Heart Failure updates

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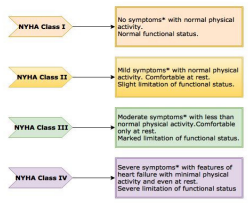
New York Heart Association (NYHA) Classification of severity of Heart Failure



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Classification of HF by LVEF

- HFrEF (HF with reduced EF): LVEF <40%
- HFimpEF (HF with improved EF): Previous LVEF <40%, with follow up measurement >40%
- HFmrEF (HF with mildly reduced EF): LVEF 41% - 49%
- HFpEF (HF with preserved EF): LVEF >50%

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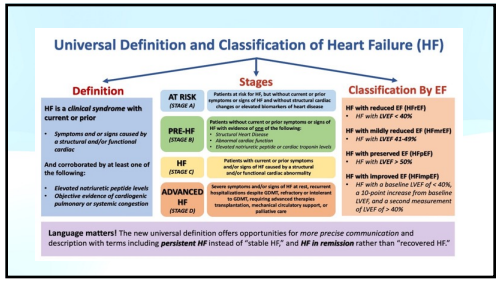

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Use of biomarkers for Prevention, Initial Diagnosis, and Risk Stratification:

- In patients presenting with dyspnea, BNP or NT-pro BNP is useful to support diagnosis or exclusion of heart failure
- In Emergency settings, BNP or NT-proBNP levels have a higher sensitivity than specificity and may be more useful for ruling out HF than ruling in HF
- Higher levels of biomarkers are associated with greater risk for adverse short-term and long-term outcomes
- Predischarge BNP and NT-proBNP are strong predictors of the risk of death or hospital readmission
- Reducing biomarker levels, results in improved longterm outcomes

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Stage A:
Primary Prevention

- Patients with hypertension: BP should be controlled to prevent symptomatic HF
- Patients with diabetes mellitus and either established CVD or high cardiovascular risk, SGLT2i should be useful
- Patients at risk of developing HF: should have biomarker screening followed by cardiology evaluation to prevent LV dysfunction (systolic or diastolic) or new onset HF

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Stage B:
Preventing clinical HF syndrome in patients with Pre-HF

- Patients with LVEF <40%: ACEi should be used to prevent symptomatic HF and reduce mortality
- Patients with recent or remote history of MI or ACS: Statins should be used to prevent symptomatic HF
- Patients with recent MI and LVEF <40%, who are intolerant to ACEi: ARB should be used to prevent symptomatic HF and reduce mortality
- Patients with recent or remote history of MI or ACS and LVEF <40%: Beta blockers should be used to reduce mortality
- Patients who are 40 days post-MI with LVEF <30% and NYHA class I: An ICD is recommended to prevent sudden death
- Patients with LVEF <50%: Non-dihydropyridine calcium channel blockers with negative inotropic effects may be harmful

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Stage C:

- Avoid excessive sodium intake
- Diuretics are recommended to relieve congestion, improve symptoms, and prevent worsening HF
- Addition of a thiazide diuretic to treatment with a loop diuretic should be reserved for patients who do not respond to moderate or high dose loop diuretics
- Patients with HFrEF and Class II to III symptoms: ARNi recommended to reduce morbidity and mortality
- Patients with HFrEF: ACEi is beneficial to reduce morbidity and mortality when use of a ARNi is not possible

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Stage C:

- Patients with HFrEF: If intolerant to ACEi because of cough or angioedema and if ARNi is not feasible: Use of ARB is recommended to reduce morbidity and mortality
- PARADIGM-HF - Use of an ARNi vs ACEi (Sacubitril-Valsartan [Entresto] vs Enalapril) in symptomatic heart failure
  - ARNi reduced the endpoint of cardiovascular death and hospitalization by 20% relative to ACEi
- ARNi is composed of an ARB and a neprilysin inhibitor (Neprilysin is an enzymes that degrades natriuretic peptides, bradykinin, adrenomedullin, and other vasoactive peptides)

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Stage C:

Beta Blockers:

- Patients with HFrEF, with current or previous symptoms: Use of a 1 of the 3 Beta blockers is recommended (Bisoprolol, Carvedilol, Metoprolol succinate)
- Improve LVEF
- Lessen the symptoms of HF
- Improve clinical status
- Even if Beta blocker do not improve symptoms, long term treatment helps prevent major cardiovascular events
- Should not be abruptly stopped - leads to clinical deterioration

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Stage C:

Mineralocorticoid Receptor Antagonists (MRAs):

- Aldosterone antagonists (Spironolactone or Eplerenone)
- Show consistent improvement in mortality, hospitalizations, and sudden cardiac death across a wide range of patients with HFrEF
- Contraindicated in patients with eGFR <30 or serum potassium >5.0

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Stage C:

Sodium-Glucose Cotransporter 2 inhibitors (SGLT2i):

- In patients with type 2 diabetes and established CVD or at high risk for CVD, SGLT2i prevent HF hospitalizations
- Reduction in hospitalization was irrespective of the presence of type 2 diabetes
  - Two major studies:
    - DABA-HF
    - EMPORER-Reduced

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Stage C:

Sodium-Glucose Cotransporter 2 inhibitors (SGLT2i)

- EMPORER-Reduced: with OR without diabetes
  - 13% decrease in all cause death
  - 14% decrease in cardiac death
  - 26% decrease in hospitalization from HF
  - 38% decrease in renal outcomes
- Canagliflozin (Invokana), Dapagliflozin (Farxiga), Empagliflozin (Jardiance), and Sotagliflozin (Zynquista)

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Stage C:

Hydralazine and Isosorbide dinitrate:

- Combination of Hydralazine and Isosorbide dinitrate is beneficial in HFrEF.
- If patients with HFrEF cannot tolerate first line agents such as ARNi, ACEi, or ARB:
  - Combination of hydralazine and isosorbide dinitrate might be considered to reduce morbidity and mortality

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Stage C:

Drugs of no value or that may worsen HF:

- Non-dihydropyridine calcium channel blocking drugs (Verapamil and Diltiazem) are not recommended – myocardial depressants
- Amlodipine - PRAISE-2 study showed no benefit
- Class IC anti-arrhythmics may increase mortality
- Flecainide and Encainide - increased mortality
- Amiodarone and Dofetilide - only anti-arrhythmics with neutral effects on mortality
- Thiazolidinediones increase the risk of worsening HF
- Patients with type 2 diabetes and high cardiovascular risk, DPP-4 inhibitors (Saxagliptin and Alogliptin) increase the risk of hospitalization
- NSAIDS worsen HF symptoms

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Stage C:

Digoxin:

- Low dose Digoxin is better than high doses (0.125 to 0.25 mg daily)
- Higher serum concentrations of Digoxin are independently associated with a higher risk of mortality
- Clinical deterioration has been observed with withdrawal of Digoxin

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Stage D (Advanced HF):

Inotropic Support

- Inotropes improve hemodynamic compromised patients
- Have not been shown to improve survival in inpatient or outpatient setting
- Still remain an option to help patients who are refractory to other therapies
- May be a necessity in patient suffering from end-organ hypoperfusion
- Continuous IV inotropic support is reasonable to maintain systemic perfusion and preserve end-organ performance
- Often utilized in patient awaiting heart transplant or mechanical circulatory support (MCS)

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Stage D (Advanced HF)

Inotropic Support

- Inotropic support may lead to arrhythmias
- Ideally should be used with an ICD in case of lethal arrhythmia

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Stage D (Advanced HF)

Mechanical Circulatory Support

- Therapeutic option to prolong life and improve functional capacity
- Effective for short-term support or long-term support
- Most appropriate for patient with HFrEF and a dilated ventricle
- LVADs are considered in patients with NYHA Class IV dependent on intravenous inotropes
- Used as bridge to transplant
- Survival has greatly improved
  - 2 year survival > 80% with newer generation LVADs

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Stage D (Advanced HF)

Mechanical Circulatory Support

- Require anticoagulation
  - Pump thrombosis
  - Hemolysis
  - Ischemic neurologic events

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Acute Decompensated HF

Common precipitating factors:

- Acute coronary syndrome
- Uncontrolled hypertension
- Atrial fibrillation / Other arrhythmias
- Acute infections (Pneumonia, UTI, etc.)
- Medication non-compliance
- Dietary non-compliance
- Anemia
- Medications that increase sodium retention (NSAIDs)
- Medications with negative inotropic effect (Verapamil)

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Acute Decompensated HF

Diuretics

- IV loop diuretic therapy provide the most rapid and effective treatment
- Titration to achieve effective diuresis may require:
  - Doubling dosage
  - Adding a thiazide diuretic
  - Adding an MRA
- Goal of therapy is to resolve signs and symptoms of congestion before discharge
- Persistent congestion at discharge = High rate of rehospitalization and mortality

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Acute Decompensated HF

Diuretics:

- Loop diuretic bolus vs infusion?
  - DOSE (Diuretic Optimization Strategies Evaluation) trial found NO significant difference in symptoms when diuretic therapy was given as a bolus vs infusion therapy

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Acute Decompensated HF

Vasodilators

- Intravenous Nitroglycerin
  - Will acutely mitigate dyspnea and relieve pulmonary congestion
  - Especially beneficial in patients with hypertension, coronary ischemia, or significant MR
  - Overall, no data to support that intravenous vasodilators improve outcomes in patients (rehospitalization rates or mortality)
  - However, will help mitigate dyspnea in patients with intact or high blood pressure

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