State of GWTG-Heart Failure 2018
Tuesday February 13, 2018

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Cleveland Clinic Main Campus
American Heart Association
Get With The Guidelines- HF

“Guideline Directed Care Algorithms”

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Northwestern University, FSM
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No relevant disclosures
Heart Failure Awareness Week 2018

Do Your Part, Know Your Heart
Yancy et al
2017 ACC/AHA/HFSA Heart Failure Focused Update

2017 ACC/AHA/HFSA Focused 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 American Academy of Family Physicians, American College of Chest Physicians, and International Society for Heart and Lung Transplantation

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Stages, Phenotypes and Treatment of HF

**STAGE A**
At high risk for HF but without structural heart disease or symptoms of HF

- e.g., Patients with:
  - HTN
  - Atherosclerotic disease
  - DM
  - Obesity
  - Metabolic syndrome
  - Patients using cardiotoxins
  - With family history of cardiomyopathy

**STAGE B**
Structural heart disease but without signs or symptoms of HF

- e.g., Patients with:
  - Previous MI
  - LV remodeling including LVH and low EF
  - Asymptomatic valvular disease

**THERAPY**
- Goals
  - Control symptoms
  - Improve HRQOL
  - Prevent hospitalization
  - Prevent mortality
- Drugs
  - ACEI or ARB as appropriate
  - Beta blockers as appropriate
- In selected patients
  - ICD
  - Revascularization or valvular surgery as appropriate

**STAGE C**
Structural heart disease with prior or current symptoms of HF

- e.g., Patients with:
  - Known structural heart disease and HF signs and symptoms

**THERAPY**
- Goals
  - Control symptoms
  - Improve HRQOL
  - Prevent hospitalization
  - Prevent mortality
- Drugs for routine use
  - Diuretics for fluid retention
  - ACEI or ARB
  - Beta blockers
  - Aldosterone antagonists
- Drugs for use in selected patients
  - Hydralazine/isosorbide dinitrate
  - ACEI and ARB
  - Digoxin
- In selected patients
  - CRT
  - ICD
  - Revascularization or valvular surgery as appropriate

**STAGE D**
Refractory HF

- e.g., Patients with:
  - Marked HF symptoms at rest
  - Recurrent hospitalizations despite GDMT

**THERAPY**
- Goals
  - Control symptoms
  - Improve HRQOL
  - Reduce hospital readmissions
  - Establish patient's end-of-life goals
- Drugs
  - ACEI or ARB as appropriate
  - Beta blockers as appropriate
- In selected patients
  - ICD
  - Revascularization or valvular surgery as appropriate

**Heart Failure**
- e.g., Patients with:
  - Previous MI
  - LV remodeling including LVH and low EF

**THERAPY**
- Goals
  - Heart healthy lifestyle
  - Prevent vascular, coronary disease
  - Prevent LV structural abnormalities
- Drugs
  - ACEI or ARB in appropriate patients for vascular disease or DM
  - Statins as appropriate

**At Risk for Heart Failure**
- e.g., Patients with:
  - HTN
  - Atherosclerotic disease
  - DM
  - Obesity
  - Metabolic syndrome
  - Patients using cardiotoxins
  - With family history of cardiomyopathy

**Developing symptoms of HF**
- Structural heart disease

Yancy C, et al. JACC, 2013
Prevalence and prognostic significance of HF Stages

Ammar et al. Circulation 2007; 115:1563
Other biomarkers of injury or fibrosis include soluble ST2 receptor, galectin-3, and high-sensitivity troponin.

ACC indicates American College of Cardiology; AHA, American Heart Association; ADHF, acute decompensated heart failure; BNP, B-type natriuretic peptide; COR, Class of Recommendation; ED, emergency department; HF, heart failure; NT-proBNP, N-terminal pro-B-type natriuretic peptide; NYHA, New York Heart Association; and pts, patients.
Lifetime risk for HF; indexed to blood pressure & sex

![Bar chart showing lifetime risk for heart failure in men and women with different blood pressure categories.](chart.png)
Blood Pressure (BP) Thresholds and Recommendations for Treatment and Follow-Up (continued on next slide)

BP thresholds and recommendations for treatment and follow-up

- Normal BP (BP <120/80 mm Hg)
  - Promote optimal lifestyle habits
  - Reassess in 1 y (Class IIa)

- Elevated BP (BP 120–129/<80 mm Hg)
  - Nonpharmacologic therapy (Class I)
  - Reassess in 3–6 mo (Class I)

- Stage 1 hypertension (BP 130–139/80-89 mm Hg)
  - Nonpharmacologic therapy (Class I)
  - Reassess in 1 y (Class IIa)
  - Nonpharmacologic therapy and BP-lowering medication (Class I)

- Stage 2 hypertension (BP ≥ 140/90 mm Hg)
  - Clinical ASCVD or estimated 10-y CVD risk ≥10%*
    - Yes
      - Nonpharmacologic therapy (Class I)
      - Nonpharmacologic therapy and BP-lowering medication† (Class I)
    - No
      - Reassess in 3–6 mo (Class I)

*Low CVD risk (10-year ASCVD risk <10%)
†Third-generation thiazide-like diuretics or agents with less potassium sparing
## Treating Hypertension to Reduce the Incidence of HF

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
<th>Comment/ Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>B-R</td>
<td>In patients at increased risk, stage A HF, the optimal blood pressure in those with hypertension should be less than 130/80 mm Hg.</td>
<td>NEW: Recommendation reflects new RCT data.</td>
</tr>
</tbody>
</table>
Simplified Schematic of the Renin–Angiotensin–Aldosterone System
Simplified Schematic of the Natriuretic Peptide System (NPS)


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Pharmacological Treatment for Stage C HF With Reduced EF

Renin-Angiotensin System Inhibition With ACE-Inhibitor or ARB or ARNI

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
<th>Comment/Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>ARNI: B-R</td>
<td>In patients with chronic symptomatic HF/EF NYHA class II or III who tolerate an ACE inhibitor or ARB, replacement by an ARNI is recommended to further reduce morbidity and mortality.</td>
<td>NEW: New clinical trial data necessitated this recommendation.</td>
</tr>
</tbody>
</table>
# Pharmacological Treatment for Stage C HF With Reduced EF

## Renin-Angiotensin System Inhibition With ACE-Inhibitor or ARB or ARNI

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
<th>Comment/Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>III:</strong> Harm</td>
<td>B-R</td>
<td>ARNI should not be administered concomitantly with ACE inhibitors or within 36 hours of the last dose of an ACE inhibitor.</td>
<td><strong>NEW:</strong> Available evidence demonstrates a potential signal of harm for a concomitant use of ACE inhibitors and ARNI.</td>
</tr>
<tr>
<td><strong>III:</strong> Harm</td>
<td>C-EO</td>
<td>ARNI should not be administered to patients with a history of angioedema.</td>
<td><strong>NEW:</strong> New clinical trial data.</td>
</tr>
</tbody>
</table>
**Pharmacological Treatment for Stage C HF With Reduced EF**

**Ivabradine**

<table>
<thead>
<tr>
<th>COR</th>
<th>LOE</th>
<th>Recommendations</th>
<th>Comment/ Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>IIa</td>
<td>B-R</td>
<td>Ivabradine can be beneficial to reduce HF hospitalization for patients with symptomatic (NYHA class II-III) stable chronic HF/EF (LVEF ≤35%) who are receiving GDEM*, including a beta blocker at maximum tolerated dose, and who are in sinus rhythm with a heart rate of 70 bpm or greater at rest.</td>
<td>NEW: New clinical trial data.</td>
</tr>
</tbody>
</table>

*In other parts of the document, the term “GDMT” has been used to denote guideline-directed management and therapy. In this recommendation, however, the term “GDEM” has been used to denote this same concept in order to reflect the original wording of the recommendation that initially appeared in the “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”.*
### Table. Demonstrated Benefits of Evidence-Based Therapies for Patients With Heart Failure and Reduced Ejection Fraction

<table>
<thead>
<tr>
<th>Evidence-Based Therapy</th>
<th>Relative Risk Reduction in All-Cause Mortality in Pivotal Randomized Clinical Trial(s), %</th>
<th>NNT to Prevent All-Cause Mortality Over Time</th>
<th>NNT for All-Cause Mortality&lt;sup&gt;a&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI/ARB</td>
<td>17</td>
<td>22 over 42 mo</td>
<td>77</td>
</tr>
<tr>
<td>ARNI&lt;sup&gt;b&lt;/sup&gt;</td>
<td>16</td>
<td>36 over 27 mo</td>
<td>80</td>
</tr>
<tr>
<td>β-Blocker</td>
<td>34</td>
<td>28 over 12 mo</td>
<td>28</td>
</tr>
<tr>
<td>Aldosterone antagonist</td>
<td>30</td>
<td>9 over 24 mo</td>
<td>18</td>
</tr>
<tr>
<td>Hydralazine/nitrate</td>
<td>43</td>
<td>25 over 10 mo</td>
<td>21</td>
</tr>
<tr>
<td>CRT</td>
<td>36</td>
<td>12 over 24 mo</td>
<td>24</td>
</tr>
<tr>
<td>ICD</td>
<td>23</td>
<td>14 over 60 mo</td>
<td>70</td>
</tr>
</tbody>
</table>

Abbreviations: ACEI, angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor blocker; ARNI, angiotensin receptor neprilysin inhibitor; CRT cardiac resynchronization therapy; ICD, implantable cardioverter defibrillator, NNT, number needed to treat.

<sup>a</sup> Standardized to 12 months.

Benefit of ARNI therapy incremental to that achieved with ACEI therapy. For the other medications shown, the benefits are based on comparisons to placebo control.
CENTRAL ILLUSTRATION: The PAL-HF Study Randomized 150 Patients With Advanced Heart Failure to Usual Care or Usual Care + a Multidimensional Palliative Care Intervention

Usual Care Alone (n = 75)  
Usual Care + Palliative Care (n = 75)

Kansas City Cardiomyopathy Questionnaire  
Functional Assessment of Chronic Illness Therapy-Palliative Care Scale

Mixed Model (adjusted for age and sex)  
9.14 (95% CI 0.56-17.72), P = 0.037  
11.09 (95% CI 0.19-21.99), P = 0.046

Treatment of HFrEF Stage C and D

†Hydral-Nitrates green box: The combination of ISDN/HYD with ARNI has not been robustly tested. BP response should be carefully monitored.
‡See 2013 HF guideline.
§Participation in investigational studies is also appropriate for stage C, NYHA class II and III HF.

ACEI indicates angiotensin-converting enzyme inhibitor; ARB, angiotensin receptor-blocker; ARNI, angiotensin receptor-neprilysin inhibitor; BP, blood pressure; bpm, beats per minute; C/I, contraindication; COR, Class of Recommendation; CrCl, creatinine clearance; CRT-D, cardiac resynchronization therapy–device; Dx, diagnosis; GDMT, guideline-directed management and therapy; HF, heart failure; HFrEF, heart failure with reduced ejection fraction; ICD, implantable cardioverter-defibrillator; ISDN/HYD, isosorbide dinitrate-hydral-nitrates; K+, potassium; LBBB, left bundle-branch block; LVAD, left ventricular assist device; LVEF, left ventricular ejection fraction; MI, myocardial infarction; NSR, normal sinus rhythm; and NYHA, New York Heart Association.
2017 ACC Expert Consensus Decision Pathway for Optimization of Heart Failure Treatment: Answers to 10 Pivotal Issues About Heart Failure With Reduced Ejection Fraction
A Report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways

Clyde W. Yancy, James L. Januzzi Jr., Larry A. Allen, Javed Butler, Leslie L. Davis, Gregg C. Fonarow, Nasrien E. Ibrahim, Mariell Jessup, JoAnn Lindenfeld, Thomas M. Maddox, Frederick A. Masoudi, Shweta R. Motiwala, J. Herbert Patterson, Mary Norine Walsh and Alan Wasserman
10 Principles for Successful Treatment of Heart Failure

How to implement GDMT...

I. Initiate & Switch
   Treatment algorithm for guideline-directed medical therapy including novel therapies (Figure 2 and 3)

II. Titration
   Target doses of select guideline-directed heart failure therapy (Tables 1, 2, 3, 4, 5)
   Considerations for monitoring

How to address challenges with...

III. Referral
    Triggers for referral to HF specialist (Table 6)

IV. Care Coordination
    Essential skills for a HF team (Table 7)
    Infrastructure for team-based HF care (Table 8)

V. Adherence
    Causes of non-adherence (Table 9)
    Interventions for adherence (Table 10, 11)

VI. Specific Patient Cohorts
    Evidence based recommendations and assessment of risk for special cohorts:
    African Americans; older adults; frail (Table 12)

VII. Cost of Care
    Strategies to reduce cost (Table 13)
    Helpful information for completion of prior authorization forms (Table 14)

How to manage...

VIII. Increasing Complexity
    Ten pathophysiologic targets in HFrEF and treatments (Table 15)
    Ten principles and actions to guide optimal therapy

IX. Comorbidities
    Common cardiac and non-cardiac comorbidities with suggested actions (Table 16)

X. Palliative/Hospice Care
    Seven principles and actions to consider regarding palliative care

Clyde W. Yancy et al. JACC 2018;71:201-230

Helping Cardiovascular Professionals

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New Guideline Takeaway messages:

• New effective medical therapies have now been fully incorporated in evidence based guideline directed treatment algorithms
• There is an increasing complexity in the treatment of HFrEF; this will require careful assessment of the clinical context/scenario
• Powerful new data should drive the PREVENTION of heart failure
• Avoiding entry into the “HF Club” is the best therapeutic approach
GWTG-HF Update and Reducing Readmissions Safely

Gregg C. Fonarow, MD FACC, FAHA, FHFSAA
Eliot Corday Chair of Cardiovascular Medicine and Science
Co-Chief UCLA Division of Cardiology
Director, Ahmanson-UCLA Cardiomyopathy Center, Los Angeles, CA
GWTG-HF Hospital Participation

GWTG-Heart Failure Enrolled Hospitals
Data through Dec. 2017

<table>
<thead>
<tr>
<th>Year</th>
<th>Participating Hospitals</th>
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<tbody>
<tr>
<td>2010</td>
<td>514</td>
</tr>
<tr>
<td>2011</td>
<td>557</td>
</tr>
<tr>
<td>2012</td>
<td>551</td>
</tr>
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<td>2013</td>
<td>543</td>
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<td>2014</td>
<td>532</td>
</tr>
<tr>
<td>2015</td>
<td>535</td>
</tr>
<tr>
<td>2016</td>
<td>637</td>
</tr>
<tr>
<td>2017</td>
<td>702</td>
</tr>
</tbody>
</table>

2/13/2018
GWTG-HF: Hospitalization Episodes Entered

Data as of 2-7-2018

Number of records

- Jul-15: 918036
- Jan-16: 1250540
- Oct-16: 1381743
- 18-Feb: 1636139
ACEI/ARB or ARNI at Discharge*

Percent of heart failure patients with left ventricular systolic dysfunction (LVSD) and without angiotensin converting enzyme inhibitor (ACEI) and angiotensin receptor blocker (ARB) or angiotensin-receptor/neprilysin inhibitor (ARNI) contraindications who are prescribed an ACEI, ARB, or ARNI at hospital discharge.

Time Period: 01/2010 - 12/2018

Data for ACEI/ARB or ARNI at Discharge*

<table>
<thead>
<tr>
<th>Period</th>
<th>Time Period</th>
<th>Percentage</th>
<th>Consecutive</th>
<th>As of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>31062</td>
<td>31060</td>
<td>94.5%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>31064</td>
<td>31061</td>
<td>95.1%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>31083</td>
<td>31081</td>
<td>94.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>31082</td>
<td>31081</td>
<td>93.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>31081</td>
<td>31080</td>
<td>95.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>31081</td>
<td>31080</td>
<td>94.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>31259</td>
<td>31258</td>
<td>93.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>31555</td>
<td>31554</td>
<td>92.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>32138</td>
<td>32138</td>
<td>93.1%</td>
</tr>
</tbody>
</table>
Post Discharge Appointment for Heart Failure Patients

Percent of eligible heart failure patients for whom a follow-up appointment was scheduled and documented including location, date, and time for follow up visits, or home health visit.

Time Period: 01/2010 - 12/2018

<table>
<thead>
<tr>
<th>Time Period</th>
<th>All Hospitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>10%</td>
</tr>
<tr>
<td>2011</td>
<td>40%</td>
</tr>
<tr>
<td>2012</td>
<td>60%</td>
</tr>
<tr>
<td>2013</td>
<td>70%</td>
</tr>
<tr>
<td>2014</td>
<td>80%</td>
</tr>
<tr>
<td>2015</td>
<td>90%</td>
</tr>
<tr>
<td>2016</td>
<td>100%</td>
</tr>
<tr>
<td>2017</td>
<td>100%</td>
</tr>
<tr>
<td>2018</td>
<td>100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Time Period</th>
<th>Numerator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>323</td>
<td>96637</td>
<td>0.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>74562</td>
<td>105489</td>
<td>13.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>59570</td>
<td>93135</td>
<td>66.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>16635</td>
<td>90332</td>
<td>44.2%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>49576</td>
<td>99131</td>
<td>50.2%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>77999</td>
<td>104070</td>
<td>74.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>90668</td>
<td>114796</td>
<td>78.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>80773</td>
<td>113336</td>
<td>71.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>1591</td>
<td>1974</td>
<td>79.0%</td>
</tr>
</tbody>
</table>
Measure LV Function

HF patients with documentation in the hospital record that left ventricular function (LVF) was assessed before arrival, during hospitalization, or is planned for after discharge.

Time Period: 01/2010 - 12/2018

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Time Period</th>
<th>Nominator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>113920</td>
<td>115315</td>
<td>98.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>121799</td>
<td>126173</td>
<td>96.5%</td>
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<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>117606</td>
<td>122189</td>
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<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>115209</td>
<td>120417</td>
<td>95.9%</td>
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<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>113550</td>
<td>125321</td>
<td>95.9%</td>
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<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>129739</td>
<td>131456</td>
<td>95.5%</td>
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<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>143363</td>
<td>145462</td>
<td>95.6%</td>
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<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>141178</td>
<td>143303</td>
<td>97.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>2811</td>
<td>2496</td>
<td>95.6%</td>
</tr>
</tbody>
</table>
Evidence-Based Specific Beta Blockers*

Percent of HF patients who were prescribed evidence-based specific beta blockers (Bisoprolol, Carvedilol, Metoprolol succinate CR/XL) at discharge

Time Period: 01/2010 - 12/2018
Angiotensin Receptor-Nephrilysin Inhibitor (ARNI) at Discharge

Percentage of eligible patients with heart failure who are prescribed an ARNI at hospital discharge.

Time Period: 01/2010 - 12/2018

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Time Period</th>
<th>Numerator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>0</td>
<td>35876</td>
<td>0.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>0</td>
<td>37076</td>
<td>0.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>0</td>
<td>35725</td>
<td>0.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>0</td>
<td>35404</td>
<td>0.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>1</td>
<td>35179</td>
<td>0.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>98</td>
<td>34787</td>
<td>2.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>3467</td>
<td>53154</td>
<td>6.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>2966</td>
<td>27963</td>
<td>10.7%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>69</td>
<td>494</td>
<td>14.0%</td>
</tr>
</tbody>
</table>
Aldosterone Antagonist at discharge

Percent of heart failure patients with left ventricular ejection fraction ≤35% or a qualitative assessment of moderate/severe dysfunction with no contraindications or documented intolerance who were prescribed Aldosterone Antagonist at discharge.

Time Period: 01/2010 - 12/2018

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Nominator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>6260</td>
<td>42573</td>
<td>14.6%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>7689</td>
<td>44410</td>
<td>17.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>10156</td>
<td>40069</td>
<td>25.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>10080</td>
<td>39687</td>
<td>27.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>12285</td>
<td>39627</td>
<td>31.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>13397</td>
<td>39098</td>
<td>35.5%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>15940</td>
<td>40648</td>
<td>39.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>15570</td>
<td>56451</td>
<td>42.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>240</td>
<td>430</td>
<td>56.1%</td>
</tr>
</tbody>
</table>
Hydralazine Nitrate at Discharge*

Black Heart Failure patients with left ventricular systolic dysfunction (LVSD) with no contraindications or documented intolerance who were prescribed a combination of hydralazine and isosorbide dinitrate at discharge. Note this treatment is recommended in addition to ACEI or ARB and beta blocker therapy at discharge.

Time Period: 01/2010 - 12/2018

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Time Period</th>
<th>Nominator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>1286</td>
<td>11381</td>
<td>11.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>1493</td>
<td>12510</td>
<td>11.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>2154</td>
<td>13197</td>
<td>17.7%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>2173</td>
<td>11827</td>
<td>18.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>2860</td>
<td>13317</td>
<td>21.5%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>2814</td>
<td>13338</td>
<td>21.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>3220</td>
<td>14032</td>
<td>23.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>3213</td>
<td>13298</td>
<td>24.2%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>92</td>
<td>254</td>
<td>24.4%</td>
</tr>
</tbody>
</table>
Anticoagulation for Atrial Fibrillation or Atrial Flutter

Percent of patients with chronic or recurrent atrial fibrillation or atrial flutter at high risk for thromboembolism, according to CHADS2 risk stratification prescribed anticoagulation at discharge.

Time Period: 01/2010 - 12/2016

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Time Period</th>
<th>Numerator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>10276</td>
<td>16806</td>
<td>61.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>15521</td>
<td>19367</td>
<td>80.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>21317</td>
<td>25859</td>
<td>82.7%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>26056</td>
<td>30147</td>
<td>86.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>29341</td>
<td>30383</td>
<td>96.1%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>30247</td>
<td>31521</td>
<td>96.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>30405</td>
<td>42450</td>
<td>71.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>30409</td>
<td>44201</td>
<td>68.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>487</td>
<td>757</td>
<td>64.0%</td>
</tr>
</tbody>
</table>
CRT-D or CRT-P Placed or Prescribed at Discharge

Percentage of heart failure patients with left ventricular ejection fraction less than or equal to 35% with QRS duration of 120 ms or above and Left Bundle Branch Block or QRS > 150ms or above regardless of QRS morphology, with no contraindications, documented intolerance, or any other reason against who have CRT-D or CRT-P, had CRT-D or CRT-P placed, or were prescribed CRT-D or CRT-P at discharge.

Time Period: 01/2010 - 12/2018

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Time Period</th>
<th>Nominator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>1765</td>
<td>4440</td>
<td>39.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>2495</td>
<td>5075</td>
<td>48.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>3322</td>
<td>6971</td>
<td>47.7%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>2719</td>
<td>5679</td>
<td>47.5%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>2856</td>
<td>5610</td>
<td>50.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>3185</td>
<td>5934</td>
<td>53.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>3443</td>
<td>6401</td>
<td>53.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>3382</td>
<td>6265</td>
<td>53.2%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>56</td>
<td>66</td>
<td>85.1%</td>
</tr>
</tbody>
</table>
Follow-up Visit Within 7 Days or Less
Percent of eligible patients with a follow-up visit scheduled within 7 days or less from time of hospital discharge
Time Period: 01/2010 - 12/2018

Table:

<table>
<thead>
<tr>
<th>Year Period</th>
<th>Number of Patients</th>
<th>Percentage</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>12,000</td>
<td>96.5%</td>
<td>13.5%</td>
</tr>
<tr>
<td>2011</td>
<td>12,500</td>
<td>95.5%</td>
<td>14.5%</td>
</tr>
<tr>
<td>2012</td>
<td>13,000</td>
<td>94.5%</td>
<td>15.5%</td>
</tr>
<tr>
<td>2013</td>
<td>13,500</td>
<td>93.5%</td>
<td>16.5%</td>
</tr>
<tr>
<td>2014</td>
<td>14,000</td>
<td>92.5%</td>
<td>17.5%</td>
</tr>
<tr>
<td>2015</td>
<td>14,500</td>
<td>91.5%</td>
<td>18.5%</td>
</tr>
<tr>
<td>2016</td>
<td>15,000</td>
<td>90.5%</td>
<td>19.5%</td>
</tr>
<tr>
<td>2017</td>
<td>15,500</td>
<td>89.5%</td>
<td>20.5%</td>
</tr>
<tr>
<td>2018</td>
<td>16,000</td>
<td>88.5%</td>
<td>21.5%</td>
</tr>
</tbody>
</table>

Legend:
- All Hospitals

Hospitals
Outpatient Cardiac Rehab Program Referral

Percent of heart failure patients referred to outpatient cardiac rehab program.

Time Period: 01/2010 - 12/2018

Data for Outpatient Cardiac Rehab Program Referral

<table>
<thead>
<tr>
<th>Benchmark Group</th>
<th>Time Period</th>
<th>Nominator</th>
<th>Denominator</th>
<th>% of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Hospitals</td>
<td>2010</td>
<td>255</td>
<td>26762</td>
<td>1.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2011</td>
<td>938</td>
<td>70389</td>
<td>1.3%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2012</td>
<td>2239</td>
<td>113320</td>
<td>2.0%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2013</td>
<td>2248</td>
<td>115485</td>
<td>1.9%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2014</td>
<td>2290</td>
<td>126870</td>
<td>1.8%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2015</td>
<td>3270</td>
<td>126335</td>
<td>2.6%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2016</td>
<td>3391</td>
<td>146612</td>
<td>2.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2017</td>
<td>3323</td>
<td>137918</td>
<td>2.4%</td>
</tr>
<tr>
<td>All Hospitals</td>
<td>2018</td>
<td>42</td>
<td>2354</td>
<td>1.8%</td>
</tr>
<tr>
<td>Guideline Recommended Therapy</td>
<td>Relative Risk Reduction in Mortality</td>
<td>Number Needed to Treat for Mortality</td>
<td>NNT for Mortality (standardized to 36 months)</td>
<td>Relative Risk Reduction in HF Hospitalizations</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>ACEI/ARB</td>
<td>17%</td>
<td>22 over 42 months</td>
<td>26</td>
<td>31%</td>
</tr>
<tr>
<td>ARNI</td>
<td>16%</td>
<td>36 over 27 months</td>
<td>27</td>
<td>21%</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>34%</td>
<td>28 over 12 months</td>
<td>9</td>
<td>41%</td>
</tr>
<tr>
<td>Aldosterone Antagonist</td>
<td>30%</td>
<td>9 over 24 months</td>
<td>6</td>
<td>35%</td>
</tr>
<tr>
<td>Hydralazine/Nitrate</td>
<td>43%</td>
<td>25 over 10 months</td>
<td>7</td>
<td>33%</td>
</tr>
<tr>
<td>CRT</td>
<td>36%</td>
<td>12 over 24 months</td>
<td>8</td>
<td>52%</td>
</tr>
<tr>
<td>ICD</td>
<td>23%</td>
<td>14 over 60 months</td>
<td>23</td>
<td>NA</td>
</tr>
<tr>
<td>Ivabradine</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>26%</td>
</tr>
</tbody>
</table>

Influence of Sacubitril/Valsartan on Readmission Rates After HF Hospitalization: PARADIGM HF

2,383 investigator-reported HF hospitalizations, of which 1,076 (45.2%) occurred in subjects assigned to sacubitril/valsartan and 1,307 (54.8%) occurred in subjects assigned to enalapril.

Hospital Readmission Reduction Program

- Up to 3% cut to all DRGs for readmissions over the expected %
- Up to 1% in fiscal year 2013, 2% in fiscal year 2014, and 3% in fiscal year 2015 and beyond
- Initially AMI, heart failure, and pneumonia
- Expand to COPD, CABG, PCI, and other vascular conditions in 2015
- 10 year decrease in reimbursement to hospitals $7.1 billion
- Public reporting began in 2010 and the hospital financial penalties began October 2012 (beginning of fiscal year 2013)

Medicare Penalizing 2,211 Hospitals For Excess Readmissions
HRRP Impact: Decreasing 30-Day HF Readmissions Accompanied by Increasing 30 Day Risk-Adjusted Mortality

5,200 additional deaths in 2014 may be related to the HRRP

10,400 additional deaths a year if previous declines in mortality had continued

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Year</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-Day Risk Adjusted Readmission with HRRP</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2008</td>
<td>23.5%</td>
<td>23.5%</td>
<td>23.4%</td>
<td>23.0%</td>
<td>22.5%</td>
<td>21.6%</td>
<td>21.4%</td>
<td>-2.1%</td>
</tr>
<tr>
<td>30-Day Mortality after discharge with HRRP</td>
<td>2008</td>
<td>7.9%</td>
<td>8.1%</td>
<td>8.4%</td>
<td>8.7%</td>
<td>8.8%</td>
<td>9.1%</td>
<td>9.2%</td>
<td>+1.3%</td>
</tr>
<tr>
<td>30-Day Mortality after discharge without HRRP (projected)</td>
<td>2008</td>
<td>7.9%</td>
<td>7.8%</td>
<td>7.5%</td>
<td>7.2%</td>
<td>7.0%</td>
<td>6.7%</td>
<td>6.6%</td>
<td>-1.3%</td>
</tr>
</tbody>
</table>

Has HRRP Reporting of Hospital Readmission Rates and Penalties Affected Patient Outcomes?

The 30-day risk-adjusted readmission rate declined from 20.0% before the HRRP implementation to 18.4% in the HRRP penalties phase (hazard ratio (HR) after vs before the HRRP implementation, 0.91; 95%CI, 0.87-0.95; \( P < .001 \)).

In contrast, the 30-day risk-adjusted mortality rate increased from 7.2% before the HRRP implementation to 8.6% in the HRRP penalties phase (HR after vs before the HRRP implementation, 1.18; 95%CI, 1.10-1.27; \( P < .001 \)).

The 1-year risk-adjusted mortality rate increased from 31.3% to 36.3% (HR, 1.10; 95%CI, 1.06-1.14; \( P < .001 \)) after vs before the HRRP implementation.
Increase in Risk-Adjusted Mortality after the HRRP Implementation among FFS Medicare Beneficiaries Hospitalized for HF

<table>
<thead>
<tr>
<th>Study</th>
<th>GWTG-HF Registry linked to FFS Medicare Data&lt;sup&gt;1&lt;/sup&gt;</th>
<th>100% Sample of FFS Medicare Data&lt;sup&gt;2&lt;/sup&gt;</th>
<th>5% Random Sample of FFS Medicare Data&lt;sup&gt;3&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Adjustment</td>
<td>Clinical</td>
<td>Administrative</td>
<td>Administrative</td>
</tr>
<tr>
<td>30-Day Mortality</td>
<td>1.4% ↑</td>
<td>1.3% ↑</td>
<td>-</td>
</tr>
<tr>
<td>90-Day Mortality</td>
<td>-</td>
<td>2.2% ↑</td>
<td>-</td>
</tr>
<tr>
<td>1-Year Mortality</td>
<td>5.0% ↑</td>
<td>-</td>
<td>3.3% ↑</td>
</tr>
</tbody>
</table>

2. Dharmarajan et al. JAMA 2017;318:270-278.
Conclusions

• GWTG-HF is focused on improving on meaningful processes of care and patient-centered outcomes

• The CMS 30 day readmission metric is fundamentally flawed in measuring quality and driving patient benefit

• The CMS HRRP has created a perfect storm for suboptimal care, both by side-stepping the best interests of the patient and by thwarting assessment of risk for both clinicians, in their care, and for CMS in its attempt at adjudication and penalty assignment to hospitals

• It is critical to move entirely away from artificial metrics and penalties and toward greater direct responsibility of health care systems for quality, safety, and value, with any potential rewards linked to long-term patient-centered benefit, through innovative approaches to care
Heart Failure Treatments in Special Populations

Adam DeVore, MD, MHS
Assistant Professor of Medicine
Duke University School of Medicine
## PARADIGM-HF Baseline Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>LCZ696 (N = 4187)</th>
<th>Enalapril (N = 4212)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age — yr</strong></td>
<td>63.8±11.5</td>
<td>63.8±11.3</td>
</tr>
<tr>
<td><strong>Female sex — no. (%)</strong></td>
<td>879 (21.0)</td>
<td>953 (22.6)</td>
</tr>
<tr>
<td><strong>Race or ethnic group — no. (%)†</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>2753 (66.0)</td>
<td>2781 (66.0)</td>
</tr>
<tr>
<td>Black</td>
<td>213 (5.1)</td>
<td>215 (5.1)</td>
</tr>
<tr>
<td>Asian</td>
<td>759 (18.1)</td>
<td>750 (17.8)</td>
</tr>
<tr>
<td>Other</td>
<td>452 (10.8)</td>
<td>466 (11.1)</td>
</tr>
<tr>
<td><strong>Region — no. (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>North America</td>
<td>310 (7.4)</td>
<td>292 (6.9)</td>
</tr>
<tr>
<td>Latin America</td>
<td>713 (17.0)</td>
<td>720 (17.1)</td>
</tr>
<tr>
<td>Western Europe and other‡</td>
<td>1026 (24.5)</td>
<td>1025 (24.3)</td>
</tr>
<tr>
<td>Central Europe</td>
<td>1393 (33.3)</td>
<td>1433 (34.0)</td>
</tr>
</tbody>
</table>

*Table 1. Characteristics of the Patients at Baseline.*

†Includes other Asian; Other includes nonwhite race, Asian, and Hispanic origin.
‡Includes all European countries other than those in Western Europe.
Populations of Interest

- Elderly
- Females
- Racial and ethnic minorities
- Specific cardiomyopathies
- Comorbid conditions
Heart Failure Care in the Elderly

Heart Failure Care in the Elderly

- High prevalence and poor outcomes
- Different presentations (e.g., different causes of peripheral edema)
- More likely to have non-CV causes of symptoms and more likely to have comorbid conditions (e.g., hypertension, atrial fibrillation)
- Low lean body mass and impaired renal function may increase adverse effects from medical therapy (e.g., hyperkalemia with MRAs or increased risk of digoxin toxicity)
- Increased risk of polypharmacy
- May require more frequent visits and laboratory monitoring
Heart Failure Care in the Elderly in 2018
Race/Ethnic Differences in Outcomes Among Hospitalized Medicare Patients With Heart Failure and Preserved Ejection Fraction

Boback Ziaei, MD, PhD,a,b Paul A. Heidenreich, MD, MS,c Haolin Xu, MS,d Adam D. DeVore, MD, MHS,de Roland A. Matsouaka, PhD,ef Adrian F. Hernandez, MD, MHS,gi Deepak L. Bhatt, MD, MPH,g Clyde W. Yancy, MD,h Gregg C. Fonarow, MDi

ABSTRACT

OBJECTIVES This study analyzed HFpEF patient characteristics and clinical outcomes according to race/ethnicity and adjusted for patient and hospital characteristics along with socioeconomic status (SES).

BACKGROUND The proportion of hospitalizations for heart failure with preserved ejection fraction (HFpEF) has increased over the last decade. Whether the short- and long-term outcomes differ between racial/ethnic groups is not well described.

METHODS The Get With The Guidelines-Heart Failure registry was linked to Medicare administrative data to identify
Precision Medicine in Heart Failure?

Figure 1. Kaplan-Meier Estimates of Overall Survival.

AHA SCIENTIFIC STATEMENT

Current Diagnostic and Treatment Strategies for Specific Dilated Cardiomyopathies

A Scientific Statement From the American Heart Association

The intent of this American Heart Association (AHA) scientific statement is to summarize our current understanding of dilated cardiomyopathies. There is special emphasis on recent developments in diagnostic approaches and therapies for specific cardiomyopathies. Recommendations in this document are based on published studies, published practice guidelines from the American College of Cardiology (ACC)/AHA\(^1\) and other organizations,\(^2,3\) and the multidisciplinary expertise of the writing group. Existing evidence in epidemiology, classification, diagnosis, and management of specific cardiomyopathies is usually

Biykem Bozkurt, MD, PhD, FAHA, Chair
Monica Colvin, MD, FAHA
Jennifer Cook, MD, FAHA
Leslie T. Cooper, MD, FAHA
Anita Deswal, MD, MPH, FAHA
Gregg C. Fonarow, MD,
Important Comorbidities in Heart Failure

- Renal dysfunction
- COPD
- Diabetes
- Sleep apnea
- Fe Deficiency +/- anemia
- Depression
- Frailty
EMPA-REG: Hospitalizations for Heart Failure

HR 0.65
(95% CI 0.50–0.85)
\( p=0.0017 \)

Conclusions

• HF care in the elderly deserves special consideration to improve outcomes and decrease risk of adverse effects
• Opportunities for precision medicine exist in HF through the study of differences in biology by race/ethnicity and specific cardiomyopathies
• Comorbid conditions in HF are common and may offer opportunities to improve care
• Pam Peterson will speak next on women with heart failure
Women with Heart Failure

Pamela N Peterson, MD MSPH
Associate Professor of Medicine
University of Colorado Anschutz Medical Center
Denver Health Medical Center
Lifetime Risk of Heart Failure

Loyd-Jones DM et al. Circulation 2002; 106:3068
Incidence of HF with Preserved vs. Reduced EF in Men and Women

Ho JE et al. Circ Heart Fail 2013
No Differences in In-Hospital Mortality by Gender or LVEF

Hsich EM et al. Am Heart J 2012
Characteristics by Sex Among those with LVEF <40%

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>74</td>
<td>69</td>
</tr>
<tr>
<td>Hypertension</td>
<td>74</td>
<td>71</td>
</tr>
<tr>
<td>Diabetes</td>
<td>42</td>
<td>40</td>
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<tr>
<td>CAD</td>
<td>48</td>
<td>55</td>
</tr>
<tr>
<td>Anemia</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Valvular Disease</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>26</td>
<td>30</td>
</tr>
<tr>
<td>Depression</td>
<td>11</td>
<td>7</td>
</tr>
</tbody>
</table>
Characteristics by Sex Among those with LVEF $>50$

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>79</td>
<td>74</td>
</tr>
<tr>
<td>Hypertension</td>
<td>81</td>
<td>78</td>
</tr>
<tr>
<td>Diabetes</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>CAD</td>
<td>41</td>
<td>50</td>
</tr>
<tr>
<td>Anemia</td>
<td>24</td>
<td>20</td>
</tr>
<tr>
<td>Valve Disease</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>34</td>
<td>35</td>
</tr>
<tr>
<td>Depression</td>
<td>13</td>
<td>9</td>
</tr>
</tbody>
</table>

Hsich EM et al. Am Heart J 2012
No Sex Differences in Treatment of HF

• Women are under-represented in RCTs
• However, available data:
  – Stratified analyses of RCTs
  – Pooled data/ meta-analyses
  – Observational data
• Guidelines do not differ based on sex
• All quality metrics apply equally to men and women
# Quality Metrics in Women vs. Men

Klein L et al. Circ Heart Fail 2011

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unadjusted OR</th>
<th>95% CI</th>
<th>Multivariable Adjusted OR*</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete set of written instructions at time of discharge</td>
<td>0.95</td>
<td>0.92–0.97</td>
<td>0.97</td>
<td>0.94–1.01</td>
</tr>
<tr>
<td>Documentation of evaluation of LV function</td>
<td>0.91</td>
<td>0.88–0.94</td>
<td>0.81</td>
<td>0.76–0.86</td>
</tr>
<tr>
<td>ACEI/ARB prescription for LVSD</td>
<td>1.01</td>
<td>0.94–1.07</td>
<td>1.03</td>
<td>0.96–1.11</td>
</tr>
<tr>
<td>Adult smoking cessation counseling</td>
<td>1.01</td>
<td>0.94–1.09</td>
<td>1.06</td>
<td>0.95–1.19</td>
</tr>
<tr>
<td>β-blocker prescription for LVSD</td>
<td>0.89</td>
<td>0.84–0.95</td>
<td>0.94</td>
<td>0.87–1.03</td>
</tr>
<tr>
<td>Defect-free measure (100% compliance with all 5 primary measures)</td>
<td>1.13</td>
<td>1.1–1.16</td>
<td>0.98</td>
<td>0.95–1.01</td>
</tr>
<tr>
<td>Composite quality measure</td>
<td>0.97</td>
<td>0.95–0.99</td>
<td>0.96</td>
<td>0.94–0.99</td>
</tr>
<tr>
<td>Warfarin at discharge for patients with atrial fibrillation</td>
<td>0.85</td>
<td>0.81–0.89</td>
<td>0.91</td>
<td>0.86–0.96</td>
</tr>
<tr>
<td>Evidence based β-blockers prescription for LVSD</td>
<td>0.93</td>
<td>0.89–0.98</td>
<td>1.02</td>
<td>0.97–1.08</td>
</tr>
<tr>
<td>Aldosterone antagonists prescription for LVSD</td>
<td>0.95</td>
<td>0.89–1.02</td>
<td>1.06</td>
<td>0.99–1.13</td>
</tr>
<tr>
<td>Black patients with LVSD prescribed hydralazine/isosorbide dinitrate</td>
<td>0.82</td>
<td>0.67–1.01</td>
<td>0.80</td>
<td>0.66–0.96</td>
</tr>
<tr>
<td>ICD in patients with LVEF ≤35% (before admission or placed during admission)</td>
<td>0.61</td>
<td>0.56–0.67</td>
<td>0.70</td>
<td>0.65–0.75</td>
</tr>
</tbody>
</table>
Among those counseled, women and men were similarly likely to receive an ICD (OR 1.13; 0.99-1.29)

Improvement in care and reduction in sex differences with GWTG participation

Klein L, et al. Circ Heart Fail 2011
Improvement in care and reduction in sex differences with GWTG participation

Klein L, et al. Circ Heart Fail 2011
A RISING TIDE LIFTS ALL BOATS.
Advanced Heart Failure: Marking a Difference

Larry A. Allen, MD, MHS
GWTG-HF Webinar
Clinical course of heart failure

Transition to Advanced Heart Failure:
- Oral therapies failing
- A time for many major decisions

Stage C  Stage D
Timing of transplant, LVAD, hospice

Too Early

Too Late
Difficult to know where a patient is ...
I: IV inotropes
N: NYHA IIIB/IV
  Natriuretic peptides persistently elevated
E: End-organ dysfunction
E: Ejection fraction <25%
D: Defibrillator shocks
H: Hospitalizations >1
E: Edema, escalating diuretics
L: Low blood pressure, high heart rate
P: Prognostic medication – progressive intolerance or down-titration of GDMT

• Right heart cath? Palliative care?
• Referral to Advanced HF Center?
Not for Everyone: Complex Trade-Offs
McIlvennan, et al. Circ Heart Fail. 2014

NNT<2
McIlvennan, et al. Circ Heart Fail. 2014
• MagLev: no bearings, less friction/heat
• Large rotor gaps: less shear, hemolysis
• Artificial pulse: flush clot, angiodysplasia
• Smaller size: easier implant
# MOMENTUM HM3 Endpoints

## Table 2. Noninferiority and Superiority Analyses in the Intention-to-Treat Population.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. of patients</td>
<td>% (95% CI)</td>
</tr>
<tr>
<td><strong>Noninferiority analysis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary end point</td>
<td>131</td>
<td>86.2 (79.7–91.2)</td>
</tr>
<tr>
<td><strong>Superiority analyses</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary end point</td>
<td>131</td>
<td>86.2 (79.7–91.2)</td>
</tr>
<tr>
<td>First event that resulted in failure to reach the primary end point</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did not receive the assigned implant</td>
<td>1</td>
<td>0.7 (0–3.6)</td>
</tr>
<tr>
<td>Had disabling stroke</td>
<td>6</td>
<td>3.9 (1.5–8.4)</td>
</tr>
<tr>
<td>Underwent reoperation to replace or remove pump‡</td>
<td>1</td>
<td>0.7 (0–3.6)</td>
</tr>
<tr>
<td>Died within 6 months after implantation</td>
<td>13</td>
<td>8.6 (4.6–14.2)</td>
</tr>
</tbody>
</table>

Transplant remains the Gold Standard
Heart transplant outcomes

- Average Age of Recipient: **54 years old**
- **Median Survival 10.7 years** 1992-2001 cohort
  - Better in post 2002 cohorts
- **93% 1 year survival**

Limited supply of donors

Lund et al. ISHLT 34th Adult Heart Transplantation Report

Overdose Deaths Involving Opioids, by Type of Opioid, United States, 2000-2016


Region of transplant:
- Europe
- North America
- Other

Median donor age (years)

N=5,074
### Which option?

<table>
<thead>
<tr>
<th>Factor</th>
<th>LVAD</th>
<th>Transplant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Survival, median</td>
<td>4-5 yr</td>
<td>10-13 yr</td>
</tr>
<tr>
<td>Quality of life (and swimming)</td>
<td>++</td>
<td>+++</td>
</tr>
<tr>
<td>RV failure and ventricular tachycardia</td>
<td>Maybe</td>
<td>Yes</td>
</tr>
<tr>
<td>Complications</td>
<td>!!!!!</td>
<td>!!!</td>
</tr>
<tr>
<td>Stroke, infection, bleeding, HF</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rejection, infection, cancer, CKD, DM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Availability of therapy</td>
<td>Unlimited</td>
<td>Limited</td>
</tr>
<tr>
<td>Cost</td>
<td>$$$$$</td>
<td>$$$</td>
</tr>
</tbody>
</table>
Option B

1) Advanced age (median HF hosp 78 years)
2) Comorbidity (50% have 5+ diagnoses)
Final Perspective

- 6,000,000 with HF
- 2,400,000 (40%) HFrEF
- 240,000 (10%) with stage D
- 60,000 (25%) may benefit from advanced Rx (LVAD/Tx)

- 2,800 transplants
- 4,000 LVADs

... but large benefit in carefully selected patients
Quality of Life in Heart Failure - A Goal Not to be Missed

Nancy M. Albert PhD, CCNS, CHFN, NE-BC, FAHA, FHFSA, FAAN

February 2018
Objective:
• Discuss the value of understanding quality of life data in patients with heart failure
Quality of Life in HF

Efficacy of Treatments from Health Care Providers
  • Based on parameters
    ▪ Clinical status
    ▪ Hemodynamics
    ▪ Neurohormonal status
    ▪ Echo/MRI indices

Efficacy of Treatments from Patients
  • Based on:
    ▪ Functional capacity
    ▪ Exercise performance
    ▪ Psychological status
    ▪ Frequency of rehospitalization

Perspectives

1) Under represented in clinical trials
2) No universal definition of quality of life endpoints
3) Difficult to standardize data collection

Nieminen MS et al. *Int J Cardiol.* 2015;191:256-64.
## Quality of Life Tools in HF

25 tools discussed in the literature

<table>
<thead>
<tr>
<th>Instrument Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnesota Living w HF Q</td>
<td>21 items; lifestyle limitations; ↓ score = ↑ QoL</td>
</tr>
<tr>
<td>Kansas City Cardiomyopathy Q</td>
<td>12/23 items; physical, symptoms, QoL, social impact and self-efficacy; ↑ score = ↑ QoL</td>
</tr>
<tr>
<td>Euro HF QoL Q</td>
<td>40 items; functional status, etc.; ↑ score = ↑ QoL</td>
</tr>
<tr>
<td>EuroQ-5D (generic; assesses problems)</td>
<td>VAS; mobility, self-care, usual activities, pain &amp; anxiety/depression domains; ↓ score = ↑ QoL</td>
</tr>
<tr>
<td>Chronic HF Q</td>
<td>20 items; dyspnea, fatigue, emotional function domains; ↑ score = ↑ QoL</td>
</tr>
<tr>
<td>Qual of Life in Severe HF</td>
<td>26 items; physical activity + VAS of life satisfaction-social/emotional; ↓ score = ↑ QoL (less impairment)</td>
</tr>
<tr>
<td>Medical Outcomes Study 36-item Short Form</td>
<td>36 items; 8 subscales; assesses negative health aspects; ↑ score = ↑ QoL</td>
</tr>
<tr>
<td>Nottingham Health Profile</td>
<td>38 items based on WHO classification of disabilities; ↑ score = ↑ QoL</td>
</tr>
<tr>
<td>Sickness Impact Profile</td>
<td>136 Y/N items; 12 areas of pts. life; ↓ score = ↑ QoL</td>
</tr>
</tbody>
</table>
Quality of Life in HF

Correlates of QoL

- 1037 older *ambulatory* adults, (KCCQ & EQ-5D)\(^1\)
  - Tools were highly related; *rho*, 0.815
  - Factors associated with worse QoL:
    - Older age, female
    - Worse functional class
    - Higher Charlson comorbidity index
    - Recent hospitalization for HF

- 1136 (MLHFQ)\(^2\) & 52 (KCCQ)\(^3\) hospitalized adults
  - QoL improved during hospitalization\(^3\) and after discharge in all patients;\(^2,3\) despite intervention vs. control group\(^2\)

Quality of Life in HF
Event-Free Survival; by MLHFQ

425 pts. from ESCAPE study; 3 Month Event*

\[ p < 0.0001 \text{ group } \times \text{ time interaction} \]

* event = death or rehospitalization

Quality of Life in HF
Event-Free Survival by Change in MLHFQ

425 pts. from ESCAPE study; 6 Month Event

$p = 0.009$, based on degree of improvement in HR-QoL at 1 month*

*, adjusted for:
- LVEF
- Na+
- BUN
- 6MWD
- Ability to obtain 6MWD
- Age
- SBP
- Pt gp. assignment

1x Self-Rated Health (SF-12)* Score Predicts Healthcare Utilization

417 community pts. in MN; followed over mean of 2.1 yrs.

**Quality of Life in HF**

1033 Hospitalizations
1407 ED visits
19,780 OPD visits

*Low physical functioning, score ≤ 25; hazard ratios for SRH are for “poor”

Quality of Life in HF
Mortality Meta-Analysis (x17 papers w >100 pts ea)

KCCQ < 50 = poor health status
MLHFQ > 45 = poor health status

N= 10,793

When it comes to HF, ~ 44% of patients do not recognize early HF symptoms,¹ & most patients do not recognize HF exacerbation²

Assessment of physical functioning / symptoms via a HR-QoL tool may optimize assessment & treatment ⇒ optimize QoL

Value of Assessing QoL

- If physical health impairments lead to hospitalization or mortality, and change in QoL score 1 month post hospitalization can predict early (60 day to 6 month) event free survival
  - QoL score should be assessed at hospitalization and 1 month after discharge
    - To provide future hospitalization/survival risk
    - To help patients understand rationale for implementing interventions known to improve QoL
QoL Goals

• If we help patients understand QoL goals as part of usual care education (based on score improvements known to be associated with improved health status)

• We might enhance patient engagement and empowerment in HF self care

• Optimal self-care medication and non-pharmacologic management, including better HF monitoring might ↓ cost of care
Quality of Life in HF
Predictors of Future Health Status

1458 pts. from EVEREST study; 6 Month Outcomes

- BNP
- BB dc
- BUN
- BL KCCQ
- h/o arrhythmia
- BNP
- h/o DM
- h/o arrhythmia

More research is needed to determine if:

- A *standard* HF-related QoL tool should be systematically used
- Tool *administration* should be standardized in the OPD (every ? months) and hospital at admission/post-discharge (? 30 days)
  - To determine *CHANGE in scores*
- Tool administration and FU *burden* is feasible - time to administer (~ 7 minutes), resources needed to administer/score/share results, communication with patient
Contact Us to Learn More

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Sign Up for Focus on Quality e-Communications
Thank you for your active participation and contributions to GWTG-Heart Failure!