



# HEART FAILURE FOR INTERNISTS

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# OUTLINE

- Definition of heart failure
- Types of heart failure
- Pathophysiology
- Diagnosis
- Investigations
- Goal of treatment
- Non-surgical device treatment of heart failure
- Management of co-morbidities
- Acute heart failure
- A Disease for Internists

# DEFINITION

- HF is defined, clinically, as a syndrome in which patients have typical symptoms –  
(e.g. breathlessness, ankle swelling, and fatigue )  
and signs-  
(e.g. elevated jugular venous pressure, pulmonary crackles, and displaced apex beat) resulting from an abnormality of cardiac structure or function.

# TYPES OF HEART FAILURE ( HF)

- Left heart failure
  - Right heart failure
  - Biventricular heart failure
  - Diastolic and systolic dysfunction
  - High output heart failure
  - Acute heart failure
  - Chronic heart failure
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# TYPES OF HEART FAILURE

Mainly 2 types according to Left ventricular ejection fraction (LV - EF)

- Heart Failure with Reduced ejection fraction (HF- REF )
  - Heart Failure with Preserved ejection fraction (HF- PEF)
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# HF-REF & HF-PEF

- **The diagnosis of HF-REF requires three conditions:**
  - 1. Symptoms typical of HF
  - 2. Signs typical of HF
  - 3. Reduced LVEF
- **The diagnosis of HF-PEF requires four conditions:**
  - 1. Symptoms typical of HF
  - 2. Signs typical of HF
  - 3. Normal or only mildly reduced LVEF and LV not dilated
  - 4. Relevant structural heart disease (LV hypertrophy/LA enlargement) and/or diastolic dysfunction

# PATHOPHYSIOLOGY

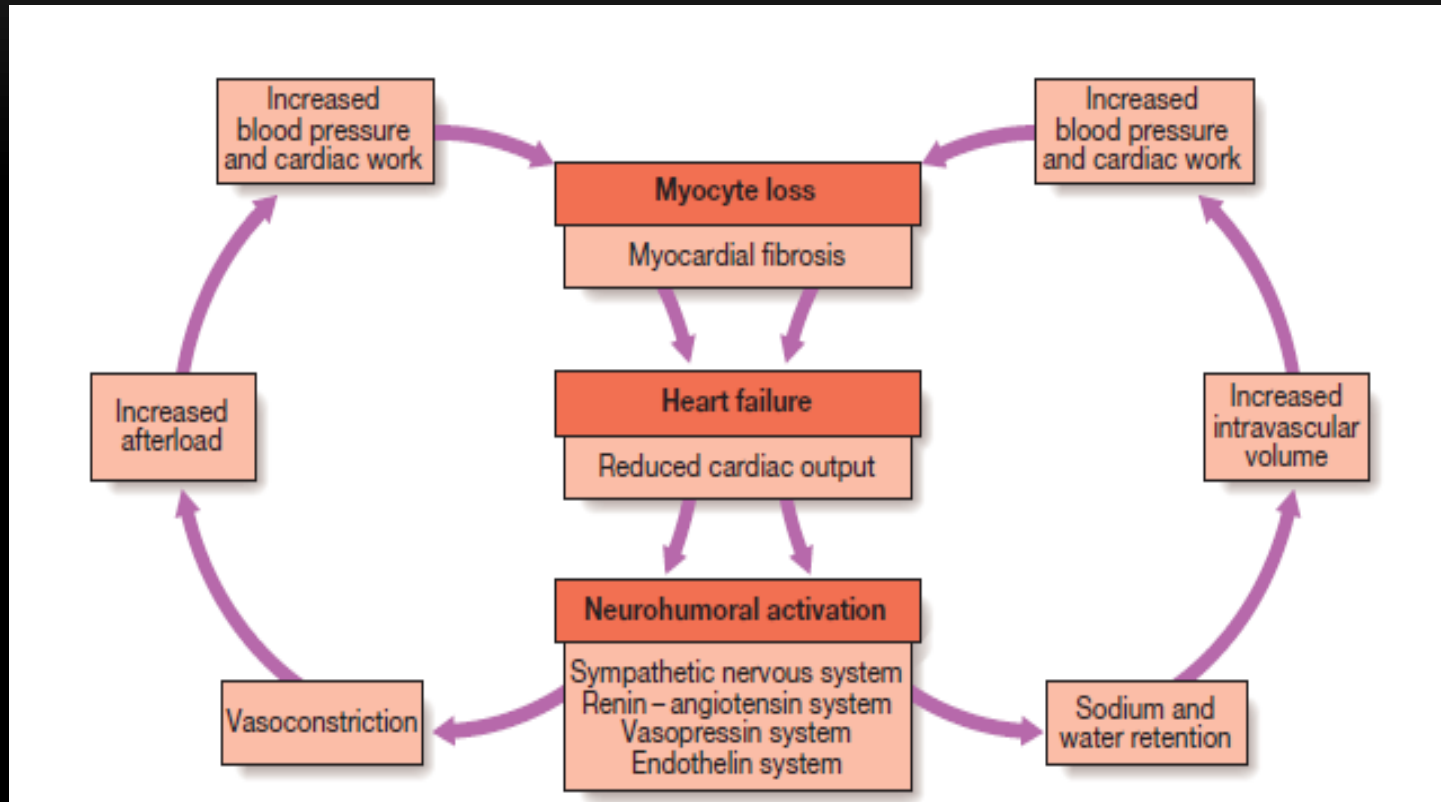


Figure: Neurohumoral activation and compensatory mechanisms in heart failure.

# DIAGNOSIS : SYMPTOMS

## Typical

- Breathlessness
- Orthopnoea
- Paroxysmal nocturnal dyspnoea
- Reduced exercise tolerance
- Fatigue, tiredness, increased time to recover after exercise
- Ankle swelling

## Less typical

- Nocturnal cough
- Wheezing
- Weight gain (>2 kg/week)
- Weight loss (in advanced HF)
- Bloating feeling
- Loss of appetite
- Confusion (especially in elderly)
- Depression
- Palpitations
- Syncope



# DIAGNOSIS : SIGNS

## More specific

- Elevated JVP
- Hepatojugular reflux
- Third Heart sound (gallop rhythm)
- Laterally displaced apical impulse
- Cardiac murmur

## Less specific

- Peripheral oedema (ankle, sacral, scrotal)
- Pulmonary crepitations
- Reduced air entry and dullness to percussion at lung bases (pleural effusion)
- Tachycardia
- Irregular pulse
- Loss of appetite
- Tachypnoea (>16 breaths/min)
- Hepatomegaly
- Ascites
- Tissue wasting (cachexia)

## ESSENTIAL INITIAL INVESTIGATIONS : TO CONSIDER IN ALL PATIENTS

- Chest X ray :
- A 12-lead ECG: to determine heart rhythm, heart rate, QRS morphology, QRS duration, other relevant abnormalities
- Transthoracic echocardiography: to evaluate cardiac structure and function, including diastolic function and to measure LVEF
- Measurement of natriuretic peptide (BNP, NT-pro BNP, or MR-pro ANP)
- Measurement of blood chemistry (including sodium, potassium, calcium, urea/blood urea nitrogen, creatinine/estimated glomerular filtration rate, liver enzymes and bilirubin, ferritin/TIBC)
- Complete Blood Count : to rule out anaemic HF

## FURTHER INVESTIGATIONS: TO CONSIDER IN SELECTED PATIENTS

- **Exercise testing** :
- **Coronary angiography** : in patients with angina pectoris
- **Cardiac Magnetic Resonance (CMR) imaging** : to evaluate cardiac structure and function, measure LVEF, characterize cardiac tissue, especially in subjects with inadequate echocardiographic images
- **Myocardial perfusion/ischaemia imaging (echocardiography, CMR, SPECT, or PET)** : to determine whether there is reversible myocardial ischaemia and viable myocardium
- **Left and right heart catheterization** : in patients being evaluated for heart transplantation or mechanical circulatory support

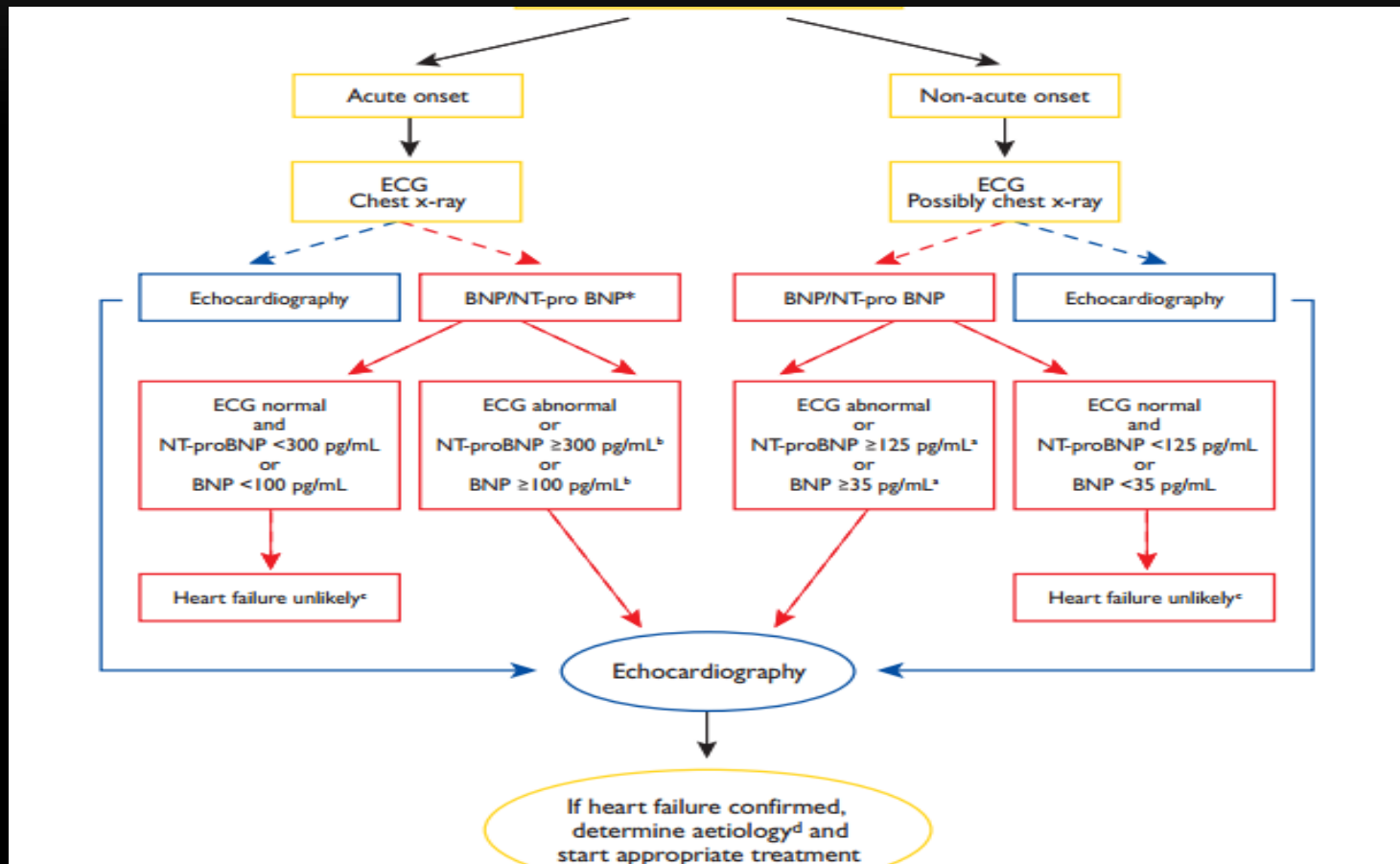
# TERMINOLOGY RELATED TO THE SYMPTOMATIC SEVERITY OF HEART FAILURE

- The **New York Heart Association (NYHA) functional classification** has been used to select patients in almost all randomized treatment trials in HF and, therefore, to describe which patients benefit from effective therapies.
  - Symptom severity correlates poorly with ventricular function.
  - **The Killip classification** may be used to describe the severity of the patient's condition in the acute setting after myocardial infarction.
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ACCF/AHA Stages of HF		NYHA Functional Classification	
A	At high risk for HF but without structural heart disease or symptoms of HF.	None	
B	Structural heart disease but without signs or symptoms of HF.	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
C	Structural heart disease with prior or current symptoms of HF.	I	No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
		II	Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.
		III	Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes symptoms of HF.
		IV	Unable to carry on any physical activity without symptoms of HF, or symptoms of HF at rest.
D	Refractory HF requiring specialized interventions.		

# ALGORITHM FOR THE DIAGNOSIS OF HEART FAILURE

Suspected HF



*McMurray JJ et al. Guidelines for the diagnosis and treatment of acute and chronic heart failure 2012. Eur Heart J 2012; 33(14): 1787-847*

# TWO MAJOR GOALS IN THE TREATMENT OF HF

- Improvement in symptoms (preferably to the point of the patient becoming asymptomatic)
- Reduction of morbidity, including hospital admissions, and mortality (ie improved survival)



# PHARMACOLOGICAL TREATMENT OF HF- REF





# PHARMACOLOGICAL TREATMENT OF HF- REF (SYSTOLIC HEART FAILURE)

Pharmacological treatments indicated in potentially all patients with symptomatic (NYHA functional class II– IV) systolic heart failure;

- **An ACE inhibitor**, in addition to a beta-blocker, for all patients with an EF  $\leq 40\%$  to reduce the risk of HF hospitalization and premature death.
- **A beta-blocker**, in addition to an ACE inhibitor (or ARB if ACE inhibitor not tolerated), for all patients with an EF  $\leq 40\%$ .
- **A Mineralocorticoid Receptor Antagonist ( MRA )** for all patients with persisting symptoms (NYHA class II–IV) and an EF  $\leq 35\%$ , despite treatment with an ACE inhibitor (or an ARB) and a beta-blocker

## OTHER TREATMENTS WITH LESS-CERTAIN BENEFITS IN SYMPTOMATIC (NYHA CLASS II–IV) SYSTOLIC HEART FAILURE

- **Angiotensin Receptor Blocker**
- **Ivabradine** : in patients in sinus rhythm with an EF  $\leq 35\%$ , a heart rate remaining  $\geq 70$  b.p.m., and persisting symptoms (NYHA class II–IV) despite treatment.
- **Digoxin**: in patients in sinus rhythm with an EF  $\leq 45\%$  who are unable to tolerate a beta-blocker.
- **Hydralazine and Isosorbide DiNitrate (ISDN)**: as an alternative to an ACE inhibitor or ARB, if neither is tolerated.
- **An omega-3 polyunsaturated fatty acid (PUFA)** : to reduce the risk of death and the risk of cardiovascular hospitalization.

# TREATMENTS NOT RECOMMENDED IN HF

- **UNPROVEN BENEFIT IN HF:**

- 3-Hydroxy-3-methylglutaryl-coenzyme A reductase inhibitors ('statins')
- Renin inhibitors: aliskiren. not presently recommended as an alternative to an ACE inhibitor or ARB
- Oral anticoagulants: Other than in patients with AF (both HF-REF and HF-PEF), no evidence of reduced mortality–morbidity compared with aspirin

- **BELIEVED TO CAUSE HARM:**

- Thiazolidinediones (glitazones)
- Most CCBs (except amlodipine and felodipine) : due to negative inotropic effect
- NSAIDs and COX-2 inhibitors: should be avoided if possible
- The addition of an ARB (or renin inhibitor) to the combination of an ACE inhibitor AND a mineralocorticoid antagonist is NOT recommended

# DIURETICS

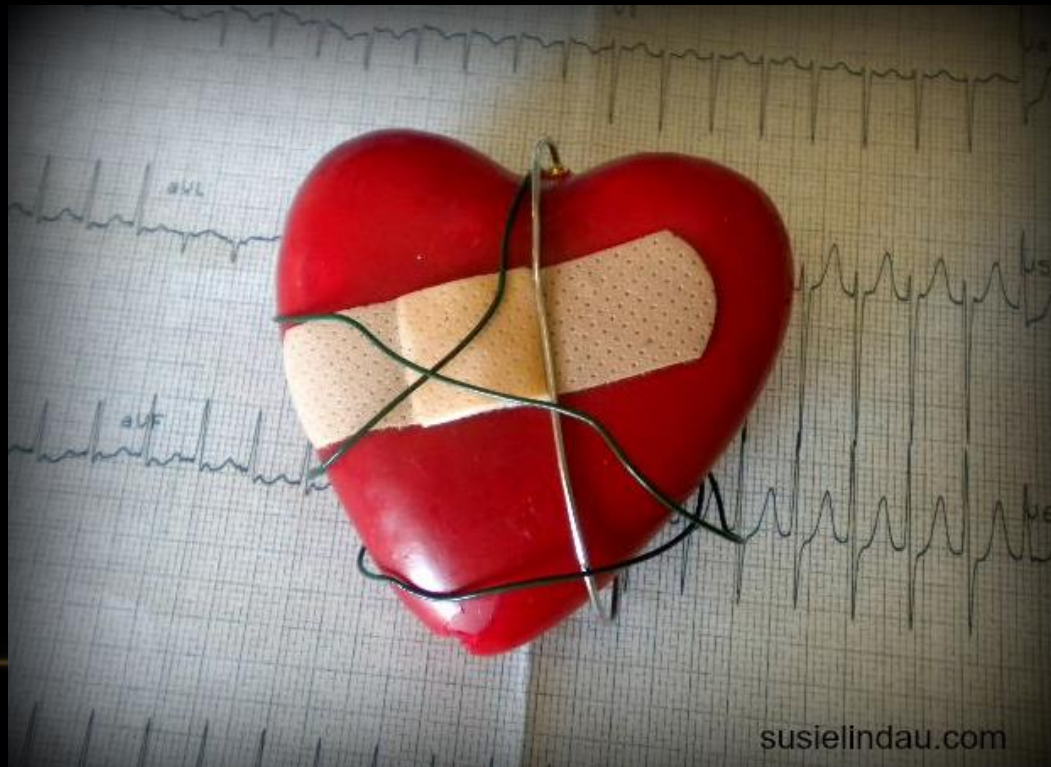
- The effects of diuretics on mortality and morbidity have not been studied in patients with HF
- Diuretics relieve **dyspnoea and oedema** and are recommended for this reason in **patients with signs and symptoms of congestion**, irrespective of EF.
- **Loop diuretics produce a more intense and shorter diuresis than thiazides**, which cause a more gentle and prolonged diuresis.
- **Thiazides may be less effective** in patients with reduced kidney function.
- **Loop diuretics are usually preferred to thiazides** in HF-REF although they act synergistically and the combination may be used (usually on a temporary basis) to treat resistant oedema.

# PHARMACOLOGICAL TREATMENT OF HF- PEF (DIASTOLIC HEART FAILURE)

- **No treatment** has yet shown a convincing reduction of morbidity and mortality in HF-PEF.
- **Diuretics** are used to control sodium and water retention and relieve breathlessness and oedema as in HF-REF.
- **Adequate treatment of hypertension and myocardial ischaemia** is important.
- **Control of the ventricular rate** in patients with AF is important: Rate limiting CCB or Beta blocker
- **Verapamil** may improve exercise capacity and symptoms. Also be useful for ventricular rate control in AF, treatment of hypertension and myocardial ischaemia .
- The drugs that should be avoided in HF-REF should also be avoided in HF-PEF, with the exception of CCBs.

# DEVICE THERAPY FOR HEART FAILURE

## TIME TO CALL THE CARDIOLOGIST!!!



# NON-SURGICAL DEVICE TREATMENT OF HF-REF

## 1. Implantable cardioverter-defibrillator (ICD)

- **Primary prevention:** An ICD is recommended in a patient with symptomatic HF (NYHA class II–III) and an EF  $\leq 35\%$  despite  $\geq 3$  months of treatment with optimal pharmacological therapy, who is expected to survive for  $>1$  year with good functional status, to reduce the risk of sudden death .
- **Secondary prevention:** An ICD is recommended in a patient with a ventricular arrhythmia causing haemodynamic instability, who is expected to survive for  $>1$  year with good functional status, to reduce the risk of sudden death.

# NON-SURGICAL DEVICE TREATMENT OF HF-REF

## 2. Cardiac resynchronization therapy (CRT)

### Recommendations in NYHA III-IV HF

- **LBBB QRS morphology:** CRT-P/CRT-D recommended in patients in sinus rhythm with a QRS duration of  $\geq 120$  ms, LBBB QRS morphology, and an EF  $\leq 35\%$ , who are expected to survive with good functional status for  $>1$  year
- **Non-LBBB QRS morphology:** CRT-P/CRT-D should be considered in patients in sinus rhythm with a QRS duration of  $\geq 150$  ms, irrespective of QRS morphology, and an EF  $\leq 35\%$ .



# IMPORTANCE AND MANAGEMENT OF OTHER CO-MORBIDITY IN HEART FAILURE

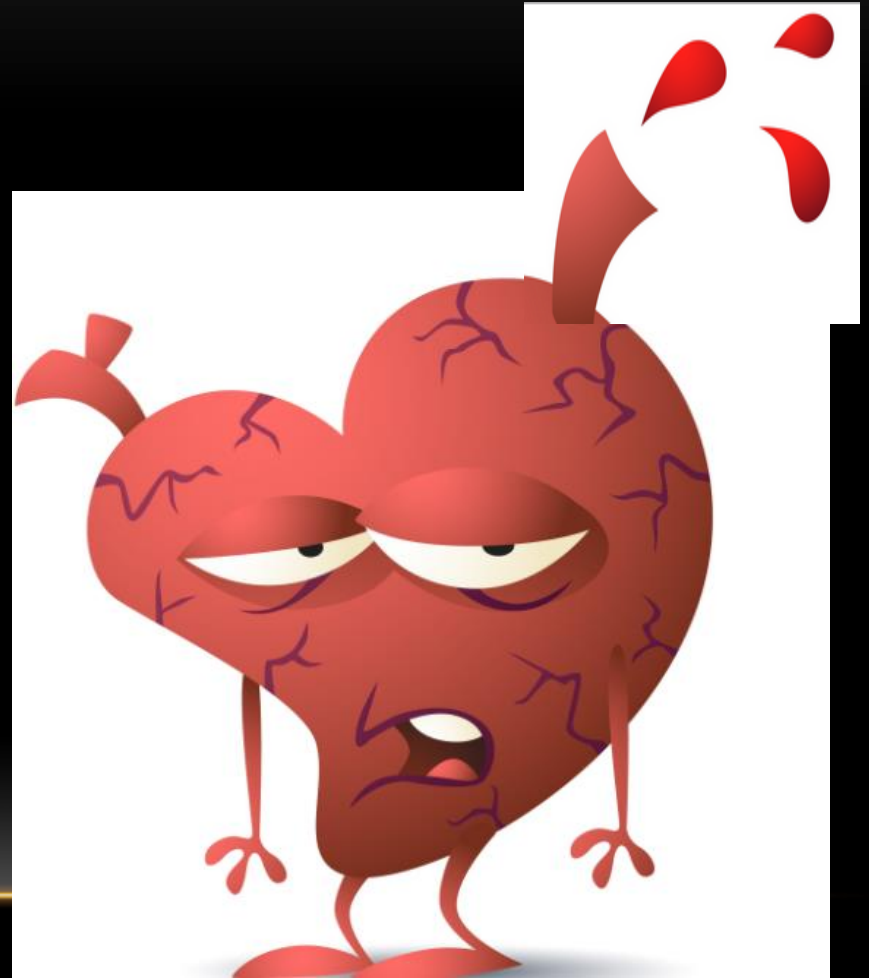
Co-morbidities are important in patients with HF for four main reasons.

1. Co-morbidities may **affect the use of treatments for HF**
2. **The drugs** used to treat co-morbidities may cause **worsening of HF**
3. **The drugs** used to treat HF and those used to treat co-morbidities may also **interact with one another and reduce patient adherence**.
4. Most co-morbidities are associated **with worse clinical status and are predictors of poor prognosis in HF (e.g. diabetes)**. This has led to some co-morbidities themselves becoming targets for treatment (e.g. anaemia).

# COMORBIDITIES TO BE MANAGED IN HF

- Anaemia
- Angina
- Asthma
- Cachexia
- Cancer
- COPD
- Diabetes
- Kidney dysfunction & cardio-renal syndrome
- Erectile dysfunction
- Gout
- Iron deficiency
- Obesity
- Prostatic obstruction
- Renal dysfunction
- Sleep disturbance and sleep-disordered breathing
- Depression

# ACUTE HEART FAILURE



# ACUTE HEART FAILURE ( AHF)

- Acute heart failure (AHF) is the term used to describe the rapid onset of, or change in, symptoms and signs of HF.
  - It is a life-threatening condition that requires immediate medical attention
  - In most cases, AHF arises as a result of deterioration in patients with a previous diagnosis of HF (either HF-REF or HF-PEF).
  - AHF may also be the first presentation of HF ('de novo' AHF).
  - AHF may be caused by an abnormality of any aspect of cardiac function.
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# INITIAL ASSESSMENT AND MONITORING IN ACUTE HF

Three parallel assessments must be made during the initial evaluation of the patient:

- **Does the patient have HF** or is there an alternative cause for their symptoms and signs (e.g. chronic lung disease, anaemia, kidney failure, or pulmonary embolism) ?
- **If the patient does have HF**, is there a precipitant and does it require immediate treatment or correction (e.g. an arrhythmia or acute coronary syndrome) ?
- **Is the patient's condition immediately life-threatening** because of hypoxaemia or hypotension leading to underperfusion of the vital organs (heart, kidneys, and brain) ?

# TREATMENT OF ACUTE HEART FAILURE

## PHARMACOLOGICAL THERAPY

### Acute management

- Oxygen
- Diuretics
- Opiates
- Vasodilator
- Nesiritide

### After stabilization

- ACEI/ ARB
- Beta blocker
- Mineralocorticoid (aldosterone) receptor antagonist
- Digoxin

### Inotropes and Vasopressors:

- Dopamine
- Dobutamine
- Norepinephrine
- Epinephrine
- Enoximone
- Milrinone
- Levosimendan

# TREATMENT OF ACUTE HEART FAILURE

- **Non-pharmacological/non-device therapy**

Restriction of sodium intake to ,2 g/day and fluid intake to 1.5–2.0 L/day

- **Ventilation**

- Non-invasive ventilation
- Endotracheal intubation and invasive ventilation

- **Mechanical circulatory support**

- Intra-aortic balloon pump
  - Ventricular Assist Devices
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# HEART FAILURE

*A DISEASE FOR THE INTERNISTS ?*





# INTERNISTS TREAT MORE HEART FAILURE !!

*Philbin EF, Jenkins PL. Differences between patients with heart failure treated by cardiologists, internists, family physicians, and other physicians: analysis of a large, statewide database. Am Heart J. 2000;139(3):491-6.*

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From a total of 44,926 patients, 23% received care from cardiologists, 63% from internists, 11% from family practitioners, and 3% from other physicians. Patients of cardiologists were younger, more frequently male, and less frequently residents of nursing homes. They were more likely to have associated cardiovascular diagnoses but less likely to have comorbid general medical conditions. Patients of cardiologists were more likely to undergo cardiac catheterization (9%) than those of internists (3%) but had similar adjusted hospital length of stay and charges. Mortality and hospital readmission rates for HF were similar among the groups. However, cardiologists' management of HF is not economically advantageous.

- The OSCUR (Outcome dello Scompenso Cardiaco in relazione all'Utilizzo della Risorse) study performed in Italy showed that the **majority of patients (78%) were treated by internists**
  - Although diagnostic procedures such as echocardiography, Holter ECG, exercise testing and angiography are performed more frequently by cardiologists and **there are no significant differences in the types and dosages of drugs prescribed**. **The dosage of these drugs are also higher when prescribed by cardiologists.**
  - Similar picture is also observed in our country . Not only heart failure , valvular heart diseases are also an immense burden for the internists.
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# TAKE HOME MESSAGE

- **Interventional Cardiologist is required** only when device therapy needed.
- Patients under the care of cardiologists may be expected to **undergo more extensive diagnostic evaluation with a more aggressive therapeutic approach.**
- **Starting of treatment would be delayed and costs of treatment during hospitalization would increase** if all heart failure patients are to be managed by cardiologists .

# TAKE HOME MESSAGE

- One of the greatest challenges in this field is **to implement treatment strategies** that have been proven to be effective which is better done by internists.
- Close cooperation between internists and cardiologists is also necessary to provide **appropriate care to all patients with heart failure, including the elderly and those with co-morbid conditions and optimal treatment** of patients with heart failure must be organized in each country according to available resources.



Thank you