

# Acute heart failure: diagnosis and management

Clinical guideline

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[www.nice.org.uk/guidance/cg187](http://www.nice.org.uk/guidance/cg187)

## Your responsibility

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.

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This guideline is the basis of QS103.

## Introduction

Heart failure is a condition in which the heart does not pump enough blood to meet all the needs of the body. It is caused by dysfunction of the heart due to muscle damage (systolic or diastolic dysfunction), valvular dysfunction, arrhythmias or other rare causes. Acute heart failure can present as new-onset heart failure in people without known cardiac dysfunction, or as acute decompensation of chronic heart failure.

Acute heart failure is a common cause of admission to hospital (over 67,000 admissions in England and Wales per year) and is the leading cause of hospital admission in people 65 years or older in the UK.

This guideline includes important aspects of the diagnosis and management of acute heart failure that are not addressed by the NICE guideline on [chronic heart failure](#) (NICE guideline CG108). The guideline on chronic heart failure focused on long-term management rather than on the immediate care of someone who is acutely unwell as a result of heart failure.

This guideline covers the care of adults (aged 18 years or older) who have a diagnosis of acute heart failure, have possible acute heart failure, or are being investigated for acute heart failure. It includes the following key clinical areas:

- the role of early natriuretic peptide testing and echocardiography
- the role of specialist management units
- the use of ventilatory support, pharmacological therapy and ultrafiltration
- treatment after stabilisation, including selected surgical interventions and initiation of the pharmacological therapies that are used in the management of chronic heart failure.

## Drug recommendations

The guideline will assume that prescribers will use a drug's summary of product characteristics to inform decisions made with individual patients.

In memory of Christopher Jones, patient member of the GDG who ensured that the patient voice was heard during the development of this guideline.

## Patient-centred care

This guideline offers best practice advice on the care of adults (aged 18 years and over) with acute heart failure or possible acute heart failure.

Patients and healthcare professionals have rights and responsibilities as set out in the [NHS Constitution for England](#) – all NICE guidance is written to reflect these. Treatment and care should take into account individual needs and preferences. Patients should have the opportunity to make informed decisions about their care and treatment, in partnership with their healthcare professionals. Healthcare professionals should follow the [Department of Health's advice on consent](#). If someone does not have capacity to make decisions, healthcare professionals should follow the [code of practice that accompanies the Mental Capacity Act](#) and the supplementary [code of practice on deprivation of liberty safeguards](#).

NICE has produced guidance on the components of good patient experience in adult NHS services. All healthcare professionals should follow the recommendations in [patient experience in adult NHS services](#).

## Key priorities for implementation

The following recommendations have been identified as priorities for implementation. The full list of recommendations is in [section 1](#).

### Organisation of care

- All hospitals admitting people with suspected acute heart failure should provide a specialist heart failure team that is based on a cardiology ward and provides outreach services.
- Ensure that all people being admitted to hospital with suspected acute heart failure have early and continuing input from a dedicated specialist heart failure team.

### Diagnosis, assessment and monitoring

- In people presenting with new suspected acute heart failure, use a single measurement of serum natriuretic peptides (B-type natriuretic peptide [BNP] or N-terminal pro-B-type natriuretic peptide [NT-proBNP]) and the following thresholds to rule out the diagnosis of heart failure.
  - BNP less than 100 ng/litre
  - NT-proBNP less than 300 ng/litre.
- In people presenting with new suspected acute heart failure with raised natriuretic peptide levels ([see recommendation 1.2.2](#)), perform transthoracic Doppler 2D echocardiography to establish the presence or absence of cardiac abnormalities.
- In people presenting with new suspected acute heart failure, consider performing transthoracic Doppler 2D echocardiography within 48 hours of admission to guide early specialist management.

### Treatment after stabilisation

- In a person presenting with acute heart failure who is already taking beta-blockers, continue the beta-blocker treatment unless they have a heart rate less than 50 beats per minute, second or third degree atrioventricular block, or shock.



- Start or restart beta-blocker treatment during hospital admission in people with acute heart failure due to left ventricular systolic dysfunction, once their condition has been stabilised – for example, when intravenous diuretics are no longer needed.
- Ensure that the person's condition is stable for typically 48 hours after starting or restarting beta-blockers and before discharging from hospital.
- Offer an angiotensin-converting enzyme inhibitor (or angiotensin receptor blocker if there are intolerable side effects) and an aldosterone antagonist during hospital admission to people with acute heart failure and reduced left ventricular ejection fraction. If the angiotensin-converting enzyme inhibitor (or angiotensin receptor blocker) is not tolerated an aldosterone antagonist should still be offered.

# 1 Recommendations

The following guidance is based on the best available evidence. The [full guideline](#) gives details of the methods and the evidence used to develop the guidance.

The wording used in the recommendations in this guideline (for example, words such as 'offer' and 'consider') denotes the certainty with which the recommendation is made (the strength of the recommendation). See [about this guideline](#) for details.

## 1.1 Organisation of care

- 1.1.1 All hospitals admitting people with suspected acute heart failure should provide a specialist heart failure team that is based on a cardiology ward and provides outreach services.
- 1.1.2 Ensure that all people being admitted to hospital with suspected acute heart failure have early and continuing input from a dedicated specialist heart failure team.
- 1.1.3 Plan the following with people with acute heart failure in line with [chronic heart failure](#) (NICE guideline CG108):
- discharge from hospital after the acute phase and
  - subsequent management in primary care, including ongoing monitoring and care provided by the multidisciplinary team and
  - information and communication about their condition, its treatment and prognosis.
- 1.1.4 A follow-up clinical assessment should be undertaken by a member of the specialist heart failure team within 2 weeks of the person being discharged from hospital.

## 1.2 Diagnosis, assessment and monitoring

- 1.2.1 Take a history, perform a clinical examination and undertake standard investigations – for example, electrocardiography, chest X-ray and blood tests –

in line with [chronic heart failure](#) (NICE guideline CG108).

1.2.2 In people presenting with new suspected acute heart failure, use a single measurement of serum natriuretic peptides (B-type natriuretic peptide [BNP] or N-terminal pro-B-type natriuretic peptide [NT-proBNP]) and the following thresholds to rule out the diagnosis of heart failure:

- BNP less than 100 ng/litre
- NT-proBNP less than 300 ng/litre.

1.2.3 In people presenting with new suspected acute heart failure with raised natriuretic peptide levels (see recommendation 1.2.2), perform transthoracic Doppler 2D echocardiography to establish the presence or absence of cardiac abnormalities.

1.2.4 In people presenting with new suspected acute heart failure, consider performing transthoracic Doppler 2D echocardiography within 48 hours of admission to guide early specialist management.

1.2.5 Do not routinely offer pulmonary artery catheterisation to people with acute heart failure.

## 1.3 Initial pharmacological treatment

1.3.1 For guidance on patient consent and capacity follow recommendations 1.2.12 and 1.2.13 in [patient experience in adult NHS services](#) (NICE guideline CG138).

1.3.2 Do not routinely offer opiates to people with acute heart failure.

1.3.3 Offer intravenous diuretic therapy to people with acute heart failure. Start treatment using either a bolus or infusion strategy.

1.3.4 For people already taking a diuretic, consider a higher dose of diuretic than that on which the person was admitted unless there are serious concerns with patient adherence to diuretic therapy before admission.

1.3.5 Closely monitor the person's renal function, weight and urine output during diuretic therapy.

- 1.3.6 Discuss with the person the best strategies of coping with an increased urine output.
- 1.3.7 Do not routinely offer nitrates to people with acute heart failure.
- 1.3.8 If intravenous nitrates are used in specific circumstances, such as for people with concomitant myocardial ischaemia, severe hypertension or regurgitant aortic or mitral valve disease, monitor blood pressure closely in a setting where at least level 2 care<sup>[1]</sup> can be provided.
- 1.3.9 Do not offer sodium nitroprusside to people with acute heart failure.
- 1.3.10 Do not routinely offer inotropes or vasopressors to people with acute heart failure.
- 1.3.11 Consider inotropes or vasopressors in people with acute heart failure with potentially reversible cardiogenic shock. Administer these treatments in a cardiac care unit or high dependency unit or an alternative setting where at least level 2 care<sup>[1]</sup> can be provided.

## 1.4 Initial non-pharmacological treatment

- 1.4.1 Do not routinely use non-invasive ventilation (continuous positive airways pressure [CPAP] or non-invasive positive pressure ventilation [NIPPV]) in people with acute heart failure and cardiogenic pulmonary oedema.
- 1.4.2 If a person has cardiogenic pulmonary oedema with severe dyspnoea and acidaemia consider starting non-invasive ventilation without delay:
- at acute presentation or
  - as an adjunct to medical therapy if the person's condition has failed to respond.
- 1.4.3 Consider invasive ventilation in people with acute heart failure that, despite treatment, is leading to or is complicated by:
- respiratory failure or
  - reduced consciousness or physical exhaustion.

1.4.4 Do not routinely offer ultrafiltration to people with acute heart failure.

1.4.5 Consider ultrafiltration for people with confirmed diuretic resistance<sup>[2]</sup>.

## 1.5 Treatment after stabilisation

1.5.1 In a person presenting with acute heart failure who is already taking beta-blockers, continue the beta-blocker treatment unless they have a heart rate less than 50 beats per minute, second or third degree atrioventricular block, or shock.

1.5.2 Start or restart beta-blocker treatment during hospital admission in people with acute heart failure due to left ventricular systolic dysfunction, once their condition has been stabilised – for example, when intravenous diuretics are no longer needed.

1.5.3 Ensure that the person's condition is stable for typically 48 hours after starting or restarting beta-blockers and before discharging from hospital.

1.5.4 Offer an angiotensin-converting enzyme inhibitor (or angiotensin receptor blocker if there are intolerable side effects) and an aldosterone antagonist during hospital admission to people with acute heart failure and reduced left ventricular ejection fraction. If the angiotensin-converting enzyme inhibitor (or angiotensin receptor blocker) is not tolerated an aldosterone antagonist should still be offered<sup>[3]</sup>.

1.5.5 Closely monitor the person's renal function, electrolytes, heart rate, blood pressure and overall clinical status during treatment with beta-blockers, aldosterone antagonists or angiotensin-converting enzyme inhibitors.

## 1.6 Valvular surgery and percutaneous intervention

1.6.1 Offer surgical aortic valve replacement to people<sup>[4]</sup> with heart failure due to severe aortic stenosis assessed as suitable for surgery.

1.6.2 Consider transcatheter aortic valve implantation (TAVI) in selected people<sup>[4]</sup>, with heart failure caused by severe aortic stenosis, who are assessed as unsuitable for surgical aortic valve replacement. Details of all people

undergoing TAVI should be entered into the UK Central Cardiac Audit database.

1.6.3 For guidance on coronary revascularisation see [chronic heart failure](#) (NICE guideline CG108).

1.6.4 Consider surgical mitral valve repair or replacement for people with heart failure due to severe mitral regurgitation assessed as suitable for surgery.

## 1.7 Mechanical assist devices

1.7.1 At an early stage, the specialist should have a discussion with a centre providing mechanical circulatory support about:

- people with potentially reversible severe acute heart failure or
- people who are potential candidates for transplantation.

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<sup>[1]</sup> Level 2 care is for people needing more detailed observation or intervention, including support for a single failing organ system or postoperative care and for those stepping down from higher levels of care. From [Levels of critical care for adult patients](#).

<sup>[2]</sup> Diuretic resistance is defined as dose escalation beyond a person's previously recognised dose ceiling or a dose approaching the maximum recommended daily dose without incremental improvement in diuresis. From [Diuretics and ultrafiltration in acute decompensated heart failure](#).

<sup>[3]</sup> In February 2016, the Medicines and Healthcare products Regulatory Agency (MHRA) published advice on the concomitant use of spironolactone and renin-angiotensin system drugs in heart failure concerning the risk of potentially fatal hyperkalaemia. See the [MHRA advice](#) for more information.

<sup>[4]</sup> For information about patient selection, see [transcatheter aortic valve implantation for aortic stenosis](#) (NICE interventional procedure guidance 421).

## 2 Research recommendations

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

### 2.1 Dopamine

In people with acute heart failure, congestion and worsening renal function, does the addition of low-dose dopamine to standard therapy lead to greater diuresis and renal protection compared with adding placebo to standard therapy?

#### Why this is important

A randomised controlled trial should be conducted to investigate whether the addition of low-dose dopamine to standard therapy leads to more clinically and cost effective decongestion in people admitted to hospital for treatment of decompensated heart failure. The study should aim to investigate the diuretic effect of dopamine as well as effects on renal function.

One of the most common and difficult to manage problems arising during the initial treatment of people with acute heart failure is an inadequate response to intravenous diuretic therapy (that is, failure to relieve congestion), which is often associated with worsening renal function. This combination frequently leads to a prolonged inpatient stay and is associated with higher inpatient mortality rates and higher post-discharge mortality and re-admission rates. The best treatment for this combination of problems is unknown. However, theoretical and experimental evidence indicates that low-dose dopamine may improve renal blood flow, as well as enhance sodium and water excretion. Clinical trials have not yet resolved whether in some patients, the use of low-dose dopamine actually results in improved decongestion and shorter hospital stays.

### 2.2 Thiazide

In people with acute heart failure and persistent congestion, does the addition of a thiazide diuretic to standard therapy lead to greater diuresis compared with adding placebo to standard therapy?

#### Why this is important

A randomised controlled trial should be conducted to investigate whether the addition of a thiazide diuretic to standard therapy leads to more clinically and cost effective decongestion in people

admitted to hospital for treatment of decompensated heart failure.

One of the most common and difficult to manage problems arising during the initial treatment of people with acute heart failure is an inadequate response to intravenous diuretic therapy. This frequently leads to a prolonged inpatient stay and is associated with higher inpatient mortality and higher post-discharge mortality and re-admission rates. The best treatment for this problem is unknown. However, there is some inconsistent and non-robust evidence that addition of a thiazide or thiazide-like diuretic (metolazone) may be beneficial. The proposed study would aim to resolve this uncertainty and guide the management of a difficult clinical problem.

## 2.3 Intra-aortic balloon counter-pulsation

In people with acute heart failure and hypoperfusion syndrome, is the use of intra-aortic balloon counter-pulsation pump (IABP) better than the use of intravenous inotropes?

### Why this is important

A randomised controlled trial should be conducted in people with decompensated heart failure due to left ventricular systolic dysfunction and systemic hypoperfusion comparing the use of IABP with the use of inotropes/vasopressors. This would determine which strategy is more clinically and cost effective in this cohort.

IABP is used in the hospital setting as an adjuvant in people with critical coronary ischaemia and in people with mechanical complications of acute myocardial infarction. It has also been used in people who develop cardiogenic shock after acute myocardial infarction. However, it is uncertain whether it can provide clinical benefit in the critically unwell patients with acute heart failure due to left ventricular systolic dysfunction and systemic hypoperfusion.

## 2.4 Ultrafiltration

In people with decompensated heart failure, fluid congestion and diuretic resistance, does ultrafiltration lead to more rapid and effective decongestion compared with continuing diuretic treatment?

### Why this is important

A randomised controlled trial should be undertaken to determine whether ultrafiltration is more clinically and cost effective than conventional diuretic therapy for people admitted to hospital with



decompensated heart failure. The study should not only investigate several clinical outcomes but also consider the impact of treatments on quality of life and provide data on safety.

People who have fluid retention that is resistant to conventional diuretic therapy, with or without renal dysfunction, make up a high proportion of hospital admissions due to heart failure. Such admissions are often prolonged and therefore have important budgetary implications for the NHS. The few, relatively small scale, randomised trials of ultrafiltration performed so far have been conducted in healthcare settings very different from the UK, with less fluid retention than is usually seen in UK practice, and where length of stay is usually much shorter than in UK (and European) practice. Although technically feasible, the evidence for benefit on heart failure outcomes is inconsistent and difficult to generalise to UK practice. Therefore a UK-based study of sufficient quality is needed.

## 3 Other information

### 3.1 Scope and how this guideline was developed

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

#### How this guideline was developed

NICE commissioned the National Clinical Guideline Centre to develop this guideline. The Centre established a Guideline Development Group (see [section 4](#)), which reviewed the evidence and developed the recommendations.

The methods and processes for developing NICE clinical guidelines are described in [the guidelines manual](#).

### 3.2 Related NICE guidance

Details are correct at the time of publication of the guideline (October 2014). Further information is available on the [NICE website](#).

## Published

### General

- [Patient experience in adult NHS services](#) (2012) NICE guideline CG138
- [Medicines adherence](#) (2009) NICE guideline CG76

### Condition-specific

- [Chronic kidney disease](#) (2014) NICE guideline CG182
- [Lipid modification](#) (2014) NICE guideline CG181
- [Atrial fibrillation](#) (2014) NICE guideline CG180
- [Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure](#) (2014) NICE technology appraisal guidance 314

- [MI – secondary prevention](#) (2013) NICE guideline CG172
- [Myocardial infarction with ST-segment-elevation](#) (2013) NICE guideline CG167
- [Intravenous fluid therapy in adults in hospitals](#) (2013) NICE guideline CG174
- [Ivabradine for treating chronic heart failure](#) (2012) NICE technology appraisal guidance 267
- [Hypertension](#) (2011) NICE guideline CG127
- [Management of stable angina](#) (2011) NICE guideline CG126
- [Bivalirudin for the treatment of ST-segment elevation myocardial infarction](#) (2011) NICE technology appraisal guidance 230
- [Chronic heart failure](#) (2010) NICE guideline CG108
- [Chest pain of recent onset](#) (2010) NICE guideline CG95
- [Unstable angina and NSTEMI](#) (2010) NICE guideline CG94
- [Type 2 diabetes](#) (2009) NICE guideline CG87
- [Prasugrel for the treatment of acute coronary syndromes with percutaneous coronary intervention](#) (2009) NICE technology appraisal guidance 182
- [Smoking cessation services](#) (2008) NICE guideline PH10
- [Varenicline for smoking cessation](#) (2007) NICE technology appraisal guidance 123
- [Cardiac resynchronisation therapy for the treatment of heart failure](#) (2007) NICE technology appraisal guidance 120
- [Short-term circulatory support with left ventricular assist devices as a bridge to cardiac transplantation or recovery](#) (2006) NICE interventional procedure guidance 177
- [Brief interventions and referral for smoking cessation](#) (2006) NICE guideline PH1
- [Myocardial perfusion scintigraphy for the diagnosis and management of angina and myocardial infarction](#) (2003) NICE technology appraisal guidance 73

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## Update information

**March 2016:** Footnote added to recommendation 1.5.4 with link to MHRA advice on spironolactone and renin-angiotensin system drugs.

## About this guideline

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

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

This guideline was developed by the National Clinical Guideline Centre. The Centre worked with a Guideline Development Group, comprising healthcare professionals (including consultants, GPs and nurses), patients and carers, and technical staff, which 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](#).

NICE produces guidance, standards and information on commissioning and providing high-quality healthcare, social care, and public health services. We have agreements to provide certain NICE services to Wales, Scotland and Northern Ireland. Decisions on how NICE guidance and other products apply in those countries are made by ministers in the Welsh government, Scottish government, and Northern Ireland Executive. NICE guidance or other products may include references to organisations or people responsible for commissioning or providing care that may be relevant only to England.

## Strength of recommendations

Some recommendations can be made with more certainty than others. The Guideline Development Group makes a recommendation based on the trade-off between the benefits and harms of an intervention, taking into account the quality of the underpinning evidence. For some interventions, the Guideline Development Group is confident that, given the information it has looked at, most patients would choose the intervention. The wording used in the recommendations in this guideline denotes the certainty with which the recommendation is made (the strength of the recommendation).

For all recommendations, NICE expects that there is discussion with the patient about the risks and benefits of the interventions, and their values and preferences. This discussion aims to help them to reach a fully informed decision (see also [patient-centred care](#)).



## Interventions that must (or must not) be used

We usually use 'must' or 'must not' only if there is a legal duty to apply the recommendation. Occasionally we use 'must' (or 'must not') if the consequences of not following the recommendation could be extremely serious or potentially life threatening.

## Interventions that should (or should not) be used – a 'strong' recommendation

We use 'offer' (and similar words such as 'refer' or 'advise') when we are confident that, for the vast majority of patients, an intervention will do more good than harm, and be cost effective. We use similar forms of words (for example, 'Do not offer...') when we are confident that an intervention will not be of benefit for most patients.

## Interventions that could be used

We use 'consider' when we are confident that an intervention will do more good than harm for most patients, and be cost effective, but other options may be similarly cost effective. The choice of intervention, and whether or not to have the intervention at all, is more likely to depend on the patient's values and preferences than for a strong recommendation, and so the healthcare professional should spend more time considering and discussing the options with the patient.

## Other versions of this guideline

The full guideline, [acute heart failure: diagnosing and managing acute heart failure in adults](#) contains details of the methods and evidence used to develop the guideline. It is published by the National Clinical Guideline Centre.

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

We have produced [information for the public](#) about this guideline.

## Implementation

[Implementation tools and resources](#) to help you put the guideline into practice are also available.

## 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 summaries of product characteristics of any drugs.

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 have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity and foster good relations. Nothing in this guidance should be interpreted in a way that would be inconsistent with compliance with those duties.

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## Accreditation

