



## Left Ventricular Failure Pathway

**Eligibility: Left Ventricular Dysfunction confirmed by ECHO**

**Lifestyle Advice:**  
 Strongly recommend stop smoking  
 Regular aerobic exercise

Low salt diet  
 Limited alcohol

**If possible discontinue aggravating drugs:**

- NSAIDS
- Most Calcium channel blockers

**Vaccinations:**

- Annual influenza
- Pneumococcal (once)

Consider whether cardioversion or rate control is appropriate – may need specialist advice.

If aim is rate control:

- Digoxin
- Anticoagulation

**Atrial Fibrillation?**

**Congestion and fluid overload?**

Start ACE inhibitor e.g. Ramipril 2.5mg once daily and titrate up.

Start diuretic e.g. Frusemide 40mg and then add ACE inhibitor e.g. Ramipril 2.5mg once daily and titrate up

**Unable to tolerate ACE inhibitor? e.g. severe cough**

Consider angiotensin II receptor antagonist

**Unable to tolerate this?**

Consider discussion with specialist re isosorbide mononitrate/hydralazine.

**Stable on ACE inhibitor and loop diuretic for > 6 weeks?**

Add beta blocker e.g. bisoprolol 2.5mg and titrate up

If patient remains moderately to severely symptomatic (NYHA III-IV) despite optimal drug therapy listed above, add spironolactone 12.5-25mg once daily

Worsening or severe (NYHA IV) heart failure despite above medications add digoxin 125-250µg once daily (reduce dose in elderly or renal impairment)

Still symptomatic – consider specialist advice regarding

- Coronary revascularisation
- Cardiac transplant
- Cardiac resynchronisation
- Implantable cardioverter-defibrillator

**Practice Point**

New York Heart Association (NYHA) classification of heart failure symptoms

Class	Symptoms
I	No limitations. Ordinary physical activity does not cause fatigue, breathlessness or palpitation. (Asymptomatic left ventricular dysfunction is included in this category.)
II	Slight limitation of physical activity. Such patients are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, breathlessness or angina pectoris (symptomatically 'mild' heart failure).
III	Marked limitation of physical activity. Although patients are comfortable at rest, less than ordinary physical activity will lead to symptoms (symptomatically 'moderate' heart failure).
IV	Inability to carry on any physical activity without discomfort. Symptoms of congestive cardiac failure are present even at rest. With any physical activity increased discomfort is experienced (symptomatically 'severe' heart failure).

**Practice Point****Initiation of ACE Inhibitor**

Which ACE inhibitor and what dose?

Licensed ACEI	Starting dose (mg)	Target dose (mg)
Captopril	6.25 three times daily	50-100 three times daily
Cilazapril*	0.5 once daily	1-2.5 once daily
Enalapril	2.5 twice daily	10-20 twice daily
Fosinopril*	10 once daily	40 once daily
Lisinopril	2.5-5.0 once daily	30-35 once daily
Perindopril	2.0 once daily	4 once daily
Quinapril*	2.5-5.0 once daily	10-20 once daily
Ramipril	2.5 once daily	5 twice daily or 10 once daily

\* Target dose based on manufacturer's recommendations rather than large outcome study.

**How to use**

- Start with a low dose (see above)
- Seek specialist advice where the patient is on a high dose (e.g. furosemide 80mg) of a loop diuretic
- Double dose at not less than 2 weekly intervals
- Aim for target does (see above) or, failing that, the highest tolerated dose
- Remember some ACE inhibitor is better than no ACE inhibitor
- Monitor blood electrolytes (in particular potassium), urea, creatinine, and blood pressure
- When to stop up-titration/down-titration – see 'Problem solving'

**Advice to patient**

- Explain expected benefits
- Treatment is given to improve symptoms, to prevent worsening of heart failure and to increase survival
- Symptoms improve within a few weeks to a few months
- Advise patients to report principal adverse effects (i.e. dizziness/symptomatic hypotension, cough)

**Problem solving**

- Asymptomatic low blood pressure does not usually require any change in therapy

**Symptomatic hypotension**

- If dizziness, light-headedness and/or confusion and a low blood pressure consider discontinuing nitrates, calcium channel blockers<sup>+</sup> and other vasodilators.
- If no signs/symptoms of congestion consider reducing diuretic dose
- If these measures do not solve problem seek specialist advice

\* Calcium channel blockers should be discontinued unless absolutely essential (e.g. for angina or hypertension).

**Cough**

- Cough is common in patients with chronic heart failure, many of whom have smoking-related lung disease
- Cough is also a symptom of pulmonary oedema which should be excluded when a new or worsening cough develops
- ACE inhibitor induced cough rarely requires treatment discontinuation
- If the patient develops a troublesome dry cough which interferes with sleep and is likely to be caused by an ACE inhibitor, consider substituting an angiotensin II receptor antagonist for the ACE inhibitor.

**Worsening renal function**

- Some rise in urea, creatinine and K<sup>+</sup> is to be expected after initiation of an ACE inhibitor; if the increase is small and asymptomatic no action is necessary
- An increase in creatinine of up to 50% above baseline, or to 200 µmol/litre, whichever is the smaller, is acceptable
- An increase in K<sup>+</sup> to ≤ 5.9 mmol/litre is acceptable
- If urea, creatinine or K<sup>+</sup> do rise excessively consider stopping concomitant nephrotoxic drugs (e.g. NSAIDs), non-essential vasodilators (e.g. calcium antagonists, nitrates), K<sup>+</sup> supplements/retaining agents (triamterene, amiloride) and, if no signs of congestion, reducing the dose of diuretic
- If greater rises in creatinine or K<sup>+</sup> than those outlined above persist despite adjustment of concomitant medications the dose of the ACE inhibitor should be halved and blood chemistry rechecked, if there is still an unsatisfactory response specialist advice should be sought
- Blood electrolytes should be monitored closely until K<sup>+</sup> and creatinine concentrations are stable

Note: it is very rarely necessary to stop an ACE inhibitor and clinical deterioration is likely if treatment is withdrawn; ideally, specialist advice should be sought before treatment discontinuation

**Practice Point****Beta-blockers**

Which beta-blocker and what dose?

Only two beta-blockers are licensed for the treatment of heart failure in the UK at the time of issue of this guideline.

	Starting dose (mg)	Target dose (mg)
Bisoprolol	1.25 once daily	10 once daily
Carvedilol	3.125 twice daily	25-50 twice daily*

\* Carvedilol: maximum dose 25 mg twice daily if **severe** heart failure. For patients with mild to moderate heart failure maximum dose 50 mg twice daily if weight more than 85 kg – otherwise maximum dose 25 mg twice daily**How to use**

- Start with a low dose (see above)
- Double dose at not less than 2 weekly intervals
- Aim for target dose (see above) or, failing that, the highest tolerated dose
- Remember some beta-blocker is better than no beta-blocker
- Monitor heart rate, blood pressure, clinical status (symptoms, signs, especially signs of congestion, body weight)
- Check blood electrolytes, urea and creatinine 1-2 weeks after initiation and 1-2 weeks after final dose titration
- When to down-titrate/stop up-titration, see 'Problem solving'

**Beta-blockers continued****Advice to patient**

- Explain expected benefits
- Emphasis that treatment given as much to prevent worsening of heart failure as to improve symptoms; beta-blockers also increase survival
- If symptomatic improvement occurs, this may develop slowly (3-6 months or longer)
- Temporary symptomatic deterioration may occur (estimated 20-30% of cases) during initiation/up-titration phase
- Advise patient to report deterioration (see 'Problem solving') and that deterioration (tiredness, fatigue, breathlessness) can usually be easily managed by adjustment of other medication; patients should be advised not to stop beta-blocker therapy without consulting their physician
- Patients should be encouraged to weigh themselves daily (after waking, before dressing, after voiding, before eating) and to consult their doctor if they have persistent weight gain

**Problem solving****Worsening symptoms/signs (e.g. increasing dyspnoea, fatigue, oedema, weight gain)**

- If increasing congestion, double dose of diuretic and/or halve dose of beta-blocker (if increasing diuretic does not work)
- If marked fatigue (and/or bradycardia, see below) halve dose of beta-blocker (rarely necessary)
- Review patient in 1-2 weeks; if not improved seek specialist advice
- If serious deterioration, halve dose of beta-blocker or stop this treatment (rarely necessary); seek specialist advice

**Low heart rate**

- If < 50 beats/min and worsening symptoms – halve dose beta-blocker or, if severe deterioration, stop beta-blocker (rarely necessary)
- Consider need to continue treatment with other drugs that slow the heart (e.g. digoxin, amiodarone, diltiazem) and discontinue if possible
- Arrange ECG to exclude heart block
- Seek specialist advice

**Asymptomatic low blood pressure**

- Does not usually require any change in therapy

**Symptomatic hypotension**

- If low blood pressure causes dizziness, light-headedness or confusion, consider discontinuing drugs such as nitrates, calcium channel blockers and other vasodilators
- If no signs/symptoms of congestion consider reducing diuretic dose
- If these measures do not solve problem seek specialist advice

Note: beta-blockers should not be stopped suddenly unless absolutely necessary (there is a risk of a 'rebound' increase in myocardial ischaemia/infarction and arrhythmias); ideally specialist advice should be sought before treatment discontinuation

**Practice Point****Spironolactone**

Which dose of spironolactone?

**Dose (mg)**

12.5-25 daily\*

\* 50 mg may be advised by a specialist if heart failure deteriorates and no problem with hyperkalaemia

**How to use**

- Start at 25 mg once daily
- Check blood chemistry at: 1, 4, 8 and 12 weeks; 6, 9 and 12 months; 6 monthly thereafter
- If K<sup>+</sup> rises to between 5.5 and 5.9 mmol/litre or creatinine rises to 200 µmol/litre reduce dose to 25 mg on alternate days and monitor blood chemistry closely
- If K<sup>+</sup> rises to ≥ 6.0 mmol/litre or creatinine to > 200 µmol/litre stop spironolactone and seek specialist advice

**Advice to patient**

- Explain expected benefits
- Treatment is given to improve symptoms, prevent worsening of heart failure and to increase survival
- Symptom improvement occurs within a few weeks to a few months of starting treatment
- Avoid NSAIDs not prescribed by a physician (self-purchased 'over the counter' treatment, e.g. ibuprofen)
- Temporarily stop spironolactone if diarrhoea and/or vomiting and contact physician

**Problem Solving****Worsening renal function/hyperkalaemia:**

- See 'How to use'
- Major concern is hyperkalaemia (≥ 6.0 mmol/litre) though this was uncommon in the RALES clinical trial; a potassium level at the higher end of the normal range may be desirable in patients with heart failure, particularly if taking digoxin
- Some 'low salt' substitutes have a high K<sup>+</sup> content
- Male patients may develop breast discomfort and/or gynaecomastia