Heart Failure update

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Clinical Effectiveness Group

Key messages

- Optimise treatment with beta-blockers and ACE/ARB.
- Rapid referral of patients with suspected heart failure and previous MI or high BNP.
- Add spironolactone if NYHA II or more.
- Avoid NSAIDs and corticosteroids in patients with heart failure.
- Consider referral for devices if LVEF<35% and high risk of arrhythmia.

Aim of the guideline

This guidance aims to impove the diagnosis of heart failure and optimization of medicines. It is in line with NICE Guidance.

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Contents

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Background

Heart failure is more common than most cancers including breast, testicular, cervical and bowel cancers[1]. Prognosis is poor with 30-40% of patients diagnosed with heart failure dying within the first year. However, accurate timely diagnosis and optimal medicines management improves outcomes for patients, is cost-effective and reduces hospital re-admissions.

Heart failure is associated with significant morbidity and mortality (58% 5-year survival compared with 93% for age and sex matched general population)[2].

Prevalence in over 75's is 12% and is likely to continue to increase with an aging population. Mortality can be reduced by approximately one third with optimal medicines management [3].

Making the diagnosis

Symptoms suggestive of heart failure

- Exertional breathlessness
- Paroxysmal nocturnal dyspnea
- Fluid retention / ankle oedema
- Fatigue

Signs of cardiac dysfunction

- Raised jugular venous pulse
- Lateral displacement of the apex beat
- Gallop Rhythm
- Basal crepitations
- Peripheral oedema and weight gain

Causes of heart failure

- Post MI
- Cardiomyopathy
- Hypertension
- Thyroid disease
- Valvular disease
- Alcohol excess
- Myocarditis
- No identifiable cause [5]

Investigations

- Full blood count
- HbA1c (or Fasting glucose)
- Serum urea and electrolytes
- ALT
- Urinalysis
- Thyroid function
- Chest X-Ray

Further Investigations

- Electrocardiogram
- N-Terminal pro-brain natriuretic peptide (NT-proBNP)
- Spirometry if indicated

Referring suspected heart failure

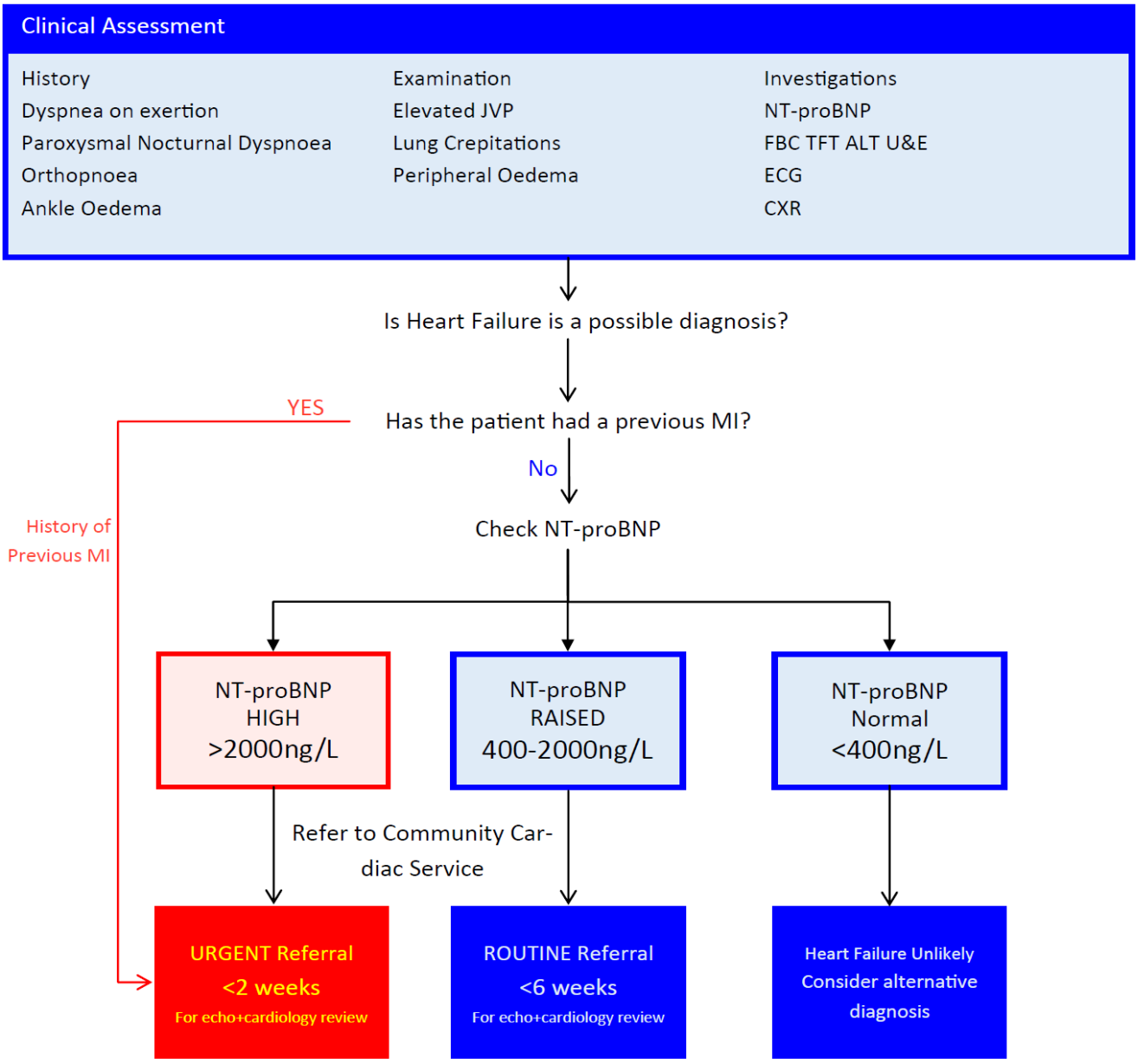
- Refer to the heart failure clinic within 2 weeks, all patients with suspected heart failure if they have either a history of a previous heart attack or very high levels of BNP (NT-proBNP >2000ng/L).
- Patients with suspected heart failure and raised BNP levels (NT-proBNP >400 ng/L <2000ng/L) should be seen within 6 weeks.

If both ECG and BNP are normal, heart failure is unlikely. *See Heart Failure Diagnostic Pathway p 4.*

Treatment of heart failure

Heart Failure due to Left Ventricular Systolic Dysfunction (LVSD) accounts for 50-65% of heart failure cases and Heart Failure with Preserved Ejection Fraction (HFPEF) the rest[6]. There is a broad consensus on the treatment of LVSD, which is outlined below. There is no agreement for treatment for HFPEF, however the best available data (and common practice) is to treat it similarly with guidance from a specialist[7].

Diagnostic pathway



Notes on BNP

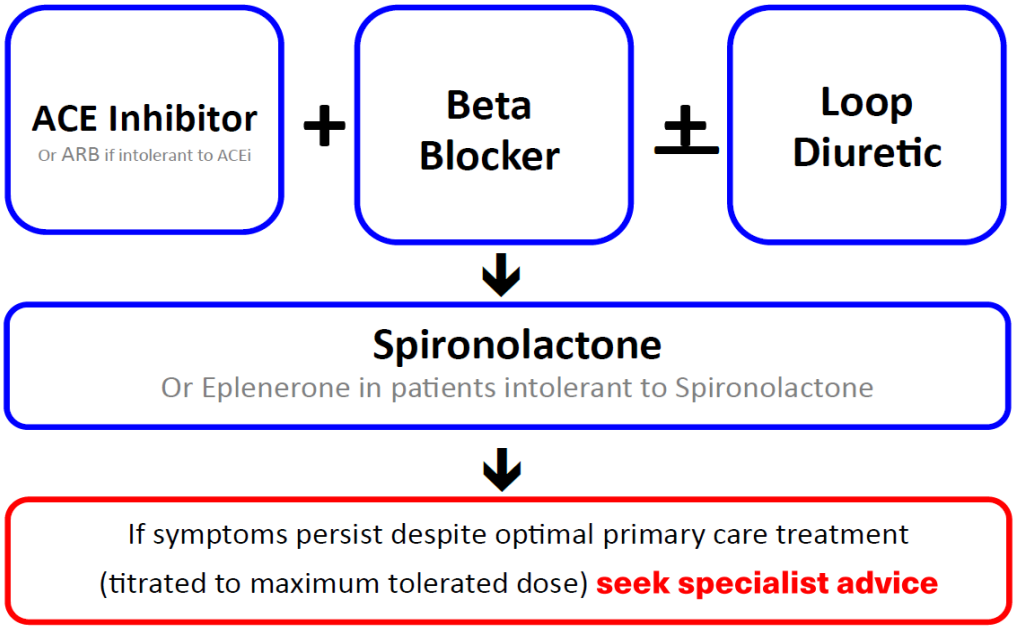
BNP is NOT a screening tool and should only be used in patients with suspected heart failure.

BNP is raised by:	BNP is reduced by:
eGFR<60ml /min	Obesity
Sepsis	Diuretics
COPD	ACE inhibitors
Age>70 years	Beta Blockers
Liver Cirrhosis	ARB's

Treatment summary

Offer **BOTH** angiotensin-converting enzyme (ACE) inhibitors **AND** beta-blockers licensed for heart failure to all patients with heart failure due to left ventricular systolic dysfunction. Use clinical judgement when deciding which drug to start first.

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.



Titrate at intervals of at least two weeks until target dose is reached or until significant side effects occur (in which case, maximum tolerated dose should be maintained). See below for titration details

ACE Inhibitors

Potassium sparing diuretics should be stopped and replaced with loop diuretics if appropriate prior to initiating an ACE inhibitor.

Dosage Increments	Target
Ramipril 1.25mg, 2.5mg, 5mg, 10mg	10mg OD
Perindopril 2mg, 4mg	4mg OD
Lisinopril 2.5mg, 5mg, 10mg, 15mg, 20mg, 25mg, 35mg	35mg OD

ARB

Losartan 12.5mg, 25mg, 50mg	50mg OD
Candesartan 4mg, 8mg, 16mg, 32mg	32mg OD

Monitor U&E, creatinine and blood pressure prior to every increase in either ACEi or ARB

Beta Blockers

When starting and titrating check that the Pulse ≥ 60 bpm and that the systolic pressure ≥ 100mmHg

Dosage Increments	Target
Bisoprolol 1.25mg OD, 2.5mg OD, 3.75mg OD, 5mg OD, 7.5mg OD, 10mg OD	10mg OD
Carvedilol 3.125mg BD, 6.25mg BD, 12.5mg BD, 25mg BD	25mg BD if body wt <85kg 50mg BD if Body wt >85kg

Loop Diuretics

Diuretics are used for symptomatic relief of symptoms of congestion such as dyspnea and ankle swelling. Therefore there is no target dose, but titration is guided by symptom relief.

Stop thiazide diuretics and use loop diuretics.

Patients' signs and symptoms should be reviewed three days after the dose is increased or decreased.

Spironolactone

Spironolactone is only recommended in those with moderate to severe heart failure due to LVSD (NYHA II-IV).

Stop potassium sparing diuretics before starting.

Spironolactone can produce gynaecomastia, hyperkalaemia and renal dysfunction making careful monitoring of blood urea, creatinine and electrolytes essential during spironolactone therapy, especially during its initiation.

Eplerone is only used in patients intolerant to Spironolactone.

Dosage Increments	Target
Spironolactone 12.5mg OD, 25mg OD	25mg OD
Eplerone 25mg OD, 50mg OD	50mg OD

Do not use in patients whose baseline serum potassium is >5.5 mmol/l or serum creatinine is >200 micromol/l.

NYHA classification

I	Underlying structural disease present, however no limitation of physical exercise and no symptoms of dyspnoea, palpitations, fatigue or angina pain
II	Disease results in mild limitation of physical exercise resulting in dyspnoea, palpitations, fatigue or angina pain; but remain comfortable at rest
III	Disease results in marked limitation of physical exercise with less than ordinary activities resulting in dyspnoea, palpitations, fatigue or angina pain; but remain comfortable at rest
IV	Disease severely restricts ordinary physical activities. Symptoms of dyspnoea, palpitations, fatigue or angina pain may be present at rest

Atrial Fibrillation and Heart Failure

In mild to moderate CHF, the prevalence of AF is 10-15% and in severe heart failure (NHYA IV), AF is present in every second patient [8].

BNP

BNP is released from the ventricles in response to stretching of the chamber and hence a useful adjunct to routine assessment by differentiating heart failure from other causes of breathlessness. NT-proBNP is NOT a screening tool and should only be used in patients with suspected heart failure. It has a high negative predictive value. ie. **normal** BNP rules **out** heart failure as a likely cause. Sensitivity for NT-proBNP in detection of heart failure is 0.91. However, it is not so specific and a positive test does not always indicate heart failure. Specificity is 0.76 in other words 24% of positive results will be 'false positives' (false positive rate =1- specificity = 0.24) [4].

BNP levels

Increased by	Decreased by
LVH	Obesity
Ischaemia	Diuretics
Tachycardia	ACE Inhibitors/ARBs
Hypoxaemia	Beta Blockers
Sepsis	Aldosterone Antagonists
COPD	
Liver cirrhosis	
Age >70 years	

Abnormalities on ECHO

ECHO fiinding	Clinical relevance
<50% ejection fraction	LV global systolic dysfunction <45% moderate LVSD <35% severe LVSD [8]
Hypokinetic/ akinetic/dyskinetic regional function	Myocardial infarction/ischaemia, Cardiomyopathy, myocarditis
Increased LV end-systolic/diastolic size	Volume overload heart failure likely
Increased systolic pulmonary artery pressure >50mmHg	Pulmonary hypertension likely

Behavioural advice

Action	Clinical relevance
Avoid concomitant harmful drugs	Ie. NSAIDs; See below
Physical activity	Offer all patients supervised group exercise-based rehabilitation (may be part of a formal cardiac rehab program)
Avoid alcohol [2]	Alcohol is a myocardial depressant
Avoid smoking [2]	Offer smoking cessation to all patients
Salt and fluid restriction	Salt restriction has a favourable effect on blood pressure. Advise against 'low salt' substitutes which are high in potassium
Home daily weight monitoring	Identification of weight gain (1.5-2 kg) will allow early intervention and avert serious decompensation or admission Advise patients to weigh themselves at the same time each day (e.g. on waking)
Screen for depression/mood disorders	These are common. Early detection will help to identify those who are at poor prognostic risk

First line drugs

ACE titration schedule	Iniitial dose	Target dose
Ramipril	1.25mg OD	5mg BD or 10mg OD
Lisinopril	2.5-5mg OD	30-35mg OD
Enalapril	2.5 mg BD	10-20mg BD

ACE Inhibitors

Rationale	Mandatory in LVSD. Improves survival & symptoms, reduces admissions
Notes	Start at a low dose and double dose every 2 weeks to target Measure U&E, BP & pulse at initiation and 2 weeks after each dose increase. Then at 1,3 and 6 monthly thereafter
Cautions	Side effects: cough, hypotension, renal impairment, hyperkalemia Contraindications: History of angioneurotic oedema, bilateral renal artery stenosis. Drug interactions: Beware potassium supplements /potassium sparing diuretics and 'low salt' substitutes which have a high potassium content
Problem solving	Hypotension: If asymptomatic no treatment required. If symptomatic: stop Calcium Channel Blockers if possible and / or diuretic if no signs of congestion Cough: May be secondary to ACE-I, pulmonary oedema or smoking related lung disease including lung cancer. If related to ACE then consider substituting ARB Deteriorating renal function: Tolerate increase in U&E to 50% above baseline or Creatinine to 221mmol/l and K to <5.5mmol/l. If K>5.5mmol/l, half ACE-I and recheck U&E within 2 week. If K>6mmol/l, stop ACE-I Review medication and consider stopping nephrotoxic drugs such as NSAIDs, diuretics in the absence of congestion or other potassium retaining agents e.g. Spironolactone/ Epleronone

ARB titration schedule	Initial dose	Target dose
Losartan	12.5mg OD	150mg OD
Candesartan	4mg OD	32 mg OD

ARB

Rationale	Improves survival & symptoms, reduces admissions
Notes	As an alternative to ACE if side effects are intolerable
Cautions	Measure U&E, BP and pulse at initiation and 2 weeks after each dose increase
Problem solving	Do not use ACE-I / ARB if suspected aortic stensois; obtain specialist review

Beta-Blockers

BB titration schedule	Initial dose	Target dose
Bisoprolol	1.25mg OD	10mg OD
Carvedilol	3.125mg BD	50 mg BD

E.g.BISOPROLOL 2 weekly: by 1.25mg to 2.5mg to 3.75m to 5mg then increase by 2.5mg monthly to 7.5mg to 10mg.

Rationale	For ALL HF patients including Peripheral Vascular Disease, Erectile Dysfunction, Diabetes Mellitus, Intermittent Pulmonary Fibrosis, Chronic Obstructive Pulmonary Disease (without reversibility)
Notes	Produce maximum benefit in medium to long term. Initially they may cause decompensation with worsening cardiac failure and hypotension. Start at a low dose and go slow until optimal or maximum tolerated dose reached e.g. double dose every four weeks. Check HR, BP and clinical status after each titration
Cautions	Contraindications: Asthma, second or third degree heart block, p<60, symptomatic hypotension Drug interactions: Digoxin, Amiodarone, Diltiazem, Verapamil (generally contraindicated in CHF)
Problem solving	Increasing congestion: consider increasing diuretic +/- decreasing beta blocker. If no help or serious deterioration reduce or stop beta blocker and seek specialist advice (rare) Bradycardia: If P <50bpm and symptomatic, half beta blocker dose or stop if necessary (rare). Review other medications and arrange ECG to exclude heart block

Diuretics

Diuretic schedule	Iniitial dose	Target dose
Furosemide	12.5mg OD	25 - 50mg OD
Bumetamide	25mg OD	50mg OD
Bendroflumethiazide	2.5mg OD	2.5-10mg OD

Rationale	Symptomatic treatment of peripheral and pulmonary oedmea due to fluid overload
Notes	Cause rapid improvement of dyspnea and increased exercise tolerance. Onset of action (oral) within 1 hour with diuresis complete within 6 hours Patients should use daily weight chart. Remember to check U & E
Cautions	Adverse effects: can exacerbate diabetes & gout. May cause hyponatraemia, hypokalaemia, dizziness/ hypotension
Problem solving	Sudden weight gain/loss of >1kg over 3 days indicates fluid overload or depletion.

Second line treatments

Mineralocorticoid antagonist	Initial dose	Target dose
Spironolactone	12.5mg OD	25 - 50mg OD
Epleronone	25mg OD	50mg OD

Mineralocorticoid antagonists Spironolactone or eplenonone	NYHA II-IV and EF<35% who are symptomatic despite max tolerated therapy with ACE-I and Beta Blockers. Side effects: gynecomastia, hyperkalemia, renal dysfunction Monitor U&E and do not use if K>5mmol/l or Creatinine >220micromol/l or eGFR<30
Ivabradine	Used in NYHA II-IV by specialists. Consider in symptomatic patients with sinus rhythm, an ejection fraction <35% and heart rate >75bpm [9]
Diuretics Furosemide, Bumetanide, Bendroflumathiazide	Used for symptom control of dyspnea or fluid retention. Over diuresis can lead to hypotension & renal dysfunction Side effects: hypokalaemia, monitor U&E Titrate up/down depending on weight & fluid retention

Anti-arrhythmic devices

Approximately half the deaths in heart failure patients are related to sudden ventricular arrhythmias[9]. Prevention of sudden death is therefore an important goal and for this reason implantable cardiac devices play an important role.

Refer patients for consideration who are not in their last year of life and have :

- LVEF <35% and high risk of sudden death
- LVEF <35% and VT without syncope or cardiac arrest
- LVEF <35% and broadened QRS (>120 ms)

Remember to advise how the device should be switched off when patients are entering into palliative care or who are dying to avoid considerable distress for the patient and their relatives.

Drugs exacerbating heart failure

DRUG	EFFECT
NSAIDs/COX-2	Sodium & water retention
Corticosteroids	Sodium & water retention
Pioglitazone	Sodium & water retention
Tricyclic antidepressant	Proarrythmic
Antifungals, macrolides eg. erythromycin/azithromycin	Proarrythmic
Verapamil, diltiazem	Reduced contractility

Palliative care

Patients with heart failure have high mortality; commonly quoted figures are 50% of patients with NYHA IV die within a year despite optimal treatment and the remaining 50% die within 5 years. Patients who are frequent hospital attenders due to heart failure despite optimal treatment, have a poor quality of life with dependence on others for their activities of daily living and who are unsuitable for heart transplantation or circulatory support should be considered for palliative care aiming for symptom control and quality of life. The focus of care should take a multidisciplinary approach with a focus on symptom control and quality of life. GP's should liaise with palliative care physicians and take care to frequently assess the patient's physical and psychological needs, symptom relief and advance care planning taking into account preferred place of death and preferences for resuscitation.

St Joseph's referral guidelines

Must have NYHA 3-4 **and** two of the following:

- Is not a candidate for further cardiac interventions.
- Has had multiple episodes of decompensation over the past year.
- Is thought to be in their last year of life.
- Is still symptomatic despite optimal tolerated therapy.

Relief of common symptoms

Anxiety	Explore patients ideas, concerns and expectations around this Try anxiety management and controlled breathing techniques If anxiety is related to breathlessness – see below Chronic anxiety may respond to regular low dose diazepam or sertraline or mirtazapine if prognosis is more than a month
Breathlessness	Use of fans, controlled breathing techniques should be encouraged Low dose opioids e.g. 1mg Oromorph prn and titrate up if good renal function or lorazepam 0.5mg sublingual bd
Nausea/vomiting	Approach depends on cause. If delayed gastric emptying try a prokinetic e.g. Metoclopramide 10mg. Consider Haloperidol 1.5mg sc max tds or Cyclizine 50mg if nausea secondary to chemical causes.
Pruritis	Emollients should be used regularly. Antihistamines may help as may SSRI's e.g. Sertraline (but takes 6 weeks to work)

Common symptoms at end of life and management suggestions [10,11]...see...

http://www.stjh.org.uk/sites/default/files/files/SymptomControlGuidelinesforPalliativeCarePatients.pdf

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