in some areas and few or no services available in others.
- While there is evidence that a range of factors is associated with successful outcomes of rehabilitation, there is no standardised approach to identifying people who will benefit from rehabilitation.
- To optimise continuity of care, sharing of information from assessments and about management between the different providers of stroke rehabilitation is necessary.
- Assessment procedures, management approaches and outcome measures vary between centres, limiting effective communication between centres and impeding attempts to work towards best practice.
- There are areas, such as falls and recovery of arm function, where the current process of rehabilitation has been shown to have limited effectiveness.
- Referral for further therapy after completion of the rehabilitation program usually only occurs in response to a clear deterioration in function. Processes should allow active identification of any need for further therapy, rather than only reacting to problems once they occur.
- Stroke can result in a sudden and catastrophic change in abilities, lifestyle and independence, to which the person with stroke may react with a range of psychological responses. Depression can occur as a reaction to the stroke, or may be directly due to the stroke. Depression and other psychological responses are also common in families or carers of people with stroke (Burvill et al 1995; 1997).
- Although the majority of strokes affect older people, 50 per cent affect people less than 75 years, and at least 5 per cent affect people under 45 years (Anderson et al 1993a). Stroke rehabilitation programs do not always meet the specific needs of younger patients such as vocational rehabilitation or retraining.

Palliative care

There are some patients with progressive heart, stroke and vascular disease for which cure becomes improbable or impossible. These patients should have access to palliative care of good quality. This has been defined by the Australian Association for Hospice and Palliative Care as care delivering coordinated medical, nursing and allied services in an environment of the person's choice where possible. Optimum symptom control is the basis of palliative care and may include drug and non-drug methods (Hodder & Turley 1990). Essentially, palliative care emphasises the care of the whole person and should address the psychological, emotional and spiritual needs of patients, their family and their carers. Where necessary, material or financial support should also be available (DHSH 1994a).

4.3 Current approaches to treatment and secondary prevention

As discussed in Chapter 3, there is a growing focus on intersectoral collaboration in Australian heath care. The integration of services is especially important in the management of heart, stroke and vascular disease to ensure continuity of care and the best possible outcomes. This section discusses provision of services by Commonwealth, State and Territory health departments, general practitioners and non-government and community organisations, and also describes a range of activities in specific areas.

Government policies and approaches

Medical Benefits Scheme/Pharmaceutical Benefits Scheme

In 1997–98, the Australian Health Technology Advisory Committee (AHTAC) undertook reviews of coronary stenting and ambulatory blood pressure monitoring (AHTAC 1997a, 1997b), and also developed guidelines on workforce and planning for acute cardiac interventions (AHTAC 1994). The Medicare Services Advisory Committee (MSAC) has now been established to strengthen evidence-based decision making for the inclusion of new items on the Medicare Benefits Schedule (MBS). Under this measure, new and emerging technologies and procedures will be assessed in terms of their safety, clinical effectiveness and cost-effectiveness.

The Commonwealth's initiatives in assessing new (and older) pharmaceutical technologies used in the management of heart, stroke and vascular disease are coordinated through the PBS listing process and focus on Pharmaceutical Benefits Advisory Council (PBAC) assessment of evidence and cost-effectiveness. In 1997–98 a government-initiated review investigated PBS expenditure on cardiovascular drugs. PBAC has also convened national consensus conferences on the management of high cholesterol and of high blood pressure.

Coordinated Care Trials

An example of the trend towards intersectoral collaboration is Commonwealth collaboration with States and Territories in the Coordinated Care Trials, which are designed to explore better ways of providing for chronically ill people who have a continuing need for a range of health and community services. This approach is particularly relevant to heart, stroke and vascular disease as it is chronic, often present in combination with other problems such as diabetes, and services can be poorly coordinated. The Commonwealth and States have pooled the funds they would otherwise spend on health and community services, for participants in each trial. A care coordinator is responsible for developing a care plan, together with the patient and their general practitioner (in some cases the care coordinator is the general practitioner), and then using the funds pool to buy the different services outlined in the care plan.

NHMRC guidelines for clinical practice

The NHMRC has produced clinical practice guidelines, and consumer and general practitioner guides, on coronary heart disease (NHMRC 1996a; 1996b) and on stroke (NHMRC 1997a; 1997e; 1997f). The NHMRC updated and adapted for use in Australia the unstable angina guidelines of the United States Agency for Health

Care Policy and Research (NHMRC 1997g; 1997h). The NHMRC is also developing partnerships with organisations such as the NHF and professional colleges to facilitate the uptake of evidence-based health advice and practices.

The Health Advisory Committee of the NHMRC has developed *A Guide to the Development, Implementation, and Evaluation of Clinical Practice Guidelines* (NHMRC 1998), to assist external organisations such as professional colleges and peak bodies to develop guidelines for NHMRC endorsement. International collaborations would also facilitate development and adaptation of guidelines, and enable appropriate ongoing surveillance of published research to ensure such guidelines remain current.

Little is known about the impact of guidelines on use rates, health outcomes or costs. Infrastructure for the dissemination and implementation of clinical practice guidelines is fundamental to their success. The Department of Health and Aged Care (HEALTH) is funding a development project that involves clinicians to investigate, develop and implement models for an evidence-based practice approach to clinical guideline development and application. Health is also seeking ways to use information technology to inform consumers about treatment options and the progress of their care.

General practice and secondary prevention

The role of general practitioners in secondary prevention is particularly important, given the difficulties people with established heart, stroke and vascular disease have in maintaining a healthy lifestyle (Campbell et al 1998; Pearson & Fuster 1996; Moher & Weston 1997). General practitioners play an important part in reinforcing lifestyle changes such as smoking cessation, regular physical activity and good nutrition as well as controlling high blood pressure and high cholesterol. General practitioners can also reinforce patient compliance with medications such as aspirin or beta blockers. This requires regular and structured follow-up by the general practitioner and is enhanced by reminder systems that prompt high-risk patients to return for review of their risk factors. Such systems are currently being evaluated in a number of trials.

The Cardiovascular Disease Alliance is a collaboration to improve general practice activity in treatment and rehabilitation. It comprises the Integration SERU of the Divisions of General Practice, the NHF (New South Wales Division) and the Pharmaceutical Partnership and is developing the following:

- a guide to currently accepted practice for Divisions addressing cardiac rehabilitation and treatment;
- draft sets of outcomes and indicators for Divisional programs in cardiac rehabilitation and treatment;
- case studies of how Divisions have tackled cardiac rehabilitation programs;
- production of a draft guide on developing Divisional shared-care programs in cardiac rehabilitation and the management of heart disease and stroke;
- a compilation of existing heart, stroke and vascular disease audits; and
- a Divisions database for patients with heart, stroke and vascular disease and diabetes which provides reminders to patients and general practitioners, audit data to health professionals on their quality of care against clinical management guidelines and data for evaluating the impact of programs on patient outcomes.

Community and non-government organisations

Heart Support-Australia (HSA) is a national, volunteer support organisation for heart patients and their families that works in collaboration with Divisions of General Practice, area health services, community health and hospitals, Cardiomyopathy Association, Heart Children and Diabetes Australia. HSA services complement formal rehabilitation programs. Through positive role modelling and peer support, HSA aims to encourage the maintenance of secondary prevention programs and compliance with medical advice, and enhance quality of life for patients and their families.

The *Australian Cardiac Rehabilitation Association* (ACRA) represents a network of health practitioners throughout Australia, delivering cardiac rehabilitation services to patients admitted to hospital with an acute coronary syndrome or undergoing revascularisation. In addition, ACRA prepares practical guidelines for health professionals for the delivery of cardiac rehabilitation services — a practitioners' guide to cardiac rehabilitation is scheduled for publication in 1999.

The *National Heart Foundation* provides guidelines and policy advice as well as Australia-wide support and resources for the planning, implementation and evaluation of cardiac rehabilitation programs.

The *Heart Research Centre*, based in Melbourne, conducts research locally into cardiac rehabilitation. It has developed *Best Practice Guidelines for Cardiac Rehabilitation and Secondary Prevention* (Goble & Worcester 1999).

The *National Stroke Foundation* is currently undertaking a cost-benefit analysis of stroke morbidity and mortality to identify areas for investment that would simultaneously improve health outcomes and reduce national health costs over the long term. The project aims to develop a model to enable the likely impact of various policy initiatives to be assessed at a strategic level.

The *Brain Foundation* has initiated several programs aimed at improving support for people affected by stroke and their carers and providing education on stroke for general practitioners and for carers of people affected by stroke.

Patient support groups can play an important role in redressing access inequities and under-resourcing, particularly in rural areas. As well as HSA referred to above, there are a number of other groups including the Open Heart Association, the Cardiomyopathy Association, and Heart Beat (in Victoria, South Australia and Tasmania).

Current activities in treatment, secondary prevention and rehabilitation in Australia

The Commonwealth and States and Territories, sometimes in collaboration with health and community organisations, have undertaken many programs that aim to improve services. This section is representative of the scope of activity in this area and is not meant as a comprehensive list of all programs in this country.

Management and treatment

Emergency treatment

- The Commonwealth medical emergency team model offers a systems approach to emergencies in hospitals replacing existing cardiac arrest teams. It involves identifying seriously ill and at-risk hospital patients using hospital-wide criteria followed up by rapid and appropriate management of these patients.
- An emergency medical response pilot has been established in Victoria to determine whether the simultaneous dispatch of both Metropolitan Fire Brigades Board and Metropolitan Ambulance Service resources to cases of suspected cardiac arrest will lead to more rapid defibrillation.
- The Survival 2001 initiative in Victoria will develop community emergency response teams in isolated or difficult to access areas and/or in areas of steady population growth; develop a targeted community training program in CPR; and evaluate different community emergency response and CPR service delivery models and their overall program outcomes.
- The Queensland Rural Divisions Coordinating Unit has collaborated with the NHF and St Andrew's Hospital to produce a broadcast on cardiac emergencies. This project was supported by the Rural Health Education Foundation and has utilised satellite viewing sites in both public and private hospitals.

Management

- The Commonwealth's National Hospital Demonstration Program via Royal Hobart Hospital is establishing clear admission criteria and placing patients on the appropriate clinical pathway to standardise the care process. Chest pain, unstable angina and heart attack pathways have been developed.
- The Care Net Illawarra Coordinated Care Trial in New South Wales involves people with a cardiovascular condition referred by their general practitioner. The Trial has developed 'prompt sheets' to aid care coordinators in the development of care plans, with a focus on heart, stroke and vascular disease as the first of the top six categories of disease to target.
- The Congestive Heart Failure and Rehabilitation Management (CHARM) Study in New South Wales is a pilot study to develop and implement a best-practice program for the management of congestive heart failure, both within hospital and in the community after discharge, based on current best evidence.
- The NSW Health Department has developed implementation strategies for national guidelines for thrombolysis for heart attack and for unstable angina in collaboration with the NHF (New South Wales Division). As well, the implementation of a summary version of the NHMRC unstable angina guidelines (NHMRC 1997g) is being evaluated in collaboration with the Centre for Clinical Epidemiology and Biostatistics.
- Guidelines on prevention and management of stroke (NSW Stroke Working Group 1999a; 1999b) have been developed, primarily for general practitioners. As well, the New South Wales Stroke Expert Working Group was established to advise NSW Health on the development of policies and strategies for stroke prevention and management, and provide a broad framework for the development of local strategies.

- An audit package for carotid endarterectomy has been developed and will be piloted (retrospectively) in all major centres, with the collaboration of over 36 hospitals and 48 clinicians within New South Wales. The first prospective State-wide audit of carotid endarterectomy will occur over the next 12 months. A stroke audit package, including a population-based service audit and a clinical audit is also under development in New South Wales.
- In 1996 a Victorian Stroke Strategy Taskforce was established jointly by the State Department of Human Services and the National Stroke Foundation. The Taskforce produced an overview of the impact of stroke and a review of key services in the State. At the same time, a major project aimed at evaluating the benefits and critical elements of hospital stroke units was funded. Community education on stroke prevention and carer support have been addressed through a number of projects, with particular focus on rural issues, ethnic communities and the role of general practitioners.
- The National Stroke Foundation has initiated a two-year study into cost-effective stroke care in Victoria. The study will prospectively collect comparative data from three Victorian hospitals with different methods of acute stroke management, with the aim of defining costs and benefits of different approaches to stroke care.
- The Brain Foundation Victoria is developing a Stroke Resource Guide for general practitioners to assist them in their management of the care of stroke patients.
- The West Moreton Cardiovascular Outcomes Project in Queensland, a collaboration between public and private hospitals, community health, public health and the Division of General Practice, aims to improve cardiovascular outcomes for its population (which has higher rates of heart, stroke and vascular disease than the State average). The project also aims to analyse the acute management of acute coronary heart disease and secondary prevention measures.
- A clinician-initiated study examining clinical outcomes and self-assessed health status for coronary bypass surgery patients is being conducted at the Prince Charles Hospital in Queensland.
- In South Australia, new models of care will be developed from knowledge and experience gained from the Coordinated Care Trials. Two projects, Heartplus and Aged Care, focus on people with heart, stroke and vascular disease, and involve Regional Demonstration Units, general practitioners, eligible patients, service coordinators, carers and other consumers, service providers and evaluation staff. HealthPlus has also developed practice guidelines for managing congestive heart failure.
- In Western Australia, the State Government supplied funds for new, world-class facilities at Fremantle Hospital which will provide patients with a continuity of care that was previously not possible for the people of Fremantle.
- Royal Perth's 12-bed stroke unit was the first purpose-built stroke treatment facility in Australia. In a recent randomised trial, patients treated in the stroke unit were found to have significantly better outcomes than those who were not.

- In the Northern Territory, standard treatment protocols for chronic conditions have been developed as part of the Tiwi and Katherine West Coordinated Care Trials. These are being introduced in community health and specialist services and are of particular benefit in remote communities, where lack of onsite medical services and high staff turnover hinder continuity of care.
- Multi-disciplinary programs are in place at the three public hospitals in Tasmania to target patients who have undergone cardiac surgery.

Secondary prevention and rehabilitation

- Hunter on the Move is a demonstration project jointly coordinated by Cardiovascular Medicine, John Hunter Hospital and the Hunter Division of the NHF (with funding from NSW Health). The project aims to improve the availability of appropriate community-based physical activity programs for people with known heart disease and those at high risk of heart disease.
- The New South Wales State Department of Health has developed policy standards for cardiac rehabilitation to provide further support for consistent delivery of evidence-based services (Schacht et al 1997).
- The Hunter Outpatient Cardiac Care Study is a collaborative project using a prospective design to determine which patients are referred to outpatient rehabilitation following a cardiac-related hospital admission. The NSW Health Policy Standards for Cardiac Rehabilitation currently being developed will be used to determine eligibility for attendance.
- The Consumer Information Resources Project is a qualitative research project in New South Wales addressing the support and information needs of people following stroke and their carers.
- A coordinated set of activities aims to enhance Victoria's network of cardiac rehabilitation and secondary prevention programs. The initial target of every hospital providing cardiac treatment offering access to a phase II rehabilitation program was met in 1997. Further work is now being undertaken to develop best-practice guidelines, establish data systems to monitor participation levels and create program evaluation tools. A State-wide forum to develop a coherent strategy on cardiac rehabilitation was held in late 1997.
- Through the Victorian Carers Initiative, the Brain Foundation has been funded to provide specialist carer support and respite to people living in Eastern Melbourne affected by stroke, and is coordinating a State-wide carer education program for carers of people affected by stroke (and other neurological conditions).
- The Queensland Division of the NHF is developing a manual for rural and remote health workers in cardiac rehabilitation and secondary prevention.
- Health Promotion staff from the Flinders Medical Centre in South Australia trialed a new approach to long-term community-based cardiac rehabilitation. Patients with unstable angina were invited to develop their own rehabilitation. Social support was found to be a vital component. Gentle physical activity of appropriate intensity was established on a regular basis, even among older participants, resulting in considerable functional improvement. A self-managed support group now exists. Results from this study show reduced re-admission to hospitals.

- The 1998 opening of the Cardiothoracic Surgical Unit in The Canberra Hospital increased the proportion of people able to access post-critical care and rehabilitation through the Heart Education And Rehabilitation Training (HEART) program. The program has a multidisciplinary focus and incorporates access, entry assessment and care planning, implementation of care, evaluation, separation and community management. The program involves three phases including education, a supervised physical activity program and peer support, and encourages the participation of families and friends of clients. Comprehensive data collection during the program allows evaluation of outcomes.
- In Tasmania, the Brain Foundation has established an extensive post-stroke support scheme for stroke sufferers and carers with organisational linkages with training programs in hospitals, rehabilitation centres, nursing homes and the University of Tasmania, as well as work skill disability courses with TAFE.