NICE National Institute for Health and Care Excellence

NICE Pathways

# Myocardial infarction with ST-segment elevation overview

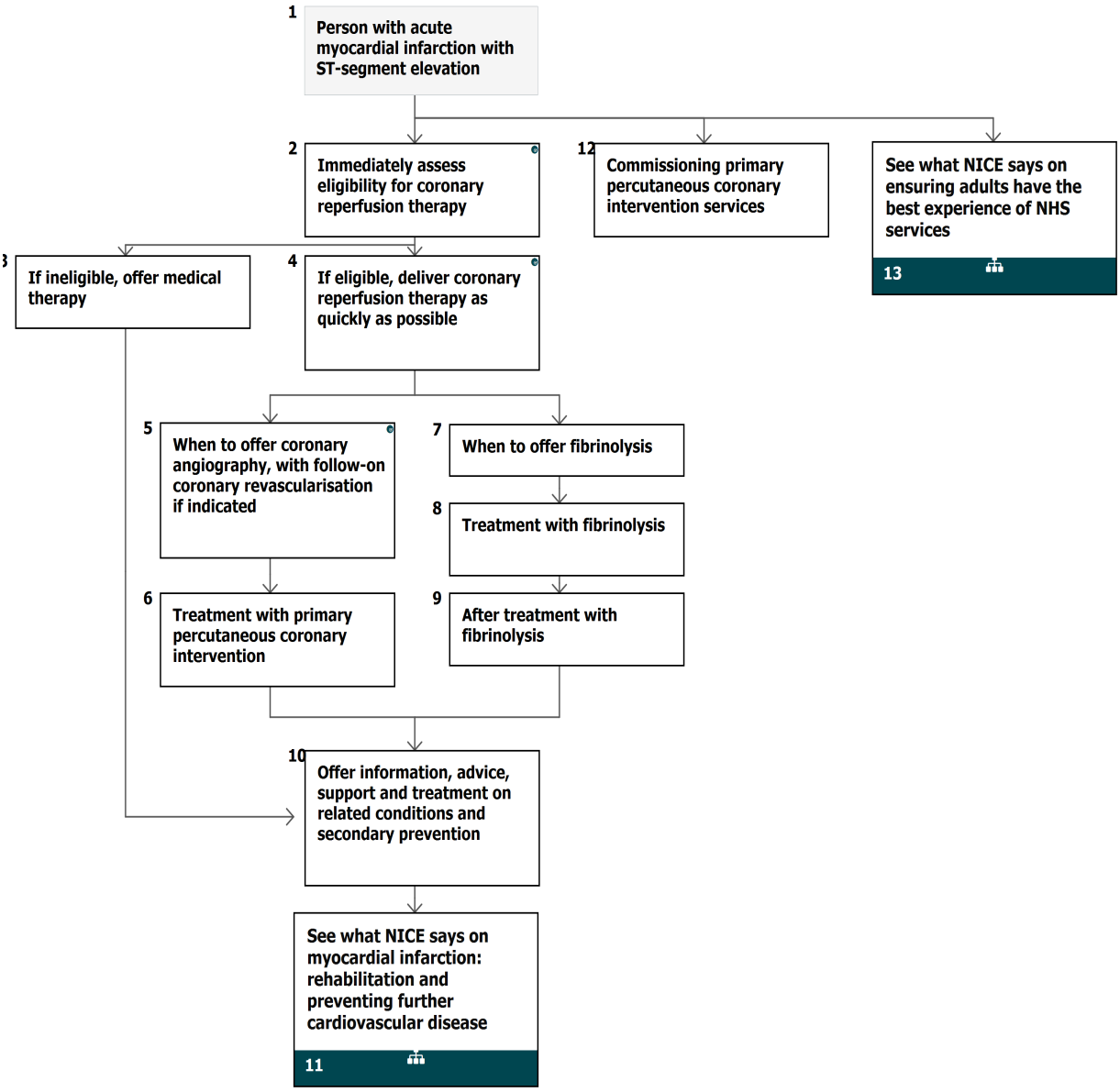
NICE Pathways bring together everything NICE says on a topic in an interactive flowchart. NICE Pathways are interactive and designed to be used online.

They are updated regularly as new NICE guidance is published. To view the latest version of this NICE Pathway see:

http://pathways.nice.org.uk/pathways/myocardial-infarction-with-st-segment-elevation

NICE Pathway last updated: 27 November 2018

This document contains a single flowchart and uses numbering to link the boxes to the associated recommendations.



## 1 Person with acute myocardial infarction with ST-segment elevation

No additional information

## 2 Assess eligibility for coronary reperfusion therapy

Immediately assess eligibility (irrespective of age, ethnicity or sex) for coronary reperfusion therapy (either primary PCI or fibrinolysis) in people with acute STEMI.

Do not use level of consciousness after cardiac arrest caused by suspected acute STEMI to determine whether a person is eligible for coronary angiography (with follow-on primary PCI if indicated).

### Quality standards

The following quality statement is relevant to this part of the interactive flowchart.

5. Level of consciousness and eligibility for coronary angiography and primary PCI

## 3 Offer medical therapy if ineligible for coronary rerperfusion therapy

Offer medical therapy to people with acute STEMI who are ineligible for reperfusion therapy.

## 4 If eligible, deliver coronary reperfusion therapy as quickly as possible

Deliver coronary reperfusion therapy (either primary PCI or fibrinolysis) as quickly as possible for eligible people with acute STEMI.

### Quality standards

The following quality statement is relevant to this part of the interactive flowchart.

6. Primary PCI for acute STEMI

## 5 When to offer coronary angiography, with follow-on coronary

## revascularisation if indicated

**Presentation within 12 hours**

Offer coronary angiography, with follow-on primary PCI if indicated, as the preferred coronary reperfusion strategy for people with acute STEMI if:

- presentation is within 12 hours of onset of symptoms **and**
- primary PCI can be delivered within 120 minutes of the time when fibrinolysis could have been given.

Offer coronary angiography, with follow-on primary PCI if indicated, to people with acute STEMI and cardiogenic shock who present within 12 hours of the onset of symptoms of STEMI.

**Presentation beyond 12 hours**

Consider coronary angiography, with follow-on primary PCI if indicated, for people with acute STEMI presenting more than 12 hours after the onset of symptoms if there is evidence of continuing myocardial ischaemia.

Consider coronary angiography, with a view to coronary revascularisation if indicated, for people with acute STEMI who present more than 12 hours after the onset of symptoms and who have cardiogenic shock or go on to develop it.

## Quality standards

The following quality statement is relevant to this part of the interactive flowchart.

6. Primary PCI for acute STEMI

## 6 Treatment with primary percutaneous coronary intervention

Consider thrombus aspiration during primary PCI for people with acute STEMI.

Do not routinely use mechanical thrombus extraction during primary PCI for people with acute STEMI.

Consider radial (in preference to femoral) arterial access for people undergoing coronary angiography (with follow-on primary PCI if indicated).

Do not offer routine glycoprotein IIb/IIIa inhibitors or fibrinolytic drugs before arrival at the catheter laboratory to people with acute STEMI for whom primary PCI is planned.

### Antiplatelet agents

#### Ticagrelor

The following recommendation is an extract from NICE technology appraisal guidance on ticagrelor for the treatment of acute coronary syndromes.

Ticagrelor in combination with low-dose aspirin is recommended for up to 12 months as a treatment option in people with STEMI – defined as ST elevation or new left bundle branch block on electrocardiogram – that cardiologists intend to treat with primary PCI.

NICE has written information for the public on ticagrelor.

#### Prasugrel

The following recommendation is from NICE technology appraisal guidance on prasugrel with percutaneous coronary intervention for treating acute coronary syndromes.

Prasugrel 10 mg in combination with aspirin is recommended as an option within its marketing authorisation, that is, for preventing atherothrombotic events in adults with acute coronary syndrome (unstable angina, non-ST-segment elevation myocardial infarction or STEMI) having primary or delayed PCI.

NICE has written information for the public on prasugrel.

#### Cangrelor

The NICE technology appraisal of cangrelor for reducing atherothrombotic events in people undergoing percutaneous coronary intervention or awaiting surgery requiring interruption of anti-platelet therapy was terminated because no evidence submission was received from The Medicines Company for the technology. Therefore NICE is **unable to make a recommendation** about the use in the NHS of cangrelor for reducing atherothrombotic events in people undergoing percutaneous coronary intervention or awaiting surgery requiring interruption of anti-platelet therapy.

NICE has published an evidence summary on coronary revascularisation: cangrelor.

### Anti-thrombin agents

#### Heparin

Offer unfractionated heparin or low molecular weight heparin to people with acute STEMI who are undergoing primary PCI and have been treated with prasugrel or ticagrelor.

#### Bivalirudin

The following recommendation is from NICE technology appraisal guidance on bivalirudin for the treatment of ST-segment-elevation myocardial infarction.

Bivalirudin in combination with aspirin and clopidogrel is recommended for the treatment of adults with STEMI undergoing primary PCI.

NICE has written information for the public on bivalirudin.

### Stents

#### Coronary artery stents

The following recommendations are from NICE technology appraisal guidance on the use of coronary artery stents.

Stents should be used routinely where PCI is the clinically appropriate procedure for patients with either stable or unstable angina or with acute myocardial infarction.

This guidance specifically relates to the present clinical indications for PCI and excludes conditions (such as many cases of stable angina) that are adequately managed with standard drug therapy.

NICE has written information for the public on coronary artery stents.

#### Drug-eluting stents

The following recommendation is from NICE technology appraisal guidance on drug-eluting stents for the treatment of coronary artery disease.

Drug-eluting stents are recommended for use in PCI for the treatment of coronary artery disease, within their instructions for use, only if:

- the target artery to be treated has less than a 3-mm calibre or the lesion is longer than 15

- mm, **and**
- the price difference between drug-eluting stents and bare-metal stents is no more than £300.

NICE has written information for the public on drug-eluting stents.

### Bioresorbable stents

NICE has published interventional procedures guidance on bioresorbable stent implantation for treating coronary artery disease with **special arrangements** for clinical governance, consent and audit or research.

### Interventional procedures

NICE has published guidance on the following procedures with **special arrangements** for consent, audit and clinical governance:

- percutaneous insertion of a temporary heart pump for left ventricular haemodynamic support in high-risk percutaneous coronary interventions
- optical coherence tomography to guide percutaneous coronary intervention.

NICE has published guidance on the following procedures with **normal arrangements** for clinical governance, consent and audit:

- percutaneous laser coronary angioplasty
- thrombin injections for pseudoaneurysms.

### Medtech innovation briefings

NICE has published medtech innovation briefings on:

- QAngio XA 3D/QFR imaging software for assessing coronary obstructions
- Impella 2.5 for haemodynamic support during high-risk percutaneous coronary interventions
- the PressureWire fractional flow reserve measurement system for coronary artery disease.

### People who have previously had PCI

### SeQuent Please balloon catheter for in-stent coronary restenosis

The following recommendations are from NICE medical technologies guidance on SeQuent Please balloon catheter for in-stent coronary restenosis.

The case for adopting SeQuent Please balloon catheter in the NHS, when used as described below, is supported by the evidence. The need for subsequent re-intervention for coronary stenosis is reduced as is the duration of clopidogrel therapy, compared with paclitaxel-eluting stent. SeQuent Please balloon catheter is associated with a cost saving of £467 per patient compared with paclitaxel-eluting stent.

SeQuent Please balloon catheter should be considered for use in patients with in-stent restenosis in bare metal coronary artery stents.

SeQuent Please balloon catheter can also be considered as an option for patients with in-stent restenosis in any type of coronary artery stent if:

- there are clinical reasons to minimise the duration of clopidogrel treatment (for example, there is concern about an increased risk of bleeding or there is the need for surgical intervention) **or**
- placement of further stents is not technically possible.

Further research is recommended in a UK setting to compare the outcomes of patients treated with SeQuent Please balloon catheter with the outcomes of patients treated with other types of drug-eluting balloon catheter and stent. This research should report long-term outcomes (for example, after 3 years), including clinical outcomes and details of further revascularisation required for subsequent restenosis. Research should investigate the use of SeQuent Please balloon catheter for restenosis in drug-eluting coronary artery stents and in de novo coronary stenosis where stenting is either technically difficult or is associated with an increased risk of complications. If research shows that SeQuent Please balloon catheter reduces the rate of restenosis in patients with drug-eluting stents or in native coronary arteries, compared with other technologies, then the number of patients for whom it might be suitable would increase significantly.

## 7 When to offer fibrinolysis

Offer fibrinolysis to people with acute STEMI presenting within 12 hours of onset of symptoms if primary PCI cannot be delivered within 120 minutes of the time when fibrinolysis could have been given.

## 8 Treatment with fibrinolysis

When treating people with fibrinolysis, give an antithrombin at the same time.

### Thrombolytic drugs

The following recommendations are from NICE technology appraisal guidance on the use of drugs for early thrombolysis in the treatment of acute myocardial infarction.

This guidance provides recommendations on the selection of thrombolytic drugs in patients with acute myocardial infarction. Recommendations are made in relation to the use of the drugs in hospital and pre-hospital settings. The guidance does not compare hospital and pre-hospital models of delivering thrombolysis.

It is recommended that, in hospital, the choice of thrombolytic drug (alteplase, reteplase, streptokinase or tenecteplase) should take account of:

- the likely balance of benefit and harm (for example, stroke) to which each of the thrombolytic agents would expose the individual patient
- current UK clinical practice, in which it is accepted that patients who have previously received streptokinase should not be treated with it again
- the hospital's arrangements for reducing delays in the administration of thrombolysis.

Where pre-hospital delivery of thrombolytic drugs is considered a beneficial approach as part of an emergency-care pathway for acute myocardial infarction (for example, because of population geography or the accessibility of acute hospital facilities), the practicalities of administering thrombolytic drugs in pre-hospital settings mean that the bolus drugs (reteplase or tenecteplase) are recommended as the preferred option.

NICE has written information for the public on thrombolytic drugs.

## 9 After treatment with fibrinolysis

Offer an electrocardiogram to people treated with fibrinolysis, 60–90 minutes after administration. For those who have residual ST-segment elevation suggesting failed coronary reperfusion:

- offer immediate coronary angiography, with follow-on PCI if indicated
- do not repeat fibrinolytic therapy.

If a person has recurrent myocardial ischaemia after fibrinolysis, seek immediate specialist cardiological advice and, if appropriate, offer coronary angiography, with follow-on PCI if indicated.

Consider coronary angiography during the same hospital admission for people who are clinically stable after successful fibrinolysis.

See treatment with primary percutaneous coronary intervention [See page 4] for more information.

## 10 Offer information, advice, support and treatment on related conditions and secondary prevention

Offer people who have had an acute STEMI written and oral information, advice, support and treatment on related conditions and secondary prevention (including lifestyle advice), as relevant, in line with published NICE guidance (see below).

| Topic | NICE's recommendations | Information for the public |
|---|---|---|
| **Related conditions** | | |
| Lipid modification and statin therapy | Familial hypercholesterolaemia | Familial hypercholesterolaemia |
| | Cardiovascular disease prevention | Cardiovascular disease prevention |
| Prevention, diagnosis and management of diabetes | Diabetes | Type 1 diabetes<br>Type 2 diabetes |
| Prevention, diagnosis and management of high blood pressure | Hypertension | Hypertension |
| Hyperglycaemia management in acute coronary syndromes | Hyperglycaemia in acute coronary syndromes | Hyperglycaemia in acute coronary syndromes |

| | | |
|---|---|---|
| **Secondary prevention** | | |
| Secondary prevention | Myocardial infarction: rehabilitation and preventing further cardiovascular disease | Myocardial infarction: cardiac rehabilitation and prevention of further cardiovascular disease |
| **Lifestyle advice** | | |
| Smoking cessation | Smoking cessation | |
| Diet, weight management and exercise | Diet | |
| | Physical activity | |
| **General guidance** | | |
| Patient experience | Patient experience | Patient experience |
| Medicines adherence | Medicines optimisation | Medicines optimisation |

## 11 See what NICE says on myocardial infarction: rehabilitation and preventing further cardiovascular disease

See Myocardial infarction: rehabilitation and preventing further cardiovascular disease

## 12 Commissioning primary percutaneous coronary intervention services

When commissioning primary PCI services for people with acute STEMI, be aware that outcomes are strongly related to how quickly primary PCI is delivered, and that they can be influenced by the number of procedures carried out by the primary PCI centre.

## 13 See what NICE says on ensuring adults have the best experience of NHS services

See Patient experience in adult NHS services

## Glossary

**PCI**

percutaneous coronary intervention

**STEMI**

myocardial infarction with ST-segment elevation

## Sources

Myocardial infarction with ST-segment elevation: acute management (2013) NICE guideline CG167

Cangrelor for reducing atherothrombotic events in people undergoing percutaneous coronary intervention or awaiting surgery requiring interruption of anti-platelet therapy (terminated appraisal) (2015) NICE technology appraisal 351

Prasugrel with percutaneous coronary intervention for treating acute coronary syndromes (2014) NICE technology appraisal guidance 317

Ticagrelor for the treatment of acute coronary syndromes (2011) NICE technology appraisal guidance 236

Bivalirudin for the treatment of ST-segment-elevation myocardial infarction (2011) NICE technology appraisal guidance 230

Drug-eluting stents for the treatment of coronary artery disease (2008) NICE technology appraisal guidance 152

Guidance on the use of coronary artery stents (2003) NICE technology appraisal guidance 71

Guidance on the use of drugs for early thrombolysis in the treatment of acute myocardial infarction (2002) NICE technology appraisal guidance 52

## Your responsibility

### Guidelines

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

### Technology appraisals

The recommendations in this interactive flowchart represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, health professionals are expected to take these recommendations fully into account, alongside the individual needs, preferences and values of their patients. The application of the recommendations in this interactive flowchart is at the discretion of health professionals and their individual patients and do not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or their carer or guardian.

Commissioners and/or providers have a responsibility to provide the funding required to enable the recommendations to be applied when individual health professionals and their patients wish to use it, in accordance with the NHS Constitution. They should do so in light of their duties to

have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

### Medical technologies guidance, diagnostics guidance and interventional procedures guidance

The recommendations in this interactive flowchart represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take these recommendations fully into account. However, the interactive flowchart does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the recommendations, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this interactive flowchart should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.