Heart Failure Management

See also the separate Heart Failure Diagnosis and Investigation, Cardiac Rehabilitation and Palliative Care of Heart Failure articles.

Chronic heart failure may be compensated and stable with few signs and baseline symptoms, or decompensated with a recent clinical deterioration and physical evidence of impaired perfusion and oxygenation.

In cases of decompensation, always consider both the original aetiology of the heart failure and potential causes of any deterioration such as:

- Further/worsening ischaemia.
- Myocardial infarction (MI).
- Additional valvular or diastolic dysfunction.
- Infections.
- Arrhythmias - commonly atrial fibrillation (AF).
- Electrolyte imbalance.
- Worsening comorbidities - eg, anaemia, thyroid dysfunction, pulmonary disease, renal dysfunction, diabetes.
- New medications.

Patient education and self-care

Patient and family education and training in self-care are effective at improving adherence, symptom control, functional capacity and well-being\(^1\). Topics should include:

- Nature and cause of symptoms.
- Available treatments, likely side-effects and responses.
- Recognition and reaction to symptoms - eg, flexible dosing of diuretics which can be titrated to symptoms, with advice as to when to contact the healthcare team.
- Risk factor modification.
- Dietary and exercise advice.
- Psychosocial aspects to the disease.
- Prognosis.

Specialist heart failure nurses

Community-based heart failure nurses provide an important adjunct to self-care, as well as a bridge to secondary care. Referral of those with moderate-to-severe heart failure to such a service improves symptom management, reduces hospital admissions and also assists in the transition to a palliative care approach when appropriate.

Lifestyle modification

Smoking

Encourage the patient who is a smoker to stop smoking; provide support with smoking cessation.
Diet and fluid intake

- Advise patients regarding good nutrition and provide help for obese patients to reduce their weight. Cachectic patients (weight loss over six months ≥6% of previous, stable body weight) should be assessed by a dietician.
- Suggest patients should avoid foods with a high salt content and should not add salt to their food. Salt intake should not exceed 2-3 g per day. Consider moderate sodium restriction in severe congestive cardiac failure (CCF); take care that ‘low-salt’ alternatives are not overused, as they can be very rich in potassium which may be a problem for patients on angiotensin- converting enzyme (ACE) inhibitors or spironolactone.
- Advise patients with severe CCF, particularly in conjunction with hyponatraemia, to restrict their fluid intake sensibly. Take care to avoid excessive dehydration - particularly in elderly patients on high-dose diuretics.
- Patients can contribute to monitoring their fluid retention by regularly weighing themselves. Where there is a sudden, unexpected weight gain of ≥2 kg in three days, advice should be sought. Some patients may benefit from being able to vary their diuretic dose on the basis of regular weights. Self-weighing complements ongoing monitoring of weight in the GP surgery and hospital outpatient and inpatient wards.

Alcohol

Alcohol can act as a negative inotrope and increase blood pressure and the risk of arrhythmias. Restrict alcohol intake to 10-20 g/day (equivalent to 1-2 glasses of wine) or advise abstention if there is alcohol-induced cardiomyopathy.

Exercise

Encouraging aerobic exercise, preferably as part of a supervised cardiac rehabilitation programme, has proven beneficial effect[2].

Travel

New York Heart Association (NYHA) class I and II are not restricted in plane travel[3]. Oxygen may be required for class III and is recommended (with in-flight medical assistance) for class IV. High altitudes and travel to very hot and humid areas should be discouraged in symptomatic patients who may not adapt easily.

The Driver and Vehicle Licensing Agency (DVLA) need not be notified for private car use but LGV drivers are disqualified, if symptomatic[4].

Sex and reproductive health

- There are no specific restrictions for sexual activity, although there is a slight risk of decompensation in those with NYHA class III-IV.
- Advise patients that symptoms such as dyspnoea, palpitations and angina are unlikely to occur related to sex unless similar symptoms are experienced with moderate exercise (eg, climbing two flights of stairs reasonably quickly).
- Sexual problems are common in patients with heart failure related to concurrent cardiovascular disease, side-effects of treatment (eg, beta-blockers) and psychological factors:
  - Sublingual glyceryl trinitrate may be used prophylactically against dyspnoea and chest pain during sex but nitrates must never be combined with phosphodiesterase inhibitors such as sildenafil.
  - Phosphodiesterase inhibitors are not currently recommended for use in those with advanced heart failure.
- Pregnancy risks worsening of heart failure due to increased blood volume and cardiac output and many relevant medications are contra-indicated in pregnancy. Potentially fertile women with heart failure should receive prenatal counselling to enable informed reproductive choice.

Mental health and well-being

Depression is very common in heart failure, occurring in at least 1 in 5 patients and at much higher levels in those with advanced disease. Screening and appropriate treatment should be considered in patients with heart failure[5].

Immunisation

Annual influenza vaccination and single pneumococcal vaccination should be given.

Commonly used drugs[5, 6]

See also the separate Acute Pulmonary Oedema article.

ACE inhibitors

- All patients with a left ventricular ejection fraction (LVEF) of 40% or less, regardless of symptom severity, should receive an ACE inhibitor unless contra-indicated or not tolerated[11].
- This is because ACE inhibitors have been shown to improve ventricular function and patient well-being, to reduce mortality and hospital admissions in many large clinical trials and are indicated in all stages of left ventricular systolic dysfunction (LVSD).
- Contra-indications include a history of angio-oedema, bilateral renal artery stenosis, hyperkalaemia (>5 mmol/L), severe renal impairment (serum creatinine >220 μmol/L) and severe aortic stenosis.
- Check U&Es and renal function prior to starting treatment and then after 1-2 weeks of treatment or dose adjustment.
- Titrate the dose up after 2-4 weeks, provided there is no worsening of renal function or hyperkalaemia, aiming for the evidence-based target dose or maximum tolerated dose.
- Recheck U&Es at one, three and six months after achieving the maintenance dose, and twice-yearly thereafter.
If renal function worsens, check and eliminate other nephrotoxic drugs such as non-steroidal anti-inflammatory drugs (NSAIDs). An increase of up to 50% from baseline or to an absolute creatinine concentration of 265 μmol/L is deemed acceptable; however, above this reduce the ACE inhibitor dose. Stop the ACE inhibitor where the creatinine concentration is ≥310 μmol/L.

Warn the patient regarding initial symptoms of dizziness; where this does not improve with time or causes risk of falling, reduce the dose or stop other hypotensive medications. Switch to an angiotensin-II receptor antagonist if a chronic cough develops.

Diuretics

- Diuretics appear to reduce the risk of death and worsening of chronic heart failure[7].
- Symptomatic failure usually requires loop diuretics such as furosemide. Diuretics give symptom relief but do not alter prognosis[1]. They should usually be used in combination with an ACE inhibitor.
- Give initial doses intravenously (IV) in cases of severe failure, as their onset of action is faster (5 minutes compared with 1-2 hours po) and oral absorption may be reduced by intestinal mucosal oedema (bumetanide has slightly better bioavailability in the oedematous gut).
- Beware of both overtreatment and undertreatment with diuretics (start with a low dose and increase depending on the response); review clinical condition and electrolytes regularly - watch for hypokalaemia, hypovolaemia leading to circulatory collapse and uraemia, particularly in the older patient. Note that creatinine is not a reliable indicator of overall renal function and that glomerular filtration rate (GFR) may be reduced by up to 75% before it begins to rise, particularly in patients with a low muscle mass.
- Weight monitoring is invaluable in assessing the degree of fluid retention and optimal diuretic strategy. Aim to maintain 'dry weight' with the lowest achievable dose of diuretic.
- Where diuretic response is insufficient:
  - Check compliance and fluid intake.
  - Increase the dose of diuretic.
  - Consider switching from furosemide to bumetanide or torasemide.
  - Add an aldosterone antagonist.
  - Combine a loop diuretic with a thiazide (eg, metolazone).
  - Give the loop diuretic bd or on an empty stomach.
  - Consider short-term use of IV infusion of loop diuretic.

- Excessive diuresis increases the risk of hypotension and renal dysfunction associated with ACE inhibitor therapy. Where ACE inhibitors or aldosterone antagonists are used with a diuretic, potassium replacement is not usually required.
Beta-blockers

- Current guidance suggests that beta-blockers should be used in all patients with symptomatic heart failure and an LVEF ≤40%, where tolerated and not contra-indicated. Trial evidence shows beta-blockers increase ejection fraction and exercise tolerance and reduce morbidity, mortality and hospital admissions additional to that produced by co-prescription of ACE inhibitors.
- They should be initiated in stabilised patients already on diuretics and ACE inhibitors, regardless of whether or not symptoms persist.[8]
- Evidence for the benefit of beta-blockade in heart failure is limited to bisoprolol, carvedilol, metoprolol and nebivolol. National Institute for Health and Care Excellence (NICE) guidance states that if patients were already taking a non-recommended beta-blocker (such as atenolol) they should continue with this.
- A study looking at beta-blocker prescribing in British general practice showed that only about a fifth of patients with heart failure received beta-blockers[8]. A major barrier to this practice is the prior, long-standing contra-indication of beta-blockers in heart failure and concerns about the difficulty of initiating beta-blockers in such patients. They can be safely initiated/titrated in the community in elderly patients and others with relative contra-indications - eg, diabetes, mild hypotension, fixed airways obstruction.
- Asthma, second- or third-degree heart block, sick sinus syndrome (without pacemaker) and sinus bradycardia (<50 beats per minute (bpm)) remain contra-indications to beta-blocker use.
- Initiate at a low dose, with increases every 2-3 weeks until the target evidence-based dose or maximum tolerated dose is reached.
- Monitor blood pressure and heart rate with each increase in dose. If hypotensive, discontinue other vasodilator drugs (eg, nitrates, calcium-channel blockers) where possible. Where bradycardia (<60 bpm) develops, stop other contributory medications (eg, digoxin, amiodarone).
- Do not abruptly stop beta-blockers, as this risks an MI or arrhythmia.

Angiotensin-II receptor antagonists[9]

- Candesartan and valsartan are now licensed for this indication. They do not cause the chronic cough side-effect associated with ACE inhibitors.
- Angiotensin receptor blockers are indicated for the treatment of heart failure with reduced ejection fraction only in patients who cannot tolerate an angiotensin-converting enzyme inhibitor because of serious side effects.
- The combination of angiotensin-converting enzyme inhibitor and angiotensin receptor blocker should be restricted to patients with symptomatic heart failure with reduced ejection fraction receiving a beta-blocker who are unable to tolerate a mineralocorticoid receptor antagonist (see below). The combination of angiotensin-converting enzyme inhibitor and angiotensin receptor blocker must be used under strict supervision.
- Angiotensin receptor blockers must only be used in patients with adequate renal function and a normal serum potassium. Serial monitoring of renal function and U&Es is vital, particularly when used in combination with an ACE inhibitor.

Mineralocorticoid/aldosterone receptor antagonists (MRAs)[1]

- A low-dose aldosterone antagonist should be considered in all patients unless contra-indicated or not tolerated and in the absence of hyperkalaemia and significant renal dysfunction.
- The Eplerenone in Mid Patients Hospitalisation And Survival Study In Heart Failure (EMPHASIS-HF) looked at 2,737 patients with NYHA class II heart failure and an ejection fraction of no more than 35%. They received eplerenone (up to 50 mg daily) or placebo in addition to other recommended therapy. Results showed that as compared with placebo, eplerenone reduced both the risk of death and the risk of hospitalisation among patients with systolic heart failure and mild symptoms[11]. A relative risk reduction of 27% was seen in cardiovascular death or hospitalisation for heart failure (42%). Reductions were also seen in rates of death from any cause (24%), cardiovascular death (24%) or hospitalisation for any reason (23%).
- Hyperkalaemia is a potential risk but has not been seen under trial conditions. It is more common in clinical practice, particularly in elderly patients or those with poor renal function. The combination of an ACE inhibitor and aldosterone antagonist increases the risk of severe hyperkalaemia and careful monitoring is required.
- Measure renal function and U&Es at one week and four weeks after starting/increasing the dose. This should be repeated monthly for the first three months and then at least twice a year on maintenance treatment.
- Where breast tenderness or enlargement occurs, switch from spironolactone to eplerenone.

Ivabradine

Ivabradine is a drug that inhibits the If channel in the sinus node[12]. Its only known pharmacological effect is to slow the heart rate in patients in sinus rhythm. It does not slow the ventricular rate in AF.

- It has been shown to reduce cardiovascular death or hospitalisation for heart failure by 18%[13].
- It also improved left ventricular function and quality of life.

Digoxin
In patients with chronic heart failure, a rhythm-control strategy has not been shown to be superior to a rate-control strategy in reducing morbidity or mortality. Digoxin therefore has a limited role in heart failure management[1]. However, digoxin may have a useful role in the treatment of patients with heart failure who are in normal sinus rhythm[14].

**Opiates or opioids (morphine or diamorphine)**
- Opiates such as morphine may be useful in some patients with acute pulmonary oedema, as they reduce anxiety and relieve distress associated with dyspnoea.
- Opiates are also thought to be venodilators, reducing cardiac filling pressures, preload and pulmonary congestion. They may also reduce sympathetic drive.
- However, opiates also induce nausea and depress respiratory drive, potentially increasing the need for invasive ventilation.

**Drugs to treat cardiovascular comorbidity**

**Anticoagulants**
Patients with severe heart failure have a greater incidence of strokes and emboli. Oral anticoagulation is recommended in patients with heart failure and permanent, persistent or paroxysmal AF without contra-indication to anticoagulation. It is also recommended for those with intracardiac thrombus or with evidence of systemic embolism.

**Statins**
In elderly patients with symptomatic chronic heart failure caused by coronary artery disease, secondary prevention with statins may reduce hospitalisations.

**Drugs to avoid in heart failure[1]**
- Pro-anti-arrhythmics with potentially negative inotropic effects - eg, flecainide.
- Calcium-channel blockers - eg, verapamil, diltiazem (only amiodipine is advisable).
- Tricyclic antidepressants.
- Lithium.
- NSAIDs and cyclo-oxygenase-2 (COX-2) inhibitors[15].
- Corticosteroids.
- Drugs prolonging QT interval and potentially precipitating ventricular arrhythmias - eg, erythromycin, terfenadine.

**Non-drug therapies**
- Where heart failure is caused, or exacerbated, by surgically correctable conditions, these should be detected and treated appropriately by:
  - Revascularisation - surgical (coronary artery bypass grafting) or radiological (percutaneous coronary intervention) techniques should be considered in selected heart failure patients with coronary artery disease.
  - Valvular disease - decisions regarding surgery should be individualised. Medical management of heart failure and comorbidities should be optimised prior to surgery.
- Cardiomyoplasty and partial left ventriculectomy (Batista's operation) are not recommended as a treatment of heart failure or alternative to heart transplantation[16].
- Cardiac resynchronisation therapy (CRT) is of benefit in patients with mild (NYHA class II) symptoms as well as in those who are more severely symptomatic[17]. CRT may be considered where patients are in sinus rhythm, have a low LVEF (≤30%), QRS duration is markedly prolonged and an ECG shows a left bundle branch morphology[1]. This is irrespective of symptom severity.
- About 50% of deaths in patients with heart failure occur suddenly. This is especially true in those with milder symptoms. Most of these are related to ventricular arrhythmias. Prevention of sudden death is therefore an important goal and one for which implantable cardioverter defibrillators (ICDs) may be recommended for both primary and secondary prevention.
- ICDs, CRT with defibrillator or CRT with pacing are recommended as treatment options for people with heart failure who have left ventricular dysfunction with a LVEF of 35% or less[18].
- The Sudden Cardiac Death in Heart Failure Trial looked at 2,521 patients with non-ischaemic dilated cardiomyopathy or ischaemic heart failure and no prior symptomatic ventricular arrhythmia. They had ejection fraction ≤35% and were in NYHA functional class II or III. These patients were randomised to placebo, amiodarone, or an ICD, in addition to conventional treatment. ICD treatment led to a relative risk reduction (in death) of 25% over a median follow-up of 45.5 months[19]. This benefit was additional to that gained with conventional treatment.
- Heart transplantation may be considered in selected patients when end-stage heart failure is reached without other treatment options. Constraints include lack of donor hearts and problems of rejection/long-term immunosuppression.
- Implantation of a left ventricular assist device may be considered for destination therapy in people ineligible for heart transplantation[20].

**Post-discharge management for chronic heart failure**

Following discharge from hospital, cardiac failure patients can either be monitored via a clinic-based outpatient service or by a home-based service[21]. Both models of care principally rely on the appointment of a specialist heart failure nurse to provide healthcare designed to optimise drug therapy, promote self-care (eg, fluid and dietary management), provide a means for early detection of clinical deterioration and apply more appropriate follow-up according to the needs of each patient.
Clinic-based service
- This involves the establishment of a specific heart failure clinic that is usually situated in the hospital outpatient department.
- Follow-up after hospitalisation at a nurse-led heart failure clinic can improve survival and self-care behaviour in patients with heart failure as well as reduce the number of events, re-admissions and days in hospital.[22]

Home-based service
- ‘The Heart Manual’ is a rehabilitation programme consisting of a self-help manual, supported by a facilitator.[23] It is the only validated home-based programme that is recommended by NICE as an alternative to clinic-based programmes.
- A home-based programme for low- to moderate-risk patients is not inferior to a traditional centre-based programme.[21]
However, the costs of travel are borne by the health service (as opposed to the patient) and individual social characteristics affect willingness to commit to the programme.

Hybrid service
Comprising home plus clinic-based follow-up.

Prognosis
- Prognosis is poor on the whole, with approximately 50% of people with heart failure dying within four years of diagnosis.[24]
- The mortality rate in the UK appears to be improving. A UK study found that the six-month mortality rate for people with heart failure had improved from 26% in 1995 to 14% in 2005.[25]
- The prognosis for people with heart failure and preserved LVEF is a little better than the prognosis for people with heart failure with reduced ejection fraction (HF-REF).

Clinical Editor’s notes (July 2017)
Dr Hayley Willacy recently read a paper in the New England Journal of Medicine on the risk of sudden death in heart failure.[26] The risk of sudden death has changed over time among patients with symptomatic heart failure and reduced ejection fraction with the sequential introduction of medications including angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, beta-blockers, and mineralocorticoid receptor antagonists. There was a 44% decline in the rate of sudden death across the trials between 1995 and 2014, involving 40,195 people.

Further reading & references
- Heart Failure Matters; Heart Failure Association of the European Society of Cardiology
- National Heart Failure Audit annual reports; National Institute for Cardiovascular Outcomes Research
- Insertion and use of implantable pulmonary artery pressure monitors in chronic heart failure; NICE Interventional Procedure Guidance, August 2013
- Extracorporeal membrane oxygenation (ECMO) for acute heart failure in adults; NICE Interventional Procedure Guidance, March 2014
- Sacubitril valsartan for treating symptomatic chronic heart failure with reduced ejection fraction; NICE Technology Appraisal Guidance, April 2016

1. Acute and Chronic Heart Failure; European Society of Cardiology (2012)
3. Filtracorporeal membrane oxygenation (ECMO) for acute heart failure in adults; NICE Interventional Procedure Guidance, March 2014
4. Assessing fitness to drive: guide for medical professionals; Driver and Vehicle Licensing Agency
5. Management of chronic heart failure; Scottish Intercollegiate Guidelines Network - SIGN (2016)
9. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure; European Society of Cardiology (ESC)
10. Sacubitril valsartan for treating symptomatic chronic heart failure with reduced ejection fraction; NICE Technology appraisal (Apr 2016)
16. Partial left ventriculectomy (the Batista procedure); NICE Interventional Procedure Guidance, February 2004
18. Implantable cardioverter defibrillators and cardiac resynchronisation therapy for arrhythmias and heart failure; NICE Technology Appraisal Guidance, June 2014
20. Implantation of a left ventricular assist device for destination therapy in people ineligible for heart transplantation; NICE Interventional Procedure Guidance, March 2015


23. The Heart Manual; NHS Lothian

24. Heart failure - chronic; NICE CKS, May 2015 (UK access only)


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