Heart Failure - Full Clinical Guideline

Reference no.: CG/T/2008/019

Adult Heart Failure Guideline (Primary and Secondary Care)

Introduction

This policy is to ensure that all adult patients with chronic heart failure are treated appropriately, based on research and/or best practice evidence

Aim and Scope:

These guidelines apply to all staff involved in the management of chronic heart failure patients in both Primary and Secondary care settings. It will support clinical decision making so as to improve the standards and outcomes for these patients.

Implementing the policy:

The successful implementation of this guideline relies on dynamic education and awareness training programme for all staff (Primary and Secondary Care).

It will be distributed throughout Primary and Secondary Care

Abbreviations

ACEi – angiotensin converting enzyme inhibitor
ARB – angiotensin receptor blockers
BNF – British National Formulary
BNP – B-type natriuretic peptide
CRT – cardiac resynchronisation therapy
eGFR – estimated glomerular filtration rate
ECG – electrocardiogram
HF – Heart failure
HFREF – heart failure with reduced ejection fraction
HFPEF – heart failure with preserved ejection fraction
H-ISDN – hydralazine and isosorbide dinitrate
HR – heart rate
ICD – implantable cardioverter defibrillator
LV – Left ventricular
LVDD – Left ventricular diastolic dysfunction
LVEF – Left ventricular ejection fraction
MRA – mineralocorticoid receptor antagonist
NTproBNP – N-terminal proB-type natriuretic peptide
OTCs – Over the counter medications
RAS – renin–angiotensin system
SBP – systolic blood pressure
U&Es – serum urea & electrolytes

Index **Page**

Key recommendations

Patients with suspected chronic heart failure should receive a range of basic tests. The investigations chosen will vary depending on the presentation but should usually include NTproBNP, a full blood count, HBA1c (or fasting blood glucose), serum urea and electrolytes (U&Es), urinalysis, thyroid function, liver function tests, electrocardiogram, lipids, peak flow or spirometry and chest X-ray.

Diagnosis

- The basis for historical diagnoses of heart failure should be reviewed, and only patients whose diagnosis is confirmed should be managed in accordance with this guideline.
- Doppler 2D echocardiographic examination should be performed to exclude important valve disease, to assess the function of the cardiac chambers and to detect intra-cardiac shunts.

Monitoring

All patients with heart failure are at risk of renal impairment and hyperkalaemia. This is a consequence of common co-morbidities (e.g. diabetes), drug treatment, or just of the heart failure itself. Monitoring renal function has a very important role in heart failure management. In some situations renal function should be measured at frequent intervals because of a change in drug treatment (e.g. initiation of spironolactone) or of an acute change in the patient's condition. When patients are clinically stable and on stable doses of medication U&E should still be checked at least twice a year in order to monitor chronic changes in renal function which might mandate modification of the patient's treatment. Heart failure treatment, especially the combination of ACEi/ARB and MRA puts the patient at risk of acute decline in renal function and hyperkalaemia. In the event of intercurrent illness, especially diarrhoea and vomiting, all patients should be counselled to contact their GP under these circumstances and to stop the ACEi/ARB and MRA (normally for 48 hours), until they have had a blood test or once they are better, passing urine and are taking oral fluids. Patients should be provided with the following leaflet containing this advice:- Patient Sick Day Information Leaflet - ACEi/ARB/MRA/Sacubitril-Valsartan

- All patients with heart failure require monitoring. This monitoring (minimum of 6 monthly for stable patients) should include:
  - a clinical assessment of functional capacity, fluid status, cardiac rhythm, and cognitive and nutritional status
  - a review of medication, including need for changes (e.g. cessation of negatively inotropic calcium channel antagonists e.g. verapamil, diltiazem) and possible side effects
  - U&Es and eGFR

- In patients that do not respond to first/second line treatment, an assessment and referral for escalation of therapy may be required either to the HF team or cardiology (this may include consideration of invasive strategies to improve heart failure).

Discharge

- Patients with heart failure should generally be discharged from hospital only when their clinical condition is stable and the management plan is optimised
- The primary care team, patient and carer must be made aware of the management plan.
- Referral for a period of cardiac rehabilitation should be considered where appropriate.

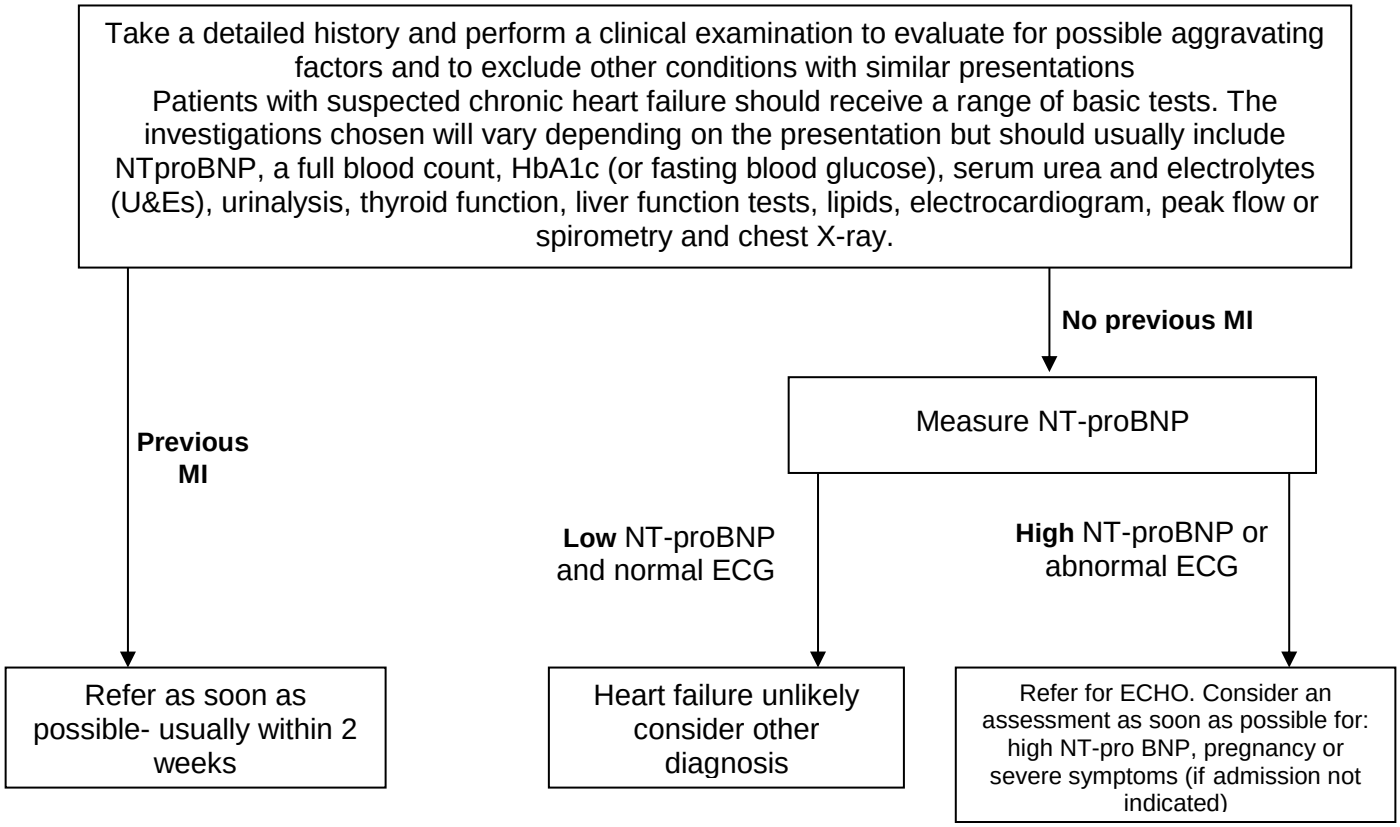
Supporting patients and carers

1. Management of heart failure should be seen as a shared responsibility between patient and healthcare professional.

Consider referral to the specialist heart failure team if appropriate: (see page 21 for referral details)

- Telephone referrals:- 01332 258 131
- Email referrals:- dhft.DerbyHFteam@nhs.net

Diagnosing heart failure



While awaiting referral and if symptoms are severe to warrant treatment (but not admission) start a loop diuretic e.g. furosemide 20mg/day to 40mg/day. Stop (if possible) oral NSAIDs (including OTCs), glitazones and non-dihydropyridine calcium channel blockers (e.g. verapamil, diltiazem)

Serum peptides

High levels	NTproBNP	> 1000 ng/L
Raised levels	NTproBNP	277-1000 ng/L
Normal levels	NTproBNP	0 – 277 ng/L

N terminal-pro-B-type natriuretic peptide (NT-proBNP) greatly improves the ability to rule out heart failure before referring for ECHO. Treatment of heart failure can however bring NT-proBNP into the normal range. This must be taken into consideration when investigating subjects with suspected heart failure who have already commenced treatment. A number of non-cardiac pathologies can result in spurious elevations in NT-pro BNP (Table 6). This also needs to be taken into consideration.

New York Classification

Class	Symptoms
I	No limitation: ordinary physical exercise does not cause undue fatigue, dyspnoea or palpitations.
II	Slight limitation of physical activity: comfortable at rest but ordinary activity results in fatigue, palpitations or dyspnoea.
III	Marked limitation of physical activity: comfortable at rest but less than ordinary activity results in symptoms.
IV	Unable to carry out any physical activity without discomfort: symptoms of heart failure are present even at rest with increased discomfort with any physical activity.

Management Of Heart Failure with Reduced Ejection Fraction (HFREF)

- All patients with HFREF should be considered for an ACE inhibitor and beta blocker. Introducing one drug at a time, and once the person is stable on the first drug (usually an ACE) then adding the second drug.

- Patients with heart failure with reduced ejection fraction who have ongoing symptoms of heart failure, NYHA class II to IV, LVEF ≤35%, despite optimal treatment, should be given mineralocorticoid receptor antagonists (MRA) unless contraindicated.

- No patient should receive three drugs which block the renin-angiotensin-aldosterone system as hyperkalaemia and renal dysfunction will be common. The safety and efficacy of combining an ACE inhibitor, an ARB and MRA is uncertain and the use of these three drugs together is not recommended.

- Monitoring renal function has a very important role in heart failure management

- NTproBNP testing is used to screen patients before referral for ECHO in patients with suspected heart failure.

- If ECHO suggests a diagnosis of HF an ECG should be done (if not already) to help identify the underlying cause of the HF.

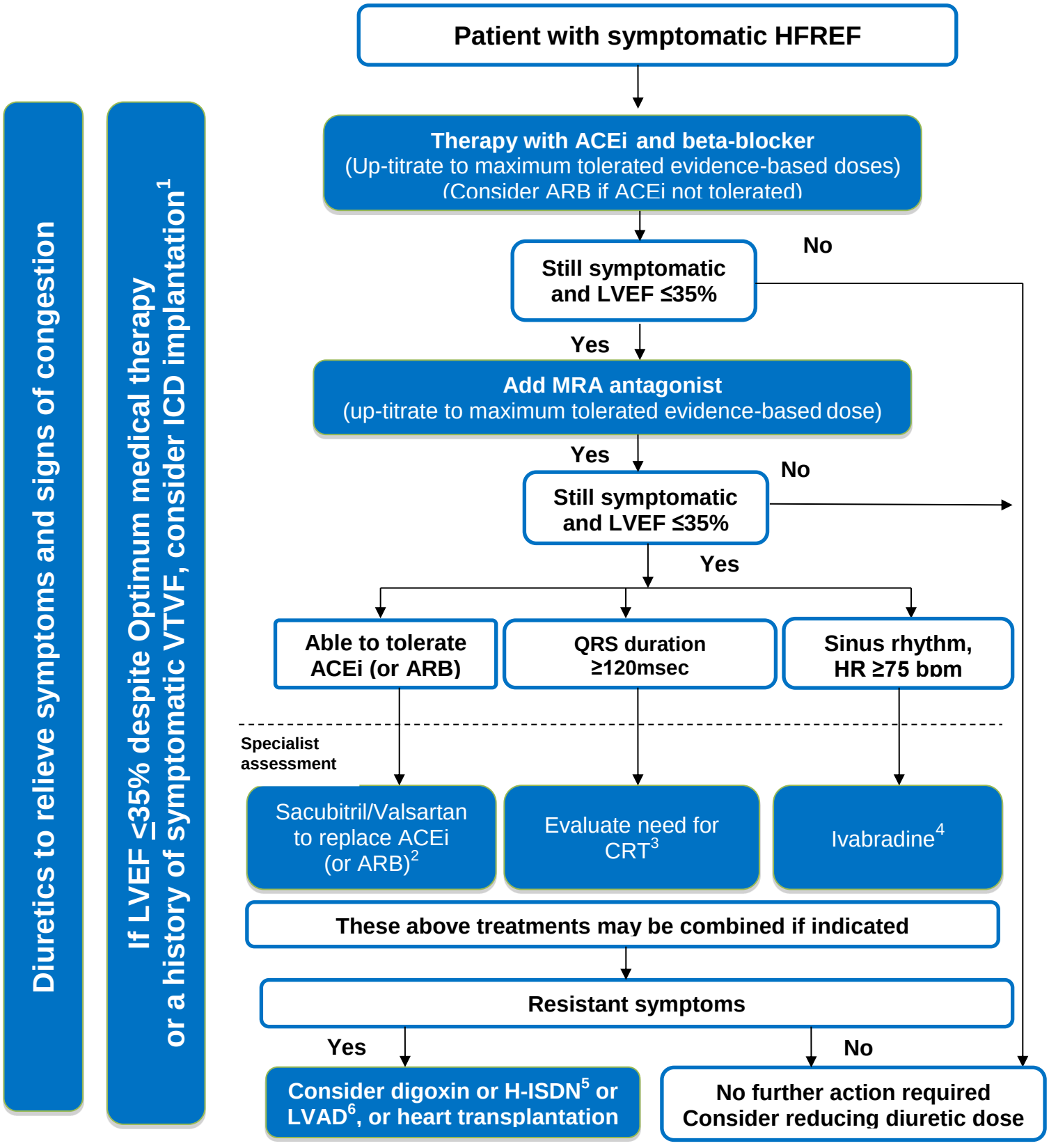
- Sacubitril-valsartan and Ivabradine are medical treatment options to be used in HFREF as per NICE guidelines. Treatment with these agents is to remain with the HF specialist service. **Patients who commence scaubitril-valsartan must have their ACEi discontinued at least 36 hours before treatment is started.** (See pages 14-15 for further details)

- Specialist advice should be sought for patients who deteriorate after having been stable for a number of years on optimum pharmacological treatment with an unaccountable cause.

- Escalation in the medical and interventional management of HFREF should follow the algorithm shown on page 6.

- Patients should be advised of the potential need to temporarily stop their heart failure medications and seek medical advice during periods of potentially dehydrating illness (such as vomiting/diarrhoea).

Management algorithm - Heart failure with Reduced Ejection Fraction



1. Consider an ICD in line with 'Implantable cardioverter defibrillators for arrhythmias' (NICE TA 394).
2. Sacubitril/Valsartan for treating chronic heart failure (NICE TA388).
3. Consider CRT in line with 'Cardiac resynchronisation therapy for the treatment of heart failure' (NICE TA 314).
4. Ivabradine for treating chronic heart failure (NICE TA267).
5. hydralazine in combination with nitrate (especially in people of African or Caribbean origin with moderate to severe heart failure).
6. LVAD - left ventricular assist device.

First-Line Management of Heart Failure due to Reduced Ejection Fraction

Echocardiogram has confirmed HFREF
(mild, moderate or severe; or LV ejection fraction less than 50% on echocardiography)

General Measures in all cases

- Discontinue aggravating drugs if possible: oral NSAID, calcium antagonists (unless absolutely essential (e.g. for angina or hypertension)
- Specific advice on fluid intake and salt in diet (<6g/day)
- Address risk factors: smoking, alcohol, obesity, hypertension, diabetes
- Follow local guidelines on primary/secondary prevention of CAD
- Advise pneumococcal vaccination and influenza vaccination
- Offer patient-held record – for therapy, weight, risk factors etc.

Initial Treatment for all patients

If signs of fluid retention (oedema, lung crackles, raised JVP, pulmonary congestion on chest X -ray) – *start oral loop diuretic*

- If patient in AF – refer to the AF guideline
  Start ACEi in all patients (check baseline U&Es), unless contraindication (severe aortic stenosis or suspected renal artery stenosis) or specialist advice needed (see below)
  If contraindication to ACEi → Refer to HF team as appropriate
- Stop potassium supplements or potassium sparing diuretics (risk of hyperkalaemia)
- Start ACEi at low dosage – warn patient about hypotensive symptoms
- Check renal biochemistry after 1-2 weeks of therapy (see page 9).
- If biochemistry stable, slowly titrate ACEi to target dosage *or* maximally tolerated dose (suggest at intervals of two weeks). Check biochemistry at each titration stage.
- Aim for target dose or maximum tolerated dose (see page 8).

Once on Target or Maximal tolerated dose of ACE-inhibitor

- Repeat renal biochemistry after one month. If stable, check every 6 months or more frequently if patient status changes (particularly intercurrent illness).
- Check for adverse effects – symptomatic hypotension; rise in creatinine to > 30% from baseline or >266micromol/l (whichever is the smaller); hyperkalaemia (potassium>5.5 mmol/l); intolerable cough (see page 9)

If truly *intolerant due to cough* of ACEi (*except* renal dysfunction or hyperkalaemia)

- Start angiotensin receptor antagonist - Candesartan 4-8 mg od: target dose 32 mg od or losartan 12.5-50mg OD: target dose 150mg OD
  (Titrate doses at intervals of two weeks).
- Check renal biochemistry according to guidelines given below (see page 9).

Once established on ACEi or Angiotensin Receptor Blocker +/- diuretic

Start titrating Beta blocker- (bisoprolol)

Seek Specialist advice before initiating ACEi therapy in following groups:

1. ***Creatinine > 221 umol/l (significant renal dysfunction)***
2. ***Potassium >5 mmol/l***
3. ***Sodium < 130 mmol/l***
4. ***Systolic BP < 90 mmHg***
5. ***Diuretic Dose > 80 mg furosemide per day (or equivalent)***
6. ***Known or suspected renal artery stenosis (e.g. severe peripheral vascular disease)***
7. ***Pregnancy (C/I 2nd & 3rd trimester)***

Drug therapy in HFREF

Treatment

1. All patients with HFREF should be considered for treatment with an ACEi (even in the absence of symptoms).
2. Beta-blockers licensed for use in heart failure should be initiated in patients with HFREF usually but not necessarily after diuretic and ACEi therapy (even if rendered asymptomatic with diuretic and ACEi). There may though be clinical reasons for starting a beta-blocker first e.g. additional anti-anginal treatment needed.

Diuretics

- Diuretics should be routinely used for the relief of congestive symptoms and fluid retention in patients with heart failure, and titrated (up and down) according to need following the initiation of subsequent heart failure therapies. The lowest dose required to relieve symptoms/congestion is the optimum dose.
- Furosemide dose usually given once a day (morning), but can be given twice daily (morning and lunchtime for additional diuresis (starting dose 20-40mg day to usual dose 40-240mg per day). (Bumetanide is a 2nd line option (lack of efficacy with furosemide) - starting dose 1mg/day to usual daily dose of 1-5mg/day)
- Check renal function and serum electrolytes 1-2 weeks after starting treatment and after each dose titration. If stable then once every 6 months.

Diuretic resistance (after specialist initiation and assessment)

- Thiazide and thiazide-like diuretics (metolazone) can be added to loop diuretics to create a synergistic and potent diuresis in patients who are failing to adequately respond to increasing doses of loop diuretics
- This combination is initiated and managed by a specialist and on-going care only handed to primary care when the clinical and renal status of the patient have been stabilised.
- This combination can be effective and avoid the need for hospitalisation, but is not without risk.

ACE inhibitors (ACEi)

- All patients with HFREF should be considered for treatment with an ACEi.
- ACEi therapy is usually, but not necessarily, initiated before beta-blockade is introduced.
- ACEi therapy should be initiated at the appropriate low dose (see table 1) and titrated upwards at short intervals (for example, every 2 weeks) until the maximum tolerated or target dose is achieved. In the inpatient setting, under specialist care, dose escalation may be undertaken at a more rapid rate.
- Blood biochemistry (urea, creatinine and electrolytes) should be measured 1-2 weeks after initiation and at 1-2 weeks after each dose increment. Once the dose is stable, monitor U&Es at least every 6 months. More frequent monitoring will be dependent on the persons clinical condition, medication regimen or co-morbidities.

Table 1 – starting and target dose for ACEi.

ACE inhibitor	Starting dose	Target dose
Enalapril tablets	2.5mg twice daily	10 - 20mg twice daily
Lisinopril tablets	2.5mg once daily	35mg once daily
Ramipril capsules	2.5mg once daily	5mg twice daily or 10mg once daily

Angiotensin receptor blockers (ARB)

- Candesartan is the ARB of choice should one be required. ARB may provide an alternative to ACE inhibitors for patients intolerant of ACEi (for example, because of cough).

Table 2 – starting and stable dose for ARB.

ARB	Starting dose	Target dose
Candesartan tablets	4 or 8 mg once daily	32mg once daily
Losartan tablets	12.5 - 50mg once daily	150mg once daily

Although the MHRA June 2014, advised that the combination use of medicines from two classes of the renin-angiotensin hormone system blocking agents (this includes ACEi, ARBs and aliskiren) is not recommended. There are some patients with heart failure may have a medical need for treatment with an ACEi and ARB. There is some evidence that the benefits of this combination use may outweigh the risks (hyperkalaemia, hypotension, impaired renal function) in a selected group of people with heart failure for whom other treatments are unsuitable. Candesartan is a RAS blocking agent licensed as add-on therapy to ACEi for people with symptomatic heart failure who require such a combination despite optimal therapy.

Note- The combination of ACE+ARB+MRA together is **not** recommended. The triple combination of ACEi, beta-blocker and ARB may be considered for persistently symptomatic patients – to be initiated only by a specialist.

Renal function in patients on ACEi and ARBs:

- A rise in urea, creatinine and potassium is to be expected after initiation of these medications.
- An increase in creatinine up to 30% above baseline or to 266 micromol/l (whichever is smaller) is acceptable.
- An increase in potassium to <5.5mmol/l is acceptable
- If greater rises in creatinine or potassium than those outlined above persist despite adjustment of concomitant medications (e.g. stopping of NSAIDs) other potassium supplements/retaining agents (triamterene, amiloride, spironolactone/ eplerenone) and, if there are no signs of congestion, reducing the dose of diuretic. The dose of the ACEi / ARB should be halved and blood urea, creatinine and electrolytes rechecked within one to two weeks; if there is still an unsatisfactory response specialist advice should be sought.
- If potassium rises to ≥5.5 mmol/l or creatinine increases by >50% or to above 310 micromol/l the ACEi / ARB should be stopped and specialist advice sought.
- Blood urea, creatinine and electrolytes should be monitored frequently and serially until potassium and creatinine have plateaued.

Beta-blockers

- Beta-blockers licensed for use in heart failure should be initiated in patients with symptomatic heart failure due to HFREF after diuretic and usually ACEi therapy (even if rendered asymptomatic with diuretic and ACEi).
- All patients with heart failure with reduced ejection fraction, NYHA class II-IV, should be started on beta-blocker therapy as soon as their condition is stable
- Beta-blockade therapy for heart failure should be introduced in a 'start low, go slow' manner, with assessment of heart rate, blood pressure, and clinical status after each titration.
- Patients who develop heart failure due to left ventricular systolic dysfunction and who are already on treatment with a beta-blocker for a concomitant condition (for example, angina, hypertension) should continue with a beta-blocker – either their current beta-blocker or an alternative licensed for heart failure treatment. Patients who are symptom free on atenolol do not necessarily need to switch to a beta-blocker licensed for heart failure.
- Monitor heart rate, BP and clinical status (symptoms, signs, especially of congestion, body weight)
- Check blood U&Es one to two weeks after initiation and one to two weeks after final dose titration.

Low Heart rate:

- If the heart rate is <55 beats/min with worsening symptoms and the patient is symptomatic
  - Review the need for other heart rate slowing drugs e.g. digoxin, amiodarone, diltiazem/verapamil (diltiazem, verapamil are generally contraindicated in HF)
  - halve the dose of beta blocker **or**
  - if there is severe deterioration, stop beta blocker (rarely necessary) and review the need for other heart rate slowing drugs, e.g. digoxin, amiodarone, diltiazem/verapamil (diltiazem and verapamil are generally contraindicated in HF).
  - Arrange an ECG to exclude heart block.
  - Seek specialist advice.

Table 3 – starting and target dose for beta blockers

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

*The recommended maximum dosage is 25 mg twice a day for patients with a body weight of less than 85 kg, and 50 mg twice a day for patients with a body weight above 85 kg, provided that the heart failure is not severe.

Starting bisoprolol in heart failure

The following conditions should be satisfied before starting bisoprolol:

1. Patient should have stable chronic heart failure without acute failure during the past 6 weeks and a mainly unchanged basic therapy during the past 2 weeks.
2. Patient should usually be treated at optimal dose with an ACEi (or ARB if not tolerated).
3. Patient should not have any absolute contraindications to bisoprolol use:
   - Acute heart failure or during episodes of heart failure decompensation requiring i.v. inotropic therapy
   - Cardiogenic shock
   - AV block of second or third degree (without a pacemaker)
   - Sick sinus syndrome
   - Sinoatrial block
   - Symptomatic/severe bradycardia with less than 60 beats/min before start of therapy
   - Symptomatic/severe hypotension (SBP < 90mmHg)
   - Severe bronchial asthma or severe chronic obstructive pulmonary disease
   - Late stages of peripheral arterial occlusive disease and Raynaud's syndrome
   - Untreated phaeochromocytoma
   - Metabolic acidosis

Some of the above may be relative contraindications for example NICE recommends the offering of a beta-blocker in COPD patients without reversibility – if unsure contact a cardiologist.

The treatment with bisoprolol has to be initiated with a titration phase:

- 1.25mg once daily for two weeks, if well tolerated increase to
- 2.5mg once daily for two weeks, if well tolerated increase to
- 3.75mg once daily for two weeks, if well tolerated increase to
- 5mg once daily for four weeks, if well tolerated increase to
- 7.5mg once daily for four weeks, if well tolerated increase to
- 10mg once daily for the maintenance therapy

The SPC recommends that after initiation of treatment and dose increases patients should be observed over 4 hours (BP, heart rate, signs of increasing heart failure). Locally this is not considered to be necessary and returning home to the supervision of a responsible, forewarned adult would be more than adequate.

Notes

1. Progression from one titration stage to the next should be as a minimum at these intervals – it doesn't matter if it takes longer. Occurrence of adverse events may prevent all patients reaching the maximum recommended dose – some bisoprolol is better than none at all.
2. If the patient complains of worsening shortness of breath then temporarily halt the titration. Leave the bisoprolol dose unchanged but increase the diuretic dose and review in a further 2 weeks. If breathlessness has reverted to its prior level, the titration can recommence. The dose of diuretic can be reduced when appropriate.
3. An alternative strategy for shortness of breath is to temporarily reduce the bisoprolol dose and prolong the intervals between subsequent titration if the breathlessness settles.
4. No further increase in bisoprolol dose should be made, without specialist advice, if the pulse (or apex beat if in AF) drops below 55 bpm and/or the SBP is less than 90mmHg, or there is symptomatic hypotension or bradycardia above these levels.
5. Treatment with bisoprolol is not recommended to be stopped abruptly since this might lead to a transitory worsening of heart failure. Many of the patients will also have ischaemic heart

disease and sudden withdrawal of beta-blockade might precipitate an angina attack or an MI. If discontinuation is necessary, the dose should be gradually decreased by dividing into halves weekly. The only indications to stop bisoprolol therapy abruptly are:
- severe symptomatic hypotension
- acute pulmonary oedema
- cardiogenic shock
- severe symptomatic brachycardia
- 2nd or 3rd degree AV block

6. Ivabradine is a treatment option to consider either in addition to beta-blockers or as an alternative if beta-blockers are contraindicated or not tolerated. Its use is restricted to patients who are in sinus rhythm with heart rate over 75bpm after specialist review (NICE TA267).

Mineralocorticoid receptor antagonist (MRA)

- Patients with HFREF (LVEF<35%) who remain symptomatic despite optimal therapy (as outlined in the algorithm) should be prescribed spironolactone at a dose of 12.5 OD or 25mg on alternate days to 25-50 mg once per day – specialist advice should be sought. Target dose is dependent on symptoms and stability of biochemistry and renal function.
- Patients with heart failure taking spironolactone should have blood potassium and creatinine levels monitored for signs of hyperkalaemia and/or deteriorating renal function. If hyperkalaemia is a problem then the dose of spironolactone should be temporarily held, then halved and biochemistry rechecked. For baseline and continuous monitoring see spironolactone flowchart on page 12 for recommendations
- If a patient requires but cannot tolerate spironolactone, eplerenone (starting dose of 25mg once daily with titrated target dose of 50mg once daily usually within 4 weeks) may be used following the advice of the specialist.

NOTE- The use of ACE+ARB+MRA together is **not** recommended

Ivabradine (as per NICE TA 267)

Ivabradine may be prescribed after consultant or specialist (with access to a multidisciplinary heart failure team) initiation following a period of 4 weeks on optimised standard therapy with ACEI, beta-blocker and aldosterone antagonist.
NICE criteria:

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

Note -MHRA June 2014, advice for healthcare professionals regarding posology and monitoring:

- The starting dose of ivabradine is 5 mg twice daily. The maintenance dose should not exceed 7.5 mg twice daily.
- Carefully monitor patients for bradycardia or its symptoms (e.g., dizziness, fatigue, hypotension).
- The usual recommended starting dose of ivabradine is 5 mg twice daily. After two weeks of treatment, the dose can be increased to 7.5 mg twice daily if resting heart rate is persistently above 60 bpm or decreased to 2.5 mg twice daily (one half 5 mg tablet twice daily) if resting heart rate is persistently below 50 bpm or in case of symptoms related to bradycardia such as dizziness, fatigue or hypotension. If heart rate is between 50 and 60 bpm, the dose of 5 mg twice daily should be maintained
- Stop ivabradine treatment if the resting heart rate remains below 50 bpm or symptoms of bradycardia persist.

Second-Line Management of Heart Failure due Reduced Ejection Fraction

Second-line treatment (after optimisation of ACEi and beta blocker) in patients with NYHA class II-IV HF and LVEF ≤35% should be a mineralocorticoid receptor anatagonist

Suitable for initiation of Spironolactone?

Spironolactone Contraindicated
- Serum potassium > 5 mmol/l
- Serum creatinine > 220 umol/l (or CKD stage >3)
- Known acute liver disease

If spironolactone contraindicated or is withdrawn *and* patient is still NYHA class II – IV despite therapy with a loop diuretic, ACE-inhibitor and beta-blocker

Refer to Secondary Care (Cardiology, Medicine, Nephrology or DME as appropriate)

Further Monitoring
- Patient may become dehydrated on spironolactone – if so reduce other diuretic dosages or stop spironolactone
- If patient develops intercurrent illness that causes salt and water loss (e.g. D & V) – tell them to ***stop spironolactone and contact their physician***
- Repeat biochemistry and monitor closely

Indications for Spironolactone
- LVEF ≤35%
- Heart failure (NYHA II – IV)
- Already on ACEi, beta-blocker and loop diuretic
- **No** evidence of hypovolaemia

Check biochemistry; stop *potassium supplements and other potassium-sparing diuretics* before *starting spironolactone*
- *Caution* if low body weight (<50 kg)
- Potassium ***must*** be < 5 mmol/l
- Continue ACE-inhibitor, loop diuretics, beta-blocker and digoxin if already prescribed
- Liaise with Heart Failure Nurse Service

- Commence spironolactone 25 mg od or on alternate days
  - Repeat U&E at 5-7 days post initiation, then at 4, 8 and 12 weeks
  - Then 6 monthly thereafter*
  - Repeat above also after a dose change
  - Target dose 25-50 mg once daily**

This monitoring is by local agreement with Derbyshire cardiologists/ specialists

*Note- 3 monthly or more intensively may be necessary if there are clinical reasons why the patient is at increased risk of renal impairment

** target dose dependent on symptoms and stability of biochemistry

If intolerant of spironolactone or potassium > 5.5 mmol/l or creatinine > 220 umol/l
- *Reduce dose to 25 mg alternate days if not done already*
- *If still clinical/biochemical problems – stop spironolactone*
- *If potassium > 5.9 mmol/l or creatinine to 310umol/l – stop spironolactone immediately and seek specialist advice*

Sacubitril/ valsartan (as per NICE TA 388)

Sacubitril/valsartan initiation, titration, prescribing and monitoring currently remains under the care of the Heart Failure specialist team (– it has been designated locally as a 'Red drug.')

NICE criteria for initiation (see flow chart on page 14-15):
- with New York Heart Association (NYHA) class II to IV symptoms **and**
- with a left ventricular ejection fraction of 35% or less **and**
- who are already taking a stable dose of ACEi or an ARB.

Treatment should not be initiated in patients with serum potassium level >5.4 mmol/l or with SBP <100 mmHg.

Usual starting dose is one (49/51mg) tablet, twice daily with the dose doubled at 2 to 4 weeks to the target dose of one (97/103mg) twice daily, as tolerated by the patient (flow chart on page 15).

A starting dose of 24mg/26mg twice daily should be considered for patients with SBP ≥100 to 110 mmHg and in patients with moderate renal impairment (eGFR 30-60 ml/min/1.73 m^2)

Patients on an ACE inhibitor should have the ACE inhibitor discontinued for 36 hours before initiating sacubitril/valsartan to minimise the risk of angioedema.

Tolerability issues
- SBP ≤95 mmHg or
- symptomatic hypotension
- hyperkalaemia
- renal dysfunction (see below)

Action
1. Adjustment of concomitant medicinal products and or
2. Temporary down–titration or
3. Discontinuation of sacubitril/valsartan is recommended.

Periodic blood pressure monitoring (no less than annually) and renal function 3 monthly once stable is recommended. As with ACE inhibitors renal function is measured at baseline and at 2 weeks after each dose change.

Renal function monitoring in patients on Sacubitril / Valsartan

As a recently developed medication there is little formal guidance on the management of renal dysfunction secondary to commencement of Sacubitril / Valsartan. It is therefore recommended that an approach is adopted as is used for the management of renal function during the use and introduction of ARBs (page 9).

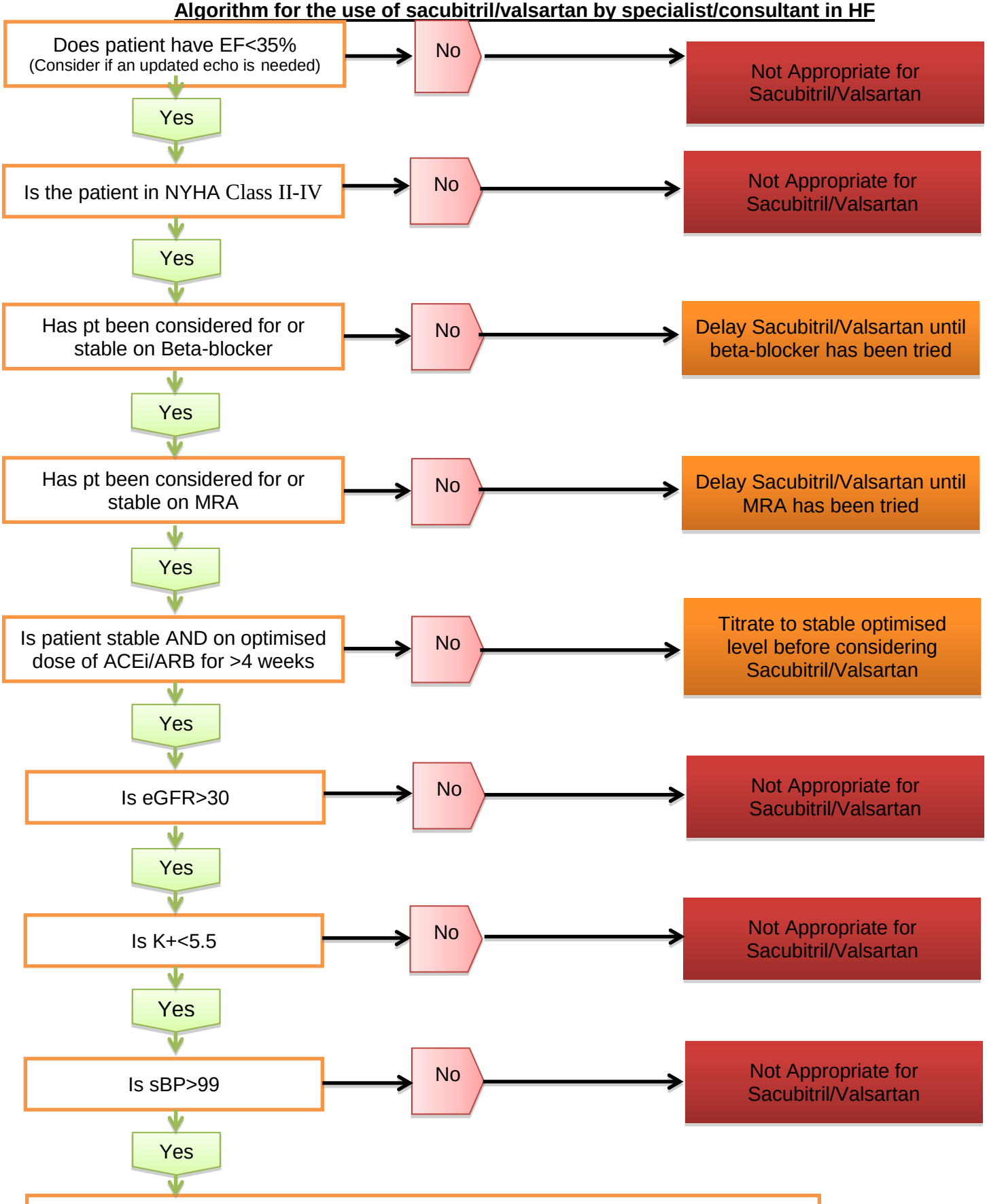
Digoxin

Digoxin is recommended for:
- Worsening or severe heart failure in sinus rhythm despite first and second line treatment
- Patients with atrial fibrillation and any degree of heart failure.

Hydralazine and Isosorbide Dinitrate (H-ISDN)
- H-ISDN should be considered in black patients with LVEF <45% in NYHA Class III – IV despite treatment with an ACEi, a beta-blocker and an MRA to reduce risk of HF hospitalisation and death.
- H-ISDN may be considered in symptomatic patients with HFREF who can tolerate neither an ACEi nor ARB (or they are contraindicated) to reduce the risk of death.

Third-Line Management of Heart Failure due Reduced Ejection Fraction

Algorithm for the use of sacubitril/valsartan by specialist/consultant in HF



Algorithm for sacubitril/valsartan initiation and dosing by specialist/consultant in HFREF

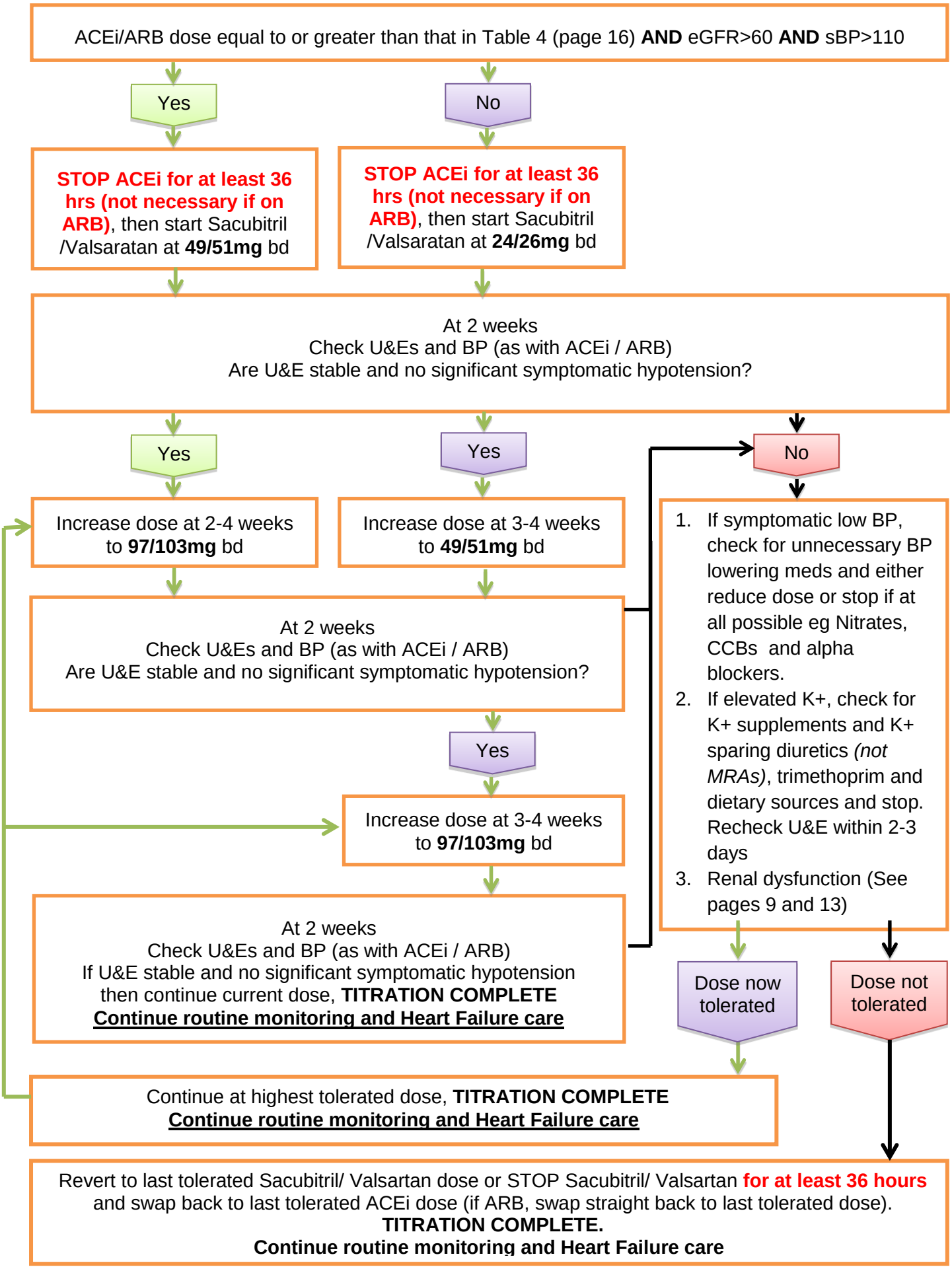


Table 4 - Dose of commonly prescribed angiotensin-converting enzyme inhibitors/ angiotensin-receptor blockers equivalent to a DAILY dose of 10 mg of enalapril.

ACE inhibitors	
Captopril 100 mg	Cilazapril 2.5 mg
Fosinopril 20 mg	Lisinopril 10 mg
Moexipril 7.5 mg	Perindopril 4 mg
Quinapril 20mg	Ramipril 5mg
Trandolapril 2mg	Zofenopril 30mg
Angiotensin-receptor blockers	
Candesartan 16 mg	Eprosartan 400 mg
Irbesartan 150 mg	Losartan 50 mg
Olmesartan 10 mg	Telmisartan 40 mg
Valsartan 160 mg	

Iron Deficiency and Anaemia in HFREF

Iron deficiency is common in heart failure and is associated with a worse prognosis in heart failure patients. HF Patients with iron deficiency should be screened for potentially treatable/reversible causes (e.g. gastrointestinal bleeding). Intravenous iron has been specifically studied in HFREF patients with iron deficiency (serum ferritin <100µg/l or ferritin between 100 and 299µg/l and transferrin saturation <20%) in subjects both with and without anaemia. Intravenous ferric carboxymaltose treatment has been shown to improve symptoms, quality of life, NYHA class, exercise capacity and reduce risk of HF hospitalisation.

Patients with symptomatic HFREF and iron deficiency should be considered for intravenous therapy with ferric carboxymaltose (weight adjusted dosing – see product literature). This must be performed in the hospital environment with the availability of appropriately trained staff and resuscitation facilities due to the risk of hypersensitivity reactions. Patient should be monitored for a minimum of 30 minutes post dose.

An ambulatory day case protocol for outpatients who require parenteral iron treatment is currently in development. Please refer patients to the heart failure specialist nursing team in order to access this service.

LIFESTYLE ADVICE

Appropriate lifestyle advice is probably as important as pharmacological therapy

Exercise
Regular aerobic and probably resistive exercise improves symptoms and quality of life. Meta-analyses suggest improvement in survival. Cardiac rehabilitation for heart failure patients is now available but all patients should be encouraged to exercise as much as their symptoms allow.

Salt restriction
The kidneys avidly retain salt in heart failure and this results in congestion. Where possible salt should be avoided. 'Lo Salt' contains some sodium and a significant amount of potassium. It should be avoided.

Weight monitoring
Obesity is a cause of heart failure and contributes towards the metabolic syndrome and obstructive sleep apnoea both of which exacerbate heart failure. Loss of fat weight can greatly improve symptoms. Fat weight rarely changes by more than a few hundred grams per day. Wet weight may change by as much as 2 Kg per day. Hospital admission is often preceded by a period of weight gain (salt and water retention). Hospital admission may be prevented by increasing the diuretic dose in response to weight gain. Similarly, in hot weather, weight loss signals the need to reduce the dose of diuretic.

Alcohol
For patients with alcoholic cardiomyopathy (in which alcohol has a toxic effect on the myocardium) complete abstinence is essential. For all others modest alcohol consumption is harmless.

Smoking
Should be strongly discouraged in all patients

Fluid restriction
Formal fluid restriction is difficult to achieve with any accuracy at home. Patients with hyponatraemia should be encouraged to be careful about the amount of fluid they drink. Occasionally it is necessary to limit the patient to less than 2 litres per day.

Patients should be made aware of Acute Kidney injury resources www.thinkkidneys.nhs.uk and PIL and sick day guidance

Prescribing tips in HFREF

1. Medications with prognostic benefit, especially ACE inhibitors, are less well tolerated when the patient is volume contracted due to overenthusiastic diuresis. It is often necessary to reduce the diuretic to “make room” for the ACEi, beta-blocker and MRA.
2. Aim for the minimum dose of diuretic required to reduce congestion
3. Aim for the target dose of ACEi and beta-blocker. But some is better than none and a little of both is better than lots of one and none of the other.
4. In heart failure a systolic blood pressure of 90 is often well tolerated. There is no need to reduce drug doses if the patient is without related symptoms. If it is necessary to reduce drug doses then consider reducing diuretic first.
5. If hypotension is a problem cut out any drugs that will lower BP but add nothing to the treatment of the heart failure eg CCBs, alpha-blockers.
6. Always stop the negatively inotropic CCBs (diltiazem, verapamil) if possible. They are associated with impaired survival. Long acting dihydropyridines (amlodipine, felodipine) have a neutral effect on mortality in heart failure
7. Cough is common in heart failure. ACE inhibitors cause cough in some patients. The effect of ACE inhibitors on survival is more certain than that of angiotensin receptor blockers. Do not rule out ACE inhibitors until you are absolutely certain that the drug is causing the cough.
8. Beta-blockers are usually perfectly well tolerated in COPD. Rhonchi are present periodically in heart failure and COPD. Do not stop the beta-blocker unless you are absolutely certain it is causing bronchospasm.
9. ACE inhibitors can often be up-titrated more quickly than recommended. Beta-blockers should always be bumped up slowly. It is sometimes necessary to leave it a lot longer than the suggested two weeks before increasing the dose. Sometimes the improvement in symptoms with beta-blockers is immediate. Sometimes it is necessary to encourage a patient to go through a period of symptom worsening before they feel better.
10. ACE inhibitors are not contraindicated in renal impairment. They are contraindicated when the presence of renovascular disease results in a decline (>50% increase in creatinine) in renal function with initiation of ACE inhibitor therapy. Check U&E one week after starting ACEi. Check sooner and more frequently where there is pre-existing renal impairment. Also beware hyperkalaemia (K^+>5.5mmol/L)
11. Spironolactone is indicated for patients with symptomatic heart failure despite optimum treatment with ACE inhibitors and beta-blockers. If the criteria for prescribing are met, spironolactone is the preferred option to digoxin.
12. Digoxin has no survival advantage in heart failure but is sometimes useful for treating symptoms. In the real world of elderly heart failure patients, drug interactions, intercurrent illnesses, and transient disturbance of renal function can lead to life-threatening hyperkalaemia or digoxin toxicity, so it is appropriate always to be cautious.
13. Drugs including Class I and III antiarrhythmics (excluding amiodarone), Rate-limiting calcium channel blockers, Minoxidil, Moxonidine, Corticosteroids, Non-steroidal anti-inflammatory drugs, Thiazolidinediones (glitazones), Tricyclic antidepressants, Itraconazole, Carbenoxolone and QT-prolonging agents may be harmful in HFREF patients and their use (where possible) should be reviewed.

Diagnosis and Management of HFPEF

Not all patients with heart failure have reduced LVEF. Patients with clinical symptoms and signs of heart failure, a causative structural or functional cardiac abnormality but normal or slightly reduced ejection fraction are described as having heart failure with a preserved ejection fraction (HFPEF). The proportion of patients with HFPEF may be as high as 35–50%.

Non cardiac diseases commonly manifest with signs and symptoms consistent with a clinical diagnosis of heart failure (Table 5). Such diseases are also often accompanied by elevations in natriuretic peptide level (Table 6). This can lead to the inappropriate diagnosis of HFPEF.

Table 5 – Conditions that may result in a diagnosis of HFPEF.

Common Cardiac Causes of HFPEF	**Non-Cardiac Conditions**
Ischaemic heart disease	Chronic obstructive pulmonary disease
Hypertension/Hypertensive cardiomyopathy	Iron deficiency and anaemia
Valvular heart disease	Primary pulmonary artery hypertension
Left ventricular hypertrophy	Pulmonary thromboembolic disease
Hypertrophic obstructive cardiomyopathy	Renal dysfunction / Nephrotic Syndrome
Constrictive pericarditis	Intravascular volume overload
Intra-cardiac shunts	Obesity
Post-radiation myocardial fibrosis	Thyroid disease
Malignant cardiac infiltration	Corticosteroid use
Tachyarrhythmias (e.g. Atrial fibrillation / Atrial flutter / Ventricular tachycardia)	Sepsis
Bradyarrhythmias (e.g. Sinus node disease / heart block	Extra-cardiac shunts • Padget's Disease • A-V malformations • A-V fistulae • Others
Infiltrative Cardiomyopathies • Amyloidosis • Sarcoidosis • Haemochromatosis • Glycogen storage diseases • Lysosomal storage diseases • Loeffler's endocarditis	
Other restrictive cardiomyopathies	
Other genetic cardiomyopathies	

Table 6 – Non-Cardiac conditions that may commonly result in elevated BNP

Non-Cardiac Causes of Elevated BNP	
Advanced Age	Ischaemic Stroke
Subarachnoid Haemorrhage	Renal Dysfunction
Liver Dysfunction (mainly liver cirrhosis)	Paraneoplastic Syndrome
Chronic Obstructive Pulmonary Disease	Severe Infections
Severe Burns	Anaemia
Thyrotoxicosis	Diabetic Ketosis
Other severe metabolic and hormone derangements	Pulmonary Embolism

Diagnosing HFPEF

The diagnosis of HFPEF relies on the presence of four criteria:-

- The presence of symptoms and signs of heart failure.
- LVEF ≥50%
- Elevated BNP / NT-BNP
- The presence of relevant cardiac disease (Table 5) or diastolic dysfunction on cardiac imaging.

Diastolic dysfunction (LVDD), which signifies reduction in ventricular compliance and elevation in left ventricular filling pressure, is characterised during transthoracic echocardiography using a wide range of parameters. These typically include 2-dimensional estimates of left atrial chamber volume, spectral Doppler assessments of mitral valve inflow and pulmonary vein blood flow velocity and tissue Doppler assessment of LV myocardial velocity. Based on these parameters diastolic dysfunction should be diagnosed and graded by the echocardiographer according to severity (Table 7).

Table 7 Classification of left ventricular diastolic dysfunction

Grade of LV Diastolic Dysfunction	**Description**
Grade 1	Slow Relaxation or Mild LVDD
Grade 2	'Pseudo-normalisation' or Moderate LVDD
Grade 3	Restrictive or Severe LVDD
Grade 4	Irreversible LVDD

Grade 1 LVDD is a common finding in elderly subjects and is often considered a normal finding in patients of advanced age who do not have heart failure symptoms.

Managing HFPEF

The treatment of HFPEF focuses on correct identification of the underlying pathophysiology (Table 5) and application of evidence based treatment to the underlying disease process. Co-morbidities should be identified and treated appropriately. No therapies have been conclusively shown to alter morbidity or mortality in patients with HF-PEF. Congestive cardiac symptoms are usually managed with the cautious introduction and up-titration of oral loop diuretics with the aim of improving congestive symptoms.

Heart Failure Team (Inpatients/Outpatients)

Referral Criteria and Contact Details

Referral Criteria please tick to confirm (must meet ALL of the following):

- ☐ Aged 18+ (unless referred by consultant Cardiologist)
- ☐ Registered with a GP in Derbyshire (for outpatients only)
- ☐ With a diagnosis of Heart Failure which MUST be confirmed by echo, angio or cardiac imaging and is accompanied by elevation in serum BNP / NT-BNP.
- ☐ The patient has been asked and agrees to the heart failure team being involved in their care

With one or more of the following (please tick which apply):

- ☐ Patient has had a recent hospital admission with worsening heart failure
- ☐ Initiation/titration of ACEi and/or Beta Blocker is problematic
- ☐ Patient is not symptom controlled on current medication
- ☐ Patient has advanced heart failure or complex palliative care needs
- ☐ Patient/carer struggling with self-management strategies

Urgency:

- ☐ **URGENT (1-3 days)**
  (FULL info AND PHONE CALL from clinician to team/office is VITAL)
- ☐ **SOON (For outpatients – within 2 weeks / For inpatients – within 2-7 days)**
  Patient has had a recent decompensation, is stable but not improving or is slowly deteriorating (please complete referral form and email through)
- ☐ **ROUTINE (2-4 weeks)**, patient is stable even if NYHA III/IV but not on optimum treatment (please complete referral and email or post)

A referral form must completed and can be posted or emailed to:

The Heart Failure Team

Inpatients:- DHFT.derbyhfteam@nhs.net
Tel:- 01332 258 131

Outpatients

Heart failure Team (North)	Heart failure Team (South)
(Covering GPs in Chesterfield, North East and High Peak and Dales areas) Heart Failure Nurse Services Welbeck Suite, Walton Hospital Whitecotes Lane Chesterfield S30 3HW Tel: 01246 253061 Monday to Friday 9 – 4pm (excl. bank holidays) DCHST.heartfailurenorth@nhs.net	(Covering GPs in Erewash, Amber Valley, Derbyshire Dales and City areas) Heart Failure Nurse Services Junction 10 level 5 London Road Community Hospital Derby, DE1 2QY Tel 01332 258131 Monday to Friday 9 – 4pm (excl. bank holidays) DHFT.derbyhfteam@nhs.net

Heart Failure Team
Referral Form

Please send a copy of patient summary information - to include GP and Patient Contact Data, Past Medical History, Current Prescriptions, known Allergies/Intolerances and recent blood tests, **then just complete the Investigations and Current Condition sections** (pg 1).

Patient Details

Name		D.O.B.		Male / Female
Address				
		NHS No		
Postcode		Telephone		

GP Details

Name			
Address			
Tel		Fax	

Referrer's Details (if not GP)

Name		Title	
Tel		Fax	

TPP GP patients, consent to share record (TPP GP PRACTICES MUST COMPLETE)

Pt. consents to IN share with GP	Y / N	Pt. consents to OUT share with GP	Y / N
Pt. consents to IN share with HFSN	Y / N	Pt. consents to OUT share with HFSN	Y / N

Investigations – (ECG, BNP and Echo findings – MUST BE COMPLETED)

	Date	Result							
BNP/NT-BNP									
ECG									
CXR									
Echo									
Last U&E		Na		K		Urea		Creat	
Trends in U&E									

Current Condition and REASON FOR REFERRAL – MUST BE COMPLETED

Brief history of illness. (Please also include any factors that may affect staff safety):

Important information

Other medical issues /events/ **ALLERGIES** / previous medicines intolerance

No of acute admissions in last year	

Current Medications

Drug	Dose	Frequency	Start Date if Known

References

1. BNF September 2016
2. SIGN 147- Management of chronic heart failure. March 2016
3. NICE TA 267 Ivabradine for treating chronic heart failure
4. NICE Clinical Knowledge Summaries (CKS) - Chronic Heart Failure
5. NICE TA 388 Sacubitril valsartan for treating symptomatic chronic heart failure with reduced ejection fraction
6. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal 2016.

Documentation Controls

Development of Guideline	Dr Robert McIntosh DTHFT consultant cardiologist
Consultation with:	Derbyshire Clinical Effectiveness team Dr Robert McIntosh DTHFT consultant cardiologist Dr Mubarak Ahamed DTHFT consultant cardiologist Dr Nauman Ahamed DTHFT consultant cardiologist Martin Melville DCHS Heart Failure Nurse DTHFT Renal Consultants DCHS Heart Failure Nursing Team
Approved By:	13/01/17 Cardiology 23/02/17 Medical Division
Review Date:	January 2020
Key Contact:	Dr Robert McIntosh DTHFT consultant cardiologist