

# Guidelines for the Management of Heart Failure

## Clinical Practice Guideline MedStar Health

These guidelines are provided to assist physicians and other clinicians in making decisions regarding the care of their patients. They are not a substitute for individual judgment brought to each clinical situation by the patient’s primary care provider-in collaboration with the patient. As with all clinical reference resources, they reflect the best understanding of the science of medicine at the time of publication but should be used with the clear understanding that continued research may result in new knowledge and recommendations.

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## INTRODUCTION

The MedStar Ambulatory Best Practice Committee endorses the 2022 AHA/ACC/HFSA Guideline for the Management of Heart Failure. Below is a synopsis of the recommendations pertinent to outpatient primary care. Physicians and other treating providers are encouraged to review the primary document for a better understanding of this summary and endorsement.

Where applicable, the class and level of evidence is included after the recommendation. The ACC/AHA guide for grading evidence is detailed in Table 1 and Table 2.

<b>Table 1</b> <b>Strength of Recommendation</b>
<b>Class 1 (Strong)</b> Benefit >>>>>Risk
<b>Class 2a (Moderate)</b> Benefit >> Risk
<b>Class 2b (Weak)</b> Benefit >/= Risk
<b>Class 3: No Benefit (Moderate)</b> Benefit = Risk
<b>Class 3: Harm (Strong)</b> Risk > Benefit

<b>Table 2</b> <b>Quality of Evidence</b>
<b>Level A</b> - High quality evidence from more than 1 RCT - Meta-analyses of high-quality RCTs
<b>Level B-R (Randomized)</b> - Moderate-quality evidence from 1 or more RCT - Meta-analysis of moderate-quality RCTs
<b>Level B-NR (Non-Randomized)</b> - Moderate-quality evidence from 1 or more well designed, well executed nonrandomized studies, observational studies, or registry studies - Meta-analysis of such studies
<b>Level C-LD (Limited Data)</b> - Randomized or non-randomized observational or registry studies with limitations of design or execution - Meta-analysis of such studies - Physiological or mechanistic studies in humans
<b>Level C-EO (Expert Opinion)</b> - Consensus of expert opinion based on clinical experience

## DEFINITIONS

- **AHA/ACC/HFSA Stages of Heart Failure**

- Stage A: At high risk for HF (hypertension, coronary artery disease, diabetes, metabolic syndrome, family history or genetic variant for cardiomyopathy) but has no symptoms and no structural or laboratory evidence of heart failure.
- Stage B: Asymptomatic, but with at least one of the following: structural heart disease on imaging, evidence of increased filling pressures, or elevated BNP or persistently elevated cardiac troponin in the absence of another cause.
- Stage C: Has structural heart disease with prior or current symptoms.
- Stage D: Advanced heart failure, characterized by symptoms interfering with daily life and recurrent hospitalizations despite attempts to optimize GDMT.

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- **NYHA Functional Classification**

- Class I: No limitation of physical activity. Ordinary physical activity does not cause symptoms of HF.
- Class II: Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in symptoms of HF.
- Class III: Marked limitation of physical activity. Comfortable at rest, but less than ordinary activity causes symptoms of HF.
- Class IV: Unable to perform any physical activity without symptoms of HF, or symptoms of HF at rest.

- **Left Ventricular Ejection Fraction (LVEF) Classification (see Figure 1)**

- HFrEF: Heart failure with reduced ejection fraction
- HFmrEF: Heart failure with mildly reduced ejection fraction
- HFpEF: Heart failure with preserved ejection fraction
- HFimpEF: Heart failure with improved ejection fraction

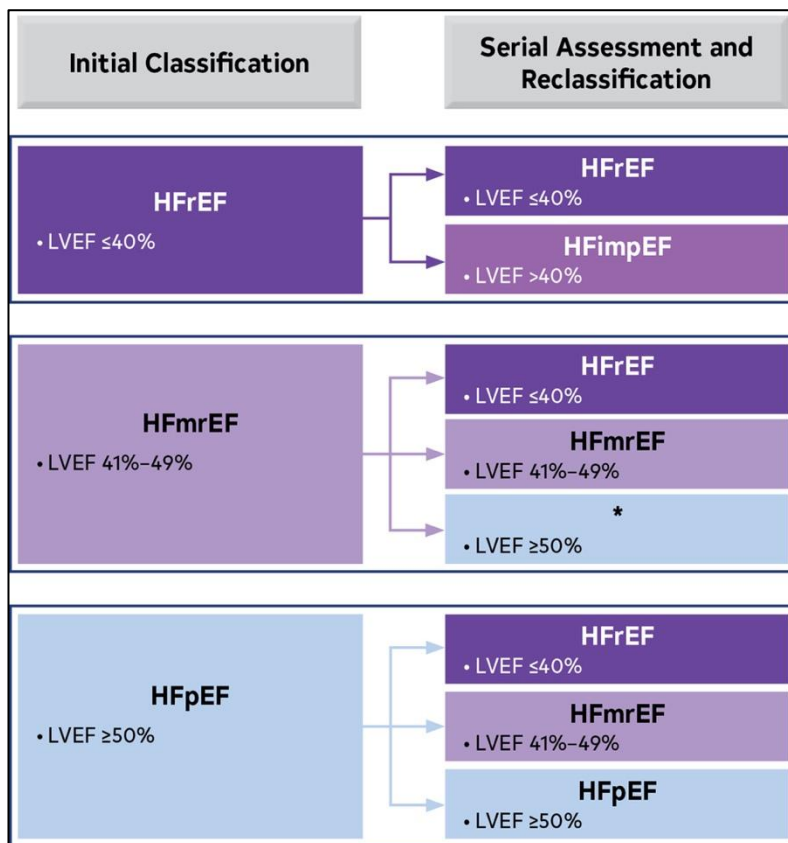


FIGURE 1: CLASSIFICATION OF HF BY LVEF  
<https://www.ahajournals.org/doi/10.1161/CIR.0000000000001063>

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## DIAGNOSIS OF HEART FAILURE

- The history and exam are critical elements of the assessment of patients with both possible and confirmed heart failure. A detailed family history can reveal inherited cardiomyopathies, and a detailed social history and timeline of the presenting symptoms can reveal the reasons why a patient has developed new heart failure. Important exam findings include jugular venous distension, orthopnea, bendopnea, and leg edema. These exam findings not only support the diagnosis of heart failure, but they have important prognostic implications and directly correlate with quality-of-life measures.
- Testing
  - Electrocardiography should be done at the initial encounter (*Class 1, Level C-EO*)
  - In patients with suspected or new-onset heart failure, or presenting with decompensated heart failure, chest x-ray should be obtained to assess heart size, pulmonary congestion, and to detect alternative cardiac, pulmonary, or other diseases that may cause symptoms. (*Class 1, Level C-LD*)
  - Lab work to support HF diagnosis
    - Natriuretic Peptide (NT-proBNP or BNP)
      - Elevations provide evidence of increased LV filling pressures. In the ambulatory setting, measurement of natriuretic peptide levels can assist diagnostic judgement when physical exam is equivocal.
      - Obesity will cause lower levels of measurements.
      - There is insufficient evidence to support using natriuretic peptide measurements to monitor treatment response.
      - In patients with chronic HF, measurements of natriuretic peptide are recommended for risk stratification. (*Class 1, Level A*)
    - Troponin
  - Transthoracic Echocardiography
    - In patients with suspected or newly diagnosed heart failure, transthoracic echocardiography should be performed during initial evaluation. (*Class 1, Level C-LD*)
    - In patients for whom transthoracic echocardiography is inadequate, consider cardiac MRI or cardiac CT to assess EF. (*Class 1, Level C-LD*)
    - In patients with heart failure and without clinical status change, treatment interventions that might have changed cardiac function, or candidacy for invasive procedures, routine repeat assessment of LV function is not indicated. (*Class3: No Benefit, Level C-EO*)
- Other tests which help determine cause of HF and direct future therapies
  - Obtain the following labs to optimize management (*Class 1, Level C-EO*)
    - Complete blood count
    - Urinalysis
    - Glucose
    - Lipid profile
    - Serum electrolytes

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- Renal profile
- Iron studies
- Thyroid stimulating hormone
- Invasive hemodynamic measurements can be useful in selected patients with persistent or worsening symptoms, signs, diagnostic parameters, and in who hemodynamics are uncertain. (Class 2a, Level C-EO). Routine use is not recommended.
- Exercise stress testing
  - Can be helpful if diagnosis is uncertain

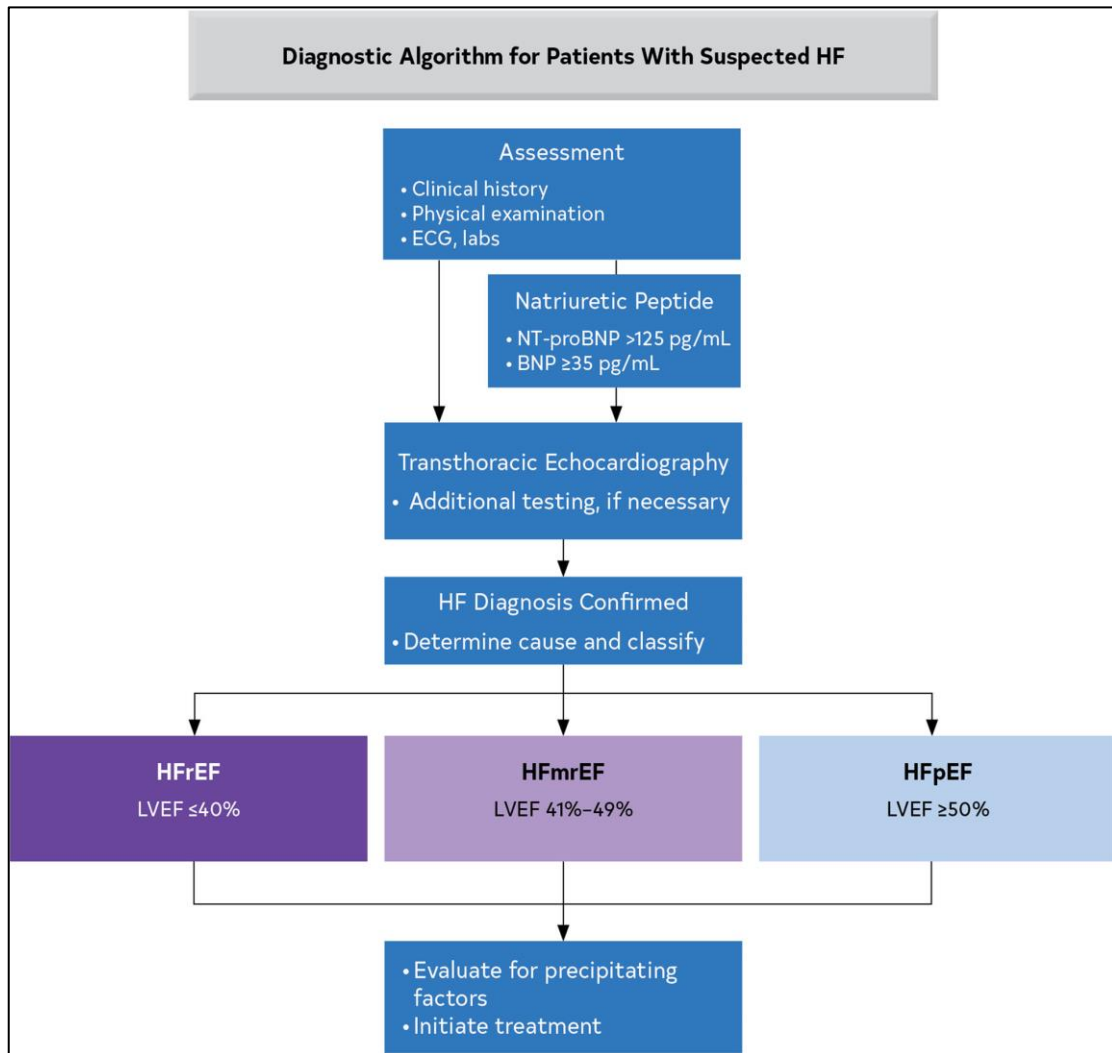


Figure 2: Algorithm for HF diagnosis  
<https://www.ahajournals.org/doi/10.1161/CIR.0000000000001063>

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## GUIDELINE DIRECTED MEDICAL THERAPY

- Renin-angiotensin system inhibition
  - Angiotensin receptor-neprilysin inhibitors (ARNi)
  - Angiotensin-converting enzyme inhibitors (ACEi)
  - Angiotensin II receptor blockers (ARB)
- Beta blockers
- Mineralocorticoid receptor antagonists (MRA)
- Sodium glucose cotransporter-2 inhibitors (SGLT2i)

## MANAGEMENT OF HEART FAILURE

- **Stage A**
  - Support primary prevention of heart failure with lifestyle modification, screening, and medical management of risk-increasing conditions.
  - For patients with hypertension, target BP goal is less than 130/80 if the CVD risk is over 10%. (*Class 1, Level A*)
  - For patients with diabetes and CVD, use an SGLT2i. (*Class 1, Level A*)
  - Recommend adherence to a Mediterranean, whole grain, plant-based diet and DASH diet – this may provide some protection against heart failure development.
- **Stage B**
  - Continue to manage comorbidities and counsel on lifestyle modification to prevent further progression to symptomatic heart failure.
  - In patients with EF less than or equal to 40%, it is recommended to treat with ACEi. (*Class 1, Level A*) If ACEi is not tolerated, treat with ARB. (*Class 1, Level B-R*)
  - In patients with EF less than or equal to 40%, it is recommended to treat with beta blocker. (*Class 1, Level B-R*)
  - In patients with a history of MI or ACS, treat with a statin.
  - In patients at least 40 days post-MI with NYHC class I symptoms whose EF is less than or equal to 30%, and whose life expectancy is over one year, ICD is recommended to prevent sudden cardiac death. (*Class 1, Level B-R*)
  - Avoid use of thiazolidinediones in patients with LVEF < 50%. (*Class 3, Level B-R*)
  - Avoid use of nondihydropyridine calcium channel blockers in patients with LVEF < 50%. (*Class 3, Level C-LD*)
- **Stage C**
  - Nonpharmacological interventions
    - The ACC recommends that patients with Stage C heart failure receive care from a multidisciplinary team that includes cardiologists, nurses, pharmacists, dieticians, mental health clinicians, social workers, and primary care. (*Class 1, Level A*)

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- Recommend influenza, pneumococcal, and COVID-19 vaccinations. (*Class 2a, Level B-NR*)
- Screen for depression, cognitive impairment, substance use disorders, and frailty and treat where appropriate. (*Class 2a, Level B-NR*)
- Screen for food insecurity, intimate partner violence, low health literacy, social isolation, housing insecurity, and transportation barriers and provide resources and interventions where appropriate.
- The AHA recommends reducing sodium to less than 2300 mg per day for heart health, but this is based on low quality or insufficient data. If adhering to a low sodium diet, monitor overall diet for quality and recommend DASH diet plans. (*Class 2a, Level C-LD*)
- Recommend regular exercise for patients with heart failure (*Class 1, Level A*) and refer to formal cardiac rehabilitation after heart failure decompensation. (*Class 2a, Level B-NR*)
- Pharmacological treatments
  - Diuretics
    - Use a loop diuretic (bumetanide, furosemide, or torsemide) to relieve congestion, improve symptoms, and prevent worsening of heart failure. (*Class 1, Level B-NR*)
    - Consider adding metolazone or chlorothiazide if patient is not responsive to loop diuretic alone, but monitor electrolytes and renal function closely. (*Class 1, Level B-NR*)
  - RAS inhibitors
    - In patients with HFrEF and NYHA class II to III symptoms, use an ARNi. If ARNi is not feasible, use ACEi. If ACEi causes adverse symptoms, use ARB. (*Class 1, Level A*)
    - If a patient with chronic symptomatic HFrEF and NYHA class II or III symptoms is on an ACEi or ARB, replace this with an ARNi if feasible. (*Class 1, Level B-R*)
    - Do not administer ARNi within 36 hours of the last dose of ACEi, and do not administer both drug classes together. (*Class 3: Harm, Level B-R*)
  - Beta Blockers
    - In patients with HFrEF, with current or prior symptoms, use one of the following beta blockers: bisoprolol, carvedilol, or sustained-release metoprolol succinate. (*Class 1, Level A*)
  - Mineralocorticoid Receptor Antagonists
    - In patients with HFrEF and NYHA class II to IV symptoms, use an MRI (spironolactone or eplerenone) if eGFR is over 30 mL/min/1.73 m<sup>2</sup> and serum potassium is less than 5 mEq/L. (*Class 1, Level A*)
    - Monitor serum potassium and renal function regularly after initiating MRA.
    - Discontinue MRA if serum potassium cannot be maintained under 5.5 mEq/L. (*Class 3, Level B-NR*)

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- Sodium Glucose Cotransporter 2 Inhibitors
  - In patients with symptomatic chronic HFrEF, SGLT2i are recommended, irrespective of the presence or absence of type 2 diabetes. *(Class 1, Level A)*
- Hydralazine and Isosorbide Dinitrate
  - In patients who self-identify as African American and who are still symptomatic despite use of ACEi or ARB, beta blockers, and MRA, consider adding hydralazine and isosorbide dinitrate. *(Class 1, Level A)*
  - In any patient who is unable to tolerate first-line agents (ACEi, ARB, or ARNi), consider hydralazine and isosorbide dinitrate therapy. *(Class 2b, Level C-LD)*
- Other drug treatments:
  - In patients with HF class II to IV symptoms, it may be reasonable to use an omega-3 polyunsaturated fatty acid (PUFA) supplement. *(Class 2b, Level B-R)*
  - In patients with HFrEF and NYHA class II to III symptoms who are on GDMT with a beta blocker at maximum tolerated dose, who are in sinus rhythm with a heart rate over 70 at rest, can use ivabradine to reduce hospitalizations and death. *(Class 2a, Level B-R)*
  - In patients with symptomatic HFrEF despite GDMT, or unable to tolerate GDMT, can consider digoxin to decrease hospitalizations. *(Class 2b, Level B-R)*
  - In high-risk patients with HFrEF and recent worsening of HF already on GDMT, can consider vericiguat to reduce hospitalization and death. *(Class 2b, Level B-R)*
  - In patients with hyperkalemia on RAS inhibiting medication, it is uncertain if potassium binders are effective. *(Class 2b, Level B-R)*
  - Anticoagulation is not recommended for patients with chronic HFrEF who do not have a specific indication (e.g., venous thromboembolism, atrial fibrillation). *(Class 3: No Benefit, Level B-R)*
  - Drugs with no known benefit in heart failure include dihydropyridine calcium channel blockers *(Class 3: No Benefit, Level A)*, and vitamins, nutritional supplements, and hormonal therapies other than to correct specific deficiencies. *(Class 3: No Benefit, Level B-R)*
  - Drugs that may worsen heart failure include nondihydropyridine calcium channel blockers, class IC antiarrhythmic medications, thiazolidinediones, dipeptidyl peptidase-4 (DPP-4), and NSAIDs. *(Class 3: Harm, Level A to Level B-R)*
- When using ACEi, ARB, ARNi, beta blocker, MRA, and isosorbide dinitrate/hydralazine, start at lower doses and titrate medications upward toward target doses as tolerated. See supplemental pharmacy guide for target dose ranges. *(Class 1, Level A)*. Can adjust medications as often as every 1-2 weeks depending on patient tolerance. *(Class 2a, Level C-EO)*

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- Devices and Interventions
  - ICD therapy candidates
    - Patients with nonischemic dilated cardiomyopathy with LVEF less than 35%, NYHA class II or III symptoms on chronic GDMT, with survival expected over one year. *(Class I, Level A)*
    - Patients with ischemic heart disease, at least 40 days post-MI, with LVEF less than 35%, NYHA class II or III symptoms on chronic GDMT, with survival expected over one year. *(Class I, Level B-R)*
  - Cardiac resynchronization therapy candidates
    - Patients with LVEF less than 35% in sinus rhythm with a left bundle branch block and QRS duration over 150 ms. and NYHA class II, III, or IV symptoms on GDMT. *(Class I, Level B-R)*
    - Patients with LVEF less than 35% in sinus rhythm with a non-left bundle branch block pattern and a QRS over 150 ms. and NYHA class II, III or IV symptoms on GDMT. *(Class 2a, Level B-R)*
    - Patients with high degree or complete heart block and LVEF 36% to 50%. *(Class 2a, Level B-R)*
    - Patients with LVEF less than 35% in sinus rhythm with a left bundle branch block and QRS duration between 120-149 ms. and NYHA class II, III, or IV symptoms on GDMT. *(Class 2a, Level B-NR)*
    - Patients with atrial fibrillation and LVEF less than 35% on GDMT can be considered if the patient requires ventricular pacing or otherwise meets criteria, and atrioventricular node ablation or pharmacological rate control will allow near 100% pacing. *(Class 2a, Level B-NR)*
    - Patients with genetic arrhythmogenic cardiomyopathy with high-risk features for sudden death with EF less than 45%. *(Class 2a, Level B-NR)*
    - Patients with LVEF less than 35% in sinus rhythm with a non-left bundle branch block pattern and a QRS duration between 120-149 ms. and NYHA class II, III or IV symptoms on GDMT. *(Class 2b, Level B-NR)*
    - Patients with LVEF less than 30%, ischemic heart failure, in sinus rhythm, with left bundle branch block and QRS over 150 ms. with NYHA class 1 symptoms on GDMT. *(Class 2b, Level B-NR)*
    - CRT is not recommended for patients that have a QRS less than 120 ms. *(Class 3: No Benefit, Level B-R)*
    - CRT is not recommended for patients with NYHA class I or II symptoms and non-LBBB pattern with QRS less than 150 ms. *(Class 3: No Benefit, Level B-NR)*

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- CRT is not recommended for patients with life expectancy less than 1 year. (*Class 3: No Benefit, Level C-LD*)
  - Revascularization
    - In selected patients with HFrEF with EF less than 35% and suitable cardiac anatomy, surgical revascularization plus GDMT is beneficial to improve symptoms, hospitalizations, and long-term mortality. (*Class 1, Level B-R*)
- **Stage D**
  - Timely referral to heart failure specialty care is recommended, if in line with the patient’s goals of care, to review management and assess candidacy for advanced heart failure therapies. (*Class 1, Level C-LD*)
  - I-NEED-HELP Acronym for Referral to Advanced Heart Failure
    - I: Intravenous inotropes
    - N: NYHA Class IIIB to IV symptoms, or persistently elevated natriuretic peptides
    - E: End organ dysfunction
    - E: EF less than 35%
    - D: Defibrillator shocks
    - H: Hospitalizations > 1
    - E: Edema despite escalating diuretics
    - L: Low systolic BP less than 90, or high heart rate
    - P: Prognostic medications: progressive intolerance or down-titration of GDMT
  - Treatment
    - Nonpharmacological Interventions
      - For patients with advanced HF and hyponatremia, the benefit of fluid restriction to reduce congestive symptoms is uncertain. (*Class 2b, Level C-LD*)
    - Pharmacological Treatments
      - Inotropes
        - In patients with Stage D HF refractory to GDMT and device therapy who are eligible for and awaiting MCS or cardiac transplantation, continuous intravenous inotropic support is reasonable as “bridge therapy”. (*Class 2a, Level B-NR*)
        - In patients with Stage D HF despite GDMT and device therapy who are ineligible for either MCS or cardiac transplantation, continuous intravenous inotropic support may be considered as a palliative therapy for symptom control. (*Class 2b, Level B-NR*)
        - In patients with HF, long term use of either continuous or intermittent intravenous inotropic support for reasons other than palliative care or as a bridge to advanced therapies is potentially harmful. (*Class 3: Harm, Level B-R*)

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- Devices and Other Interventions
  - Mechanical Circulatory Support (MCS)
    - In select patients with advanced HFrEF with NYHA Class IV symptoms who are dependent on continuous intravenous inotropes or temporary MCS, durable LVAD implantation is effective to improve functional status, quality of life, and survival. (*Class 1, Level A*)
    - In select patients with advanced HFrEF who have NYHA class IV symptoms despite GDMT, durable MCS can be beneficial to improve symptoms, improve functional status, and reduce mortality. (*Class 2a, Level B-R*)
    - In patients with advanced HFrEF and hemodynamic compromise and shock, temporary MCS, including percutaneous and extracorporeal ventricular assist devices, and reasonable as a “bridge to recovery” or a “bridge to decision”. (*Class 2a, Level B-NR*)
  - Cardiac transplantation
    - For selected patients with advanced HF despite GDMT, cardiac transplantation is indicated to improve survival and quality of life. (*Class 1, Level C-LD*)
- Heart failure exacerbation
  - Causes include new myocardial ischemia, pulmonary emboli, systemic infection, uncontrolled comorbid conditions, medications (i.e., NSAIDs), dietary indiscretion, substance use, and many other possibilities.
  - In patients with heart failure who have had a significant clinical change, or who have received GDMT and are being considered for advanced therapies, repeat measurement of EF, degree of structural remodeling, and valve function is clinically useful. (*Class 1, Level C-LD*)
- In patients with improved EF after treatment, continue GDMT to prevent relapse of HF and LV dysfunction, even in patients who are asymptomatic. (*Class 1, Level B*)

## PRIMARY CARE FOR PATIENTS WITH LVAD

- Overview
  - As LVAD outcomes continue to improve, primary care providers will more frequently encounter patients with LVAD in clinic. It is therefore important for primary care providers to have knowledge of both routine care and LVAD emergencies.
  - HeartWare/HVAD, Heartmate II and Heartmate 3 may all be seen in the community. The Heartmate 3 is the only FDA approved third generation device currently implanted.
- Ambulatory vital signs
  - Blood pressure: Can be estimated manually by a Doppler ultrasound probe and brachial blood pressure cuff, the cuff is inflated to block the brachial flow, then inflated 20 mmHg higher. Slowly

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the pressure is released, and the pressure at which brachial flow returns is the “opening pressure”. If the patient has a consistent and strong pulse, this is the systolic blood pressure. If the pulse is intermittent or absent (most cases), this is likely an estimate of the patient’s mean arterial pressure (MAP).

- MAP goal is 60-80 mmHg
    - MAP over 90 indicates need for intervention, as increased pressure greatly increases the risk for stroke and pump thrombosis. High blood pressures can also trigger low flow alarms.
  - Heart rate: Best measured by ECG or telemetry
- Emergencies
  - Gastrointestinal bleeding: Melena or other overt bleeding is concerning for arteriovenous malformation in the gastrointestinal tract, a common complication of LVAD use.
  - Drive line infection: Any signs or symptoms of infection should be urgently communicated with the implanting LVAD center.
  - Stroke: Treat per usual stroke protocols – activate Code Stroke or emergently transport the patient to nearest stroke center.
- Non-pharmacological
  - Driveline care: Patients should use proper hand hygiene, sterile gloves, antiseptic cleansing solutions, and sterile dressings regularly.
  - Oral health: Recommend regular dentist visits and regular toothbrushing and flossing. Anticoagulation should not be discontinued for dental procedures. Many centers recommend antibiotic prophylaxis similar to that for patients with prosthetic valves, although there is no specific guideline.
  - Driving and air travel are safe for LVAD patients after they are cleared by their LVAD team.
- Pharmacological
  - Coumadin is recommended for all LVAD patients to reduce the risk of blood clots, with a goal INR of 2.0 to 3.0.
    - Note that the HeartMate 3 has lower incidence of pump thrombosis, and there are current trials testing safety of an INR goal of 1.5-1.9.
    - Some patients who have developed bleeding complications will be on reduced or no anticoagulation.
  - Aspirin 81 mg daily was recommended to reduce thrombotic complications for the Heartmate 3 devices, but new evidence has reduced this practice. Refer to the ARIES-HM3 trial for more details. (*The ARIES-HM3 Randomized Clinical Trial. JAMA. 2023;330(22):2171–2181*)
  - Aspirin 325 mg daily may be used for the Heartmate II and HeartWare devices.
  - GDMT for heart failure remains important.

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## SPECIAL CIRCUMSTANCES AND COMORBIDITIES

- **Suspected Amyloid**
  - These patients should undergo screening for monoclonal light chains, and if this is negative, they should undergo bone scintigraphy to confirm the presence of transthyretin amyloid. (*Class 1, Level B-R*)
  - Genetic testing should be done to in patients with transthyretin amyloid to differentiate hereditary from wild type. (*Class 1, Level B-R*)
  - In wild type or variant transthyretin amyloid, it is recommended to treat with Tafamadis. (*Class 1, Level B-R*)
  - In patients with amyloid and atrial fibrillation, consider anticoagulation to reduce the risk of stroke regardless of CHA2DS2-VASc score. (*Class 2a, Level C-LD*)
  
- **Familial Cardiomyopathy**
  - Ask patients with heart failure if family members have been told their heart is weak, enlarged, or thick, if they needed a pacemaker or defibrillator, if they were on a heart transplant list, or died suddenly and unexpectedly. (*Class 1, Level B-NR*)
  - Consider referring patients with a suspicious family history to a genetic counselor for pedigree analysis. (*Class 2a, Level B-NR*)
  
- **Valvular Heart Disease**
  - Manage patients with heart failure and valvular heart disease in a multidisciplinary manner. (*Class 1, Level B*)
  - In patients with chronic severe secondary mitral regurgitation and heart failure, optimize GDMT before any intervention for secondary mitral regurgitation. (*Class 1, Level C*)
  - Transcatheter aortic valve replacement (TAVR) for moderate aortic stenosis in patients with HFrEF may not reduce death, disabling stroke, or hospitalizations from heart failure when compared to aortic stenosis surveillance, but it is safe and may improve quality of life. (*TAVR UNLOAD Trial, JACC, 2025 Mar, 85 (9) 878-890.*)
  
- **HFmrEF and HFimpEF**
  - HFmrEF
    - SGLT2i can reduce HF hospitalization and cardiovascular mortality. (*Class 2, Level B*)
    - Use of beta blockers, ARNi, ACEi, or ARB, and MRAs may be considered to reduce risk of HF hospitalization and cardiovascular mortality. (*Class 2, Level B*)
  - HFimpEF
    - In patients with improved EF after treatment, continue GDMT to prevent relapse of HF and LV dysfunction, even if asymptomatic. (*Class 1, Level B*)

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- **HFpEF**
  - SGLT2i can reduce HF hospitalization and cardiovascular mortality. (*Class 2, Level B*)
  - In patients with HFpEF, management of atrial fibrillation can improve symptoms. (*Class 2, Level C*)
  - In selected patients with HFpEF, MRAs and/or ARB/ARNi may decrease hospitalizations, especially in those with LVEF on lower end. (*Class 2, Level B*)
  
- **Iron Deficiency Anemia**
  - In patients with HFrEF and iron deficiency with or without anemia, IV iron replacement is reasonable to improve functional status and quality of life. (*Class 2, Level B*)
  - In patients with HF and anemia, erythropoietin stimulating agents should not be used to improve morbidity and mortality (*Class 3: Harm, Level B*)
  
- **Hypertension**
  - Titrate medications to attain blood pressure targets in accordance with published clinical practice guidelines to prevent morbidity. (*Class 1, Level C*)
  - Up titrate GDMT to maximally tolerated dose. (*Class 1, Level C*)
  
- **Sleep Apnea**
  - In patients with HF and risk factors for sleep disordered breathing, a formal sleep assessment is reasonable to confirm the diagnosis and differentiate between obstructive and central sleep apnea (*Class 2, Level C*)
  - In patients with HF and obstructive sleep apnea, continuous positive airway pressure may be reasonable. (*Class 2, Level B*)
  - In patients with NYHA class II to IV HFrEF and central sleep apnea, adaptive servo-ventilation causes harm (*Class 3: Harm, Level B*)
  
- **Diabetes Type 2**
  - In patients with HF and type 2 diabetes, SGLT2i medications are recommended to manage both hyperglycemia and reduce HF-related morbidity and mortality. (*Class 1, Level A*)
  
- **Atrial Fibrillation**
  - Patients with chronic HF with permanent-persistent-paroxysmal atrial fibrillation and a CHA2DS2-VASc score of over 2 for men and over 3 for women should receive chronic anticoagulant therapy. (*Class 1, Level A*)
  - For patients with chronic HF with permanent-persistent-paroxysmal atrial fibrillation, DOAC is recommended over warfarin in eligible patients. (*Class 1, Level A*)
  - For patients with HF and symptoms caused by atrial fibrillation, ablation is reasonable to improve symptoms. (*Class 2, Level B*)

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- For patients with atrial fibrillation and LVEF over 50%, if a rhythm control strategy fails or is not desired, and ventricular rates remain rapid despite medical therapy, it is reasonable to perform AV node ablation and implant CRT device. *(Class 2, Level B)*
- Patients with chronic HF with permanent-persistent-paroxysmal atrial fibrillation without additional risk factors (low CHA2DS2-VASc), use of chronic anticoagulation therapy is reasonable. *(Class 2, Level B)*

- **Malignancy**

- In patients who develop cancer therapy-related cardiomyopathy or HF, a multidisciplinary discussion involving the patient about the risks and benefits of interruption, discontinuation, or continuation is recommended. *(Class 1, Level B)*
- In patients with asymptomatic cancer therapy related cardiomyopathy and EF less than 50%, use of ARB/ACEi, and beta blockers is reasonable to prevent progression to HF. *(Class 2, Level B)*
- In patients with cardiovascular risk factors or known cardiac disease who are being considered for potentially cardiotoxic cancer therapies, it is reasonable to evaluate cardiac function prior to initiating cancer therapy. These patients should also have periodic monitoring of cardiac function to identify drug induced cardiomyopathy early. *(Class 2, Level B)*
- In patients at risk of cancer therapy related cardiomyopathy, initiation of beta blockers and ACEi/ARB for primary prevention of drug induced cardiomyopathy is of uncertain benefit. *(Class 2, Level B)*
- In patients being considered for potentially cardiotoxic therapies, serial measurement of cardiac troponin might be reasonable to risk stratify. *(Class 2, Level C)*

- **Pregnancy**

- In women with a history of HF or cardiomyopathy, including previous peripartum cardiomyopathy, patient-centered counseling regarding contraception and risks of cardiovascular deterioration during pregnancy should be provided. *(Class 1, Level C)*
- In women with acute HF caused by peripartum cardiomyopathy and LVEF less than 30%, anticoagulation may be reasonable from diagnosis until 6-8 weeks postpartum, although efficacy and safety data are uncertain. *(Class 2, Level C)*
- In women with HF or cardiomyopathy or are pregnant or currently planning for pregnancy, avoid use of ACEi, ARB, ARNi, MRA, SGLT2i, ivabradine, and vericiguat due to significant risk of fetal harm. *(Class 3: Harm, Level C)*

- **Vulnerable Populations and Health Disparities**

- HF risk assessments and multidisciplinary management strategies should target known risks for CVS as well as social determinants of health. *(Class 1, Level C)*
- Evidence of health disparities should be monitored at the individual practice level and health care system levels. *(Class 1, Level C)*

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## SOURCES

- 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. Circulation. Volume 145, Number 18.
- Left Ventricular Assist Devices 101: Shared Care for General Cardiologists and Primary Care. Singhvi A, Trachtenberg B. J Clin Med. 2019 Oct 18;8(10):1720.
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## MEDICATIONS FOR HEART FAILURE

Adapted from Table 1: Guideline Directed Medication Therapy from 2024 ACC Expert Consensus Decision Pathway for Treatment of Heart Failure with Reduced Ejection Fraction

Medication*	Starting Dose	Target Dose	Common Adverse Effects	Additional Clinical Information
<b>Beta Blockers</b>				
Bisoprolol (\$12-68)	1.25mg once daily	10mg once daily	Headache Fatigue	May mask symptoms of hypoglycemia in diabetic patients
Carvedilol <i>Coreg</i> ® (\$3-129)	3.125mg twice daily	Weight <85kg: 25mg twice daily  Weight ≥85kg: 50mg twice daily	Dizziness Fatigue Weight gain Erectile dysfunction	Take with food to decrease risk of orthostatic hypotension May mask symptoms of hypoglycemia in diabetic patients
Metoprolol Succinate <i>Toprol XL</i> ® (\$9-92)	12.5-25mg daily	200mg daily	Dizziness Fatigue Headache Depression	Tartrate form should not be used in heart failure May be split in half but not crushed or chewed Do not discontinue abruptly May mask symptoms of hypoglycemia in diabetic patients
<b>ARNIs</b>				
Sacubitril/valsartan <i>Entresto</i> ® (\$846 – brand only)	24/26mg-49/51mg daily	97/103mg daily	Hyperkalemia Dizziness	Avoid in pregnant patients
<b>ACEIs</b>				
Captopril (\$261)	6.25mg 3x/day	50mg 3x/day	Hyperkalemia Dizziness Angioedema	Take at least 1 hour before meals Avoid in pregnant patients
Enalapril <i>Vasotec</i> ® (\$60-166)	2.5mg twice daily	10-20mg twice daily	Hyperkalemia Dizziness Angioedema	Avoid in pregnant patients
Lisinopril <i>Zestril</i> ® (\$1-47)	2.5-5mg daily	20-40mg daily	Dizziness Headache Hyperkalemia	Avoid in pregnant patients

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			Angioedema	
Ramipril <i>Altace</i> ® (\$11-67)	1.25-2.5mg daily	10mg daily	Dizziness Headache Angioedema	Avoid in pregnant patients
<b>ARBs</b>				
Candesartan <i>Atacand</i> ® (\$129)	4-8mg daily	32mg daily	Dizziness Headache	Avoid in pregnant patients
Losartan <i>Cozaar</i> ® (\$9-140)	25-50mg daily	50-150mg daily	Dizziness	Avoid in pregnant patients
Valsartan <i>Diovan</i> ® (\$19-395)	20-40mg twice daily	160mg twice daily	Dizziness Headache	Avoid in pregnant patients
<b>Aldosterone Antagonists</b>				
Eplerenone <i>Inspra</i> ® (\$130)	25mg daily	50mg daily	Hyperkalemia	Use contraindicated eGFR <30
Spironolactone <i>Aldactone</i> ® (\$26)	12.5-25mg daily	25-50mg daily	Hyperkalemia Gynecomastia	Use not recommended eGFR <30
<b>SGLT Inhibitors</b>				
Dapagliflozin <i>Farxiga</i> ® (\$663)	10mg daily	10mg daily	Urinary tract infection Diabetic ketoacidosis Hypotension	Must maintain adequate hydration Avoid starting therapy in eGFR <25
Empagliflozin <i>Jardiance</i> ® (\$755 – brand only)	10mg daily	10mg daily	Urinary tract infection Diabetic ketoacidosis Hypotension	Must maintain adequate hydration Avoid starting therapy in eGFR <20
Sotagliflozin <i>Inpefa</i> ® (\$739 – brand only)	200 mg daily	400 mg daily	Urinary tract infection Diarrhea Diabetic ketoacidosis	Must maintain adequate hydration Avoid starting therapy in eGFR <25
<b>Vasodilators</b>				
Hydralazine (\$4-25)	25mg 3x/day	75mg 3x/day	Diarrhea Loss of appetite Hydralazine-induced lupus-like syndrome	
Isosorbide dinitrate <i>Isordil Titrados</i> ® (\$214)	20mg 3x/day	40mg 3x/day	Headache Lightheadedness	PDE 5 inhibitors contraindicated in patients on nitrates

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Isosorbide dinitrate/hydralazine combination (20/37.5mg) <i>BiDil</i> ® (\$121-754)	1-tab 3x/day	2-tab 3x/day	See individual agents	
<b>Other</b>				
Ivabradine <i>Corlanor</i> ® (\$681 – brand only)	2.5-5mg twice daily	Titrated to goal heart rate 50-60bpm Max dose 7.5mg twice daily	Atrial fibrillation Phosphenes	Take with food Available as oral solution if patient unable to swallow tabs
Vericiguat <i>Verquvo</i> ® (\$832 – brand only)	2.5mg daily	10mg daily	Hypotension Anemia	Avoid in pregnant patients PDE-5 inhibitors and nitrates contraindicated in patients on vericiguat Avoid starting therapy in eGFR <15

\*AWP for 30 days of medication at maximum target dose unless specified otherwise

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