

# Heart Failure Overview

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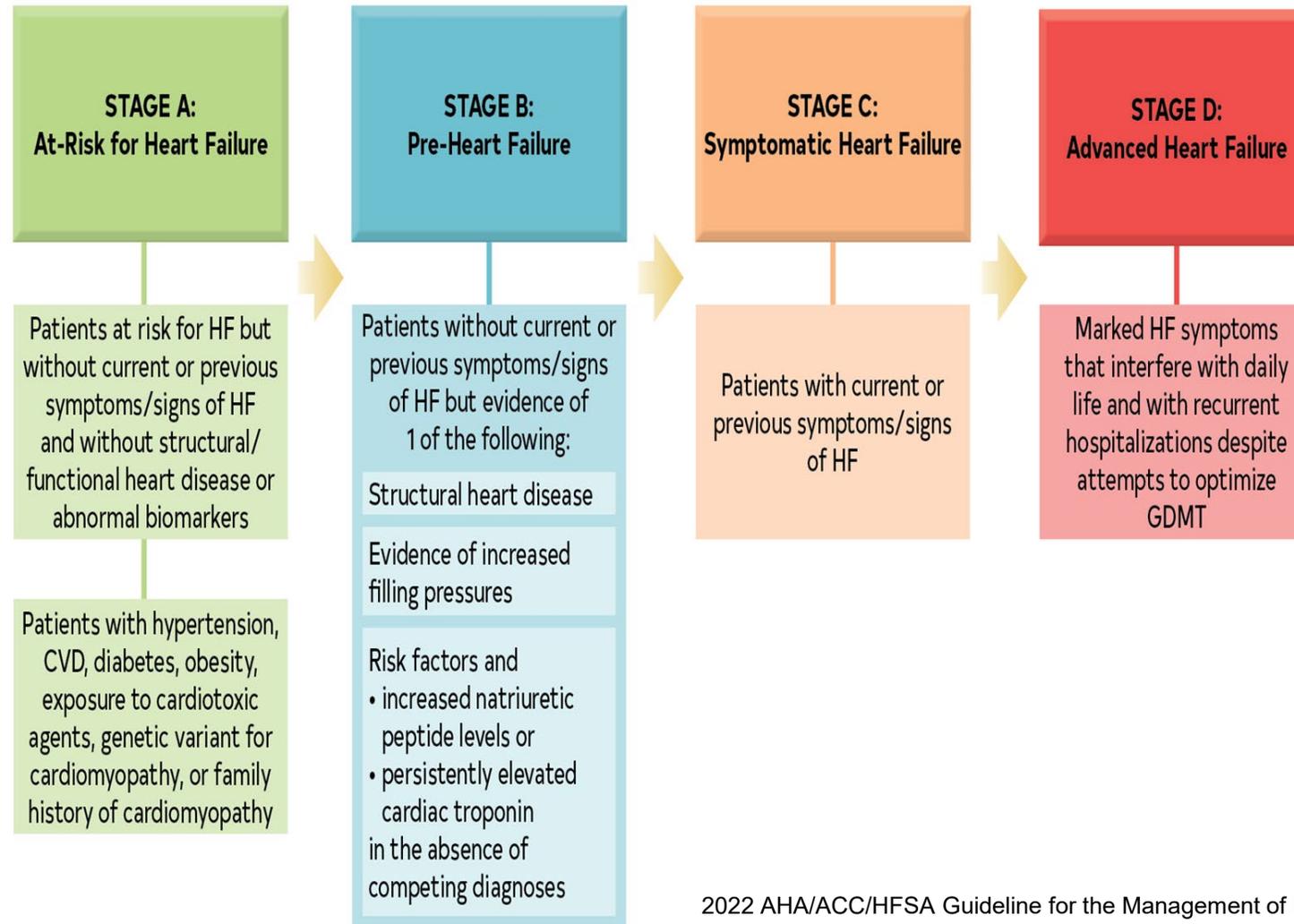
# Objectives

- Definition of Heart Failure
- Guideline Directed Medical Therapy
- Strategies to prevent heart failure readmissions

# Heart Failure (HF)

- “Heart failure is a clinical syndrome that can result from any structural or functional cardiac disorder that impairs the ability of the ventricle to fill with or eject blood”
- 1.2 million admissions with the primary diagnosis of HF annually

# ACC Stages of Heart Failure



# Classification of Heart Failure by LVEF

Type of HF According to LVEF	Criteria
HFrEF (HF with reduced EF)	LVEF $\leq 40\%$
HFimpEF (HF with improved EF)	Previous LVEF $\leq 40\%$ and a follow-up measurement of LVEF $>40\%$
HFmrEF (HF with mildly reduced EF)	<b>LVEF 41%–49%</b> Evidence of spontaneous or provokable increased LV filling pressures (eg, elevated natriuretic peptide, noninvasive and invasive hemodynamic measurement)
HFpEF (HF with preserved EF)	<b>LVEF <math>\geq 50\%</math></b> Evidence of spontaneous or provokable increased LV filling pressures (eg, elevated natriuretic peptide, noninvasive and invasive hemodynamic measurement)

# NYHA Classification of Heart Failure

**Class I**

Asymptomatic: No limitation of physical activity. Ordinary activity does not cause sx's.

**Class II**

Symptomatic with moderate exertion. Ordinary physical activity causes SOB, fatigue.

**Class III**

Symptomatic with minimal exertion. Less than usual activity causes symptoms.

**Class IV**

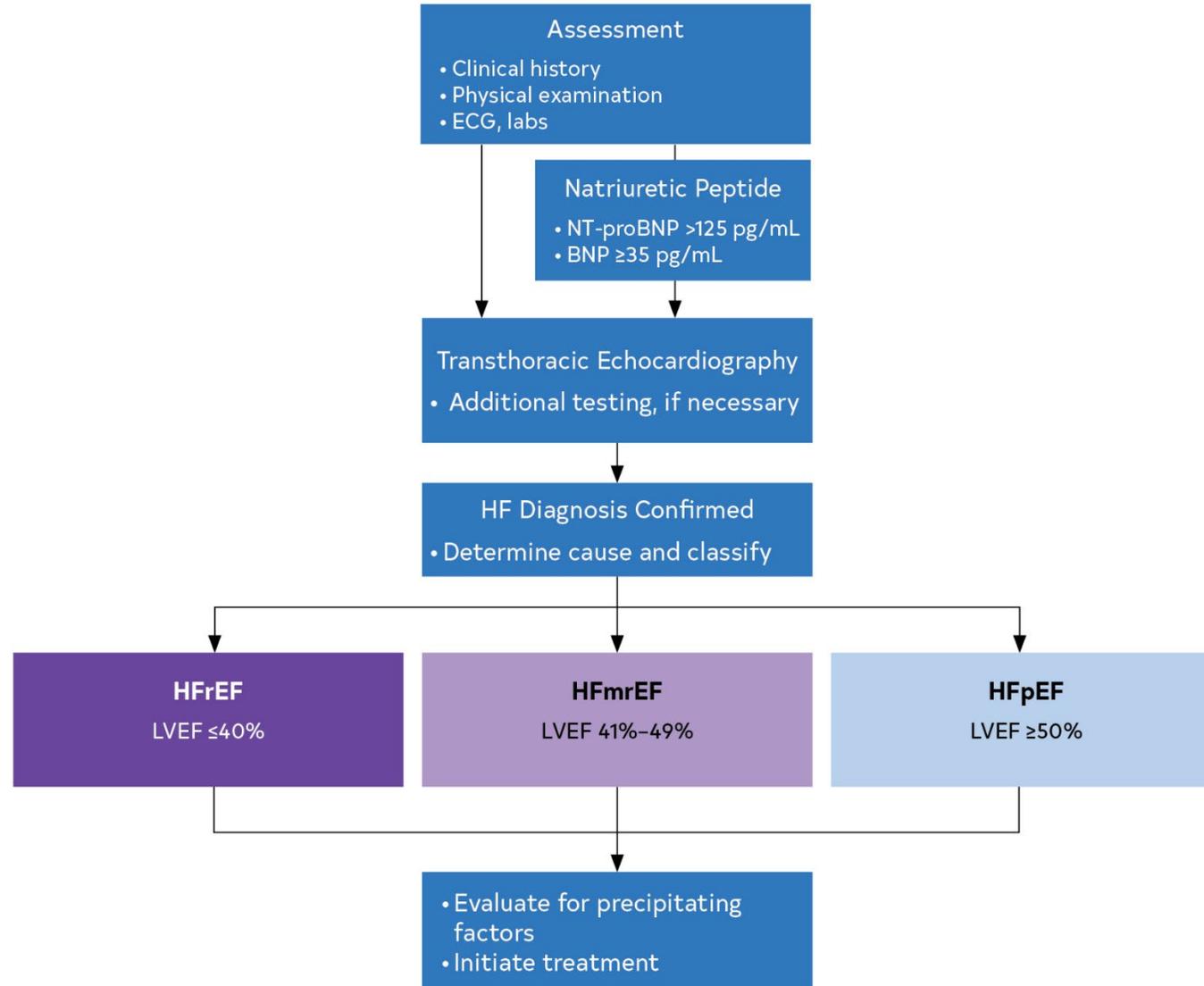
Symptomatic at rest. Unable to carry on any activity without discomfort.

# Signs and Symptoms

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- Common Symptoms in Acute Heart Failure:
  - Breathlessness
  - Wheezing
  - Edema
  - Fatigue
- Other symptoms:
  - Abdominal Pain, Nausea, Anorexia
  - Confusion
  - Lethargy
- Physical Exam Findings:
  - JVD
  - S3
  - Rales
  - Hepatomegaly, AJR
  - Peripheral Edema

# Diagnostic Algorithm for Patients with Suspected HF



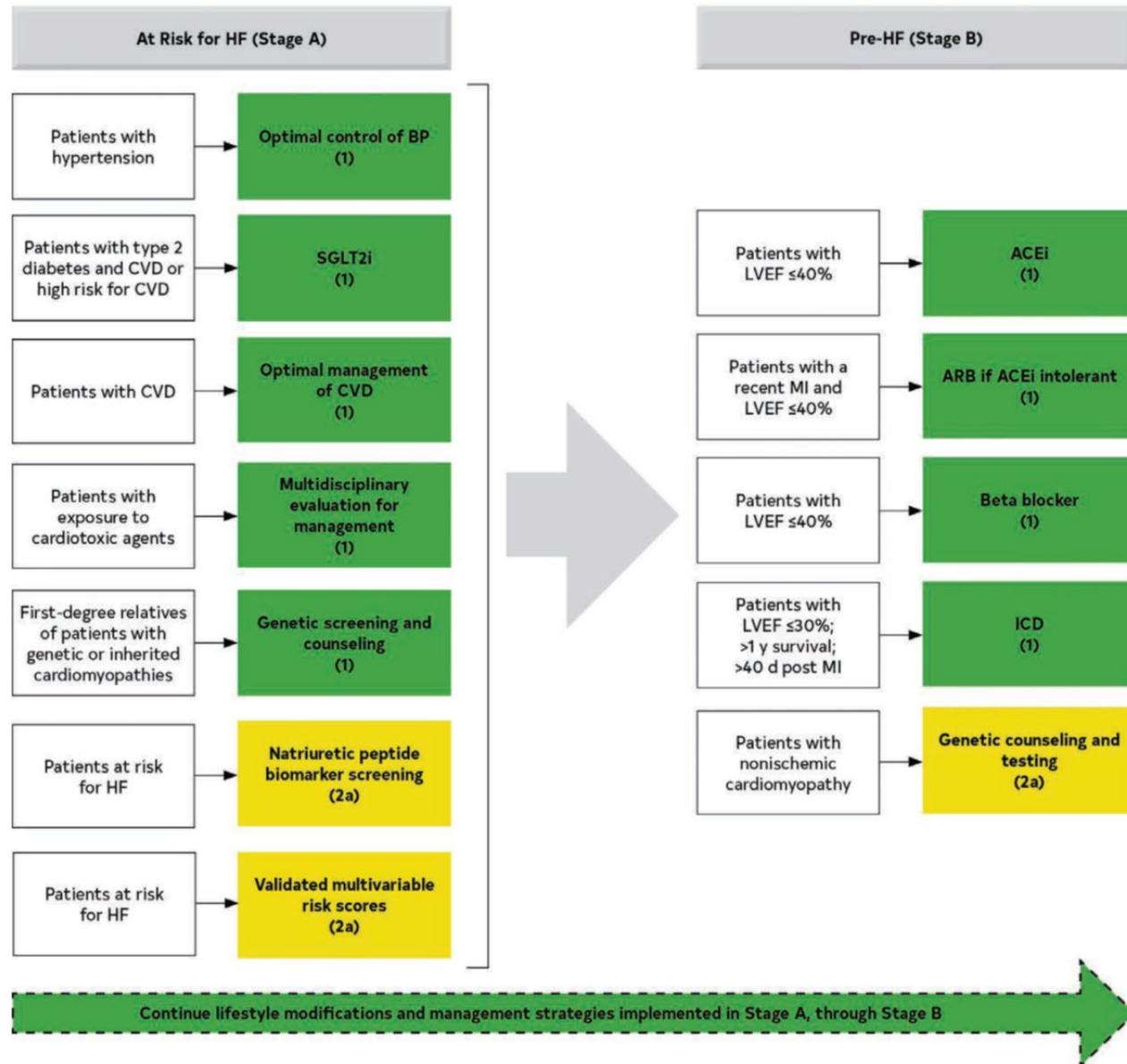
## Causes of HF

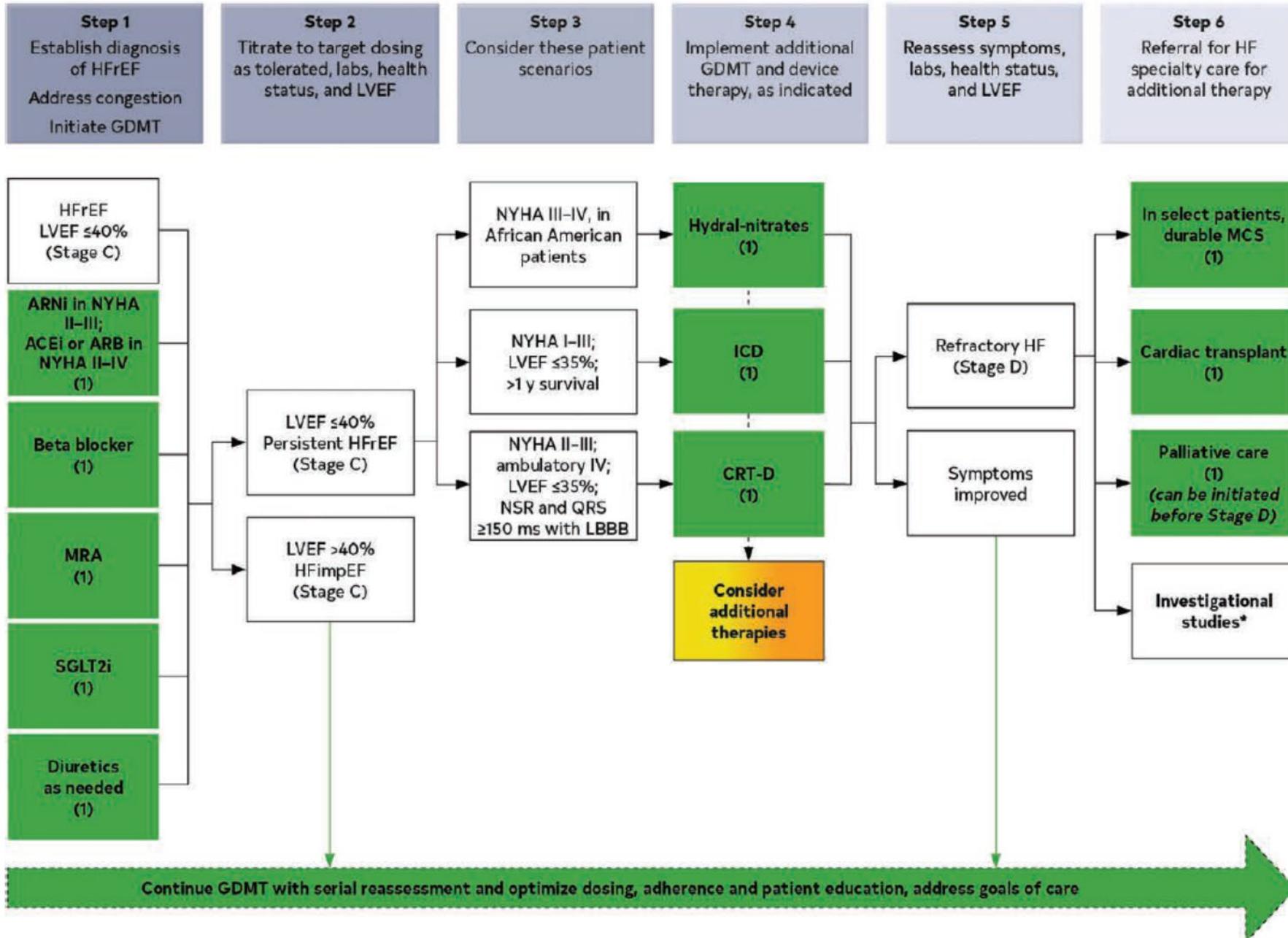
- Ischemia, myocardial infarction
- Chemotherapy and other cardiotoxic medications
- Rheumatologic or autoimmune
- Endocrine or metabolic (thyroid, acromegaly, pheochromocytoma, diabetes, obesity)
- Familial cardiomyopathy or inherited and genetic heart disease
- Heart rhythm–related (e.g., tachycardia-mediated, PVCs, RV pacing)
- Hypertension
- Infiltrative cardiac disease (e.g., amyloid, sarcoid, hemochromatosis)
- Myocarditis (infectious, toxin or medication, immunological, hypersensitivity)
- Peripartum cardiomyopathy
- Stress cardiomyopathy (Takotsubo)
- Substance abuse (e.g., alcohol, cocaine, methamphetamine)
- Others

# Common Factors Precipitating HF Hospitalization

- Acute coronary syndrome
- Uncontrolled hypertension
- AF and other arrhythmias
- Additional cardiac disease (e.g. endocarditis)
- Acute infections
- Nonadherence with medication regimen or dietary intake
- Anemia
- Hyper- or hypothyroidism
- Medications that increase sodium retention (e.g. NSAID)
- Medications with negative inotropic effect (e.g. verapamil)

# ***Pharmacological and Device Therapy***





# ACE Inhibitors Used in Clinical Trials

Generic Name	Initial Daily Dose	Target Dose	Mean Dose in Clinical Trials
Captopril	6.25 mg tid	50 mg tid	122.7 mg/day
Enalapril	2.5 mg bid	10 mg bid	16.6 mg/day
Fosinopril	5-10 mg qd	80 mg qd	N/A
Lisinopril	2.5-5 mg qd	20 mg qd	4.5 mg/day, 33.2 mg/day
Quinapril	5 mg bid	80 mg qd	N/A
Ramipril	1.25-2.5 mg qd	10 mg qd	N/A
Trandolapril	1 mg qd	4 mg qd	N/A

# Angiotensin Receptor Blockers Used in Clinical Trials

<b>Generic Name</b>	<b>Initial Daily Dose</b>	<b>Target Dose</b>	<b>Mean Dose in Clinical Trials</b>
<b>Candesartan</b>	<b>4-8 mg qd</b>	<b>32 mg qd</b>	<b>24 mg/day</b>
<b>Losartan</b>	<b>12.5-25 mg qd</b>	<b>150 mg qd</b>	<b>129 mg/day</b>
<b>Valsartan</b>	<b>40 mg bid</b>	<b>160 mg bid</b>	<b>254 mg/day</b>

# Sacubitril-valsartan Used in Clinical Trials

<b>Initial Daily Dose</b>	<b>Target Dose</b>	<b>Mean Dose in Clinical Trials</b>
49 mg sacubitril and 51 mg valsartan twice daily  (may be initiated at 24 mg sacubitril and 26 mg valsartan twice daily)	97 mg sacubitril and 103 mg valsartan twice daily	182 mg sacubitril and 193 mg valsartan total daily

# Beta Blockers Used in Clinical Trials

Generic Name	Initial Daily Dose	Target Dose	Mean Dose in Clinical Trials
Bisoprolol	1.25 mg once daily	10 mg once daily	8.6 mg total daily
Carvedilol	3.125 mg twice daily	25–50 mg twice daily	37 mg total daily
Carvedilol CR	10 mg once daily	80 mg once daily	NA
Metoprolol succinate extended release (metoprolol CR/XL)	12.5–25 mg once daily	200 mg once daily	159 mg total daily

# SGLT2i Used in Clinical Trials

Generic Name	Initial Daily Dose	Target Dose	Mean Dose in Clinical Trials
Dapagliflozin	10 mg once daily	10 mg once daily	9.8 mg total daily
Empagliflozin	10 mg once daily	10 mg once daily	10 mg once daily

# Fixed Dose Isosorbide dinitrate and hydralazine Used in Clinical Trial

Generic Name	Initial Daily Dose	Target Dose	Mean Dose in Clinical Trials
Fixed dose combination	20 mg isosorbide dinitrate and 37.5 mg hydralazine 3 times daily	40 mg isosorbide dinitrate and 75 mg hydralazine 3 times daily	90 mg isosorbide dinitrate and ~175 mg hydralazine total daily

# Mineralocorticoid receptor antagonists used in Clinical Trials

Generic Name	Initial Daily Dose	Target Dose	Mean Dose in Clinical Trials
Spironolactone	12.5–25 mg once daily	25–50 mg once daily	26 mg total daily
Eplerenone	25 mg once daily	50 mg once daily	42.6 mg total daily

# Diuretics and Decongestion Strategies in Patients With HF

In patients with HF who have fluid retention, diuretics are recommended to relieve congestion, improve symptoms, and prevent worsening HF. (1)

Drug	Initial Daily Dose	Maximum Total Daily Dose	Duration of Action
Loop diuretics			
Bumetanide	0.5–1.0 mg once or twice	10 mg	4–6 h
Furosemide	20–40 mg once or twice	600 mg	6–8 h
Torsemide	10–20 mg once	200 mg	12–16 h
Thiazide diuretics			
Chlorthiazide	250–500 mg once or twice	1000 mg	6–12 h
Chlorthalidone	12.5–25 mg once	100 mg	24–72 h
Hydrochlorothiazide	25 mg once or twice	200 mg	6–12 h
Indapamide	2.5 mg once	5 mg	36 h
Metolazone	2.5 mg once	20 mg	12–24 h

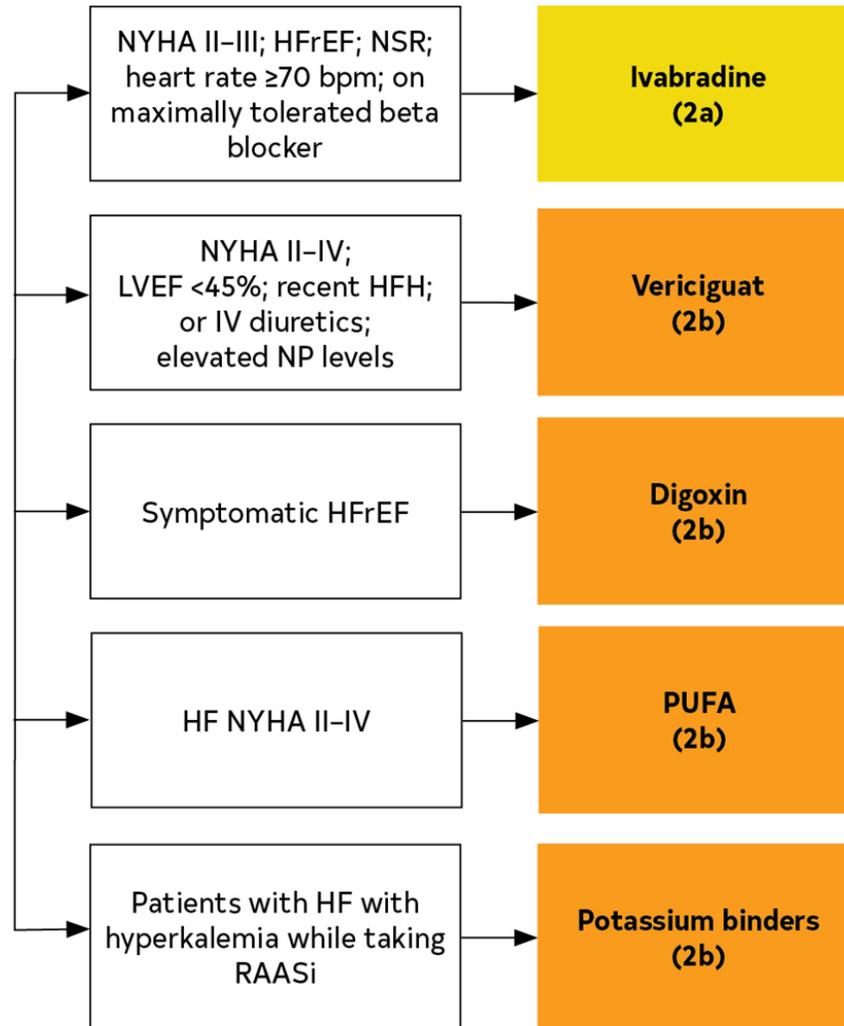
## Other Recommendations

- For patients with stage C HF, avoiding excessive sodium intake is reasonable to reduce congestive symptoms. Restrict daily salt intake to 1800 mg or less.
- In patients with HFrEF, nondihydropyridine calcium channel-blocking drugs are not recommended.
- In patients with HFrEF, class IC antiarrhythmic medications and dronedarone may increase the risk of mortality.

## Other Recommendations

- In patients with HFrEF, thiazolidinediones increase the risk of worsening HF symptoms and hospitalizations.
- In patients with type 2 diabetes and high cardiovascular risk, the dipeptidyl peptidase-4 (DPP-4) inhibitors saxagliptin and alogliptin increase the risk of HF hospitalization and should be avoided in patients with HF.
- In patients with HFrEF, NSAIDs worsen HF symptoms and should be avoided or withdrawn whenever possible.

## Consider Additional Therapies Once GDMT Optimized



## Ivabradine dosage

- **Starting dose= 5mg po BID with meals**
- Target- resting heart rate of 50-60 bpm
- Assess after 2 weeks
  
- **Maximum dose= 7.5mg Po BID**
- Titrated up in 2 to 4 weeks
  
- **Reduce starting dose= 2.5mg po BID**
- History of conduction defects
- Brady cardia could lead to hemodynamic compromise
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# Device Therapy: Prophylactic ICD Placement

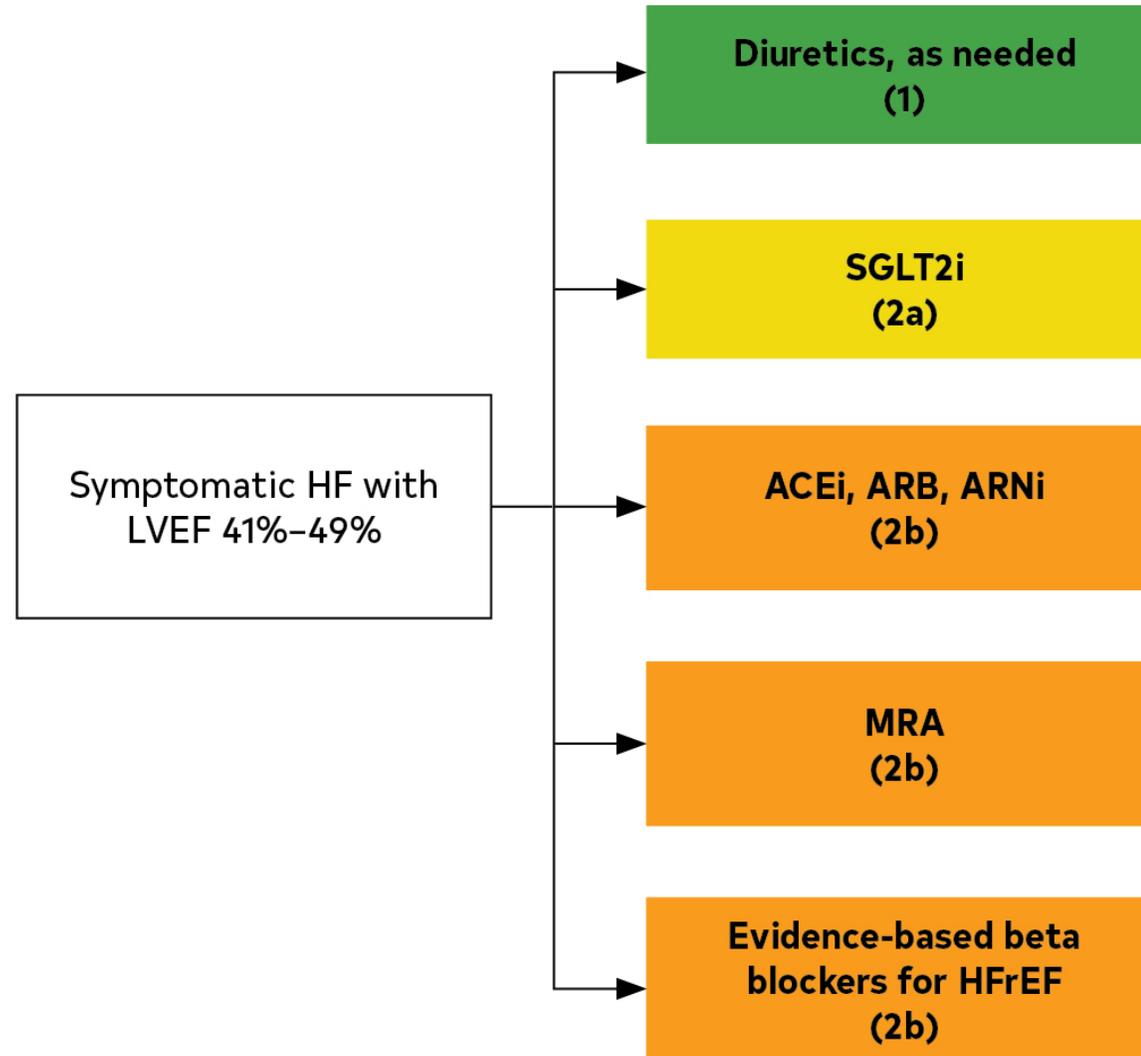
- Should be considered in patients with EF  $\leq 35\%$  and mild to moderate HF symptoms
- In patients who are undergoing implantation of a biventricular pacing device, use of a device that provides defibrillation should be considered
- After 3-6 mos. of optimal medical therapy

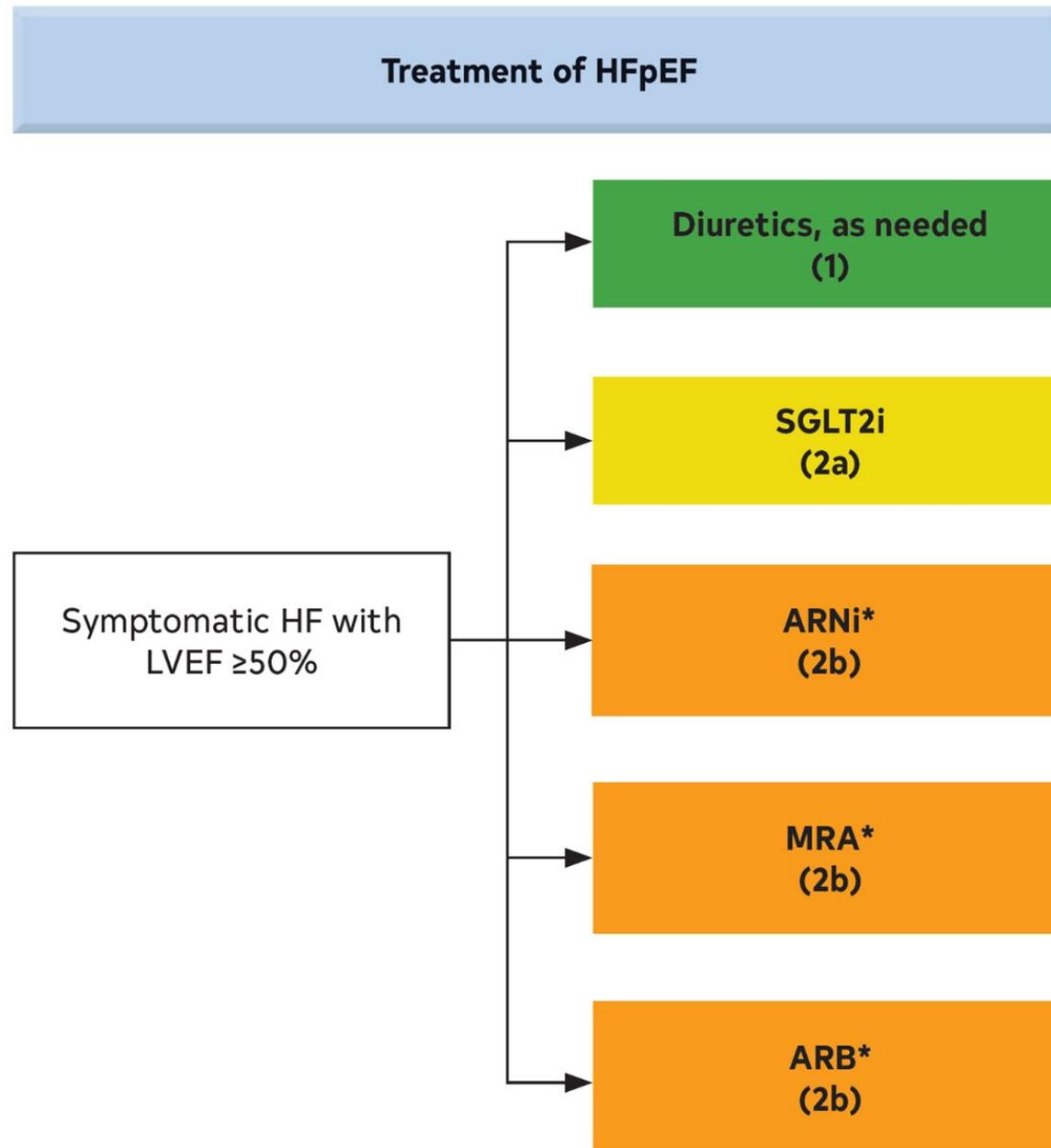
# Device Therapy: Biventricular Pacing

**Biventricular pacing therapy is recommended for patients with *all of the following*:**

- Sinus rhythm
- LBBB
- A widened QRS interval ( $\geq 150$  ms)
- Severe LV systolic dysfunction (LVEF  $\leq 35\%$ )
- Persistent symptoms of HF (NYHA II - IV) despite optimal medical therapy

## Treatment of HFmrEF





# Management of Comorbidities in HF Patients

- In patients with HFrEF and iron deficiency with or without anemia, intravenous iron replacement is reasonable to improve functional status and QOL.
- In patients with HFrEF and hypertension, uptitration of GDMT to the maximally tolerated target dose is recommended.
- In patients with HF and type 2 diabetes, the use of SGLT2i is recommended for the management of hyperglycemia and to reduce HF related morbidity and mortality.

# Management of Comorbidities in HF Patients

- In patients with HF and suspicion of sleep-disordered breathing, a formal sleep assessment is reasonable to confirm the diagnosis and differentiate between obstructive and central sleep apnea.
- In patients with HF and obstructive sleep apnea, continuous positive airway pressure may be reasonable to improve sleep quality and decrease daytime sleepiness.

# Stage D (Advanced) HF

Timely referral for HF specialty care is recommended to review HF management and assess suitability for advanced HF therapies (LVAD, cardiac transplantation, palliative care, and palliative inotropes) when consistent with the patient's goals of care.

# Activity, Exercise Prescription, and Cardiac Rehabilitation

Exercise training (or regular physical activity) is recommended to improve functional status, exercise performance, and QOL

Cardiac rehabilitation program can be useful to improve functional capacity, exercise tolerance, and health-related QOL

# Hospitalizations Can Be Prevented

Follow up appointment within 7 days of discharge

Multidisciplinary approach

Education

Utilization of evidence-based treatments

Improved outpatient care

Treat precipitating factors and comorbid conditions

Screening for depression, social isolation, frailty, and low health literacy as risk factors for poor self-care is reasonable to improved management

Goals of Care discussion

**2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines (Circ. 2022)**

**2023 ACC Expert Consensus Decision Pathway on Management of Heart Failure With Preserved Ejection Fraction (JACC May 9, 2023)**

# Thank you

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