

Hyperglycaemia in acute coronary syndromes

Management of hyperglycaemia in acute
coronary syndromes

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NICE clinical guideline 130

guidance.nice.org.uk/cg130

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Introduction

This guideline partially updates a recommendation in [Type 1 diabetes](#). See 'About this guidance' for details.

This guideline covers the role of intensive insulin therapy in managing hyperglycaemia within the first 48 hours in people admitted to hospital for acute coronary syndromes (ACS). Intensive insulin therapy is defined as an intravenous infusion of insulin and glucose with or without potassium. For the purposes of this guideline, hyperglycaemia is defined as a blood glucose level above 11 mmol/litre. This definition was based on the expert opinion of the Guideline Development Group (GDG) and was agreed by consensus.

ACS encompass a spectrum of unstable coronary artery disease, ranging from unstable angina to transmural myocardial infarction. All forms of ACS begin with an inflamed and complicated fatty deposit (known as an atheromatous plaque) in a blood vessel, followed by blood clots forming on the plaque. The principles behind the presentation, investigation and management of these syndromes are similar, but there are important distinctions depending on the category of ACS.

Hyperglycaemia is common in people admitted to hospital with ACS. Recent studies found that approximately 65% of patients with acute myocardial infarction who were not known to have diabetes had impaired glucose regulation when given a glucose tolerance test.

Hyperglycaemia at the time of admission with ACS is a powerful predictor of poorer survival and increased risk of complications while in hospital, regardless of whether or not the patient has diabetes. Despite this, hyperglycaemia remains underappreciated as a risk factor in ACS and is frequently untreated.

Persistently elevated blood glucose levels during acute myocardial infarction have been shown to be associated with increased in-hospital mortality, and to be a better predictor of outcome than admission blood glucose. Management of hyperglycaemia after ACS is therefore an important clinical issue.

A wide range of national guidance is available for the care of people with diabetes in hospital with relevance to ACS patients. For example the NHS Institute for Innovation and Improvement

ThinkGlucose toolkit recommends that all patients with ACS and known diabetes are referred to the inpatient diabetes team.

Drug recommendations

The guideline does not make recommendations on drug dosage; prescribers should refer to the 'British national formulary' for this information. The guideline also assumes that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.

Who this guideline is for

This document is for healthcare professionals and other staff in secondary and tertiary care who manage hyperglycaemia in people admitted for ACS. This guideline may also be relevant to healthcare professionals in primary care.

Patient-centred care

This guideline offers best practice advice on the management of hyperglycaemia in all adults admitted to hospital for an acute coronary syndrome regardless of whether or not they have a diagnosis of diabetes.

Treatment and care should take into account patients' needs and preferences. People with ACS and hyperglycaemia should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. If patients do not have the capacity to make decisions, healthcare professionals should follow the [Department of Health's advice on consent](#) and the [code of practice that accompanies the Mental Capacity Act](#). In Wales, healthcare professionals should follow [advice on consent from the Welsh Government](#).

Good communication between healthcare professionals and patients is essential. It should be supported by evidence-based written information tailored to the patient's needs. Treatment and care, and the information patients are given about it, should be culturally appropriate. It should also be accessible to people with additional needs such as physical, sensory or learning disabilities, and to people who do not speak or read English.

If the patient agrees, families and carers should have the opportunity to be involved in decisions about treatment and care.

1 Recommendations

Managing hyperglycaemia in inpatients within 48 hours of ACS

Recommendations in this section partially update recommendation 1.12.3.6 in [Type 1 diabetes](#). Recommendation 1.12.3.6 is updated for the treatment of patients with threatened or actual myocardial infarction, but not stroke.

- 1.1.1 Manage hyperglycaemia in patients admitted to hospital for an acute coronary syndrome (ACS) by keeping blood glucose levels below 11.0 mmol/litre while avoiding hypoglycaemia. In the first instance, consider a dose-adjusted insulin infusion with regular monitoring of blood glucose levels.
- 1.1.2 Do not routinely offer intensive insulin therapy (an intravenous infusion of insulin and glucose with or without potassium) to manage hyperglycaemia (blood glucose above 11.0 mmol/litre) in patients admitted to hospital for an ACS unless clinically indicated.

Identifying patients with hyperglycaemia after ACS who are at high risk of developing diabetes

- 1.1.3 Offer all patients with hyperglycaemia after ACS and without known diabetes tests for:
 - HbA_{1c} levels before discharge and
 - fasting blood glucose levels no earlier than 4 days after the onset of ACS.

These tests should not delay discharge.

- 1.1.4 Do not routinely offer oral glucose tolerance tests to patients with hyperglycaemia after ACS and without known diabetes if HbA_{1c} and fasting blood glucose levels are within the normal range.

Advice and ongoing monitoring for patients with hyperglycaemia after ACS and without known diabetes

1.1.5 Offer patients with hyperglycaemia after ACS and without known diabetes lifestyle advice on the following:

- healthy eating in line with [MI: secondary prevention](#) and [Obesity](#)
- physical exercise in line with [MI: secondary prevention](#) and [Four commonly used methods to increase physical activity](#)
- weight management in line with [MI: secondary prevention](#) and [Obesity](#)
- smoking cessation in line with [Unstable angina and NSTEMI](#), [Smoking cessation services](#), [MI: secondary prevention](#) and [Brief interventions and referral for smoking cessation](#)
- alcohol consumption in line with [MI: secondary prevention](#).

1.1.6 Advise patients without known diabetes that if they have had hyperglycaemia after an ACS they:

- are at increased risk of developing type 2 diabetes
- should consult their GP if they experience the following symptoms:
 - frequent urination
 - excessive thirst
 - weight loss
 - fatigue
- should be offered tests for diabetes at least annually.

1.1.7 Inform GPs that they should offer at least annual monitoring of HbA_{1c} and fasting blood glucose levels to people without known diabetes who have had hyperglycaemia after an ACS.

2 Notes on the scope of the guideline

NICE guidelines are developed in accordance with a scope that defines what the guideline will and will not cover. The [scope](#) of this guideline is available.

3 Implementation

NICE has developed [tools](#) to help organisations implement this guidance.

4 Research recommendations

The Guideline Development Group has made the following recommendation for research, based on its review of evidence, to improve NICE guidance and patient care in the future.

4.1 Optimal management of hyperglycaemia in ACS

What is the optimal management of hyperglycaemia in people with acute coronary syndrome who have diagnosed or previously undiagnosed diabetes?

Why this is important

Existing studies on the optimal management of hyperglycaemia in people who have ACS and diagnosed or previously undiagnosed diabetes are generally of poor quality.

It is recommended that a large randomised controlled trial is conducted for people with ACS and hyperglycaemia (blood glucose 11 mmol/litre and over) stratified by NSTEMI and STEMI and by known diabetes and without a previous diagnosis of diabetes.

The interventions for the trial should be intravenous insulin or subcutaneous insulin administered within 4 hours of presentation to hospital. The aim is to achieve blood glucose between 6 and 11 mmol/litre for at least 24 hours. The comparator should be standard care.

5 Other versions of this guideline

5.1 Full guideline

The full guideline, [Hyperglycaemia in acute coronary syndromes: management of hyperglycaemia in acute coronary syndromes](#), contains details of the methods and evidence used to develop the guideline.

5.2 NICE pathway

The recommendations from this guideline have been incorporated into a [NICE pathway](#).

5.3 Information for the public

NICE has produced [information for the public](#) explaining this guideline.

We encourage NHS and voluntary sector organisations to use text from this information in their own materials about hyperglycaemia in acute coronary syndromes.

6 Related NICE guidance

Published

- [Ticagrelor for the treatment of acute coronary syndromes](#). NICE technology appraisal guidance 236 (2011).
- [Diabetes in adults](#). NICE quality standard (2011).
- [Alcohol dependence and harmful alcohol use](#). NICE clinical guideline 115 (2011).
- [Alcohol-use disorders – preventing harmful drinking](#). NICE public health guidance 24 (2010).
- [Liraglutide for the treatment of type 2 diabetes mellitus](#). NICE technology appraisal guidance 203 (2010).
- [Chronic heart failure](#). NICE clinical guideline 108 (2010).
- [Chest pain of recent onset](#). NICE clinical guideline 95 (2010).
- [Unstable angina and NSTEMI](#). NICE clinical guideline 94 (2010).
- [Type 2 diabetes](#). NICE clinical guideline 87 (2009).
- [Prasugrel for the treatment of acute coronary syndromes with percutaneous coronary intervention](#). NICE technology appraisal guidance 182 (2009).
- [Smoking cessation services](#). NICE public health guidance 10 (2008).
- [Diabetes in pregnancy](#). NICE clinical guideline 63 (2008).
- [Continuous subcutaneous insulin infusion for the treatment of diabetes mellitus \(review\)](#). NICE technology appraisal guidance 151 (2008).
- [MI: secondary prevention](#). NICE clinical guideline 48 (2007).
- [Four commonly used methods to increase physical activity](#). NICE public health guidance 2 (2006).
- [Brief interventions and referral for smoking cessation](#). NICE public health guidance 1 (2006).
- [Obesity](#). NICE clinical guideline 43 (2006).

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- [Type 1 diabetes in children, young people and adults](#). NICE clinical guideline 15 (2004).
 - [Type 2 diabetes: prevention and management of foot problems](#). NICE clinical guideline 10 (2004).
 - [Myocardial perfusion scintigraphy for the diagnosis and management of angina and myocardial infarction](#). NICE technology appraisal guidance 73 (2003).
 - [Guidance on the use of long acting insulin analogues for the treatment of diabetes – insulin glargine](#). NICE technology appraisal guidance 53 (2002).
 - [Guidance on the use of drugs for early thrombolysis in the treatment of acute myocardial infarction](#). NICE technology appraisal guidance 52 (2002).
 - [Guidance on the use of glycoprotein IIb/IIIa inhibitors in the treatment of acute coronary syndromes](#). NICE technology appraisal guidance 47 (2002).

Under development

NICE is developing the following guidance (details available from www.nice.org.uk):

- Type 2 diabetes-preventing the progression from pre-diabetes. NICE public health guidance. Publication expected May 2012
- Long-acting exenatide for the second-line (dual therapy) or third-line (triple therapy) treatment of type 2 diabetes. NICE technology appraisal. Publication expected February 2012.
- Buccal insulin for the management of type 1 diabetes. NICE technology appraisal. Publication date to be confirmed.

7 Updating the guideline

NICE clinical guidelines are updated so that recommendations take into account important new information. New evidence is checked 3 years after publication, and healthcare professionals and patients are asked for their views; we use this information to decide whether all or part of a guideline needs updating. If important new evidence is published at other times, we may decide to do a more rapid update of some recommendations. Please see [our website](#) for information about updating the guideline.

Appendix A The Guideline Development Group, Short Clinical Guidelines Technical Team and NICE project team

The Guideline Development Group

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Appendix B The Guideline Review Panel

The Guideline Review Panel is an independent panel that oversees the development of the guideline and takes responsibility for monitoring adherence to NICE guideline development processes. In particular, the panel ensures that stakeholder comments have been adequately considered and responded to. The panel includes members from the following perspectives: primary care, secondary care, lay, public health and industry.

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About this guideline

NICE clinical guidelines are recommendations about the treatment and care of people with specific diseases and conditions in the NHS in England and Wales.

The guideline was developed by the Centre for Clinical Practice at NICE. The Centre worked with a group of healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, who reviewed the evidence and drafted the recommendations. The recommendations were finalised after public consultation.

The methods and processes for developing NICE clinical guidelines are described in [The guidelines manual](#). This guideline was developed using the [short clinical guideline process](#).

This guideline partially updates recommendation 1.12.3.6 in [Type 1 diabetes](#) (NICE clinical guideline 15). Recommendation 1.12.3.6 is updated for the treatment of patients with threatened or actual myocardial infarction, but not stroke.

The recommendations from this guideline have been incorporated into a [NICE pathway](#). We have produced [information for the public](#) explaining this guideline. Tools to help you put the guideline into practice and information about the evidence it is based on are also [available](#).

Changes after publication

March 2013: minor maintenance

Your responsibility

This guidance represents the view of NICE, which was arrived at after careful consideration of the evidence available. Healthcare professionals are expected to take it fully into account when exercising their clinical judgement. However, the guidance 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, and informed by the summary of product characteristics of any drugs they are considering.

Implementation of this guidance is the responsibility of local commissioners and/or providers. Commissioners and providers are reminded that it is their responsibility to implement the

guidance, in their local context, in light of their duties to avoid unlawful discrimination and to have regard to promoting equality of opportunity. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

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