

Heart Failure

Definition

Heart failure (HF) is a complex clinical syndrome in which the ventricles' ability to fill with or eject blood is impaired. It is defined by the ejection fraction (EF): HF with reduced EF (HFrEF) and HF with preserved EF (HFpEF).

It is largely a clinical diagnosis that is based on a careful history and physical examination with confirmation of ventricular impairment on echocardiogram (ECHO).

CLINICAL PRESENTATION

Left heart failure:

- Dyspnoea at rest or on exertion
- Orthopnoea
- Paroxysmal nocturnal dyspnoea
- Cough, frothy sputum
- Wheeze
- Syncope
- Fatigue, reduced exercise tolerance

Right heart failure:

- Ankle oedema, increased abdominal girth
- Anorexia, weight loss

Clinical signs left heart failure:

- Bi-basal crepitations
- Pleural effusions
- Tachypnoea
- Laterally displaced apex beat
- Poor peripheral perfusion

Clinical signs right heart failure:

- Raised jugular venous pressure
- Peripheral/ankle oedema
- Hepatomegaly
- Ascites
- Right ventricular heave

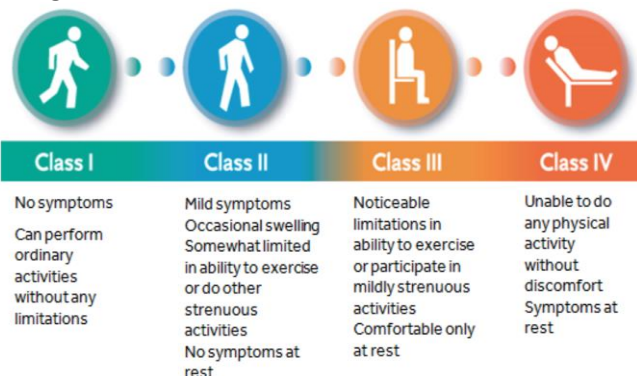


Figure 1: New York Health Association Classification (NYHA Class) (Dolgin & NYHA 1994)

INVESTIGATIONS

- Baseline full blood examination, urea and electrolytes, Liver Function Tests, lipids, Thyroid Function Tests, iron studies, N terminal pro-brain natriuretic peptide level (NT-proBNP), glycated haemoglobin (HbA1c)
- Chest X-ray
- Electrocardiogram (ECG)
- ECHO is the gold standard test for HF
- Spirometry/lung function testing (look for respiratory disease contributing to symptoms or to right heart failure)

DIAGNOSTIC CRITERIA

HFrEF diagnosis:

- Symptoms +/- signs of HF
- Left ventricular EF (LVEF) $\leq 40\%$

HFpEF diagnosis:

- Symptoms +/- signs of HF
- LVEF $\geq 50\%$
- Objective evidence on ECHO of:
 - Relevant structural heart disease (left ventricular hypertrophy (LVH) or left atrial enlargement) *and/or*
 - Diastolic dysfunction with no alternative cause

The most common causes of chronic HF in the Kimberley include coronary artery disease, hypertension, valvular heart disease (e.g., Rheumatic Heart Disease (RHD)), cardiomyopathy (commonly alcoholic) and arrhythmias.

Consider events precipitating HF:

- Acute coronary syndrome
- Malignant hypertension
- Arrhythmia
- Valvular failure
- Pulmonary embolus
- Infections

Screening

Ask about symptoms of HF in everyone with:

- Hypertension
- Diabetes
- Smoking
- Advanced age (>60 years)
- Ischaemic Heart Disease (IHD) or high risk for IHD

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- Valvular heart disease, including history of Acute Rheumatic Fever (ARF)/RHD
- Family history of cardiomyopathy
- History of arrhythmia *or* abnormal ECG
- History of current or past excessive alcohol consumption
- Obesity

Principles of Management

GOALS OF MANAGEMENT

- Confirm diagnosis and establish aetiology
- Reduction in mortality
- Prevention of complications, e.g., ventricular arrhythmia
- Prevention of recurrent hospitalisations
- Improvement in clinical status, functional capacity and quality of life

BASELINE CLINICAL ASSESSMENT

- Vital signs including peripheral pulse oximetry
- Body mass index (BMI) measurement
- Waist circumference
- Blood pressure
- Full cardiovascular examination
- ECG: looking for arrhythmia, QRS width, LVH, signs of ischaemia
- Spirometry: to detect and exclude associated airway dysfunction
- Screen for obstructive sleep apnoea, depression

NON-PHARMACOLOGICAL MANAGEMENT

(All types of HF)

1. Treat and manage co-morbidities such as diabetes, hypertension, IHD, atrial fibrillation, obstructive sleep apnoea, hyperlipidaemia, iron deficiency and anaemia (aim for Hb>100).
2. Avoid exacerbating medications if possible:
 - Nonsteroidal anti-inflammatory drugs (NSAIDs)
 - COX-2 Inhibitors
 - Thiazolidinediones
 - Corticosteroids
 - Tricyclic antidepressants, some antipsychotics e.g., Clozapine.
3. Lifestyle changes:
 - Encourage smoking cessation
 - Cessation/limitation of alcohol
 - Healthy diet and healthy weight
 - Exercise – encourage walking or aerobic exercise for 30 minutes 5 days/week
 - If available, refer for cardiac rehabilitation.

4. Limit fluid intake to 1.5-2 litres per day in patients with moderate to severe disease (NYHA Class III and IV) or recurrent presentations with decompensated HF, particularly hyponatraemic patients (caution and modify in outdoors/high humidity environment)
5. Ensure vaccinations are up to date
6. Avoid excessive salt intake, aim for <5g per day
7. Early identification and initiation of non-pharmacological treatments for depression

PHARMACOLOGICAL MANAGEMENT

All types of HF:

1. Maintain euvolaemia – use of loop diuretics with titration to ensure patient is euvolaemic; frusemide (refer Kimberley Standard Drug List (KSDL))

HFrEFE:

1. Angiotensin converting enzyme inhibitors (ACEi)/ angiotensin II receptor blockers (ARBs): in all patients with EF <40%. Should be considered in those with EF 41%-49%; Ramipril (KSDL), Irbesartan (KSDL)
2. Beta blockers
 - a. Bisoprolol (KSDL), metoprolol XR (KSDL), or nebivolol (especially frail/elderly)
 - b. Aim for heart rate <70bpm
3. Angiotensin receptor-neprolysin inhibitor (ARNI) (e.g., Sacubitril/Valsartan; Entresto), commence at 24/26 mg (KSDL) twice daily and increase by doubling dose every 2-4 weeks if tolerated to 97/103mg twice daily
 - a. NYHA class II-IV
 - b. Replace ACEi/ARB in HFrEF (EF<40%) when on maximal ACE inhibition and beta-blockade to decrease mortality and hospitalization
 - c. Note 36-hour washout period of ACEi
4. Sodium-glucose cotransporter type 2 inhibitors (SGLT-2)
 - a. Empagliflozin (KSDL)
 - b. Recommended in patients with HFrEF to decrease the risk of cardiovascular events, hospitalisation and death due to HF
 - c. Monitor fluid balance: diuretics may need to be reduced, watch for dehydration
 - d. Contra-indicated in pregnancy, estimated glomerular filtration rate (eGFR) <20, hypotension, Type-1 diabetes, frequent diabetic ketoacidosis, frequent and complicated urinary tract infections

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- e. Caution regarding euglycaemic ketoacidosis (withhold during prolonged fasting, low carbohydrate intake, excessive alcohol intake, acute serious illness, perioperative)
5. Mineralocorticoid receptor antagonist: Spironolactone (KSDL)
 - a. If NYHA class II-IV
 - b. Start low dose of 12.5mg daily and up titrate
 - c. Careful in renal impairment or hyperkalaemia
6. Intravenous Iron: ferritin <100 or 100-299 with transferrin saturation <20%. Improves symptoms and quality of life, reduces risk of HF related hospitalisation. (Ferinject preferred due to low fluid volume)

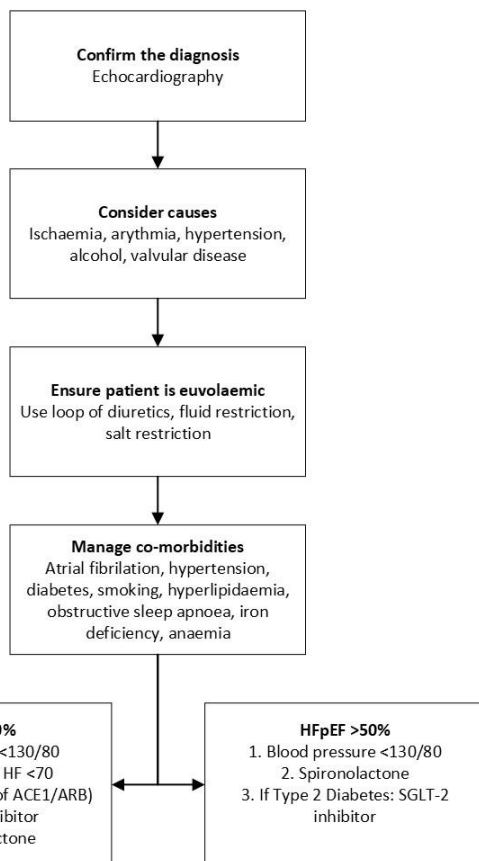


Figure 2: Flowchart of management

NB: SGLT-2 inhibitors can be used for NYHA classes II, III and IV with LVEF $\leq 40\%$ in absence of Type-2 diabetes.

MAIN SIDE EFFECTS OF MANAGEMENT

- Symptomatic postural hypotension (ACEi, ARB, loop diuretic, ARNI)
- Hyperkalaemia (ACEi, ARB, mineralocorticoid receptor blocker, ARNI)
- Deterioration in renal function (ACEi, ARB, mineralocorticoid receptor blocker, loop diuretic,

ARNI)

- Hypokalaemia (loop diuretic)

VISIT FREQUENCY

- At least every 2 weeks while titrating therapy, check creatinine, electrolytes, weight and blood pressure (weekly in chronic kidney disease)
- Once stable, check these parameters 3-monthly
- If asymptomatic, a systolic blood pressure ≥ 90 mmHg is acceptable

ECHOCARDIOGRAM

- Yearly if LVEF <40% or if any symptomatic decline

Women of Childbearing Age

Strongly encourage use of reliable contraception, pre-pregnancy counseling and early antenatal care. Review medications, particularly ACEi, ARB, statin, Empagliflozin (KSDL), Spironolactone (KSDL), Frusemide (KSDL) and beta blockers (discuss with cardiologist, physician or obstetrician).

Pregnancy should be avoided in patients with moderate to severe chronic heart disease (NYHA III-IV).

If pregnant:

- Cease ACEi
- Discuss with cardiologist, physician or obstetrician as soon as pregnancy is confirmed. Review medications as above

If breastfeeding:

- Use Enalapril (KSDL) 5mg daily doubling every 2 weeks to maximum dose 40mg daily
- Review use of Spironolactone (KSDL), Frusemide (KSDL) and beta blockers with assistance from cardiologist, physician or obstetrician

Refer Discuss

Cardiologist/Physician

- Discuss newly diagnosed, especially young, patients with HF
- LVEF <35% (for consideration of device therapies, resynchronization therapy)
- For investigation of IHD: percutaneous coronary interventions or coronary angiography
- Persisting symptoms despite maximal tolerable therapy
- Arrhythmia, such as atrial fibrillation
- eGFR <60

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- Planning pregnancy or currently pregnant
- Those with significant co-morbidities
- For consideration of digoxin

Cardiac Rehabilitation

- Via referral to local physiotherapist

Obstetrician

- If planning pregnancy or early pregnancy

Palliative Care

- Consider in patients who have symptoms consistent with NYHA Class IV

References and Resources

- ACC/AHA/HFSA (2017) [Focused Update of the 2013 ACCF/AHA Guideline for the Management of HF](#)
- Dolgin M. & New York Heart Association (NYHA) Criteria Committee (1994) *Nomenclature and criteria for diagnosis of diseases of the heart and great vessels* (9th ed.). Little Brown.
- European Society of Cardiology (2021) [Guidelines for the diagnosis and treatment of acute and chronic HF](#)
- KAHPF [Kimberley Clinical Protocols and Guidelines](#)
- KAHPF [Kimberley Standard Drug List](#)
- National Heart Foundation of Australia and Cardiac Society of Australia and New Zealand (2018) [Guidelines for the Prevention, Detection, and management of HF in Australia](#).

Glossary of Abbreviations

>	Greater than
≥	Greater than or equal to
<	Less than
≤	Less than or equal to
+/-	with or without
ACEi	Angiotensin converting enzyme inhibitors
ARB	angiotensin II receptor blockers
ARF	Acute Rheumatic Fever
ARNI	Angiotensin receptor-neprolysin inhibitor
BMI	body mass index
DKA	diabetic ketoacidosis
ECG	Electrocardiogram
ECHO	Echocardiogram
EF	ejection fraction
eGFR	estimated glomerular filtration rate
FBE	full blood examination
HbA1c	glycated haemoglobin
HF	heart failure
HFpEF	heart failure with preserved ejection fraction
HFrfEF	heart failure with reduced ejection fraction
IHD	Ischaemic Heart Disease
JVP	jugular venous pressure
KAHPF	Kimberley Aboriginal Health Planning Forum
KSDL	Kimberley Standard Drug List
LA	left atrial
LFT	Liver Function Test
LVEF	left ventricular ejection fraction
LVH	left ventricular hypertrophy
NSAIDs	Nonsteroidal anti-inflammatory drugs
NT-proBNP	- N terminal pro-brain natriuretic peptide level
NYHA Class	- New York Health Association Classification
RHD	Rheumatic Heart Disease
SGLT-2	Sodium-glucose cotransporter type 2 inhibitors
TFT	Thyroid Function Test
U&E	urea and electrolytes