Achieving Coordinated Identification, Detection and Treatment of Heart Failure Summit

April 12th, Hyatt Regency Bethesda, MD

The American Heart Association would like to thank Novartis Pharmaceuticals for supporting the Achieving Coordinated Identification, Detection and Treatment of Heart Failure Summit.
Welcome

The American Heart Association would like to thank Novartis Pharmaceuticals for supporting the Achieving Coordinated Identification, Detection and Treatment of Heart Failure Summit.
Thank You to All Attendees
Summit Goals

Our goals for the day include identification of strategies that will:

- **Make Heart Failure a national priority**
- **Support the AHA/ASA goal to reduce to death and disability by heart disease by 20% by 2020**
- **Support the Rise Above Heart Failure initiative goal to reduce hospitalization by 10% by 2020**
Summit Objectives

- **Foster dialogue and action** to close the gaps in screening and identification of heart failure.
- **Define optimal systems of care** to realize treatment advances for heart failure, including mechanisms for dissemination, implementation, and maintenance.
- **Drive the market to purposeful consideration** on how to address the gaps amongst underserved heart failure patients including women, minorities and those with socio-economic disparities.
- **Determine actionable strategies** to reduce hospitalization, leading to improved patient outcomes.
- As an outcome of the meeting, we will **develop an action plan** for the American Heart Association and other organizations to advance as we move forward.
Our Goals & Objectives

Dr. Clyde Yancy
A Review of the State of the Science in Heart Failure

Dr. Ileana Piña
Heart Failure: The Clinician’s Perspective from 40,000 ft.

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Professor of Medicine, Epidemiology and Population Health
Albert Einstein College of Medicine
Associate Chief of Cardiology for Academic Affairs
Director, Cardiology, Einstein Campus
Montefiore-Einstein Medical Center
Bronx, NY
Chair CI-LCD AHA
Disclosures

- Advisory Board: Relypsa, modest
- Speakers Bureau: None
- FDA Senior Staff Fellow
- Medscape: Heart Failure editor/blog

Today my comments are purely my own and speak as a clinician with over 20 years of HF/Transplant/LVAD experience.
HFReF clinical goals

When are my patients the happiest?

- When they feel better
  - Independence
  - Self care
  - More function ADL’s
  - Better appetite
- Out of the hospital
  - Stretch out their visits
  - No arrhythmias, especially AFib
- When they are told they don’t need an ICD because their LV is better
- Their heart has improved
- When I simplify their med regimen
  - Limit diuretics
- When they meet their life milestones
- Health status including QOL

When am I the happiest?

- See reverse remodeling
  - Equates to lower mortality
  - No need for ICD
  - Less MR
- Keep them out of the hospital
  - Last hospitalization
  - No arrhythmias
- When I can medicate them to my standards
  - Keep them euvolemic
  - When adherent to meds
  - Limit diuretics
  - Minimize side effects
- When I hear how much they can do—walk as much as they want
- Loosing weight (not muscle mass)
- Increased activity levels
- Na and K are stable
- Stretch out their visits
HFReF clinical goals

**When are my patients the happiest?**
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  - Independence
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- Loosing weight (not muscle mass)
- Increased activity levels
- Na and K are stable
- Stretch out their visits
Continuity of the syndrome forgotten

NYHA classification

Compensated

Chronically decompensated

Acutely decompensated

Clinical status

NYHA I ➔ NYHA II ➔ NYHA III ➔ NYHA IV

STAGE B

First myocardial injury

First episode of AHF with hospitalization

ED

CCU

Telemetry

DC

Early Post DC

Outpatient

DEATH
“Failure” of Usual Care in Heart Failure

- Failure to prescribe evidence-based medications
- Failure to discontinue medication that may exacerbate HF
- Failure to titrate medications to target doses
- Failure to adhere to prescribed medications
- Failure to adequately address comorbidities
- Failure to consider device therapies
- Failure to provide adequate dietary counseling
- Failure to comply with dietary regimen
- Failure to seek early care with escalating symptoms
- Failure of adequate discharge planning
- Failure of adequate follow-up
- Failure of adequate monitoring
- Failure of patient social support systems
- Failure to address patient and care-giver needs
Hospitalizations: An important outcome for HFReF at a minimum, 30, 60 and 90 days  |  The Why’s

Why do I believe in reducing hospitalizations (all kinds)
- Increased mortality
- The revolving door
- Good drugs removed and Good drugs not given
- Bad drugs given
- Loss of function in bed
- Poor physical therapy or rehab
- No consistent pattern of care determined by attending (often not even Cardiology)
- LOS usually not sufficient to reverse the storm and adequately decongest. Pressure to discharge

- Hospitalizations (all cause) should be an OUTCOME
- HF Hospitalizations should be an OUTCOME
- Hospitalization equivalents (ED visit, unscheduled HF office visit) should be an OUTCOME
Outcomes in Patients Hospitalized with HF

Hospital Readmissions

- Median hospital LOS: 6 days

Mortality

- NYHA class III HF: 12% [COPERNICUS DATA]
- NYHA class II HF: 7% [SCD-HeFT DATA]

Annual mortality rate
Survival After HF Hospitalizations

Setoguchi et al
Am Heart J 2007

Median Survival Years

<table>
<thead>
<tr>
<th>Condition</th>
<th>1 hosp</th>
<th>2 hosp</th>
<th>3 hosp</th>
<th>4 hosp</th>
</tr>
</thead>
<tbody>
<tr>
<td>No CKD</td>
<td>3.0</td>
<td>2.6</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>With CKD</td>
<td>3.0</td>
<td>2.6</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Age 75-85</td>
<td>3.0</td>
<td>2.6</td>
<td>1.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Age &gt; 85</td>
<td>2.5</td>
<td>2.2</td>
<td>1.5</td>
<td>1.0</td>
</tr>
</tbody>
</table>

Survival:

- No CKD: 11,110
- With CKD: 3264
- Age 75-85: 5472
- Age > 85: 4098

Setoguchi et al
Am Heart J 2007
Typical List of Meds: BB Clinic
What am I confident of?

- GDMT
- Reverse remodeling should mean improvement in outcomes
- Exercise therapy can improve health outcomes, safe
- Capturing health status clinically
- Other prognostic factors, e.g., serum sodium, Pro BNP, VO2
Why do I insist on GDMT?

- **It works!**
  - Consistent
  - Gradual
  - Know pharmacology
  - Confident with dosing
  - Follow biomarkers

- The inability to medicate (by experts) = Outcome
- Not a checkbox without doses or reasons
- Can it be done?
Incremental Benefits with HF Therapies
(Cumulative % Reduction in Odds of Death at 24 Months)

Reverse Remodeling?

- Remodeling is an adverse myocardial process
- Advanced remodeling________worse outcomes
- Remodeling involves not only myocytes
- Surrogates of remodeling or its true reversal:
  - LVEDV, LVEDVi
  - LVESV, LVESVi
  - Mass
  - EF
  - Reduction or resolution of MR
- Remodeling is a time related process
- Reverse remodeling is a time related process
- May serve as a response to specific therapies
- *Reverse remodeling should be linked to favorable outcomes: Causal relationship*
- *Should reverse remodeling be an outcome: YES*
Heart Failure Clinic Stats  CWRU 2002-2004

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Pt Visits</th>
<th>Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>21</td>
<td>5</td>
</tr>
<tr>
<td>2003</td>
<td>48</td>
<td>8</td>
</tr>
<tr>
<td>2004</td>
<td>42</td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statistic</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>59</td>
<td>59</td>
<td>59</td>
</tr>
<tr>
<td>Gender</td>
<td>49%</td>
<td>49%</td>
<td>49%</td>
</tr>
<tr>
<td>Etiology</td>
<td>41%</td>
<td>41%</td>
<td>41%</td>
</tr>
<tr>
<td>Wt</td>
<td>175 lbs</td>
<td></td>
<td>175 lbs</td>
</tr>
<tr>
<td>B/P</td>
<td>133/70</td>
<td></td>
<td>133/70</td>
</tr>
<tr>
<td>HR</td>
<td>78</td>
<td></td>
<td>78</td>
</tr>
<tr>
<td>NYHA</td>
<td>2.4 ± 0.8</td>
<td></td>
<td>2.4 ± 0.8</td>
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</tbody>
</table>

HFSA 2002
# Beta blocker use in CASE HF clinic

<table>
<thead>
<tr>
<th></th>
<th>Improved LVEF</th>
<th>Non-Improved</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female (%)</strong></td>
<td>40</td>
<td>48</td>
<td>0.79</td>
</tr>
<tr>
<td><strong>Caucasian (%)</strong></td>
<td>47</td>
<td>44</td>
<td>0.98</td>
</tr>
<tr>
<td><strong>Nonischemic (%)</strong></td>
<td>77</td>
<td>58</td>
<td>0.25</td>
</tr>
<tr>
<td><strong>Initial LVEDD (mmHg)</strong></td>
<td>6.4</td>
<td>6.3</td>
<td>0.94</td>
</tr>
<tr>
<td><strong>ACEI Use (%)</strong></td>
<td>95</td>
<td>83</td>
<td>0.28</td>
</tr>
<tr>
<td><strong>Mean Dose of ACEI (mg/day)</strong></td>
<td>36</td>
<td>35</td>
<td>0.78</td>
</tr>
<tr>
<td><strong>B-Blocker Use (%)</strong></td>
<td>81</td>
<td>77</td>
<td>0.9</td>
</tr>
<tr>
<td><strong>Initial Pulmonary Artery Systolic Pressure (mmHg)</strong></td>
<td>37</td>
<td>45</td>
<td>0.13</td>
</tr>
<tr>
<td><strong>Initial Peak Oxygen Uptake (ml/kg/min)</strong></td>
<td>13.8</td>
<td>13.6</td>
<td>0.89</td>
</tr>
<tr>
<td><strong>Cardiac Index (L/min/m²)</strong></td>
<td>2.3</td>
<td>2.5</td>
<td>0.57</td>
</tr>
<tr>
<td><strong>Initial NYHA Class</strong></td>
<td>2.4</td>
<td>2.5</td>
<td>0.29</td>
</tr>
</tbody>
</table>

**HFSA 2002**
Beta blocker use in CASE HF clinic

Figure 2: Changes in LVEF

<table>
<thead>
<tr>
<th></th>
<th>Improved</th>
<th>Not Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>44%</td>
<td>26%</td>
</tr>
<tr>
<td>Post</td>
<td>18%</td>
<td>23%</td>
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</tbody>
</table>

Figure 3: Changes in LVEDD

<table>
<thead>
<tr>
<th></th>
<th>Improved</th>
<th>Not Improved</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial</td>
<td>6.4</td>
<td>6.3</td>
</tr>
<tr>
<td>Post</td>
<td>5.3</td>
<td>5.9</td>
</tr>
</tbody>
</table>
Figure 1: Differences in Beta Blocker Doses in Metoprolol Equivalent Doses in mg/day

- Improved LVEF Group (N=37): 139
- Non-Improved Group (N=48): 98

P=0.007

HFSA 2002
More patients had clinically meaningful improvement at 12 months in the exercise arm than usual care.
# Results

## Demographics

<table>
<thead>
<tr>
<th>Number of Patients</th>
<th>86</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>51 ± 8 years</td>
</tr>
<tr>
<td>Men</td>
<td>49</td>
</tr>
<tr>
<td>Women</td>
<td>37</td>
</tr>
<tr>
<td>Caucasian</td>
<td>40</td>
</tr>
<tr>
<td>African-American</td>
<td>31</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1</td>
</tr>
<tr>
<td>EF (%)</td>
<td>19.8 ± 8.1%</td>
</tr>
</tbody>
</table>
### Results

<table>
<thead>
<tr>
<th>NYHA</th>
<th>Physical Limitation</th>
<th>Total Symptom</th>
<th>Self-Efficacy</th>
<th>QoL</th>
<th>Social Limitation</th>
<th>Overall Summary</th>
<th>Clinical Summary</th>
<th>EF (%)</th>
<th>VO₂ ml/min/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.00</td>
<td>76.23</td>
<td>74.62</td>
<td>61.62</td>
<td>50.08</td>
<td>55.15</td>
<td>64.23</td>
<td>75.62</td>
<td>21.54</td>
<td>16.31</td>
</tr>
<tr>
<td>3.00</td>
<td>48.94</td>
<td>47.00</td>
<td>73.71</td>
<td>36.12</td>
<td>37.00</td>
<td>42.35</td>
<td>48.24</td>
<td>19.29</td>
<td>13.59</td>
</tr>
<tr>
<td>4.00</td>
<td>29.25</td>
<td>31.00</td>
<td>34.50</td>
<td>10.25</td>
<td>16.00</td>
<td>21.75</td>
<td>30.50</td>
<td>18.33</td>
<td>13.26</td>
</tr>
<tr>
<td>Total</td>
<td>57.06</td>
<td>55.68</td>
<td>64.47</td>
<td>38.41</td>
<td>41.47</td>
<td>48.29</td>
<td>56.62</td>
<td>20.09</td>
<td>14.56</td>
</tr>
</tbody>
</table>

Results are in mean values
Kansas City Cardiomyopathy Questionnaire at CASE

![Graph showing NYHA classes II, III, and IV with Sx Score, Clinical Score, and Overall Score](image)
### Brown Bag Clinic: Montefiore

<table>
<thead>
<tr>
<th>Parameter (n=32)</th>
<th>Mean ± Std Dev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>61 ± 14</td>
</tr>
<tr>
<td>Gender (% women)</td>
<td>25%</td>
</tr>
<tr>
<td>HF-PEF (n)</td>
<td>8</td>
</tr>
<tr>
<td>EF (%)</td>
<td>72 ± 8</td>
</tr>
<tr>
<td>Pro BNP</td>
<td>1382.5 ± 159 pg/ml</td>
</tr>
<tr>
<td>HF-REF (n)</td>
<td>24</td>
</tr>
<tr>
<td>EF (%)</td>
<td>30 ± 6</td>
</tr>
<tr>
<td>Pro BNP</td>
<td>7008 ± 7905 pg/ml</td>
</tr>
<tr>
<td><strong>KCCQ overall Score</strong></td>
<td><strong>52.14 ± 20.46</strong></td>
</tr>
</tbody>
</table>
HFPeF
Why Do HFPEF Patients Decompensate?

- Excess salt
- Inadequate diuretic Rx
- Worsening hypertension
- Medications: NSAIDs, thiazolidinediones, ?CCBs, ?alpha-blockers
- Atrial fibrillation
- Worsening renal function
- Myocardial ischemia
- Anemia
- Iatrogenic volume overload

Can absence of any of these be Outcomes? E.g., Afib, renal function
## Treatment of HFpEF

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systolic and diastolic blood pressure should be controlled according to published clinical practice guidelines</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>Diuretics should be used for relief of symptoms due to volume overload</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>Coronary revascularization for patients with CAD in whom angina or demonstrable myocardial ischemia is present despite GDMT</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Management of AF according to published clinical practice guidelines for HFpEF to improve symptomatic HF</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>Use of beta-blocking agents, ACE inhibitors, and ARBs for hypertension in HFpEF</td>
<td>IIa</td>
<td>C</td>
</tr>
<tr>
<td>ARBs might be considered to decrease hospitalizations in HFpEF</td>
<td>IIb</td>
<td>B</td>
</tr>
<tr>
<td>Nutritional supplementation is not recommended in HFpEF</td>
<td>III: No Benefit</td>
<td>C</td>
</tr>
</tbody>
</table>
### Echocardiographic parameters in select HFpEF trials.

*Anderson and Vasan. Heart Fail Clin. 2014 July; 10(3)*

<table>
<thead>
<tr>
<th>Table 2</th>
<th>TOPCAT(62)</th>
<th>PARAMOUNT(63)</th>
<th>RELAX(20)</th>
<th>I-PRESERVE(17,64)</th>
<th>CHARMES(65,66)</th>
<th>Aldo-DHF(6)</th>
<th>PEP-CIFF(18)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>935</td>
<td>292</td>
<td>216</td>
<td>745</td>
<td>312</td>
<td>422</td>
<td>850</td>
</tr>
<tr>
<td>Definition of diastolic heart failure</td>
<td>LVEF &gt;45%, HF hospitalization, or BNP ≥100 or NT-proBNP ≥360 pg/mL</td>
<td>LVEF ≥45%, NT-pro-BNP &gt;400 pg/mL</td>
<td>LVEF ≥50%, NT-pro-BNP &gt;400, pVO2 &lt;60% of predicted</td>
<td>LVEF ≥45%, recent HF hospitalization or other objective signs of HF</td>
<td>LVEF &gt;40%</td>
<td>LVEF ≥50%, echocardiographic diastolic dysfunction or AF pVO2 ≤25</td>
<td>LVEF &gt;40%, HF by clinical criteria</td>
</tr>
<tr>
<td>Age (years)</td>
<td>70±10</td>
<td>71±9</td>
<td>69 (62–77)</td>
<td>72±7</td>
<td>66±11</td>
<td>67±8</td>
<td>75 (72–79)</td>
</tr>
<tr>
<td>Women</td>
<td>49%</td>
<td>56%</td>
<td>48%</td>
<td>62%</td>
<td>34%</td>
<td>52%</td>
<td>56%</td>
</tr>
<tr>
<td><strong>LV structure</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EDD (cm)</td>
<td>4.80±0.58</td>
<td>4.64±0.48</td>
<td>4.6 (4.3–5.1)</td>
<td>4.8±0.6</td>
<td>5.4±0.7</td>
<td>4.65±0.62</td>
<td>4.6 (4.2–5.1)</td>
</tr>
<tr>
<td>EDVI (mL/m2)</td>
<td>49.9±15.5</td>
<td>61.4±15.4</td>
<td>NA</td>
<td>49±14</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>MWT (cm)</td>
<td>1.18±0.20</td>
<td>0.91±0.16</td>
<td>NA</td>
<td>0.93±0.15</td>
<td>NA</td>
<td>NA</td>
<td>1.3 (1.2–1.5)</td>
</tr>
<tr>
<td>LVMi (g/m2)</td>
<td>111±31</td>
<td>79.1±22.2</td>
<td>78 (62–94)</td>
<td>NA</td>
<td>117±42</td>
<td>109±28</td>
<td>NA</td>
</tr>
<tr>
<td>RWT</td>
<td>0.49±0.10</td>
<td>0.38±0.08</td>
<td>0.40±0.08</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>LV geometry</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>14%</td>
<td>72%</td>
<td>NA</td>
<td>46%</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Concentric remodeling</td>
<td>34%</td>
<td>14%</td>
<td>NA</td>
<td>25%</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Concentric hypertrophy</td>
<td>43%</td>
<td>7%</td>
<td>NA</td>
<td>29%</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Eccentric hypertrophy</td>
<td>9%</td>
<td>7%</td>
<td>NA</td>
<td>0%</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td><strong>LV systolic function</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EF (%)</td>
<td>59.6±8.0</td>
<td>57.7±7.9</td>
<td>60 (56–65)</td>
<td>64±9</td>
<td>50 (18–65)</td>
<td>67±8</td>
<td>65 (56–66)</td>
</tr>
<tr>
<td><strong>LV diastolic function</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LAVi (mL/m2)</td>
<td>29.8±12.5</td>
<td>35.9±13.5</td>
<td>44 (36–59)</td>
<td>NA</td>
<td>41.3±14.7</td>
<td>28.0±8.4</td>
<td>NA</td>
</tr>
<tr>
<td>LA diameter (cm)</td>
<td>4.3±0.6</td>
<td>3.7±0.5</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>4.5 (4.1–4.8)</td>
</tr>
<tr>
<td>E/A ratio</td>
<td>1.2±0.7</td>
<td>1.1±0.62</td>
<td>1.5 (1.0–2.1)</td>
<td>1.05±0.74</td>
<td>1.1±0.7</td>
<td>0.91±0.33</td>
<td>0.7 (0.6–0.9)</td>
</tr>
<tr>
<td>TDI E- septal (cm/s)</td>
<td>6.1±2.2</td>
<td>5.8±2.0</td>
<td>6 (5–8)</td>
<td>7.2±2.9</td>
<td>NA</td>
<td>5.9±1.3</td>
<td>NA</td>
</tr>
<tr>
<td>TDI E- lateral (cm/s)</td>
<td>8.2±3.2</td>
<td>7.5±2.8</td>
<td>NA</td>
<td>9.1±3.4</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>E/E- ratio (septal)</td>
<td>15.6±6.8</td>
<td>15.9±7.3</td>
<td>16 (11–24)</td>
<td>NA</td>
<td>NA</td>
<td>12.8±4.0</td>
<td>NA</td>
</tr>
</tbody>
</table>
Incident Atrial fibrillation: A growing problem and concern

- Often coexists with HFpEF presentation
- May be the causation of decompensation
- Meta-analysis of > 54,000 patients,
- A significantly higher risk of death in AF patients with HFrEF compared to those with HFpEF.
  - There was a crude mortality rate of 24% versus 18% respectively, over 2 years.
  - No significant difference in incident stroke or heart failure hospitalization between the two groups.

Exploratory (post-hoc): Placebo vs. Spiro by region

US, Canada, Argentina, Brazil
HR = 0.82 (0.69-0.98)

Russia, Rep Georgia
HR = 1.10 (0.79-1.51)

Interaction p = 0.122

Placebo:
280/881 (31.8%)

Placebo:
71/842 (8.4%)
Figure. Individual and mean (■) responses of peak exercise $\text{VO}_2$ following 16 weeks of supervised exercise training. Results are displayed in raw, nonindexed peak $\text{VO}_2$, as this is uninfluenced by weight.

HFPeF: Key points

- HFPeF is common, especially among the elderly and in women.
- With an increasing prevalence of HTN, obesity, Afib, and diabetes, and the growing elderly segment of the general population, the prevalence of HFPEF is projected to increase.
- HFPEF = diagnostic challenge and studies differ widely in their reported incidence and mortality rates associated with this condition.
- There is agreement that between a third and one half of HF patients in the community have HFPEF.
- Prognosis is overall poor. Patients with HFPEF have substantial comorbidity, high rates of repeated hospitalizations, and a high mortality.
- Is the mortality often not related to the HFPEF but to the comorbidities?
- Are there different groups within the phenotypes?

**OUTCOME:**
- Reduction in all cause hospitalization
- Improvement in objective function: ability to rehab
- Improvement in symptoms (well captured)
- Absence of a fib
What is ADHF?
A semicolon in the total sentence...
Continuity of the syndrome forgotten

NYHA classification

Compensated

Chronically decompensated

Acutely decompensated

First myocardial injury

First episode of AHF with hospitalization

DEATH

NYHA I → NYHA II → NYHA III → NYHA IV

ED
CCU
Telemetry
DC
Early Post DC
Outpatient
Achieving Coordinated Identification, Detection and Treatment of Heart Failure Summit
April 12th, Hyatt Regency Bethesda, MD

The Progression of Symptoms in ADHF

- Abnormal LV function (Sys and/or Dia)
- Orthopnea
- Dyspnea
- Fatigue
- Edema

↑ LVDP + impaired volume regulation
Increase PA pressure
Increased PCWP (congestion)
↑ RV + RA pressure
Systemic congestion (JVD, edema)
↑ LA and LV diastolic pressure
↑ LVDP + impaired volume regulation
Abnormal LV function (Sys and/or Dia)

Systemic congestion (JVD, edema)
↑ RV + RA pressure
Increase PA pressure
Increased PCWP (congestion)
↑ LA and LV diastolic pressure
↑ LVDP + impaired volume regulation
Abnormal LV function (Sys and/or Dia)
Most Heart Failure Hospitalizations are due to Worsening Chronic Heart Failure

- ~70% Worsening chronic HF
  Associated with reduced or preserved left ventricular systolic function (LVEF)

- ~25% de novo HF
  After a large MI; sudden increase in blood pressure superimposed on a noncompliant LV

- ~5% Advanced HF
  Refractory to therapy; with severe LV systolic dysfunction, associated with a worsening low-output state

# Clinical Trials of ADHF

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Study</th>
<th>Physiologic Target</th>
<th>Sx or outcome</th>
<th>mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diuretic</td>
<td>DOSED</td>
<td>Hi vs. low continuous</td>
<td>Modest</td>
<td>NA</td>
</tr>
<tr>
<td>AVP blockers</td>
<td>EVEREST</td>
<td>AVP receptor</td>
<td>Neutral on dyspnea</td>
<td>No benefit</td>
</tr>
<tr>
<td>UF</td>
<td>UNLOAD CARESS</td>
<td>Volume</td>
<td>Relief of dyspnea</td>
<td>No benefit; renal fct worse</td>
</tr>
<tr>
<td>Seralaxin</td>
<td>RELAX-AHF</td>
<td>Vasodilation in ADHF</td>
<td>Modest dyspnea relief</td>
<td>No benefit in hospitalizations RELAX II almost complete</td>
</tr>
<tr>
<td>Nesiritide</td>
<td>ASCEND-HF</td>
<td>Vasodilation</td>
<td>Modest Sx relief</td>
<td>No benefit</td>
</tr>
<tr>
<td>Levosimendan</td>
<td>SURVIVE REVIVE II</td>
<td>Ca++ sensitization</td>
<td>Modest Sx relief</td>
<td>Possible harm</td>
</tr>
<tr>
<td>Ularitide</td>
<td>TRUE-AHF</td>
<td>Mortality In-hospital worsening</td>
<td>Lower ProBNP less hospital events. No reduction in hospitalizations</td>
<td>No benefit on mortality but lowered BNP</td>
</tr>
</tbody>
</table>
Do we need to change our “injury” theory?

- The “neurohormonal storm” not addressed with diuretics or vasodilators
- No guide after the early intervention
- Is it time for devices to treat or to prevent?
  - Safe if implanted
  - Durable (do not lose signal)
  - Cost effective
  - Who monitors the monitor?
    - Patient or providers?
  - How to respond to signals? Best drug, dose?

Transition from IVAM to Chronic Oral Heart Failure Therapy

Acute Heart Failure initiated on IVAM

YES → Hold ACEI and BB

Hemodynamics optimized and/or renal function normalized, go to #2

#1: Shock state or worsening renal function?

NO → Continue baseline medical therapy

Continue baseline medical therapy

NO → Serum K+ <5 mEq/L

Serum K+ <5 mEq/L

NO → GFR

<30: no antagonist

30-40: spironolactone 12.5mg

>40: spironolactone 25mg

YES → Aldosterone antagonist

No Aldosterone antagonist

#2: Aldosterone antagonist?

YES → Continue

#3: ACEI?

YES → Consider changing to short-acting equivalent for ease of titration

Captopril 6.25mg every 8 hrs

NO → #4: Systolic Blood Pressure ≥ 90mmHg?

#4: Systolic Blood Pressure ≥ 90mmHg?

NO → Maintain dose and reattempt up titration at each subsequent dosing interval

If SBP >90 (continue to #6)

YES → Increase to next incremental dose at subsequent dosing interval. Repeat dose to dose adjustment to achieve target 50mg every 8 hours

#5: ACEI at target dose and SBP >90mmHg?

YES → Go to #6

NO → Isosorbide Dinitrate 10mg every 8 hrs

Titrato goal 40 mg if SBP >90

#6: Volume and Perfusion optimized?

NO → Continue IVAM and IV diuretic

Reassess every 24 hrs

YES → Wean IVAM and switch to oral diuretics

#7: Clinically stable off IVAM and on oral diuretics for 24hrs?

NO → Consider re-initiation of IVAM and IV diuretics

YES → Increase or initiate BB

Discharge home and follow-up within 7 days

Beyond the First 48 hrs: Then what?

A Transition Ignored

Figure 1. Suggested algorithm for continuation and initiation of long-term therapy during an admission for ADHF in which the patient is receiving IVAM. There are 7 cardinal points for decision making.

More than 50% of Patients Have Little or No Weight Loss During Hospitalization

Current treatment options
- Loop diuretics
- IV inotropes
- Nitrates
- Nesiritide

Congestion After Initial In-Hospital Therapy Is Associated with Higher 60-day Mortality

60-Day All-cause Mortality

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Na ≥ 136</th>
<th>Na &lt; 136</th>
<th>BUN &gt; 29</th>
<th>BUN ≤ 29</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>319</td>
<td>250</td>
<td>69</td>
<td>140</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(78.4%)</td>
<td>(21.6%)</td>
<td>(44%)</td>
<td>(56%)</td>
</tr>
<tr>
<td>Severe congestion*</td>
<td>204</td>
<td>115</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(64%)</td>
<td>(36%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Edema, dyspnea, and JVD at baseline.
Furosemide Monotherapy Causes a Significant Decline in Renal Function

Change in GFR after furosemide 80 mg IV
Class III HF, n = 16, age 61, LVEF 0.28, CAD 63%

Impact of IV Diuretics on Patients Hospitalized With ADHF

ADHERE: All Enrolled Discharges (n = 56,484) October 2001 to October 2003

Diuretics Activate Neurohormonal Systems in HF

Adapted with permission from Bayliss J et al. Br Heart J. 1987;57:17
Background:
Limitations of diuretic therapy

- Deleterious acute hemodynamic effects
- Activation of neurohormonal axes
- Decline in renal function
- Tubuloglomerular feedback mechanisms
- High doses associated with worse outcomes
Acute Therapy = Acute Endpoints (24 hrs. → Until Discharge)

- Clinically important symptoms and/or signs
- Hemodynamics (BNP, NT-pro BNP? as surrogate)
- Myocardial injury (Tn? as surrogate)
- Renal function (BUN, BUN/Cr),
- Normalizing serum sodium, hemoglobin?

Long-term Safety Endpoints

- Readmissions
- Mortality
- Acute surrogate endpoints predicting long-term safety (Tn, BNP/NT-pro BNP, viability/remodeling assessment) should not worsen
Achieving Coordinated Identification, Detection and Treatment of Heart Failure Summit
April 12th, Hyatt Regency Bethesda, MD

Identification of Stage B Patients: Missed Opportunities

Moderator: Dr. Ileana Piña
Panelists: Dr. Mary Walsh
           Dr. Javed Butler
           Dr. Mark Drazner
Figure 2. Kaplan-Meier curves for survival.

Lee R. Goldberg, and Mariell Jessup Circulation. 2006;113:2851-2860
Figure 1. ACC/AHA guidelines for the evaluation and management of chronic HF: evolution of HF and recommended therapy by stage.

Lee R. Goldberg, and Mariell Jessup Circulation. 2006;113:2851-2860
### Recommendations for Treatment of Stage B HF

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>COR</th>
<th>LOE</th>
</tr>
</thead>
<tbody>
<tr>
<td>In patients with a history of MI and reduced EF, ACE inhibitors or ARBs should be used to prevent HF</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>In patients with MI and reduced EF, evidence-based beta blockers should be used to prevent HF</td>
<td>I</td>
<td>B</td>
</tr>
<tr>
<td>In patients with MI, statins should be used to prevent HF</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Blood pressure should be controlled to prevent symptomatic HF</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>ACE inhibitors should be used in all patients with a reduced EF to prevent HF</td>
<td>I</td>
<td>A</td>
</tr>
<tr>
<td>Beta blockers should be used in all patients with a reduced EF to prevent HF</td>
<td>I</td>
<td>C</td>
</tr>
<tr>
<td>An ICD is reasonable in patients with asymptomatic ischemic cardiomyopathy who are at least 40 d post-MI, have an LVEF ≤30%, and on GDMT</td>
<td>IIa</td>
<td>B</td>
</tr>
<tr>
<td>Nondihydropyridine calcium channel blockers may be harmful in patients with low LVEF</td>
<td>III: Harm</td>
<td>C</td>
</tr>
</tbody>
</table>
Creating Systems of Care to Diagnose and Track Patients with Heart Failure

Dr. Larry Allen
Creating Systems of Care to Diagnose and Track Patients with Heart Failure

Keep your eye on the ball...

Larry Allen
Heart Failure Summit
April 12, 2017, Bethesda
Disclosures

- Grant funding: AHA, PCORI, NIH
- Consultant: Novartis, Janssen
- Employer: University of Colorado
Health systems do not consistently deliver high-value care

Americans only receive \(~\text{half}\) of guideline-indicated care.

Americans only receive \textit{\~half} of guideline-indicated care.

Of eligible HFrEF patients:
- only receive spironolactone or eplerenone only 25\% of the time.

Health systems do not consistently delivery high-value care

Americans only receive \textit{\sim half} of guideline-indicated care.

Of eligible HFrEF patients:

\begin{itemize}
  \item only receive spironolactone or eplerenone only 25\% of the time
  \item only receive sacubitril/valsartan only 2.5\% of the time
\end{itemize}

Triple Aim

- Improving the patient experience of care
- Improving the health of populations
- Reducing the per capita cost of healthcare

Quality Infrastructure

- Data
- Benchmarking

System changes
- EMR
- Standing orders
- Critical pathways
- Integrated care

Clinician leaders

Administrative support

Therapeutic Innovation

Payment and Policies
The course of Stage C HF

Onset of Symptoms  \hspace{10cm}  Transition to Stage D (…Death)

Symptomatic HF

MAJORITY of patients with HF and associated burdens and costs
The course of Stage C HF and *opportunities* along the way

Timely Diagnosis

Symptomatic HF
The course of Stage C HF and opportunities along the way

Symptomatic HF

Timely Diagnosis

Case: 67yo F with progressive shortness of breath and cough. After a week, sees PCP, prescribed Z-pack. Persists, after 3 weeks, sees PCP again, prescribed levofloxacin. A week later taken to ED in florid pulmonary edema.
The course of Stage C HF and opportunities along the way

**Symptomatic HF**

**Timely Diagnosis**

Case: 67yo F with progressive shortness of breath and cough. After a week, sees PCP, prescribed Z-pack. Persists, after 3 weeks, sees PCP again, prescribed levofloxacin. A week later taken to ED in florid pulmonary edema.

Case: 35yo M with fatigue, RUQ abdominal pain. Gall bladder “sludge” on ultrasound. Taking to the OR for lap chole, when he becomes extremely hypotensive with induction of anesthesia. Stat echo shows LVEF 10%.
The course of Stage C HF and opportunities along the way

- Timely Diagnosis
- Link Care to LVEF

Symptomatic HF
The almighty ejection fraction

LVEF
How hard can it be?
LVEF Field Coded

- KPNW: Echo auto Nuclear
- KPCO: Free text Manual
- KPNC: PDF NLP
- MGH: Unable
- Utah: Solution A
- Duke: Solution B
- UCH: Solution C

Strategically Focused Research Networks
Achieving Coordinated Identification, Detection and Treatment of Heart Failure Summit

April 12th, Hyatt Regency Bethesda, MD

**Interpretation Summary**

The left ventricle is moderately dilated.

Left ventricular systolic function is severely reduced.

There is global severe hypokinesia/akinesia.

The right ventricle is normal in size.

Right ventricular function is moderately reduced.

There is moderate mitral regurgitation.

There is mild tricuspid regurgitation.

Right ventricular systolic pressure is normal.

The inferior vena cava is normal in size with respiratory variation indicating a right atrial pressure of approximately 3 mm Hg.

There is no comparison study available.

**Procedure**

A complete transthoracic echocardiogram was performed (mode, Spectral and Color Flow Doppler imaging). Image contrast (Definity) was administered to improve visualization of the left ventricle.

The left ventricle is moderately dilated and normal in thickness. Left ventricular ejection fraction is severely reduced. Calculated biplane EF is 22.2% by 2D or color Doppler. There is no evidence of a wall motion abnormality by 2D or color Doppler. There is no evidence of a thrombus in the left ventricle.
The course of Stage C HF and opportunities along the way

- Symptomatic HF
  - Timely Diagnosis
  - Automatic Identification
  - Link Care to LVEF
- Deployed at **all VA cath labs** (N=78)
- **Point of care** data collection
- Standardized ACC NCDR **definitions**
- **Real-time** capture and feedback

Intelligent re-design

When a DES is implanted....

... automatic link to pharmacy; If patient does not pick up clopidogrel, patient contacted

IVR during follow-up: adherence & refill reminders, detect problems with meds

Who in your hospital has HF?

- ~$10,000/episode (70% HF $)
- Mean LOS 5 days
- Opportunities
  - Education
  - Rx optimization
- Coding retrospective
  - Admitting Dx nonspecific
  - Requires active approaches
The course of Stage C HF and **opportunities** along the way

- **Symptomatic HF**
  - Timely Diagnosis
  - Automatic Identification
  - Link Care to LVEF
  - Integrated Risk Stratification
## Automated risk score display

### Allen HF Inpt 10 Patients

<table>
<thead>
<tr>
<th>Room/</th>
<th>Patient Name/Age/Sex</th>
<th>MRN</th>
<th>Admis Date</th>
<th>Length of Stay</th>
<th>Attending</th>
<th>Re-admitt. Last 30 Days</th>
<th>Score Readm LACE+</th>
<th>Score Readmit Parkland</th>
<th>Creatinine</th>
</tr>
</thead>
<tbody>
<tr>
<td>356/01</td>
<td>Wortham, T (69 y.o.) M</td>
<td>404908</td>
<td>11/6/16 16d 18h</td>
<td></td>
<td>Brieke, Andreas, MD</td>
<td>—</td>
<td>81</td>
<td>14</td>
<td>1.2 mg/dL</td>
</tr>
<tr>
<td>360/01</td>
<td>Ruis, D (67 y.o.) M</td>
<td>2310520</td>
<td>11/1... 1d 10h</td>
<td></td>
<td>Brieke, Andreas, MD</td>
<td>—</td>
<td>67</td>
<td>13</td>
<td>2.2 mg/dL</td>
</tr>
<tr>
<td>361/01</td>
<td>Fettner, R (35 y.o.) M</td>
<td>1817591</td>
<td>7/13/16 123d</td>
<td></td>
<td>Brieke, Andreas, MD</td>
<td>▼</td>
<td>81</td>
<td>11</td>
<td>1.1 mg/dL</td>
</tr>
</tbody>
</table>
### Ancillary Consults

<table>
<thead>
<tr>
<th>Inpatient consult to Case Management, Social Work, Home Care</th>
<th>Reason for Consult? HF patient at high risk for frequent readmissions. Please assess for home care needs (ie, medication management, home HF program, PT/OT, etc.) and/or placement needs (SNF LTAC etc).</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inpatient consult to Smoking Cessation Program</td>
<td>Routine, ONCE. Patient reports smoking within previous 12 months Reason for Consult? Educate on low sodium diet and/or fluid intake</td>
</tr>
<tr>
<td>Inpatient consult to Nutrition</td>
<td>Routine, ONCE. Reason for Consult? Deconditioning / worsening heart failure, assess placement needs</td>
</tr>
<tr>
<td>PT eval and treat</td>
<td>Routine, ONCE. Reason for Consult? Worsening heart failure, assess placement needs</td>
</tr>
<tr>
<td>OT eval and treat</td>
<td></td>
</tr>
</tbody>
</table>
The course of Stage C HF and **opportunities** along the way
Integrating home-based data
Question #1: How can we improve the diagnosis of symptomatic heart failure so that it is more timely and maps more specifically to the underlying cause?

Question #2: How can we improve the identification and tracking of patients with heart failure in order to target the appropriate interventions?

Medical Innovation
Systems Redesign
Payment and Policy Reform
Role of Population Health in Heart Failure Management

Dr. Paul Heidenreich
How Can We Deliver Population Health Care for Future Heart Failure?

Paul Heidenreich MD, MS
No Conflicts of Interest

VA and Stanford Health Care Employee
Outline

- The case for population health for heart failure
- Implementing population health (examples)
  - Notes to providers for ICDs
  - Reminders in echo reports
  - Patient outreach for cholesterol testing
  - Nurse titration clinics
- Questions
GWTG-HF: Achievement Measures

* Modified to include Beta Blocker at Discharge and Discharge Instructions rather than Evidence-Based Beta Blocker at D/C and Post Discharge Appointment
Baseline = Admissions Jan2005 – Dec2005
Current = Overall

<table>
<thead>
<tr>
<th></th>
<th>COMPLIANCE</th>
<th>LV Function Measurement</th>
<th>ACEI or ARB at D/C for LV SD</th>
<th>Evidence-Based Beta Blocker at D/C for LVSD</th>
<th>Beta Blocker Discharge</th>
<th>Post Discharge Appointment for HF patients</th>
<th>Discharge Instructions</th>
<th>Composite Performance Measure*</th>
<th>100% Compliance Measure*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td>Baseline</td>
<td>90.10%</td>
<td>81.20%</td>
<td>61.00%</td>
<td>87.30%</td>
<td>39.30%</td>
<td>69.70%</td>
<td>80.30%</td>
<td>62.10%</td>
</tr>
<tr>
<td><strong>Current</strong></td>
<td>Current</td>
<td>98.64%</td>
<td>91.68%</td>
<td>92.60%</td>
<td>97.90%</td>
<td>74.64%</td>
<td>95.42%</td>
<td>96.68%</td>
<td>92.52%</td>
</tr>
</tbody>
</table>
GWTG-HF: Quality Measures (1)

<table>
<thead>
<tr>
<th>QUALITY MEASURE</th>
<th>Baseline</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warfarin at D/C</td>
<td>57.30%</td>
<td>84.61%</td>
</tr>
<tr>
<td>Aldosterone antagonist at D/C for LVSD</td>
<td>19.90%</td>
<td>39.62%</td>
</tr>
<tr>
<td>Hydralazine/Isosorbide at D/C for AA</td>
<td>10.80%</td>
<td>29.14%</td>
</tr>
<tr>
<td>ICD Counseling or ICD placed or prescribed at D/C</td>
<td>31.30%</td>
<td>54.10%</td>
</tr>
</tbody>
</table>

Baseline = Admissions Jan2005 – Dec2005
October 2016
Current = Overall
### GWTG-HF: Quality Measures (2)

<table>
<thead>
<tr>
<th>QUALITY MEASURE</th>
<th>Baseline (Jan 2009 – Dec 2009)</th>
<th>Current (Overall)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pneumococcal Vaccine</td>
<td>22.90%</td>
<td>67.50%</td>
</tr>
<tr>
<td>Influenza Vaccine</td>
<td>17.70%</td>
<td>78.00%</td>
</tr>
<tr>
<td>Follow-up visit within 7 days</td>
<td>61.90%</td>
<td>79.03%</td>
</tr>
<tr>
<td>DVT Management</td>
<td>25.40%</td>
<td>85.42%</td>
</tr>
<tr>
<td>CRT placed or prescribed at discharge</td>
<td>39.90%</td>
<td>49.78%</td>
</tr>
</tbody>
</table>

**Notes:**
- **Baseline:** Admissions Jan 2009 – Dec 2009
- **Current:** Overall

The graph and the table above display the compliance rates for various quality measures related to heart failure treatment. The compliance rates for different measures show significant improvements from baseline to current data.
Heart Failure Clinics Can See only a Minority of HF Patients

Recommendations by the Heat Failure Society of America:

- Patients recently hospitalized for heart failure
- Persistent New York Heart Association Class III or IV symptoms
- Frequent hospitalizations for any cause
- Renal insufficiency
- Diabetes
- Chronic obstructive pulmonary disease
- Elderly patients and other patients with multiple active comorbidities
- A history or depression, cognitive impairment, persistent nonadherence to therapeutic regimens, or inadequate social or economic support

Hauptman, J Card Failure 2008
Population Health vs. Traditional Care

- **Traditional Care**
  - Health Care Team reactive
  - Patient must bring problems to the attention of the team
  - Number of HF patients in the system unknown

- **Population Health**
  - Health Care Team identifies all patients in the system with heart failure
  - Patients possibly in need of care identified and contacted
  - Number of HF patients known-registry
Population Health Steps

1. **Database Creation**
   - HF codes (e.g. ICD10)
   - LV ejection fraction (may require natural language processing)

2. **Link to available data**
   - Pharmacy
   - Lab
   - Encounters (inpatient and outpatient)
   - Devices

3. **Determine possibly under/over treated patients**

4. **Prioritize**

4. **Intervene (depending on resources)**
   - Computer Reminders, Patient mailings (inexpensive, small effect)
   - Patient calls, new visits/clinics (expensive, larger effect)
Impact of ICD Note in the Medical Record
LVEF <=35% and age < 80 years, not in ICD clinic

Gupta, Circ HF, 2013
Other Impacts of ICD Note

- Improvement in medication use through referral to cardiology
- More discussion of end of life plans
- Mortality benefit

Gupta, Circ HF, 2013
VA Beta-Blocker Reminder Study

Could a clinical reminder attached to the echocardiography report (that provides ejection fraction data) be effective in increasing prescriptions for beta-blockers?
Reminder in the Echo Report for Beta-blockers

Heidenreich, Circulation 2007;115:2829
Primary Care Provider Survey

Recall the Reminder?  Should Reminders Continue?

- Yes
- No
- No Opinion

Heidenreich, Circulation 2007;115:2829
Patient Outreach: Cholesterol Screening

- **No CVD and no Lipid test in 5 years (Persell J Eval Clin Pract. 2016)**
  - 480 Patient randomized
  - Intervention *(mailing, testing available without appointment)*
  - Outcome *(cholesterol testing)*
    - 13% (intervention) vs. 11% (control, p=NS)

- **High risk Patients without CVD (Persell, Circ CVO, 2015)**
  - 646 randomized
  - Intervention *(mailing and telephone calls)*
  - Outcome: Discussion with primary care provider
    - 13% (intervention) vs. 11% (control, p<0.01)
  - Outcome: Statin Use
    - 10% (intervention) vs 6% (control, p=NS)
Nurse Medication Titration Clinic

169 patients randomized (beta-blocker candidates) to:
Nurse Clinic, Reminder/Notification, or Usual Care
Population Health Questions

- Which patients should be tracked?
- What treatments (underuse, overuse) are most important?
  - Impact on outcome, gap in care, cost
- What interventions?
- What is the business case for population health in HF?
Implementation of the Reminder:
51 Echocardiography Labs: 3 Months Post-Intervention

- Won't do it
- Not Sure
- Already
- Plan to
- Started
Strategies for Reducing Heart Failure Hospitalization

Dr. Pamela Peterson
Self-Management:
What Have We Learned Over Time

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

Cleveland Clinic, Cleveland Ohio
Self Management: Why Should We Care?

COACH study: Self Care

Assessed compliance in:
1) Sodium-restricted diet*
2) Fluid restriction*
3) Exercise*
4) Weight monitoring**

* scored mostly or always
** 3 x/week to daily

Compliance measured 1 month after hospital discharge & followed for 18 months; 48% (N=830 patients)

*** all-cause death or HF rehospitalization

COACH study: Self-Care Adherence

Compliance with advice on weight monitoring, low sodium diet, fluid restriction and exercise

* $P < 0.01$; ** $P < 0.05$

Self Management (based on SCHFI) & Event-Free Survival Risk

<table>
<thead>
<tr>
<th>Factor</th>
<th>Adjusted HR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (y)</td>
<td>.967 (.941, .995)</td>
</tr>
<tr>
<td>Depression</td>
<td>1.074 (1.04, 1.11)</td>
</tr>
<tr>
<td>$\beta$-Blocker</td>
<td>.346 (.187, .641)</td>
</tr>
<tr>
<td>DASI Score</td>
<td>.960 (.930, .991)</td>
</tr>
<tr>
<td>Symptom free</td>
<td>.481 (.238, .971)</td>
</tr>
<tr>
<td>Above average SCM score</td>
<td>.441 (.222, .877)</td>
</tr>
</tbody>
</table>

Behavioral Predictors of 30-Day Rehospitalization; N=729

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Univariate Regression</th>
<th>Multivariable Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>95% CI</td>
</tr>
<tr>
<td>Service decline/refusal</td>
<td>2.21</td>
<td>1.42-3.43</td>
</tr>
<tr>
<td>Nonadherence</td>
<td>1.99</td>
<td>1.28-3.10</td>
</tr>
<tr>
<td>Dementia</td>
<td>1.91</td>
<td>1.08-3.40</td>
</tr>
<tr>
<td>Depression</td>
<td>1.55</td>
<td>1.00-2.40</td>
</tr>
<tr>
<td>Missed appointment</td>
<td>1.99</td>
<td>1.28-3.09</td>
</tr>
</tbody>
</table>

Patient-Identified Factors of HF Hospitalization

• Interviews; Reasons for rehosp ≤ 6 months
  – 28 patients
    • 8 from community hospitals
    • 20 from academic centers

5 themes:
• Distressing symptoms
• Unavoidable progression of illness
• Influence of psychosocial factors
• Good but imperfect self-care
• Health system failures

No differences in themes between those admitted ≤ 30 days vs. > 30 days from their last admission

Naturalistic Decision-Making

- Conflict vs synergy with personal goals or family goals
- Decision characteristics
  - Uncertainty
  - Ambiguity
  - High/low stakes
  - Illness characteristics
  - Others’ involvement

Mental simulation of actions

Self Care Decision

Situational Awareness

Experiences or Illness beliefs
- Identity
- Cause
- Timeline
- Consequences
- Cure/Control

Patient Activation

• Patients who are “activated” (have skills, ability, and willingness to manage their own health and health care)
  – Experience better health outcomes at lower costs compared to less activated patients

• Patient activation measure: 13-items; values range from 38.6 to 53 (rescaled on a 0-100 point scale)
  – 4 levels (1, lowest; 4 highest); scores the degree to which someone sees himself or herself as a manager of his or her health and care
    • Active role is important → Confidence & knowledge to take action → Taking action → Staying the course under stress

Hibbard JH. *Health Services Res.* 2005;40(6);1918-1930.
Patient Activation in Heart Failure

- At Mayo Clinic in ADHF, 302 patients studied; mean age 77.3 yrs

- Patients with lower activation were older, less educated; had lower patient satisfaction, and worse health literacy

Enhancing Patient Activation

84 patients with HF randomized to UC or Heart PACT Program then reassessed at 3- and 6-months.

Enhancing Patient Activation

Who is in Charge?

• Patients are in control
  – No matter what we as health professionals do or say, patients are in control of important self-management decisions
  – When patients leave the clinic or office, they can and do veto recommendations their healthcare provider makes

• Shared decision making allows patients and their providers to make health care decisions together, taking into account the best scientific evidence available, as well as the patient’s values and preferences

## Strategies for Shared Decision Making

<table>
<thead>
<tr>
<th>Clinician</th>
<th>Patient and Family</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diagnosis</td>
<td>Personal experience of illness</td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
</tr>
<tr>
<td>Prognosis</td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>Preferences</td>
</tr>
<tr>
<td>Treatment Outcome</td>
<td></td>
</tr>
<tr>
<td>Risk/benefit associated with each outcome</td>
<td>Attitudes/feelings regarding risks</td>
</tr>
</tbody>
</table>

Patients are the most underutilized RESOURCE, and they have the most at stake!

http://www.informedmedicaldecisions.org/
Decision Aid Example

Heart Rhythm Problems: Should I Get an Implantable Cardioverter-Defibrillator (ICD)?

You may want to have a say in this decision, or you may simply want to follow your doctor's recommendation. Either way, this information will help you understand what your choices are so that you can talk to your doctor about them.

| Heart Rhythm Problems: Should I Get an Implantable Cardioverter-Defibrillator (ICD)? |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Get the Facts | Compare Options | Your Feelings | Your Decision | Quiz Yourself | Your Summary |

Get the facts

Your options
- Get an ICD.
- Don't get an ICD.

Ottawa Hospital Research Institute: [https://www.healthwise.net/cochranedecisionaid/Content/StdDocument.aspx?DOCHWID=abk4103](https://www.healthwise.net/cochranedecisionaid/Content/StdDocument.aspx?DOCHWID=abk4103)
“There simply is no pill that can replace human connection. There is no pharmacy that can fill the need for compassionate interaction with others. There is no panacea. The answer to human suffering is both within us and between us.”

-Dr. Joanne Cacciatore
Steps in Shared Decision Making

• Invite patient & family to participate
• Both parties share information
  – Clinician
    – Introduces concept of participation in decision making
    – Offers options & describes associated risks/benefits
  – Patient & family
    – Express preference/values
• In audiotaped single medical visits of 93 HF patients (36 w companion)
  – 32% more positive rapport-building statements ($p<0.01$) and almost 3x as many social rapport-building statements ($p<0.01$) from patients and companions in accompanied visits versus unaccompanied patient visits

What matters most: what are the priorities for the patient & family?

http://www.informedmedicaldecisions.org/
Caring for Patients with Heart Failure

Engagement in care assessed via qualitative interviews

- 60 patients, 22 caregivers, and 11 healthcare providers

• Key themes of *patients & caregivers*:
  1. Education on disease specifics
  2. Guidance to enhance quality of life
  3. Learning to cope with HF
  4. Future outlook and care decisions

• Themes of “greatest impact” by *healthcare providers*:
  1. Knowledge is powerful
  2. Adherence to treatment plan
  3. Compliance with medication

**Compare - Contrast**

Patient Engagement Strategies

• Must be prepared to do MORE than just deliver intense, repeated education and reinforce post-discharge follow-up appointments
  • Flip the script and empower patients to care for themselves
  • MUST see the person behind the patient
Shared Decision Making

“You have to learn about thousands of diseases, but I only have to focus on fixing what’s wrong with ME! Now which one of us do you think is the expert?”
Self Care Management Strategies
TABLE DISCUSSIONS

• How can we enhance:
  – *Patient engagement* in HF self-care adherence (globally and for specific self-care themes)?
  – *Shared decision making* in our real world clinical settings?
  – Patient adherence to self-care strategies *when under distress or in difficult situations*?

• What strategies are needed to shift provider focus from teaching “what” self-care entails to “how” to *practically carry it out*?

• What would a “home care for HF” program look like (who, what, when, how...) if the goal was to enhance self-care adherence?

• What *tools/resources* are needed (or if already available, how would they need to be altered) to enhance self-care adherence?
• Concluding Remarks
• Next Steps
Thank You