Left Ventricular Systolic Dysfunction (LVSD) Management

<u>Known Left Ventricular Systolic Dysfunction</u>

If no established diagnosis of heart failure, please see referral for suspected diagnosis of heart failure page

For patients with an established diagnosis of heart failure:

Classify severity according to NYHA score

- Class I - No symptoms and no limitation in ordinary physical activity, e.g. shortness of breath when walking, climbing stairs etc.
- Class II - Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.
- Class III - Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances. Comfortable only at rest.
- Class IV - Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients.

Optimise patient management as per pathway attached - pharmacological, management of comorbidities, self-management and lifestyle

- Stop contraindicated medicines including: NSAIDs and calcium-channel blocker
- Consider a loop diuretic as symptom management. Titrate dose to control symptoms
- Monitor urea and electrolytes at baseline and 1-2 weeks after medication initiation (or dose increase)
- Beta blockers should only be considered when the patient is stable
- Consider lifestyle management advice
- Monitor weight and hydration status
- See relevant pathways elsewhere on website for management of co-morbidities

Indications for referral:

- Severe heart failure - NYHA Class IV (symptomatic at rest) – refer to specialist multidisciplinary heart failure team
- Heart failure not responding to treatment – refer to specialist multidisciplinary heart failure team

- Heart failure that can no longer be effectively managed in the community – refer to specialist multidisciplinary heart failure team
- If the patient is pregnant, or planning a pregnancy – refer to cardiology for specialist advice
- If the patient has certain co-morbidities (listed below) – refer to cardiology if the co-morbidity is: severe, contributing significantly to HF in the patient or complicating the management of HF
    - Angina
    - Renal impairment (e.g. Creatinine >200)
    - Anaemia
    - Thyroid disease
    - Asthma or COPD
    - Gout
    - Peripheral arterial disease
    - Cardiac valve disease
- LV ejection fraction <35% and previous MI – refer to cardiology for consideration of complex cardiac conditions CRD-D or ICD
- NYHA Class III or IV symptoms and known left bundle branch block (LBBB) on ECG – refer for consideration of CRT-D or ICD

Referral letter should include:

- Type, onset and duration of symptoms
- Past medical history including cardiac history and significant co-morbidities
- Examination findings - signs of heart failure and basic observations
- Current heart failure medications
- Blood test results as relevant (FBC, U&Es, TFTs, BNP/pro-NT BNP)
- ECG findings (where indicated)
- Most recent echo findings

Left Ventricular Systolic Dysfunction (LVSD)

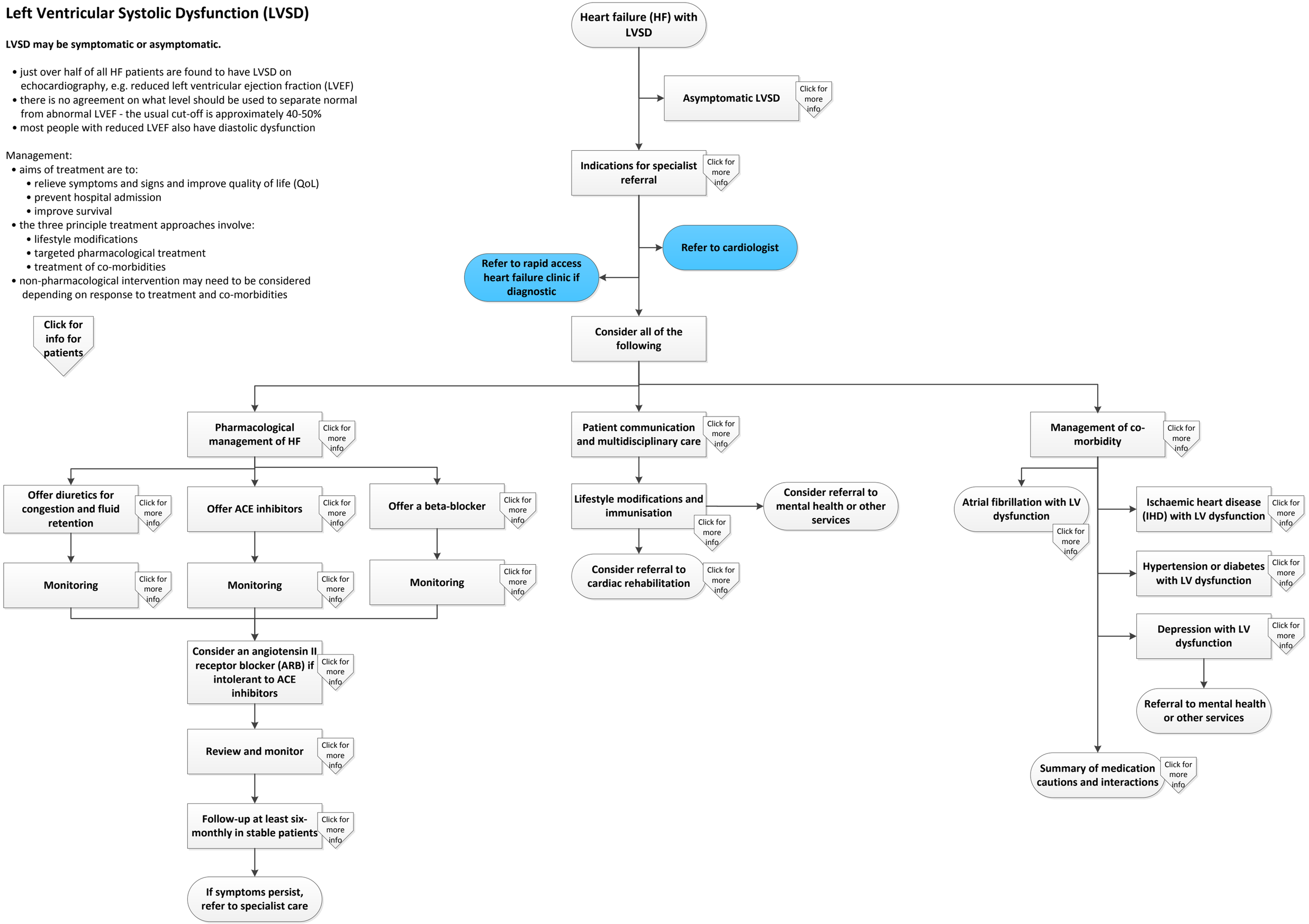
LVSD may be symptomatic or asymptomatic.

- just over half of all HF patients are found to have LVSD on echocardiography, e.g. reduced left ventricular ejection fraction (LVEF)
- there is no agreement on what level should be used to separate normal from abnormal LVEF - the usual cut-off is approximately 40-50%
- most people with reduced LVEF also have diastolic dysfunction

Management:

- aims of treatment are to:
  - relieve symptoms and signs and improve quality of life (QoL)
  - prevent hospital admission
  - improve survival
- the three principle treatment approaches involve:
  - lifestyle modifications
  - targeted pharmacological treatment
  - treatment of co-morbidities
- non-pharmacological intervention may need to be considered depending on response to treatment and co-morbidities

Click for info for patients



Back to pathway

Asymptomatic LVSD

- prevalence of asymptomatic LVSD is 3% of the general population
- the mean age of patients with asymptomatic LVSD is lower than that of symptomatic patients
- classified as New York Heart Association (NYHA) class I
- patients are at increased risk of having a cardiovascular event
- patients with untreated asymptomatic LVSD have an 8% risk of developing HF symptoms annually

Management of asymptomatic LVSD:

- lifestyle modifications
- vigorous management of risk factors, e.g. IHD and hypertension
- pharmacological treatment targeted towards preventing disease progression

Back to pathway

Indications for specialist referral

Refer patients to the specialist multidisciplinary HF team for:

- the initial diagnosis of HF; and
- the management of:
  - severe HF – New York Heart Association (NYHA) class IV
  - HF that does not respond to treatment
  - HF that can no longer be managed effectively in the home setting

Refer patients who are planning a pregnancy, or who are pregnant, for specialist advice.

Consider referral for assessment for CRT and an ICD for patients who meet either of the following criteria:

- LV ejection fraction ≤ 35%, and previous MI; or
- NYHA class III or IV symptoms, and LBBB

Specialist advice may be appropriate for some patients with HF and a co-morbidity, such as:

- angina
- renal impairment, e.g. serum creatinine level > 200micromol/L
- anaemia
- thyroid disease
- severe peripheral arterial disease
- asthma or COPD
- gout
- valve disease

Consider referral to a specialist for patients with HF and a co-morbidity if:

- the co-morbidity is:
  - severe
  - contributing significantly to HF in the patient
  - complicating the management of HF
  - the GP does not have a special interest (GPwSI) in the co-morbidity present

Back to pathway

Pharmacological Management of HF

The treatment of HF routinely involves the use of an ACE inhibitor, a diuretic to treat fluid retention, and a beta-blocker.

Prescribe a beta-blocker and an ACE inhibitor as soon as possible after diagnosis.

Use clinical judgement when deciding which medication to start first, e.g. the preferred initial treatment might be:

- a beta-blocker, if the patient has angina
- an ACE inhibitor, if the patient has diabetes
- an ACE inhibitor, if the patient still has signs of fluid overload:
  - treating a patient with HF who still has fluid overload with a beta-blocker may make the symptoms of HF worse

Beta-blockers:

- have been shown to improve clinical symptoms and ventricular function in patients with systolic dysfunction, decrease hospitalisations and mortality, and have a beneficial effect on exercise capacity
- in the short term, can produce decompensation with worsening of HF and hypotension

ACE inhibitors:

- prolong life in patients with heart failure symptoms and ejection fraction < 35% and reduce symptom development in asymptomatic patients with ejection fraction < 35%
- slow disease progression, improve exercise capacity, and decrease hospitalisations and mortality

Keep dosing regimens as simple as possible.

Ensure that the patient and carer are fully informed about their medication.

Alternative therapies that may be considered later, usually at specialist care level, if HF is unresponsive – include:

- aldosterone antagonists
- ARBs, e.g. candesartan
- ivabradine
- digoxin
- hydralazine in combination with nitrate – particularly if the patient is of Afro-Caribbean origin and has moderate to severe heart failure

Oral anticoagulation therapy:

- other than in patients with AF there is no evidence that an oral anticoagulant reduces mortality or morbidity compared with placebo or aspirin

See also 'Summary of medications to be avoided in HF' box.

Back to pathway

Offer ACE inhibitors

ACE inhibitors have widely demonstrated efficacy for patients with HF:

- recommended for all patients with HF with LVSD
- also benefits patients with asymptomatic LVSD
- slows disease progression, improves exercise capacity, and decreases hospitalisations and mortality
- no clinically important differences in efficacy have been demonstrated between ACE inhibitors:
  - however, CKS recommends the following ACE inhibitors for use in primary care:
  - enalapril
  - lisinopril
  - ramipril
  - trandolapril

Commencing treatment:

- initiate therapy at a low dose
- monitor and titrate the dose upwards at no > 2-weekly intervals until a target dose for management, or highest tolerated dose, is achieved
- discontinue medications, if possible, that may have a further detrimental effect upon renal function, i.e. NSAIDs, calcium-channel blockers, and K supplements
- do not start a diuretic and an ACE inhibitor at the same time because of the risk of hypotension

Seek specialist advice prior to commencing treatment if:

- baseline creatinine is greater than 221micromol/L or eGFR of < 30mL/min/1.73m2
- K is > 5mmol/L
- urea is > 12mmol/L
- sodium is ≤ 130mmol/L
- the patient is taking high-dose diuretics (> 80mg furosemide daily)
- there are concerns about low BP
- the patient is frail and elderly

Adverse effects:

- hypotension may occur with concomitant therapy - if it is symptomatic:
  - discontinue calcium channel blockers and nitrates if at all possible
  - consider reducing the diuretic dose if there are no signs of congestion
  - consider seeking specialist advice
- dry cough:
  - may be a symptom of pulmonary oedema
  - if the cough is persistent and troubling the patient, an ARB may be substituted for the ACE inhibitor
- worsening of renal function
- hyperkalaemia
- angioedema (rarely)

Contraindications:

- pregnancy and breastfeeding
- previous angioedema with use
- hereditary or idiopathic angioedema
- renal artery stenosis
- high pre-treatment serum potassium level (>5 mmol/L)
- concomitant use of perindopril with aliskiren (a renin inhibitor) - contraindicated in people with diabetes or renal impairment

Back to pathway

Offer diuretics for congestion and fluid retention

Diuretics:

- should be routinely used for the relief of congestive symptoms and fluid retention in patients with HF
- effect depends on good renal function, i.e. creatinine clearance > 40mL/minute

Loop diuretics:

- preferred diuretics in HF as they have a more powerful effect than thiazides
- include furosemide, bumetanide, torasemide
- the most beneficial of the diuretics as they:
  - increase sodium and free water excretion
  - maintain this effect even when there is slight renal impairment

Thiazide-type diuretics:

- cause more gentle and prolonged diuresis than loop diuretics
- include bendroflumethiazide, chlortalidone, or metolazone
- consider prescribing if patient:
  - is hypertensive with only mild symptoms
  - has resistant oedema:
    - may be added (with caution) to treatment with a loop diuretic
    - may be given in primary care under specialist supervision
- use with caution when prescribing a thiazide and loop diuretic as the combination can cause severe diuresis and dehydration, hyponatraemia, hypovolaemia, and hypokalaemia

Potassium-sparing diuretics:

- not generally recommended due to the risk of severe hyperkalaemia in combination with other drugs used in HF
- in patients with HF with LVSD, there is no justification to use amiloride or triamterene as potassium sparing diuretics which do not serve any other purpose:
  - whereas aldosterone antagonists, such as spironolactone and eplerenone, spare the potassium and result in improvement of morbidity and mortality
- NB: aldosterone antagonists, e.g. spironolactone and eplerenone, may be used in the second-line treatment of HF:
  - improve prognosis in patients with LVSD as well as having a diuretic effect
  - seek specialist advice before initiating in primary care
  - high-dose spironolactone or eplerenone (> 50mg once daily) is not permitted if the patient is taking an ACE inhibitor or ARB

Commencing treatment:

- loop diuretics are usually given once a day in the morning, but can be given twice a day (morning and lunchtime) for additional diuresis
- the patient can adjust the timing of the doses to suit their social needs
- use the lowest dose possible to control symptoms
- review and adjust the dose according to:
  - symptoms
  - signs of congestion
  - weight loss
  - after subsequent treatment for HF has been introduced
- provide education regarding self-adjustment of the dose based on regular weight measurements and other signs and symptoms of fluid retention

Refer for specialist advice if doses of > 80mg furosemide daily are necessary.

Adverse effects of excessive diuresis may include:

- orthostatic hypotension
- dehydration
- renal dysfunction
- electrolyte imbalances, e.g. hyponatraemia, hypokalaemia
- hyperuricaemia
- gout

Back to pathway

Monitoring

During treatment with diuretics:

- check renal function and serum electrolytes:
  - before starting treatment
  - 1-2 weeks after medication initiation (or dose increase)
  - at least every 6 months once stable
- earlier monitoring (after 5-7 days) may be required for patients with existing renal impairment or those taking a combination of a diuretic plus an ACE inhibitor, an ARB, or an aldosterone antagonist
- for patients receiving a combination of a loop diuretic and a thiazide:
  - check renal function within 5 days of starting combination treatment and recheck every 5-14 days, depending on the patient's stability
  - monitor weight and hydration status – if diuresis is extensive, consider earlier testing of renal function
- once treatment is stable, measure renal function and serum electrolytes at least once every 6 months

Managing abnormal results:

- if serum creatinine level increases by > 20% or the eGFR decreases by > 15%, of baseline, re-measure renal function within 2 weeks
- if serum creatinine increases by 30-50% (or to >200micromol/L) or the eGFR is < 30mL/min/1.73m2:
  - review volume status
  - reduce or stop diuretics (if the patient is hypovolaemic)
  - re-measure renal function within 1 week
- if serum creatinine level increases by > 50% or to >256micromol/L (eGFR is approximately 20-25mL/min/1.73m2):
  - assess volume status
  - check BP
  - review other renal function tests, including electrolytes and proteinuria
  - if the patient is hypovolaemic, stop the diuretic; otherwise, manage accordingly
  - **seek specialist advice urgently if there is any uncertainty**
- patients at high risk of cardiac arrhythmias with even mild hypokalaemia include those:
  - taking digoxin or drugs that prolong the QT interval, e.g. amiodarone
  - with paroxysmal arrhythmias, unstable angina, or chronic liver disease
- if the K level decreases to below 3mmol/L (or 4mmol/L in high-risk patients):
  - seek urgent specialist advice or consider admission
  - review diuretic treatment
- if the K concentration decreases to < 3.5mmol/L seek specialist advice urgently:
  - expert opinion recommends urgent admission for treatment in this scenario
- expert opinion suggests considering the use of K supplements or spironolactone

Back to Pathway

Monitoring

During treatment with ACE inhibitors:

- monitor renal function and serum electrolytes:
  - before starting an ACE inhibitor
  - 1-2 weeks after starting treatment
  - 1-2 weeks after each dose increase
  - earlier monitoring (after 5-7 days) may be required for patients with existing renal impairment or those taking a combination of an ACE inhibitor or an ARB plus a diuretic or an aldosterone antagonist
  - at regular intervals every 3 months
  - NB: CKS suggests that monitoring every 6 months is adequate if the patient is stable and no co-morbidities are present

Managing abnormal results:

- some increase in serum creatinine and K levels is expected after starting or increasing the dose of an ACE inhibitor or an ARB
- if eGFR decreases by 25%, or the serum creatinine level increases by up to 30%:
  - do not modify the ACE inhibitor/ARB dose
  - re-check eGFR in a further 1-2 weeks
- if eGFR decreases by 25% or more, or the serum creatinine level increases by 30% or more:
    - investigate other causes of deteriorating renal function, such as volume depletion
    - stop or reduce the dose of the following drugs (where appropriate) if the person is taking them:
      - nephrotoxic drugs, e.g. NSAIDs
      - vasodilators, e.g. calcium-channel blockers, nitrates
      - K supplements or K-sparing diuretics
      - diuretics - consider dose reduction if the patient is hypovolaemic
  - if the decrease in eGFR or the increase in serum creatinine level persists despite these measures:
    - stop the ACE inhibitor or ARB; or
    - reduce the dose to a previously tolerated lower dose and re-check levels in 5-7 days; and
    - add an alternative antihypertensive medication if required
- if the serum K level is 5.0mmol/L or above, re-check the level:
  - if the K level remains at 5.0mmol/L or above:
    - investigate other causes of hyperkalaemia and treat accordingly
    - stop or reduce the dose of K-sparing diuretics, e.g. amiloride, triamterene, spironolactone
    - stop or reduce the dose of nephrotoxic medications, e.g. NSAIDs
  - if the serum K level persists between 5.0 and 5.9mmol/L despite these measures:
    - consider reducing the dose of ACE inhibitor or ARB to a previously tolerated lower dose
    - recheck levels in 5-7 days
  - stop ACE inhibitors or ARBs if serum K persists above 6mmol/L despite these measures
  - consider referral to a dietician:
    - a low-K diet (up to 2g daily) or dietary advice may help resolve hyperkalaemia

Back to pathway

Offer a beta-blocker

Offer beta-blockers licensed for HF to all patients with HF due to LVSD, including:

- older adults
- patients with:
  - peripheral vascular disease
  - erectile dysfunction
  - diabetes mellitus
  - interstitial pulmonary disease
  - COPD without reversibility
- may be considered in asymptomatic LVSD

Beta-blockers:

- should only be started once the patient is stable (without fluid overload or hypotension)
- beta-blockers licensed for use in HF include bisoprolol, carvedilol, and nebivolol:
  - nebivolol is only licensed for the management of mild to moderate HF in people aged > 70 years
- in the short term, they can produce decompensation with worsening of HF and hypotension

Adverse effects:

- worsening symptoms and signs of congestion:
  - if temporary deterioration occurs during the initiation or up-titration of beta-blockers, diuretic dose may need to be increased briefly
  - if congestion occurs, increase diuretics and consider reducing the dose of beta-blocker (but not discontinuing)
  - where there is extreme fatigue (or bradycardia < 50 beats per minute), consider reducing the dose of beta-blocker
  - seek specialist advice if serious deterioration (fatigue, oedema, weight gain, and dyspnoea) does not improve
  - review the patient in 1-2 weeks and seek specialist advice if there is no improvement
- hypotension:
  - if symptomatic, reconsider the need for vasodilator drugs if possible, e.g. nitrates and calcium channel blockers
  - consider reducing the dose of diuretic, if there are no congestive signs or symptoms
  - seek specialist advice if there is no improvement
  - in asymptomatic hypotension, do not alter the dose of beta-blocker
- bradycardia (<50 beats per minute):
  - review the need for contributory medications, e.g. digoxin or amiodarone
  - consider halving the dose or, if complications are severe, stopping the beta-blocker (seek specialist advice)
  - seek specialist advice if there is no improvement
- cold extremeties, paraesthesia, and numbness - if troublesome, seek specialist advice as beta-blockers may need to be stopped
- sexual dysfunction - loss of libido can occur

Medication interactions:

- the combination of a beta-blocker and a class I antiarrhythmic, e.g. quinidine or flecainide, is not recommended
- the combination of a beta-blocker and amiodarone should be prescribed with caution - monitor pulse and BP and check for signs of worsening HF
- if prescribing a beta-blocker with digoxin:
  - monitor pulse carefully
  - an increase in digoxin levels has been noted with carvedilol – monitor for signs of toxicity

Contraindications:

- severe bradycardia
- second- or third-degree heart block
- a history of asthma or bronchospasm
- reversible COPD
- sick sinus syndrome, unless pacemaker in place
- severe hypotension
- severe peripheral vascular disease
- cardiogenic shock or phaeochromocytoma (without concomitant alpha-blocker)
- decompensated HF
- known allergic reaction
- NB: if there is concern about side effects in patients with HF who also have irreversible COPD or peripheral vascular disease, selective beta-blockers licensed for HF may be considered

Seek specialist advice before starting in patients with current or recent exacerbation of HF.

Back to pathway

Monitoring

During treatment with beta-blockers:

- considerable care when commencing and monitoring treatment is essential
- beta-blocker treatment should be initiated by those experienced in the management of HF
- introduce beta-blockers in a 'start low, go slow' manner:
  - initiate at low dose
  - increase dose slowly (i.e. at least 2- weekly intervals) until the target effective dose, or maximum dose tolerated, is attained
- continue treatment at the target or highest tolerated dose indefinitely unless complications occur
- assess heart rate, BP and clinical status after each titration
- abrupt withdrawal of beta-blockers should be avoided:
  - may precipitate a myocardial event or arrhythmias
  - expert opinion should be sought before stopping a beta-blocker
- switch stable patients who are already taking a beta-blocker for a co-morbidity and who develop heart failure due to LVSD to a beta-blocker licensed for HF

Back to pathway

Consider an angiotensin II receptor blocker (ARB) if intolerant to ACE inhibitors

ARBs:

- primarily recommended as an alternative treatment for patients intolerant to ACE inhibitors
- reduce morbidity, mortality, and hospitalisations in patients with HF
- include candesartan and valsartan
- do not cause cough

Monitoring and commencing treatment:

- see 'Offer ACE inhibitors' and 'Monitoring' for ACE inhibitors for further information

Adverse effects:

- similar to those seen with ACE inhibitors, although they tend to be milder, and include:
  - dizziness, hypotension, and headaches
  - hyperkalaemia
  - renal dysfunction

Contraindications:

- history of angioedema associated with previous exposure to an ARB
- hereditary or idiopathic angioedema
- bilateral renal artery stenosis
- pregnancy:
  - when pregnancy is confirmed, treatment with an ARB should be stopped as soon as possible and, if appropriate, alternative treatment should be started
- use of ARBs during breastfeeding is not recommended

Back to pathway

Review and monitor

All people with HF require regular follow-up, monitoring, and review of medications to:

- assess any need for changes
- detect possible adverse effects

Patients should receive MDT follow-up.

The frequency of monitoring depends on:

- clinical status and stability of the patient
- intensity of treatment
- any co-morbidities

The monitoring interval:

- should be short (days to 2 weeks) if the clinical condition or medication has changed
- is required at least 6-monthly for stable patients
- monitor patient response and re-check renal function 1 week after commencing treatment and following each dose increase

Patients who wish to be involved in monitoring their condition should be provided with sufficient education and support to do this, with clear guidelines as to what to do in the event of deterioration.

Assess and monitor:

- symptoms and signs of HF:
  - functional capacity, limitation of activity by fatigue and dyspnoea according to New York Heart Association (NYHA) classification
  - pulmonary and systemic congestion:
    - auscultate for crepitations
    - assess JVP
    - assess for peripheral oedema, body weight change, and hepatomegaly
- haemodynamic status:
  - lying and standing BP
  - heart rate and rhythm:
    - ask about syncopal and presyncopal symptoms
    - examine pulse
    - perform a 12-lead ECG if indicated
- urea, creatinine, and electrolytes, eGFR - frequency dependent on individual case, current medication, recent dose increase, instability
- psychosocial needs, including depression
- weight - patients should weigh themselves daily and report weight gain of > 2kg in 3 days

See 'Monitoring' boxes for further information about monitoring diuretics, ACE inhibitors, and beta-blockers.

Women who are planning a pregnancy or who are pregnant should be referred for specialist advice.

Back to pathway

Follow-up at least six-monthly in stable patients

If the patient is clinically stable on treatment, continue to review as above at least 6-monthly:

- doses of ACE inhibitor and beta-blocker should be continued long-term at target doses (or maximum tolerated) once stabilised
- monitor for the development of signs and symptoms of congestion
- annual ECG to detect new left bundle branch block (if detected and NYHA 2+ refer to specialist)
- chronic HF often follows an unstable course with periods of stability compounded by decompensation, sometimes rapid and severe, that may considerably alter treatment plan and prognosis
- approximately half of all deaths related to HF occur suddenly
- HF care should be delivered by a multidisciplinary team with an integrated approach across the healthcare community

A recent review has found that specialist clinics for patients with HF can reduce the risk of unplanned admissions.

Back to pathway

Patient communication and multidisciplinary care

Effective communication is key to successful HF management and is likely to increase patient compliance with therapy.

All management decisions should be discussed with the patient and viewed as shared decisions between both the patient and the GP.

When communicating with the patient:

- provide explanations in a manner appropriate to the individual
- account for the patient's level of understanding - consider written information, diagrams, key words, etc.
- understand and respect patient's views and beliefs
- involve family members or carers in discussions

Provide clear information on:

- the pathogenesis and prognosis of HF
- medication, including:
  - all pharmacological treatment used and the role of each medication
  - the need for dose titration and adjusting the dose according to changes in weight and fluid retention
  - the potential effects of therapy on symptoms, including the initial detrimental effect of beta-blockers
  - potential adverse effects
  - possible medication interactions and medication combinations that are best avoided
- when to seek immediate medical advice
- local support groups

Self-management advice:

- patients should be encouraged to self-manage their condition where appropriate
- some patients, with appropriate education, can monitor their own volume status by regular weighing and adjusting their diuretic therapy accordingly:
  - this requires easy access to the HF team
- ensure that the patient or their carer knows:
  - how to adjust the dose in response to symptoms
  - when to seek help if their symptoms deteriorate or fail to respond to dose adjustment
- inform the patient that they can adjust the times that they take the diuretic to suit social needs, e.g. if they are going out, they can delay a dose until they return

Multidisciplinary care:

- the approach to management should be multidisciplinary, involving primary, secondary and community care professionals
- should target high-risk symptomatic patients

Back to pathway

Lifestyle modifications and immunisation

Lifestyle modifications may contribute to improved outcome - educate and advise all patients with chronic HF on the following:

- physical activity within ability:
  - encourage regular aerobic exercise to improve functional capacity and symptoms
  - reduces thromboembolic risk and other consequences of prolonged bed rest
- outpatient exercise training programmes:
  - benefit patients with (LVEF of ≤ 40%, and age < 75 years
  - improve exercise capacity, performance and QoL
  - seem to be safe for clinically stable patients
- healthy weight and dietary restrictions:
  - excessive intake of salt is to be avoided
  - inform about the salt content of common food
  - advise patients not to replace salt with salt substitutes that are high in potassium
  - specific dietary advice may be indicated in certain patients, e.g. those with diabetes
  - cachectic patients (up to half of those with chronic HF) should be fully assessed by a dietitian and receive nutritional support as indicated
  - in overweight patients, referral to a weight loss group or dietitian may be appropriate
- advise patients to avoid excessive fluid intake:
  - consider restricting to 1.5-2.0L per day in those with severe symptoms
  - NB: CKS suggest restricting fluid intake to less than approximately 2.0L a day in patients with mild/moderate symptoms:
    - however, the ESC guidelines state that routine fluid restriction in all patients with mild to moderate symptoms is probably not of benefit
  - restriction of hypotonic fluids may improve hyponatraemia
  - weight-based fluid restriction may cause less thirst:
    - 30mL/kg body weight; or
    - 35mL/kg if body weight > 85 kg
- smoking:
  - all smokers should be encouraged to stop and offered assistance in smoking cessation
  - an individual programme based on motivational assessment may include referral to smoking cessation services and nicotine replacement therapy
- alcohol:
  - discuss alcohol consumption with the patient and tailor advice appropriately to the clinical circumstances
  - alcohol is contraindicated in those with alcohol related cardiomyopathy
- psychosocial aspects:
  - depression and anxiety:
    - the diagnosis of depression should be considered in all patients with HF
    - routine screening using a validated questionnaire is good practice
    - where depression is likely to have been precipitated by HF symptoms, reassess the patient's psychosocial status once the physical condition has stabilised
    - where it is apparent that depression is co-existing with HF, treat the patient for depression
    - carefully consider the potential risks and benefits of medication treatment
    - TCA are contraindicated in patients with HF
    - there is an increased risk of lithium toxicity if used in combination with loop and thiazide diuretics
    - patients should consult a healthcare professional before using over-the-counter therapies for depression, such St John's wort (Hypericum perforatum), due to potential interactions
  - a recent review of the evidence suggests a significant overall improvement in QoL after conducting psychosocial interventions
- travel and leisure:
  - air travel - no restrictions are necessary in stable patients
  - when travelling, carry a written report of medical history and current medication regimen, and carry extra medication
  - monitor and adapt fluid intake, particularly during flights and in hot climates
  - beware of adverse reactions to sun exposure with certain medications, e.g. amiodarone
- driving regulations:
  - direct the patient to DVLA requirements for car or motorcycle drivers with heart conditions
  - Group 1 includes cars and motorcycles - driving may continue if there are no symptoms that may distract the driver's attention
  - Group 2 includes large goods vehicles and passenger carrying vehicles:
    - disqualified from driving if symptomatic
    - (re)licensing is dependent on left ventricular function equal to or greater than 0.4
- sexual activity - there are no specific restrictions; broach the subject in a sensitive manner as necessary and target advice towards the individual

Consider immunisation in all patients to minimise the risk of exacerbating chronic HF with respiratory infection:

- advise an annual influenza vaccination
- offer a single pneumococcal vaccination

Back to pathway

Consider referral to cardiac rehabilitation

Offer a supervised group exercise-based rehabilitation programme designed for patients with HF:

- ensure patient is stable and does not have a condition or device that would preclude an exercise-based rehabilitation programme
- include a psychosocial and educational component in the programme
- the programme may be incorporated within an existing cardiac rehabilitation programme

NB: on-going physical activity e.g. level four cardiac rehabilitation does not necessarily need to be supervised, and appropriate activities can be sign-posted e.g. Health Walks

Back to pathway

Management of co-morbidity

Co-morbidities are important in patients with HF because:

- existing co-morbidities may affect the use of treatments for HF
- medications used to treat co-morbidities may cause worsening of HF:
  - such as NSAIDs used to treat arthritis
- medications used to treat HF and those used to treat co-morbidities may interact with one another:
  - such as beta-blockers and beta-agonists for COPD and asthma
- can reduce patient adherence
- most co-morbidities are associated with worse clinical status and are predictors of poor prognosis in HF, such as diabetes, leading to some co-morbidities themselves becoming targets for treatment, e.g. anaemia

Common co-morbidities that may influence the treatment of HF and may require specialist advice include:

- angina
- renal impairment, e.g. serum creatinine level > 200micromol/L
- anaemia
- thyroid disease
- severe peripheral arterial disease
- asthma or COPD
- gout
- valve disease

Consider referral to a specialist for patients with HF and a co-morbidity if:

- the co-morbidity is:
  - severe
  - contributing significantly to HF in the patient
  - complicating the management of HF
- the GP does not have a special interest (GPwSI) in the co-morbidity present

Back to pathway

Ischaemic heart disease (IHD) with LVSD

- IHD is a common cause of HF and people with HF often have IHD

Pharmacological management considerations:

- beta-blockers:
  - recommended for angina as well as an essential treatment for systolic HF
- nitrates:
  - have a good safety profile for use in HF
  - should be initiated by a specialist
  - contraindicated in unstable or acute HF
- ivabradine:
  - considered to be a safe anti-anginal treatment for patients with HF; however
    - there is emerging evidence of increased cardiovascular risk which may be associated with a target heart rate below 60 beats per minute; therefore:
      - carefully monitor patients for bradycardia or its symptoms, e.g. dizziness, fatigue, hypotension
      - avoid concomitant use of ivabradine with heart rate-reducing calcium channel blockers such as verapamil or diltiazem
- calcium-channel blockers:
  - are effective at controlling angina symptoms, but some may aggravate HF
  - consider amlodipine
  - verapamil, diltiazem, and short-acting dihydropyridine agents should be avoided
- aldosterone antagonists:
  - eplerenone has been demonstrated to significantly improve outcomes when combined with an ACE inhibitor and beta-blocker in patients with LVSD following MI
- aspirin:
  - should be prescribed for patients with HF and atherosclerotic arterial disease (including coronary heart disease)
- statins:
  - should be commenced according to normal practice in patients with symptomatic IHD, however;
  - their use in patients with HF and asymptomatic coronary artery disease remains controversial

The safety of other anti-anginal drugs such as nicorandil and ranolazine is uncertain.

Coronary revascularisation:

- percutaneous and surgical revascularisation are alternative approaches to the treatment of angina
- coronary artery bypass grafting is recommended for patients with
  - significant left main stenosis
  - two or three vessel coronary disease
- PCI may be considered for patients considered unsuitable for surgery

Back to pathway

Hypertension or diabetes with LVSD

- all patients with LVSD should be prescribed an ACE inhibitor and beta-blocker
- consider adding an aldosterone antagonist:
  - if the patient remains symptomatic
  - if the patient is no longer symptomatic but still requires treatment of hypertension
- consider a thiazide diuretic, or switch to a loop diuretic if the patient is already being treated with a thiazide diuretic
- consider amlodipine, hydralazine, or felodipine if hypertension persists
- other calcium channel blockers should be avoided, particularly verapamil and diltiazem
- moxonidine and alpha-adrenoceptor antagonists are not recommended

Diabetes and LVSD:

- may increase the progression of HF
- diabetes may be prevented by treatment with ARBs and possibly ACE inhibitors
- eplerenone reduces morbidity and mortality in patients with diabetes 3-14 days post MI with LVSD
- medication management:
  - good glycaemic control should be maintained
  - if using metformin:
    - monitor renal function
    - review the use of metformin if the serum creatinine level is > 130micromol/L, or the eGFR is < 45mL/min/1.73m2
    - use as a first-line agent in overweight patients with type 2 diabetes mellitus without significant renal dysfunction
  - thiazolidinediones are contraindicated
  - non-selective beta-blockers can mask warning signs of hypoglycaemia - a cardioselective beta-blocker is preferred
- some concern has existed over the adverse metabolic effects of beta-blockers in those with diabetes:
  - however, beta-blockers are not contraindicated in diabetes and are as effective in improving outcome in diabetic patients as in non-diabetic individuals, although different beta-blockers may have different effects on glycaemic indices

Back to pathway

Depression with LVSD

Depression frequently co-exists in patients with HF:

- the diagnosis of depression should be considered in all patients with HF
- routine screening using a validated questionnaire is good practice
- where depression is likely to have been precipitated by HF symptoms, reassess the patient's psychosocial status once the physical condition has stabilised
- where it is apparent that depression is co-existing with HF, treat the patient for depression

Carefully consider the potential risks and benefits of medication treatment:

- TCA are contraindicated in patients with HF
- lithium should be avoided (it has a high risk of toxicity when used in conjunction with thiazide diuretics)
- patients should consult a healthcare professional before using over-the-counter therapies for depression such St John's wort (Hypericum perforatum), due to potential interactions

Consider the role of counselling and CBT where appropriate:

- a recent review of the evidence suggests a significant overall improvement in QoL after conducting psychosocial interventions

Back to pathway

AF with LVSD

- AF is the most common arrhythmia in people with HF
- a rapid and irregular rhythm is associated with impaired ventricular filling, and compromised cardiac output
- consider referral for assessment for possible cardioversion or rhythm control
- consider the following issues in patients with HF and AF, especially a first episode of AF or paroxysmal AF:
  - identification of correctable causes
  - identification of potential precipitating factors - this may determine whether a rhythm-control strategy is preferred to a rate-control strategy
  - assessment for thromboembolism prophylaxis

To control heart rate:

- beta-blockers are preferred over digoxin because:
  - digoxin does not provide rate control during exercise
  - beta-blockers have favourable effects on mortality and morbidity in systolic HF
- if ventricular rate remains uncontrolled, the addition of digoxin can be considered
- digoxin is recommended in patients unable to tolerate a beta-blocker
- other treatment options include amiodarone and AV node ablation and pacing

Thromboembolic prophylaxis should be based on the CHA_2DS_2-VASc score and bleeding risk.

Back to pathway

Summary of medication cautions and interactions

The following medications may have an adverse effect upon HF or in some way interact with other administered medications.

Class I anti-arrhythmics, e.g. quinidine, flecainide, propafenone:
- not recommended because of an increased risk of premature death
- combination of beta-blockers and class I anti-arrhythmics is not recommended because bradycardia and myocardial depression can occur

Class III anti-arrhythmics:
- amiodarone is the only anti-arrhythmic that should be used in patients with systolic HF
- the combination of a beta-blocker and amiodarone should be prescribed with caution:
  - monitor heart rate and BP
  - check for signs of worsening HF, as risk of bradycardia, AV block, and myocardial depression is increased

Dronedarone:
- contraindicated in patients with HF with LVSD

Digoxin:
- concomitant administration of a beta-blocker and digoxin can reduce heart rate and prolong AV conduction time, increasing the risk of AV block and bradycardia – monitor pulse carefully
- an increase in plasma digoxin levels has been noted with carvedilol:
  - monitor for signs of digoxin toxicity (confusion, anorexia, nausea, disturbance of colour vision) when starting, adjusting, or stopping carvedilol

Calcium-channel blockers:
- most calcium channel blockers (except amlodipine and felodipine) should not be used as they have a negative inotropic effect and can cause worsening HF
- avoid other dihydropyridine derivatives and avoid verapamil and diltiazem
- NB: calcium-channel blockers (with the exception of amlodipine) have been found to exacerbate symptoms of HF or increase mortality after MI in patients who have pulmonary congestion or LVSD

Tricyclic antidepressants (TCA):
- are not recommended as they may cause hypotension, worsening HF and arrhythmias

Lithium:
- there is an increased risk of toxicity if loop and thiazide diuretics are used in combination with lithium

The addition of an ARB (or renin inhibitor) to the combination of an ACE inhibitor and an aldosterone antagonist is not recommended because of the risk of renal dysfunction and hyperkalaemia.

NSAIDs and cyclo-oxygenase-2 inhibitors:
- should be avoided if possible as they may cause sodium and water retention, worsening renal function, and worsening HF
- all NSAIDs are contraindicated in severe heart failure
- diclofenac and inhibitors of selective cyclo-oxygenase-2 (e.g. celecoxib, etoricoxib, and parecoxib) are contraindicated in mild to severe HF

Oral corticosteroids:
- should be avoided in patients with COPD as they cause sodium and water retention, potentially leading to worsening HF:
  - however this is not believed to be a problem with inhaled corticosteroids

Xanthine oxidase inhibitors, e.g. allopurinol:
- may be used to prevent gout, although safety is uncertain:
  - manufacturers state possible increased risk of leucopenia and hypersensitivity reactions when ACE inhibitors are given with allopurinol, especially in renal impairment – rare

Medications that prolong QT interval and may precipitate ventricular arrhythmias, such as:
- macrolide antibiotics e.g. erythromycin, clarithromycin
- certain antifungals
- certain antihistamines, e.g. terfenadine
- medications that reduce BP:
  - an additive hypotensive effect may occur
- monitor for signs of hypotension, including dizziness, light-headedness, and confusion

Thiazolidinediones (glitazones):
- cause worsening HF and increase risk of HF hospitalization

Chemotherapy agents:
- some chemotherapy agents can cause or aggravate LVSD and HF
- these include anthracyclines, e.g. doxorubicin, and trastuzumab

Alpha-adrenoceptor antagonists:
- not recommended due to safety concerns – neurohormonal activation, fluid retention and worsening HF

Back to pathway

Information for Patients

Heart Failure from BUPA - http://www.bupa.co.uk/

Heart Failure from Patient Info - http://patient.info/health/heart-failure-leaflet

Chronic heart failure in adults: Management, from NICE - https://www.nice.org.uk/guidance/cg108/chapter/1-Guidance

British Heart Foundation Link to living with a heart Condition - https://www.bhf.org.uk/heart-health/living-with-a-heart-condition