

Are you up to date with the heart failure

Find out about the latest revision to interventions for patients, whether hospitalized or outpatient.

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HHeart failure, which affects about 5 million Americans, is a chronic, progressive disease with high morbidity and mortality, and a staggering cost.¹ The American College of Cardiology and American Heart Association recently updated their guidelines on the diagnosis and management of heart failure and reduced left ventricular ejection fraction in adults. In this article, we'll review the previous guidelines, published in 2005, and then describe the changes in the focused update.

A quick look back

The 2005 guidelines presented a new staging system in heart failure development that emphasized the progressive nature of heart failure (see *Staging heart failure*).² The new staging system also included recommended therapies by stage. Stages A and B recommendations target early identification and treatment, including risk factors for heart failure development. The use of drugs such as angiotensin-converting enzyme (ACE) inhibitors or angiotensin receptor blockers and beta-blockers became part of the standard of care for heart failure in appropriate patients because of landmark outcomes studies.³⁻⁷ To prevent sudden cardiac death, implanted device therapy, such as biventricular

guidelines?



pacings or implantable defibrillators, was recommended in selected patients.^{8,9}

The 2005 guidelines included recommendations for both patients with heart failure with reduced left ventricular ejection fraction, and patients with heart failure with preserved left ventricular ejection fraction. The recommendations for patients with preserved left ventricular ejection fraction remain unchanged: control of systolic and diastolic BP in accordance with published guidelines, restoring and maintaining sinus rhythm in patients with atrial fibrillation (AF), and diuretic therapy to minimize signs and symptoms of heart failure in patients with evidence of fluid retention.

End-of-life considerations for patients with refractory end-stage heart failure were discussed in the 2005 guidelines. These interventions included

ongoing discussions of the patient's prognosis, options for developing and implementing advance directives, and the role of palliative and hospice care services. The guidelines also recommended discussing deactivation of implantable cardioverter defibrillators (ICDs).

What's new for outpatients?

The updated guidelines separate the treatment recommendations for outpatients from the treatment recommendations for patients with acutely decompensated heart failure requiring hospitalization.¹⁰

For outpatients, the guidelines clarify the roles of the New York Heart Association (NYHA) functional classification system, B-type natriuretic peptide (BNP), and N-terminal pro-BNP (NT-proBNP) in assessing patients with heart failure. Although the NYHA classification system is

the most widely used tool to assess a patient's functional capacity, it's limited by its subjectivity. Tools such as measuring the distance a patient can walk in 6 minutes, and maximal exercise testing provide objective assessment of functional capacity.

The 6-minute walk test may assess the patient's functional limitation and provide prognostic value. Maximal exercise testing with a peak oxygen uptake measurement can be used to determine the patient's disability and to help formulate exercise prescriptions, and may also help identify patients who need cardiac transplantation.

BNP and NT-proBNP are released from the heart in response to increased volume and pressure, and are associated with reduced left ventricular ejection fraction, left ventricular hypertrophy, and acute myocardial infarction (MI) and ischemia. Elevated levels of these natriuretic peptides also can occur with pulmonary embolism and chronic obstructive pulmonary disease. Serum BNP levels are associated with the severity of heart failure, but factors such as age, gender, weight, and renal function also affect BNP levels. Although evidence has shown that BNP (or NT-proBNP) can provide prognostic information, using it to guide therapy hasn't been shown to improve outcomes. However, BNP can be useful in risk stratification in both systolic and diastolic dysfunction, and in evaluating patients in urgent care settings when the clinical diagnosis of heart failure is uncertain.

Staging heart failure

Stage A

Patient has no structural heart disease or symptoms of heart failure, but is at high risk for heart failure because of the following risk factors: hypertension, atherosclerotic disease, diabetes, obesity, metabolic syndrome, cardiotoxin use, or a family history of cardiomyopathy.

Stage B

Patient has structural heart disease but no signs or symptoms of heart failure. Examples of structural heart disease include a history of MI, left ventricular remodeling (including left ventricular hypertrophy and low ejection fraction), or asymptomatic valvular disease.

Stage C

Patient has structural heart disease with previous or current symptoms of heart failure, such as shortness of breath and fatigue, or reduced exercise tolerance.

Stage D

Patient has refractory heart failure requiring specialized interventions. The patient has marked symptoms at rest despite maximal medical therapy.

The only change to outpatient treatment recommendations in the new guidelines is for patients with reduced left ventricular systolic function. For these patients, the use of ACE inhibitors or angiotensin receptor blockers and beta-blockers remains unchanged in the update. The updated guidelines recommend using a combination of hydralazine and isosorbide for African American patients with moderate-to-severe heart failure symptoms on optimal drug therapy; this has been elevated to a Class I recommendation.

To clarify previous recommendations (and be consistent with the Heart Rhythm Society's 2008 guidelines), the updated guidelines recommend that a patient have an ejection fraction of 35% or less to be considered for an ICD for primary prevention of sudden cardiac death.

For patients with AF and heart failure, a rhythm or rate control strategy can be pursued, per the guidelines. The guidelines don't recommend the routine use of intermittent infusions of vasoactive and positive inotropic agents in patients with refractory end-stage heart failure.

What's new for acute decompensation?

Heart failure is associated with high morbidity and a high hospital readmission rate. The most common reasons for hospitalization include acute volume overload, profound depression of cardiac output (hypoperfusion), and signs and symptoms of shock and fluid overload. The following are Class I recommendations—these treat-



Administer vasopressors or I.V. inotropes to patients with clinical evidence of hypoperfusion.

ments should be performed or administered because the benefits outweigh the risks for these patients.

- **Assessment and diagnosis.** The diagnosis of heart failure should be primarily based on the patient's signs and symptoms, according to the guidelines (see *Assessing a patient for heart failure*). Clinicians should assess and document the patient's volume status, adequacy of systemic perfusion, and presence of precipitating factors and comorbidities.

Identifying the precipitating factor or factors is important to guide therapy. Common factors that can precipitate decompensated heart failure include: acute myocardial ischemia; uncorrected hypertension; AF or other dysrhythmias; nonadherence to medications or to sodium or fluid restriction; worsening renal function; recent addition of negative inotropic drugs, such as verapamil and diltiazem; nonsteroidal anti-inflammatory

drugs; concurrent infections such as pneumonia; pulmonary embolus; excessive use of alcohol or illicit drugs; and endocrine abnormalities such as hyperthyroidism.

The patient's plasma BNP or NT-proBNP should be measured if the diagnosis of heart failure is uncertain, for example in patients with dyspnea in which the contribution of heart failure isn't known. Acute coronary syndromes can be ruled out by cardiac troponin levels and an ECG. Obtaining an echocardiogram may be helpful (particularly in patients with new-onset heart failure) but shouldn't delay treatment.

- **Early therapy.** Administer oxygen therapy to relieve signs and symptoms related to hypoxemia. Start I.V. loop diuretics, as prescribed, in the ED or outpatient clinic without delay as soon as fluid overload is identified. If diuresis is inadequate and the patient's congestion isn't relieved, an intensified diuretic regimen may be needed. This regimen consists of either a higher dose of the loop diuretic, addition of a second diuretic, or a continuous infusion of a loop diuretic.

Patients with clinical evidence of hypoperfusion (as manifested by decreased urine output and signs and symptoms of shock) and elevated cardiac filling pressures, such as elevated jugular venous pressure, should be given I.V. inotropes or vasopressors to maintain systemic perfusion and preserve end-organ function.

- **Ongoing therapy and patient teaching.** After the I.V. diuretics, inotropes, and vasopressors are discontinued, the

Assessing a patient for heart failure

The section in boldfaced italics is the 2009 update, a modification of the 2005 recommendation. Class I treatments should be performed because the benefits outweigh the risks. Class II treatments can be reasonable (Class IIa) or may be considered (Class IIb) for the patient. Class III treatments shouldn't be done because they aren't helpful and may be harmful.

INITIAL EVALUATION

Class I

- Thorough history and physical exam, including current or past use of alcohol, illicit drugs, chemotherapy, or alternative therapies, to identify cardiac and non-cardiac causes of heart failure. (Level of Evidence [LOE] C—consensus of expert opinions, case studies, or standard of care from a very limited population.)
- Assessment of orthostatic BP changes, volume status, measurement of body mass index, and ability to perform routine and desired activities of daily living. (LOE C)
- Complete blood cell count, urinalysis, serum electrolytes, lipid profile, hepatic profile, thyroid function tests, 12-lead ECG, chest X-ray, two-dimensional echocardiography with Doppler. (LOE C)
- Coronary angiography for inpatients with angina or significant ischemia, unless they're ineligible for revascularization. (LOE B—single randomized study or nonrandomized studies with limited populations.)

Class IIa

- Coronary angiography in patients presenting with heart failure and chest pain or who have known or suspected coronary artery disease (CAD) without angina, unless they're ineligible for revascularization. (LOE C)
- Noninvasive imaging to detect myocardial ischemia and viability in patients with known CAD and no angina unless they're ineligible for revascularization. (LOE C)
- Maximal exercise testing with or without measurement of respiratory gas exchange or blood oxygen saturation, to determine whether heart failure is the cause of exercise limitation. (LOE C)

- Screening for other causes, such as hemochromatosis, sleep-disturbed breathing, human immunodeficiency disease, rheumatologic disease, amyloidosis or pheochromocytoma; endomyocardial biopsy when a specific diagnosis is suspected. (LOE C)
- Maximal exercise testing with measurement of respiratory gas exchange or blood oxygen saturation to identify patients who are candidates for cardiac transplantation or other advanced treatments. (LOE B)
- ***Measurement of natriuretic peptides (BNP or NT-proBNP) in the urgent care setting can be useful in risk stratification. (LOE A—multiple randomized clinical studies with multiple populations)***

Class IIb

- Noninvasive imaging to determine likelihood of CAD. (LOE C)
- Holter monitoring in patients with a history of MI and those being considered for electrophysiologic study. (LOE C)

Class III

- Endomyocardial biopsy, signal averaged electrocardiography, and measurements of neurohormones aren't recommended for routine initial evaluation. (LOE C)

SERIAL EVALUATION (AT EACH VISIT)

Class I

- Careful history of current use of alcohol, tobacco, illicit drugs, chemotherapy, and alternative therapies. (LOE C)
- Assessment of the patient's volume status, weight, diet, sodium intake, and ability to perform routine and desired activities of daily living. (LOE C)

Class IIa

- Repeated measurement of ejection fraction in patients whose clinical status has changed or who have improved from a clinical event or received treatment that might have had a significant effect. (LOE C)

Class IIb

- Serial measurement of BNP. (LOE C)

patient should be started on a low-dose beta-blocker if he's hemodynamically stable. Long-term oral maintenance therapy should consist of an ACE inhibitor or angiotensin receptor blocker and beta-blockers, and should be continued if the

patient is hemodynamically stable and has no other contraindications. Long-term maintenance therapy should be started before discharge if the patient isn't already on these medications.

Before the patient is discharged, provide comprehensive

written discharge instructions for the patient and his caregivers. These instructions should focus on the six aspects of care: diet, discharge medications (with emphasis on adherence), activity level, follow-up appointments, daily weight monitoring, and

what to do if signs and symptoms of heart failure worsen.

Class II recommendations

The following interventions are considered reasonable for patients with acute decompensated heart failure:

- *Urgent cardiac catheterization and revascularization* for patients with acute decompensated heart failure and known or suspected acute myocardial ischemia due to occlusive coronary disease. Cardiac catheterization and revascularization is considered reasonable especially if the patient has signs and symptoms of inadequate systemic perfusion and the interventions are likely to prolong meaningful survival.

- If the adequacy of the patient's cardiac function can't be determined by clinical assessment, invasive hemodynamic monitoring can be used to guide therapy. Invasive monitoring also may be helpful in carefully selected patients with persistent symptoms despite empiric adjustments of standard therapies.

- *Vasodilators* such as I.V. nitroglycerine, nitroprusside, or nesiritide, may be helpful when given with diuretics or if patients don't respond to diuretics alone.

- *I.V. inotropic agents* such as dopamine, dobutamine, or milrinone, for patients who have hypotension and evidence of low cardiac output (with or without congestion).

- *Ultrafiltration* or another renal replacement strategy may be reasonable for patients when diuretic therapy isn't successful. Because ultrafiltration removes more sodium than diuretics, the healthcare provider should consult with a renal specialist before



Patient care should always be individualized and based on the patient's clinical status.

using a mechanical strategy for diuresis.

Class III recommendations

The following interventions aren't recommended for routine therapy because they aren't helpful and may be harmful: using parenteral inotropes in normotensive patients who lack evidence of decreased organ perfusion, and using routine invasive hemodynamic monitoring in normotensive patients with acute decompensated heart failure and congestion who have obtained symptomatic relief from diuretics and vasodilators.

Staying up to date

Guidelines can help healthcare providers make clinical decisions, but patient care should always be individualized and based on the patient's clinical status. By understanding the latest guidelines, you can provide your patients with care based on the latest and best available evidence. ❖

REFERENCES

1. American Heart Association. Heart disease and stroke statistics 2009 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. <http://www.circ.aha-journals.org/cgi/content/full/119/2/e21>.
2. Hunt SA, Abraham WT, Chin MH, et al. American College of Cardiology/American Heart Association 2005 Heart Failure Guideline Update for the diagnosis and management of chronic heart failure in the adult. *Circulation*. 2005;112(12):e154-e235.
3. Effect of enalapril on survival in patients with reduced left ventricular ejection fractions and congestive heart failure. The SOLVD Investigators. *N Engl J Med*. 1991;325:293-302.
4. Cohn JN, Tognoni G, for the Valsartan Heart Failure Trial Investigators. A randomized trial of the angiotensin receptor blocker valsartan in chronic heart failure. *N Engl J Med*. 2001;345:1667-1675.
5. Packer M, Bristow MR, Cohn JN, et al. The effect of carvedilol on morbidity and mortality in patients with chronic heart failure. U.S. Carvedilol Heart Failure Study Group. *N Engl J Med*. 1996;334:1349-1355.
6. Effect of metoprolol CR/XL in chronic heart failure: Metoprolol CR/XL Randomised Intervention Trial in Congestive Heart Failure (MERIT-HF). *Lancet*. 1999;353:2001-2007.
7. CIBIS-II Investigators and Committees. The Cardiac Insufficiency Bisoprolol Study II (CIBIS-II): a randomized trial. *Lancet*. 1999;353:9-13.
8. Bardy GH, Lee KL, Mark DB, et al. Amiodarone or an implantable cardioverter-defibrillator for congestive heart failure. *N Engl J Med*. 2005;352:225-237.
9. Bristow MR, Saxon LA, Boehmer J, et al., for the Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure (COMPANION) Investigators. Cardiac resynchronization therapy with or without an implantable cardioverter defibrillator in advanced heart failure. *N Engl J Med*. 2004;350:2140-2150.
10. Jessup M, Abraham WT, Casey DE, et al. writing on behalf of the 2005 Guideline Update for the Diagnosis and Management of Chronic Heart Failure in the Adult Writing Committee, 2009 Focused update: ACC/AHA guidelines for the diagnosis and management of heart failure in adults: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. <http://circ.ahajournals.org>.

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