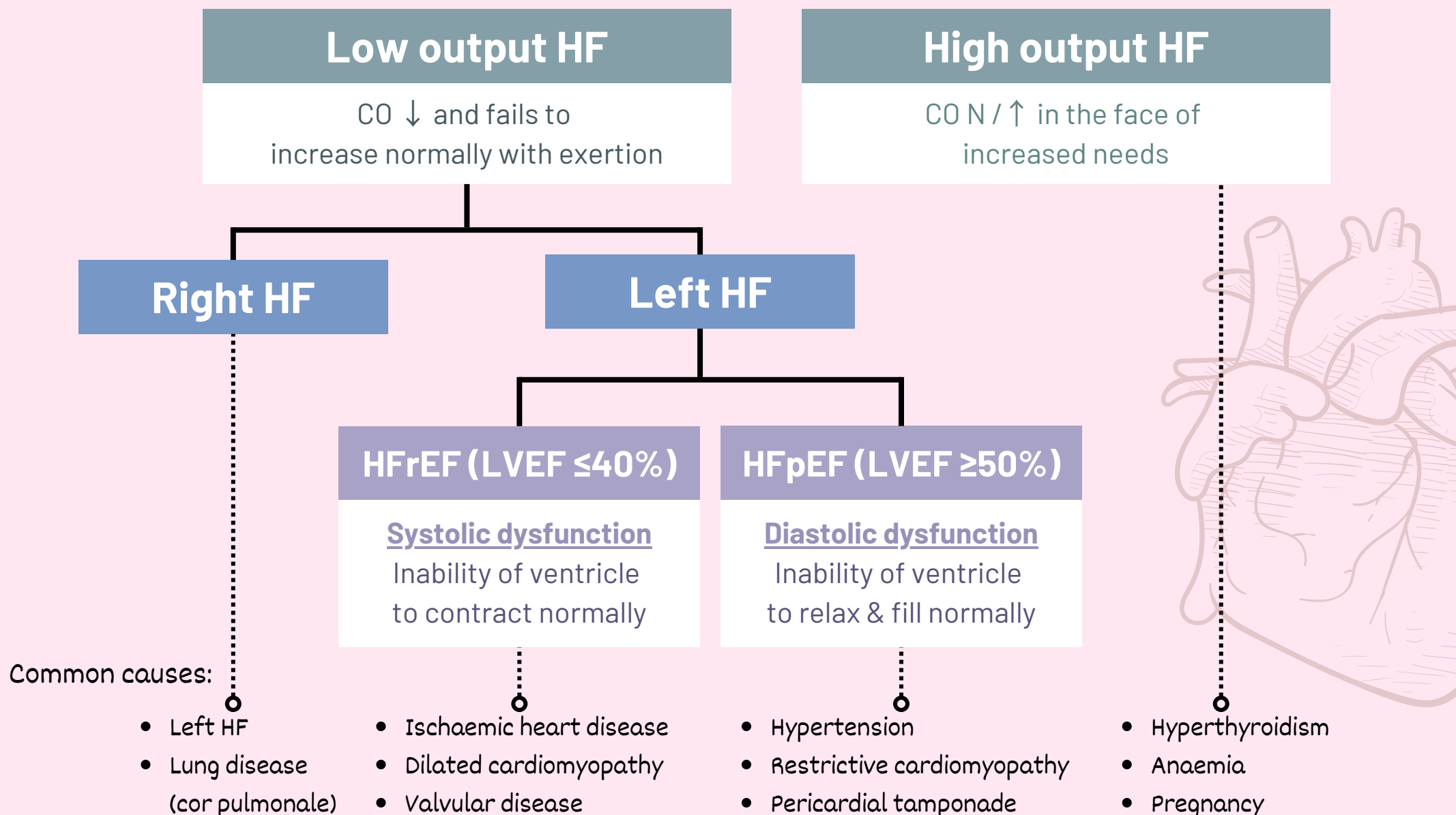


What is Heart Failure

CARDIAC OUTPUT < BODY'S REQUIREMENT

Clinical syndrome due to any **structural or physiological abnormality** of the heart resulting in its **inability to meet the body's metabolic demands** or its ability to do so only at **higher than normal filling pressures**

Classification of Heart Failure



Right vs Left Heart Failure

COMMON CAUSES OF HEART FAILURE

Coronary artery disease (CAD)

Hypertension

Dilated cardiomyopathy (idiopathic, familial)

Valvular heart disease

Diabetic cardiomyopathy



Left ventricular failure is a common cause of right heart failure!

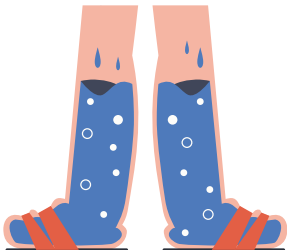
Right

Left

SYMPTOMS

SYMPTOMS

- Bilateral ankle swelling
- Weight gain
- Nausea
- Anorexia



Pulmonary congestion:

- Dyspnea
- Orthopnea
- Tachypnea
- PND



Low cardiac output:

- Weakness
- Fatigue
- Tachycardia
- Palpitations
- Diaphoresis

SIGNS

SIGNS

- Raised JVP, peripheral pitting edema, ascites
- Hepatosplenomegaly
- Loud P2 (pulmonary hypertension)
- RV heave due to RV hypertrophy



- Confusion, restlessness
- Peripheral cyanosis
- Cool & clammy extremities
- Diaphoresis, tachycardia and tachypnea
- Bilateral pulmonary crackles at lung bases

Systolic Dysfunction

- S3: turbulent flow into distended LV

Diastolic Dysfunction

- S4: atria contracts against stiff LV



NYHA Functional Classification of Heart Disease

Functional status of patients with HF are often described using NYHA classification



Class	Description	1-year Mortality
I	- No limitation - Ordinary physical activity does not cause symptoms 	5-10%
II	- Slight limitation - Comfortable at rest - Ordinary physical activity results in symptoms 	10-15%
III	- Marked limitation - Comfortable at rest - Less than ordinary activity leads to symptoms 	15-20%
IV	- Inability to carry on any physical activity without discomfort - Symptoms present at rest 	20-50%

Investigations for Heart Failure

ECG

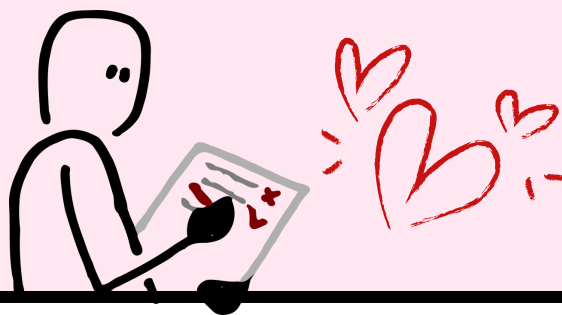
- Heart rate, rhythm
- QRS morphology
- Evidence of ischemia
- LV hypertrophy and arrhythmias

CXR

- Pulmonary congestion
- Cardiomegaly
- Underlying lung pathology

Natriuretic peptides

- Brain natriuretic peptide (BNP)
- N-terminal pro BNP (NTproBNP)
- Hormones secreted by ventricles in response to wall stress

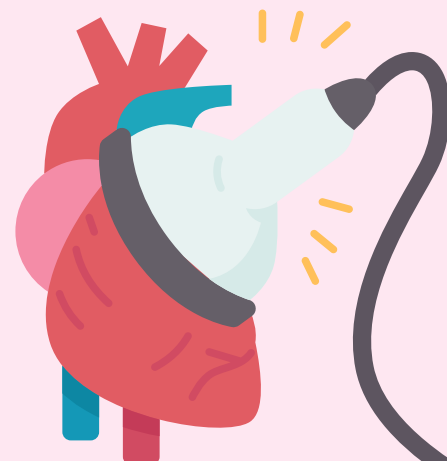


Transthoracic echocardiography



Preferred investigation for suspected heart failure!

- Diagnostic quantification of LV systolic & diastolic function
- Valvular structure and function
- Congenital cardiac abnormalities



Management of Acute Heart Failure

Definition	New-onset acute or decompensation of chronic heart failure	
Presentation	• Pulmonary and/or peripheral oedema • Signs of hypoperfusion (low output state) • Combination of pulmonary oedema and low output state	
Terminology	Cold = poor perfusion Warm = adequate perfusion	Wet = congested Dry = not congested

Initial Management

Oxygen

- Supplemental O₂ therapy recommended when SpO₂ < 95 %

Diuretics

- IV furosemide
- Indicated in fluid overloaded patients (wet)

Vasodilators

- Glyceryl trinitrate
- Caution if SBP < 100 mmHg

Morphine

- IV morphine
- Indicated in dyspneic and restless patients

Inotropes

- IV dopamine / dobutamine / noradrenaline
- Indicated if non-responsive to above measures esp. if persistent hypoperfusion (cold)



Management of Chronic HFrEF

These drug classes are shown to improve outcomes in HFrEF!

The 4 pillars

Drug examples

Take note!

RAAS antagonist

- ACE-i (perindopril)
- ARB (candesartan)
- ARNI (sacubitril-valsartan)

If persistent HFrEF even with ACE-i / ARB, substitute with ARNI
DO NOT use >1 RAAS antagonist concurrently

β -blocker

(heart failure-specific)

- Bisoprolol
- Carvedilol
- Metoprolol

DO NOT start β -blockers during acute decompensation / patients showing signs of congestion

Mineralocorticoid receptor antagonist

- Spironolactone
- Eplerenon

Side effects

Hyperkalemia
Gynecomastia

SGLT-2 inhibitor

- Dapagliflozin
- Empagliflozin

Side effects

Euglycemic DKA



Unless contraindicated or not tolerated, **start all 4 classes of drugs** at diagnosis or within 2 to 4 weeks of diagnosis of heart failure

TEST YOUR KNOWLEDGE!

A 74-year-old man, with a history of coronary bypass graft surgery and ischaemic cardiomyopathy, has been admitted with worsening breathlessness on minimal exertion. He denies any chest pains. He is currently taking aspirin, perindopril, nebivolol and furosemide regularly.

On examination, his BP is 132/68, JVP elevated at +4cm, and he has bibasal lung crepitations on chest auscultation. After an increase in his furosemide, his oxygen saturations have improved, his lungs are clear and he is less breathless.

Select which medication can be added to improve his prognosis.

- A. Spironolactone
- B. Candesartan
- C. Carvedilol
- D. Amlodipine



References

1. Malaysia CPG management of Heart Failure 2019
2. Oxford medical handbook
3. <https://www.uptodate.com/contents/right-heart-failure-causes-and-management>
4. <https://www.uptodate.com/contents/heart-failure-clinical-manifestations-and-diagnosis-in-adults>
5. <https://drraghu.com/resources/heart-failure/types-of-heart-failure/>
6. <https://calgaryguide.ucalgary.ca/?s=heart+failure>
7. Dr. Amudha's Slide on Cardiovascular therapy
8. eTG Heart Failure
9. <https://academic.oup.com/book/40619/chapter/348245583>

