

Contents

| | |
|---|----|
| <u>Definition</u> | 2 |
| <u>Prevalence and incidence</u> | 3 |
| <u>Signs and symptoms</u> | 4 |
| <u>Causes/risk factors</u> | 5 |
| <u>Pathophysiology (mechanism of disease)</u> | 5 |
| <u>Non-pharmacological treatment</u> | 10 |
| <u>Further resources</u> | 12 |
| <u>Patient support</u> | 12 |
| <u>External websites</u> | 13 |
| <u>References</u> | 13 |

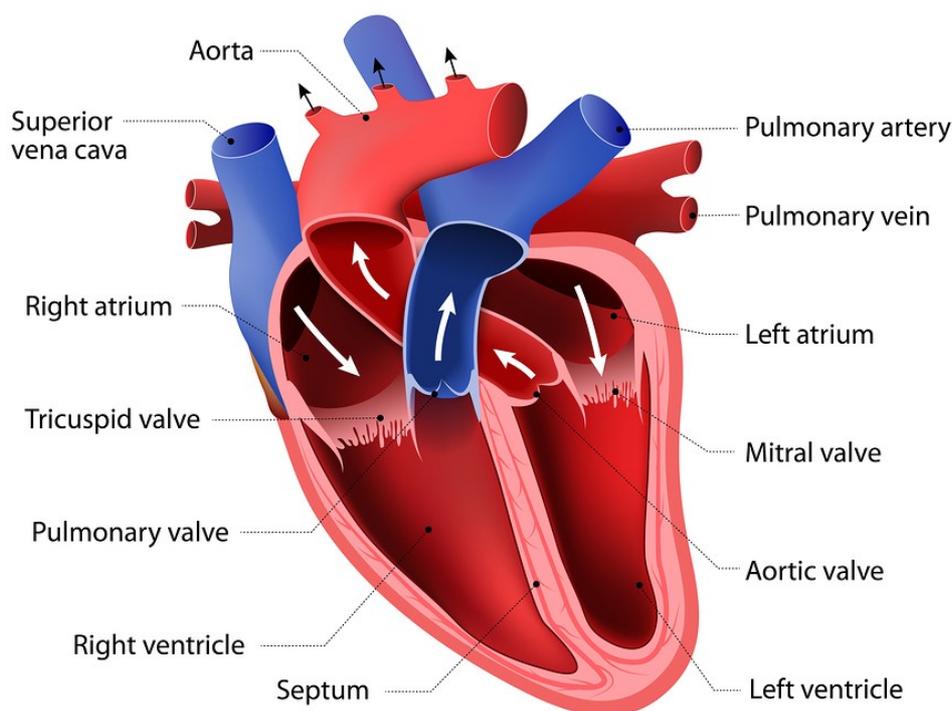
Please note that links in this page may take you directly to the British Heart Foundation's website, where you can find person-centred information on heart conditions and related terms.

Definition

Heart failure is a syndrome where the heart's ability to pump blood around the body is impaired. This is as a result of impaired ventricular filling or ejection due to structural or functional impairment.¹

The diagram below shows the basic anatomy of the heart and the location of the ventricles. The white arrows indicate the direction of blood flow.

Heart Anatomy



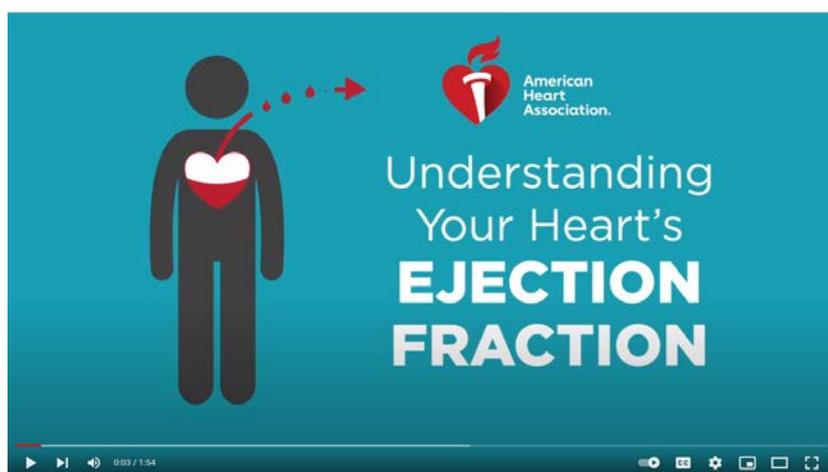
Access the American Heart Association's interactive cardiovascular library page on [Heart failure](#) to see the changes to the heart that can occur during heart failure.

Terminology

Some of the different classifications of heart failure will be referred to throughout this fact sheet. To learn about the classification of heart failure, access the [NICE CKS Heart failure – chronic](#) resource, which describes the subtypes of heart failure:

- heart failure with reduced ejection fraction (HFREF or HFrEF)
- heart failure with mildly reduced ejection fraction (HFmrEF)
- heart failure with preserved ejection fraction (HF-PEF or HFpEF)
- end-stage heart failure.¹

Access the American Heart Association's video (1:54 minutes) on [ejection fraction – heart failure measurement](#) to understand how ejection fraction (EF) is measured, what the numbers mean, and the terminology used in heart failure management.



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[NICE CKS Heart failure - chronic](#) also refers to the New York Heart Association (NYHA) functional classification of heart failure which can be used to describe a person's symptom level in terms of limitations in physical activity, due to heart failure.¹

Section 3.2 *Terminology*, in the 2021 [ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology \(ESC\). Developed with the special contribution of the Heart Failure Association \(HFA\) of the ESC](#) provides more detail about the terminology used to describe heart failure – definitions relating to ejection fraction, right ventricular dysfunction, acute and chronic heart failure, decompensated heart failure and the symptomatic severity of heart failure (NYHA).²

The terminology used to describe heart failure is also explained in the Northern Ireland Centre for Pharmacy Learning and Development (NICPLD) [Cardiovascular disease: heart failure](#) e-learning programme hosted on CPPE's website. This can be found in Section 1, *Heart failure*, page 2 of 32, *Terminology*.

[Return to contents](#)

Prevalence and incidence

The [NICE CKS Heart failure - chronic](#) resource states that the prevalence of heart failure slowly increases with age until about 65 years of age, and then more rapidly. In the UK, the prevalence of heart failure is estimated to be about:

- 1 in 35 people 65 to 74 years of age.
- 1 in 15 people 75 to 84 years of age.
- Just over 1 in 7 people 85 years of age or older.^{1,3}

The average age at first diagnosis is 76 years of age.³

According to the 2021 [ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure](#), Section 3.3, *Epidemiology and natural history of heart failure*, of those affected by heart failure, about 50 percent have HFrEF and 50 percent have HFpEF. In addition, heart failure patients are somewhat more than 50 percent female.²

[Return to contents](#)

Signs and symptoms

[NICE CKS Heart failure - chronic](#) states that many of the symptoms of heart failure are non-specific, which means that they are not very helpful when it comes to making a diagnosis. They can, however, be used to classify the severity of heart failure and for monitoring response to treatment.¹

The [NHS UK Conditions: Heart failure](#) resource states that the most common symptoms of heart failure are:

- breathlessness on exertion, at rest, on lying flat (orthopnoea) and at night,
- fluid retention leading to peripheral oedema (ankle swelling),
- fatigue, decreased exercise tolerance or increased recovery time after exercise.⁴

Less common symptoms include:

- persistent cough which may be worse at night,
- waking at night due to breathlessness (paroxysmal nocturnal dyspnoea or PND)
- tachycardia (heart rate over 100 beats per minute)
- light headedness or syncope (loss of consciousness or fainting, usually due to insufficient blood flow to the brain)
- fluid retention causing a bloated feeling or abdominal swelling,
- weight gain or weight loss,
- a pounding, fluttering or irregular heartbeat (palpitations)
- fast breathing (tachypnoea)
- wheezing
- confusion.¹

When a person is examined, the following signs may indicate heart failure:

- abnormal heart sounds
- abnormal lung sounds
- hypertension
- raised jugular venous pressure (JVP – pressure in the vein in the neck leading back into the heart)
- enlarged liver (due to engorgement with blood).¹

[Return to contents](#)

Causes/risk factors

In the UK, the most common cause of heart failure is [coronary heart disease](#). Other causes include:

- [high blood pressure](#)
- [myocardial infarction \(heart attack\)](#)
- [cardiomyopathy](#)
- [abnormal heart rhythms](#)
- [heart valve disease](#)
- [pericarditis](#)
- [congenital heart disease](#)
- conditions that increase the demand on the heart, leading to increased cardiac output (high output states), for example, complications of [anaemia](#), [hyperthyroidism](#), [adrenal disorders](#), [sepsis](#) and [liver failure](#)
- volume overload due to [end-stage chronic kidney disease](#) or [nephrotic syndrome](#) (a type of kidney disease)
- obesity
- drugs such as alcohol and cocaine.¹

Comorbidities may worsen heart failure and can affect treatment. For more information about comorbidities affecting heart failure, access the NICPLD [Cardiovascular disease: heart failure](#) e-learning programme hosted on CPPE's website. This can be found in Section 1, *Heart failure*, page 24 of 32 *Comorbidities*.

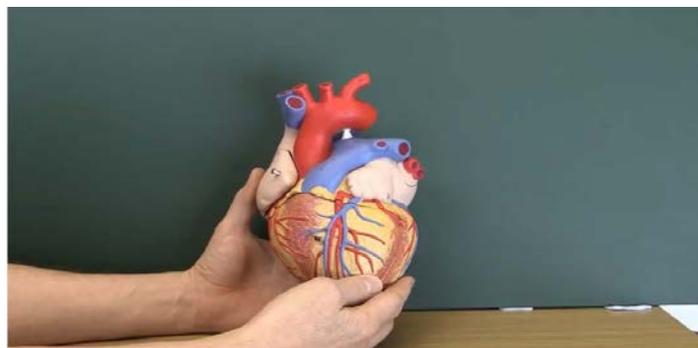
Note that non-steroidal anti-inflammatory drugs (NSAIDs) may worsen pre-existing heart failure; beta-blockers may worsen heart failure when first initiated (which is why treatment is always started with a small dose with careful dose titration); and calcium-channel blockers (particularly verapamil and diltiazem) may worsen some types of heart failure.

[Return to contents](#)

Pathophysiology (mechanism of disease)

To understand how heart failure develops, it's important to have a basic understanding of the anatomy of the heart. If you would like to refresh your understanding of the structure of the heart, watch the following video by Dr John Campbell.

[Dr John Campbell – Anatomy 13, heart](#)



The pathophysiology of heart failure is explained in simple terms in the NICPLD [Cardiovascular disease: heart failure](#) e-learning programme hosted on CPPE's website. This can be found in Section 1, *Heart failure*, page 4 of 32, *Pathophysiology*.

[BMJ Best Practice 2023 Chronic heart failure](#) also summarises the aetiology and pathophysiology of chronic heart failure.⁵

[Return to contents](#)

Prognosis and complications

The prognosis for those who have heart failure is poor. About 50 percent of people die within five years of diagnosis.⁶

Approximately ten percent of those admitted to hospital with acute heart failure in the UK die in hospital, with more than one third of those discharged dying in the following year.¹

[NICE Clinical Knowledge Summary: Heart failure – chronic](#), highlights that there are several factors which affect a person's heart failure prognosis. Factors which are linked to a poor prognosis include:

- *Increased age.*
- *Reduced ejection fraction (the lower the ejection fraction, the poorer the prognosis).*
- *The presence of comorbidities (such as atrial fibrillation, chronic kidney disease, chronic obstructive pulmonary disease, depression and diabetes mellitus).*
- *Worsening severity of symptoms (based on the NYHA classification).*
- *the presence of signs such as raised jugular venous pressure, third heart sound, low systolic blood pressure and tachycardia.*
- *Obesity or cachexia (wasting.)*
- *Smoking.*
- *Heart failure caused by ischaemic heart disease, and specifically a history of myocardial infarction*
- *The presence of complex ventricular arrhythmias (frequent premature ventricular complexes and non-sustained ventricular tachycardia).¹*

[NICE CKS Heart failure – chronic](#), highlights there are several complications associated with heart failure, including cardiac arrhythmias, depression, cachexia, [chronic kidney disease](#) (CKD), sexual dysfunction and sudden cardiac death.¹

Note: CKD is common in those with heart failure, with an impaired response to treatment with diuretics and ACE-inhibitors. CKD is strongly associated with increased morbidity and mortality.⁵ In addition, heart failure is also a risk factor for [CKD](#) and [acute kidney injury](#) (AKI). Refer to the NICE guideline [\[NG148\] Acute kidney injury: prevention, detection and management](#), December 2019 and the NICE Quality standard [\[QS76\] Acute kidney injury](#) March 2023 for more information.

The most common arrhythmia associated with heart failure is atrial fibrillation.² Information about atrial fibrillation in heart failure can be found in the NICPLD [Cardiovascular disease: heart failure](#) e-learning programme hosted on CPPE's website. This can be found in Section 1, *Heart failure*, page 23 of 32, *Atrial fibrillation in heart failure*.

[Return to contents](#)

Diagnosis/detection

There are a variety of tests that need to be performed to confirm a diagnosis of heart failure. These include:

- electrocardiogram (ECG) to identify arrhythmias and current ischaemia or evidence of previous ischaemia (for example, as a result of a myocardial infarction)
- chest X-ray to help differentiate between heart and lung conditions and other conditions
- echocardiography to provide information about the heart's structure, determine the level of heart function, assess valve function and measure EF
- blood tests
 - renal function profile (electrolytes, creatinine and estimated glomerular filtration rate [eGFR]) – deranged electrolytes may increase the risk of arrhythmias; additionally, many patients with heart failure will have impaired renal function or chronic kidney disease.
 - thyroid function profile, liver function profile, lipid profile, glycosylated haemoglobin (HbA1c) and full blood count
 - N-terminal pro-B-type natriuretic peptide (NT-proBNP), which is released by cardiomyocytes when the wall of the ventricle is stretched. This test helps to determine the likelihood of symptoms being heart failure, and also disease severity.⁵

Other tests may be undertaken to rule out differential diagnoses.

Section 1.2, *Diagnosing heart failure* of NICE guidance [Chronic heart failure in adults: diagnosis and management \[NG106\]](#), provides information on the symptoms, signs and investigations (including interpretation of NT-proBNP levels) which support the diagnosis of heart failure.³

The British Heart Foundation's [Tests](#) information booklet offers simple explanations about which tests are commonly offered to help diagnose heart diseases.

[Return to contents](#)

Collaborative working in heart failure

NICE guidance [Chronic heart failure in adults: diagnosis and management \[NG106\]](#), Section 1.1, *Team working in the management of heart failure* outlines the roles of a core specialist heart failure multidisciplinary team (MDT) and primary care team, and how they should work in collaboration. The wider MDT should always be considered when initiating or modifying a person's pharmacological treatments.

Pharmacological treatment

The 2021 [ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure](#) covers pharmacological treatment options in heart failure with reduced and preserved EF, which can be found in Sections 5,7 and 8.²

Note: The ESC Guidelines are considered to be more contemporary, ie, more in line with current practice than NICE guidance [\[NG106\]](#).

Pharmacological treatment options are outlined in NICE guidance [Chronic heart failure in adults: diagnosis and management \[NG106\]](#) under the following sections:

- 1.4 *Treating heart failure with reduced ejection fraction*
- 1.5 *Treating heart failure with reduced ejection fraction in people with chronic kidney disease*
- 1.6 *Managing all types of heart failure*
- 1.7 *Monitoring treatment for all types of heart failure*³

Refer to the [\[NG106\] visual summary](#) for an overview.

Note: Updated NICE guidance is expected later in 2023. Key developments relating to the use of the SGLT2 inhibitors in heart failure are included in the NICE Technology appraisal guidance for dapagliflozin and empagliflozin in HFREF.

- [NICE Technology appraisal guidance \[TA679\]: Dapagliflozin for treating chronic heart failure with reduced ejection fraction](#) Published: 24 February 2021
- [NICE Technology appraisal guidance \[TA773\]: Empagliflozin for treating chronic heart failure with reduced ejection fraction](#). Published: 9 March 2022

Developments currently being considered by NICE for HFpEF and HFmrEF:

- [NICE final appraisal Dapagliflozin for treating chronic heart failure with preserved or mildly reduced ejection fraction \[ID1648\]: In development \[GID-TA10942\]](#) Expected publication date: 21 June 2023

[NICE Clinical Knowledge Summaries: Heart failure – chronic](#) also outlines prescribing information focusing on the medicines commonly used in heart failure:

- Angiotensin converting enzyme inhibitors (ACE inhibitors) / angiotensin-II receptor antagonists (AIIIRAs or ARBs) / angiotensin receptor neprilysin inhibitor (ARNI = sacubitril + valsartan)
- [Beta-blockers](#) licensed for heart failure
- Mineralocorticoid receptor antagonist (MRA)
- [SGLT2 inhibitors](#) (dapagliflozin or empagliflozin)
- Diuretics if required for congestion

Think Kidneys, [the Renal Association](#) and the [British Society for Heart Failure](#) produced a position statement [Changes in kidney function and serum potassium during ACEI/ARB/diuretic treatment in primary care](#) with recommendations on the management of ACE inhibitors, ARBs and diuretic treatment in primary care.

Clarke A., et al. discuss the position statement and other national guidance in more detail in a BMJ Heart review, [Change in renal function associated with drug treatment in heart failure: national guidance](#) – this is a useful article to develop your understanding of how this complex situation should be managed.⁷

Pharmacological treatment options and the rationale for their use are also outlined in the NICPLD [Cardiovascular disease: heart failure](#) e-learning programme hosted on CPPE's website. This can be found in Section 1, *Heart failure*, page 10 to 18 of 32, *Treatment*.

Additional treatments for heart failure for selected patients, usually on specialist advice, include digoxin, hydralazine+nitrates, ivabradine, intravenous iron and potassium binders.³

Diuretics

Diuretics are an integral part of the management of symptomatic heart failure, The Heart Failure Association of the European Society of Cardiology position statement [The use of diuretics in heart failure with congestion](#) provides a comprehensive summary of the use of diuretics, explaining that:

*'...the vast majority of acute heart failure episodes are characterized by increasing symptoms and signs of congestion with volume overload. The goal of therapy in those patients is the relief of congestion through achieving a state of euvolaemia, mainly through the use of diuretic therapy. The appropriate use of diuretics however remains challenging, especially when worsening renal function, diuretic resistance and electrolyte disturbances occur.'*⁸

This position paper focuses on the use of diuretics in heart failure with congestion.

'The manuscript addresses frequently encountered challenges, such as:

- (i) evaluation of congestion and clinical euvolaemia,*
- (ii) assessment of diuretic response/resistance in the treatment of acute heart failure,*
- (iii) an approach towards stepped pharmacologic diuretic strategies, based upon diuretic response, and*
- (iv) management of common electrolyte disturbances.*

*Recommendations are made in line with available guidelines, evidence and expert opinion.'*⁸

Notes:

The capacity of inducing natriuresis or diuresis following diuretic administration is defined as [diuretic response](#).

[Diuretic resistance](#) is defined as an impaired sensitivity to diuretics resulting in reduced natriuresis and diuresis limiting the possibility to achieve euvolaemia.⁸

Vaccination

People with heart failure should be offered an annual vaccination against influenza and a once-only vaccination against pneumococcal disease.³

Also, COVID-19 vaccination in line with the national programme is recommended.

[Return to contents](#)

Non-pharmacological treatment

Salt intake and fluid balance

NICE recommends the following in [Chronic heart failure in adults: diagnosis and management \[NG106\]](#):

‘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.*³

The Scottish Intercollegiate Guidelines Network (SIGN) national clinical guideline [\[SIGN147\] Management of chronic heart failure](#) recommends that *‘patients with heart failure should be advised to aim for a salt intake of less than 6 g/day’*.⁹

The BHF have a *‘healthy living: healthy eating’* resource about [salt](#). [Action on salt](#) also has a wide range of useful [resources](#) and support the annual [World salt awareness week](#) (and sugar awareness week).

The [SIGN147] guideline recommends that fluid intake should be assessed in those who experience frequent episodes of decompensated heart failure, and information about fluid restriction should be tailored to an individual patient’s needs. They go on to state that *‘patients with chronic heart failure should be encouraged to weigh themselves at a set time of day, every day (after waking, before dressing, after voiding, before eating). Patients should report to their general practitioner or heart failure specialist any weight gain of more than 1.5 to 2 kg (3 to 4 lbs) in two days’*.⁹

Further lifestyle information

The provision of information on smoking cessation, alcohol intake, air travel and driving is recommended.⁵

For more information, access NICE guidance [Chronic heart failure in adults: diagnosis and management \[NG106\]](#), Section 1.6, *Managing all types of heart failure, Lifestyle advice*.

The BHF provide information and support for people with [heart failure](#).

The following video follows Edith who has made small changes to her lifestyle to help her live well with her heart failure.

[British Heart Foundation – One step at a time, Edith’s heart failure story](#)



Cardiac rehabilitation

Cardiac rehabilitation involves exercise and information. For more information, you can watch the following British Heart Foundation (BHF) video, *Joining a Cardiac Rehabilitation Programme*, which can be found on their [Cardiac rehabilitation](#) page.

[British Heart Foundation - Joining a cardiac rehabilitation programme](#)



Pacemakers and implantable cardioverter defibrillator (ICDs)

Some people with heart failure may be offered either a [pacemaker](#) or an [implantable cardioverter defibrillator \(ICD\)](#) to regulate their heart rate (pacemakers) and additionally cardiovert or defibrillate (ICDs).

More information about these devices can be found in Section 6, *Cardiac rhythm management for heart failure with reduced ejection fraction* in the 2021 [ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure](#) and NICE technology appraisal guidance [Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure \[TA314\]](#).¹⁰

End-stage heart failure

The NICE CKS [Heart failure – chronic](#), Scenario: *End-stage heart failure* covers the management that can be offered to those approaching the end of life.

The BHF's [Difficult Conversations – talking to people with heart failure about the end of life](#) guide aims to support those caring for people affected by heart failure, in particular healthcare professionals, to open up conversations about end of life wishes and preferences.

[Return to contents](#)

Further resources

Patient support

The [Pumping Marvellous Foundation \(PMF\)](#) is the UK's patient-led heart failure charity which is focused on improved patient outcomes.

The Health Talk page ***Specialist heart failure nurses*** looks at the role of specialist heart failure nurses and how they support those with heart failure.

The BHF offers information about specific conditions and support to those with heart conditions. More information can be found on their [Information & support](#) page.

The NHS has a dedicated [Heart failure](#) page, with information on symptoms, diagnosis, treatment and living with heart failure.

[The British Society for Heart Failure – Help us make heart failure a national priority](#) offers information and links to organisations, patient groups and websites.

[NHSE Managing heart failure @home information for patients](#) February 2023.

[Heart Failure Matters](#) have a range of [support](#) and resources for patients and professionals.

[Return to contents](#)

External websites

CPPE is not responsible for the content of any non-CPPE websites mentioned on this page or for the accuracy of any information to be found there.

All web links were accessed on 24 May 2023.

[Return to contents](#)

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[Return to contents](#)

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