Heart failure currently affects six million Americans, with an estimated 870,000 new cases annually. Reasons for this increase include an aging population; comorbid conditions such as diabetes, hypertension, and obesity; and higher survival rates after heart attacks, which can predispose survivors to heart failure.

No matter where you work as a nurse, caring for a patient with heart failure is inevitable, so you should know which medications will provide the most benefit and the potential side effects you’ll need to assess for. This article reviews the medications recommended by the American Heart Association (AHA) and the American College of Cardiology Foundation Guideline for the Management of Heart Failure.

Stages and classes of heart failure
Two reliable indices are used to stratify heart failure: the AHA stages and the New York Heart Association (NYHA) functional classes.

The AHA classifies heart failure into four stages based on structural heart damage. (See AHA heart failure stages.) Stages A and B require minimal medications. Stage C is broken into two categories—heart failure with a preserved ejection fraction (HFpEF, ejection fraction > 45%) and heart failure with reduced ejection fraction (HFrEF, ejection fraction < 45%). Patients fall into these categories based on their left ventricle’s ability to pump blood or relax and fill with blood. Stage D of the AHA classification requires additional interventions beyond medication.

Originally published in 1928 and updated over the years (the last update was 1994), the NYHA heart failure classification is still used today. It categorizes classes I through IV according to subjective patient symptom assessment. (See NYHA heart failure classification.)

Medication classes
Heart failure treatment requires careful balancing of several medications that affect preload (amount of ventricular stretch at the end of diastole) and afterload (pressure the heart must work against to eject blood). In addition to the following medication classes, hydralazine/
AHA heart failure stages

The American Heart Association (AHA) classifies heart failure into four stages based on structural damage.

<table>
<thead>
<tr>
<th>Stage A</th>
<th>At risk for HF but without structural heart disease or symptoms of HF</th>
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<tbody>
<tr>
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<td>e.g., Patients with:</td>
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<tr>
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<td>• HTN</td>
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<td>• Atherosclerotic disease</td>
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<td>• Obesity</td>
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<td>• Metabolic syndrome</td>
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<td>Patients:</td>
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<td>• Using cardiotoxins</td>
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<td>• With family history of cardiomyopathy</td>
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<th>Stage B</th>
<th>Structural heart disease but without signs or symptoms of HF</th>
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<tr>
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<td>e.g., Patients with:</td>
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<td>• Previous MI</td>
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<td></td>
<td>• LV remodeling including LVH and EF</td>
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<td>• Asymptomatic valvular disease</td>
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<tr>
<th>Stage C</th>
<th>Structural heart disease with prior or current symptoms of HF</th>
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<td>e.g., Patients with:</td>
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<td></td>
<td>• Known structural heart disease and</td>
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<td>• HF signs and symptoms</td>
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<th>Stage D</th>
<th>Refractory HF</th>
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<tr>
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<td>e.g., Patients with:</td>
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<td></td>
<td>• Marked HF symptoms at rest</td>
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<td></td>
<td>• Recurrent hospitalizations despite GDMT</td>
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**Therapy**

**Goals**
- Heart-healthy lifestyle
- Prevent vascular, coronary disease
- Prevent LV structural abnormalities

**Drugs**
- ACEI or ARB in appropriate patients for vascular disease or DM
- Statins as appropriate

**Therapy**

**Goals**
- Prevent HF symptoms
- Prevent further cardiac remodeling

**Drugs**
- ACEI or ARB as appropriate
- Beta blockers as appropriate

**In selected patients:**
- ICD
- Revascularization or valvular surgery as appropriate

**Therapy**

**Goals**
- Control symptoms
- Improve HRQOL
- Prevent hospitalization
- Prevent mortality

**Strategies**
- Identification of comorbidities

**Treatment**
- Diuresis to relieve symptoms of congestion
- Following guideline-driven indications for comorbidities (e.g., HTN, AF, CAD, DM)

**Therapy**

**Goals**
- Control symptoms
- Patient education
- Prevent hospitalization
- Prevent mortality

**Drugs for routine use**
- Diuretics for fluid retention
- ACEI or ARB
- Beta blockers
- Aldosterone antagonists

**Drugs for use in selected patients**
- Hydralazine/isosorbide dinitrate
- ACEI or ARB
- Digitalis

**In selected patients**
- CRT
- ICD
- Revascularization or valvular surgery as appropriate

**Therapy**

**Goals**
- Control symptoms
- Improve HRQOL
- Prevent hospitalization
- Prevent mortality

**Drugs for routine use**
- Diuretics for fluid retention
- ACEI or ARB
- Beta blockers
- Aldosterone antagonists

**Drugs for use in selected patients**
- Hydralazine/isosorbide dinitrate
- ACEI or ARB
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**In selected patients**
- CRT
- ICD
- Revascularization or valvular surgery as appropriate

**Therapy**

**Goals**
- Control symptoms
- Improve HRQOL
- Prevent hospitalization
- Prevent mortality

**Options**
- Advanced care measures
- Heart transplant
- Chronic inotropes
- Temporary or permanent MCS
- Experimental surgery or drugs
- Palliative care and hospice
- ICD deactivation

ACEI = angiotensin-converting enzyme inhibitor, AF = atrial fibrillation, ARB = angiotensin receptor blocker, CAD = coronary artery disease, CRT = cardiac resynchronization therapy, DM = diabetes mellitus, EF = ejection fraction, GDMT = guideline-directed medical therapy, HF = heart failure, HFrEF = heart failure with reduced ejection fraction, HRQOL = health-related quality of life, HTN = hypertension, ICD = implantable cardioverter defibrillator, LV = left ventricle, LVH = left ventricular hypertrophy, MCS = mechanical circulatory support, MI = myocardial infarction

isosorbide dinitrate, sacubitril/valsartan, and ivabradine are indicated for heart failure treatment. (See New medications for treating heart failure.)

Angiotensin-converting enzyme inhibitors
Angiotensin-converting enzyme (ACE) inhibitors cause vasodilation in both the venous and arterial systems, so they decrease both preload and afterload, increasing blood flow to vital organ systems and improving ejection fraction. These medications also block the enzyme needed to convert angiotensin I to angiotensin II. Angiotensin II is a strong vasoconstrictor that raises blood pressure, releases aldosterone, and leads to sodium and water retention. ACE inhibitors prevent this cascade of effects.

Examples: Captopril, enalapril, and lisinopril.

Indications: ACE inhibitors decrease the risk of death and hospitalizations in patients with HFrEF.

Adverse effects: Adverse effects include hyperkalemia, renal failure, and a dry, persistent cough associated with increased bradykinin. If the cough is intolerable, the provider may discontinue the ACE inhibitors in favor of an angiotensin receptor blocker (ARB).

Nursing points: Although the cough can be annoying, explain to the patient that it’s a side effect of the medication and encourage him or her to continue its use.

Angiotensin receptor blockers
Similar to ACE inhibitors, ARBs block the action of angiotensin II. However, they work at a different level of interaction with angiotensin II, reducing the risk of hyperkalemia or cough that's seen with ACE inhibitors. ARBs block angiotensin II receptors in the blood vessels and the adrenal glands. In the blood vessels, ARBs cause venous and arterial dilation to reduce both preload and afterload.
Blocking angiotensin II receptors in the adrenal glands decreases the release of aldosterone, which in turn increases the excretion of sodium and water.

Examples: Valsartan and losartan.

Indications: ARBs are sometimes substituted for patients who can't tolerate ACE inhibitors.

Adverse effects: ARBs are well tolerated and have minimal side effects.

Nursing points: ARBs and ACE inhibitors shouldn't be used interchangeably. ACE inhibitors are preferred over ARBs because they're associated with a decrease in morbidity and mortality.

Beta blockers
Beta blockers decrease sympathetic nervous system stimulation, lowering heart rate and blood pressure and improving left ventricular function, hemodynamics, and exercise tolerance. They have moderate afterload reduction effects and slightly reduce preload.

Examples: Bisoprolol, carvedilol, sustained-release metoprolol.

Indications: Beta blockers slow the progression of symptoms in patients with HFrEF and allow more time for ventricular filling prior to ejection in patients with HfPEF.

Adverse effects: Adverse effects of beta blockers include fluid retention, fatigue, bradycardia, and hypotension.

Nursing points: Fluid retention may worsen heart failure but can usually be managed with diuretics. If bradycardia or hypotension are problematic, the provider may reduce the beta blocker dose. Because of decreased heart rate and blood pressure associated with beta blockers, they shouldn't be administered at the same time as ACE inhibitors.

Diuretics
Loop diuretics act on the ascending limb of the loop of Henle to inhibit sodium and chloride reabsorption, leading to increased urinary excretion of sodium and water.

Examples: Furosemide, bumetanide, and torsemide.

Indications: Loop diuretics are preferred diuretics to increase urinary excretion of sodium and water when managing heart failure. Dose adjustments may be necessary based on sodium and fluid intake.

Adverse effects: Electrolyte loss.

Nursing points: Instruct patients to decrease their dietary intake of sodium, weigh themselves daily, and take the diuretic early in the day to prevent nocturia. Hypokalemia is a side effect of loop diuretics, so monitor patients' serum potassium levels.

Aldactone antagonists
Aldactone antagonists decrease all-cause mortality, sudden cardiac death, and heart failure symptoms when added to the treatment regimen of patients with heart failure and HFrEF.

Examples: Spironolactone or eplerenone.

Indications: Aldactone antagonists are indicated for use in patients with HFrEF.

Adverse effects: Aldactone antagonists inhibit potassium excretion and may lead to hyperkalemia.

Nursing points: Advise patients taking an aldactone antagonist to avoid salt substitutes, nonsteroidal anti-inflammatory drugs, and foods high in potassium to reduce the risk of hyperkalemia. Monitor serum potassium, blood urea nitrogen, creatinine, and creatinine clearance levels. If a patient is also taking an ACE inhibitor, assess for signs of renal insufficiency.

Improving outcomes
When you understand the mechanisms of action, indications, and adverse effects of the medications used to treat heart failure, you can deliver nursing care that improves outcomes and provide patients and family members with the education they need to manage the condition.

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Selected references


