

## Coronary revascularisation

There are three management options for patients with coronary heart disease (CHD):

- **Medical therapy and risk factor modification:** this is the main option for stable, low-risk patients and should be given to all patients with CHD. See separate [Cardiovascular Risk Assessment](#) and [Cardiac Rehabilitation](#) articles. In low-risk patients with stable coronary artery disease, aggressive lipid-lowering therapy is at least as effective as angioplasty in reducing the incidence of ischaemic events.
- **Coronary artery bypass graft (CABG) surgery:** this has been shown to produce better survival rates compared with medical therapy in certain patient groups. See separate [Coronary Artery Bypass Grafting](#) article.
- **Percutaneous coronary intervention (PCI):** this is generally for patients with isolated coronary artery disease. See separate [Percutaneous Coronary Intervention](#) article.

See also separate [Acute Coronary Syndrome](#), [Acute Myocardial Infarction](#), [Acute Myocardial Infarction Management](#), [Stable Angina](#) and [Cardiac Catheterisation](#) articles.

### Risk assessment<sup>[1]</sup>

Coronary revascularisation is not without risks; thus, determining the risk/benefits prior to revascularisation is important. Risk assessment is undertaken using scoring systems. There are a number of various scoring models – for example:

- **The European System for Cardiac Operative Risk Evaluation (EuroSCORE):** the EuroSCORE is a similar European system for cardiac operative risk evaluation based on a large database. It can be used to predict the risk of revascularisation regardless of whether surgery or PCI is considered.

- **The SYNTAX score:** predicts the risks associated with PCI, thus stratifying patients into those who are most likely to have adverse effects. Other scoring systems for PCI include the National Cardiovascular Database Registry (NCDR) CathPCI risk score.
- **The Society of Thoracic Surgeons score and Age, Creatinine and Ejection Fraction score:** these are both used to determine surgical risk.

### Special considerations <sup>[1]</sup>

A number of important factors influence the likely balance of risks and benefits. These include:

- **Smoking:** this is associated with poorer long-term survival after CABG. Those who stop smoking are less likely to undergo repeat surgery or to have a heart attack.
- **Diabetes mellitus:** patients have poorer long-term survival after revascularisation and a higher risk of re-stenosis. Good control of diabetes and hypertension reduces the rate of progression of vascular disease.
- **Impaired left ventricular function:** despite a higher operative mortality, they also obtain greater long-term survival benefit from revascularisation than people without impaired left ventricular function.
- **Advanced age:** the procedure-associated risk rises rapidly with age.
- **Gender:** women may have a higher procedure-associated mortality compared with men <sup>[2]</sup> .
- **Recent myocardial infarction or episode of unstable angina:** recent coronary events increase procedural risk.
- **Unfavourable coronary anatomy:** extensive disease in the distal parts of coronary arteries reduces the likely benefits of intervention.
- **Results of pre-intervention tests:** eg, myocardial perfusion scanning or cardiac MRI.

- **Presence of chronic kidney disease:** CABG is superior to PCI where the eGFR is between 30–90 mL/min/1.73 m<sup>2</sup>. In severe chronic kidney disease and end-stage kidney disease or haemodialysis there is no such evidence and thus deciding between CABG and PCI is based on the individual patient.

Any decision should be made within a multidisciplinary team and patients should take an active role in the decision-making process. Obviously this may not be possible in the acutely unwell patient.

## Revascularisation in stable disease or silent ischaemia<sup>[1]</sup>

This is required when:

- The patient has persisting symptoms (medical therapy should be optimised); and/or
- Anatomical disease which, if intervened upon, will improve prognosis – eg, left main stem disease or proximal left anterior descending artery disease or a large area of ischaemia.

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## Revascularisation in non-ST-elevation acute coronary syndromes<sup>[1] [3] [4]</sup>

In this group, revascularisation is undertaken usually for both symptomatic relief and improvement in outcomes. This is the largest group of patients requiring PCI but the prognosis is very variable and, as such, scoring systems are also used in acute coronary syndrome to determine the risk:benefit ratio.

The European Society of Cardiology (ESC) recommend the use of the Global Registry of Acute Coronary Events score (GRACE score) in acute coronary syndrome patients. This determines the long-term risks and helps decisions regarding which patient should undergo invasive PCI. The GRACE score is discussed more fully in the separate [Acute Coronary Syndrome](#) article.

ESC recommends:

- Urgent coronary angiography (within 2 hours) for patients at very high ischaemic risk.

- Early invasive strategy (within 24 hours) in patients with at least one high risk criterion.
- An invasive strategy (within 72 hours after presentation) if at least one intermediate-risk-criterion, or recurrent symptoms.
- Revascularisation strategy should be based on the clinical status and comorbidities, as well as disease severity.
- In cardiogenic shock, routine revascularisation of non-IRA lesions is not recommended during primary PCI.

NICE recommends treating NSTEMACS either with stents or with medication depending on the person's risk. These treatments are quite commonly used in younger people, but older people are less likely to receive them. The results of a meta-analysis dealing with the treatment of people aged over 75 years who have non ST-elevation acute coronary syndrome (NSTEMACS) suggest that routine invasive therapy for people aged over 75 with non-ST-elevation acute coronary syndromes reduces the risk of dying, having a heart attack or stroke, and need for further intervention. However, there was a higher risk of major bleeding compared to treating people with medication and the authors suggest greater clarity is needed around the balance of risks and benefits for this group of people.<sup>[5]</sup> .

## **Revascularisation in ST-segment elevation myocardial infarction<sup>[1]</sup>**

- Reperfusion therapy is indicated in all patients with time from symptom onset less than 12 hours and persistent ST-segment elevation.

- In the absence of ST-segment elevation, a primary PCI strategy is indicated in patients with suspected ongoing ischaemic symptoms suggestive of MI and at least one of the following:
  - Haemodynamic instability or shock.
  - Recurrent or ongoing chest pain refractory to medical treatment.
  - Life-threatening arrhythmias or cardiac arrest.
  - Mechanical complications of MI.
  - Acute heart failure.
  - Recurrent dynamic ST-segment or T-wave changes, particularly with intermittent ST-segment elevation.
- A primary PCI strategy is recommended over fibrinolysis within the indicated time frames.
- In patients with symptom onset more than 12 hours, a primary PCI strategy is indicated if ongoing symptoms or signs suggestive of ischaemia, haemodynamic instability or life-threatening arrhythmias.
- A routine primary PCI strategy should be considered in patients presenting late (12-48 hours) after symptom onset.

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