What’s New in Heart Failure?
Updates for the Primary Care Clinician

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>1 million Heart Failure Hospitalizations
-Growth at extremes of age

Heart Failure Care is Expensive

Physicians/Other Providers
($3 billion) 7%

Drugs/Medical Durables
($5 billion) 10%

Home Health
($3 billion) 10%

Hospital /Nursing Homes
($26 billion) 73%

Total Direct Costs: $31 billion in 2012 ---> $70 billion in 2030


What is New in Heart Failure?

1. Patient Self-management support
2. Exercise training
3. New therapies for HF with preserved EF (Diastolic Dysfxn)
   - Mineralocorticoid receptor blockers (spironolactone)
   - Phosphodiesterase 5A inhibitors (sildenafil)
4. New pacing strategies for HF with reduced EF
   - CRT for mild HF with prolonged QRS
   - CRT for patients with AV block
5. New ACC/AHA Guidelines for treatment of HF
6. Cutting Edge Stuff
   - Wireless Sensors for remote hemodynamic monitoring and early intervention
Using a ‘teach-to-goal’ strategy to promote learning in HF

Caring for Your Heart: Living Well with Heart Failure education manual

(http://www.nchealthliteracy.org/hfselfmanage.html)

6 Learning & Behavioral HF Goals

1. Check yourself every day (edema, symptoms [SOB, lightheadedness], weight)
2. Mark your weight down on the color coded scoring sheet
3. Take your meds as directed
4. Eat less salt
5. Exercise every day
6. Change your water pill dose if the colors on the scoring sheet change
Single education session (~ 40 minutes)
- Caring for Your Heart: Living Well with Heart Failure
- Given a new digital scale

Randomization
Stratified by Literacy

No further intervention
- Single Session Only (SSO)

Additional Education
- Teach to Goal (TTG)

Single Session

#1—How do I feel today?
You can tell how well your heart is doing by how you feel and what you can do.

Am I short of breath walking?
Heart failure can make you feel short of breath while walking.

When Should I Call?
Call us if:
- You are short of breath at rest or more short of breath than usual.
- You have to sleep upright or in a chair.
- You have more swelling in your legs than usual.
- You have a lot of dizziness or light headedness that is worse than usual.
- Your weight gain up by 4 or more pounds from your target weight.
Teach to Goal Group also:

- Taught diuretic self-adjustment
- 5-8 calls first month
- Call every 2-4 weeks thereafter
- Topics discussed based on set knowledge and behavior goals
- Call frequency based on demonstrated mastery
- All intervention focused on patient education, not system change

Odds of HF Related Hospitalization

- All 0.90 (0.70, 1.15)
- Low Literacy 0.53 (0.29, 0.96)
- High Literacy 1.36 (0.88, 2.12)
Implications

- The dose and style of self-management support programs has differential effects based on patient literacy.
- TTG is an effective design to assist patients with low literacy to prevent HF hospitalizations.
- A one-size fits all approach to self-management support may not optimize use of resources.

Exercise Training in HF r-EF

- Structured, group-based, supervised exercise program.
- Goal 3 sessions/week x 36 sessions in 3 months.
- Exercise initiated at 15-30 min/session at HR of 60% of HR reserve (Max HR).
- After 6 sessions, duration of exercise increased to 30-35 min, and intensity increased to 70% of HR reserve.
- After 18-36 sessions, exercise continued at home.

Exercise Training in HF r-EF reduces events by 13%


Drugs That Reduce Mortality in HF With Reduced Ejection Fraction (r-EF)

- Angiotensin receptor blocker
- ACE inhibitor
- Beta blocker
- Mineralocorticoid receptor antagonist

Based on results of SOLVD-Treatment, CHARM-Alternative, COPERNICUS, MERIT-HF, CIBIS II, RALES and EMPHASIS-HF

% Decrease in Mortality

- 0%
- 10%
- 20%
- 30%
- 40%

Drugs that inhibit the renin-angiotensin system have modest effects on survival
A word about Diuretics in HF

- Torsemide ↓hospitalizations compared to furosemide

- Have to be given BID to avoid rebound Na reabsorption

- Metolazone/ chlorthiazide in refractory HF or in pts. with renal failure. Should not be used more than once daily or every other day due to long half life.


A word about B Blockers for HF r-EF:
COMET: Metoprolol vs. Carvedilol

Carvedilol: “The Cadillac of BB”

- “Switches off” beta receptor more than all other beta-blockers.
- Better BP control, insulin sensitivity, peripheral vasodilatation.
- Optimum dose: 25mg po BID if can tolerate

New medical therapies for HF with preserved EF

- Mineralocorticoid receptor blockers (spironolactone)
- ?Phosphodiesterase 5A inhibitors (sildenafil)
**HF PEF: Rising Prevalence**

GWTG-HF (n = 110,621 pts.) hospitalized with HF


**HF PEF: No Current Treatments**

Mineralocorticoid Receptor Blockers
What Have we Known?

Aldosterone in HF:
- Mediates activation of SNS & Antidiuretic effect
- Stimulates cardiac hypertrophy and apoptosis

Aldosterone inhibition in HF with REF is beneficial:
- NYHA class III/IV (RALES 1999)
- post MI (EPHESUS 2003)
- NYHA class II/III (EMPHASIS 2010)

Aldosterone inhibition in HF with PEF:
- Improves biomarkers in short term
- Improves LV function; no effect on peak VO2 (ALDO DHF 2013)
- Need for outcomes trial (TOPCAT 2014)
Spironolactone \( \downarrow \) HF Hospitalizations by 17% in HFpEF

\[ HR = 0.83 \text{ (95\% CI 0.69 – 0.99), } p = 0.042 \]

Did Russia Contaminate this Trial? Mortality + HF Hosp by Regions

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

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

Interaction \( p = 0.122 \)

Summary: Spironolactone in HF PEF

- Decreases HF hospitalizations
- **May** decrease CVD mortality
- Safe:
  - Hyper K
    - 19% vs. 9%; alleviated by regular CHEM-7 checks
    - No deaths reported
  - Hypo K
    - 16% vs. 23%
  - Cr increases
    - Doubling above nl values (HR 1.5)
    - No difference in Cr > 3 or need for HD
- **Should be used in treating patients with HF PEF**

HF PEF Clinical Presentations

Characteristics of HF PEF with pHTN

- Usually middle age women with HTN, DM, CKD, AFib
- Marked volume overload (3+ LE edema, ascites)
- Frequent HF hospitalizations
- Persistent NYHA class III
- Echo:
  - EF > 55%, grade I or II diastolic dysfn.
  - Marked LA enlargement
  - PASP > 50-60 mmHg
  - RVH with RV dysfunction

Sildenafil in HF PEF with pHTN - What Have We Known?

- PDE5A inhibitor, ↑cGMP, ↑NO activity
- Selective pulmonary arterial vasodilator
- Murine models:
  - ↓LV hypertrophy in response to pressure overload, ↓fibrosis in this setting
  - ↑Lusitropy (↑enhances LV relaxation)
- Small human studies *
  - Improves RV function, PA pressures and QOL
- Need for larger RCT (RELAX 2013)


Sildenafil in HF PEF with PH

- Sildenafil did not improve QOL or exercise capacity
- Sildenafil was well tolerated

Reconciling the Differences

<table>
<thead>
<tr>
<th>Guazzi M et al. (n=44)</th>
<th>Redfield MM et al. (n=216)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of PH <strong>required</strong> (PAM 38 mmHg)</td>
<td>Evidence of PH <strong>not required</strong></td>
</tr>
<tr>
<td>PASP 53 mmHg</td>
<td>PASP 41 mmHg</td>
</tr>
<tr>
<td>Mean PADP - PCWP: ~9 mmHg</td>
<td>Hemodynamic testing not done</td>
</tr>
<tr>
<td>12 month f/u</td>
<td>6 month f/u</td>
</tr>
<tr>
<td>50 mg TID x 12 mo</td>
<td>20 mg TID x 3 mo; 60 mg TID x 3 mo</td>
</tr>
<tr>
<td>Primary outcome: Hemodynamics, RV function, QOL</td>
<td>Primary outcome: Peak VO₂ (2/3 had chronotropic incompetence!), QOL</td>
</tr>
</tbody>
</table>

Sildenafil may be useful in HF PEF with PH if **PASP high (> 50 mmHg)**, used in high doses

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What is New in Heart Failure?

New pacing strategies for HF with **reduced EF**

- CRT for **mild** HF with prolonged QRS
- CRT for pts with AV block
**Electrical Issues in HF-rEF**

Delayed ventricular activation

- Sinus node
- AV node
- Conduction block

PROBLEMS WITH CARDIAC OUTPUT:
- Delayed lateral wall contraction
- Disorganized ventricular contraction
- Decreased pumping efficiency

**Dys-synchrony in relation to EF**

LBBB Prevalence

<table>
<thead>
<tr>
<th>EF Status</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preserved EF</td>
<td>8%</td>
</tr>
<tr>
<td>Reduced EF</td>
<td>24%</td>
</tr>
<tr>
<td>NYHA Class III/IV</td>
<td>38%</td>
</tr>
</tbody>
</table>

All-Cause Mortality

<table>
<thead>
<tr>
<th>EF Status</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preserved EF</td>
<td>49%</td>
</tr>
<tr>
<td>Reduced EF</td>
<td>34%</td>
</tr>
<tr>
<td>NYHA Class III/IV</td>
<td>12%</td>
</tr>
</tbody>
</table>

**Electrical Issues in HF-rEF**

Resynchronization of atrial and ventricular activation

- Intraventricular Activation
- Organized ventricular activation sequence
- Coordinated septal and lateral wall contraction
- Improved pumping efficiency

**Sinus node**
**AV node**
**Conduction block**
**Stimulation therapy**

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**Electrical Issues in HF-rEF**

Healthy NSR  Cardiomyopathy with LBBB

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Electrical Issues in HF-rEF

Baseline After CRT

Cardiac Resynchronization in HF –rEF: What Has Been Known?

- For pts with SR, NYHA III/ IV and EF < 35%:
  - ↓ Myocardial O2 consumption, ↓ LV size, ↓ MR
  - ↑ LV EF, QOL, exercise capacity
  - Improves survival (w & w/o ICD)
  - ↓ HF hospitalizations

- ? pts with mild HF symptoms and prolonged QRS
- ? pts with low EF, mild HF symptoms & AV block
Survival with Cardiac-Resynchronization Therapy in Mild Heart Failure

Ilan Goldenberg, M.D., Valentina Kutyifa, M.D., Ph.D., Helmut U. Klein, M.D.,
David S. Cannon, M.D., Mary W. Brown, M.S., Ariela Dan, Ph.D.,
James P. Drubert, M.D., N.A. Mark Estes III, M.D., Elyse Foster, M.D.,
Henry Greenberg, M.D., Josef Kautzner, M.D., Robert Klemmner, M.D.,
Malte Kuniss, M.D., Bala Merkey, M.D., Ph.D., Marc A. Mfeffer, Ph.D.,
Aurelio Quisada, M.D., Ph.D., Sami Vahan, M.D., Scott McNitt, M.S.,
Bronislava Polonsky, M.S., Ali Chahram, M.D., Scott D. Solomon, M.D.,
David Wilber, M.D., Wojciech Zareba, M.D., Ph.D., and Arthur J. Moss, M.D.

ABSTRACT

The Multicenter Automatic Defibrillator Implantation Trial with Cardiac Resynchronization Therapy (MADIT-CRT) showed that early intervention with cardiac-resynchronization therapy with a defibrillator (CRT-D) in patients with an electrocardiographic pattern showing left bundle-branch block was associated with a significant reduction in heart failure events over a median follow-up of 2.4 years, as compared with defibrillator therapy alone.

METHODS

We evaluated the effect of CRT-D on long-term survival in the MADIT-CRT population. Post-trial follow-up over a median period of 5.6 years was assessed among all 1,691 surviving patients (phase 1) and subsequently among 854 patients who were enrolled in post-trial registries (phase 2). All reported analyses were performed on an intention-to-treat basis.

CRT Increases Survival and ↓ HF Events in mild HF with rEF with LBBB (but not w/o)

Table 2. Hazard Ratios for End Points with CRT by Mode ICD Alone, According to the Presence or Absence of Left Bundle-Branch Block.

<table>
<thead>
<tr>
<th>End Point</th>
<th>No. of Patients</th>
<th>No. of Events</th>
<th>Left Bundle-Branch Block</th>
<th>Non-Left Bundle-Branch Block</th>
<th>P Value for Interaction*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hazard Ratio</td>
<td>Hazard Ratio</td>
<td>P Value</td>
<td>Hazard Ratio</td>
<td>P Value</td>
</tr>
<tr>
<td>Death from any cause</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted analysis</td>
<td>292</td>
<td>1818</td>
<td>0.63 (0.59–0.69)</td>
<td>0.00</td>
<td>2.11 (0.87–1.86)</td>
</tr>
<tr>
<td>Adjusted analysis†</td>
<td>267</td>
<td>1818</td>
<td>0.61 (0.56–0.67)</td>
<td>0.00</td>
<td>1.12 (0.89–1.49)</td>
</tr>
<tr>
<td>Nonfatal heart failure event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted analysis</td>
<td>442</td>
<td>1818</td>
<td>0.42 (0.37–0.48)</td>
<td>0.00</td>
<td>1.10 (0.79–1.51)</td>
</tr>
<tr>
<td>Adjusted analysis†</td>
<td>405</td>
<td>1681</td>
<td>0.45 (0.40–0.50)</td>
<td>0.00</td>
<td>1.04 (0.83–1.30)</td>
</tr>
<tr>
<td>Nonfatal heart failure event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted analysis</td>
<td>577</td>
<td>1818</td>
<td>0.50 (0.45–0.56)</td>
<td>0.000</td>
<td>1.21 (0.99–1.51)</td>
</tr>
<tr>
<td>Adjusted analysis†</td>
<td>530</td>
<td>1681</td>
<td>0.45 (0.37–0.54)</td>
<td>0.000</td>
<td>1.27 (0.94–1.73)</td>
</tr>
</tbody>
</table>

*Adverse events (10%): Pneumothorax, infection, hematoma, LV lead repositioning

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Cardiac Resynchronization in HF-rEF

- ↓ Myocardial O2 consumption, LV size, Mitral Regurg
- ↑ LV EF
- Improves QOL, exercise capacity
- Improves survival (w & w/o ICD)
- ↓ HF hospitalizations
- Only in pts with SR, NYHA III/ IV and EF < 35%

- CRT ↑ survival and ↓ HF symptoms in pts with SR, mild HF (NYHA I/ II), rEF, but only if LBBB
- **CRT should be used in all HF-rEF pts, LBBB, SR, EF < 35%**

Electrical Issues in HF REF

Prolonged AV conduction delay (aka prolonged PR)

Sinus node

AV node

PROBLEMS WITH CARDIAC OUTPUT:
- Sub-optimal contribution of atrial systole
- Limited filling period
- Mitral regurgitation
Eiventricular Pacing for Atrioventricular Block and Systolic Dysfunction

Anne B. Curtis, M.D., Seth J. Worley, M.D., Philip B. Adamson, M.D.,
Eugene S. Chung, M.D., Imran Niazi, M.D., Lou Sheferese, Ph.D.,
Timothy Shims, M.D., and Martin St. John Sutton, M.D.,
for the Eiventricular versus Right Ventricle Pacing in Heart Failure
Patients with Atrioventricular Block (BLOCK-HF) Trial investigators

ABSTRACT

BACKGROUND

Right ventricular pacing restores an adequate heart rate in patients with aiventricular block, but high percentages of right ventricular apical pacing may promote left ventricular systolic dysfunction. We evaluated whether biventricular pacing might reduce mortality, morbidity, and adverse left ventricular remodeling in such patients.

METHODS

We enrolled patients who had indications for pacing with aiventricular blocks, New York Heart Association (NYHA) class II, II, or III heart failure; and a left ventricular ejection fraction of 50% or less. Patients received a cardioresynchronization pacing or implantable cardioverter-defibrillator (ICD) (the latter if the patient had an indication for defibrillation therapy) and were randomly assigned to standard right ventricular pacing or biventricular pacing. The primary outcome was the time to death from any cause, an urgent care visit for heart failure that required intravenous therapy, or a 15% or more increase in the left ventricular end-systolic volume index.

FROM THE UNIVERSITY OF BUFFALO, BUFFALO, NY (M.D.A.C.); LANCERSTON GENERAL HOSPITAL, LANCASTER, PA (D.M.K.); OKLAHOMA FOUNDATION FOR CARDIOVASCULAR RESEARCH, OKLAHOMA CITY (D.A.J.); THE HEART AND VASCULAR CENTER OF CHICAGO HOSPITAL, CINCINNATI, OH (J.S.C.); ST. LUKAS MORTAL OFFICER, MIDWEST, IL (J.M.); MEDICINE, MINNEAPOLIS, MN (L.I.H.); INDIANA UNIVERSITY SCHOOL OF MEDICINE, INDIANAPOLIS, IN (J.H.F.); AND THE UNIVERSITY OF PENNSYLVANIA MEDICAL CENTER, PHILADELPHIA (J.L.L.). ADDRESS REPRINT REQUESTS TO DR. CURTIS AT THE DEPARTMENT OF MEDICINE, UNIVERSITY OF BUFFALO, BUFFALO GENERAL MEDICAL CENTER, 100 HIGH ST., BUFFALO, NY 14203, OR AT CURTISJ@UBMC.EDU. REPRINTS AVAILABLE AT 10% OF PRINTED COST.


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BLOCK-HF: Clinical Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Pacemaker (N=406)</th>
<th>ICD (N=207)</th>
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<tbody>
<tr>
<td></td>
<td>Eiventricular</td>
<td>Right Ventricle</td>
</tr>
<tr>
<td></td>
<td>Pacing</td>
<td>Pacing</td>
</tr>
<tr>
<td>Male sex — no. (%)</td>
<td>183 (45.5)</td>
<td>168 (41.9)</td>
</tr>
<tr>
<td>Age — yr</td>
<td>74.4±10.2</td>
<td>73.8±10.8</td>
</tr>
<tr>
<td>Left ventricular ejection fraction — %</td>
<td>43.4±6.5</td>
<td>42.1±6.6</td>
</tr>
<tr>
<td>Heart rate — beats/min</td>
<td>66.7±22.4</td>
<td>68.7±21.7</td>
</tr>
<tr>
<td>QRS duration — m/s</td>
<td>125.4±32.8</td>
<td>124.1±31.1</td>
</tr>
<tr>
<td>NYHA class — no. (%)</td>
<td>1</td>
<td>51 (12.5)</td>
</tr>
<tr>
<td>III</td>
<td>143 (50.0)</td>
<td>125 (32.3)</td>
</tr>
<tr>
<td>Left</td>
<td>66 (27.2)</td>
<td>68 (28.2)</td>
</tr>
<tr>
<td>Right</td>
<td>35 (14.4)</td>
<td>47 (19.5)</td>
</tr>
<tr>
<td>Cardioembolism — no. (%)</td>
<td>94 (30.7)</td>
<td>91 (37.8)</td>
</tr>
<tr>
<td>Nonischemic</td>
<td>47 (19.3)</td>
<td>65 (26.7)</td>
</tr>
<tr>
<td>Unknown</td>
<td>2 (0.8)</td>
<td>6 (2.5)</td>
</tr>
<tr>
<td>Other</td>
<td>9 (2.7)</td>
<td>6 (2.7)</td>
</tr>
<tr>
<td>CAD — no. (%)</td>
<td>151 (62.1)</td>
<td>147 (60.1)</td>
</tr>
<tr>
<td>Myocardial infarct — no. (%)</td>
<td>93 (38.0)</td>
<td>77 (32.0)</td>
</tr>
<tr>
<td>Hypertension — no. (%)</td>
<td>200 (82.2)</td>
<td>260 (82.0)</td>
</tr>
<tr>
<td>Atrial fibrillation — no. (%)</td>
<td>136 (56.0)</td>
<td>133 (52.5)</td>
</tr>
<tr>
<td>Diabetes — no. (%)</td>
<td>90 (37.0)</td>
<td>87 (36.1)</td>
</tr>
<tr>
<td>Atrioventricular block — no. (%)</td>
<td>1st degree</td>
<td>39 (14.0)</td>
</tr>
<tr>
<td>2nd degree</td>
<td>84 (34.8)</td>
<td>70 (29.5)</td>
</tr>
<tr>
<td>Right</td>
<td>120 (49.0)</td>
<td>135 (56.0)</td>
</tr>
</tbody>
</table>

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CRT (vs. RV pacing) ↓ HF Events

**Cardiac Resynchronization in HF-rEF**

- ↓ Myocardial O2 consumption, LV size, Mitral Regurg
- ↑ LV EF
- Improves QOL, exercise capacity
- Improves survival (w & w/o ICD)
- ↓ HF hospitalizations
- In all pts with HF REF (NYHA I - IV), SR, EF < 35%, LBBB

- CRT is better than RV pacing alone in pts with AV block, EF < 50% and NYHA I-III
- **CRT should be used in all pts with AV block & EF < 50%**

### Table 2: Primary and Secondary Outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Pacemaker (N=484)</th>
<th>ICD (N=287)</th>
<th>Hazard Ratio (95% CI)*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Biventricular</td>
<td>Right Ventr</td>
<td>Biventricular</td>
</tr>
<tr>
<td></td>
<td>Pacing (N=243)</td>
<td>Pacing (N=141)</td>
<td>Pacing (N=106)</td>
</tr>
<tr>
<td>Primary outcome</td>
<td>108</td>
<td>127</td>
<td>52</td>
</tr>
<tr>
<td>Event related to left ventricular end-systolic volume index</td>
<td>58</td>
<td>79</td>
<td>31</td>
</tr>
<tr>
<td>Urgent care visit for heart failure</td>
<td>40</td>
<td>38</td>
<td>16</td>
</tr>
<tr>
<td>Death</td>
<td>12</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Secondary outcomes:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Death or urgent care visit for heart failure</td>
<td>78</td>
<td>95</td>
<td>39</td>
</tr>
<tr>
<td>Death or hospitalization for heart failure</td>
<td>76</td>
<td>89</td>
<td>39</td>
</tr>
<tr>
<td>Death</td>
<td>52</td>
<td>64</td>
<td>23</td>
</tr>
<tr>
<td>Hospitalization for heart failure</td>
<td>49</td>
<td>63</td>
<td>27</td>
</tr>
</tbody>
</table>

*Adverse events (11%): Pneumothorax, infection, hematoma, LV lead repositioning

What is New in Heart Failure?

New ACC/AHA Guidelines for the Treatment of Heart Failure

New ACC/AHA Recommendations (2013)

- New classification
  - HF REF (LV EF < 40%)
  - HF PEF (LV EF > 50%)
    - Borderline EF (LV EF 41-49%)
    - improved EF (LV EF > 40%, but prior LV EF < 40%)

- Biomarkers in hospitalized & non-hospitalized pts
  - BNP or NT-pro BNP useful in making diagnosis and for prognosis, not monitoring

- Imaging use
  - Repeat echo only if change in clinical condition
New Recommendations

- **Medications**
  - Mineralocorticoid receptor blockers (MRB) should be used in all HF pts, NYHA II-IV, *irrespective of EF*
  - No anticoagulation needed for low EF if no prior CVA or Afib

- **Devices**
  - CRT should be used in NYHA II-IV, EF < 35%, SR, LBBB, QRS > 150 ms* (*published prior to studies of AV block in EF >50%)

- **Electrical Therapies**
  - ICD Therapy in ICM, EF < 30%, NYHA class I.
  - ICD Therapy in HF, EF < 35%, NYHA II-III.

- **Revascularization**
  - CABG (or PCI) for HF with CAD & angina, irrespective of EF

What Will be New in Heart Failure?

- Sensors for remote hemodynamic monitoring
Remote Monitoring of PA Pressures (pulmonary artery sensor implantation)

Hypothesis of "CardioMEMS Heart sensor Allows Monitoring of Pressure to Improve Outcomes in NYHA III Heart Failure (CHAMPION) trial, was that management of HF by use of pulmonary artery pressures would greatly reduce the rate of heart-failure events.

Congestion Precedes Hospitalization

Hospitalization Hospitalization Hospitalization
Remote Treatment Based on PAP
\(\downarrow\) HF Hospitalizations by 36%

![Graph of HF hospitalizations reduction](image)

Conclusions:

- Self-Mgmt support with a “teach-to-goal” approach for 6 basic HF tasks + diuretic self-titration, \(\downarrow\) HF hospitalizations in low literacy
- Exercise training beneficial to all HF pts with r-EF
- \(\sim 50\%\) of pts with HF have preserved EF:
  - spironolactone 25 mg QD \(\downarrow\) HF hospitalizations for all EF
  - Sildenafil 60 mg TID MIGHT improve QOL if pulm HTN
- In pts with LBBB and EF < 30\%, CRT can \(\uparrow\) survival and \(\downarrow\) HF symptoms in mild HF (NYHA I/II) and SR (+patients with worse NYHA)
- In pts with AV block and EF < 50\%, CRT is much better than RV pacing, NYHA I-III
- Remote PA monitoring will play an important role
Optimize HF Mnemomic: Fortify the “Seaboard” during a Tsunami

- Self-management support
- Exercise
- Aldosterone receptor antagonist
- Beta blockers
- Occlusions
- ACE/ARB
- Resynchronization/defibrillation
- Diuretics

END
Revascularization in Ischemic SHF

STICH Trial (1212 pts.):
- LVEF ≤ 0.35 within 3 months of trial entry
- CAD suitable for CABG
- MED eligible:
  - Absence of left main stenosis of ≥ 50%.
  - Absence of CCS III-IV angina (angina markedly limiting ordinary activity).


Revascularization in Ischemic SHF

Hazard ratio, 0.86 (95% CI, 0.72–1.04)
P=0.12

Hazard ratio, 0.74 (95% CI, 0.64–0.85)
P<0.001

**Selected Medications in Systolic HF**

- **Digoxin:**
  - 4th choice if pts. still symptomatic on ACE-I/ BB/ MRB.
  - Keep serum concentration 0.7 - 0.9 ng/mL (especially women).

- **Hydralazine-nitrates:**
  - Add on therapy in AA pts. still symptomatic on ACE-I/ BB.
  - Future research will likely extend this to all GLU 298 GLU in NOS3 synthase (40% of Caucasians have this genotype).

**Electrical Therapies in Systolic HF**

**Stage B (class I indications):**
- ICD Therapy in ICM, EF < 30%, NYHA class I.

**Stage C (class I indications):**
- ICD Therapy in HF, EF < 35%, NYHA class II-III.

Eplerenone in NYHA II HF