

# **Acute heart failure: diagnosing and managing acute heart failure in adults**

## **NICE guideline**

**Draft for consultation, May 2014**

If you wish to comment on this version of the guideline, please be aware that all the supporting information and evidence is contained in the full version.

For further information, see chapter 10 of 'The guidelines manual', available from the webboard.

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## Introduction

Heart failure is a complex clinical syndrome of symptoms and signs that suggest the heart as a pump, supporting physiological circulation, is impaired. It is caused by structural or functional abnormalities of the heart. Acute heart failure can present as new-onset heart failure in people without known cardiac dysfunction, or as acute decompensation of chronic heart failure (that is, a significant deterioration in heart function).

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

This guideline covers important aspects of the diagnosis and management of acute heart failure that are not addressed by the NICE guideline on [chronic heart failure](#) (NICE clinical guideline 108), which focused on long-term management rather than the immediate care of someone who is acutely unwell as a result of heart failure.

It covers the care of adults (aged 18 years or older) who have a diagnosis of acute heart failure, or 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 people with 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](#).

## **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.

## Key priorities for implementation

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

- All hospitals admitting people with suspected acute heart failure should provide a specialist heart failure service, based on a cardiology ward and providing outreach services. **[1.7.1]**
- 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. **[1.7.2]**
- 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]) to rule out the diagnosis of heart failure. **[1.1.2]**
- In people with raised natriuretic peptide levels perform transthoracic Doppler 2D echocardiography to establish the presence or absence of cardiac abnormalities. **[1.1.4]**
- Consider echocardiography within 48 hours of admission to enable early specialist management. **[1.1.5]**
- 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. **[1.4.1]**
- 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. **[1.4.2]**
- Offer an angiotensin-converting enzyme inhibitor to people with acute heart failure and reduced left ventricular ejection fraction during hospital admission. **[1.4.4]**

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- Offer a mineralocorticoid receptor antagonist to people with acute heart failure and reduced left ventricular ejection fraction during hospital admission. **[1.4.5]**
- Ensure that the person's condition is stable for typically 48 hours before discharging from hospital and/or after starting or restarting beta-blockers. **[1.4.3]**

## 1 Recommendations

The following guidance is based on the best available evidence. The [full guideline](#) [\[hyperlink to be added for final publication\]](#) gives details of the methods and the evidence used to develop the guidance.

### 1.1 *Diagnosis, assessment and monitoring*

- 1.1.1 Take a history and examination and undertake standard investigations – for example, electrocardiography, chest X-ray and blood tests – in line with [Chronic heart failure](#) (NICE Clinical Guideline 108) in order to establish a diagnosis.
- 1.1.2 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]) to rule out the diagnosis of heart failure.
- 1.1.3 Use the following thresholds to rule out acute heart failure for people presenting with suspected acute heart failure:
- BNP less than 100 ng/litre and
  - NT-proBNP less than 300 ng/litre.
- 1.1.4 In people with raised natriuretic peptide levels (see recommendation 1.1.3), perform transthoracic Doppler 2D echocardiography to establish the presence or absence of cardiac abnormalities.
- 1.1.5 Consider echocardiography within 48 hours of admission to enable early specialist management.
- 1.1.6 Do not routinely offer pulmonary artery catheterisation to people with acute heart failure.

### 1.2 *Initial pharmacological treatment*

- 1.2.1 Before starting any treatment, check that it is compatible with any advanced care plan the person has made.

- 1.2.2 Do not routinely offer opiates to people with acute heart failure.
- 1.2.3 Offer intravenous diuretic therapy to people with acute heart failure; start treatment using either a bolus or infusion strategy.
- 1.2.4 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.
- 1.2.5 Closely monitor the person's renal function, weight loss and urine output during diuretic therapy.
- 1.2.6 Discuss with the person the best strategies of coping with an increased urine output.
- 1.2.7 Do not routinely offer nitrates to people with acute heart failure.
- 1.2.8 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 can be provided.
- 1.2.9 Do not offer sodium nitroprusside to people with acute heart failure.
- 1.2.10 Do not routinely offer inotropes or vasopressors to people with acute heart failure.
- 1.2.11 Consider inotropes or vasopressors in people with acute heart failure with potentially reversible cardiogenic shock. Administer these treatments in a coronary care unit or high dependency unit or an alternative setting where at least level 2 care can be provided.

### **1.3 *Initial non-pharmacological treatment***

- 1.3.1 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.

1.3.2 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.

1.3.3 Consider invasive mechanical 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.

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

1.3.5 Consider ultrafiltration for people with confirmed diuretic resistance.

## **1.4 Treatment after stabilisation**

1.4.1 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.

1.4.2 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.

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

- 1.4.4 Offer an angiotensin-converting enzyme inhibitor to people with acute heart failure and reduced left ventricular ejection fraction during hospital admission.
- 1.4.5 Offer a mineralocorticoid receptor antagonist to people with acute heart failure and reduced left ventricular ejection fraction during hospital admission.

## **1.5 *Valvular surgery and percutaneous intervention***

- 1.5.1 Offer surgical aortic valve replacement to people with heart failure due to severe aortic stenosis assessed as suitable for surgery<sup>1</sup>.
- 1.5.2 Consider transcatheter aortic valve implantation (TAVI) in selected people, 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<sup>2</sup>.
- 1.5.3 For guidance on coronary revascularisation see [Chronic heart failure](#) (NICE clinical guideline 108).
- 1.5.4 Consider surgical mitral valve repair or replacement for people with heart failure assessed as suitable for surgery.

## **1.6 *Mechanical assist devices***

- 1.6.1 People with potentially reversible severe acute heart failure or who are potential candidates for transplantation should be discussed at an early stage with a centre providing mechanical circulatory support.

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<sup>1</sup> For information about patient selection, see [Transcatheter aortic valve implantation for aortic stenosis](#) (NICE interventional procedure guidance 421).

<sup>2</sup> For information about patient selection, see [Transcatheter aortic valve implantation for aortic stenosis](#) (NICE interventional procedure guidance 421).

## **1.7 Organisation of care**

- 1.7.1 All hospitals admitting people with suspected acute heart failure should provide a specialist heart failure service, based on a cardiology ward and providing outreach services.
- 1.7.2 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.
- 1.7.3 Plan the following for people with acute heart failure in line with [Chronic heart failure](#) (NICE clinical guideline 108):
- 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.
- 1.7.4 A follow-up clinical assessment should be undertaken by a member of the multidisciplinary heart failure team within 2 weeks of the person being discharged from hospital.

## **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 to date 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 decompensation 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 consultation on the guideline (May 2014). Further information is available on [the NICE website](#).

##### **Published**

###### ***General***

- [Patient experience in adult NHS services](#). NICE clinical guidance 138 (2012).
- [Medicines adherence](#). NICE clinical guidance 76 (2009).

###### ***Condition-specific***

- [MI: secondary prevention](#). NICE clinical guideline 172 (2013).
- [Myocardial infarction with ST-segment-elevation](#). NICE clinical guidance 167 (2013).
- [Ivabradine for treating chronic heart failure](#). NICE technology appraisal guidance 267 (2012).
- [Hypertension](#). NICE clinical guideline 127 (2011).

- [Management of stable angina](#). NICE clinical guideline 126 (2011).
- [Bivalirudin for the treatment of ST-segment elevation myocardial infarction](#). NICE technology appraisal guidance 230 (2011).
- [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).
- [Chronic kidney disease](#). NICE clinical guideline 73 (2008).
- [Lipid modification](#). NICE clinical guideline 67 (2008).
- [Smoking cessation services](#). NICE public health guidance 10 (2008).
- [Varenicline for smoking cessation](#). NICE technology appraisal guidance 123 (2007).
- [Cardiac resynchronisation therapy for the treatment of heart failure](#). NICE technology appraisal guidance 120 (2007).
- [Atrial fibrillation](#). NICE clinical guideline 36 (2006).
- [Short-term circulatory support with left ventricular assist devices as a bridge to cardiac transplantation or recovery](#). NICE interventional procedure guidance 177 (2006).
- [Brief interventions and referral for smoking cessation](#). NICE public health guidance 1 (2006).
- [Myocardial perfusion scintigraphy for the diagnosis and management of angina and myocardial infarction](#). NICE technology appraisal guidance 73 (2003).

### **Under development**

NICE is developing the following guidance (details available from [the NICE website](#)):

Atrial fibrillation (update). NICE clinical guideline. Publication expected June 2014.

## DRAFT FOR CONSULTATION

Implantable cardioverter defibrillators for the treatment of arrhythmias and cardiac resynchronisation therapy for the treatment of heart failure (review of TA95 and TA120). Publication expected June 2014.

Lipid modification (update). NICE clinical guideline. Publication expected July 2014.

## **4 The Guideline Development Group, National Collaborating Centre and NICE project team**

### **4.1 *Guideline Development Group***

#### **Jonathan Mant (GDG Chair)**

Professor of Primary Care Research and Honorary Consultant, University of Cambridge

#### **Abdallah Al-Mohammad**

Consultant Cardiologist and Honorary Senior Clinical Lecturer, Sheffield Teaching Hospitals NHS Trust

#### **Peter Bolton**

Patient member

#### **Jane Butler**

Heart Failure Specialist Consultant Nurse, Barts Health NHS Trust

#### **Martin Cowie**

Professor of Cardiology and Honorary Consultant Cardiologist, Imperial College London

#### **Suzanna Hardman**

Consultant Cardiologist and Honorary Senior Lecturer, Whittington Hospital

#### **Nicholas Ioannou**

Consultant Intensivist and Anaesthetist, Guy's and St Thomas' NHS Foundation Trust, London

#### **Christopher Jones<sup>3</sup>**

Patient member

#### **Jason Kendall**

Consultant in Emergency Medicine, North Bristol NHS Trust

---

<sup>3</sup> Oct 2012–RIP February 2014

**Jayne Masters**

Lead Heart Failure Specialist Nurse, University Hospitals Southampton NHS Foundation Trust

**John McMurray**

Professor of Medical Cardiology and Honorary Consultant Cardiologist, University of Glasgow

**Tanzeem Raza**

Consultant Physician in Acute Medicine, Royal Bournemouth Hospital

**4.2 National Clinical Guideline Centre**

**Liz Avital**

Associate Director (January to July 2013)

**Amelia Ch'ng**

Project Manager (until September 2013)

**Saskia Cheyne**

Project Manager (from July 2013)

**Jill Cobb**

Information Scientist (from January 2013)

**Katharina Dworzynski**

Senior Research Fellow

**Lina Gulhane**

Joint Head of Information Science (until January 2013)

**Andrew Ludman (Specialist trainee adviser)**

Specialist Trainee in Cardiology, Royal Brompton and Harefield NHS Foundation Trust

**Su Park**

Research Fellow (from August 2013)

**Elisabetta Fenu**

Senior Health Economist (until March 2013)

**Edward Griffin**

Health Economist (from March 2013)

**Gill Ritchie**

Associate Director (until December 2012 and from August 2013)

**Juan Carlos Rejon**

Health Economist (until January 2013)

**Emmert Roberts**

Research Fellow (until July 2013)

**4.3 NICE project team**

**Sharon Summers-Ma**

Guideline Lead

**Mark Baker**

Clinical Adviser

**Caroline Keir**

Guideline Commissioning Manager

**Margaret Ghلامي**

Guideline Coordinator

**Steven Barnes**

Technical Lead

**Bhash Naidoo**

Health Economist

**Annette Mead**

Editor