

PRACTICE

GUIDELINES

Acute management of myocardial infarction with ST-segment elevation: summary of NICE guidance

Serena Carville *senior research fellow and project manager*¹, Martin Harker *health economist*¹, Robert Henderson *consultant cardiologist*², Huon Gray *consultant cardiologist*³, on behalf of the Guideline Development Group

¹National Clinical Guideline Centre, Royal College of Physicians, London NW1 4LE, UK; ²Trent Cardiac Centre, Nottingham University Hospitals NHS Trust, Nottingham NG5 1PB, UK; ³Wessex Cardiac Unit, University Hospital Southampton NHS Foundation Trust, Southampton SO16 6YD, UK

This is one of a series of *BMJ* summaries of new guidelines based on the best available evidence; they highlight important recommendations for clinical practice, especially where uncertainty or controversy exists.

The incidence of myocardial infarction has been declining in the UK over the past 25 years,^{1,2} but it varies between regions and still averages more than 600 hospitalised cases of ST-segment elevation myocardial infarction (STEMI) per million people each year.^{3,4} The case fatality rates after myocardial infarction have also fallen, which has been attributed to improved access to effective treatments.⁵ The over-riding priority in the management of STEMI is to restore coronary perfusion rapidly and effectively, thereby limiting the extent of damage to myocardium and reducing the likelihood of death or future heart failure. Coronary reperfusion can be achieved by fibrinolysis (with agents such as reteplase and tenecteplase) or by mechanical reopening of the occluded artery by angioplasty and stent insertion (primary percutaneous coronary intervention). This article summarises the most recent recommendations from the National Institute for Health and Care Excellence (NICE) on the delivery of effective and timely coronary reperfusion treatment for people with STEMI.⁶

Recommendations

NICE recommendations are based on systematic reviews of best available evidence and explicit consideration of cost effectiveness. When minimal evidence is available, recommendations are based on the guideline development group's experience and opinion of what constitutes good practice. Evidence levels for the recommendations are given in italics in square brackets.

Assess eligibility for coronary perfusion therapy

- Immediately assess eligibility (irrespective of age, ethnicity, or sex) for coronary reperfusion (either primary percutaneous coronary intervention (PCI) or fibrinolysis) in people with acute STEMI. [*Based on the experience and opinion of the Guideline Development Group (GDG), and absence of evidence for age, ethnicity, or sex differences*]
- 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). [*Based on the experience and opinion of the GDG*]

Treatment options

- Deliver coronary reperfusion therapy (either primary PCI or fibrinolysis) as quickly as possible for eligible people with acute STEMI. [*Based on evidence from an individual patient data meta-analysis and the experience and opinion of the GDG*]
- 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.[*Based on evidence from an individual patient data meta-analysis*]
- 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. [Based on moderate to very low quality evidence from randomised controlled trials and the experience and opinion of the GDG]

- Offer medical therapy, as per NICE clinical guidelines for chest pain of recent onset⁷ and for secondary prevention after myocardial infarction,⁸ to people with acute STEMI who are ineligible for reperfusion therapy (such as those presenting too late to benefit from reperfusion therapy, those with comorbidity or bleeding risk that make reperfusion therapy inappropriate, or those who undergo coronary arteriography but are found not to require primary PCI). [Based on the experience and opinion of the GDG]
- Consider coronary angiography, with follow-on primary PCI if indicated, for people with acute STEMI presenting more than 12 hours after symptom onset and with evidence of continuing myocardial ischaemia. [Based on the experience and opinion of the GDG]
- Do not routinely offer glycoprotein IIb/IIIa inhibitors or fibrinolytic drugs before arrival at the catheter laboratory to people with acute STEMI for whom primary PCI is planned. [Based on low to very low quality evidence from randomised controlled trials and the experience and opinion of the GDG]
- 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. [Based on high to low quality evidence from randomised controlled trials and the experience and opinion of the GDG]
- Consider thrombus aspiration during primary PCI for people with acute STEMI. [Based on low to very low quality evidence from randomised controlled trials and the experience and opinion of the GDG]
- Consider radial (in preference to femoral) arterial access for people undergoing coronary angiography (with follow-on primary PCI if indicated). [Based on low to very low quality evidence from randomised controlled trials and the experience and opinion of the GDG]
- 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. [Based on low quality evidence from registry studies]

For people treated with fibrinolysis

- Offer an electrocardiogram 60–90 minutes after administration of fibrinolytic therapy. 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.
 [Based on high to low quality evidence from randomised controlled trials]
- If a person has recurrent myocardial ischaemia after fibrinolysis, seek immediate specialist cardiologist advice and, if appropriate, offer coronary angiography, with follow-on PCI if indicated. [Based on high to very low quality evidence from randomised controlled trials]

- Consider coronary angiography during the same hospital admission for people who are clinically stable after successful fibrinolysis. [Based on high to very low quality evidence from randomised controlled trials]

Overcoming barriers

In 2008 the National Infarct Angioplasty Project, sponsored by the Department of Health,⁹ determined that a national coronary reperfusion strategy of primary PCI was both feasible and cost effective compared with the previous strategy of delivering fibrinolysis.¹⁰ Since then, implementation of a national primary angioplasty service in England has almost been completed with >90% of STEMI patients suitable for reperfusion therapy receiving primary PCI.³ Increasing the percentage of patients receiving primary PCI will require increased access to services for those living in more rural areas, because of the challenges of transporting patients in a timely fashion. Some additional primary PCI centres are being commissioned in order to improve access, and greater use of air ambulances would also benefit these communities. Fibrinolysis will probably still be required for an important minority of patients, so paramedic skills within ambulance services serving these rural populations must be maintained. Configuration of PCI services must take account of the need for centres to undertake sufficient interventional procedures (not just primary PCI) in order to maintain centre and individual operator competence, and provide a “round the clock” primary PCI service.

The members of the Guideline Development Group were: Sotiris Antoniou, Charles Deakin, Huon Gray (chair), Robert Henderson (deputy chair), Jason Kendall, Hugh McIntyre, Jim McLenachan, Francesco Palma, Gerald Robinson, Fiona Sayers, Dave Smith, L David R Smith, Mark Vaughan, and Mark Whitbread. The technical team at the National Clinical Guideline Centre included Serena Carville, Angela Cooper, Martin Harker, Taryn Krause, Kate Lovibond, Rachel O’Mahoney, Jill Parnham, and Carlos Sharpin.

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- 3 Myocardial Ischaemia National Audit Project (MINAP). *How the NHS cares for patients with heart attack. Annual public report April 2011 to March 2012*. National Institute for Cardiovascular Outcomes Research, 2010.
- 4 Townsend N, Wickramasinghe K, Bhatnagar P, Smolina K, Nichols M, Leal J, et al. *Coronary heart disease statistics 2012 edition*. British Heart Foundation, 2012.

Further information on the guidance

The evidence base favouring the use of primary PCI over fibrinolysis is widely accepted, and the UK has moved in line with other European countries in delivering primary PCI services. The guideline also addresses other aspects of interventional practice that have varied, such as the approach to patients with STEMI who remain unconscious after resuscitation from cardiac arrest or those with cardiogenic shock, the site of arterial access (radial or femoral arteries), and the use of coronary thrombus extraction devices. The evidence base for several of these areas of practice is not robust, not least because of the difficulty undertaking randomised trials in the populations being considered (such as unconscious or haemodynamically unstable patients). However, this guideline has reviewed what evidence there is and attempted to provide consensus descriptions of best practice to help those providing these services.

Methods

The Guideline Development Group followed standard NICE methods in the development of this guideline (www.nice.org.uk/about/nice/howwe/work/developingniceclinicalguidelines/developing_nice_clinical_guidelines.jsp). The GDG comprised five consultant cardiologists (including the chair and deputy chair), a professor of resuscitation and prehospital emergency medicine, a consultant in emergency medicine, a consultant pharmacist, a consultant physician, a general practitioner, two lay members, a cardiac nurse, and a senior paramedic.

The group developed clinical questions; collected and appraised clinical evidence; and evaluated the cost effectiveness of proposed interventions and management strategies through literature review and economic analysis. The draft guideline went through a rigorous reviewing process, in which stakeholder organisations were invited to comment; the group took all comments into consideration when producing the final version of the guideline. Quality ratings of the evidence were based on the GRADE method (www.gradeworkinggroup.org). These relate to the quality of the available evidence for assessed outcomes rather than the quality of the clinical study. Where standard methods could not be applied, a customised quality assessment was undertaken. These were either presented as a narrative summary of the evidence or in customised GRADE tables (such as for meta-analysis of individual participant data).

NICE has produced three different versions of the guideline: a full version; a summary version, known as the "NICE guideline"; and a version for people who have had a STEMI, their family and carers, and the public. All these versions, as well as a pathway and a suite of tools to help implement the guideline, are available from the NICE website (<http://guidance.nice.org.uk/CG167>). Updates of the guideline will be produced as part of NICE's guideline development programme.

Future research

The guideline development group identified the following areas as needing further research:

- If a person with acute STEMI presents within 1 hour of the onset of symptoms, is it better for that person to be given fibrinolysis with a short call to needle time rather than be transferred to a centre that carries out primary PCI for primary PCI with a delay of up to 120 minutes?
- In people with acute STEMI who present more than 1 hour after the onset of symptoms, is the delay of 120–180 minutes for primary PCI associated with outcomes similar to, better than, or worse than prehospital fibrinolysis?
- What are the clinical effectiveness and cost effectiveness of radial arterial access compared with femoral arterial access for coronary angiography or primary PCI in people with acute STEMI managed by primary PCI?
- Does multivessel PCI, at the time of presentation of people with acute STEMI, confer an advantage over a strategy of "culprit vessel only" primary PCI, followed by further elective revascularisation driven by symptoms and evidence of ischaemia?
- What is the relationship between hospital volume of primary PCI procedures and optimal outcomes in people with acute STEMI?

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- 6 National Institute for Health and Care Excellence. The acute management of myocardial infarction with ST-segment elevation. (Clinical guideline 167) 2013. <http://guidance.nice.org.uk/CG167>.
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- 8 National Institute for Health and Clinical Excellence. Post myocardial infarction: secondary prevention in primary and secondary care for patients following a myocardial infarction. (Clinical guideline 48) 2007. <http://guidance.nice.org.uk/CG48>.

- 9 Department of Health. *Treatment of heart attack national guidance: final report of the National Infarct Angioplasty Project (NIAP)*. Department of Health, 2008.
- 10 Wailoo A, Goodacre S, Sampson F, Alava MH, Asseburg C, Palmer S, et al. Primary angioplasty versus thrombolysis for acute ST-elevation myocardial infarction: an economic analysis of the National Infarct Angioplasty Project. *Heart* 2010;96:668-72.

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