Yancy, CW, et al.

Heart Failure Focused Update on Pharmacological Therapy

2016 ACC/AHA/HFSA Focused Update on New Pharmacological Therapy for Heart Failure: An Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure

A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines and the Heart Failure Society of America

Developed in Collaboration With the International Society for Heart and Lung Transplantation

WRITING COMMITTEE MEMBERS*

Clyde W. Yancy, MD, MSc, MACC, FAHA, FHFS, Chair
Mariell Jessup, MD, FACC, FAHA, FESC, Vice Chair
Biykem Bozkurt, MD, PhD, FACC, FAHA†
Javed Butler, MD, MBA, MPH, FACC, FAHA‡
Donald E. Casey, Jr, MD, MPH, MBA, FACC§
Monica M. Colvin, MD, FAHA∥
Mark H. Drazner, MD, MSc, FACC, FAHA‡
Gerasimos Filippatos, MD, FESC
Gregg C. Fonarow, MD, FACC, FAHA, FHFS∥
Michael M. Givertz, MD, FACC, FHFS∥

ACC/AHA TASK FORCE MEMBERS

Jonathan L. Halperin, MD, FACC, FAHA, Chair
Glenn N. Levine, MD, FACC, FAHA, Chair-Elect
Sana M. Al-Khatib, MD, MHS, FACC, FAHA
Kim K. Birtcher, PharmD, MS, AACC
Biykem Bozkurt, MD, PhD, FACC, FAHA
Ralph G. Brindis, MD, MPH, MACC
Joaquin E. Cigarroa, MD, FACC
Lesley H. Curtis, PhD, FAHA
Lee A. Fleisher, MD, FACC, FAHA
Federico Gentile, MD, FACC
Samuel Gidding, MD, FAHA
Mark A. Hlatky, MD, FACC
John Ikonomidis, MD, PhD, FAHA
José Joglar, MD, FACC, FAHA
Susan J. Pressler, PhD, RN, FAHA
Duminda N. Wijeysundera, MD, PhD

*Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry may apply; see Appendix 1 for detailed information.
†ACC/AHA Task Force on Clinical Practice Guidelines Liaison. ‡ACC/AHA Representative. §ACP Representative. ∥ISHLT Representative. ¶HFSA Representative. #CHEST Representative. **ACC/AHA Task Force on Performance Measures Representative. ††AAFP Representative.

This document was approved by the American College of Cardiology Board of Trustees and Executive Committee, the American Heart Association Science Advisory and Coordinating Committee and Executive Committee, and the Heart Failure Society of America Executive Committee in April 2016.

Yancy, CW, et al.
Heart Failure Focused Update on Pharmacological Therapy


This article has been copublished in the Journal of American College of Cardiology and Circulation.

Copies: This document is available on the World Wide Web sites of the American College of Cardiology (www.acc.org), the American Heart Association (professional.heart.org), and the Heart Failure Society of America (www.hfsa.org). For copies of this document, please contact the Elsevier Inc. Reprint Department via fax (212-633-3820) or e-mail (reprints@elsevier.com).

Permissions: Multiple copies, modification, alteration, enhancement, and/or distribution of this document are not permitted without the express permission of the Journal of Cardiac Failure. Requests may be completed online via the Elsevier site (http://www.elsevier.com/about/policies/author-agreement/obtaining-permission).

© 2016 by the American College of Cardiology Foundation, the American Heart Association, Inc., and the Heart Failure Society of America.
Table of Contents

Preamble ........................................................................................................................................... 4
Introduction ........................................................................................................................................ 6
7.3. Stage C ...................................................................................................................................... 8
  7.3.2. Pharmacological Treatment for Stage C HF With Reduced Ejection Fraction: Recommendations 8
    7.3.2.10. Renin-Angiotensin System Inhibition With Angiotensin-Converting Enzyme Inhibitor or Angiotensin Receptor Blocker or ARNI: Recommendations ......................................................... 8
    7.3.2.11. Ivabradine: Recommendation ......................................................................................... 11
References ........................................................................................................................................ 13
Appendix 1. Author Relationships With Industry and Other Entities (Relevant) .............................. 16
Appendix 2. Reviewer Relationships With Industry and Other Entities (Comprehensive) .......... 19
Preamble

Incorporation of new study results, medications, or devices that merit modification of existing clinical practice guideline recommendations, or the addition of new recommendations, is critical to ensuring that guidelines reflect current knowledge, available treatment options, and optimum medical care. To keep pace with evolving evidence, the American College of Cardiology (ACC)/American Heart Association (AHA) Task Force on Clinical Practice Guidelines (“Task Force”) has issued this focused update to reassess guideline recommendations on the basis of recently published study data. This update has been subject to rigorous, multilevel review and approval, similar to the full guidelines. For specific focused update criteria and additional methodological details, please see the ACC/AHA guideline methodology manual (1).

Modernization—Processes have evolved over time in response to published reports from the Institute of Medicine (2, 3) and ACC/AHA mandates (4-7), leading to adoption of a “knowledge byte” format. This process entails delineation of a recommendation addressing a specific clinical question, followed by concise text (ideally <250 words) and hyperlinked to supportive evidence. This approach better accommodates time constraints on busy clinicians, facilitates easier access to recommendations via electronic search engines and other evolving technology, and supports the evolution of guidelines as “living documents” that can be dynamically updated as needed.

Guideline-Directed Evaluation and Management—The term guideline-directed evaluation and management (GDEM) refers to care defined mainly by ACC/AHA Class I recommendations. For these and all recommended drug treatment regimens, the reader should confirm dosage with product insert material and carefully evaluate for contraindications and interactions. Recommendations are limited to treatments, drugs, and devices approved for clinical use in the United States.

Class of Recommendation and Level of Evidence—The Class of Recommendation (COR) and Level of Evidence (LOE) are derived independently of each other according to established criteria. The COR indicates the strength of recommendation, encompassing the estimated magnitude and certainty of benefit of a clinical action in proportion to risk. The LOE rates the quality of scientific evidence supporting the intervention on the basis of the type, quantity, and consistency of data from clinical trials and other sources (Table 1). Recommendations in this focused update reflect the new 2015 COR/LOE system, in which LOE B and C are subcategorized for the purpose of increased granularity (1, 5, 8).

Relationships With Industry and Other Entities—The ACC and AHA exclusively sponsor the work of guideline writing committees without commercial support, and members volunteer time for this activity. Selected organizations and professional societies with related interests and expertise are invited to participate as partners or collaborators. The Task Force makes every effort to avoid actual, potential, or perceived conflicts of interest that might arise through relationships with industry or other entities (RWI). All writing committee members and reviewers are required to fully disclose current industry relationships or personal interests, beginning 12 months before initiation of the writing effort. Management of RWI involves selecting a balanced writing committee and requires that both the chair and a majority of writing committee members have no relevant RWI (see Appendix 1 for the definition of relevance). Members are restricted with regard to writing or voting on sections to which RWI apply. Members of the writing
Yancy, CW, et al.
Heart Failure Focused Update on Pharmacological Therapy

commits who recused themselves from voting are indicated and specific section recusals are noted in Appendix 1. In addition, for transparency, members’ comprehensive disclosure information is available as an Online Supplement (http://jaccjacc.acc.org/Clinical_Document/HF_Focused_Update_RWI_Table_comprehensive_S5.pdf), and reviewers’ RWI disclosures are included in Appendix 2. Comprehensive disclosure information for the Task Force is also available at http://www.acc.org/guidelines/about-guidelines-and-clinical-documents/guidelines-and-documents-task-forces. The Task Force strives to avoid bias by selecting experts from a broad array of backgrounds representing different geographic regions, genders, ethnicities, intellectual perspectives, and scopes of clinical activities.

Intended Use—Guidelines provide recommendations applicable to patients with or at risk of developing cardiovascular disease. The focus is on medical practice in the United States, but guidelines developed in collaboration with other organizations may have a broader target. Although guidelines may be used to inform regulatory or payer decisions, the intent is to improve quality of care and align with patients’ interests. The guidelines are reviewed annually by the Task Force and are official policy of the ACC and AHA. Each guideline is considered current unless and until it is updated, revised, or superseded by a published addendum.

Related Issues—For additional information pertaining to the methodology for grading evidence, assessment of benefit and harm, shared decision making between the patient and clinician, structure of evidence tables and summaries, standardized terminology for articulating recommendations, organizational involvement, peer review, and policies regarding periodic assessment and updating of guideline documents, we encourage readers to consult the ACC/AHA guideline methodology manual (1).

Jonathan L. Halperin, MD, FACC, FAHA
Chair, ACC/AHA Task Force on Clinical Practice Guidelines
Introduction

The ACC, the AHA, and the Heart Failure Society of America (HFSA) recognize that the introduction of effective new therapies that potentially affect a large number of patients presents both opportunities and challenges. The introduction of an angiotensin receptor–neprilysin inhibitor (ARNI) (valsartan/sacubitril) and a sinoatrial node modulator (ivabradine), when applied judiciously, complements established pharmacological and device-based therapies and represents a milestone in the evolution of care for patients with heart failure (HF). Accordingly, the writing committees of the “2016 ACC/AHA/HFSA Focused Update on New Pharmacological Therapy for Heart Failure” and the “2016 ESC Guideline on the Diagnosis and Treatment of Acute and Chronic Heart Failure” concurrently developed recommendations for the incorporation of these therapies into clinical practice. Working independently, each writing committee surveyed the evidence, arrived at similar conclusions, and constructed similar, but not identical, recommendations. Given the concordance, the respective organizations simultaneously issued aligned recommendations on the use of these new treatments to minimize confusion and improve the care of patients with HF.

Members of the ACC/AHA/HFSA writing committee without relevant RWI voted on the final recommendations. These were subjected to external peer review by 25 official, organizational, and content reviewers before approval by the Task Force and the leadership of the ACC, AHA, and HFSA, as well as endorsement by the International Society for Heart and Lung Transplantation. The statements issued by the European Society of Cardiology writing committee went through a similarly rigorous process of external review before endorsement by the societal leadership.

No single clinical trial answers all pertinent questions, nor can trial results be perfectly replicated in clinical practice. Several critical questions remain unanswered, and further experience in both ongoing trials and clinical therapeutics may require modification of these initial recommendations. On the basis of the currently available evidence, however, the recommendations that follow reflect our assessment of how best to proceed today.
Table 1. Applying Class of Recommendation and Level of Evidence to Clinical Strategies, Interventions, Treatments, or Diagnostic Testing in Patient Care* (Updated August 2015)

<table>
<thead>
<tr>
<th>CLASS (STRENGTH) OF RECOMMENDATION</th>
<th>LEVEL (QUALITY) OF EVIDENCE‡</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CLASS I</strong> (STRONG) Benefit &gt;&gt;&gt; Risk</td>
<td><strong>LEVEL A</strong></td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td>- High-quality evidence† from more than 1 RCT</td>
</tr>
<tr>
<td>- Is recommended</td>
<td>- Meta-analyses of high-quality RCTs</td>
</tr>
<tr>
<td>- Is indicated/useful/effective/beneficial</td>
<td>- One or more RCTs corroborated by high-quality registry studies</td>
</tr>
<tr>
<td>- Should be performed/administered/other</td>
<td></td>
</tr>
<tr>
<td>- Comparative-Effectiveness Phrases†:</td>
<td></td>
</tr>
<tr>
<td>- Treatment/strategy A is recommended/indicated in preference to treatment B</td>
<td></td>
</tr>
<tr>
<td>- Treatment A should be chosen over treatment B</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS IIa</strong> (MODERATE) Benefit &gt;&gt; Risk</td>
<td><strong>LEVEL B-R</strong> (Randomized)</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>- Is reasonable</td>
<td>- Moderate-quality evidence† from 1 or more RCTs</td>
</tr>
<tr>
<td>- Can be useful/effective/beneficial</td>
<td>- Meta-analyses of moderate-quality RCTs</td>
</tr>
<tr>
<td>- Comparative-Effectiveness Phrases†:</td>
<td></td>
</tr>
<tr>
<td>- Treatment/strategy A is probably recommended/indicated in preference to treatment B</td>
<td></td>
</tr>
<tr>
<td>- It is reasonable to choose treatment A over treatment B</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS IIb</strong> (WEAK) Benefit ≥ Risk</td>
<td><strong>LEVEL B-NR</strong> (Nonrandomized)</td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>- May/might be reasonable</td>
<td>- Moderate-quality evidence† from 1 or more well-designed, well-executed nonrandomized studies, observational studies, or registry studies</td>
</tr>
<tr>
<td>- May/might be considered</td>
<td>- Meta-analyses of such studies</td>
</tr>
<tr>
<td>- Usefulness/effectiveness is unknown/unclear/uncertain or not well established</td>
<td></td>
</tr>
<tr>
<td><strong>CLASS III: No Benefit (MODERATE)</strong></td>
<td><strong>LEVEL C-LD</strong> (Limited Data)</td>
</tr>
<tr>
<td>(Generally, LOE A or B use only) Benefit = Risk</td>
<td></td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>- Is not recommended</td>
<td>- Randomized or nonrandomized observational or registry studies with limitations of design or execution</td>
</tr>
<tr>
<td>- Is not indicated/useful/effective/beneficial</td>
<td>- Meta-analyses of such studies</td>
</tr>
<tr>
<td>- Should not be performed/administered/other</td>
<td>- Physiological or mechanistic studies in human subjects</td>
</tr>
<tr>
<td><strong>CLASS III: Harm (STRONG)</strong></td>
<td><strong>LEVEL C-EO</strong> (Expert Opinion)</td>
</tr>
<tr>
<td>Risk &gt; Benefit</td>
<td><strong>Consensus of expert opinion based on clinical experience</strong></td>
</tr>
<tr>
<td>Suggested phrases for writing recommendations:</td>
<td></td>
</tr>
<tr>
<td>- Potentially harmful</td>
<td></td>
</tr>
<tr>
<td>- Causes harm</td>
<td></td>
</tr>
<tr>
<td>- Associated with excess morbidity/mortality</td>
<td></td>
</tr>
<tr>
<td>- Should not be performed/administered/other</td>
<td></td>
</tr>
</tbody>
</table>

COR and LOE are determined independently (any COR may be paired with any LOE). A recommendation with LOE C does not imply that the recommendation is weak. Many important clinical questions addressed in guidelines do not lend themselves to clinical trials. Although RCTs are unavailable, there may be a very clear clinical consensus that a particular test or therapy is useful or effective.

* The outcome or result of the intervention should be specified (an improved clinical outcome or increased diagnostic accuracy or incremental prognostic information).

† For comparative-effectiveness recommendations (COR I and IIa; LOE A and B only), studies that support the use of comparator verbs should involve direct comparisons of the treatments or strategies being evaluated.

‡ The method of assessing quality is evolving, including the application of standardized, widely used, and preferably validated evidence grading tools; and for systematic reviews, the incorporation of an Evidence Review Committee.

COR indicates Class of Recommendation; EO, expert opinion; LD, limited data; LOE, Level of Evidence; NR, nonrandomized; R, randomized; and RCT, randomized controlled trial.
7.3. Stage C

7.3.2. Pharmacological Treatment for Stage C HF With Reduced Ejection Fraction: Recommendations

7.3.2.10. Renin-Angiotensin System Inhibition With Angiotensin-Converting Enzyme Inhibitor or Angiotensin Receptor Blocker or ARNI: Recommendations

See the Online Data Supplement (http://jaccjacc.acc.org/Clinical_Document/2016_Heart_Failure_Focused_Update_Data_Supplement_New_Therapy_Only_S5.pdf) for evidence supporting these recommendations.

| Recommendations for Renin-Angiotensin System Inhibition With ACE Inhibitor or ARB or ARNI |
|---|---|
| COR | LOE | Recommendations |
| I | ACE: A | The clinical strategy of inhibition of the renin-angiotensin system with ACE inhibitors (Level of Evidence: A) (9-14), OR ARBs (Level of Evidence: A) (15-18), OR ARNI (Level of Evidence: B-R) (19) in conjunction with evidence-based beta blockers (20-22), and aldosterone antagonists in selected patients (23, 24), is recommended for patients with chronic HFrEF to reduce morbidity and mortality. |
| | ARB: A | Angiotensin-converting enzyme (ACE) inhibitors reduce morbidity and mortality in heart failure with reduced ejection fraction (HFrEF). Randomized controlled trials (RCTs) clearly establish the benefits of ACE inhibition in patients with mild, moderate, or severe symptoms of HF and in patients with or without coronary artery disease (9-14). ACE inhibitors can produce angioedema and should be given with caution to patients with low systemic blood pressures, renal insufficiency, or elevated serum potassium. ACE inhibitors also inhibit kininase and increase levels of bradykinin, which can induce cough but also may contribute to their beneficial effect through vasodilation. |
| | ARNI: B-R | Angiotensin receptor blockers (ARBs) were developed with the rationale that angiotensin II production continues in the presence of ACE inhibition, driven through alternative enzyme pathways. ARBs do not inhibit kininase and are associated with a much lower incidence of cough and angioedema than ACE inhibitors; but like ACE inhibitors, ARBs should be given with caution to patients with low systemic blood pressure, renal insufficiency, or elevated serum potassium. Long-term therapy with ARBs produces hemodynamic, neurohormonal, and clinical effects consistent with those expected after interference with the renin-angiotensin system and have been shown in RCTs (15-18) to reduce morbidity and mortality, especially in ACE inhibitor–intolerant patients. |
| | | In ARNI, an ARB is combined with an inhibitor of neprilysin, an enzyme that degrades natriuretic peptides, bradykinin, adrenomedullin, and other vasoactive peptides. In an RCT that compared the first approved ARNI, |
| | | See Online Data Supplements 1, 2, 18-20. |
valsartan/sacubitril, with enalapril in symptomatic patients with HFrEF tolerating an adequate dose of either ACE inhibitor or ARB, the ARNI reduced the composite endpoint of cardiovascular death or HF hospitalization significantly, by 20% (19). The benefit was seen to a similar extent for both death and HF hospitalization and was consistent across subgroups. The use of ARNI is associated with the risk of hypotension and renal insufficiency and may lead to angioedema, as well.

<table>
<thead>
<tr>
<th>I</th>
<th>ACE: A</th>
<th>The use of ACE inhibitors is beneficial for patients with prior or current symptoms of chronic HFrEF to reduce morbidity and mortality (9-14, 25).</th>
</tr>
</thead>
</table>

ACE inhibitors have been shown in large RCTs to reduce morbidity and mortality in patients with HFrEF with mild, moderate, or severe symptoms of HF, with or without coronary artery disease (9-14). Data suggest that there are no differences among available ACE inhibitors in their effects on symptoms or survival (25). ACE inhibitors should be started at low doses and titrated upward to doses shown to reduce the risk of cardiovascular events in clinical trials. ACE inhibitors can produce angioedema and should be given with caution to patients with low systemic blood pressures, renal insufficiency, or elevated serum potassium (>5.0 mEq/L). Angioedema occurs in <1% of patients who take an ACE inhibitor, but it occurs more frequently in blacks and women (26). Patients should not be given ACE inhibitors if they are pregnant or plan to become pregnant. ACE inhibitors also inhibit kininase and increase levels of bradykinin, which can induce cough in up to 20% of patients but also may contribute to beneficial vasodilation. If maximal doses are not tolerated, intermediate doses should be tried; abrupt withdrawal of ACE inhibition can lead to clinical deterioration and should be avoided.

Although the use of an ARNI in lieu of an ACE inhibitor for HFrEF has been found to be superior, for those patients for whom ARNI is not appropriate, continued use of an ACE inhibitor for all classes of HFrEF remains strongly advised.

<table>
<thead>
<tr>
<th>I</th>
<th>ARB: A</th>
<th>The use of ARBs to reduce morbidity and mortality is recommended in patients with prior or current symptoms of chronic HFrEF who are intolerant to ACE inhibitors because of cough or angioedema (15-18, 27, 28).</th>
</tr>
</thead>
</table>

ARBs have been shown to reduce mortality and HF hospitalizations in patients with HFrEF in large RCTs (15-18). Long-term therapy with ARBs in patients with HFrEF produces hemodynamic, neurohormonal, and clinical effects consistent with those expected after interference with the renin-angiotensin system (27, 28). Unlike ACE inhibitors, ARBs do not inhibit kininase and are associated with a much lower incidence of cough and angioedema, although kininase inhibition by ACE inhibitors may produce beneficial vasodilatory effects.

Patients intolerant to ACE inhibitors because of cough or angioedema should be started on ARBs; patients already tolerating ARBs for other
indications may be continued on ARBs if they subsequently develop HF. ARBs should be started at low doses and titrated upward, with an attempt to use doses shown to reduce the risk of cardiovascular events in clinical trials. ARBs should be given with caution to patients with low systemic blood pressure, renal insufficiency, or elevated serum potassium (>5.0 mEq/L). Although ARBs are alternatives for patients with ACE inhibitor–induced angioedema, caution is advised because some patients have also developed angioedema with ARBs.

Head-to-head comparisons of an ARB versus ARNI for HF do not exist.

For those patients for whom an ACE inhibitor or ARNI is inappropriate, use of an ARB remains advised.

<table>
<thead>
<tr>
<th>I</th>
<th>ARNI: B-R</th>
<th>In patients with chronic symptomatic HFrEF NYHA class II or III who tolerate an ACE inhibitor or ARB, replacement by an ARNI is recommended to further reduce morbidity and mortality (19).</th>
</tr>
</thead>
</table>

Benefits of ACE inhibitors with regard to decreasing HF progression, hospitalizations, and mortality rate have been shown consistently for patients across the clinical spectrum, from asymptomatic to severely symptomatic HF. Similar benefits have been shown for ARBs in populations with mild-to-moderate HF who are unable to tolerate ACE inhibitors. In patients with mild-to-moderate HF (characterized by either 1) mildly elevated natriuretic peptide levels, BNP [B-type natriuretic peptide] >150 pg/mL or NT-proBNP [N-terminal pro-B-type natriuretic peptide] ≥600 pg/mL; or 2) BNP ≥100 pg/mL or NT-proBNP ≥400 pg/mL with a prior hospitalization in the preceding 12 months) who were able to tolerate both a target dose of enalapril (10 mg twice daily) and then subsequently an ARNI (valsartan/sacubitril; 200 mg twice daily, with the ARB component equivalent to valsartan 160 mg), hospitalizations and mortality were significantly decreased with the valsartan/sacubitril compound compared with enalapril. The target dose of the ACE inhibitor was consistent with that known to improve outcomes in previous landmark clinical trials (10). This ARNI has recently been approved for patients with symptomatic HFrEF and is intended to be substituted for ACE inhibitors or ARBs. HF effects and potential off-target effects may be complex with inhibition of the neprilysin enzyme, which has multiple biological targets. Use of an ARNI is associated with hypotension and a low-frequency incidence of angioedema. To facilitate initiation and titration, the approved ARNI is available in 3 doses that include a dose that was not tested in the HF trial; the target dose used in the trial was 97/103 mg twice daily (29). Clinical experience will provide further information about the optimal titration and tolerability of ARNI, particularly with regard to blood pressure, adjustment of concomitant HF medications, and the rare complication of angioedema (30).

<table>
<thead>
<tr>
<th>III: Harm</th>
<th>B-R</th>
<th>ARNI should not be administered concomitantly with ACE inhibitors or within 36 hours of the last dose of an ACE inhibitor (31, 32).</th>
</tr>
</thead>
</table>

See Online Data Supplements 1 and 18.

See Online Data Supplement 3.
Yancy, CW, et al.
Heart Failure Focused Update on Pharmacological Therapy

Omapatrilat, was studied in both hypertension and HF, but its development was terminated because of an unacceptable incidence of angioedema (31, 32) and associated significant morbidity. This adverse effect was thought to occur because both ACE and neprilysin break down bradykinin, which directly or indirectly can cause angioedema (32, 33). An ARNI should not be administered within 36 hours of switching from or to an ACE inhibitor.

### III: Harm

<table>
<thead>
<tr>
<th>C-EO</th>
<th>ARNI should not be administered to patients with a history of angioedema.</th>
</tr>
</thead>
</table>

Omapatrilat, a neprilysin inhibitor (as well as an ACE inhibitor and aminopeptidase P inhibitor), was associated with a higher frequency of angioedema than that seen with enalapril in an RCT of patients with HFrEF (31). In a very large RCT of hypertensive patients, omapatrilat was associated with a 3-fold increased risk of angioedema as compared with enalapril (32). Blacks and smokers were particularly at risk. The high incidence of angioedema ultimately led to cessation of the clinical development of omapatrilat (34, 35).

In light of these observations, angioedema was an exclusion criterion in the first large trial assessing ARNI therapy in patients with hypertension (36) and then in the large trial that demonstrated clinical benefit of ARNI therapy in HFrEF (19). ARNI therapy should not be administered in patients with a history of angioedema because of the concern that it will increase the risk of a recurrence of angioedema.

### 7.3.2.11. Ivabradine: Recommendation

See the Online Data Supplement
(http://jaccjacc.acc.org/Clinical_Document/2016_Heart_Failure_Focused_Update_Data_Supplement_New_Therapy_Only_S5.pdf) for evidence supporting this recommendation.

<table>
<thead>
<tr>
<th>Recommendation for Ivabradine</th>
</tr>
</thead>
<tbody>
<tr>
<td>COR</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>IIa</td>
</tr>
</tbody>
</table>

Ivabradine is a new therapeutic agent that selectively inhibits the If current in the sinoatrial node, providing heart rate reduction. One RCT demonstrated the efficacy of ivabradine in reducing the composite endpoint of cardiovascular death or HF hospitalization (38). The benefit of ivabradine was driven by a reduction in HF hospitalization. The study included patients with HFrEF (NYHA class II-IV, albeit with only a modest representation of NYHA class IV HF) and left ventricular ejection fraction (LVEF) ≤35%, in sinus rhythm with a resting heart rate of ≥70 beats per minute. Patients enrolled included a small number with paroxysmal atrial fibrillation (<40% of the time) but otherwise in
sinus rhythm and a small number experiencing ventricular pacing but with a predominant sinus rhythm. Those with a myocardial infarction within the preceding 2 months were excluded. Patients enrolled had been hospitalized for HF in the preceding 12 months and were on stable GDEM for 4 weeks before initiation of ivabradine therapy. The target of ivabradine is heart rate slowing (the presumed benefit of action), but only 25% of patients studied were on optimal doses of beta-blocker therapy (20-22, 38). Given the well-proven mortality benefits of beta-blocker therapy, it is important to initiate and up titrate these agents to target doses, as tolerated, before assessing the resting heart rate for consideration of ivabradine initiation (38).

The remainder of the 2016 ACC/AHA/HFSA Focused Update on the Management of Heart Failure: An Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure will be forthcoming.

Presidents and Staff

**American College of Cardiology**

Richard A. Chazal, MD, FACC, President
Shalom Jacobovitz, Chief Executive Officer
William J. Oetgen, MD, MBA, FACC, Executive Vice President, Science, Education, Quality, and Publications
Amelia Scholtz, PhD, Publications Manager, Science, Education, Quality, and Publishing

**American College of Cardiology/American Heart Association**

Melanie Stephens-Lyman, MSc, Director, Guideline Operations and Strategy
Lisa Bradfield, CAE, Director, Guideline Methodology and Policy
Abdul R. Abdullah, MD, Associate Science and Medicine Advisor
Morgane Cibotti-Sun, MPH, Project Manager, Clinical Practice Guidelines

**American Heart Association**

Mark A. Creager, MD, FACC, FAHA, President
Nancy Brown, Chief Executive Officer
Rose Marie Robertson, MD, FAHA, Chief Science and Medical Officer
Gayle R. Whitman, PhD, RN, FAHA, FAAN, Senior Vice President, Office of Science Operations
Comilla Sasson, MD, PhD, FACEP, Vice President, Science and Medicine
Jody Hundley, Production Manager, Scientific Publications, Office of Science Operations

**Key Words:** ACC/AHA Clinical Practice Guidelines ■ Heart Failure ■ Focused Update ■ Angiotensin Receptor-Neprilysin Inhibitor ■ Ivabradine ■ Angiotensin Receptor Blockers ■ Angiotensin-Converting Enzyme Inhibitors ■ Beta blockers ■ Angioedema ■ Natriuretic Peptides
References


Yancy, CW, et al.
Heart Failure Focused Update on Pharmacological Therapy

Appendix 1. Author Relationships With Industry and Other Entities (Relevant)—2016 ACC/AHA/HFSA Focused Update on New Pharmacological Therapy for Heart Failure (December 2015)

<table>
<thead>
<tr>
<th>Committee Member</th>
<th>Employment</th>
<th>Consultant</th>
<th>Speakers Bureau</th>
<th>Ownership/Partnership/Principal</th>
<th>Personal Research</th>
<th>Institutional, Organizational, or Other Financial Benefit</th>
<th>Expert Witness</th>
<th>Voting Recusals By Section*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clyde W. Yancy (Chair)</td>
<td>Northwestern University Feinberg School of Medicine, Division of Cardiology—Professor of Medicine and Chief; Diversity and Inclusion—Vice Dean</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Mariell Jessup (Vice Chair)</td>
<td>University of Pennsylvania—Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Biykem Bozkurt</td>
<td>Michael E. DeBakey VA Medical Center—The Mary and Gordon Cain Chair and Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>• Novartis</td>
<td>None</td>
<td>None</td>
<td>7.3.2.10 and 7.3.2.11.</td>
</tr>
<tr>
<td>Javed Butler</td>
<td>Stony Brook University—Division Chief of Cardiology</td>
<td>• Bayer†</td>
<td>• CardioCell†</td>
<td>• Medtronic</td>
<td>• Novartis†</td>
<td>• Amgen (DSMB)†</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Donald E. Casey, Jr</td>
<td>Thomas Jefferson College of Population Health—Adjunct Faculty; Alvarez &amp; Marsal IPO4Health—Principal and Founder</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Monica M. Colvin</td>
<td>University of Michigan—Associate Professor of Medicine, Cardiology</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Mark H. Drazner</td>
<td>University of Texas Southwestern Medical Center—Professor, Internal Medicine</td>
<td>None</td>
<td>None</td>
<td>• Trevena†</td>
<td>None</td>
<td>• DCRI/Otsuka</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>
## Gerasimos S. Filippatos
National and Kapodistrian University of Athens; Attikon University Hospital, Department of Cardiology, Heart Failure Unit—Professor of Cardiology

None
None
None
Bayer†
Bayer (DSMB)
Novartis†
Servier
Pharmaceuticals†
Vifor
None
None
7.3.2.10 and 7.3.2.11.

## Gregg C. Fonarow
Ahmanson-UCLA Cardiomyopathy Center—Director; UCLA Division of Cardiology—Co-Chief

• Amgen
• Janssen Pharmaceuticals
• Novartis†
None
None
Novartis†
None
None
7.3.2.10 and 7.3.2.11.

## Michael M. Givertz
Brigham and Women's Hospital—Professor of Medicine

• Merck
• Novartis
None
None
None
None
None
7.3.2.10 and 7.3.2.11.

## Steven M. Hollenberg
Cooper University Hospital—Director, Coronary Care Unit, Professor of Medicine

None
None
None
None
None
None
None

## JoAnn Lindenfeld
Vanderbilt Heart and Vascular Institute—Director, Advanced Heart Failure and Transplant Section—Professor of Medicine

• Abbott
• Janssen Pharmaceuticals
• Novartis
• Relypsa†
• ResMed†
None
None
AstraZeneca
Novartis†
None
None
7.3.2.10 and 7.3.2.11.

## Frederick A. Masoudi
University of Colorado, Denver—Associate Professor of Medicine, Division of Cardiology

None
None
None
None
None
None
None

## Patrick E. McBride
University of Wisconsin School of Medicine and Public Health—Professor of Medicine and Family Medicine; Associate Director, Preventive Cardiology

None
None
None
None
None
None
None

## Pamela N. Peterson
University of Colorado, Denver Health Medical Center—Associate Professor of Medicine, Division of Cardiology

None
None
None
None
None
None
None

## Lynne W. Stevenson
Brigham and Women’s Hospital Cardiovascular Division—Director, Cardiomyopathy and Heart Failure Program

None
None
None
Novartis—PARENT trial (PI)
None
None
7.3.2.10 and 7.3.2.11.
Yancy, CW, et al.
Heart Failure Focused Update on Pharmacological Therapy

<table>
<thead>
<tr>
<th>Cheryl Westlake</th>
<th>Azusa Pacific University—Professor and Associate Dean, International and Community Programs</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
</tr>
</thead>
</table>

This table represents the relationships of committee members with industry and other entities that were determined to be relevant to this document. These relationships were reviewed and updated in conjunction with all meetings and/or conference calls of the writing committee during the document development process. The table does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant interest in a business if the interest represents ownership of ≥5% of the voting stock or share of the business entity, or ownership of ≥$5,000 of the fair market value of the business entity, or if funds received by the person from the business entity exceed 5% of the person’s gross income for the previous year. Relationships that exist with no financial benefit are also included for the purpose of transparency. Relationships in this table are modest unless otherwise noted.

According to the ACC/AHA, a person has a relevant relationship IF: a) The relationship or interest relates to the same or similar subject matter, intellectual property or asset, topic, or issue addressed in the document; or b) the company/entity (with whom the relationship exists) makes a drug, drug class, or device addressed in the document, or makes a competing drug or device addressed in the document; or c) the person or a member of the person’s household has a reasonable potential for financial, professional, or other personal gain or loss as a result of the issues/content addressed in the document.

*Writing committee members are required to recuse themselves from voting on sections to which their specific relationships with industry and other entities may apply.
†Significant relationship.

ACC indicates American College of Cardiology; AHA, American Heart Association; DCRI, Duke Clinical Research Institute; DSMB, data safety monitoring board; HFSA, Heart Failure Society of America; UCLA, University of California, Los Angeles; and VA, Veterans Affairs.
Appendix 2. Reviewer Relationships With Industry and Other Entities (Comprehensive)—2016
ACC/AHA/HFSA Focused Update on New Pharmacological Therapy for Heart Failure (March 2016)

<table>
<thead>
<tr>
<th>Reviewer</th>
<th>Representation</th>
<th>Employment</th>
<th>Consultant</th>
<th>Speakers Bureau</th>
<th>Ownership/Partnership/Principal</th>
<th>Personal Research</th>
<th>Institutional, Organizational, or Other Financial Benefit</th>
<th>Expert Witness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kim K. Birtcher</td>
<td>Official Reviewer—ACC/AHA Task Force on Clinical Practice Guidelines</td>
<td>University of Houston College of Pharmacy—Clinical Professor</td>
<td>• Jones &amp; Bartlett Learning</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Akshay S. Desai</td>
<td>Official Reviewer—HFSA</td>
<td>Brigham and Women's Hospital—Director, Heart Failure Disease Management, Advanced Heart Disease Section, Cardiovascular Division; Associate Professor of Medicine, Harvard Medical School</td>
<td>• Medscape Cardiology*</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>• Novartis*</td>
<td>None</td>
</tr>
<tr>
<td>Anita Deswal</td>
<td>Official Reviewer—AHA</td>
<td>Michael E. DeBakey VA Medical Center—Associate Chief of Cardiology; Director, Heart Failure Program; Baylor College of Medicine—Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>• NIH*</td>
<td>• AHA</td>
<td>None</td>
</tr>
<tr>
<td>Dipti Itchhaporia</td>
<td>Official Reviewer—ACC Board of Trustees</td>
<td>Newport Coast Cardiology—Robert and Georgia Roth Endowed Chair for Excellence in Cardiac Care; Director of Disease Management</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>• AHA (GWTG Steering Committee)† • HFSA†</td>
<td>None</td>
</tr>
<tr>
<td>Ileana L. Piña</td>
<td>Official Reviewer—AHA</td>
<td>Montefiore Medical Center—Associate Chief for Academic Affairs, Cardiology</td>
<td>• Relypsa</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>• St. Jude Medical</td>
<td>None</td>
</tr>
<tr>
<td>Name</td>
<td>Role</td>
<td>Institution/Position</td>
<td>Conflicts of Interest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Geetha Raghuveer</td>
<td>Official Reviewer—ACC Board of Governors</td>
<td>University of Missouri-Kansas City School of Medicine—Professor of Pediatrics; Children's Mercy Hospital—Pediatric Cardiology</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>James E. Udelson</td>
<td>Official Reviewer—HFSA</td>
<td>Tufts Medical Center—Chief, Division of Cardiology</td>
<td>Lantheus Medical Imaging • Gilead (DSMB) • GlaxoSmithKline (DSMB) • NHLBI • Otsuka</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Abbott Laboratories (Eligibility Committee) • AHA* • Circulation/Circulation: Heart Failure† • HFSA (Executive Council)† • Pfizer/GlaxoSmithKline (Clinical Events Committee) • Sunshine Heart (Eligibility Committee)</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mary Norine Walsh</td>
<td>Official Reviewer—ACC Board of Trustees</td>
<td>St Vincent Heart Center of Indiana—Medical Director, Heart Failure and Cardiac Transplantation</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Corvia Medical • Otsuka • PCORI • Thoratec</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>David A. Baran</td>
<td>Organizational Reviewer—ISHLT</td>
<td>Newark Beth Israel Medical Center—Director of Heart Failure and Transplant Research</td>
<td>Maquet • Otsuka* • Novartis • XDr–IMAGE trial (Steering Committee)* • NIH*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• ACCP</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kenneth Casey</td>
<td>Organizational Reviewer—CHEST</td>
<td>Wm. S. Middleton Memorial Veterans Hospital—Director, Sleep Medicine</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. Fuad Jan</td>
<td>Organizational Reviewer—CHEST</td>
<td>Aurora Advanced Healthcare—Cardiologist</td>
<td>None</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Role and Affiliation</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td>Kenneth W. Lin</td>
<td>Organizational Reviewer—AAFP, Georgetown University School of Medicine—Clinician Educator Track, Associate Professor</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Joaquin E. Cigarroa</td>
<td>Content Reviewer—ACC/AHA Task Force on Clinical Practice Guidelines, Oregon Health &amp; Science University—Clinical Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Lee A. Fleisher</td>
<td>Content Reviewer—ACC/AHA Task Force on Clinical Practice Guidelines, University of Pennsylvania Health System—Robert Dunning Dripps Professor of Anesthesiology and Critical Care; Chair, Department of Anesthesiology &amp; Critical Care</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>Samuel S. Gidding</td>
<td>Content Reviewer—ACC/AHA Task Force on Clinical Practice Guidelines, Nemours/Alfred I. duPont Hospital for Children—Chief, Division of Pediatric Cardiology</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>James L. Januzzi</td>
<td>Content Reviewer, Massachusetts General Hospital—Hutter Family Professor of Medicine in the Field of Cardiology</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
</tbody>
</table>

- ACC/AHA†
- AHA†
- ASA†
- Catheterization and Cardiovascular Intervention†
- NIH
- Portland Metro Area AHA (President)†
- SCAI Quality Interventional Council†
- Blue Cross/Blue Shield*
- NQF†
- Yale University
- Johns Hopkins (DSMB)
- Association of University Anesthesiologists†
- NIH
- FH Foundation†
- International FH Foundation†
- FH Foundation†
- NIH*
- Amgen (DSMB)
- Boergering Ingelheim (DSMB)*
- Janssen Pharmaceuticals (DSMB)
- Prevencio*
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Institution</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>José A. Joglar</td>
<td>Content Reviewer—ACC/AHA Task Force on Clinical Practice Guidelines</td>
<td>UT Southwestern Medical Center—Professor of Internal Medicine; Clinical Cardiac Electrophysiology—Program Director</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Edward K. Kasper</td>
<td>Content Reviewer</td>
<td>Johns Hopkins Cardiology—E. Cowles Andrus Professor in Cardiology</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Wayne C. Levy</td>
<td>Content Reviewer</td>
<td>University of Washington—Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Amgen*</td>
<td>None</td>
</tr>
<tr>
<td>Judith E. Mitchell</td>
<td>Content Reviewer</td>
<td>SUNY Downstate Medical Center—Director/Heart Failure Center; SUNY Downstate College of Medicine—Associate Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>NIH†</td>
<td>None</td>
</tr>
<tr>
<td>Sean P. Pinney</td>
<td>Content Reviewer</td>
<td>Mount Sinai School of Medicine—Associate Professor of Medicine, Cardiology</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>NIH†</td>
<td>None</td>
</tr>
<tr>
<td>Randall C. Starling</td>
<td>Content Reviewer—ACC Heart Failure and Transplant Council</td>
<td>Cleveland Clinic Department of Cardiovascular Medicine—Vice Chairman, Department of Cardiovascular Medicine; Section Head, Heart Failure &amp; Cardiac Transplant</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>Medtronic</td>
<td>None</td>
</tr>
<tr>
<td>W. H. Wilson Tang</td>
<td>Content Reviewer</td>
<td>Cleveland Clinic Foundation—Assistant Professor of Medicine</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>NIH*</td>
<td>None</td>
</tr>
</tbody>
</table>
Yancy, CW, et al.
Heart Failure Focused Update on Pharmacological Therapy

<table>
<thead>
<tr>
<th>Emily J. Tsai</th>
<th>Content Reviewer</th>
<th>Columbia University College of Physicians &amp; Surgeons—Assistant Professor, Section of Cardiology</th>
<th>None</th>
<th>None</th>
<th>None</th>
<th>● Roche ● Novartis ● Thoratec</th>
<th>None</th>
<th>None</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duminda N. Wijeysundera</td>
<td>Content Reviewer—ACC/AHA Task Force on Clinical Practice Guidelines</td>
<td>Li Ka Shing Knowledge Institute of St. Michael’s Hospital—Scientist; University of Toronto—Assistant Professor, Department of Anesthesia and Institute of Health Policy Management and Evaluation</td>
<td>None</td>
<td>None</td>
<td>None</td>
<td>● Bayer† ● Bristol-Myers Squib† ● NHLBI*</td>
<td>None</td>
<td>None</td>
</tr>
</tbody>
</table>

This table represents the relationships of reviewers with industry and other entities that were disclosed at the time of peer review, including those not deemed to be relevant to this document. The table does not necessarily reflect relationships with industry at the time of publication. A person is deemed to have a significant interest in a business if the interest represents ownership of ≥5% of the voting stock or share of the business entity, or ownership of ≥$5,000 of the fair market value of the business entity, or if funds received by the person from the business entity exceed 5% of the person’s gross income for the previous year. A relationship is considered to be modest if it is less than significant under the preceding definition. Relationships that exist with no financial benefit are also included for the purpose of transparency. Relationships in this table are modest unless otherwise noted. Names are listed in alphabetical order within each category of review.

American College of Physicians did not provide a peer reviewer for this document.

*Significant relationship.
†No financial benefit.

AAFP indicates American Academy of Family Physicians; ACC, American College of Cardiology; AHA, American Heart Association; ASA, American Stroke Association; CHEST, American College of Chest Physicians; CIHR, Canadian Institutes of Health Research; DSMB, data safety monitoring board; FH, familial hypercholesterolemia; GWTG, Get With The Guidelines; HFSA, Heart Failure Society of America; ISHLT, International Society for Heart and Lung Transplantation; NIH, National Institutes of Health; NHLBI, National Heart, Lung, and Blood Institute; NQF, National Quality Forum; PCORI, Patient-Centered Outcomes Research Institute; SCAI, Society for Cardiac Angiography and Interventions; SUNY, State University of New York; UT, University of Texas; and VA, Veterans Affairs.