



**SIGN**

Scottish Intercollegiate Guidelines Network

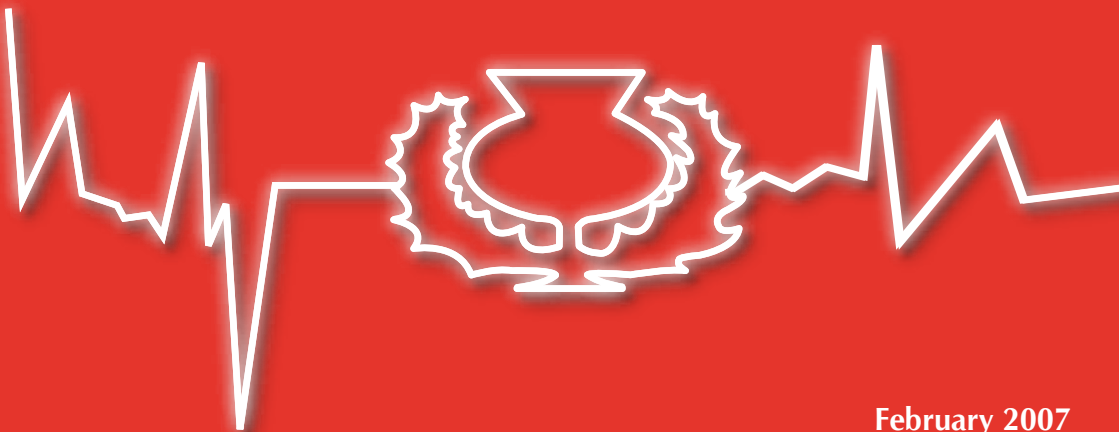
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# Heart Disease

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February 2007

# SIGN 93

## Acute coronary syndromes



## PRESENTATION, ASSESSMENT AND DIAGNOSIS

### CLINICAL PRESENTATION AND IMMEDIATE ASSESSMENT

**D** Patients with suspected acute coronary syndrome should be assessed immediately by an appropriate healthcare professional and a 12 lead electrocardiogram should be performed.

Repeat 12 lead electrocardiograms should be performed if there is diagnostic uncertainty or a change in the clinical status of the patient, and at hospital discharge.

Patients with persisting bundle branch block or ST segment change should be given a copy of their electrocardiogram to assist their future clinical management should they present with a suspected acute coronary syndrome.

### SELF MEDICATION IN PATIENTS WITH CORONARY ARTERY DISEASE

Patients with known coronary heart disease should be given clear advice on how to self medicate with glyceryl trinitrate to relieve the symptoms of their angina:

- an initial dose should be taken at symptom onset
- if necessary, a further two doses should be taken at five minute intervals
- if symptoms have not settled within five minutes of taking the third dose (15 minutes in total from onset of symptoms) emergency medical services should be contacted.

### BIOCHEMICAL DIAGNOSIS

**C** In patients with suspected acute coronary syndrome, serum troponin concentration should be measured on arrival at hospital to guide appropriate management and treatment.

**B** To establish a diagnosis in patients with an acute coronary syndrome, a serum troponin concentration should be measured 12 hours from the onset of symptoms.

To establish a diagnosis in patients with an acute coronary syndrome when symptom onset is uncertain, serum troponin concentration should be measured 12 hours from presentation.

When considering a diagnosis of ACS, serum troponin concentrations should not be interpreted in isolation but with regard to the clinical presentation of the patient.

## MANAGEMENT IN THE FIRST 12 HOURS

### CARDIAC MONITORING

**D** Patients with an acute coronary syndrome should have continuous cardiac rhythm monitoring.

### ANTIPLATELET THERAPY

**A** Patients with an acute coronary syndrome should be treated immediately with aspirin (300 mg).

**A** In the presence of ischaemic electrocardiographic changes or elevation of cardiac markers, patients with an acute coronary syndrome should be treated immediately with both aspirin (300 mg) and clopidogrel (300 mg) therapy.

### GLYCOPROTEIN IIB/IIIA RECEPTOR ANTAGONISTS

**B** High-risk patients with non-ST elevation acute coronary syndrome should be treated with an intravenous glycoprotein Iib/IIia receptor antagonist, particularly if they are undergoing percutaneous coronary intervention.

## ANTICOAGULANT THERAPY

<b>A</b>	In the presence of ischaemic electrocardiographic changes or elevation of cardiac markers, patients with an acute coronary syndrome should be treated immediately with low molecular weight heparin or fondaparinux.
<b>B</b>	Patients with an ST elevation acute coronary syndrome who do not receive reperfusion therapy should be treated immediately with fondaparinux.
<input checked="" type="checkbox"/>	Anticoagulant therapy should be continued for eight days, or until hospital discharge or coronary revascularisation.

## BETA BLOCKERS

<b>B</b>	In the absence of bradycardia or hypotension, patients with an acute coronary syndrome in Killip class I should be considered for immediate intravenous and oral beta blockade.
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## GLYCAEMIC CONTROL

<b>B</b>	Patients with clinical myocardial infarction and diabetes mellitus or marked hyperglycaemia ( $> 11.0$ mmol/l) should have immediate intensive blood glucose control. This should be continued for at least 24 hours.
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## REPERFUSION THERAPY FOR ST ELEVATION ACUTE CORONARY SYNDROMES

### PRIMARY PERCUTANEOUS CORONARY INTERVENTION

<b>A</b>	Patients with an ST elevation acute coronary syndrome should be treated immediately with primary percutaneous coronary intervention.
<b>A</b>	Patients undergoing primary percutaneous coronary intervention should be treated with a glycoprotein IIb/IIIa receptor antagonist.
<b>A</b>	Intracoronary stent implantation should be used in patients undergoing primary percutaneous coronary intervention.

### THROMBOLYTIC THERAPY

<b>D</b>	When primary percutaneous coronary intervention cannot be provided within 90 minutes of diagnosis, patients with an ST elevation acute coronary syndrome should receive immediate thrombolytic therapy.
<b>B</b>	Thrombolysis should be conducted with a fibrin-specific agent.
<input checked="" type="checkbox"/>	A bolus fibrin-specific agent is preferred on practical grounds, particularly in the pre-hospital setting.
<input checked="" type="checkbox"/>	Patients with an ST elevation acute coronary syndrome and contraindications to thrombolytic therapy should be considered for immediate primary percutaneous coronary intervention.

### 'RESCUE' PERCUTANEOUS CORONARY INTERVENTION

<b>B</b>	Patients presenting with ST elevation acute coronary syndrome within six hours of symptom onset, who fail to reperfuse following thrombolysis, should be considered for rescue percutaneous coronary intervention.
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## RISK STRATIFICATION AND NON-INVASIVE TESTING

**C** Risk stratification using clinical scores should be conducted to identify those patients with an acute coronary syndrome who are most likely to benefit from early therapeutic intervention.

Greater generalisability and accuracy favours the use of the GRACE score for risk stratification in acute coronary syndromes.

**C** In patients with an acute coronary syndrome, assessment of cardiac function should be conducted in order to identify those patients at high risk and to aid selection of appropriate therapeutic interventions.

Pre-discharge stress testing should be considered in low risk patients with an acute coronary syndrome.

## INVASIVE INVESTIGATION AND REVASCULARISATION

**B** Patients with non-ST elevation acute coronary syndromes at medium or high risk of early recurrent cardiovascular events should undergo early coronary angiography and revascularisation.

**C** Patients with ST elevation acute coronary syndromes treated with thrombolytic therapy should be considered for early coronary angiography and revascularisation.

Hospitals adopting early invasive intervention for patients with acute coronary syndromes should consider the early discharge of patients at low risk of subsequent events.

## EARLY PHARMACOLOGICAL INTERVENTION

### ANTIPLATELET THERAPY

**A** Following an acute coronary syndrome all patients should be maintained on long term aspirin therapy.

A dose of 75-150 mg aspirin per day is recommended in patients with acute coronary syndrome.

**B** In addition to long term aspirin, clopidogrel therapy should be continued for three months in patients with non-ST elevation acute coronary syndromes.

**A** In addition to long term aspirin, clopidogrel therapy should be continued for up to four weeks in patients with ST elevation acute coronary syndromes.

### STATIN THERAPY

**B** Patients with an acute coronary syndrome should be commenced on long term statin therapy prior to hospital discharge.

### BETA BLOCKER AND ANTIANGINAL THERAPY

**C** Patients with unstable angina or evidence of myocyte necrosis should be maintained on long term beta blocker therapy

**A** Patients with clinical myocardial infarction should be maintained on long term beta blocker therapy.

Nitrates should be used in acute coronary syndromes to relieve cardiac pain due to continuing myocardial ischaemia or to treat acute heart failure.

### ACE INHIBITORS

**B** Patients with unstable angina or myocyte necrosis should be commenced on long term angiotensin converting enzyme inhibitor therapy.

**A** Patients with clinical myocardial infarction should be commenced on long term angiotensin converting enzyme inhibitor therapy within the first 36 hours.

**ANGIOTENSIN RECEPTOR BLOCKERS**

- A** Patients with clinical myocardial infarction complicated by left ventricular dysfunction or heart failure should be commenced on long term angiotensin receptor blocker therapy if they are intolerant of angiotensin converting enzyme inhibitor therapy.

**ALDOSTERONE RECEPTOR ANTAGONISTS**

- B** Patients with clinical myocardial infarction complicated by left ventricular dysfunction (*ejection fraction* < 0.40) in the presence of either clinical signs of heart failure or diabetes mellitus should be commenced on long term eplerenone therapy.

**TREATMENT OF HYPOXIA AND CARDIOGENIC SHOCK****NON-INVASIVE VENTILATION**

- B** Patients with an acute coronary syndrome complicated by acute cardiogenic pulmonary oedema and hypoxia should be considered for non-invasive positive airway pressure ventilation.

**INTRAVASCULAR VOLUME LOADING AND INOTROPIC THERAPY**

- D** In the *absence* of clinical evidence of volume overload, patients with an acute coronary syndrome complicated by hypotension and cardiogenic shock should be considered for intravascular volume loading.

- D** In the *presence* of clinical evidence of volume overload, patients with an acute coronary syndrome complicated by hypotension and cardiogenic shock should be considered for inotropic therapy.

**INTRA-AORTIC BALLOON COUNTERPULSATION**

- D** Patients with an acute coronary syndrome complicated by cardiogenic shock, myocardial rupture (*ventricular septal defect and papillary muscle rupture*) or refractory ischaemia should be considered for intra-aortic balloon counterpulsation especially when contemplating emergency coronary revascularisation or corrective surgery.

**CORONARY REVASCUARISATION**

- C** Patients presenting with cardiogenic shock due to left ventricular failure within six hours of acute myocardial infarction should be considered for immediate coronary revascularisation.

**CARDIAC SURGERY**

- D** Patients with mechanical complications of acute myocardial infarction (*ventricular septal, free wall or papillary muscle rupture*) should be considered for corrective surgery within 24-48 hours.

**PATIENT SUPPORT AND INFORMATION NEEDS**

- B** Patients with acute coronary syndromes should be offered early psychosocial assessment and individualised psychosocial intervention with an emphasis on identifying and addressing health beliefs and cardiac misconceptions.

- Psychosocial intervention forms part of the formal cardiac rehabilitation programme and should be viewed as a continuous process throughout the patient care pathway.

- C** Provision of patient information should be determined by individual patient needs. Partner/family inclusion in receiving information should be considered and appropriate audiovisual materials employed.

- D** Physicians should be involved in providing information to patients.



# SIGN 94

## Cardiac arrhythmias in coronary heart disease





**ARRHYTHMIAS ASSOCIATED WITH CARDIAC ARREST**

**PRIMARY PREVENTION OF SUDDEN CARDIAC DEATH**

- D** Efforts to prevent sudden cardiac death should include:
- risk factor intervention in those individuals who are at high risk for coronary heart disease
  - health promotion measures and encouragement of moderate intensity physical activity in the general population.

**BYSTANDER CARDIOPULMONARY RESUSCITATION**

- CPR should be performed in accordance with the Resuscitation Council (UK) guidelines.
- All healthcare workers who have direct patient contact should have annual refresher training in cardiopulmonary resuscitation.

**DEFIBRILLATION**

- Defibrillation should be administered in accordance with the Resuscitation Council (UK) guidelines.
- B** Defibrillation in patients with VF or pulseless VT should be administered without delay for witnessed cardiac arrests and immediately following two minutes of CPR for unwitnessed out-of-hospital cardiac arrests.
- C** Prompt defibrillation should be available throughout all healthcare facilities.
- C** All healthcare workers trained in CPR should also be trained, equipped, authorised and encouraged to perform defibrillation.

**AUTOMATED EXTERNAL DEFIBRILLATORS**

- A** Automated external defibrillators should be used by trained first responders, with their use integrated within the emergency medical services system.
- B** Automated external defibrillators should be sited in locations which have a high probability of a cardiac arrest event.

**ADJUNCTIVE THERAPIES IN THE PERI-ARREST PERIOD**

**REFRACTORY VT/VF**

- D** Intravenous adrenaline/epinephrine should be used for the management of patients with refractory VT/VF.
- A** Intravenous amiodarone should be considered for the management of refractory VT/VF.
- Adjuvant therapies should be administered in accordance with the Resuscitation Council (UK) guidelines.

## SUSTAINED VT (NO CARDIAC ARREST)

**D** Intravenous amiodarone, procainamide or sotalol should be used in the management of patients with haemodynamically stable VT.

Intravenous drug therapy for ventricular tachycardia should ideally be given under expert guidance. If the first IV drug fails to restore sinus rhythm, electrical cardioversion or anti-tachycardia pacing should be considered.

**D** Patients with polymorphic VT should be treated with intravenous magnesium. QT interval prolonging drugs, if prescribed, should be withdrawn. If present, hypokalaemia should be corrected by potassium infusion and bradycardia by temporary pacing or isoprenaline infusion.

## ASYSTOLE AND PULSELESS ELECTRICAL ACTIVITY

**D** Patients with cardiac arrest secondary to asystole or pulseless electrical activity should receive intravenous adrenaline/epinephrine.

## BRADYCARDIA/SINOATRIAL DYSFUNCTION/HEART BLOCK

**C** Atropine should be used in the treatment of patients with symptomatic bradycardia.

**D** Temporary transcutaneous pacing should be initiated quickly in patients not responding to atropine.

**D** When atropine or transcutaneous pacing is ineffective consider adrenaline/epinephrine, dopamine, isoprenaline or aminophylline infusions before transvenous pacing is instituted.

Transcutaneous pacing should be followed by transvenous pacing if bradycardia persists.

## ARRHYTHMIAS ASSOCIATED WITH ACUTE CORONARY SYNDROMES

## ATRIAL FIBRILLATION

**B** Class 1C anti-arrhythmic drugs should not be used in patients with AF in the setting of acute MI.

**D** Patients with AF and haemodynamic compromise should have urgent synchronised DC cardioversion or be considered for anti-arrhythmic and rate-limiting therapy using:

- intravenous amiodarone  
or
- digoxin, particularly in presence of severe LV systolic dysfunction with heart failure.

**D** Patients with AF with a rapid ventricular response, without haemodynamic compromise but with continuing ischaemia should be treated with one of:

- intravenous beta blockade, in absence of contraindications
- intravenous verapamil where there are contraindications to beta blockade and there is no LV systolic dysfunction
- synchronised DC cardioversion.

**D** Patients with AF without haemodynamic compromise or ischaemia should be treated with rate-limiting therapy, preferably a beta blocker, and be considered for chemical cardioversion with amiodarone or DC cardioversion.

Where indicated, cardioversion should be performed under short-acting general anaesthesia or conscious sedation.

## CONDUCTION DISTURBANCES AND BRADYCARDIA

**D** In patients with symptomatic bradycardia/conduction disturbance, concurrent therapies which predispose to bradycardia (eg beta blockers, digoxin, verapamil) should be discontinued.

**D** Isolated first degree heart block/Mobitz type I second degree heart block require no treatment.

**D** Transvenous temporary pacing should be considered for patients with:

- sinus bradycardia (heart rate < 40 beats per minute) associated with symptoms and unresponsive to atropine
- alternating left and right bundle branch block
- Mobitz type II AV block with new bundle branch block
- third degree AV block in inferior MI, if unresponsive to atropine and haemodynamically compromised, and in all cases of anterior MI
- ventricular standstill.

Transcutaneous pacing should be available to all patients with other atrioventricular and intraventricular conduction disturbances.

**D** Permanent pacing is indicated for patients with persistent Mobitz type II second degree block, or persistent third degree AV block.

**D** Permanent pacing should be considered for patients who have had transient second degree or third degree AV block with associated bundle branch block.

All patients requiring a permanent pacemaker should be evaluated for an implantable cardioverter defibrillator and/or biventricular pacing.

## VENTRICULAR ARRHYTHMIAS

### VENTRICULAR ARRHYTHMIAS AND ACUTE MI

**C** Patients who have primary VF should be recognised as being at increased risk during their hospital stay, and medical therapy should be optimised.

**D** Patients who have monomorphic VT following acute MI, or VF greater than 48 hours after infarction, should be recognised as being at increased short and long term risk and should be considered for revascularisation and ICD.

### PREVENTION OF VENTRICULAR ARRHYTHMIAS AND SUDDEN DEATH

**A** Routine use of anti-arrhythmic drugs is not recommended following MI.

**B** Patients who have suffered a recent myocardial infarction and with LVEF  $\leq 0.40$  and either diabetes or clinical signs of heart failure should receive eplerenone unless contraindicated by the presence of renal impairment or high potassium levels.

### ASSESSMENT OF RISK OF SUDDEN DEATH

**C** LV function should be assessed in all patients with acute MI during the index admission.

**C** Non-invasive assessment of the risk of ventricular arrhythmias may be considered but is not routinely recommended.

**C** Invasive electrophysiological studies are not routinely recommended for all patients post-MI.

## ARRHYTHMIAS ASSOCIATED WITH CHRONIC CORONARY HEART DISEASE

## ATRIAL FIBRILLATION

## ANTI-ARRHYTHMIC DRUGS

**A** Amiodarone or sotalol treatment should be considered where prevention of atrial fibrillation recurrence is required on symptomatic grounds.

- Patients with arrhythmias successfully controlled on amiodarone should have the dose titrated down to the lowest effective level.
- Patients taking amiodarone should have thyroid and liver function measured at baseline and at six monthly intervals. A baseline set of lung function tests should be performed (including transfer factor of carbon monoxide; DLCO).
- Patients with new or increasing cough or breathlessness during amiodarone therapy should be promptly referred for respiratory evaluation.
- Patients receiving amiodarone therapy should be provided with information on potential adverse effects.

## RATE VERSUS RHYTHM CONTROL

**A** Rate control is the recommended strategy for management of patients with well tolerated atrial fibrillation.

- Patients who are haemodynamically compromised, have myocardial ischaemia or are severely symptomatic as a result of AF with a rapid ventricular response should be treated promptly by electrical cardioversion.
- Patients with AF who remain severely symptomatic despite adequate rate control should be considered for rhythm control.

## PHARMACOLOGICAL THERAPIES FOR RATE CONTROL

**A** Ventricular rate in AF should be controlled with beta blockers, rate-limiting calcium channel blockers (*verapamil* or *diltiazem*), or digoxin.

**C** Digoxin does not control rate effectively during exercise and should be used as first line therapy only in people who are sedentary, or in overt heart failure.

**C** In some people a combination of drugs may be required to control heart rate in atrial fibrillation. Options include the addition of digoxin to either a beta blocker or a rate-limiting calcium channel blocker.

## NON-PHARMACOLOGICAL THERAPIES

**B** Ablation and pacing should be considered for patients with AF who remain severely symptomatic or have LV dysfunction in association with poor rate control or intolerance to rate control medication.

- Patients with atrial fibrillation who are severely symptomatic despite optimum tolerated medical therapy should be referred to a cardiac rhythm specialist for consideration of non-pharmacological therapy, eg radiofrequency ablation.

## VENTRICULAR ARRHYTHMIAS

## REVASCULARISATION FOR SECONDARY PREVENTION OF VT/VF

**C** Revascularisation should be considered in patients who have had sustained VT or VF.

- Patients with previous sustained VT/VF should undergo assessment for inducible ischaemia by stress testing or myocardial perfusion imaging followed, if appropriate, by coronary arteriography and revascularisation. These patients should all be considered for implantable cardioverter defibrillator therapy.

**IMPLANTABLE CARDIOVERTER DEFIBRILLATOR THERAPY – PRIMARY PREVENTION**

**A** Patients with moderate to severe LV dysfunction (eg ejection fraction  $< 0.35$ ), in NYHA class I-III at least one month after myocardial infarction should be considered for ICD therapy.

**B** Patients with spontaneous non-sustained ventricular tachycardia (especially if sustained ventricular tachycardia is inducible), severely impaired ejection fraction ( $< 0.25$ ) or prolonged QRS complex duration ( $> 120ms$ ) should be prioritised for ICD implantation.

**A** Patients meeting criteria for ICD implantation who have prolonged QRS duration ( $> 120ms$ ) and NYHA class III-IV symptoms should be considered for CRT-D therapy.

**IMPLANTABLE CARDIOVERTER DEFIBRILLATOR THERAPY – SECONDARY PREVENTION**

**A** Patients surviving the following ventricular arrhythmias in the absence of acute ischaemia or treatable cause should be considered for ICD implantation:

- cardiac arrest (VT or VF)
- VT with syncope or haemodynamic compromise
- VT without syncope if LVEF  $< 0.35$  (not NYHA IV).

**ANTI-ARRHYTHMIC DRUG THERAPY**

**A** Class 1 anti-arrhythmic drugs should not be used for treatment of premature ventricular beats or non-sustained VT in patients with previous MI.

**A** Long term beta blockers are recommended for routine use in post-MI patients without contraindications.

**A** Amiodarone therapy is not recommended for post-MI patients or patients with congestive heart failure who do not have sustained ventricular arrhythmias or atrial fibrillation.

**B** Sotalol therapy is not recommended for post-MI patients who do not have sustained ventricular arrhythmias or atrial fibrillation.

**B** In patients who have recovered from an episode of sustained ventricular tachycardia (with or without cardiac arrest) who are not candidates for an ICD, amiodarone or sotalol should be considered.

**A** Calcium channel blocker therapy is not recommended for reduction in sudden death or all-cause mortality in post-MI patients.

**ARRHYTHMIAS ASSOCIATED WITH CORONARY ARTERY BYPASS GRAFT SURGERY**

**RISK FACTORS**

**D** In patients undergoing coronary artery bypass graft surgery, age, previous AF and left ventricular ejection fraction should be considered when assessing risk of postoperative arrhythmia.

**PROPHYLACTIC INTERVENTIONS**

**PHARMACOLOGICAL THERAPIES**

**A** Amiodarone may be used when prophylaxis for atrial fibrillation and ventricular arrhythmias is indicated following CABG surgery.

**A** Beta blockers including sotalol may be used when prophylaxis for atrial fibrillation is indicated following CABG surgery.

**B** Verapamil and diltiazem may be used for prophylaxis of atrial fibrillation following CABG surgery.

**B** Digoxin should not be used for prophylaxis of atrial fibrillation following CABG surgery.

**C** Glucose-insulin-potassium regimens should not be used for prophylaxis of atrial fibrillation following CABG surgery.

## MANIPULATION OF BLOOD ELECTROLYTES

**A** Magnesium may be used when prophylaxis for atrial fibrillation and ventricular arrhythmias is indicated following CABG surgery.

Blood levels of potassium and calcium should be measured frequently following CABG surgery and corrected if necessary.

## ANAESTHESIA AND ANALGESIA

**A** The choice of anaesthetic agent or technique and analgesia should be based on factors other than atrial fibrillation prophylaxis.

## SURGICAL TECHNIQUES

**A** The choice of whether or not to use cardiopulmonary bypass should be based on factors other than atrial fibrillation prophylaxis.

**A** Atrial pacing may be used for prophylaxis of AF in patients who have atrial pacing wires placed for other indications.

**A** Bonded cardiopulmonary bypass circuits should not be used on the basis of AF prophylaxis alone.

## DEFIBRILLATOR IMPLANTATION

**A** Defibrillators should not be routinely implanted in patients with a poor left ventricular ejection fraction at the time of coronary artery bypass graft surgery.

## TREATMENTS FOR ATRIAL FIBRILLATION

## PHARMACOLOGICAL THERAPIES

**D**

- Patients with AF and haemodynamic compromise should have synchronised cardioversion.
- In the immediate postoperative period, patients with persistent AF without haemodynamic compromise should be treated with rate-limiting therapy.
- Patients with persistent AF should be considered for elective synchronised cardioversion.

Whatever pharmacological therapy is used for treatment of AF, the need for continuing treatment should be reviewed within six weeks of hospital discharge.

Anticoagulation should be considered on a case-by-case basis for patients with AF following CABG where it is anticipated that the AF is likely to persist.

## TREATMENTS FOR VENTRICULAR ARRHYTHMIAS

**D**

- Patients with VF or pulseless VT should be defibrillated immediately.
- Intravenous adrenaline/epinephrine should be used for the management of patients with refractory VT/VF.
- Sternal reopening, internal heart massage and internal defibrillation should be considered in patients with refractory VT/VF.
- Intravenous amiodarone should be considered for the management of patients with refractory VT/VF.

- Cardiac tamponade following CABG surgery is a cause of cardiac arrest and should be considered as a differential diagnosis.
- Should other methods fail, sternal reopening should be performed promptly for cardiac arrest if the patient is in critical care and within 24 hours of surgery. Sternal reopening after the first 24 hours in the general ward is unlikely to improve survival.
- The ability to institute cardiopulmonary bypass in the critical care area should be available in all units undertaking coronary artery bypass grafting surgery.

Telemetric ECG monitoring of patients in the general ward allows early detection and treatment of patients in VT/VF.

Patients suffering VT/VF >48 hours after CABG should be considered for ICD implantation.

**A Biphasic defibrillation should be used to terminate ventricular fibrillation that occurs on declamping the aorta.**

### PREOPERATIVE INFORMATION

Preoperative information/education, including that related to arrhythmias, should be tailored to individual patient's needs.

## PSYCHOSOCIAL ISSUES

### PSYCHOSOCIAL ASSESSMENT AND SCREENING

**D Patients with chronic cardiac arrhythmias should be screened for anxiety or depressive disorders with referral to specialist mental health services where appropriate.**

**D Selective cognitive screening should be available especially for post arrest and older cardiac patients experiencing persistent memory or other cognitive difficulties.**

### PSYCHOSOCIAL SUPPORT AND INTERVENTION

**C Psychosocial implications for people experiencing cardiac arrhythmias should be considered by all healthcare staff throughout assessment, treatment and care.**

Psychosocial support for patients experiencing cardiac arrhythmias should not be restricted to recipients of ICDs.

**B Psychosocial intervention offered as part of a comprehensive rehabilitation programme should encompass a cognitive behavioural component.**

# SIGN 95

## Management of chronic heart failure





## DIAGNOSIS AND INVESTIGATIONS

## CLINICAL ASSESSMENT

**There is no symptom or sign that is both sensitive and specific for the diagnosis of chronic heart failure (CHF). Basic early investigations are necessary to differentiate heart failure from other conditions and to provide prognostic information.**

- |                                     |   |
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| <input checked="" type="checkbox"/> | Patients suspected of chronic heart failure should receive a range of basic tests. The investigations chosen will vary depending on the presentation but should usually include a full blood count, fasting blood glucose, serum urea and electrolytes, urinalysis, thyroid function and chest X-ray. |
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## FURTHER INVESTIGATIONS

<b>B</b>	<b>Brain natriuretic peptide or NT pro-BNP levels and/or an electrocardiogram should be recorded to indicate the need for echocardiography in patients with suspected heart failure.</b>
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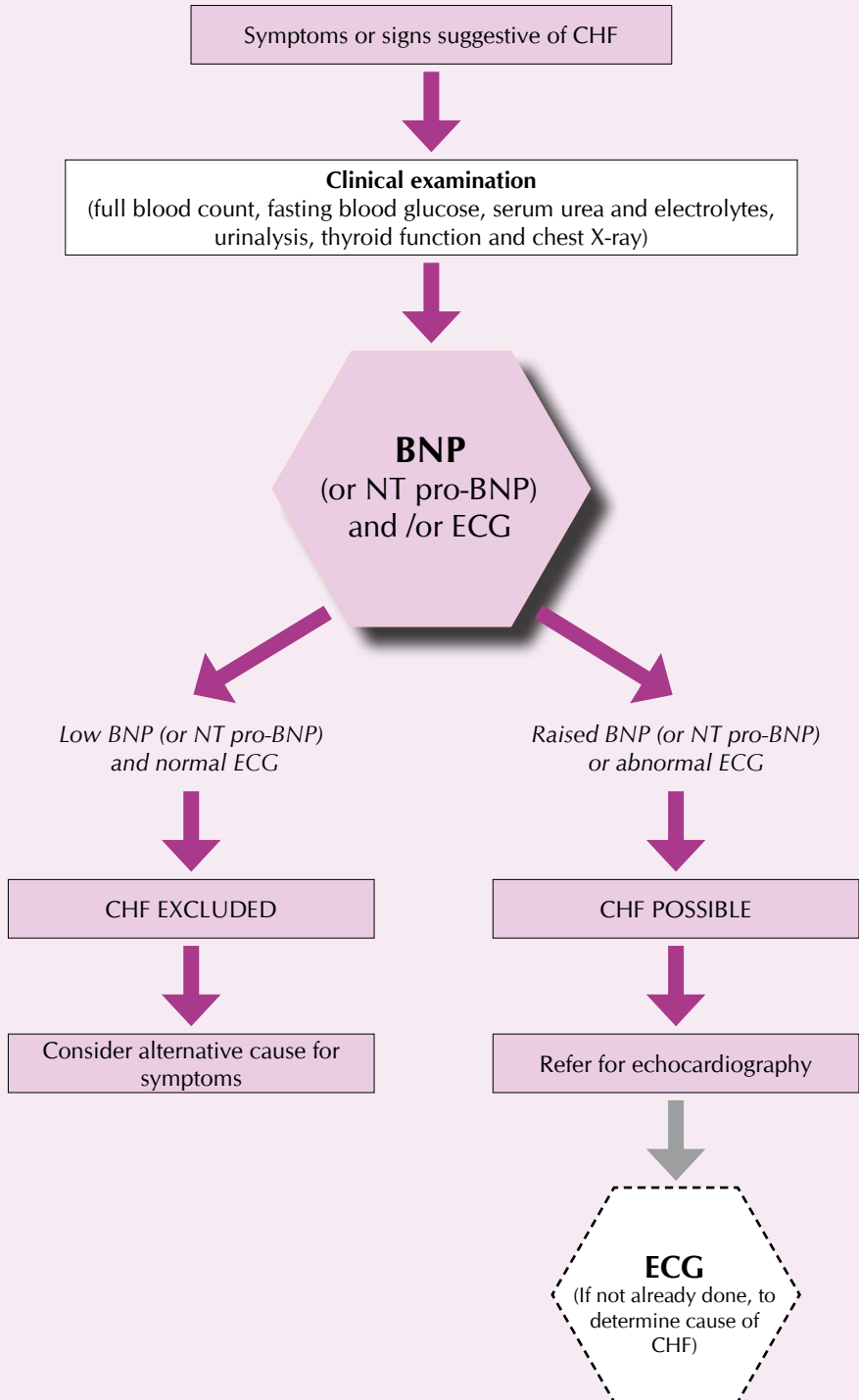
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| <input checked="" type="checkbox"/> | In the assessment of suspected heart failure, brain natriuretic peptide or NT pro-BNP levels should ideally be checked on samples taken prior to commencing therapy. |
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- |                                     |  |
|-------------------------------------|--|
| <input checked="" type="checkbox"/> | <p>Echocardiography is recommended in patients with suspected heart failure who have either a raised brain natriuretic peptide or NT pro-BNP level or abnormal ECG result to confirm the diagnosis and establish the underlying cause. The investigation should include:</p> <ul style="list-style-type: none"> <li>▪ a description of overall left ventricular systolic function together with any wall motion abnormalities</li> <li>▪ assessment of diastolic function</li> <li>▪ measurement of left ventricular wall thickness</li> <li>▪ Doppler assessment of any significant valve disease</li> <li>▪ estimation of pulmonary artery systolic pressure, where possible.</li> </ul> |
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<b>B</b>	<b>A chest X-ray is recommended early in the diagnostic pathway to look for supportive evidence of chronic heart failure and to investigate other potential causes of breathlessness.</b>
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| <input checked="" type="checkbox"/> | Differentiation between heart failure due to idiopathic dilated cardiomyopathy and heart failure due to coronary artery disease may be achieved by analysis of clinical findings, electrocardiogram, or coronary angiography. |
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## DIAGNOSTIC ALGORITHM FOR PATIENTS WITH SUSPECTED CHRONIC HEART FAILURE



**BEHAVIOURAL MODIFICATION**

**ALCOHOL CONSUMPTION**

**C** All patients with heart failure should be advised to refrain from excessive alcohol consumption. When the aetiology of heart failure is alcohol related, patients should be strongly encouraged to stop drinking alcohol.

**SMOKING**

**B** Patients with chronic heart failure should be strongly advised not to smoke and should be offered smoking cessation advice and support.

**UNSUPERVISED PHYSICAL ACTIVITY**

**B** Motivational techniques should be used to promote regular low intensity physical activity amongst patients with stable heart failure.

**DIETARY CHANGES**

Patients with chronic heart failure should be advised to avoid a salt intake of >6 g/day but not to use “low salt” substitutes due to their high potassium content.

- Healthcare professionals caring for patients with frequent decompensated heart failure should assess individual patients’ fluid intake and use a tailored approach when giving fluid restriction advice.

Patients with chronic heart failure should be encouraged to weigh themselves at a set time of day, every day (after waking, before dressing, after voiding, before eating). Patients should report to their general practitioner or heart failure specialist any weight gain of more than 1.5 to 2 kg in two days.

Patients with chronic heart failure:

- who are taking warfarin should be advised to avoid cranberry juice (which may increase drug potency).
- who are taking simvastatin should be advised to avoid grapefruit juice (which may interfere with liver metabolism of the drug).
- should not take St John’s wort supplements due to the interaction with warfarin, digoxin, eplerenone and selective serotonin re-uptake inhibitors.

**PHARMACOLOGICAL THERAPIES**

**ACE INHIBITORS**

**A** ACE inhibitors should be considered in patients with all NYHA functional classes of heart failure due to left ventricular systolic dysfunction.

**BETA BLOCKERS**

**A** All patients with heart failure due to LVSD of all NYHA functional classes should be started on beta blocker therapy as soon as their condition is stable (*unless contraindicated by a history of asthma, heart block or symptomatic hypotension*).

**ANGIOTENSIN RECEPTOR BLOCKERS**

**A** Patients with chronic heart failure due to left ventricular systolic dysfunction alone, or heart failure, left ventricular systolic dysfunction or both following myocardial infarction who are intolerant of angiotensin converting enzyme inhibitors should be considered for an angiotensin receptor blocker.

**B** Patients with heart failure due to LVSD who are still symptomatic despite therapy with an ACE inhibitor and a beta blocker may benefit from the addition of candesartan, following specialist advice.

**ALDOSTERONE ANTAGONISTS**

**B** Following specialist advice, patients with moderate to severe heart failure due to LVSD should be considered for spironolactone unless contraindicated by the presence of renal impairment or a high potassium concentration.

Eplerenone can be substituted for spironolactone in patients who develop gynaecomastia.

**B** Patients who have suffered a myocardial infarction and with left ventricular ejection fraction  $\leq 40\%$  and either diabetes or clinical signs of heart failure should be considered for eplerenone unless contraindicated by the presence of renal impairment or high potassium levels.

**DIURETICS**

**B** Diuretic therapy should be considered for heart failure patients with dyspnoea or oedema (*ankle or pulmonary*).

**DIGOXIN**

**A** Digoxin should be considered as an add-on therapy for heart failure patients in sinus rhythm who are still symptomatic after optimum therapy.

**INTERVENTIONAL PROCEDURES**

**A** For patients in sinus rhythm with drug refractory symptoms of heart failure due to LVSD (*left ventricular ejection fraction  $\leq 35\%$* ) and who are in NYHA class III or IV and who have a QRS duration of  $> 120$  ms, cardiac resynchronisation should be considered.

**B** Consideration should be given to enrolling stable heart failure patients who are in NYHA class II - III into a moderate intensity supervised exercise training programme to give improved exercise tolerance and quality of life.

- Patients should be encouraged to take aerobic exercise within limits dictated by their symptoms.
- Exercise programmes should be individually tailored to the patient following the recommendations in SIGN guideline 57 on cardiac rehabilitation.

**B** In patients undergoing coronary artery bypass grafting with left ventricular ejection fraction  $< 35\%$  consideration should be given to preoperative introduction of intra-aortic balloon counterpulsation.

**FOLLOW UP POST-DISCHARGE**

**A** Comprehensive discharge planning should ensure that links with post-discharge services are in place for all those with symptomatic heart failure. A nurse led, home based element should be included.

**A**

- Follow up (*including by telephone*) by trained heart failure nurses should be considered for patients post-discharge or with stable heart failure. Nurses should have the ability to alter diuretic dose and the interval between telephone calls, and recommend emergency medical contact.
- Patients with heart failure should be offered multidisciplinary follow up, including pharmacy input to address knowledge of drugs and compliance. Follow up should include feedback to clinicians about possibilities for optimising pharmacological interventions.

**PALLIATIVE CARE**

A palliative care approach, with focus on symptom relief and the discontinuation of non-essential treatments should be adopted by all clinicians managing patients with chronic heart failure in the early stages of the disease.

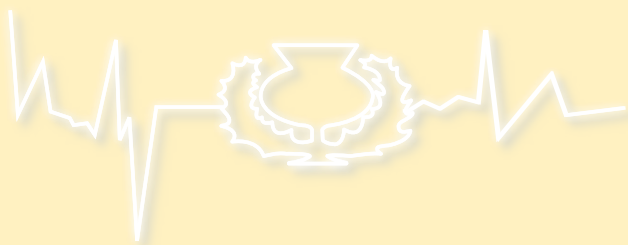
Issues of sudden death and living with uncertainty are pertinent to all patients with heart failure. The opportunity to discuss these issues should be available to patients at all stages of care.

After optimising diet, fluid intake and standard management for chronic heart failure, prescription of low dose opioids, titrated against effect, should be considered in patients with dyspnoea.



# SIGN 96

## Management of stable angina



### DIAGNOSIS AND ASSESSMENT

#### CLINICAL ASSESSMENT

Some patients describe discomfort and heaviness or breathlessness, rather than pain. Chest discomfort, irrespective of its site, is more likely to be angina when precipitated by exertion and relieved by rest. It is also characteristically relieved by glyceryl trinitrate.

Characteristic features of stable angina include:

- tight, dull or heavy feeling of discomfort
- discomfort is often retrosternal or left side of chest and can radiate to left arm, neck, jaw and back
- angina is often brought on with exertion or emotional stress and eased with rest
- typically the symptoms last up to several minutes after exertion or emotional stress has stopped
- other factors – angina may be precipitated by cold weather or following a meal.

Patients with suspected angina should have a detailed initial clinical assessment which includes history, examination and an assessment of blood pressure, haemoglobin, thyroid function, cholesterol and glucose levels.

Those patients who should be considered for early referral to secondary care include those with new onset angina and those with established coronary heart disease with an increase in symptoms.

#### DIAGNOSIS

**C** Patients with suspected angina should usually be investigated by a baseline electrocardiogram and an exercise tolerance test.

**B** Patients unable to undergo exercise tolerance testing or who have pre-existing electrocardiogram abnormalities should be considered for myocardial perfusion scintigraphy.

Coronary angiography should be considered after non-invasive testing where patients are identified to be at high risk or where a diagnosis remains unclear.

**D** Following initial assessment in primary care, patients with suspected angina should, wherever possible, have the diagnosis confirmed and the severity of the underlying coronary heart disease assessed in the chest pain evaluation service which offers the earliest appointment, regardless of model.

## PHARMACOLOGICAL MANAGEMENT

## FIRST LINE THERAPY

**A** Beta blockers should be used as first line therapy for the relief of symptoms of stable angina.



**A** Patients who are intolerant of beta blockers should be treated with either rate limiting calcium channel blockers, long-acting nitrates or nicorandil.

## NITRATES

**A** Sublingual glyceryl trinitrate tablets or spray should be used for the immediate relief of angina and before performing activities that are known to bring on angina.

## COMBINATION THERAPY

**A** When adequate control of anginal symptoms is not achieved with beta-blockade a calcium channel blocker should be added.



Rate-limiting calcium channel blockers should be used with caution when combined with beta blockers.



Patients whose symptoms are not controlled on maximum therapeutic doses of two drugs should be considered for referral to a cardiologist

## DRUG INTERVENTIONS TO PREVENT NEW VASCULAR EVENTS

**A** All patients with stable angina due to atherosclerotic disease should receive long term standard aspirin and statin therapy.

**A** All patients with stable angina should be considered for treatment with angiotensin-converting enzyme inhibitors.

## REVASCULARISATION

## ALL PATIENTS

Coronary artery bypass grafting and percutaneous coronary interventions are both appropriate options for the alleviation of anginal symptoms.

## PATIENTS WITH TRIPLE VESSEL DISEASE

**A** Patients with triple vessel disease should be considered for coronary artery bypass grafting to improve prognosis, but where unsuitable be offered percutaneous coronary intervention.

## PATIENTS WITH LEFT MAIN STEM DISEASE

**A** Patients with significant left main stem disease should undergo coronary artery bypass grafting.

## PATIENTS WITH SINGLE/DOUBLE VESSEL DISEASE

**A** Patients with single or double vessel disease, where optimal medical therapy fails to control angina symptoms, should be offered percutaneous coronary intervention or where unsuitable, considered for coronary artery bypass grafting.



## PATIENTS UNDERGOING NON-CARDIAC SURGERY

## RISK ASSESSMENT

The Revised Cardiac Risk Index is a simple risk stratification tool which combines patient risk and procedural risk and can aid clinical decision making. Six factors for major cardiac complications with approximately equal prognostic importance are defined.

- high risk surgery
- history of ischaemic heart disease
- history of congestive heart failure
- history of cerebrovascular disease
- preoperative insulin treatment
- preoperative creatinine > 180 micromol/l

- B**
- **As part of the routine assessment of fitness for non-cardiac surgery, a risk assessment tool should be used to quantify the risk of serious cardiac events in patients with coronary heart disease.**
  - **Patients undergoing high risk surgery who have a history of coronary heart disease, stroke, diabetes, heart failure or renal dysfunction should have further investigation by either exercise tolerance testing or other non-invasive testing or coronary angiography, if appropriate.**

- D**
- An objective assessment of functional capacity should be made as part of the preoperative assessment of all patients with coronary heart disease before major surgery.**

## PREOPERATIVE REVASCULARISATION

- D**
- **Coronary artery bypass grafting is not recommended before major or intermediate risk non-cardiac surgery unless cardiac symptoms are unstable and/or coronary artery bypass grafting would be justified on the basis of long term outcome.**

- D**
- **If emergency or urgent non-cardiac surgery is required after percutaneous coronary intervention, dual antiplatelet therapy should be continued whenever possible. If the bleeding risk is unacceptable and antiplatelet therapy is withdrawn, it should be reintroduced as soon as possible after surgery.**

- The indications used for revascularisation prior to non-cardiac surgery should be those used in the non-operative setting.

- Where possible, non-cardiac surgery should be delayed for at least one month after coronary artery bypass grafting. When deciding when to operate, the balance of risks and benefits in an individual patient will depend on the severity of the coronary artery disease and the nature and urgency of the non-cardiac surgery.

## DRUG THERAPY

- A**
- Preoperative beta blocker therapy should be considered in patients with coronary heart disease undergoing high or intermediate risk non-cardiac surgery who are at high risk of cardiac events.**

- Where possible beta blockers should be started days or weeks in advance of surgery to allow for dose titration and to assess tolerance.

- A**
- Pre-existing beta blocker therapy should be continued in the perioperative period.**

- C**
- Low-dose aspirin therapy should only be withheld before non-cardiac surgery in patients with coronary heart disease where the aspirin related bleeding complications are expected to be significant (VTE, MI, stroke, peripheral vascular occlusion, or cardiovascular death).**

**D** If low-dose aspirin therapy is withdrawn before non-cardiac surgery in patients with coronary heart disease, it should be recommenced as soon as possible after surgery.

Patients presenting for non-cardiac surgery on statin therapy should have the statin continued through the perioperative period.

**PATIENT ISSUES AND FOLLOW UP**

**DELIVERING INFORMATION**

Patients newly diagnosed with angina and those who are immediately pre- and postinterventions and revascularisation, should be given appropriate information to help them understand their condition and how to manage it, and any procedure being undertaken.

- Health beliefs and misconceptions should be addressed when delivering information.

**FOLLOW UP**

**A** Patients presenting with angina and with a diagnosis of coronary heart disease should receive long term structured follow up in primary care.

**PSYCHOLOGICAL AND COGNITIVE ISSUES**

**D** Patients with angina should be assessed for the impact of angina on mood, quality of life and function, to monitor progress and inform treatment decisions.

**B** Patients with stable angina whose symptoms remain uncontrolled or who are experiencing reduced physical functioning despite optimal medical therapy should be considered for the Angina Plan.

**D** Patients who are older and have other evidence of atherosclerosis and/or existing cognitive impairment may be more at risk of increasing decline and these factors should be considered when evaluating options for revascularisation to achieve symptom relief.

Depression is a significant factor influencing mortality and morbidity post-CABG.

**D** Patients undergoing coronary artery bypass grafting should receive screening for anxiety and depression pre-surgery and during the following year as part of postsurgical assessment, rehabilitation and coronary heart disease secondary prevention clinics. Where required patients should receive appropriate treatment (*psychological therapy, rehabilitation, medication*).

**D** Rehabilitation programmes should be implemented after revascularisation for patients with stable angina.

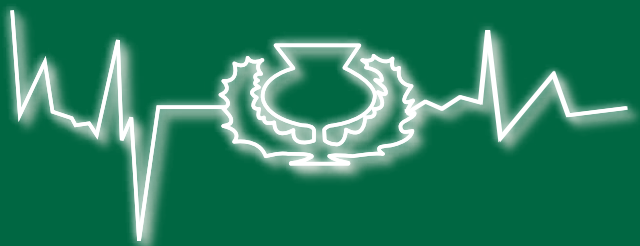
**D** Patients' beliefs about angina should be assessed when discussing management of risk factors and how to cope with symptoms.

**B** Interventions based on psychological principles designed to alter beliefs about heart disease and angina, such as the Angina Plan, should be considered.



# SIGN 97

## Risk estimation and the prevention of cardiovascular disease



## RISK ASSESSMENT

**The following individuals should have an assessment of cardiovascular risk at least every five years:**

- all adults aged 40 years or above, and
- individuals at any age with a first-degree relative who has premature atherosclerotic CVD or familial dyslipidaemia.

**D Individuals with symptoms of cardiovascular disease or who are over the age of 40 years and have diabetes (type 1 or 2) or familial hypercholesterolaemia should be considered at high risk ( $\geq 20\%$  risk over ten years) of cardiovascular events.**

**D Cardiovascular risk should be estimated at least once every five years in adults over the age of 40 years with no history of cardiovascular disease, familial hypercholesterolaemia or diabetes and who are not being treated for blood pressure or lipid reduction.**

**D Asymptomatic individuals should be considered at high risk if they are assessed as having  $\geq 20\%$  risk of a first cardiovascular event over ten years.**

**D Individuals at high cardiovascular risk warrant intervention with lifestyle changes and consideration for drug therapy, to reduce their absolute risk.**

Risk factors should be monitored at least annually in people who are on antihypertensive or lipid lowering therapy.

Individuals from deprived socioeconomic groups must be regarded as being at higher total cardiovascular risk than indicated by risk estimation tools that do not use social deprivation to calculate total risk.

Other risk factors not included in the CVD risk prediction should be taken into account in assessing and managing a person's overall CVD risk. These include: ethnicity, abdominal obesity, impaired glucose tolerance, raised fasting triglyceride and a family history of premature CVD.

## DIET

**A Diets low in total and saturated fats should be recommended to all for the reduction of cardiovascular risk.**

**A People with hypertension should be advised to reduce their salt intake as much as possible to lower blood pressure.**

All individuals should aim to consume less than 6 g of salt per day.

**B Patients, and individuals at risk of cardiovascular disease, who are overweight, should be targeted with interventions designed to reduce weight, and to maintain this reduction.**

All patients with the metabolic syndrome should be identified and offered professional advice in relation to a cardioprotective diet, exercise and weight monitoring. They should be followed up regularly according to the progress they are making in reducing their total cardiovascular risk.

## PHYSICAL ACTIVITY

**B Physical activity of at least moderate intensity (eg makes person slightly out of breath) is recommended for the whole population (unless contraindicated by condition).**

## SMOKING

- B** All people who smoke should be advised to stop and offered support to help facilitate this in order to minimise cardiovascular and general health risks.
- A** Nicotine replacement therapies or bupropion should be used as part of a smoking cessation programme to augment professional advice and increase long term abstinence rates.
- B** Smokers with coronary heart disease and comorbid clinical depression should have their depression treated both for alleviation of depressive symptoms and to increase the likelihood of stopping smoking.

## ALCOHOL

- B** Patients with no evidence of coronary heart disease may be advised that light to moderate alcohol consumption may be protective against the development of coronary heart disease.
- C** Patients with established coronary heart disease may be advised that light to moderate alcohol consumption may be protective against further coronary events.
- When giving advice to patients with coronary heart disease, the current general advice of no more than two to three units of alcohol per day for women and no more than three to four units of alcohol per day for men, with at least two drink-free days per week for both men and women, should be recommended.
- A** Brief multi-contact interventions should be used to encourage patients to reduce their levels of drinking if their current intake is hazardous to their health.

## ANTIPLATELET THERAPY

- A** Individuals with established atherosclerotic disease should be treated with 75 mg aspirin daily.
- A** Individuals with a history of stroke or transient ischaemic attack and who are in sinus rhythm should be considered for low dose aspirin (75–300 mg daily) and dipyridamole (200 mg twice daily) to prevent stroke recurrence and other vascular events. If aspirin is contraindicated, or there are side effects, clopidogrel 75 mg daily is an alternative.
- A** Asymptomatic individuals without established atherosclerotic disease but with a calculated cardiovascular risk of  $\geq 20\%$  over ten years should be considered for treatment with aspirin 75 mg daily.
- Aspirin 75 mg daily is recommended for all people with type 2 diabetes who are over 50 years of age and for selected younger individuals with diabetes who are considered to be at increased cardiovascular risk.

## LIPID LOWERING THERAPY

- A** All adults over the age of 40 years who are assessed as having a ten year risk of having a first cardiovascular event  $\geq 20\%$  should be considered for treatment with simvastatin 40 mg/day following an informed discussion of risks and benefits between the individual and responsible clinician.
- Patients started on a statin should be advised to report unexplained muscle pains or other adverse effects promptly, especially if associated with fever or malaise.
  - If such effects are mild, a different statin may be tried and/or the statin dose reduced after discussing the risks involved with the patient.
  - If severe side effects are experienced statin therapy should be discontinued.
- In individuals without established cardiovascular disease, lifestyle measures to reduce cholesterol levels should be encouraged, irrespective of the need for pharmacological treatment.

Secondary causes of dyslipidaemia should be considered and excluded before commencing lipid lowering drug therapy.

**B All patients with established symptomatic atherosclerotic cardiovascular disease should be considered for more intensive statin therapy following an informed discussion of risks and benefits between the individual and responsible clinician.**

Patients who are using medications that influence cytochrome P450 metabolism should avoid concomitant use of atorvastatin or simvastatin. In such cases, pravastatin is an acceptable alternative lipid lowering therapy.

**A Individuals with hypertriglyceridaemia ( $> 1.7$  mmol/l) and/or low high density lipoprotein cholesterol level ( $< 1$  mmol/l in men, or  $< 1.2$  mmol/l in women) should be considered for treatment with a fibrate or nicotinic acid.**

### BLOOD PRESSURE LOWERING THERAPY

All individuals with a persistent blood pressure  $> 140/90$  mm Hg or a family history of hypertension should receive lifestyle advice to help reduce their blood pressure and cardiovascular disease risk.

**B Individuals with blood pressure greater than 160/100 mm Hg should have drug treatment and specific lifestyle advice to lower their blood pressure and risk of cardiovascular disease.**

- Asymptomatic individuals with sustained systolic blood pressures  $\geq 140$  mm Hg and/or diastolic blood pressures  $\geq 90$  mm Hg and whose ten year risk of a first CVD event is calculated to be  $\geq 20\%$  should be considered for blood pressure lowering drug therapy.
- Individuals with such blood pressure levels whose ten year risk of a first CVD event is  $< 20\%$  should continue with lifestyle strategies and have their blood pressure and total CVD risk reassessed every one to five years, depending on clinical circumstances.

In any individual with hypertension, consideration should be given to using two or more antihypertensive agents, in half to standard doses, to achieve additive blood pressure lowering whilst minimising the adverse effect profile.

**A Individuals with sustained systolic blood pressures  $> 140$  mm Hg and/or diastolic blood pressures  $> 90$  mm Hg and clinical evidence of cardiovascular disease should be considered for blood pressure lowering drug therapy.**

**A Individuals with established cardiovascular disease, who also have chronic renal disease or diabetes with complications, or target organ damage may be considered for treatment at the lower threshold of systolic  $> 130$  mm Hg and/or diastolic  $> 80$  mm Hg.**

### PSYCHOSOCIAL ISSUES

**B Depression and social isolation or lack of quality social support are risk factors for the development of and prognosis with coronary heart disease and should be taken into account when assessing individual risk.**

**A Cognitive behaviour therapy should be considered for increasing physical function and improving mood in patients with coronary heart disease.**

**A Use of the stages of change model alone is not recommended as a method for changing the health behaviour of individuals with coronary heart disease.**

**B Motivational interviewing should be considered in patients with cardiovascular disease who require to change health behaviours including diet, exercise, alcohol and compliance with treatment.**

# Glossary

<b>ACE</b>	Angiotensin converting enzyme
<b>ACS</b>	Acute coronary syndrome
<b>AF</b>	Atrial fibrillation
<b>ARB</b>	Angiotensin receptor blocker
<b>AV</b>	Atrioventricular
<b>CABG</b>	Coronary artery bypass graft
<b>CHF</b>	Chronic heart failure
<b>CPR</b>	Cardiopulmonary resuscitation
<b>CRT-D</b>	Cardiac resynchronisation therapy + defibrillator
<b>CVD</b>	Cardiovascular disease
<b>ECG</b>	Electrocardiogram
<b>ICD</b>	Implantable cardioverter defibrillator
<b>LV</b>	Left ventricular
<b>LVEF</b>	Left ventricular ejection fraction
<b>LVSD</b>	Left ventricular systolic dysfunction
<b>MI</b>	Myocardial infarction
<b>NYHA</b>	New York Heart Association
<b>PCI</b>	Percutaneous coronary intervention
<b>QRS</b>	The principal deflection in the electrocardiogram, representing ventricular depolarisation
<b>VF</b>	Ventricular fibrillation
<b>VT</b>	Ventricular tachycardia



This Quick Reference Guide provides a summary of the main recommendations in the SIGN guidelines on **Heart Disease**.

Recommendations are graded **A B C D** to indicate the strength of the supporting evidence.

Good practice points  are provided where the guideline development group wishes to highlight specific aspects of accepted clinical practice.

Details of the evidence supporting these recommendations can be found in the full guidelines, available on the SIGN website: [www.sign.ac.uk](http://www.sign.ac.uk)

ISBN (10) 1 905813 11 2

ISBN (13) 978 1 905813 11 7

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