NICE National Institute for Health and Care Excellence

NICE guideline

# Chronic heart failure in adults: diagnosis and management

NICE guideline
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## 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.

# Contents

This guideline replaces CG108.

This guideline is the basis of QS167 and QS9.

## Overview

This guideline covers diagnosing and managing chronic heart failure in people aged 18 and over. It aims to improve diagnosis and treatment to increase the length and quality of life for people with heart failure.

NICE has also produced a guideline on acute heart failure.

### *Who is it for?*

- Healthcare professionals
- People with heart failure and their families and carers

# Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

## *1.1 Team working in the management of heart failure*

1.1.1 The core specialist heart failure multidisciplinary team (MDT) should work in collaboration with the primary care team, and should include:

- a lead physician with subspecialty training in heart failure (usually a consultant cardiologist) who is responsible for making the clinical diagnosis
- a specialist heart failure nurse
- a healthcare professional with expertise in specialist prescribing for heart failure. **[2018]**

1.1.2 The specialist heart failure MDT should:

- diagnose heart failure
- give information to people newly diagnosed with heart failure (see giving information to people with heart failure)
- manage newly diagnosed, recently decompensated or advanced heart failure (NYHA [New York Heart Association] class III to IV)
- optimise treatment
- start new medicines that need specialist supervision
- continue to manage heart failure after an interventional procedure such as implantation of a cardioverter defibrillator or cardiac resynchronisation device
- manage heart failure that is not responding to treatment. **[2018]**

1.1.3 The specialist heart failure MDT should directly involve, or refer people to, other services, including rehabilitation, services for older people and palliative care services, as needed. [2018]

1.1.4 The primary care team should carry out the following for people with heart failure at all times, including periods when the person is also receiving specialist heart failure care from the MDT:

- ensure effective communication links between different care settings and clinical services involved in the person's care
- lead a full review of the person's heart failure care, which may form part of a long-term conditions review
- recall the person at least every 6 months and update the clinical record
- ensure that changes to the clinical record are understood and agreed by the person with heart failure and shared with the specialist heart failure MDT
- arrange access to specialist heart failure services if needed. [2018]

## Care after an acute event

For recommendations on the diagnosis and management of acute heart failure see NICE's guideline on acute heart failure.

1.1.5 People with heart failure should generally be discharged from hospital only when their clinical condition is stable and the management plan is optimised. Timing of discharge should take into account the wishes of the person and their family or carer, and the level of care and support that can be provided in the community. [2003]

1.1.6 The primary care team should take over routine management of heart failure as soon as it has been stabilised and its management optimised. [2018]

## Writing a care plan

1.1.7 The specialist heart failure MDT should write a summary for each person with heart failure that includes:

- diagnosis and aetiology
- medicines prescribed, monitoring of medicines, when medicines should be reviewed and any support the person needs to take the medicines
- functional abilities and any social care needs
- social circumstances, including carers' needs. [2018]

1.1.8 The summary should form the basis of a care plan for each person, which should include:

- plans for managing the person's heart failure, including follow-up care, rehabilitation and access to social care
- symptoms to look out for in case of deterioration
- a process for any subsequent access to the specialist heart failure MDT if needed
- contact details for
  - a named healthcare coordinator (usually a specialist heart failure nurse)
  - alternative local heart failure specialist care providers, for urgent care or review.
- additional sources of information for people with heart failure. [2018]

1.1.9 Give a copy of the care plan to the person with heart failure, their family or carer if appropriate, and all health and social care professionals involved in their care. [2018]

## *1.2 Diagnosing heart failure*

### Symptoms, signs and investigations

1.2.1 Take a careful and detailed history, and perform a clinical examination and tests to confirm the presence of heart failure. [2010]

1.2.2 Measure N-terminal pro-B-type natriuretic peptide (NT-proBNP) in people with suspected heart failure. [2018]

1.2.3 Because very high levels of NT-proBNP carry a poor prognosis, refer people with suspected heart failure and an NT-proBNP level above 2,000 ng/litre (236 pmol/litre) urgently, to have specialist assessment and transthoracic echocardiography within 2 weeks. **[2018]**

1.2.4 Refer people with suspected heart failure and an NT-proBNP level between 400 and 2,000 ng/litre (47 to 236 pmol/litre) to have specialist assessment and transthoracic echocardiography within 6 weeks. **[2018]**

1.2.5 Be aware that:

- an NT-proBNP level less than 400 ng/litre (47 pmol/litre) in an untreated person makes a diagnosis of heart failure less likely
- the level of serum natriuretic peptide does not differentiate between heart failure with reduced ejection fraction and heart failure with preserved ejection fraction. **[2018]**

1.2.6 Review alternative causes for symptoms of heart failure in people with NT-proBNP levels below 400 ng/litre. If there is still concern that the symptoms might be related to heart failure, discuss with a physician with subspeciality training in heart failure. **[2018]**

1.2.7 Be aware that:

- obesity, African or African–Caribbean family origin, or treatment with diuretics, angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, angiotensin II receptor blockers (ARBs) or mineralocorticoid receptor antagonists (MRAs) can reduce levels of serum natriuretic peptides
- high levels of serum natriuretic peptides can have causes other than heart failure (for example, age over 70 years, left ventricular hypertrophy, ischaemia, tachycardia, right ventricular overload, hypoxaemia [including pulmonary embolism], renal dysfunction [eGFR less than 60 ml/minute/1.73 $m^2$], sepsis, chronic obstructive pulmonary disease, diabetes, or cirrhosis of the liver). **[2010, amended 2018]**

1.2.8 Perform transthoracic echocardiography to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle, and detect intracardiac shunts. **[2003, amended 2018]**

1.2.9 Transthoracic echocardiography should be performed on high-resolution equipment by experienced operators trained to the relevant professional standards. Need and demand for these studies should not compromise quality. **[2003, amended 2018]**

1.2.10 Ensure that those reporting echocardiography are experienced in doing so. **[2003]**

1.2.11 Consider alternative methods of imaging the heart (for example, radionuclide angiography [multigated acquisition scanning], cardiac MRI or transoesophageal echocardiography) if a poor image is produced by transthoracic echocardiography. **[2003, amended 2018]**

1.2.12 Perform an ECG and consider the following tests to evaluate possible aggravating factors and/or alternative diagnoses:

- chest X-ray
- blood tests:
  - renal function profile
  - thyroid function profile
  - liver function profile
  - lipid profile
  - glycosylated haemoglobin ($HbA_{1c}$)
  - full blood count
- urinalysis
- peak flow or spirometry. **[2010, amended 2018]**

1.2.13 Try to exclude other disorders that may present in a similar manner. **[2003]**

1.2.14 When a diagnosis of heart failure has been made, assess severity, aetiology, precipitating factors, type of cardiac dysfunction and correctable causes. **[2010]**

### Heart failure caused by valve disease

1.2.15 Refer people with heart failure caused by valve disease for specialist assessment and advice regarding follow-up. [2003]

### Reviewing existing diagnoses

1.2.16 Review the basis for a historical diagnosis of heart failure, and manage care in accordance with this guideline only if the diagnosis is confirmed. [2003]

1.2.17 If the diagnosis of heart failure is still suspected, but confirmation of the underlying cardiac abnormality has not occurred, then the person should have appropriate further investigation. [2003]

## *1.3 Giving information to people with heart failure*

1.3.1 When giving information to people with heart failure, follow the recommendations in the NICE guideline on patient experience in adult NHS services. [2018]

1.3.2 Discuss the person's prognosis in a sensitive, open and honest manner. Be frank about the uncertainty in predicting the course of their heart failure. Revisit this discussion as the person's condition evolves. [2018]

1.3.3 Provide information whenever needed throughout the person's care. [2018]

1.3.4 Consider training in advanced communication skills for all healthcare professionals working with people who have heart failure. [2018]

### First consultations for people newly diagnosed with heart failure

1.3.5 The specialist heart failure MDT should offer people newly diagnosed with heart failure an extended first consultation, followed by a second consultation to take place within 2 weeks if possible. At each consultation:

- discuss the person's diagnosis and prognosis
- explain heart failure terminology
- discuss treatments

- address the risk of sudden death, including any misconceptions about that risk
- encourage the person and their family or carers to ask any questions they have. [2018]

## *1.4 Treating heart failure with reduced ejection fraction*

See section 1.6 for general recommendations on managing all types of heart failure.

When managing pharmacological treatment, follow the recommendations in the NICE guidelines on medicines adherence and medicines optimisation.

### First-line treatment

1.4.1 Offer an angiotensin-converting enzyme (ACE) inhibitor and a beta-blocker licensed for heart failure to people who have heart failure with reduced ejection fraction. Use clinical judgement when deciding which drug to start first. [2010]

#### *ACE inhibitors*

1.4.2 Do not offer ACE inhibitor therapy if there is a clinical suspicion of haemodynamically significant valve disease until the valve disease has been assessed by a specialist. [2003]

1.4.3 Start ACE inhibitor therapy at a low dose and titrate upwards at short intervals (for example, every 2 weeks) until the target or maximum tolerated dose is reached. [2010]

1.4.4 Measure serum sodium and potassium, and assess renal function, before and 1 to 2 weeks after starting an ACE inhibitor, and after each dose increment. [2010, amended 2018]

1.4.5 Measure blood pressure before and after each dose increment of an ACE inhibitor. Follow the recommendations on measuring blood pressure, including measurement in people with symptoms of postural hypotension, in the NICE guideline on hypertension in adults. [2018]

1.4.6 Once the target or maximum tolerated dose of an ACE inhibitor is reached, monitor treatment monthly for 3 months and then at least every 6 months, and at any time the person becomes acutely unwell. [2010, amended 2018]

### *Alternative treatments if ACE inhibitors are not tolerated*

1.4.7 Consider an ARB licensed for heart failure as an alternative to an ACE inhibitor for people who have heart failure with reduced ejection fraction and intolerable side effects with ACE inhibitors. **[2010]**

1.4.8 Measure serum sodium and potassium, and assess renal function, before and after starting an ARB and after each dose increment. **[2010, amended 2018]**

1.4.9 Measure blood pressure after each dose increment of an ARB. Follow the recommendations on measuring blood pressure, including measurement in people with symptoms of postural hypotension, in the NICE guideline on hypertension in adults. **[2018]**

1.4.10 Once the target or maximum tolerated dose of an ARB is reached, monitor treatment monthly for 3 months and then at least every 6 months, and at any time the person becomes acutely unwell. **[2010, amended 2018]**

1.4.11 If neither ACE inhibitors nor ARBs are tolerated, seek specialist advice and consider hydralazine in combination with nitrate for people who have heart failure with reduced ejection fraction. **[2010]**

### *Beta-blockers*

1.4.12 Do not withhold treatment with a beta-blocker solely because of age or the presence of peripheral vascular disease, erectile dysfunction, diabetes, interstitial pulmonary disease or chronic obstructive pulmonary disease. **[2010]**

1.4.13 Introduce beta-blockers in a 'start low, go slow' manner. Assess heart rate and clinical status after each titration. Measure blood pressure before and after each dose increment of a beta-blocker. **[2010,amended 2018]**

1.4.14 Switch people whose condition is stable and who are already taking a beta-blocker for a comorbidity (for example, angina or hypertension), and who develop heart failure with reduced ejection fraction, to a beta-blocker licensed for heart failure. **[2010]**

### *Mineralocorticoid receptor antagonists*

1.4.15 Offer an MRA, in addition to an ACE inhibitor (or ARB) and beta-blocker, to people who have heart failure with reduced ejection fraction if they continue to have symptoms of heart failure. **[2018]**

1.4.16 Measure serum sodium and potassium, and assess renal function, before and after starting an MRA and after each dose increment. **[2018]**

1.4.17 Measure blood pressure before and after after each dose increment of an MRA. Follow the recommendations on measuring blood pressure, including measurement in people with symptoms of postural hypotension, in the NICE guideline on hypertension in adults. **[2018]**

1.4.18 Once the target, or maximum tolerated, dose of an MRA is reached, monitor treatment monthly for 3 months and then at least every 6 months, and at any time the person becomes acutely unwell. **[2018]**

## Specialist treatment

### *Ivabradine*

These recommendations are from NICE's technology appraisal guidance on ivabradine for treating chronic heart failure.

1.4.19 Ivabradine is recommended as an option for treating chronic heart failure for people:

- with New York Heart Association (NYHA) class II to IV stable chronic heart failure with systolic dysfunction **and**
- who are in sinus rhythm with a heart rate of 75 beats per minute (bpm) or more **and**
- who are given ivabradine in combination with standard therapy including beta-blocker therapy, angiotensin-converting enzyme (ACE) inhibitors and aldosterone antagonists, or when beta-blocker therapy is contraindicated or not tolerated **and**
- with a left ventricular ejection fraction of 35% or less. **[2012]**

1.4.20 Ivabradine should only be initiated after a stabilisation period of 4 weeks on optimised standard therapy with ACE inhibitors, beta-blockers and aldosterone antagonists. **[2012]**

1.4.21 Ivabradine should be initiated by a heart failure specialist with access to a multidisciplinary heart failure team. Dose titration and monitoring should be carried out by a heart failure specialist, or in primary care by either a GP with a special interest in heart failure or a heart failure specialist nurse. **[2012]**

### *Sacubitril valsartan*

These recommendations are from NICE's technology appraisal guidance on sacubitril valsartan for treating symptomatic chronic heart failure with reduced ejection fraction.

1.4.22 Sacubitril valsartan is recommended as an option for treating symptomatic chronic heart failure with reduced ejection fraction, only in people:

- with New York Heart Association (NYHA) class II to IV symptoms **and**
- with a left ventricular ejection fraction of 35% or less **and**
- who are already taking a stable dose of angiotensin-converting enzyme (ACE) inhibitors or ARBs. **[2016]**

1.4.23 Treatment with sacubitril valsartan should be started by a heart failure specialist with access to a multidisciplinary heart failure team. Dose titration and monitoring should be performed by the most appropriate team member as defined in NICE's guideline on chronic heart failure in adults: diagnosis and management[1]. **[2016]**

1.4.24 This guidance is not intended to affect the position of patients whose treatment with sacubitril valsartan was started within the NHS before this guidance was published. Treatment of those patients may continue without change to whatever funding arrangements were in place for them before this guidance was published until they and their NHS clinician consider it appropriate to stop. **[2016]**

### *Hydralazine in combination with nitrate*

1.4.25 Seek specialist advice and consider offering hydralazine in combination with nitrate (especially if the person is of African or Caribbean family origin and has moderate to severe heart failure [NYHA class III/IV] with reduced ejection fraction). **[2010]**

### *Digoxin*

For recommendations on digoxin for people with atrial fibrillation see rate and rhythm control in the NICE guideline on atrial fibrillation.

1.4.26 Digoxin is recommended for worsening or severe heart failure with reduced ejection fraction despite first-line treatment for heart failure. Seek specialist advice before initiating. **[2010, amended 2018]**

1.4.27 Routine monitoring of serum digoxin concentrations is not recommended. A digoxin concentration measured within 8 to 12 hours of the last dose may be useful to confirm a clinical impression of toxicity or non-adherence. **[2003]**

1.4.28 The serum digoxin concentration should be interpreted in the clinical context as toxicity may occur even when the concentration is within the 'therapeutic range'. **[2003]**

## *1.5 Treating heart failure with reduced ejection fraction in people with chronic kidney disease*

1.5.1 For people who have heart failure with reduced ejection fraction and chronic kidney disease with an eGFR of 30 ml/min/1.73 $m^2$ or above:

- offer the treatment outlined in section 1.4 **and**
- if the person's eGFR is 45 ml/min/1.73 $m^2$ or below, consider lower doses and/or slower titration of dose of ACE inhibitors or ARBs, MRAs and digoxin. **[2018]**

1.5.2 For people who have heart failure with reduced ejection fraction and chronic kidney disease with an eGFR below 30 ml/min/1.73 $m^2$, the specialist heart failure MDT should consider liaising with a renal physician. **[2018]**

1.5.3 Monitor the response to titration of medicines closely in people who have heart failure with reduced ejection fraction and chronic kidney disease, taking into account the increased risk of hyperkalaemia. **[2018]**

## *1.6 Managing all types of heart failure*

When managing pharmacological treatment, follow the recommendations in the NICE guidelines on medicines adherence and medicines optimisation.

### Pharmacological treatment

#### *Diuretics*

1.6.1 Diuretics should be routinely used for the relief of congestive symptoms and fluid retention in people with heart failure, and titrated (up and down) according to need following the initiation of subsequent heart failure therapies. **[2003]**

1.6.2 People who have heart failure with preserved ejection fraction should usually be offered a low to medium dose of loop diuretics (for example, less than 80 mg furosemide per day). People whose heart failure does not respond to this treatment will need further specialist advice. **[2003, amended 2018]**

#### *Calcium-channel blockers*

1.6.3 Avoid verapamil, diltiazem and short-acting dihydropyridine agents in people who have heart failure with reduced ejection fraction. **[2003, amended 2018]**

#### *Amiodarone*

1.6.4 Make the decision to prescribe amiodarone in consultation with a specialist. **[2003]**

1.6.5 Review the need to continue the amiodarone prescription at the 6-monthly clinical review. **[2003, amended 2018]**

1.6.6 Offer people taking amiodarone liver and thyroid function tests, and a review of side effects, as part of their routine 6-monthly clinical review. **[2003, amended 2018]**

### *Anticoagulants*

1.6.7 For people who have heart failure and atrial fibrillation, follow the recommendations on anticoagulation in the NICE guideline on atrial fibrillation. Be aware of the effects of impaired renal and liver function on anticoagulant therapies. [2018]

1.6.8 In people with heart failure in sinus rhythm, anticoagulation should be considered for those with a history of thromboembolism, left ventricular aneurysm or intracardiac thrombus. [2003]

## Vaccinations

1.6.9 Offer people with heart failure an annual vaccination against influenza. [2003]

1.6.10 Offer people with heart failure vaccination against pneumococcal disease (only required once). [2003]

## Contraception and pregnancy

1.6.11 In women of childbearing potential who have heart failure, contraception and pregnancy should be discussed. If pregnancy is being considered or occurs, specialist advice should be sought. Subsequently, specialist care should be shared between the cardiologist and obstetrician. [2003]

## Depression

See NICE's guideline on depression in adults with a chronic physical health problem.

## Lifestyle advice

### *Salt and fluid restriction*

1.6.12 Do not routinely advise people with heart failure to restrict their sodium or fluid consumption. Ask about salt and fluid consumption and, if needed, advise as follows:

- restricting fluids for people with dilutional hyponatraemia

- reducing intake for people with high levels of salt and/or fluid consumption.

  Continue to review the need to restrict salt or fluid. [2018]

1.6.13 Advise people with heart failure to avoid salt substitutes that contain potassium. [2018]

### *Smoking and alcohol*

See NICE's guidance on smoking and tobacco and alcohol.

### *Air travel*

1.6.14 Air travel will be possible for the majority of people with heart failure, depending on their clinical condition at the time of travel. [2003]

### *Driving*

1.6.15 Large Goods Vehicle and Passenger Carrying Vehicle licence: physicians should be up to date with the latest Driver and Vehicle Licensing Agency guidelines. Check the DVLA website for regular updates [2003]

## *1.7 Monitoring treatment for all types of heart failure*

See section 1.4 for specific recommendations on monitoring treatment for heart failure with reduced ejection fraction.

### Clinical review

1.7.1 All people with chronic heart failure need monitoring. This monitoring should include:

- a clinical assessment of functional capacity, fluid status, cardiac rhythm (minimum of examining the pulse), cognitive status and nutritional status
- a review of medication, including need for changes and possible side effects
- an assessment of renal function[2]. [2010, amended 2018]

1.7.2 More detailed monitoring will be needed if the person has significant comorbidity or if their condition has deteriorated since the previous review. [2003]

1.7.3 The frequency of monitoring should depend on the clinical status and stability of the person. The monitoring interval should be short (days to 2 weeks) if the clinical condition or medication has changed, but is needed at least 6-monthly for stable people with proven heart failure. [2003]

1.7.4 People with heart failure who wish to be involved in monitoring of their condition should be provided with sufficient education and support from their healthcare professional to do this, with clear guidelines as to what to do in the event of deterioration. [2003]

### Measuring NT-proBNP

1.7.5 Consider measuring NT-proBNP (N-terminal pro-B-type natriuretic peptide) as part of a treatment optimisation protocol only in a specialist care setting for people aged under 75 who have heart failure with reduced ejection fraction and an eGFR above 60 ml/min/1.73 $m^2$. [2018]

## *1.8 Interventional procedures*

### Coronary revascularisation

1.8.1 Do not routinely offer coronary revascularisation to people who have heart failure with reduced ejection fraction and coronary artery disease. [2018]

### Cardiac transplantation

1.8.2 Specialist referral for transplantation should be considered for people with severe refractory symptoms or refractory cardiogenic shock. [2003]

### Implantable cardioverter defibrillators and cardiac resynchronisation therapy

See NICE's technology appraisal guidance on implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure.

1.8.3 When discussing implantation of a cardioverter defibrillator:

- explain the risks, benefits and consequences of cardioverter defibrillator implantation, following the principles on shared decision making in the NICE guideline on patient experience in adult NHS services
- ensure the person knows that the defibrillator function can be deactivated without affecting any cardiac resynchronisation or pacing, and reactivated later
- explain the circumstances in which deactivation might be offered
- discuss and dispel common misconceptions about the function of the device and the consequences of deactivation
- provide the person and, if they wish, their family or carers with written information covering the information discussed. [2018]

1.8.4 Review the benefits and potential harms of a cardioverter defibrillator remaining active in a person with heart failure:

- at each 6-monthly review of their heart failure care
- whenever their care goals change
- as part of advance care planning if it is thought they are nearing the end of life. [2018]

## *1.9 Cardiac rehabilitation*

1.9.1 Offer people with heart failure a personalised, exercise-based cardiac rehabilitation programme, unless their condition is unstable. The programme:

- should be preceded by an assessment to ensure that it is suitable for the person
- should be provided in a format and setting (at home, in the community or in the hospital) that is easily accessible for the person
- should include a psychological and educational component
- may be incorporated within an existing cardiac rehabilitation programme
- should be accompanied by information about support available from healthcare professionals when the person is doing the programme. [2018]

## *1.10 Palliative care*

1.10.1 Do not offer long-term home oxygen therapy for advanced heart failure. Be aware that long-term home oxygen therapy may be offered for comorbidities, such as for some people with chronic obstructive pulmonary disease (see the section on oxygen in the NICE guideline on chronic obstructive pulmonary disease in over 16s). [2018]

1.10.2 Do not use prognostic risk tools to determine whether to refer a person with heart failure to palliative care services. [2018]

1.10.3 If the symptoms of a person with heart failure are worsening despite optimal specialist treatment, discuss their palliative care needs with the specialist heart failure multidisciplinary team and consider a needs assessment for palliative care. [2018]

1.10.4 People with heart failure and their families or carers should have access to professionals with palliative care skills within the heart failure team. [2003]

1.10.5 If it is thought that a person may be entering the last 2 to 3 days of life, follow the NICE guideline on care of dying adults in the last days of life. [2018]

## *Terms used in this guideline*

### Heart failure with preserved ejection fraction

This is usually associated with impaired left ventricular relaxation, rather than left ventricular contraction, and is characterised by normal or preserved left ventricular ejection fraction with evidence of diastolic dysfunction .

### Heart failure with reduced ejection fraction

Heart failure with an ejection fraction below 40%.

### Mineralocorticoid receptor antagonist

A drug that antagonises the action of aldosterone at mineralocorticoid receptors.

[1] See team working in the management of heart failure in this guideline.

[2] This is a minimum. People with comorbidities or co-prescribed medications will need further monitoring. Monitoring serum potassium is particularly important if a person is taking digoxin or an MRA.

## Putting this guideline into practice

NICE has produced tools and resources to help you put this guideline into practice.

Putting recommendations into practice can take time. How long may vary from guideline to guideline, and depends on how much change in practice or services is needed. Implementing change is most effective when aligned with local priorities.

Changes recommended for clinical practice that can be done quickly – like changes in prescribing practice – should be shared quickly. This is because healthcare professionals should use guidelines to guide their work – as is required by professional regulating bodies such as the General Medical and Nursing and Midwifery Councils.

Changes should be implemented as soon as possible, unless there is a good reason for not doing so (for example, if it would be better value for money if a package of recommendations were all implemented at once).

Different organisations may need different approaches to implementation, depending on their size and function. Sometimes individual practitioners may be able to respond to recommendations to improve their practice more quickly than large organisations.

Here are some pointers to help organisations put NICE guidelines into practice:

1. **Raise awareness** through routine communication channels, such as email or newsletters, regular meetings, internal staff briefings and other communications with all relevant partner organisations. Identify things staff can include in their own practice straight away.

2. **Identify a lead** with an interest in the topic to champion the guideline and motivate others to support its use and make service changes, and to find out any significant issues locally.

3. **Carry out a baseline assessment** against the recommendations to find out whether there are gaps in current service provision.

4. **Think about what data you need to measure improvement** and plan how you will collect it. You may want to work with other health and social care organisations and specialist groups to compare current practice with the recommendations. This may also help identify local issues that will slow or prevent implementation.

5. **Develop an action plan**, with the steps needed to put the guideline into practice, and make sure it is ready as soon as possible. Big, complex changes may take longer to implement, but some may be quick and easy to do. An action plan will help in both cases.

6. **For very big changes** include milestones and a business case, which will set out additional costs, savings and possible areas for disinvestment. A small project group could develop the action plan. The group might include the guideline champion, a senior organisational sponsor, staff involved in the associated services, finance and information professionals.

7. **Implement the action plan** with oversight from the lead and the project group. Big projects may also need project management support.

8. **Review and monitor** how well the guideline is being implemented through the project group. Share progress with those involved in making improvements, as well as relevant boards and local partners.

NICE provides a comprehensive programme of support and resources to maximise uptake and use of evidence and guidance. See our into practice pages for more information.

Also see Leng G, Moore V, Abraham S, editors (2014) Achieving high quality care – practical experience from NICE. Chichester: Wiley.

# Context

## *Key facts and figures*

Heart failure is a complex clinical syndrome of symptoms and signs that suggest the efficiency of the heart as a pump is impaired. It is caused by structural or functional abnormalities of the heart. Around 920,000 people in the UK today have been diagnosed with heart failure. Both the incidence and prevalence of heart failure increase steeply with age, and the average age at diagnosis is 77. Improvements in care have increased survival for people with ischaemic heart disease, and treatments for heart failure have become more effective. But the overall prevalence of heart failure is rising because of population ageing and increasing rates of obesity.

## *Current practice*

Uptake of NICE's 2010 guidance on chronic heart failure appears to be good. However, the Department of Health's 2013 cardiovascular disease outcomes strategy noted that prescribing of ACE inhibitors, beta-blockers and aldosterone antagonists remains suboptimal, and that improved use of these drugs has the potential to reduce hospitalisations and deaths caused by heart failure. This update reviewed evidence on the clinical and cost effectiveness of these therapies.

Interdisciplinary working has contributed to better outcomes in heart failure but there is further room to improve the provision of multidisciplinary teams (MDTs) and integrate them more fully into healthcare processes. This update highlights and further expands on the roles of the MDT and collaboration between the MDT and the primary care team.

The 2013 cardiovascular disease outcomes strategy also noted that the proportion of people with heart failure who have cardiac rehabilitation was around 4%, and that increasing this proportion would reduce mortality and hospitalisation. This update recommends that all people with heart failure are offered an easily accessible, exercise-based cardiac rehabilitation programme, if this is suitable for them.

## *More information*

To find out what NICE has said on topics related to this guideline, see our web page on cardiovascular conditions.

## Recommendations for research

The guideline committee has made the following recommendations for research. The committee's full set of research recommendations is detailed in the full guideline.

### *1 Diuretic therapy for managing fluid overload in people with advanced heart failure in the community*

In people with advanced heart failure and significant peripheral fluid overload, what is the clinical and cost effectiveness of oral, subcutaneous and intravenous diuretic therapy in the community?

#### Why this is important

This research is critical to inform practice of how best to manage people with advanced heart failure in the community if they develop significant peripheral fluid overload. These people are more likely to have multiple admissions that, together with fluid overload, have a negative impact on their quality of life. Management in the community can minimise disruption for the person and reduce costs from hospital admissions. Knowledge of the most clinically and cost-effective routes of administration for diuretic therapy will dictate the level of resource needed to provide the service. Intravenous and subcutaneous diuretics usually need to be administered by nursing or healthcare staff. although a pump for self-administration of subcutaneous diuretics has recently been developed. Oral formulations can be self-administered.

### *2 Cardiac MRI versus other imaging techniques for diagnosing heart failure*

What is the optimal imaging technique for the diagnosis of heart failure?

#### Why this is important

The role of cardiac MRI in the detection and characterisation of several structural and functional cardiac abnormalities has become well established over the past 25 years. In people with heart failure, cardiac MRI provides reliable and reproducible assessments of the left ventricular (and to a degree the right ventricular) shapes, volumes and ejection fractions. It also provides spatial assessments of the congenital and acquired structural abnormalities of the heart and their interrelationships with the remainder of the heart, as well as functional and haemodynamic assessments of these abnormalities on the heart's performance. Finally, cardiac MRI provides valuable information about the myocardial structure and metabolism, including the presence of inflammation, scarring, fibrosis and infiltration. Cardiac MRI is an expensive form of imaging, and

much of this diagnostic information could be provided by less costly non-invasive imaging techniques, chiefly echocardiography. This question aims to find the most clinically and cost-effective imaging technique for the clinical diagnosis of heart failure.

## *3 The impact of atrial fibrillation on the natriuretic peptide threshold for diagnosing heart failure*

What is the optimal NT-proBNP threshold for the diagnosis of heart failure in people with atrial fibrillation?

### Why this is important

Atrial fibrillation is a common arrhythmia in the general population, and occurs in 30 to 40% of people with heart failure. Atrial fibrillation can raise the level of serum natriuretic peptides, including NT-proBNP, even in the absence of heart failure. This is complicated further in heart failure with preserved ejection fraction, in which 2 echocardiographic diagnostic criteria become unreliable (the left atrial volume and the tissue doppler imaging assessment of diastolic function). These factors contribute to the complexity of the diagnosis and have a potential impact on the usual thresholds for NT-proBNP in people who have atrial fibrillation. This has been recognised in several ongoing randomised controlled trials of heart failure, which are using higher NT-proBNP thresholds for the diagnosis of heart failure in people with atrial fibrillation.

## *4 The impact of advanced kidney disease on the natriuretic peptide threshold for diagnosing heart failure*

What are the optimal NT-proBNP thresholds for diagnosing heart failure in people with stage IIIb, IV or V chronic kidney disease?

### Why this is important

Heart failure incidence and prevalence increase with age, with the rise starting at age 65 and peaking between 75 and 85. Both advancing age and heart failure are associated with a gradual and progressive decline in renal function. In addition, the progression of heart failure and some treatments for heart failure lead to progressive deterioration of renal function. A decline in renal function is associated with increased fluid retention and a rise in the level of the serum natriuretic peptides, including NT-proBNP, even in the absence of heart failure. There is some evidence that the use of higher NT-proBNP thresholds would improve diagnostic accuracy for heart failure in people with significant deterioration of creatinine clearance.

## *5 Risk tools for predicting non-sudden death in heart failure*

What is the most accurate prognostic risk tool in predicting 1-year mortality from heart failure at specific clinically relevant thresholds (for example, sensitivity, specificity, negative predictive value and positive predictive value at a threshold of 50% risk of mortality at 1 year)?

### Why this is important

There are a number of validated prognostic risk tools for heart failure but most do not report sensitivity and specificity at clinically relevant thresholds. This information is crucial to enable accurate prediction of a person's risk of mortality. The ability to accurately predict a person's prognosis would allow clearer communication and timely referral to other services such as palliative care. Inaccurate prediction has the potential to lead to significant psychological harm and increased morbidity.

# Update information

## *September 2018*

This guideline updates and replaces NICE clinical guideline 108 (published August 2010). NICE clinical guideline 108 updated and replaced NICE clinical guideline 5 (published July 2003).

Recommendations are marked as **[2018]**, **[2016]**, **[2012]**, **[2010]**, **[2010, amended 2018]**, **[2003]**, **[2003, amended 2018]** or **[2003, amended 2010]**,

**[2018]** indicates that the evidence was reviewed and the recommendation added, updated or unchanged in 2018.

**[2016]** refers to NICE technology appraisal guidance published in 2016.

**[2012]** refers to NICE technology appraisal guidance published in 2012.

**[2010]** indicates that the evidence was reviewed in 2010.

**[2010, amended 2018]** indicates that the evidence was reviewed in 2010 but changes were made to the recommendation wording in 2018 that changed the meaning.

**[2003]** indicates that the evidence was reviewed in 2003.

**[2003, amended 2018]** indicates that the evidence was reviewed in 2003 but changes were made to the recommendation wording in 2018 that changed the meaning.

**[2003, amended 2010]** indicates that the evidence was reviewed in 2003 but changes were made to the recommendation wording in 2010 that changed the meaning.

## *Recommendations that have been changed*

### Amended recommendation wording (change to meaning)

| Recommendation in 2010 guideline | Recommendation in current guideline | Reason for change |
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| All recommendations referring to heart failure due to left ventricular systolic dysfunction (LVSD). | All recommendations referring to heart failure with reduced ejection fraction. | 'Heart failure due to left ventricular systolic dysfunction (LVSD)' has been replaced by 'heart failure with reduced ejection fraction' in line with current terminology and the 2018 guideline scope. |
| All recommendations referring to aldosterone antagonists. | All recommendations referring to mineralocorticoid receptor antagonists (MRAs). | 'Aldosterone antagonists' has been replaced by 'mineralocorticoid receptor antagonists (MRAs') to clarify the function of the receptor, and in line with the 2018 guideline scope. |

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| 1.1.1.6 Be aware that:<br>• obesity or treatment with diuretics, angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, angiotensin II receptor antagonists (ARBs) and aldosterone antagonists can reduce levels of serum natriuretic peptides<br>• high levels of serum natriuretic peptides can have causes other than heart failure (for example, left ventricular hypertrophy, ischaemia, tachycardia, right ventricular overload, hypoxaemia [including pulmonary embolism], renal dysfunction [GFR 60 ml/minute], sepsis, chronic obstructive pulmonary disease [COPD], diabetes, age 70 years and cirrhosis of the liver). **[new 2010]** | 1.2.7 Be aware that:<br>• obesity, African or African-Caribbean family origin, or treatment with diuretics, angiotensin-converting enzyme (ACE) inhibitors, beta-blockers, angiotensin II receptor blockers (ARBs) or mineralocorticoid receptor antagonists (MRAs) can reduce levels of serum natriuretic peptides<br>• high levels of serum natriuretic peptides can have causes other than heart failure (for example, left ventricular hypertrophy, ischaemia, tachycardia, right ventricular overload, hypoxaemia [including pulmonary embolism], renal dysfunction [GFR 60 ml/minute], sepsis, chronic obstructive pulmonary disease [COPD], diabetes, age 70 years and cirrhosis of the liver). **[2010, amended 2018]** | 'African or African-Caribbean family origin' has been added because of the high incidence of heart failure with preserved ejection fraction in these populations. Recent evidence shows that NT-proBNP levels are lower in people of west African family origin and are a confounder in the diagnosis of heart failure. |

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| 1.1.1.7 Perform transthoracic doppler 2D echocardiography to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle, and detect intracardiac shunts. [2003] | 1.2.8 Perform transthoracic echocardiography to exclude important valve disease, assess the systolic (and diastolic) function of the (left) ventricle, and detect intracardiac shunts. **[2003, amended 2018]** | All transthoracic echocardiography would have doppler 2D as a minimum and it is no longer necessary to specify this. |
| 1.1.1.8 Transthoracic doppler 2D echocardiography should be performed on high-resolution equipment by experienced operators trained to the relevant professional standards. Need and demand for these studies should not compromise quality. [2003]. | 1.2.9 Transthoracic echocardiography should be performed on high-resolution equipment by experienced operators trained to the relevant professional standards. Need and demand for these studies should not compromise quality. **[2003, amended 2018]** | All transthoracic echocardiography would have doppler 2D as a minimum and it is no longer necessary to specify this. |
| 1.1.1.10 Consider alternative methods of imaging the heart (for example, radionuclide angiography, cardiac magnetic resonance imaging or transoesophageal doppler 2D echocardiography) when a poor image is produced by transthoracic doppler 2D echocardiography. [2003] | 1.2.11 Consider alternative methods of imaging the heart (for example, radionuclide angiography [multigated acquisition scanning], cardiac MRI or transoesophageal echocardiography) if a poor image is produced by transthoracic echocardiography. **[2003, amended 2018]** | 'Multigated acquisition scanning' has been added to reflect current imaging technology.<br><br>All transthoracic echocardiography would have doppler 2D as a minimum and it is no longer necessary to specify this. |

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| 1.1.1.13 Perform an ECG and consider the following tests to evaluate possible aggravating factors and/or alternative diagnoses:<br>• chest X-ray<br>• blood tests:<br>• electrolytes, urea and creatinine<br>• eGFR (estimated glomerular filtration rate)<br>• thyroid function tests<br>• liver function tests<br>• fasting lipids<br>• fasting glucose<br>• full blood count<br>• urinalysis<br>• peak flow or spirometry **[2003, amended 2010]** | 1.2.12 Perform an ECG and consider the following tests to evaluate possible aggravating factors and/or alternative diagnoses:<br>• chest X-ray<br>• blood tests:<br>• renal function profile<br>• thyroid function profile<br>• liver function profile<br>• lipid profile<br>• glycosylated haemoglobin ($HbA_{1c}$)<br>• full blood count<br>• urinalysis<br>• peak flow or spirometry **[2010, amended 2018]** | Measurement of urea has been deleted because the guideline committee agreed that it is not needed and is not part of renal function profiles in most centres in the UK.<br><br>Blood tests for electrolytes, creatinine and eGFR have been grouped together under the term 'renal function profile' because they are provided as a unified set of analyses in the NHS. The term 'profile' is applied to a group of tests (assays). Thus these tests are more accurately described as 'profiles' as they contain multiple individual assays and have replaced thyroid function test, liver function test and lipid measurement.<br><br>'Fasting glucose' has been replaced by 'glycosylated haemoglobin ($HbA_{1c}$)' in line with the NICE guidelines on diabetes. |
| 1.2.2.6 Measure serum urea, creatinine, electrolytes and eGFR at initiation of an ACE inhibitor and after each dose increment. **[2010]** | 1.4.4 Measure serum sodium and potassium, and assess renal function, before and 1 to 2 weeks after starting an ACE inhibitor, and after each dose increment. **[2010, amended 2018]** | Measurement of serum urea has been deleted because the guideline committee agreed that it is not needed and is not part of renal function profiles in most centres in the UK. |

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| | | Measurement of potassium has been added to ensure that monitoring is consistent across treatments. |
| No recommendation | 1.4.6 Once the target or maximum tolerated dose of an ACE inhibitor is reached, monitor treatment monthly for 3 months and then at least every 6 months, and at any time the person becomes acutely unwell. **[2010, amended 2018]** | A recommendation has been added to clarify the timing of monitoring after treatment starts. |
| 1.2.2.15 Monitor serum urea, electrolytes, creatinine and eGFR for signs of renal impairment or hyperkalaemia in patients with heart failure who are taking an ARB. **[new 2010]** | 1.4.8 Measure serum sodium and potassium, and assess renal function, before and after starting an ARB and after each dose increment. **[2010, amended 2018]** | Measurement of urea has been deleted because the guideline committee agreed that it is not needed and is not part of renal function profiles in most centres in the UK. |
| | | Monitoring for hyperkalaemia has been replaced by potassium measurement for clarity. |
| No recommendation | 1.4.10 Once the target or maximum tolerated dose of an ARB is reached, monitor treatment monthly for 3 months and then at least every 6 months, and at any time the person becomes acutely unwell. **[2010, amended 2018]** | A recommendation has been added to clarify the timing of monitoring after treatment starts. |

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| 1.2.2.8 Introduce beta-blockers in a 'start low, go slow' manner, and assess heart rate, blood pressure, and clinical status after each titration. **[2010]** | 1.4.13 Introduce beta-blockers in a 'start low, go slow' manner. Assess heart rate and clinical status after each titration. Measure blood pressure before and after each dose increment of a beta-blocker. **[2010, amended 2018]** | Blood pressure measurement has been clarified and made consistent with other treatments. |
| 1.2.2.16 Digoxin is recommended for:<br>• worsening or severe heart failure due to left ventricular systolic dysfunction despite first- and second-line treatment for heart failure . **[2003, amended 2010]** | 1.4.26 Digoxin is recommended for worsening or severe heart failure with reduced ejection fraction despite first-line treatment for heart failure .Seek specialist advice before initiating. **[2010, amended 2018]** | As a result of new evidence the treatment pathway for heart failure with reduced ejection fraction has been amended. Second-line treatment has been replaced by specialist treatment.<br><br>A sentence has been added to clarify that specialist advice should be sought before starting treatment with digoxin. |
| 1.2.2.18 The diagnosis and treatment of heart failure with preserved ejection fraction should be made by a specialist, and other conditions that present in a similar way may need to be considered. Patients in whom this diagnosis has been made should usually be treated with a low to medium dose of loop diuretics (for example, less than 80 mg furosemide per day). Patients who do not respond to this treatment will require further specialist advice. **[2003]** | 1.6.2 People who have heart failure with preserved ejection fraction should usually be offered a low to medium dose of loop diuretics (for example, less than 80 mg furosemide per day). People whose heart failure does not respond to this treatment will need further specialist advice. **[2003, amended 2018]** | The first part of the recommendation has been removed because it is now covered in section 1.1 on team working in the management of heart failure. |

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| 1.2.2.19 Amlodipine should be considered for the treatment of comorbid hypertension and/or angina in patients with heart failure, but verapamil, diltiazem or short-acting dihydropyridine agents should be avoided. [2003] | 1.6.3 Avoid verapamil, diltiazem and short-acting dihydropyridine agents in people who have heart failure with reduced ejection fraction. **[2003, amended 2018]** | Amlodipine to treat hypertension has been superseded by the NICE guideline on hypertension in adults. |
| 1.2.2.21 The need to continue the amiodarone prescription should be reviewed regularly. [2003] | 1.6.5 Review the need to continue the amiodarone prescription at the 6-monthly clinical review. **[2003, amended 2018]** | 'Regularly' has been replaced by 'at the 6-monthly clinical review' for clarification. |
| 1.2.2.22 Patients taking amiodarone should have a routine 6-montly clinical review, including liver and thyroid function test, and including a review of side effects. [2003] | 1.6.6 Offer people taking amiodarone liver and thyroid function tests, and a review of side effects, as part of their routine 6-monthly clinical review. **[2003, amended 2018]** | The wording has been amended in line with recommendation 1.6.5. |

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| 1.4.1.1 All people with chronic heart failure need monitoring. This monitoring should include:<br>• a clinical assessment of functional capacity, fluid status, cardiac rhythm (minimum of examining the pulse), cognitive status and nutritional status<br>• a review of medication, including need for changes and possible side effects<br>• serum urea, electrolytes, creatinine and eGFR. **[2003, amended 2010]** | 1.7.1 All people with chronic heart failure need monitoring. This monitoring should include:<br>• a clinical assessment of functional capacity, fluid status, cardiac rhythm (minimum of examining the pulse), cognitive status and nutritional status<br>• a review of medication, including need for changes and possible side effects<br>• an assessment of renal function. **[2010, amended 2018]** | Measurement of urea has been deleted because the guideline committee agreed that it is not needed and is not part of renal function profiles in most centres in the UK. |

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## *Accreditation*