Guidelines for the management of chronic heart failure in primary and secondary care in Cornwall

V4.0

April 2014
# Table of Contents

1. Introduction 5
2. Purpose of this policy 6
3. Scope 6
4. Definitions / Glossary 6
   4.1 Symptoms of Heart Failure 6
   4.2 Signs of heart failure 6
   4.3 Abbreviations 6
5. Ownership and Responsibilities 7
   5.2. Role of the Heart Failure Clinical Lead and the Heart Function Service Lead 7
5.3 Role of the Managers 7
5.4. Role of the Cardiology Speciality Governance Group 7
5.5. Role of Individual Staff 7
6. Standards and Practice 8
   6.1. The Heart Failure MDT 8
      6.1.1. What is a Specialist? 8
      6.1.2. Heart Failure Specialist Nurses 8
      6.1.3. Cardiac Rehabilitation 9
   6.2. Investigations 9
      6.2.1 Purpose 9
      6.2.2 For those presenting with suspected HF 10
      6.2.3. Plasma Natriuretic peptides 10
      6.2.4. Abnormal ECG 10
      6.2.5. Echocardiography 10
      6.2.6. Other diagnostic imaging tests 10
   6.3. Pharmacological management
      6.3.1 Loop Diuretics 11
      6.3.2. Angiotensin Converting Enzyme inhibitors (ACEi) 11
      6.3.3. Angiotensin II Receptor Blockers (ARBs) 11
      6.3.4. Beta Blockers 11
      6.3.5. ACE inhibitor or Beta Blocker first? 12
      6.3.6. Mineralocorticoid Receptor Antagonists (MRA) 12
6.3.7. Ivabradine
6.3.8. Thiazide Diuretics
6.3.9. Nitrates and Hydralazine
6.3.10. Digoxin
6.3.11. Calcium Channel Blockers
6.3.12. Warfarin
6.3.13. Inotropic agents
6.3.14. Amiodarone
6.3.15. Aspirin and Statin therapy

6.4. Non-Pharmacological and invasive management & treatments
6.4.1. Ultrafiltration
6.4.2. Revascularisation
6.4.3. Implantable Cardioverter Defibrillator (ICD)
6.4.4. Cardiac Resynchronisation Therapy (CRT) aka bi-ventricular pacemaker
6.4.5. Cardiac Resynchronisation Therapy with a Defibrillator (CRT-D)
6.4.6. Cardiac Transplantation and Left Ventricular assist Devices
6.4.7. DC Cardioversion

6.5. Lifestyle advice
6.5.1. Smoking Cessation
6.5.2. Alcohol Consumption
6.5.3. Healthy Eating
6.5.4. Physical activity
6.5.5. Sexual activity
6.5.6. Vaccination
6.5.7. Driving
   6.5.7.1 For Group 1 licences
   6.5.7.2 For Group 2 licences
6.5.8. Air Travel
6.5.9. Depression
6.5.10. Pregnancy

6.6. Other considerations
6.6.1. Apical Ballooning Syndrome aka Takotsubo Cardiomyopathy, stress cardiomyopathy or broken heart syndrome

6.6.2. Heart Failure with Preserved Ejection Fraction (HeFPEF) aka diastolic dysfunction

6.6.3. Valvular heart disease

6.6.4. Atrial Fibrillation

6.6.5 Other co-morbidities
   6.6.5.1. MI: Secondary Prevention
   6.6.5.2. Type 2 Diabetes
   6.6.5.3. Hypertension

6.6.6. Palliative care

6.7. Monitoring

7. Dissemination and implementation

8. Monitoring compliance and effectiveness

9. Updating and review

10. Equality and Diversity

11. Equality Impact Assessment

12. References

Appendices

1. Governance Information

2. Initial Equality Impact Assessment Form

3. New York Heart Association (NYHA) symptom scale

4. National Heart Failure Audit

5. Diagnostic Pathway (primary care)

6. NT-ProBNP

7. In-patient Pathway (RCHT)

8. Managing proven LVSD

9. Conversion doses for beta blockers

10. CHADS2 and CHA2DS2-VASc stroke risk in AF scoring

11. Cardiology Heart Function - Pathway

Version Control Table
1. Introduction

1.1. Heart failure is a common condition with a poor prognosis. There are about 878,000 people in the UK who have a diagnosis of definite or probable heart failure. In England, one million inpatient bed days (2% of all inpatient bed days) are due to heart failure.\textsuperscript{1} Up to 50\% of people admitted to hospital with a primary diagnosis of heart failure are readmitted within three months: half these readmissions may be preventable.\textsuperscript{5}

The average age at first diagnosis is 76 years.\textsuperscript{2,3} Once diagnosed, 30-40\% of heart failure patients die within a year with mortality less than 10\% per year thereafter.\textsuperscript{3,6,7} It is widely recognised that survival rates from heart failure are similar to those from cancer of the colon and worse than those from cancer of the breast, uterus, bladder and prostate. It is estimated that over 5\% of all deaths in the UK are due to heart failure.\textsuperscript{1}

The principle underlying cause in 51\% of patients is Ischaemic Heart disease (National Heart Failure Audit 2012-13). Non-ischaemic causes include Atrial Fibrillation, Hypertension, Valve disease, thyrotoxicosis, myocarditis, alcohol abuse and idiopathic dilated cardiomyopathy.

The prevalence is rising both due to an ageing population and as more people survive acute myocardial infarctions. An aging population is likely to result in a rise in hospital admissions for heart failure by 50\% over the next 25 years.\textsuperscript{3,8} In Cornwall, around 10\% of the registered population is currently aged 75 years or over (data from NWCS).

The symptomatic and prognostic benefit of the various therapeutic interventions outlined in this guideline primarily applies to heart failure due to Left Ventricular Systolic Dysfunction (LVSD), both symptomatic and asymptomatic.

People with LVSD may have no symptoms or signs of heart failure. Identification is important to help prevent deterioration of their condition and improve survival.

Not all people with heart failure will have LVSD. In a sizeable minority, heart failure may be due to left ventricular diastolic dysfunction as a result of hypertensive heart disease or, simply, being elderly. Heart failure with preserved systolic function may also be due to surgically correctable valvular heart disease (e.g. aortic stenosis). In many people these abnormalities of cardiac function may co-exist.

1.2. This version supersedes any previous versions of this document.
2. **Purpose of this Policy/Procedure**

2.1. Evaluating someone presenting with heart failure requires more than simply establishing that heart failure is present. It requires consideration of the underlying abnormality of the heart, its severity, the cause(s), the presence of any precipitating or exacerbating factors, the identification of relevant co-morbidities and an estimation of prognosis.

This guideline aims, using a multidisciplinary approach, to improve outcomes (i.e. reduce preventable admissions, morbidity, mortality, and improve quality of life) for people with heart failure by:
- identification of cases
- proper evaluation and assessment
- implementation of appropriate treatment and support
- regular monitoring and evaluation of care
- appropriate use of and referral to specialist services

3. **Scope**

3.1. This document provides guidance for any professional involved in the clinical management of patients, presenting to either secondary or primary care NHS care providers in Cornwall, with suspected or proven heart failure. This will include:
- GP’s
- Specialist Nurses
- Junior Drs
- Speciality Registrars
- Consultants

4. **Definitions / Glossary**

4.1. **Symptoms of heart failure:**
- Breathlessness
- Orthopnoea
- paroxysmal nocturnal dyspnoea (PND)
- fatigue

4.2. **Signs of heart failure:**
- raised Jugular Venous Pressure (JVP)
- displaced apex beat
- tachycardia
- basal crepitations
- ankle oedema
- gallop rhythm

4.3. **Abbreviations:**
- ACEi Angiotensin Converting Enzyme inhibitor
- AF Atrial Fibrillation
5. **Ownership and Responsibilities**

5.1. This section provides a detailed overview of the strategic and operational roles responsible for the development, management and implementation of this policy/procedure.

5.2. **Role of the Heart Failure Clinical Lead and the Heart Function Service lead**

The Heart Failure Clinical lead and the Heart Function service lead are responsible for:

- Reviewing this document every 3 years (or sooner if new, relevant national guidelines are published)

5.3. **Role of the Managers**

Line managers are responsible for:

- Ensuring staff are aware of, and act upon, the Trust’s procedural documents.
- Implementing the procedural documents for the areas in which they apply.
- Notifying all new and existing staff on how to access both current and archived Trust procedural documents.
- Ensuring that all staff members have access to the Trust intranet site to enable access to published procedural documents.
- Ensuring that all staff members are aware of their responsibility in maintaining compliance with Trust documents.

5.4. **Role of the Cardiology speciality governance Group**

The Cardiology speciality governance Group is responsible for:

- Signing off the reviewed document prior to upload to the document library
5.5. Role of Individual Staff

All staff members are responsible for:

- Making themselves aware of the procedural documents that relate to their role and responsibilities.
- Complying with agreed Trust procedural documents where they apply.
- Raising any queries about implementation of Trust documents with their line manager.
- Alerting their line manager of any non-compliance with procedural documents where it is noted and represents an actual risk to the Trust, its staff, patients or the public.
- Contacting the CITS Service Desk (01209 881717) if experiencing difficulties accessing the electronic Document Library.

6. Standards and Practice

6.1. The Heart Failure MDT

6.1.1. What is a ‘Specialist’?

The National Institute for Health and Care Excellence (NICE) published their updated guidelines for the management of chronic heart failure in August 2010 (CG108). In it they provide the following statement regarding what a specialist is:

‘Throughout this guideline, the term 'specialist' denotes a physician with a sub-speciality interest in heart failure (often a consultant cardiologist) who leads a specialist multidisciplinary heart failure team of professionals with appropriate competencies from primary and secondary care. The team will involve, where necessary, other services (such as rehabilitation, tertiary care and palliative care) in the care of individual patients. Unless otherwise specified, within this guideline specialist assessment or management refers to assessment or management by this specialist multidisciplinary heart failure team. The team will decide who is the most appropriate team member to address a particular clinical problem’.

The Royal Cornwall Hospital Trust has a Consultant Cardiologist clinical lead for Heart Failure who provides mentorship for the Heart Failure Specialist Nurses (HFSNs) and General Practitioners with Specialist Interest (GPwSI) within the team.

6.1.2. Heart Failure Specialist Nurses

The Heart Failure Specialist Nurses (HFSN) are a valuable resource in both the community and acute settings. All have extensive background experience cardiac nursing and have also undergone British Heart Foundation (BHF) training in heart failure at Degree level. They are educationally and professionally supported by the BHF.

The main focus of their work is to provide patients and carers with:

- information and education about heart failure
- lifestyle advice & behavioural modification
drug therapy initiation and optimisation supervision
self monitoring skills
self management skills
palliative care

In addition, the HFSNs provide management advice and support to GPs, practice nurses and community matrons etc. as well as helping to bridge the interface with secondary care services. They have also helped to establish local patient support groups.

RCHT has the Heart Function Nursing service with 2 full-time HFSNs, both qualified non-medical prescribers registered with the Nursing Midwifery Council, based at Royal Cornwall Hospital (RCH) whose role is to:

- provide educational support to inpatients and their carers
- provide clinical and educational support to healthcare colleagues
- collect audit data for the National Heart Failure Audit
- initiate evidence-based treatments in line with NICE guidance
- liaise with on-call Consultant Cardiologist regarding complex management issues
- Initiate and assist with the delivery of ultrafiltration (see page 15 & Appendix 7)
- provide GPs with individually structured discharge management plans
- refer patients to the community cardiac specialist nurses for follow up after discharge
- Deliver the nurse led Rapid Access Heart Function Clinic (RAHFC), see Appendix

The in-patient HFSNs aim to see all patients with an unplanned admission to the Acute Trust, who have a primary diagnosis of heart failure due to LVSD with an Ejection Fraction of ≤45%

6.1.3. Cardiac Rehabilitation
Rehabilitation programmes which included a combination of education, psychological support and exercise have been shown to be effective in patients with coronary heart disease in terms of reducing hospital admissions, improving quality of life and exercise tolerance. It is also beneficial in people with both ischaemic and non-ischaemic heart failure.

The Cardiac Rehabilitation service is available county wide.

6.2. Investigations (See Appendices 5&7 for relevant pathways)

6.2.1. Purpose:
- Confirm or refute the diagnosis quickly and accurately
- Define the precise underlying cause if possible
- Identify factors which may alleviate or aggravate the condition
- Aid management and treatment decisions
• Provide baseline information for future monitoring
• Obtain prognostic information

6.2.2. For those presenting with suspected heart failure:
• Blood tests: FBC/U&E/LFT/TFT/Glucose/Lipid profile ± NT-pro BNP (primary care only)
• 12 lead ECG
• Chest X-ray
• Echocardiogram

6.2.3. Plasma natriuretic peptides
A ‘normal’ NT-proBNP serum level makes a diagnosis of heart failure unlikely, as does a normal ECG and normal heart size on chest X-ray.
Further information about BNP and N-terminal pro-BNP (NTproBNP) can be found in appendix 6.

6.2.4. Abnormal ECG
The presence of previous Q-wave infarction, atrial fibrillation, left bundle branch block conduction, non-specific ST & T-wave changes and/or left ventricular hypertrophy increases the likelihood of heart failure.

6.2.5. Echocardiography
Transthoracic echocardiography (TTE) aims to provide information about cardiac structure and function. In addition to confirming a diagnosis of heart failure, it will often help determine the cause, for example, CHD, hypertension or valvular heart disease.

An attempt is usually made to quantify the severity of any LVSD present in terms of the ejection fraction [EF]. The EF is the percentage of the diastolic volume that is ejected from the left ventricle during systole – normally between 50-70%. The EF is derived from measurements of one or two-dimensional images. This can be difficult (and inaccurate), especially in the presence of localised ventricular wall damage, which typically results from areas of infarction. Alternatively a visual estimate may be given. Transpulmonary contrast echo can be useful in poor echo windows and borderline cases to accurately assess EF.

The British Society of Echocardiography categorisation of LVSD relative to ejection fractions is:
• EF ≥55% = normal
• EF 45-54% = mild LVSD
• EF 36-44% = moderate LVSD
• EF ≤35% = severe LVSD

6.2.6. Other diagnostic imaging tests
Left ventricular angiography (with coronary arteriography), radionuclide imaging (MUGA) scans and cardiac MRI scans are
all alternative sources of objective evidence about cardiac function.

6.3. Pharmacological management

6.3.1. Loop diuretics $^{3,10,12,30}$
People with signs of sodium and water retention (lung crepitations, raised JVP, peripheral oedema) should receive loop diuretic therapy. Diuretics should be titrated according to symptoms but not be used as monotherapy in LVSD. Once established on prognostic heart failure therapy, diuretic requirement often reduces and the aim should be to maintain the patient on the lowest level of diuretic possible.

6.3.2. Angiotensin Converting Enzyme inhibitors (ACEi) $^{3,27,28,29,30}$
All patients with symptomatic heart failure and/or evidence of LVSD should be treated with an ACEi licensed for use in Heart Failure. ACEi's are associated with a 24% reduction in mortality in people with heart failure. Adding an ACEi to diuretics results in:

- Improved symptoms and signs of all grades of heart failure
- Improved exercise tolerance
- Slowing of progression from mild to severe heart failure
- Reduced hospital admission rates
- Improved survival in all grades of heart failure

People with a recent myocardial infarction and evidence of LVSD should receive an ACEi.

There is no evidence of any clinically important differences between ACEi's. However, not all ACEi's have full 24-hour duration of action. People should be treated with the cheapest ACEi titrated to the recommended therapeutic dose $^{17}$ (or the maximum tolerated dose):

ACEi's can delay the development of symptomatic heart failure and reduce cardiovascular events in patients with asymptomatic LVSD. Around 74 patients with heart failure need to be treated for one year with an ACEi (in the recommended dose) to prevent one death.

ACEi's can be up-titrated at 2 weekly intervals with careful monitoring of blood pressure and renal function. However in the secondary care setting, with closer monitoring, a more rapid up titration is possible.

6.3.3. Angiotensin II Receptor Blockers (ARB) $^{3,16,30}$
ARBs licensed for use in heart failure should only be used in patients with true ACEi intolerance.

6.3.4. Beta Blockers $^{3,22,23,24,30}$
Beta-blockers are first line therapy along-side ACEI. Beta-blockers licensed for use in heart failure should be offered to all people with heart failure due to LVSD including:
• older adults
• peripheral vascular disease
• erectile dysfunction
• diabetes mellitus
• chronic obstructive pulmonary disease (COPD) without reversibility
• interstitial pulmonary disease

Beta-blocker therapy should be introduced in a ‘start low, go slow’ manner.

Where a patient is already taking a Beta Blocker for a co-morbidity (for example angina), if the Beta blocker they are taking is not licenced for use in heart failure (for example Atenolol) then the beta blocker should be switched to one licenced for use in heart failure. See Appendix 9 for Beta Blocker conversion doses.

Transient worsening of symptoms and signs of heart failure, hypotension and/or fluid retention after commencing or increasing the dose a beta-blocker may be treated by adjusting doses of diuretics, reverting to the previous dose of beta-blocker or temporarily discontinuing the treatment. If therapy has to be discontinued for more than 2 weeks, the starting dose should tried again.

6.3.5. **ACEi or Beta Blocker First**

NICE guidance for management of chronic heart failure categorise ACEi and beta-blockers as first line therapy: clinical judgement should be used when deciding which drug to start first.

6.3.6. **Mineralocorticoid Receptor Antagonist** (aka Aldosterone Receptor Antagonist)

People already treated with a loop diuretic, ACEi/ARB and/or beta-blocker who have moderate or severe heart failure (NYHA class III or IV) should be considered for low dose Spironolactone (25mg once daily). This has been shown to reduce mortality and hospital admissions. Eplerenone is licenced for the following indications:

- in addition to standard therapy including beta-blockers, to reduce the risk of cardiovascular mortality and morbidity in stable patients with left ventricular dysfunction (LVEF ≤ 40 %) and clinical evidence of heart failure after recent myocardial infarction (commence within 3 -14days of MI).

- in addition to standard optimal therapy, to reduce the risk of cardiovascular mortality and morbidity in adult patients with NYHA class II (chronic) heart failure and left ventricular systolic dysfunction (LVEF ≤30%)

6.3.7. **Ivabradine**

NICE recommend ivabradine as an option for treating chronic heart failure for people:
• with New York Heart Association (NYHA) class II to IV stable chronic heart failure with systolic dysfunction 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, angiotensin-converting enzyme (ACE) inhibitors and aldosterone antagonists, or when beta-blocker therapy is contraindicated or not tolerated and

• with a left ventricular ejection fraction of 35% or less.

With the proviso that Ivabradine should only be initiated after a stabilisation period of 4 weeks on optimised standard therapy with ACE inhibitors, beta-blockers and Mineralocorticoid Receptor Antagonist http://www.nice.org.uk/TA267

6.3.8. **Thiazide diuretics**

For the LVSD patient with persistent peripheral oedema, not responsive to first line therapy and loop diuretics, a small dose of Metolazone (2.5mg once daily) can be given in combination with a loop diuretic. Profound diuresis can occur with this intervention so it is essential that people are closely monitored (BP, fluid balance, daily weight and renal function/electrolytes).

When metolazone is not available the British Society for Heart failure (BSH) recommend replacing with bendroflumethiazide http://www.bsh.org.uk/latest-news/metolazone-withdrawal/

6.3.9. **Nitrates and Hydralazine**

This combination should be considered for patients intolerant of ACEI and A2RBs, with a careful eye being kept on blood pressure and uptitration every 2-4 weeks:

**Isosorbide dinitrate**
Starting dose: 20mg three times daily
Target dose: 40mg three times daily

**Hydralazine**
Starting dose: 25mg three times daily
Target dose: 75mg three times daily

Although direct evidence for its use is lacking, isosorbide mononitrate SR 40–120mg once daily may be used if isosorbide dinitrate is not available or to improve compliance.

6.3.10. **Digoxin**
Digoxin (62.5mcg once daily) may reduce hospital admission rates for heart failure but has not been shown to reduce mortality. It is recommended for treating worsening heart failure in people already on a diuretic and ACEi and is specifically indicated in heart failure:

• to control ventricular rate in the presence of atrial fibrillation (AF) and beta-blocker therapy is contraindicated or not tolerated
• moderate/severe symptoms (NYHA III/IV) with severe LVSD in addition to a loop diuretic and ACEi;
• recurrent hospital admission for heart failure;
• intolerance of ACEis and ARBs (also consider Hydralazine + Isosorbide dinitrate).

6.3.11. Calcium Channel Blockers
The BNF advises ‘caution’ or contraindicates most drugs in this group for use in patients with heart failure. These should usually be avoided due to the side effects of arrhythmias, worsening heart failure and oedema unless specifically recommended by a cardiologist. If required, Amlodipine can be considered. Verapamil, Diltiazem or short acting dihydropyridine agents (e.g. Nifedipine) should be avoided.

6.3.12. Warfarin
Consider anticoagulation for patients with heart failure who are in sinus rhythm with a history of thromboembolism, left ventricular aneurysm or intracardiac thrombus.

Anticoagulation should be considered for all patients with heart failure who are in atrial fibrillation (AF)

CHADS2.21 / CHA2DS2-VASc34 scoring risk assessments are available as decision aid, but patients in heart failure with AF, de facto, will have a risk score of at least 1 (see appendix 10), when warfarin therapy would be recommended.

6.3.13. Inotropic agents
These agents should only be considered for the short term treatment of acute decompensation of chronic heart failure only in the acute hospital setting. This will require specialist advice.

6.3.14. Amiodarone
is effective against most ventricular arrhythmias (but has not been shown to reduce mortality). It has numerous side effects and should only be initiated, and continued, in discussion with a specialist. Its use should be reviewed regularly to assess any side effects and to monitor thyroid & liver function at least every 6 months.

6.3.15. Aspirin and Statin therapy
Coronary heart disease is the single most common cause of heart failure due to LVSD. All patients should be considered for Aspirin 75-150mg daily and statin therapy.

6.4. Non-Pharmacological & Invasive management & treatments
Although drug treatment is the mainstay of treatment for chronic heart failure due to LVSD, some people will also benefit from diagnostic and interventional invasive procedures. Specialist advice is recommended for guidance about when these procedures should be considered.

*Please refer to the on-call Cardiologist for assessment and advice.*

6.4.1. **Ultrafiltration**
This treatment allows fluid removal from fluid overloaded patients who do not respond to conventional therapy. It is an alternative to standard diuretic therapy which can safely achieve fluid removal rates of up to 500mls per hour. This compares to 1 to 2 litres a day using conventional diuretic therapy.

*At the time of writing RCHT is carrying out a trial of this treatment. Once the pilot is complete formal policy and guidelines will be available on the document library.*

6.4.2. **Revascularisation**
Coronary revascularisation should be considered in patients with heart failure due to ischaemic cardiomyopathy, particularly if they have refractory angina.

6.4.3. **Implantable Cardioverter Defibrillators (ICDs)**
NICE outline a number of considerations and recommendations for ICD implantations for primary and secondary prevention of arrhythmias. For further information please refer to ‘Implantable cardioverter defibrillators for arrhythmias’ [http://guidance.nice.org.uk/TA95](http://guidance.nice.org.uk/TA95)

6.4.4. **Cardiac Resynchronisation Therapy (CRT) or biventricular pacemakers**
NICE currently recommends that CRT should be considered for patients already on optimal pharmacological therapy with: New York Heart Association (NYHA) class III–IV symptoms. Left ventricular ejection fraction of ≤35% in sinus rhythm:

- either
  - with a QRS duration of 150 ms or longer estimated by standard electrocardiogram (ECG)
  - or
  - with a QRS duration of 120–149 ms estimated by ECG and mechanical dyssynchrony that is confirmed by echocardiography.
Refer to ‘Cardiac resynchronisation therapy for the treatment of heart failure’ [http://guidance.nice.org.uk/TA120](http://guidance.nice.org.uk/TA120)

6.4.5. **Cardiac resynchronisation therapy with a defibrillator device (CRT-D)**\(^3,31,32\)
may be considered for people who fulfil the criteria for implantation of a CRT device and who also separately fulfil the criteria for the use of an ICD device.\(^31\)

6.4.6. **Cardiac transplantation & left ventricular assist devices**\(^3\)
People aged <65 years with intractable severe heart failure (NYHA IV) despite optimum drug therapy and not amenable to other forms of surgical intervention should be referred for consideration of transplantation. Left Ventricular Assist Devices (LVADs) are often used as a bridging therapy prior to transplant but not as a destination therapy at the time of this update. For guidelines on the management of patients admitted to RCHT with an LVAD in situ please see:


6.4.7. **DC cardioversion**
Generally, pharmacological and/or electrical cardioversion for atrial fibrillation is unlikely to be successful in the long term for people with dilated cardiac chambers, but can be considered in select cases. Please discuss with Cardiologist first

6.4.8. **6.5. Lifestyle advice**\(^3\)

6.5.1. **Smoking Cessation**
People with heart failure are strongly advised not to smoke. Those who actively wish to quit smoking should be offered detailed advice, support and follow up: self-referral to the local Health Visitor-led support team and other support services should be encouraged. Nicotine replacement therapy and other medications may improve cessation rates

6.5.2. **Alcohol Consumption**
People with heart failure should be advised to refrain from excessive alcohol consumption. Where the underlying cause is alcohol related they should be strongly encouraged to stop drinking alcohol completely

6.5.3. **Healthy Eating**
Avoid salt-rich foods. Referral to a dietician is indicated in obese (BMI>30) people, and those with diabetes. Obesity should be managed with small stepped changes towards modest weight loss targets.
- Sodium alternatives should be avoided because they often contain high levels of potassium
- Cranberry juice should be avoided in those taking warfarin (may increase drug potency)
- Grapefruit juice should be avoided in those taking simvastatin (may interfere with liver metabolism of the drug)
- St John’s Wort should be avoided (may interfere with digoxin, warfarin, Eplerenone)

6.5.4. **Physical activity**
Inactivity leads to physical deconditioning, a worsening of symptoms and exercise tolerance. An individualised exercise programme specifically tailored for people with stable heart failure should be offered unless contra-indicated (e.g. serious arrhythmia).

6.5.5. **Sexual Activity**
Breathlessness on exertion, the inability to lie flat, and concern about cardiac rhythm disturbances during intercourse may limit activity. There is little evidence base for any specific advice but concerns should be discussed with patients and their partners where appropriate. Although frequently of concern, discussion is often not raised by patients.

6.5.6. **Vaccination**
Annual influenza and once-only pneumococcal immunisation is recommended.

6.5.7. **Driving**
The following information is taken from the DVLA ‘At a glance guide to the current medical standards of fitness to drive’ on 01/03/14. This guide is regularly updated. To ensure you are providing your patient with the most up to date information please check their web site: https://www.gov.uk/government/publications/at-a-glance

6.5.7.1. **For group 1 licences (Car/Motorcycle)**
DVLA need not be notified and Driving may continue provided there are no symptoms that may distract the driver’s attention.

6.5.7.2. **For Group 2 Licences (Lorry Bus)**
Disqualifies from driving if symptomatic.
Re/licensing may be permitted provided:
- The LV ejection fraction is = to or> 040%.
- There is no other disqualifying condition

Exercise or other functional testing may be required depending on the likely cause for the heart failure.

6.5.8. **Air Travel**
People with decompensated heart failure, including pulmonary oedema, may become more hypoxic during air travel, and those who are symptomatic at rest or on minimal exertion may be unfit...
to fly. A reasonable assessment of fitness to fly might include the
ability to climb a flight of stairs in the home, or the ability to hold
normal conversation, without stopping for breath. Dependence on
oxygen therapy at rest is a contraindication. For further
information and advice, please see the British Cardiac Society
(BCS) ‘fitness to fly’ guidelines which categorise according to New
York Heart Association (NYHA) status and whether the patient
has had a recent admission with decompensated heart failure:

6.5.9. **Depression**

Depression is common in people with chronic heart failure and
may be associated with increased mortality and hospitalisation.
Screening for depression may identify those with poorer
prognosis.

There is little evidence about the safety and efficacy of
psychological and/or drug therapies. Tricyclic antidepressant
medication should be avoided.

6.5.10. **Pregnancy**

Pregnancy and contraception should be discussed with women of
childbearing age. The teratogenic effects of drugs should also be
considered.

6.6. **Other considerations**

6.6.1. **Apical ballooning syndrome aka Takotsubo cardiomypathy**

Apical Ballooning syndrome was initially recognised & reported in
Japan in 1990. The reversible apical ballooning (in the absence
of ischaemic heart disease) resembles the shape of the Japanese
fishing pot for trapping octopus, the ‘takot-subo’, hence the term
Takotsubo Cardiomyopathy.

The presenting symptoms of this syndrome mimic Acute Coronary
Syndrome (ACS) and these patients frequently are treated as
such.

The presenting patient is predominantly female (10% male) and
older than 50. In 85% of cases the symptoms are triggered by an
emotionally or physically stressful event, which can precede the
symptoms by minutes or hours. Locally patients have presented
with apical ballooning syndrome following the unexpected death of
a relative; being the victim in a road rage incident and being the
recipient of a surprise birthday party. Cases have also been
reported following occupational stress and major surgery.

The cause of this condition is not confirmed and there have been
a number of theories including coronary vasospasm, transient
myocarditis and microvascular spasm. However the most likely
cause is believed to be ‘stunning’ due to extreme adrenergic
stimulation. Excessive levels of catecholamines have been
observed in patients with apical ballooning syndrome.
Due to the nature of this condition, there is no evidence based management. However one of the hallmarks of the condition is that most patients make a complete recovery with conventional heart failure therapy. Early beta-blocker usage, given the putative role of adrenergically mediated damage, is felt to be very important. A follow up echo at 3-4 months should be performed to check that recovery has occurred.

6.6.2. **Heart Failure with Preserved Ejection Fraction (HeFPEF) aka diastolic dysfunction.**

Up to as many as 50% of patients with heart failure may have preserved systolic function. This is sometimes referred to as heart failure with preserved ejection fraction (HFPEF) or diastolic dysfunction. Echocardiography can help determine the aetiology of these cases of heart failure in most instances.

The mortality of HFPEF ranges between 5-8% per year, which is about half of that for heart failure due to systolic dysfunction (LVSD). The morbidity, hospitalisation rates and healthcare costs per patient however are very similar between patients with HeFPEF and those with LVSD and it is a condition which is being increasingly recognised.

The definition of what constitutes preserved systolic function in studies varies widely. The diagnosis is often difficult and should be made by a specialist. It is based on the clinical presence of heart failure with the echocardiography findings of preserved left ventricular ejection fraction and the absence of valvular abnormalities - see ACC/AHA guidelines.

Patients with HFPEF tend to be older on average than those with LVSD and, in most studies, the majority have been women. Other risk factors and causative conditions include hypertension with left ventricular hypertrophy, ischaemic heart disease, dilated cardiomyopathy and the restrictive cardiomyopathies (e.g. amyloidosis and sarcoidosis).

These patients do not tolerate atrial fibrillation, tachycardia, hypertension or myocardial ischaemia well which can precipitate clinical heart failure.

The exact mechanism of HFPEF is still evolving, but it is increasingly recognized that is a disorder of longitudinal cardiac function, as opposed to the radial contraction (the hallmark of systolic function) that is measured by ejection fraction on echocardiography.

This may represent a continuous spectrum with early loss of longitudinal function progressing over time (if risk factors are not addressed) until radial function is impaired and overt LVSD becomes evident. Primary prevention of diastolic heart failure
includes smoking cessation and aggressive control of hypertension, hypercholesterolemia, and coronary artery disease. Lifestyle modifications such as weight loss, smoking cessation, dietary changes, limiting alcohol intake, and exercise are equally effective in preventing diastolic and systolic heart failure.

No pharmacotherapy has been shown to confer mortality benefits with HFPEF although symptomatic benefit may result from the following strategies:

- Loop diuretics - in the presence of symptoms and signs of fluid overload
- Strict blood pressure control
- Candesartan (may reduce hospital admissions for heart failure but not mortality)

Effects of candesartan in patients with chronic heart failure and preserved left-ventricular ejection fraction: the CHARM-Preserved Trial, Lancet 2003 Sep6; 362; 777-78

6.6.3. **Valvular Heart Disease**
Clinical examination and echocardiography should detect valve disease. Detection is important because heart failure due to valve disease may be curable, but requires management that differs from heart failure due to LVSD. ACEi (and other vasodilators) may be harmful in the presence of severe aortic stenosis. They may be helpful in aortic and mitral regurgitation.

Patients with heart failure and valve disease should be referred to a specialist for assessment and advice regarding follow up.

6.6.4. **Atrial Fibrillation**
Atrial fibrillation (AF) is common in heart failure and may exacerbate or precipitate heart failure. Management may be aimed at either controlling heart rate or restoring and maintaining sinus rhythm, which can improve symptoms and hence quality of life

Specialist advice for a strategy to manage AF should be sought on an individual basis.
Anticoagulation is indicated in all cases of AF with heart failure
http://guidance.nice.org.uk/CG36

6.6.5. **Other Co-morbidities**
For additional advice on the management of co-morbidities refer to relevant NICE guidance, including

6.6.5.1. **MI: Secondary Prevention:**
http://www.nice.org.uk/guidance/CG48
6.6.5.2. Type 2 Diabetes:
http://guidance.nice.org.uk/CG87

6.6.5.3. Hypertension:
http://guidance.nice.org.uk/CG127

6.6.6. Palliative care
Studies suggest high unmet needs in the areas of symptom management, communication decision-making, emotional support, co-ordination of care and quality of end-of-life care. Palliative care should focus on treatments for symptom relief, rather than prognostic benefit, with regular medication reviews and discontinuation of all non-essential treatments.

Issues of sudden death and prognostic uncertainty are relevant to all those with heart failure and should be discussed at all stages with patients, their family and carers. Discussions should include type and place of end-of-life care, spiritual needs, resuscitation preferences, the deactivation of ICDs etc.

Local arrangements with palliative care services include access to the MacMillan service and hospice beds provision.

6.7. Monitoring
All people with chronic heart failure require monitoring.

Chronic heart failure carries a high morbidity and mortality and has a considerable impact on patients’ and carers’ lives. Patients and carers play an increasing role in monitoring, requiring appropriate education and support provided.

Clinical review should include assessment of:
- functional capacity e.g. NYHA class
- fluid balance - including weight, lying & standing blood pressure, JVP, presence of peripheral oedema, lung crackles, hepatomegaly
- cardiac rhythm - pulse ± ECG ± 24-hour ECG monitoring
- medication – consider need for changes & enquire about side effects
- laboratory – minimum of U&Es/Creatinine but also (where appropriate) FBC/LFTs/TFTs/glucose/lipid profile, INR monitoring, digoxin levels (not recommended routinely)
- cognitive status & screening for anxiety and/or depression
- co-morbidity – e.g. hypertension, diabetes, COPD etc.
- social issues - carer & family support and involvement, employment
- nutritional status

The frequency of monitoring will depend on the clinical status and stability of the person. The interval should be short (days or weeks) if the condition or medication has changed but should be no less often than every 6 months for people who are stable.

People who wish to be involved in monitoring their condition should be provided with sufficient education and support to do this (usually
7. Dissemination and Implementation

7.1. This document will be disseminated electronically to all relevant stakeholders once published. It will also be available on the RCHT Document library.

7.2. There are 3 previous versions of this document which should be in the archive.

8. Monitoring compliance and effectiveness

<table>
<thead>
<tr>
<th>Element to be monitored</th>
<th>All of it</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead</td>
<td>The Heart Function Service Lead</td>
</tr>
<tr>
<td>Tool</td>
<td>Data Collected for the National Heart Failure Audit</td>
</tr>
<tr>
<td>Frequency</td>
<td>Every admission to RCHT with a primary diagnosis of heart failure will be audited and uploaded to the NICOR. A national report with hospital level data is published annually.</td>
</tr>
<tr>
<td>Reporting arrangements</td>
<td>The Annual report will be reviewed through the Cardiology Speciality audit &amp; governance frameworks</td>
</tr>
<tr>
<td>Acting on recommendations and Lead(s)</td>
<td>The Heart Failure Clinical lead and the Heart Function service lead will undertake subsequent recommendations and action planning for any or all deficiencies and recommendations within reasonable timeframes.</td>
</tr>
<tr>
<td>Change in practice and lessons to be shared</td>
<td>Required changes to practice will be identified and action will commence within 1 month of report review (due to size of report). A lead member of the heart failure multidisciplinary team will be identified to take each change forward where appropriate. Lessons will be shared with all the relevant stakeholders via the Cardiology Speciality audit &amp; governance frameworks</td>
</tr>
</tbody>
</table>
9. Updating and Review

9.1. This document will be updated by the Heart Failure Clinical lead and the Heart Function service lead every 3 years.

9.2. Revisions will be made ahead of the review date if new, relevant national guidelines are published. Where the revisions are significant and the overall policy is changed, the Heart Failure Clinical lead and the Heart Function service lead will ensure the revised document is taken through the standard consultation, approval and dissemination processes.

9.3. Where the revisions are minor, e.g. amended job titles or changes in the organisational structure, approval will be sought from the Executive Director responsible for signatory approval, and can be re-published accordingly without having gone through the full consultation and ratification process.

9.4. Any revision activity will be recorded in the Version Control Table as part of the document control process.

10. Equality and Diversity

10.1. This document complies with the Royal Cornwall Hospitals NHS Trust service Equality and Diversity statement which can be found in the ‘Equality, Diversity & Human Rights Policy’ or the Equality and Diversity website.

10.2. Royal Cornwall Hospitals NHS Trust is committed to a Policy of Equal Opportunities in employment. The aim of this policy is to ensure that no job applicant or employee receives less favourable treatment because of their race, colour, nationality, ethnic or national origin, or on the grounds of their age, gender, gender reassignment, marital status, domestic circumstances, disability, HIV status, sexual orientation, religion, belief, political affiliation or trade union membership, social or employment status or is disadvantaged by conditions or requirements which are not justified by the job to be done. This policy concerns all aspects of employment for existing staff and potential employees.

11. Equality Impact Assessment

The Initial Equality Impact Assessment Screening Form is at Appendix 2.
12. References


30. the Cornwall and Isles of Scilly prescribing committee (2010) the Cornwall and Isles of Scilly Joint Formulary, sixth edition. Cornwall: in house publishing


## Appendix 1. Governance Information

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Guidelines for the management of chronic heart failure in primary and secondary care in Cornwall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Issued/Approved:</td>
<td>April 2014</td>
</tr>
<tr>
<td>Date Valid From:</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; June 2014</td>
</tr>
<tr>
<td>Date Valid To:</td>
<td>1&lt;sup&gt;st&lt;/sup&gt; June 2018</td>
</tr>
<tr>
<td>Directorate / Department responsible (author/owner):</td>
<td>Joanna Davies, Clinical Nurse &amp; Team Lead Specialist Heart Function</td>
</tr>
<tr>
<td>Contact details:</td>
<td>01872 253018</td>
</tr>
<tr>
<td>Brief summary of contents</td>
<td>This document provides guidance for any professional involved in the clinical management of patients, presenting to either secondary or primary care NHS care providers in Cornwall, with suspected or proven heart failure.</td>
</tr>
<tr>
<td>Suggested Keywords:</td>
<td>Cardiology, Heart Failure, Left Ventricular Systolic Dysfunction (LVSD), Takotsubo Cardiomyopathy, Ultrafiltration</td>
</tr>
<tr>
<td>Target Audience</td>
<td>RCHT</td>
</tr>
<tr>
<td>Executive Director responsible for Policy:</td>
<td>Medical Director – Dr Rob Parry</td>
</tr>
<tr>
<td>Date revised:</td>
<td>April 2014</td>
</tr>
<tr>
<td>This document replaces (exact title of previous version):</td>
<td>Guidelines for the management of chronic heart failure in primary and secondary care in Cornwall V3.0 June 2011</td>
</tr>
<tr>
<td>Approval route (names of committees)/consultation:</td>
<td>Consultant Cardiologists, Members of The Cardiology Speciality Governance group.</td>
</tr>
<tr>
<td>Divisional Manager confirming approval processes</td>
<td>Dr Andy Virr, Divisional Director</td>
</tr>
<tr>
<td>Name and Post Title of additional signatories</td>
<td>Not Required</td>
</tr>
<tr>
<td>Signature of Executive Director giving approval</td>
<td>{Original Copy Signed}</td>
</tr>
<tr>
<td>Publication Location (refer to Policy on)</td>
<td>Internet &amp; Intranet</td>
</tr>
<tr>
<td>Policies – Approvals and Ratification:</td>
<td></td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Document Library Folder/Sub Folder</td>
<td>Clinical / Cardiology</td>
</tr>
<tr>
<td>Links to key external standards</td>
<td></td>
</tr>
<tr>
<td>Training Need Identified?</td>
<td>No</td>
</tr>
</tbody>
</table>
Appendix 2. Initial Equality Impact Assessment Form

<table>
<thead>
<tr>
<th>Name of the policy (hereafter referred to as policy) :</th>
<th>Guidelines for the management of chronic heart failure in primary and secondary care in Cornwall version 4.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directorate and service area: Medicine, ED &amp; WCH, Cardiology speciality</td>
<td>Is this a new or existing Procedure? Existing</td>
</tr>
<tr>
<td>Name of individual completing assessment: Joanna Davies</td>
<td>Telephone: 01872 253018</td>
</tr>
</tbody>
</table>

1. Policy Aim*  
Who is the strategy / policy / proposal / service function aimed at?  
To improve the clinical management of patients with heart failure who are either presenting to their GP with symptoms of heart failure or acutely admitted to the Royal Cornwall Hospital, reducing the risk of adverse outcomes for this group of patients who have complex clinical management requirements.

2. Policy Objectives*  
To provide a clear, speciality agreed pathways and guidelines for the diagnosis and clinical management of patients with a heart failure on presentation to their GP or on admission to the Royal Cornwall Hospital.

3. Policy – intended Outcomes*  
Availability of a robust, measureable, Speciality agreed pathways and guidelines for the diagnosis and clinical management of patients with a heart failure.

4. *How will you measure the outcome?  
Outlined in section 8 of this document.

5. Who is intended to benefit from the policy?  
Patients with heart failure presenting to their GP or acutely admitted to RCHT and those members of the MDT caring for them.

6a) Is consultation required with the workforce, equality groups, local interest groups etc. around this policy?  
Yes, Workforce

b) If yes, have these *groups been consulted?  
Yes

C). Please list any groups who have been consulted about this procedure.  
All Consultant Cardiologists  
Cardiology Speciality Group

7. The Impact  
Please complete the following table.

Are there concerns that the policy could have differential impact on:

<table>
<thead>
<tr>
<th>Equality Strands:</th>
<th>Yes</th>
<th>No</th>
<th>Rationale for Assessment / Existing Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>-------------------------------------------------------------------------</td>
<td>-----</td>
<td>----</td>
<td></td>
</tr>
<tr>
<td>Sex (male, female, trans-gender / gender reassignment)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Race / Ethnic communities /groups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disability - Learning disability, physical disability, sensory impairment and mental health problems</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Religion / other beliefs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marriage and civil partnership</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pregnancy and maternity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sexual Orientation, Bisexual, Gay, heterosexual, Lesbian</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

You will need to continue to a full Equality Impact Assessment if the following have been highlighted:
- You have ticked “Yes” in any column above and
- No consultation or evidence of there being consultation - this excludes any policies which have been identified as not requiring consultation. or
- Major service redesign or development

8. Please indicate if a full equality analysis is recommended. [ ] Yes [ ] No

9. If you are not recommending a Full Impact assessment please explain why.

It does not meet any of the criteria to require a full assessment

Signature of policy developer / lead manager / director
Date of completion and submission

Names and signatures of members carrying out the Screening Assessment
1. 
2.

Keep one copy and send a copy to the Human Rights, Equality and Inclusion Lead, c/o Royal Cornwall Hospitals NHS Trust, Human Resources Department, Knowledge Spa, Truro, Cornwall, TR1 3HD

A summary of the results will be published on the Trust’s web site.

Signed __________________
Date __________________

Guidelines for the management of chronic heart failure in primary and secondary care in Cornwall v4.0 April 2014
Page 31 of 44
### Appendix 3. New York Heart Association (NYHA) symptom Scale\textsuperscript{13}

<table>
<thead>
<tr>
<th>Class</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No Limitations. Ordinary physical activity does not cause fatigue, breathlessness or palpitation.</td>
</tr>
<tr>
<td>II</td>
<td>Slight limitation of physical activity. Such patients are comfortable at rest. Ordinary physical activity results in fatigue, palpitation or breathlessness (symptomatically ‘mild’ heart failure)</td>
</tr>
<tr>
<td>III</td>
<td>Marked limitation of physical activity. Although patients are comfortable at rest, less than ordinary physical activity will lead to symptoms (symptomatically ‘moderate’ heart failure)</td>
</tr>
<tr>
<td>IV</td>
<td>Inability to carry out any physical activity without discomfort. Symptomatic at rest (symptomatically ‘severe’ heart failure)</td>
</tr>
</tbody>
</table>

12-month survival may range from >95% for those in class I, to around 10% in class IV.
Appendix 4. National Heart Failure Audit

Every unplanned admission or readmission to RCHT of an adult with a proven primary diagnosis of heart failure needs to be included in the National Heart Failure Audit

The National Heart failure Audit is one of the National Clinical Audit Patient Outcomes Programme (NCAPOPOP) that it is mandatory for RCHT to participate in. It is managed by the National Institute for Cardiovascular Outcomes Research (NICOR) and commissioned by the Healthcare Quality Improvement Partnership (HQIP).

For each patient there are 243 fields of information requested, of which 59 fields are core and have to be completed to ensure successful upload of data.

Every unplanned admission or readmission to RCHT of an adult with a proven primary diagnosis of heart failure needs to be included in the National Heart Failure Audit

Inclusion criteria:

• Adult patient with a proven primary diagnosis of LVSD - EF ≤40%
• Unplanned admission or readmission

With any of the following ICD10 codes in the primary position:

• I50.0 Congestive heart failure
• I50.1 Left Ventricular failure
• I50.9 Heart Failure Unspecified
• I11.0 Hypertensive heart disease with (congestive) heart failure
• I42.0 Dilated Cardiomyopathy
• I25.5 Ischaemic Cardiomyopathy
• I42.9 Cardiomyopathy Unspecified

The in-patient heart failure specialist nurses collect and record this data, therefore it is vital that all patients admitted with a primary diagnosis of heart failure are referred to the team to ensure their details are included in this audit. This includes patients who are at the end of their life or those not requiring follow up by the community heart failure nursing team.

For further information on the National Heart Failure Audit please see http://www.ucl.ac.uk/nicor/audits/heartfailure
Appendix 5.  Diagnostic pathway (Primary Care)

Patient presents to GP with signs or symptoms of heart failure

**PMHx MI**
Do not carry out NT-Pro BNP testing

**No PMHx MI**

NT-Pro BNP  
(age < 60) > 100pg/ml; (age 60 – 75) > 200pg/ml; (age >75)> 400pg/ml.

**NT-Pro BNP Normal**

**NT-Pro BNP ≥2000pg/ml**

2 Week Pathway
Refer to Rapid Access Heart Function Clinic via choose and book
Please give the patient a copy of the patient information leaflet which can be found in the heart failure section of the RMS website
no ECG or C-XRay required prior to referral to ensure 2 week target is met

GP to book Echocardiography via choose and book
Echocardiography report to be actioned by GP.

If Cardiologist review is required please ensure ECG & Chest X-Ray are available for Cardiologist Review

Consider differential diagnoses

Following echocardiogram and Specialist Assessment

Left Ventricular Systolic Dysfunction: See relevant pathway

Left Ventricular Diastolic Dysfunction: Clinical Management as per NICE guidance

Diagnosis of other Cardiac disorder: Clinical Management as per NICE/RMS guidance

No Cardiac Diagnosis
Appendix 6. NT-ProBNP

Background
Considerable evidence exists to support the measurement of plasma B-type natriuretic peptides as an adjunct to clinical assessment, ECG, CXR and echocardiography in patients with suspected heart failure. They do not negate the importance of clinical assessment and/or echocardiography.

NICE guidance has recommended their role in the initial diagnosis of heart failure. In addition, studies show that these peptides may help in determining prognosis and risk; in titrating drug treatments; and in screening for heart failure.

What are natriuretic peptides?
As well as its mechanical role as a pump, the heart has an endocrine function. Atrial and ventricular myocytes, but mainly those situated in the left ventricle, secrete a number of vasoactive peptide hormones, in response to stretching and increased wall tension. These peptides, which can be measured in plasma, serum and whole blood, affect urinary volume and sodium excretion, and vascular smooth muscle tone.

How do natriuretic peptides help in diagnosing heart failure?
The reliability of clinical diagnosis alone of heart failure in primary care is poor, with reported rates of misdiagnosis of 50-75% when patients are assessed against objective criteria.

Concentrations of natriuretic peptides are raised in patients with heart failure and increase in line with the severity of symptoms (New York Heart Association – NYHA – class).

Currently, they are best used as a “rule-out” test for suspected heart failure – ‘normal’ levels making a diagnosis of heart failure very unlikely. They are at least as effective as an ECG as a ‘rule-out’ test.

Their use may permit more appropriate and targeted use of limited diagnostic resources.

What is the difference between BNP and NT-proBNP?
The prehormone proBNP is cleaved upon release into the circulation in equal portions of the bioactive hormone BNP and its inactive spliced counterpart, N-terminal proBNP (NT-proBNP). BNP and NT-proBNP have different half-lives of 20 minutes and 120 minutes respectively. This greater stability of NT-proBNP makes it more useful as the assay of choice in primary care, when sample transportation times may be high. Both peptides can be measured in the laboratory and at ‘point-of-care’.

Which peptide is better for diagnosis?
BNP and NT-proBNP are equally effective in their sensitivity to detect, and in their negative predictive value to exclude, heart failure. Although dependent upon the cut-off levels used and the pre-test probability of heart failure existing, the sensitivity of these peptides to identify correctly new patients with heart failure presenting with suggestive symptoms in a primary care setting is around 93%.
• Sensitivity: for every 100 patients presenting with (subsequently confirmed) heart failure, 93 can be expected to have an ‘abnormal’ BNP or NT-proBNP level (leading to further investigation to confirm the diagnosis) while another 7 will have a falsely negative BNP or NT-proBNP level and so potentially be missed – at least on initial investigation.

The specificity of BNP and NT-proBNP for heart failure is less robust. Again, depending on the cut-off levels used and the pre-test probability of heart failure existing, the specificity of these tests to correctly identify heart failure may – at best – be only 75%.

• Specificity: for every 100 patients with a raised BNP or NT-proBNP level – at best – only 75 patients will actually have heart failure. 25 patients will not have heart failure after all. The lower the ‘normal’ threshold level set, the greater the number of false positives.

The lower the BNP or NT-proBNP threshold level set, the greater the confidence one can have in excluding heart failure in a patient with a ‘normal’ result – the negative predictive value. However, this will be at the expense of more patients with false positive results who will require further evaluation with echocardiography.

**What are ‘normal’ levels?**

Blood levels of BNP and NT-proBNP are continuous and not dichotomous – there is no clear cut-off between normal and abnormal. Levels can vary in clinical practice from almost zero to >10,000pg/ml.

By employing assays of BNP and NT-proBNP to assist clinical decision making, there is trade off between simplicity of any chosen ‘threshold’ level and the accuracy of the test to discriminate between the presence or absence of heart failure. However, in between artificial cut-off levels, a grey zone of clinical uncertainty will exist.

Age specific, tiered cut-off levels may enable greater confidence in ‘ruling in’ and ‘ruling out’ heart failure with fewer false negative and false positive results, with better targeting of echocardiography.

NT-proBNP cut-off levels (for a primary care setting) have been agreed locally. Please note that these levels may vary slightly between different laboratories. You are asked to follow the guidance issued with each individual result. Assays will be run once a week initially.

A diagnosis of heart failure is unlikely below these cut-offs, but **referral for echocardiography is still an option if heart failure is suspected despite a ‘negative’ NT-proBNP test.** These levels may need to be adjusted in the future following ongoing audit of the service.

New NICE guidance [www.nice.org.uk/guidance/CG108](http://www.nice.org.uk/guidance/CG108) recommends that any patient with suspected heart failure and an NT-proBNP >2000pg/ml should be seen within 2 weeks for echocardiography and specialist assessment.
What else affects natriuretic peptide levels?
These are not specific markers for left ventricular systolic dysfunction (LVSD) and will be raised in heart failure due to diastolic dysfunction (when systolic function may be preserved).

Levels are also affected by age and gender: they rise with age and are higher in women than men. They may also be raised in hypertension, atrial fibrillation, coronary artery disease, left ventricular hypertrophy, valvular heart disease, pulmonary embolism, cor pulmonale, renal disease etc. Patients with these conditions (and without heart failure) may, of course, benefit from echocardiography.

Treatments for heart failure, such as diuretics and ACE inhibitors, may lower levels.

Why has NT-proBNP been chosen?
The greater half-life and stability of NT-proBNP makes is the more convenient assay for general practice, where transportation times to the laboratory may be an issue.

The biochemistry department at RCHT (Treliske) uses a Roche analytical platform for much of its existing work. The introduction of the Roche NT-proBNP assay involves minimal additional capital expenditure on equipment: the main additional cost is of reagents – each test costs £25.

Laboratory-based (as opposed to point-of-care) testing has been recommended at present due for quality control purposes and lower costs.

What blood collection tube is required?
A gold-coloured top (gel separation) Vacutainer 8.5ml tube.

Who should be offered an NT-proBNP assay?
Patients need firstly to have symptoms suggestive of heart failure, such as breathlessness.

If they additionally have a history of myocardial infarction, they should be referred directly for echocardiography (i.e. without a NT-proBNP test first).

Otherwise, symptomatic patients should have an NT-proBNP test performed and the decision to refer for echocardiography should depend upon the NT-proBNP result.
Appendix 7. Inpatient pathway (RCHT)

Patient presents acutely to RCHT with signs/symptoms of decompensated heart failure & fluid overload:
(SOB, weight gain, peripheral oedema, ascites, pulmonary oedema, PND, Orthopnoea, NYHA III / IV)

Diagnosis of LVSD confirmed on imaging?
If not book IP Echocardiogram via cardiac department

Yes
Refer to IP heart failure nursing service
heartfunctions@rcht@cornwall.nhs.uk

No
Consider alternative clinical management or differential diagnosis & refer onwards as appropriate.

Refer to on call Cardiologist:
If any referral criteria met (see below)

Suitable for IV diuretics?
BNF states no evidence of: severe hypokalaemia, severe hyponatraemia, anuria, comatose and pre-comatose
states associated with liver cirrhosis and in renal failure due to nephrotoxic or hepatotoxic drugs

Yes
Commence IV Furosemide:
Initial dose (if not previously on diuretic therapy): 20mg to 50mg iv (max rate 4mg/minute). If already on oral loop: calculate iv loop dose to be
40mg/24hrs higher than oral dose (oral Bumetanide 1mg = 40mg Furosemide). Second dose: not less than 2 hours later. Continue regular IV dosing
according to response, usually once or twice daily to maximum dose 240mg/24hrs.

No

48 hours after commencing IV Furosemide, is the patients urine output <1000mls / 24 hours?

Yes
Refer for Ultrafiltration
Bleep 3045

No
Continue with IV diuretics until fluid removal complete
Optimise evidence based heart failure medications

Refer to on call Cardiologist

- Heart failure diagnosis not excluded (normal ejection fraction but echo abnormal) e.g. diastolic dysfunction, valvular heart disease
- Severe/unresponsive heart failure: NYHA class III & IV symptoms, EF<35%; bundle branch conduction (QRS duration >120ms)
- Significant co-morbidities • Pregnancy/pregnancy planning • Atrial fibrillation & complex arrhythmias • CHD (angiography ± revascularisation)
Appendix 8. Managing proven LVSD

Initial Considerations
- Address reversible causes – Alcohol / drugs
- Manage aggravating co-morbidities – Anaemia, AF, thyrotoxicosis.
- Review requirement for aggravating drugs and stop if possible – NSAIDs, CCBs, Steroids
- Baseline observations – BP, HR, Weight, Clinical status, U+Es, Creatinine, eGFR

Evidence of fluid overload:
Peripheral oedema / Pleural oedema / Ascities / JVP

Yes:
- Manage with Loop diuretic (eg Furosemide 40–80mg)
- Encourage patient to Weigh Daily
- Max fluid intake 2l/24 hours

No:
- Encourage patient to Weigh Daily
- Max fluid intake 2l/24 hours

Offer Both ACEi and BB licensed for use in Heart Failure.
- Up-titrare alternate drugs at 2 week intervals.
- Use clinical judgement when deciding which agent to start or uptitrare first

Commence Beta Blocker Licensed for use in Heart Failure.
- Including older patients or patients with:
  - PVD
  - ED
  - DM
  - COPD
  - Interstitial Pulmonary Disease
- Contraindications:
  - Uncontrolled/decompensated heart failure
  - Asthma
  - Heart Block
- Start low, go slow.
- Assess HR, BP & clinical status after each up-titrare
- If already on a Beta Blocker for a co-morbidity, switch to one licensed for use in heart failure

Commence ACE inhibitor Licensed for use in Heart Failure:
- Seek specialist advice prior to commencement:
  - Creatinine >200umol/l
  - eGFR <30ml/min
  - K+ >5.9mmol/l
  - Na+ <130mmol/l
  - Systolic BP <90mmHg
  - Diuretic dose >80mg Furosemide / 2mg Bumetanide
  - Severe aortic valve stenosis
  - Frail elderly/significant co-morbidity
- Assess Renal function, BP & clinical status after each up-titrare
- If intolerable cough develops and other causes excluded, consider switching to ARB licenced for use in heart failure

Notes:
Beta Blockers available in joint formulary & Licensed for use in LVSD: Bisoprolol, Carvedilol,
ACE inhibitors available in joint formulary & Licensed for use in LVSD: Lisinopril, Ramipril, Perindopril
ARBs available in joint formulary & Licensed for use in LVSD: Candesartan, Valsartan
## Appendix 9. Conversion doses for Beta Blockers

<table>
<thead>
<tr>
<th>Not licenced for use in heart failure</th>
<th>Licenced for use in heart failure</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Atenolol</strong></td>
<td><strong>Bisoprolol</strong></td>
<td><strong>Carvedilol (twice daily)</strong></td>
</tr>
<tr>
<td>25mg</td>
<td>2.5mg</td>
<td>6.25mg</td>
</tr>
<tr>
<td>50mg</td>
<td>5mg</td>
<td>12.5mg</td>
</tr>
<tr>
<td>75mg</td>
<td>7.5mg</td>
<td>25mg</td>
</tr>
<tr>
<td>100mg</td>
<td>10mg</td>
<td>50mg (if ≥85kg)</td>
</tr>
</tbody>
</table>
### Appendix 10. CHADS\textsuperscript{2} and CHA\textsuperscript{2}DS\textsuperscript{2}VASc

#### CHADS\textsuperscript{2} score for AF stroke risk (maximum score = 6)

- Congestive heart failure + 1
- Hypertension + 1
- Age ≥75 years + 1
- Diabetes mellitus + 1
- Stroke/TIA + 2

<table>
<thead>
<tr>
<th>Score</th>
<th>Expected annual stroke risk (assuming no aspirin or Warfarin)</th>
<th>Treatment strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>1.9</td>
<td>Aspirin</td>
</tr>
<tr>
<td>1</td>
<td>2.8</td>
<td>Warfarin or aspirin</td>
</tr>
<tr>
<td>2</td>
<td>4.0</td>
<td>Warfarin</td>
</tr>
<tr>
<td>3</td>
<td>5.9</td>
<td>Warfarin</td>
</tr>
<tr>
<td>4</td>
<td>8.5</td>
<td>Warfarin</td>
</tr>
<tr>
<td>5</td>
<td>12.5</td>
<td>Warfarin</td>
</tr>
<tr>
<td>6</td>
<td>18.2</td>
<td>Warfarin</td>
</tr>
</tbody>
</table>

#### CHA\textsuperscript{2}DS\textsuperscript{2}-VASc score for AF stroke risk (maximum score = 9)

- Congestive heart failure/LV dysfunction + 1
- Hypertension + 1
- Age ≥75 years + 2
- Diabetes mellitus + 1
- Stroke/TIA/TE + 2
- Vascular disease (prior MI, PVD, or aortic plaque) + 1
- Age 65-74 years + 1
- Sexual category - female + 1

<table>
<thead>
<tr>
<th>Score</th>
<th>Expected annual stroke risk (assuming no aspirin or Warfarin)</th>
<th>Treatment strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>Aspirin or nothing</td>
</tr>
<tr>
<td>1</td>
<td>1.3</td>
<td>Warfarin or aspirin</td>
</tr>
<tr>
<td>2</td>
<td>2.2</td>
<td>Warfarin</td>
</tr>
<tr>
<td>3</td>
<td>3.2</td>
<td>Warfarin</td>
</tr>
<tr>
<td>4</td>
<td>4.0</td>
<td>Warfarin</td>
</tr>
<tr>
<td>5</td>
<td>6.7</td>
<td>Warfarin</td>
</tr>
<tr>
<td>6</td>
<td>9.8</td>
<td>Warfarin</td>
</tr>
<tr>
<td>7</td>
<td>9.6</td>
<td>Warfarin</td>
</tr>
<tr>
<td>8</td>
<td>6.7</td>
<td>Warfarin</td>
</tr>
<tr>
<td>9</td>
<td>15.2</td>
<td>Warfarin</td>
</tr>
</tbody>
</table>
Appendix 11. Cardiology Heart Function - Pathway

The Cardiology Heart Function Pathway has been published separately as Appendix 1 and can be accessed via the Document Library by searching for ‘Heart Function’ or [click here](#).
## Version Control Table

<table>
<thead>
<tr>
<th>Date</th>
<th>Version No</th>
<th>Summary of Changes</th>
<th>Changes Made by</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dec 2008</td>
<td>1.0</td>
<td>First Issue</td>
<td>Dr Sam Freegard, GPwSI, Stennack Surgery, St Ives Dr Alistair Slade Consultant Cardiologist, RCHT</td>
</tr>
<tr>
<td>June 2010</td>
<td>2.0</td>
<td>Updated to reflect changes in BSE chamber quantification</td>
<td>Dr Robin van Lingen, Consultant Cardiologist and Heart Failure Clinical Lead, RCHT Mrs Joanna Davies, In Patient Heart Failure Specialist Nurse, RCHT</td>
</tr>
<tr>
<td>June 2011</td>
<td>3.0</td>
<td>Updated to reflect new NICE guidelines</td>
<td>Dr Robin van Lingen, Consultant Cardiologist and Heart Failure Clinical Lead, RCHT Mrs Joanna Davies, In Patient Heart Failure Specialist Nurse, RCHT</td>
</tr>
<tr>
<td>April 2014</td>
<td>4.0</td>
<td>Planned review, updated to reflect changes in RCHT Heart Failure management pathways &amp; to include information on Apical Ballooning syndrome and Ultrafiltration</td>
<td>Dr Robin van Lingen, Consultant Cardiologist and Heart Failure Clinical Lead, RCHT Mrs Joanna Davies, Clinical Nurse Specialist, Heart Function, RCHT</td>
</tr>
</tbody>
</table>

---

**All or part of this document can be released under the Freedom of Information Act 2000**

**This document is to be retained for 10 years from the date of expiry.**

**This document is only valid on the day of printing**

**Controlled Document**

This document has been created following the Royal Cornwall Hospitals NHS Trust Policy on Document Production. It should not be altered in any way without the express permission of the author or their Line Manager.