Current Guidelines For The Evaluation And Management Of Heart Failure

This issue of *EM Practice Guidelines Update* reviews 2 recently updated guidelines on the evaluation and management of heart failure (HF). The European Society of Cardiology (ESC) guideline is an update of their 2008 issue and provides practical, evidence-based guidelines for the diagnosis and treatment of acute and chronic HF. The joint American College of Cardiology Foundation (ACCF)/American Heart Association (AHA) guideline is an update of their 2009 publication that is primarily focused on chronic HF. The focus of this review is on the recommendations most relevant to emergency medicine practice—the assessment and treatment of acute HF.

**Practice Guideline Impact**

- B-type natriuretic peptide (BNP) or N-terminal pro-B-type natriuretic peptide (NT-proBNP) measurements are useful to support clinical judgment for the diagnosis of acute HF, especially in the setting of clinical uncertainty.
- A completely normal electrocardiogram (ECG) indicates that HF is unlikely.
- Patients with acute HF should be treated promptly with intravenous (IV) diuretics to reduce morbidity.
- Vasodilators may be used as an adjunct to diuretic therapy in an effort to reduce dyspnea, but they do not improve major outcomes.
- Drugs that are potentially harmful in patients with a reduced ejection fraction include most antiarrhythmic drugs, most calcium-channel-blocking drugs (except amlodipine), and nonsteroidal anti-inflammatory drugs (NSAIDs).
Introduction To The Guidelines: Heart Failure

This issue of EM Practice Guidelines Update reviews 2 recently published guidelines on the evaluation and management of HF:

1. “ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012,” published by the European Society of Cardiology (ESC), available at: http://eurheartj.oxfordjournals.org/content/33/14/1787.full.pdf

HF is a common condition affecting approximately 1% to 2% of the adult population, with a prevalence of ≥ 10% in patients aged > 70 years. Survival for HF patients has improved, but absolute mortality rates remain at approximately 50% at 5 years for all-cause HF. There is some evidence that the number of hospitalizations attributed primarily to HF is declining; however, there has been an increase in the number of hospitalizations of patients with a diagnosis of chronic HF.

HF is a heterogeneous clinical syndrome caused by structural and functional impairment of ventricular filling or ejection of blood, resulting primarily in dyspnea and fatigue with or without symptoms of volume overload. There is no definitive diagnostic test for HF. As a result, there is considerable variability in the definitions and terminology used to describe HF. The AHA recommends against use of the term “congestive heart failure,” as fluid overload need not be present, and prefers the term “heart failure.” The ACCF/AHA guideline writing committee used the terms “heart failure with a preserved ejection fraction” (HFpEF), defined as an ejection fraction (EF) ≥ 50%; and “heart failure with a reduced ejection fraction” (HFrEF), defined as an EF ≤ 40%. The ESC uses similar definitions, but considers a reduced EF to be ≤ 35%. EFs of 35% to 50% encompass a gray area, and most likely represent patients with mild systolic dysfunction. There is also no standardized terminology to describe acutely or subacutely worsened HF, and the terms “acute heart failure,” “acute heart failure syndromes,” and “acutely decompensated heart failure” have been used by various authors and organizations. The ACCF/AHA suggests that the use of clinical descriptors can help subclassify patients with acute HF as congested or not (“wet” or “dry”) and/or as being well-perfused or not (“warm” or “cold”).

This issue of EM Practice Guidelines Update will inform the emergency clinician of the new and updated guidelines in the diagnosis and care of patients with HF. Faced with the pressures of managing patients with acute HF or HF as a comorbidity, reducing admission rates for acute HF, and determining the often subtle presentations of new-onset HF in the ED, the emergency clinician must be well-versed in the acute treatment guidelines, chronic treatment regimens, and approaches to diagnosis. Many of the recommendations in the full guidelines apply to the outpatient setting, and only those that are applicable to the care of the ED patient will be reviewed here. The ACCF/AHA guidelines are more focused on the United States population and much broader in their discussion of outpatient management and chronic congestive HF. The ESC recommendations apply to a more global population, with a greater focus on acute care.

—Trevor Lewis, MD
Guest Editor Comment: Deborah Diercks, MD

For the emergency clinician, an ideal guideline on HF would provide clear recommendations for decisions regarding ED-based diagnostics, treatment, and disposition. These 2 recently published guidelines by the major American and European cardiology societies focus largely on the care of chronic HF, but they also provide guidance for patients presenting with acute HF. The ACCF/AHA HF guideline covers acute care under the section entitled “The Hospitalized Patient.” It does not explicitly address the ED setting (not surprising, perhaps, as no emergency physicians were included on the writing panel).

The ACCF/AHA continues to suggest categorization of acute HF patients by their hemodynamic status and degree of congestion. Diagnostic tests (eg, chest x-ray and natriuretic peptide levels) can be used to assist in this assessment. For patients with congestion who are hemodynamically stable, the Class I recommendation is to use loop diuretics as part of the initial management (“...to be given in the ED”). Adjuncts to diuretics that are also suggested (with Class IIb recommendations) include low-dose dopamine, ultrafiltration, IV vasodilators (nitroglycerin, nitroprusside, nesiritide), and vasopressin receptor antagonists (for patients with severe hyponatremia). Ultrafiltration may not be relevant to emergency clinicians outside of specialized healthcare settings, as it requires resources that are limited in the ED setting. Surprisingly, the ACCF/AHA guidelines do not address the use of non-invasive ventilation (NIV). Unlike ultrafiltration, NIV is widely available and in common use in the ED.

In contrast to the ACCF/AHA guidelines, the ESC HF guidelines present more comprehensive and user-friendly recommendations for patients presenting with acute HF. These guidelines present algorithms for diagnosis and management, and, unlike the ACCF/AHA guidelines that suggest treatment based on assessment of perfusion and congestion, these guidelines recommend treatment based on blood pressure and oxygenation in patients with pulmonary congestion. The actual treatment recommendations differ very little between the guidelines. The ESC does address NIV, endorsing it with a IIb recommendation based on class B evidence. In their discussion, they cite concern that a randomized controlled trial (RCT) from 2008 did not show positive results; however, readers should be reminded of the 2013 Cochrane review (which included this RCT) that showed a reduction in mortality, a reduction in the need for endotracheal intubation, as well as a reduction in the number of days spent in the intensive care unit without increasing the risk of having a heart attack during or after treatment.

Overall, the treatment guidelines are relatively consistent with current practices in the ED, so they may provide reassurance to ED clinicians that their current management plan is sufficient. However, these guidelines also highlight important regulatory benchmarks that are tracked on HF patients, and these are relevant, as emergency clinicians are taking a more comprehensive role in the management of acute HF patients. The outcome measures of admission rates and 30-day risk-standardized HF readmission rates are clearly in the domain of the emergency clinician. Currently, there are approximately 700,000 ED visits for acute HF per year in the United States, approximately 80% of which result in admission. Despite this (and perhaps because the ACCF/AHA writing committee did not focus on the ED setting), the question of risk stratification and potential discharge from the ED is not addressed.

The recommendations in the ACCF/AHA guidelines for management of acute HF are somewhat difficult to locate within the document; however, the ESC guidelines present the information in a clear format. The best use of the ACCF/AHA guidelines is as a reference for specific issues. For the emergency clinician seeking to practice guideline-based therapy and utilize algorithms, the ESC guidelines are much more useful.
Assessment Of The Guideline Methodology

A committee appointed by the ACCF/AHA Task Force on Practice Guidelines authored the ACCF/AHA guidelines. The definitions and levels of recommendations are noted in Table 1. Members of the ESC Task Force were selected by the ESC to write the guideline in accordance with the ESC Committee for Guidelines Policy. The same definitions for the recommendations were utilized as noted in Table 1.

The authors of this issue of EM Practice Guidelines Update, Trevor Lewis, MD and Editor-in-Chief Sigrid Hahn, MD, MPH graded this guideline using the Appraisal of Guidelines for Research and Education (AGREE) II instrument (available at http://www.agreetrust.org/). This instrument is a checklist that allows users to grade a guideline on 23 items in 6 domains, reflecting the degree to which the guideline developers used unbiased, best-practice methodology in developing the guideline and writing the recommendations. The results of the AGREE instrument are presented in Figure 1, with a percentile calculated and assigned for each domain (maximum score of 100%). The score for relevance to emergency medicine is not part of the AGREE instrument, but reflects the judgment of the author and editor of this issue.

—Trevor Lewis, MD; and Sigrid Hahn, MD, MPH

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<th>Level of Evidence</th>
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Table 1. Definition Of Classes And Levels Of Evidence Used In American Heart Association Recommendations

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<tr>
<td>A</td>
<td>Conditions for which there is conflicting evidence for and/or general agreement that the procedure or treatment is useful and effective</td>
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<td>B</td>
<td>Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment</td>
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<td>C</td>
<td>The weight of evidence or opinion is in favor of the procedure or treatment</td>
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<td>Usefulness/efficacy is less well established by evidence or opinion</td>
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<td></td>
<td>Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases may be harmful</td>
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Figure 1. AGREE Criteria For Heart Failure Guidelines

Abbreviation: AGREE, Appraisal of Guidelines for Research and Education.
The recommendations excerpted here are presented as they appear in the original guidelines, including the strength of the recommendation and the level of evidence. Recommendations on the same clinical topic from the 2 guidelines are presented side-by-side to facilitate comparison. However, when there is overlap and no significant discrepancy, only 1 of the 2 guideline recommendations are presented, in the interest of brevity. Disease prevention, nonsurgical device implantation, and surgical options are not reviewed, as they have limited relevance to the emergency clinician.

**Initial Assessment Of Suspected Acute Heart Failure**
- Common precipitating factors for acute HF should be considered during initial evaluation, as recognition of these conditions is critical to guide appropriate therapy. (ACCF/AHA, Class I, Level C)
- Common factors that precipitate acute decompensated HF include:
  - Nonadherence with medication regimen, sodium and/or fluid restriction
  - Acute myocardial ischemia
  - Uncorrected high blood pressure
  - Atrial fibrillation and other arrhythmias
  - Recent addition of negative inotropic drugs (eg, verapamil, nifedipine, diltiazem, beta blockers)
  - Pulmonary embolus
  - Initiation of drugs that increase salt retention (eg, steroids, thiazolidinediones, NSAIDs)
  - Excessive alcohol or illicit drug use
  - Endocrine abnormalities (eg, diabetes mellitus, hyperthyroidism, hypothyroidism)
  - Concurrent infections (eg, pneumonia, viral illnesses)
  - Additional acute cardiovascular disorders (eg, valve disease endocarditis, myopericarditis, aortic dissection)
- Acute coronary syndromes (ACS) precipitating acute HF decompensation should be promptly identified by ECG and serum bio-markers, including cardiac troponin testing, and treated optimally as appropriate to the overall condition and prognosis of the patient. (ACCF/AHA, Class I, Level C)

**Electrocardiogram**
- A 12-lead ECG is recommended to determine heart rhythm, heart rate, QRS morphology, and QRS duration, and to detect other relevant abnormalities. This information also assists in planning treatment and is of prognostic importance. A completely normal ECG makes systolic HF unlikely. (ESC, Class I, Level C)

**Chest X-Ray**
- Patients with suspected or new-onset HF or patients presenting with acute decompensated HF, should undergo a chest x-ray to assess heart size and pulmonary congestion and to detect alternative cardiac, pulmonary, and other diseases that may cause or contribute to the patient’s symptoms. (ACCF/AHA, Class I, Level C)

**Editorial Comment: Trevor Lewis, MD**
Several points are worth highlighting: (1) Heart failure is very unlikely in patients with a normal ECG; (2) A normal chest x-ray does not exclude pulmonary edema and is better for identifying an alternative diagnosis than for ruling in acute HF; (3) Although ESC does not make a formal recommendation about the role of echocardiography in the ED (the recommendations about echocardiography refer to the ambulatory setting), they incorporate echocardiography in their diagnostic algorithm for acute HF. They endorse early echocardiography for patients presenting to the ED with suspected acute HF (immediate echocardiography is recommended in shocked or severely hemodynamically compromised patients). Neither organization discusses the role of bedside echocardiography. (See Figure 2, page 6.)
**Figure 2. European Society Of Cardiology Recommended Diagnostic Testing For Acute Heart Failure**

- **Suspected heart failure of acute onset**
  - ECG
  - Chest x-ray
  - BNP/NT-proBNP*  

- **ECG abnormal or NT-proBNP ≥ 300 pg/mL† or BNP ≥ 100 pg/mL†**
  - Echocardiogram

- **ECG normal and NT-proBNP < 300 pg/mL or BNP < 100 pg/mL**
  - Heart failure unlikely‡

- If heart failure is confirmed, determine etiology and start appropriate treatment

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*In the acute setting, MR-proANP may also be used (cut-off point < 120 pmol/L; ie, < 120 pmol/L = heart failure unlikely).

†Other causes of elevated natriuretic peptide levels in the acute setting are an acute coronary syndromes, atrial or ventricular arrhythmias, pulmonary embolism, and severe chronic obstructive pulmonary disease with elevated right heart pressure, renal failure, and sepsis. Other causes of an elevated natriuretic level in the nonacute setting are: old age (> 75 years), atrial arrhythmias, left ventricular hypertrophy, chronic obstructive pulmonary disease, and chronic kidney disease.

‡Treatment may reduce natriuretic peptide concentration, and natriuretic concentrations may not be markedly elevated in patients with HF-PEF.

Abbreviations: BNP, B-type natriuretic peptide; ECG, electrocardiogram; HF-pEF, heart failure with preserved ejection fraction; MR-proANP, midregional pro-atrial natriuretic peptide; NT-proBNP, N-terminal B-type natriuretic peptide.
Laboratory Testing

- Measurement of BNP or NT-proBNP is useful to support clinical judgment for the diagnosis of acutely decompensated HF, especially in the setting of uncertainty for the diagnosis. (ACCF/AHA, Class I, Level A; revised from previous guidelines)\(^9\)
- Measurement of BNP or NT-proBNP and/or cardiac troponin is useful for establishing prognosis or disease severity in acutely decompensated HF. (ACCF/AHA, Class I, Level A; revised from previous guidelines)\(^9\)
- The usefulness of BNP- or NT-proBNP-guided therapy for acutely decompensated HF is not well established. (ACCF/AHA, Class IIb, Level C, new recommendation)
- Measurement of other clinically available tests (such as biomarkers of myocardial injury or fibrosis) may be considered for additive risk stratification in patients with acutely decompensated HF. (ACCF/AHA, Class IIb, Level A, new recommendation)
- Measurement of natriuretic peptide (BNP, NT-proBNP, or midregional pro-atrial natriuretic peptide [MR-proANP]) should be considered to:
  - Exclude alternative causes of dyspnea (if the level is below the exclusion cut-point, HF is very unlikely) (ESC, Class IIb, Level C)
  - Obtain prognostic information (ESC, Class IIb, Level C)

Editorial Comment: Trevor Lewis, MD

Routine laboratory testing can help elucidate possible causes of acute HF (such as anemia). The ACCF/AHA guideline newly recommends measuring troponin for “additive risk stratification” in acute HF, and comments that the measurement of troponins should be routine in patients presenting with acute HF. The ESC suggests only that troponins “may be indicated” in the ED patient. The ACCF/AHA has revised its recommendations regarding the use of BNP and provides a strong recommendation in support of the role of BNP in cases of diagnostic uncertainty (much stronger than the ESC). The ESC guideline emphasizes the ability of a BNP measurement to exclude acute HF in the ED patient if NT-proBNP is < 300 pg/mL or BNP is < 100 pg/mL. BNP also has obvious prognostic value, but no established value in guiding treatment. The role of BNP in the diagnostic workup of acute HF is shown in the algorithm from the ESC guideline. (See Figure 2, page 6.)

Treatment Of Acute Heart Failure Without Shock

Oxygen

High-flow oxygen is recommended in patients with a capillary oxygen saturation < 90% or \(\text{PaO}_2 < 60\) mm Hg (8.0 kPa) to correct hypoxemia. (ESC, Class I, Level C)

Editorial Comment: Trevor Lewis, MD

Oxygen should not be used routinely in nonhypoxic patients as it causes vasoconstriction and reduced cardiac output.

Noninvasive Ventilation

NIV (eg, CPAP) should be considered in dyspneic patients with pulmonary edema and a respiratory rate > 20 breaths/min to improve breathlessness and reduce hypercapnia and acidosis. NIV can reduce blood pressure and should not generally be used in patients with a systolic blood pressure (SBP) < 85 mm Hg (and blood pressure should be monitored regularly when this treatment is used). (ESC, Class IIa, Level B)

Editorial Comment: Trevor Lewis, MD

The use of NIV has become routine in the management of patients presenting to the ED with acute HF. As previously noted, a 2013 Cochrane meta-analysis found a reduction in hospital mortality and the need for intubation with NIV.\(^7\) The ESC guideline authors, however, cite an RCT (also included in the meta-analysis) that demonstrated that neither continuous positive airway pressure (CPAP) nor noninvasive positive pressure ventilation (NIPPV) reduced mortality or the rate of endotracheal intubation when compared with standard therapy.\(^6\) This appears to be why they describe NIV as an “adjunct” therapy for patients who are not improving with pharmacologic therapy or who are in severe distress, rather than as a Class I, first-line therapy.

\(\text{See Figure 2, page 6.}\)
Treatment Of Acute Heart Failure Without Shock (Continued)

Diuretics

- Patients with HF admitted with evidence of significant fluid overload should be promptly treated with IV loop diuretics to reduce mortality. (ACCF/AHA, Class I, Level B)
- If patients are already receiving loop diuretic therapy, the initial IV dose should equal or exceed their chronic oral daily dose and should be given as either intermittent boluses or as a continuous infusion. Urine output and signs and symptoms of congestion should be serially assessed, and the diuretic dose should be adjusted accordingly to relieve symptoms, reduce volume excess, and avoid hypotension. (ACCF/AHA, Class I, Level B; revised from previous guideline)
- An IV loop diuretic is recommended to improve breathlessness and relieve congestion. Symptoms, urine output, renal function, and electrolytes should be monitored regularly during use of IV diuretics (ESC, Class I, Level B)
- Low-dose dopamine infusion may be considered in addition to loop diuretic therapy to improve diuresis and to better preserve renal function and renal blood flow. (ACCF/AHA, Class IIb, Level B)

Editorial Comment: Trevor Lewis, MD
Both guidelines conclude that diuretics are a cornerstone of therapy for acute HF. The AHA guidelines codify what has already been a common ED dosing regimen for years, and they recommend starting diuretics in the ED without delay, in an effort to improve outcomes (although their impact on mortality is not well established). The ESC guideline does not specify dosing, noting the lack of good evidence for the use of high-dose over low-dose loop diuretics and tradeoffs that include transiently worsened renal function. The addition of a thiazide diuretic is a good option to remember when initial aggressive furosemide dosing is inadequate. The weak recommendation to consider dopamine is added in this section for reader interest; however, it should be noted that this is based on a single study and the guideline authors remarked that more data are needed.

Vasodilators

- If symptomatic hypotension is absent, IV nitroglycerin, nitroprusside, or nesiritide may be considered an adjuvant to diuretic therapy for relief of dyspnea in patients admitted with acutely decompensated HF. (ACCF/AHA, Class IIb, Level B)
- An IV infusion of a nitrate should be considered in patients with pulmonary congestion/edema and a SBP > 110 mm Hg who do not have severe mitral or aortic stenosis, to reduce pulmonary capillary wedge pressure and systemic vascular resistance. Nitrates may also relieve dyspnea and congestion. Symptoms and blood pressure should be monitored frequently during administration of IV nitrates. (ESC, Class IIa, Level B)
- An IV infusion of sodium nitroprusside may be considered in patients with pulmonary congestion/edema and a SBP > 110 mm Hg who do not have severe mitral or aortic stenosis, to reduce pulmonary capillary wedge pressure and systemic vascular resistance. Nitroprusside may also relieve dyspnea and congestion. Symptoms and blood pressure should be monitored frequently during administration of IV nitroprusside. (ESC, Class IIa, Level B)

Editorial Comment: Trevor Lewis, MD
Both guideline writing committees conclude that, overall, there are no data to suggest that IV vasodilators improve major outcomes in the patient hospitalized with HF. IV vasodilators may help relieve dyspnea. The ACCF/AHA guideline also cautions that IV vasodilators should be administered with caution in patients with HFpEF, as these patients are typically more volume sensitive.

Opiates

An IV opiate (along with an antiemetic) should be considered in particularly anxious, restless, or distressed patients to relieve these symptoms and improve breathlessness. Alertness and ventilatory effort should be monitored frequently after administration because opiates can depress respiration. (ESC, Class IIa, Level C)
**Treatment Of Acute Heart Failure Without Shock (Continued)**

**Inotropes And Vasopressors**
- Inotropic agents are NOT recommended unless the patient is hypotensive (SBP < 85 mm Hg), hypoperfused, or shocked because of safety concerns (atrial and ventricular arrhythmias, myocardial ischemia, and death). (ESC, Class III, Level C)
- Use of parenteral inotropic agents in hospitalized patients without documented severe systolic dysfunction, low blood pressure, or impaired perfusion and evidence of significantly depressed cardiac output, with or without congestion, is potentially harmful. (ACCF/AHA, Class III, Level B)

**Editorial Comment: Trevor Lewis, MD**
Inotropes or vasopressors are only potentially appropriate in patients with significant hypoperfusion or cardiogenic shock. (See discussion following.)

**Treatment Of Acute Heart Failure With Hypotension, Hypoperfusion, Or Shock**

**Cardioversion**
- Electrical cardioversion is recommended if an atrial or ventricular arrhythmia is thought to be contributing to the patient’s hemodynamic compromise in order to restore sinus rhythm and improve the patient’s clinical condition. (ESC, Class I, Level C)

**Inotropes And Vasopressors**
- Short-term, continuous IV inotropic support may be reasonable in hospitalized patients presenting with documented severe systolic dysfunction who present with low blood pressure and significantly depressed cardiac output to maintain systemic perfusion and preserve end-organ performance (ACCF/AHA, Class IIb, Level B; revised from previous guideline)
- Until definitive therapy (eg, coronary revascularization, mechanical circulatory support, heart transplantation) or resolution of the acute precipitating problem, patients with cardiogenic shock should receive temporary IV inotropic support to maintain systemic perfusion and preserve end-organ performance. (ACCF/AHA, Class I, Level C)

- An IV infusion of an inotrope (eg, dobutamine) should be considered in patients with hypotension (SBP < 85 mm Hg) and/or hypoperfusion to increase cardiac output, increase blood pressure, and improve peripheral perfusion. The ECG should be monitored continuously because inotropic agents can cause arrhythmias and myocardial ischemia. (ESC, Class IIa, Level C)
- A vasopressor (eg, dopamine or norepinephrine) may be considered in patients who have cardiogenic shock, despite treatment with an inotrope, to increase blood pressure and vital organ perfusion. The ECG should be monitored, as these agents can cause arrhythmias and/or myocardial ischemia. Intra-arterial blood pressure measurement should be considered. (ESC, Class IIb, Level C)
- An IV infusion of levosimendan (or a phosphodiesterase inhibitor) may be considered to reverse the effect of beta blockade if beta blockade is thought to be contributing to hypoperfusion. The ECG should be monitored continuously because inotropic agents can cause arrhythmias and myocardial ischemia, and, as these agents are also vasodilators, blood pressure should be monitored carefully. (ESC, Class IIb, Level C)

**Editorial Comment: Trevor Lewis, MD**
Patients with acute HF and shock have severely compromised circulatory status, and the use of inotropes and vasopressors requires an assessment of the tradeoff between potential benefits and risks (including myocardial ischemia and arrhythmias) in these critically ill patients. Despite improving hemodynamic status, inotropes have not been shown to improve patient outcomes. Of note, many of the studies focus on end-stage chronic HF patients, which may not be applicable to the acute presentation of the ED patient.
Treatment Of Acute Heart Failure With Hypotension, Hypoperfusion, Or Shock (Continued)

Mechanical Circulatory Support

- Short-term mechanical circulatory support should be considered (as a "bridge to recovery") in patients remaining severely hypoperfused despite inotropic therapy and with a potentially reversible cause (e.g., viral myocarditis) or a potentially surgically correctable cause (e.g., acute interventricular septal rupture). (ESC, Class IIa, Level C)
- Short-term mechanical circulatory support may be considered (as a "bridge to decision") in patients deteriorating rapidly before a full diagnostic and clinical evaluation can be made. (ESC, Class IIb, Level C)

Treatment Of Acute Heart Failure Due To Acute Coronary Syndromes

- Immediate primary percutaneous coronary intervention (PCI) (or coronary artery bypass graft [CABG] in selected cases) is recommended if there is an ST elevation or a new left bundle branch block ACS in order to reduce the extent of myocyte necrosis and reduce the risk of premature death. (ESC, Class I, Level A; revised from previous guideline)10
- Alternative to PCI or CABG: IV thrombolytic therapy is recommended if PCI/CABG cannot be performed, or if there is ST-segment elevation or new left bundle branch block, to reduce the extent of myocyte necrosis and reduce the risk of premature death. (ESC, Class I, Level A; revised from previous guideline)10
- Early PCI (or CABG in selected patients) is recommended if there is non-ST elevation ACS in order to reduce the risk of recurrent ACS. Urgent revascularization is recommended if the patient is hemodynamically unstable. (ESC, Class I, Level A; revised from previous guideline)10

Editorial Comment: Trevor Lewis, MD

Management of patients with ST-segment elevated myocardial infarction (STEMI) and HF is straightforward, as these patients need immediate cardiac intervention. In contrast, the diagnosis and management of non-ST-segment elevated myocardial infarction (NSTEMI) is complicated by the fact that patients both with and without coronary artery disease often have elevated troponin levels in the setting of acute HF.

Treatment Of Acute Heart Failure With An Arrhythmia

- Electrical cardioversion is recommended in patients hemodynamically compromised by atrial fibrillation and in whom urgent restoration of sinus rhythm is required to improve the patient's clinical condition rapidly. (ESC, Class I, Level C)
- Patients should be fully anticoagulated (e.g., with IV heparin), if not already anticoagulated and with no contraindication to anticoagulation, as soon as atrial fibrillation is detected to reduce the risk of systemic arterial embolism and stroke. (ESC, Class I, Level A)
- Electrical cardioversion or pharmacological cardioversion with amiodarone should be considered in patients when a decision is made to restore sinus rhythm nonurgently ("rhythm control" strategy). This strategy should only be employed in patients with a first episode of atrial fibrillation of <48 hours' duration (or in patients with no evidence of left atrial appendage thrombus on transesophageal echocardiogram). (ESC, Class I, Level C)

Editorial Comment: Trevor Lewis, MD

The ACCF/AHA guideline defers to the 2011 ACCF/AHA/HRS Focused Update on the Management of Patients With Atrial Fibrillation guideline (available at http://circ.ahajournals.org/content/123/1/104.extract) for treatment of patients with HF and arrhythmia. The ESC guideline comments on the use of urgent heparin for patients who are not currently anticoagulated. In addition, the guidelines mirror the current Advanced Cardiac Life Support (ACLS) recommendations to cardiovert the unstable patient. Care must be employed in interpreting what constitutes an "unstable" patient, especially in the setting of unknown duration of AF with the potential for atrial clot. A fully revised atrial fibrillation guideline, which will include updated recommendations on HF with atrial fibrillation, is in development by the ACCF/AHA, with publication expected in 2014.
Summary Of Guideline-Directed Medical Therapy For The Emergency Physician: Trevor White, MD

The ACCF/AHA guideline emphasizes the importance of “guideline-directed medical therapy,” and both they and the ESC spend much time discussing the appropriate outpatient regimen for the management of chronic HF. An understanding of these medications is useful for the emergency clinician when managing HF patients in the ED, whether they have an acute decompensation or not.

Both angiotensin-converting enzyme (ACE) inhibitors and beta blockers have been cornerstones of HFrEF treatment for years. Key trials have included the Cooperative North Scandinavian Enalapril Survival Study (CONSENSUS) and Studies of Left Ventricular Dysfunction (SOLVD), which have shown reductions in mortality of 27% and 16%, respectively, with the use of these drugs.\(^\text{11-13}\) The primary role of angiotensin-receptor blockers (ARBs) still appears to be as a substitute for patients who are intolerant to ACE inhibitors. The expansion of the role of mineralocorticoid/aldosterone-receptor antagonists has come from recent RCTs, including the Eplerenone in Mild Patients Hospitalization and Survival Study in Heart Failure (EMPHASIS-HF), which found that patients already taking ACE inhibitors and beta blockers had a decrease in hospitalizations and death.\(^\text{14,15}\) The bottom line is that the use of ACE inhibitors, beta blockers, and mineralocorticoid/aldosterone-receptor antagonists is fundamentally important in improving the course of systolic HF and should, at least, be considered in every patient. The utility of digoxin still remains more of an additive medication after the implementation of other first-line therapies.

Treatments That May Cause Harm

- Drugs known to adversely affect the clinical status of patients with current or prior symptoms of HFrEF are potentially harmful and should be avoided or withdrawn whenever possible (eg, most antiarrhythmic drugs, most calcium-channel-blocking drugs [except amlodipine], NSAIDs, or thiazolidinediones). (ACCF/AHA, Class III, Level B)
- Thiazolidinediones (glitazones) should not be used, as they cause worsening HF and increase the risk of HF hospitalization. (ESC, Class III, Level A)
- Most calcium-channel blockers (with the exception of amlodipine and felodipine) should not be used, as they have a negative inotropic effect and can cause worsening HF. (ESC, Class III, Level B)
- NSAIDs and cyclooxygenase-2 (COX-2) inhibitors should be avoided, if possible, as they may cause sodium and water retention, worsening renal function, and worsening HF. (ESC, Class III, Level B)

Editorial Comment: Trevor Lewis, MD

These recommendations are new in the current guidelines. They provide a useful summary of drugs for emergency clinicians to avoid when managing HF. Reviewing a patient’s medication list can provide clues to reasons for their decompensation. Commonly prescribed diabetes medications, such as pioglitazone (Actos\textsuperscript{®}) and rosiglitazone (Avandia\textsuperscript{®}) should be avoided in HF patients. More important for emergency medicine practice is the avoidance of NSAIDs and COX-2 selective inhibitor medications in HF. These are commonly prescribed medications in the ED and often given to this subset of patients.
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1. **BNP may be helpful for all of the following clinical scenarios except to:**
   a. Support a clinical diagnosis in the setting of suspected acute HF
   b. Provide prognostic information in patients with acute HF
   c. Guide therapy for patients with acute HF
   d. Establish disease severity in patients with acute HF

2. **The ACCF/AHA guideline gives the strongest recommendation to which of the following treatments for acute HF?**
   a. IV vasodilators
   b. IV diuretics
   c. NIV
   d. IV opiates

3. **Which of the following treatment options is generally contraindicated in the severely hypotensive patient with acute HF?**
   a. NIV
   b. Inotropes
   c. Vaspressors
   d. Mechanical circulatory support

4. **Which of the following classes of medications is generally contraindicated in patients with HFrEF?**
   a. ACE inhibitors
   b. Beta blockers
   c. MRAs
   d. NSAIDs
Current Guidelines For The Evaluation And Management Of Heart Failure

To contact the Editor-In-Chief, email Sigrid Hahn, MD, MPH at: editorial@ebmedicine.net

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Target Audience: This enduring material is designed for emergency medicine physicians, physician assistants, nurse practitioners, and residents.

Goals: Upon completion of this article, you should be able to: (1) demonstrate medical decision-making based on the strongest clinical evidence, (2) cost-effectively diagnose and treat the most critical ED presentations, and (3) describe the most common medicolegal pitfalls for each topic covered.

Objectives: Upon completion of this article, you should be able to: (1) cite recommendations for the evaluation of the patient with suspected acute HF in the ED; (2) describe recommendations for the treatment of the patient with suspected acute HF in the ED; (3) name medications that are contraindicated in patients with acute HF; and (4) name medications used for the outpatient management of chronic HF.

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