

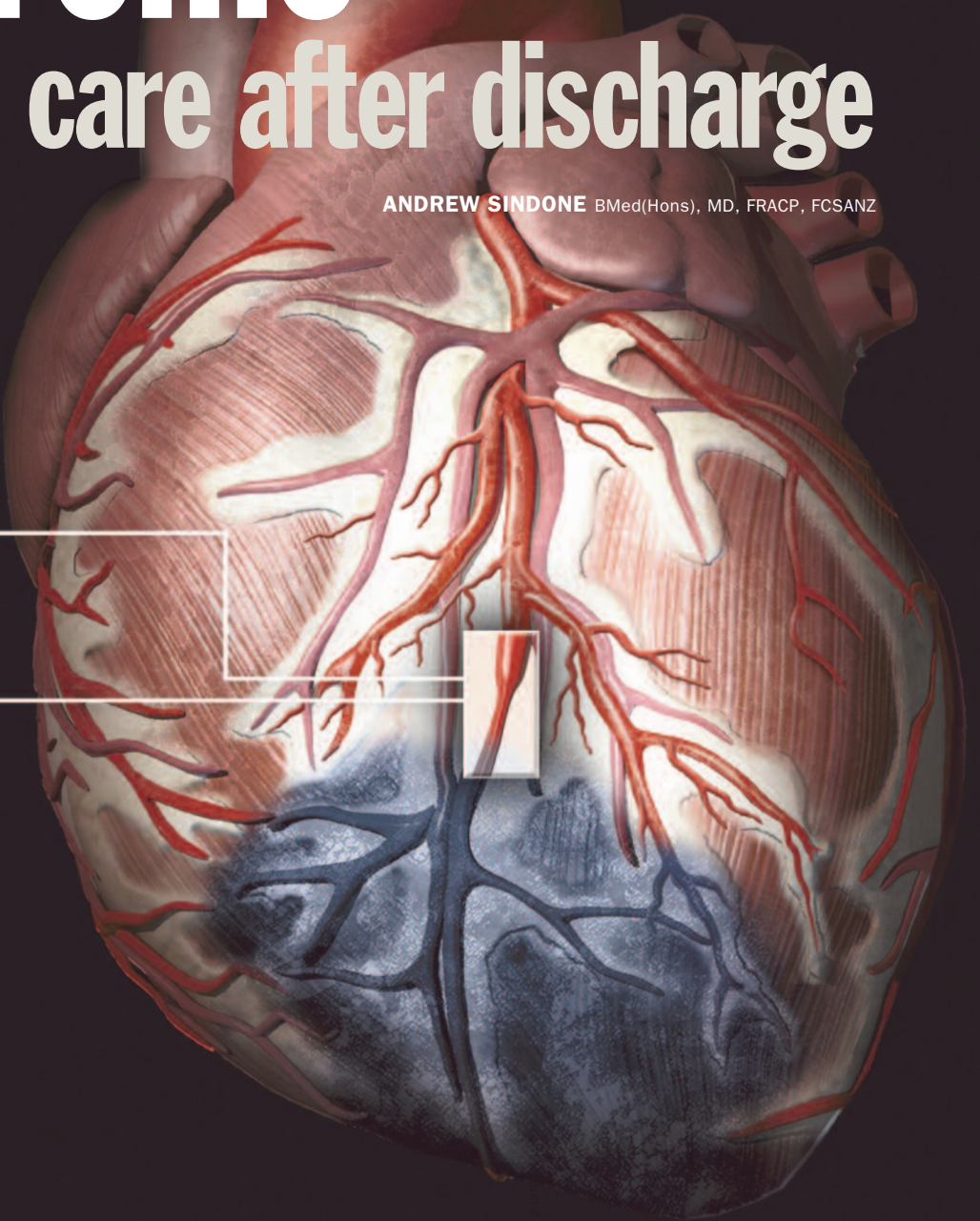
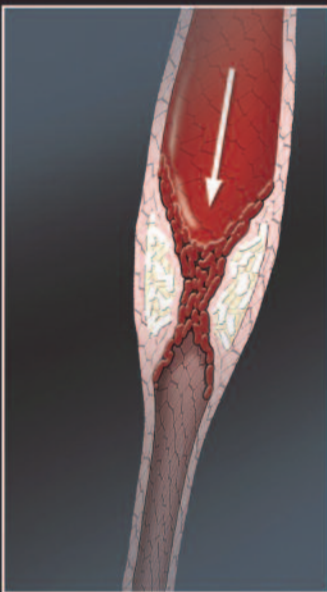
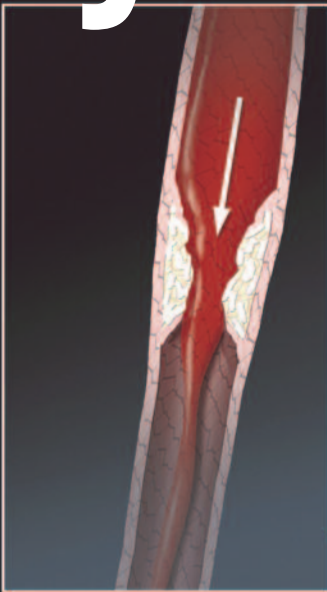


FEATURE

Acute coronary syndrome

care after discharge

ANDREW SINDONE BMed(Hons), MD, FRACP, FCSANZ



GPs are increasingly responsible for treating and managing patients after an acute coronary syndrome (ACS) event. The early recognition of serious complications and the initiation and maintenance of treatment to increase survival will lead to improved outcomes among patients with ACS. The judicious use of appropriate investigations will help guide this care and aid in identifying preventable problems.

Key points

- GPs now face new challenges in the treatment and management of patients with acute coronary syndrome (ACS), particularly after changes to acute patient care.
- It is often the role of the GP to initiate and continue ancillary treatment in patients with ACS, helping to improve long-term survival.
- It is important for GPs to be aware of and look out for the common complications of ACS, some of which may be emergency situations, and facilitate their treatment.
- Patients with ACS will often require some form of cardiac procedure, and resulting complications can be minimised by the GP if discovered early and treated quickly.
- The purpose and importance of the patient's ongoing medication may not have been fully explained or understood during the patient's brief hospital stay. GPs have an important role in monitoring the patient's medication use and correcting omissions in his or her medication regimen.
- Cardiac rehabilitation and exercise programs are an important part of ACS management and can help improve medication adherence and quality of life for the patient.
- The close relationship between the GP and patient provides a valuable opportunity for assessing and ensuring medication compliance in patients with ACS.

The management of patients with acute coronary syndrome (ACS) has changed dramatically over the past decade. Patients are more frequently presenting with non-ST elevation myocardial infarction (NSTEMI) and unstable angina than ST elevation myocardial infarction (STEMI). Patients with STEMI are more often managed with urgent primary stenting, and most patients with NSTEMI and unstable angina receive coronary angiography with a view to revascularisation. As a result of these changes in acute patient care, GPs now face new challenges in the management of patients with ACS, particularly as many spend only a brief time in hospital compared with previously. Additionally, these patients are becoming increasingly older and have multiple comorbidities.

There is now a significant body of evidence to suggest that ancillary treatments improve survival after ACS, and it is often the role of the GP to initiate and continue treatment to further increase long-term survival in this common, but serious, condition.

Complications of ACS

GPs should be aware of and watch for the more common complications of ACS and facilitate their treatment, particularly as some may be emergency situations.

Recurrent myocardial ischaemia/infarction

Recurrent myocardial ischaemia/infarction is usually investigated prior to discharge from hospital with either a coronary angiogram or an exercise stress test. However, some patients may not be suitable for revascularisation because of unsuitable anatomy, advanced age (making intervention high risk or not in the patient's best interests) or patient preference. If a patient complains of symptoms similar to those that led to the initial hospitalisation, such as chest/arm/neck tightness, breathlessness, sweating or feeling faint on exertion, then an ECG should be performed to exclude acute myocardial infarction. Referral back to the hospital, discussion with the cardiologist or an increase in the antianginal therapy should be strongly considered.

Recurrent chest pain

Patients may present to the GP with chest pain after ACS. Taking a thorough history is critical to making an accurate diagnosis. Was the pain similar to that of the initial event? Where was the pain? Where did it radiate? How long did it last? What brought the pain on? What relieved the pain? Was there any breathlessness, sweating, nausea, dizziness or palpitation? Physical examination is usually less helpful except to detect arrhythmia, heart failure, respiratory infection (or, rarely, pericardial tamponade or pleural effusion). An ECG is mandatory to exclude myocardial infarction or ischaemia. A serum troponin level is not recommended because if a patient experiences chest pain and

CARDIOLOGY TODAY 2011; 1(4): 4-10

Professor Sindone is a Director of the Heart Failure Unit and Department of Cardiac Rehabilitation at Concord Hospital, Sydney, NSW.



myocardial infarction is suspected, the patient should be referred to the Emergency Department of the nearest hospital. Performing a blood test and awaiting the result may lead to unnecessary delays in admission to hospital, increased myocardial damage because of ongoing ischaemia and an increased risk of life-threatening arrhythmia.

Heart failure

Heart failure should have been evaluated with an echocardiogram and chest x-ray during the patient’s hospitalisation. If the patient does have significant left ventricular dysfunction after myocardial infarction, it is a marker of worse outcome and these patients should be reviewed more frequently. If possible, these patients should be receiving an ACE inhibitor, β-blocker, aldosterone receptor antagonist (such as spironolactone or eplerenone) and a loop diuretic if there is evidence of fluid overload. Symptoms of exertional dyspnoea, orthopnoea, paroxysmal nocturnal dyspnoea or fatigue, coupled with signs of ankle oedema, basal crepitations and elevation of the jugular venous pressure, should suggest the diagnosis of heart failure.

Arrhythmia and sudden cardiac death

The most common arrhythmia after ACS is atrial fibrillation. Patients may complain of palpitations, worsening breathlessness, dizziness or an irregular pulse may be found on physical examination in the absence of specific symptoms (this may occur in up to 50% of cases). Atrial fibrillation may occur at any stage after ACS. It is an important diagnosis to make because it increases the risk of stroke and may require anticoagulation depending on the patient’s overall risk profile (usually evaluated by the CHADS₂ score).

The most feared arrhythmia after ACS is ventricular tachycardia. This usually causes cardiac arrest and degenerates quickly to ventricular fibrillation and asystole. Rarely, the patient may be able to maintain consciousness and this is an emergency where the patient should be taken by ambulance to hospital for defibrillation. The patient should be defibrillated on the scene if loss of consciousness occurs. The most common causes of sudden death after ACS are listed in the box on this page.

Depression

Depression is a common occurrence after ACS and has been associated with increased mortality. Depression and cognitive impairment are well recognised adverse events after coronary artery

bypass grafting for ACS. Anxiety is also a common consequence of ACS and appropriate management of these factors is important in patient care.

Complications of cardiac procedures

Most patients who have experienced an ACS will undergo some form of cardiac procedure, which are often invasive and may have serious complications. These complications can be minimised if discovered early and treated quickly.

Percutaneous coronary intervention

Coronary angiography and percutaneous coronary intervention (PCI; this refers to coronary artery stenting – angioplasty alone is rarely indicated except where stenting is not technically feasible) are performed almost routinely in most large hospitals in patients presenting with ACS. If the patient presents with STEMI, then PCI is performed as an emergency; if the patient presents with NSTEMI, then PCI is usually deferred for 24 to 48 hours.

Patients may develop a large haematoma at the site of the arterial puncture (either the femoral or radial artery), or they may develop a false aneurysm, venous thrombosis because of the compression used to achieve haemostasis, an arteriovenous fistula or even arterial occlusion. (A false aneurysm usually presents as a painful, growing, pulsating lump at the site of the arterial puncture.) Most of these should have been identified and managed before discharge but, occasionally, the complications present late. An ultrasound of the site of the arterial puncture will identify a false aneurysm, venous thrombosis, arterial occlusion, fistula or a simple haematoma. With the exception of a haematoma, these complications usually necessitate readmission to hospital. Asking the patient if the puncture site is painful or swollen and examining the wound are important for further evaluation.

Thrombolysis

In some hospitals, thrombolysis is the reperfusion technique of choice. These medications (referred to as ‘clot busters’) increase the risk of bleeding and bruising, particularly at the site of venipuncture, angiography, trauma or spontaneous bleeding/bruising, such as gastrointestinal bleeding, retroperitoneal haematoma, intracerebral bleeding or ocular bleeding. The risk of bleeding decreases with time but may persist longer if antiplatelet therapy or anticoagulant medications are co-administered with thrombolysis.

Coronary artery bypass grafting

If a patient is found to have severe coronary artery stenoses not suitable for PCI, a decision may be made to perform coronary artery bypass grafting (CABG) before the patient is discharged. Patients who do not have complications are usually discharged within five to seven days postoperatively.

Complications associated with CABG include wound infection, wound dehiscence, malunion of the sternum, atrial fibrillation, cognitive impairment, mood changes (particularly depression),

Causes of sudden death after myocardial infarction
<ul style="list-style-type: none"> • Acute coronary occlusion • Ventricular tachycardia/fibrillation • Ruptured mitral papillary muscle • Ruptured interventricular septum • Ruptured left ventricular free wall



Guideline-recommended medications shown to improve survival after myocardial infarction

- Statins
- Antiplatelet therapy
- ACE inhibitors
- Beta blockers
- ± Omega-3 ethyl esters

pericardial effusions and pleural effusions. Effusions may require hospital readmission for drainage, particularly if accompanied by symptoms of dyspnoea or haemodynamic compromise. The sternal wound and the site of conduit harvesting from the leg or radial artery should be examined to exclude pain, redness, purulent exudate and poor healing, which may require antibiotics, additional wound dressing or re-admission to hospital for debridement or revision of the wound.

Device implantation

Patients who sustain an ACS may develop a bradyarrhythmia requiring permanent implantation of a pacemaker, or sustain a ventricular tachyarrhythmia requiring an implantable cardioverter defibrillator (ICD) to reduce the risk of sudden death. Complications of implanted devices to be aware of include haematoma formation at the site of the device insertion, infection or cellulitis over the device (although cellulitis is uncommon), wire fracture or displacement of the tip of the wire (which may be associated with loss of function of the device) or perforation of the tip of the right ventricle (which may cause sharp chest pain or pericardial tamponade). Pacing of the diaphragm or pectoral muscle may also occur and this causes spasmodic hiccoughs or muscle twitching.

Medications after an ACS

Patients who experience an ACS often spend minimal time in hospital. This may mean that inadequate time is spent explaining to the patient the purpose and importance of their medications after discharge. Under some circumstances, important medication may have been omitted or not charted in the patient's records. A vigilant GP may be able to close some of these important gaps in patient care. The standard medications used after myocardial infarction are listed in the box on this page.

First-line treatments

Statins

More than half of all patients who have an ACS have normal cholesterol levels. Regardless of this, there is overwhelming evidence that statin therapy reduces mortality, reinfarction, development of heart failure and the need for further revascularisation after ACS. All patients should be taking a statin after ACS unless there is a strong contraindication.

Antiplatelet therapy

Aspirin has been the mainstay of antiplatelet treatment for patients with ACS for many years, and has been shown to be almost as good as thrombolytic therapy. Aspirin reduces the risk of subsequent coronary thrombosis and reduces the risk of stent thrombosis, particularly when combined with other more potent antiplatelet agents, such as clopidogrel, prasugrel or ticagrelor. These agents have been shown to reduce the risk of recurrent myocardial ischaemia and reinfarction when combined with aspirin after stent implantation. Clopidogrel has also been shown to reduce mortality at one year when added to aspirin treatment after ACS in patients who have not undergone PCI. However, clopidogrel, prasugrel or ticagrelor monotherapy is not recommended unless there is documented, definite adverse effects with aspirin because the benefit of dual antiplatelet therapy is greater than either agent alone.

ACE inhibitors

The ACE inhibitor class of medications has been shown to improve survival after myocardial infarction, particularly in those who have sustained larger infarcts. ACE inhibitors also reduce the risk of death, heart failure, stroke and recurrent myocardial ischaemia in patients with a high risk of vascular events, particularly those with diabetes.

Beta blockers

Beta blockers reduce arrhythmia, sudden death, recurrent ischaemia and recurrent myocardial infarction in patients who have experienced a myocardial infarction. Carvedilol has been shown to reduce cardiovascular events in patients with heart failure after myocardial infarction.

Omega-3 ethyl esters

High potency omega-3 ethyl esters have been shown to reduce mortality at one year when commenced within three months of myocardial infarction, in particular, reducing sudden cardiac death. Omega-3 ethyl esters may reduce the rate of death in patients with heart failure or those with left ventricular dysfunction.

Second-line treatments

Nitrates

Neither oral nor topical nitrates have been shown to improve survival post myocardial infarction. They are useful to reduce recurrent angina after ACS and secondary pulmonary hypertension in patients with heart failure.

Calcium channel blockers

Both centrally (e.g. verapamil, diltiazem) and peripherally acting calcium channel blockers (e.g. amlodipine, nifedipine, lercanidipine, felodipine) have been shown to increase mortality after myocardial infarction and are contraindicated in this situation. Calcium channel blockers are also contraindicated in patients with heart failure. However, in patients with unstable angina, calcium channel blockers may reduce recurrent ischaemia and help control hypertension.

Aldosterone receptor antagonists

Aldosterone receptor antagonists are not routinely used after an ACS but eplerenone has been shown to reduce mortality in patients who have post-infarct heart failure.

Angiotensin II receptor blockers

Angiotensin II receptor blockers (ARBs) have shown similar improvements in outcomes after myocardial infarction when compared to ACE inhibitors. Although ACE inhibitors are still the preferred treatment, if patients cannot tolerate an ACE inhibitor then ARBs are an acceptable alternative. ARBs have also shown similar reductions in cardiovascular events when compared to ACE inhibitors in patients at high cardiovascular risk, but, again, ACE inhibitors are regarded as the first-choice treatment unless they cannot be tolerated (usually because of a cough or angioedema).

Antiarrhythmic agents

Apart from amiodarone, most antiarrhythmic agents are contraindicated after ACS. Amiodarone is used in patients with atrial fibrillation, to reduce the risk of ventricular tachycardia or, rarely, to treat symptomatic atrial and ventricular ectopic beats. Amiodarone has not been shown to improve survival after ACS. Amiodarone may be used to reduce the frequency of ventricular tachycardia in patients with an implantable defibrillator to avoid frequent shocks.

Anticoagulation

Traditionally, warfarin has been used to treat patients with atrial fibrillation and a high risk of stroke or those with coronary artery thrombus or left ventricular thrombus after ACS. Warfarin treatment requires patients to have regular blood tests to determine the appropriate dose and many patients remain either over anticoagulated or under anticoagulated. Newer agents for nonvalvular atrial fibrillation do not require blood testing and have similar, and possibly better, efficacy compared with warfarin, with at least similar, or possibly lower, rates of bleeding. The newer agents on the horizon include the direct thrombin inhibitor dabigatran and the activated factor Xa inhibitors rivaroxaban, apixaban and edoxaban. At present, these agents are not available for these indications on the PBS and only dabigatran is approved for this use by the Therapeutic Goods Administration. Edoxaban is not currently available in Australia.

Cardiac rehabilitation and exercise

It is recommended that all patients, if possible, attend a cardiac rehabilitation program that includes supervised exercise programs, education, support and follow up (Figure). Such programs have been shown to improve medication compliance and patient education, increase exercise frequency and duration, improve quality of life and increase regular contact with the GP and specialist. They can also help to increase awareness of the symptoms of ACS, improve utilisation of an ACS action plan, increase appropriate treatment with sublingual nitrates, improve dietary adherence, improve



Figure. Cardiac rehabilitation programs have been shown to improve exercise frequency and duration.

long-term blood pressure and lipid control through the involvement of the patient and facilitate earlier return to work in patients continuing employment after ACS. Several meta-analyses have shown that cardiac rehabilitation programs increase survival after ACS, probably via the above mechanisms.

Barriers to the patient attending cardiac rehabilitation, such as patient inertia, transport, cultural or employment difficulties may be overcome with the help of their GP. Many models of secondary prevention programs now exist, including the modular secondary prevention for specific risk factors and COACH (Coaching Patients On Achieving Cardiovascular Health) programs. Regular telephone follow up can encourage patients to adhere to risk factor management and home exercise programs.

Medication compliance

Even the best doctor in the world cannot help a patient if they do not take their medications as prescribed. Many studies have shown that adherence to medications at 12 months after ACS is sub-optimal in patients with chronic hypertension or hyperlipidaemia. Many of these medications may be life saving and GPs, with their close relationship with the patient, have a key role in ensuring and assessing the patient's compliance. Simply measuring the blood pressure will help assess antihypertensive medication compliance and measurement of the lipid profile will assess compliance with lipid-lowering therapy. Checking when the last prescription was issued for a medication will help assess adherence to medications in the longer term.



Blood pressure targets

Patients who have had an ACS require more strict blood pressure-lowering targets than in primary prevention. A blood pressure target of less than 130/80 mmHg is usually recommended, unless the patient has proteinuria or heart failure, in which case the target levels may be lower.

Lipid targets

It is recommended that patients who have had an ACS maintain an LDL cholesterol level below 2.0 mmol/L. Target levels for HDL and triglycerides should also be sought (greater than 1.0 mmol/L for HDL and less than 1.7 mmol/L for triglycerides), but LDL cholesterol is the primary lipid parameter targeted.

The target level is below that recommended in primary prevention and the patient's lipid profile should be checked at least three monthly until the target is met, and then every six to 12 months thereafter. If the patient is taking a statin, creatine kinase and liver function should be measured along with the patient's lipid levels.

Pathology testing

Liver function and creatine kinase should be measured about six weeks after statins are introduced and monitored whenever lipid levels are checked. Electrolytes, urea and creatinine should be measured seven to 14 days after initiating treatment with ACE inhibitors or diuretics, and monitored according to renal function and clinical indication. If spironolactone or eplerenone are prescribed, particular care should be taken in watching renal function and electrolytes because aldosterone antagonists may cause acute renal failure, particularly in patients over the age of 70 years who are receiving therapy with concomitant diuretics, ACE inhibitors, β -blockers and/or ARBs. These patients may initially require electrolytes and monitoring of renal function monthly or more often if indicated. Patients with diabetes should monitor their blood glucose levels carefully as dramatic swings in blood glucose levels are not desirable after ACS. This is particularly important if the patient is trying to lose weight.

Haemoglobin measurement may need to be performed, at least initially, to exclude bleeding or anaemia. If patients are anaemic after ACS, a haemoglobin level of more than 100 g/L is desirable, particularly if there is residual myocardial ischaemia. Iron studies should be performed because there is evidence that parenteral correction of iron deficiency in patients with heart failure may improve exercise capacity and quality of life.

Other investigations

Ongoing investigations for the management of patients with ACS may be performed as required. They include:

- ECG – to assess for further ischaemia or infarction if symptoms recur and to confirm or exclude atrial fibrillation
- echocardiography – critical in investigating left ventricular function as well as valvular heart disease, pericarditis and pericardial effusions, ischaemic ventricular septal rupture and pulmonary hypertension

- chest x-ray – important for assessing pulmonary congestion, pleural effusions, respiratory infection and other lung pathology
- Holter monitoring – helpful in patients with paroxysmal palpitations that were not present at the time of consultation
- stress testing – useful in assessing residual myocardial ischaemia, exercise capacity, exercise-induced arrhythmia and hypertensive response to exercise
- measurement of B-type natriuretic peptide levels – may have a role in management of patients with shortness of breath to exclude heart failure as a cause of dyspnoea
- measurement of troponin levels – to assess whether further infarction has occurred. If a patient experiences chest pain and myocardial infarction is suspected, the patient should be referred to the Emergency Department of the nearest hospital.

Conclusion

The burden of care is increasingly falling to GPs to manage patients after discharge who have sustained an ACS event. The early recognition of serious complications, and the initiation and maintenance of treatments that can increase survival, will lead to improved outcomes among patients with ACS. The judicious use of appropriate investigations will help guide this care and aid in identifying preventable problems. **CT**

Further reading

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COMPETING INTERESTS: Professor Sindone has received honoraria, speaker fees and consultancy fees from and is a member of advisory boards and/or has appeared on expert panels for Abbott, Alphapharm, Aspen, AstraZeneca, Bayer, Biotronic, Boehringer Ingelheim, Bristol Myers Squibb, CSL, Cube, Elixir, General Electric, GlaxoSmithKline, Guidant, Janssen-Cilag, Johnson & Johnson, Medtronic, Merck Sharp & Dohme, National Heart Foundation of Australia, Novartis, NSW Department of Health, Ogilvy, Pfizer, Phillips, Roche, Sanofi-Aventis, Schering-Plough, Servier, Solvay, Sunshine Health, St Jude and Ventracor.