To Admit or Not to Admit? The Drive to Reduce Heart Failure Readmissions

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Director of Cardiac Intensive Care Unit
Sands Constellation Heart Institute
Rochester Regional Health
The Scope of the Problem

• ~ 5.1 million individuals with history of HF
• > 900,000 new cases per year
• 20% lifetime risk of developing HF

Go, et al., Circ. 2015
Furthermore...

• ~50% of people diagnosed with heart failure will die within five years
• >50% of patients die from SCD
• >600,000 deaths/year

Percentage breakdown of deaths attributable to cardiovascular disease (United States: 2013).

- Coronary Heart Disease: 46.2%
- Stroke: 16.1%
- Heart Failure*: 8.1%
- High Blood Pressure: 9.0%
- Diseases of the Arteries: 3.2%
- Other: 17.4%


- CHF:
  - 2015: 24
  - 2020: 30
  - 2025: 38
  - 2030: 47

Estimated Direct and Indirect Costs of HF in US

- Hospitalization: $20.9 billion (53.3%)
- Nursing Home: $4.7 billion (11.9%)
- Physicians/Other Professionals: $2.5 billion (6.4%)
- Drugs/Other Medical Durables: $3.2 billion (8.2%)
- Home Healthcare: $3.8 billion (10.5%)
- Lost Productivity/Mortality*: $4.1 billion (9.7%)
2010!

*contains: Hospital Readmissions Reduction Program*
Rehospitalization Rates


30-Day Rehospitalization Rates in HF
24.8% (Medicare)

30-Day Mortality rate
10%

Mortality with Hospitalizations

B. Heart Failure Age ≥ 65 years

Readmission Rates, %

Year

Payer Groups

Medicaid

Medicare

Private Insurance

AJM 2018
Challenges to keeping CHF patients out of hospital

- Heterogeneous population with heterogenous diseases
- Various socio-economic factors
- Various co-morbidities
- Health Literarcy
- Resource intensive population
- Are hospitals best suited to manage outpatient care???
- Proper transitions of care
Can’t we just examine patients?

**FIGURE 4** Impact of Baseline PA Diastolic Pressure on Diuretic Changes

- **PA Pressure Guided HF Management (Treatment Group)**
- **Standard of Care HF Management Only (Control Group)**

LANCET 2011
Weight monitoring?

WISH Trial EurJF 2014
Salt and Fluid restrictions

Aggressive Fluid and Sodium Restriction in Acute Decompensated Heart Failure

A Randomized Clinical Trial

Graziella Badin Aliti, RN, ScD; Eneida R. Rabelo, RN, ScD; Nadine Clausell, MD, PhD; Luis E. Rohde, MD, ScD; Andreia Biolo, MD, ScD; Luis Beck-da-Silva, MD, ScD

READMISSIONS AND EMERGENCY DEPARTMENT VISITS

All visits to the emergency department or hospital admission were computed within a 30-day period after the seventh day or discharge. There were no significant between-group differences in the number of readmissions occurring within 30 days of the end of the study (IG, 11 patients [29%]; CG, 7 patients [19%]; P = .41).
Pharmacist guided therapy?

BMJ 2016
Visiting nurse services?

Table 2

All-cause and heart failure related hospitalization.

<table>
<thead>
<tr>
<th></th>
<th>Single Session Only</th>
<th>Multisession</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Incidence Rate/Year</td>
</tr>
<tr>
<td>All-cause Hospitalization or death</td>
<td>605</td>
<td>0.73</td>
</tr>
<tr>
<td>Inadequate Literacy</td>
<td>225</td>
<td>0.90</td>
</tr>
<tr>
<td>Adequate Literacy</td>
<td>380</td>
<td>0.63</td>
</tr>
<tr>
<td>HF-Related Hospitalization</td>
<td>605</td>
<td>0.30</td>
</tr>
<tr>
<td>Inadequate Literacy</td>
<td>225</td>
<td>0.40</td>
</tr>
<tr>
<td>Adequate Literacy</td>
<td>380</td>
<td>0.24</td>
</tr>
</tbody>
</table>

Circ 2012
• So what works???
• Medications
• (some) Devices
ACE/ARB/MRA

1-year mortality

- Discontinued
- Not started
- Started
- Continued

Cumulative incidence vs. Days after discharge

Cardiorenal Medicine 2020
Beta Blockers!

Table 3. Unadjusted and Adjusted Outcomes Based on Beta-Blocker Use During Hospitalization

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Chi-Square</th>
<th>OR (95% CI)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rehospitalization</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>1.2</td>
<td>0.70 (0.38–1.31)</td>
<td>0.27</td>
</tr>
<tr>
<td>Adjusted†</td>
<td>3.6</td>
<td>0.45 (0.19–1.03)</td>
<td>0.048</td>
</tr>
<tr>
<td>Rehospitalization or death</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unadjusted</td>
<td>3.7</td>
<td>0.52 (0.27–1.02)</td>
<td>0.053</td>
</tr>
<tr>
<td>Adjusted‡</td>
<td>7.1</td>
<td>0.27 (0.10–0.71)</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

ESCAPE Post Hoc JACC 2006
US Carvedilol NEJM 1996
C Hospitalization for Heart Failure

Hazard ratio, 0.79 (95% CI, 0.71–0.89)
P<0.001

Cumulative Probability

No. at Risk

<table>
<thead>
<tr>
<th></th>
<th>LCZ696</th>
<th>3922</th>
<th>3663</th>
<th>3018</th>
<th>2257</th>
<th>1544</th>
<th>896</th>
<th>249</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enalapril</td>
<td>4212</td>
<td>3883</td>
<td>3579</td>
<td>2922</td>
<td>2123</td>
<td>1488</td>
<td>853</td>
<td>236</td>
</tr>
</tbody>
</table>

Days since Randomization

McMurray JJ, et al; NEJM. 2014
**Figure 5. Rates of Hospitalization for Heart Failure, Death from Any Cause, and Renal Outcomes in the Integrated CANVAS Program.**

The hazard ratios and 95% confidence intervals were estimated with the use of Cox regression models with stratification according to trial and history of cardiovascular disease for all canagliflozin groups combined versus placebo. Analyses are based upon the full, integrated data set comprising all participants who underwent randomization. The insets in Panels A, B, and D show the same data on enlarged y axes.

NEJM 2017
2021 Update to the 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 Solution Set Oversight Committee
**FIGURE 3** Treatment Algorithm for Guideline-Directed Medical Therapy Including Novel Therapies

**HFpEF Stage C Treatment**

- ARNI/ACEI/ARB (ARNI preferred) Figures 2A and 2B; AND evidence-based beta-blocker” (Figure 2C) with diuretic agent (Figure 2D) as needed.

For patients with:
- eGFR < 30 mL/min/1.73 m² or creatinine ≥ 2.5 mg/dL, in males or ≥ 2.0 mg/dL in females or K+ ≥ 5.0 mEq/L, NYHA class II/IV

- Add Aldosterone antagonist (Figure 2E)

For patients meeting eGFR criteria (Figure 2F), NYHA class II/IV

- Add SGLT2 inhibitor (Figure 2F)

For patients with persistent volume overload, NYHA class II/IV

- Add Diuretic agent (Figure 2G)

For persistently symptomatic Black patients despite ARNI/beta-blocker/aldosterone antagonist/SGLT2 inhibitor, NYHA class II/IV

- Add Hydralazine + isosorbide dinitrate (Figure 2H)

For patients with resting HR > 70, on maximally tolerated beta-blocker dose in sinus rhythm, NYHA class II/IV

- Add Isradipine (Figure 2H)

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*ARNI/ARB should only be considered in patients with contraindications, intolerance or inaccessibility to ARNI. In those instances, please consult Figure 2 and text for guidance on initiation.

*Covered with metoprolol succinate, or bisoprolol.

ACD = angiotensin converting enzyme inhibitors; ARNI = angiotensin receptor neprilysin inhibitors; ARB = angiotensin receptor blocker; eGFR = estimated glomerular filtration rate; HFrEF = heart failure with reduced ejection fraction; HR = heart rate; K+ = potassium; NYHA = New York Heart Association; SGLT2 = sodium-glucose cotransporter 2.
### Cumulative Impact of Evidence-Based Heart Failure with Reduced EF Medical Therapies

<table>
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<tr>
<th>Relative-risk</th>
<th>2 yr Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>35%</td>
</tr>
<tr>
<td>ACEI or ARB</td>
<td>↓ 23%</td>
</tr>
<tr>
<td>Beta Blocker</td>
<td>↓ 35%</td>
</tr>
<tr>
<td>Aldosterone Ant</td>
<td>↓ 30%</td>
</tr>
<tr>
<td>ARNI (replacing ACEI/ARB)</td>
<td>↓ 16%</td>
</tr>
<tr>
<td>SGLT2 inhibitor</td>
<td>↓ 17%</td>
</tr>
</tbody>
</table>

Cumulative risk reduction if all evidence-based medical therapies are used: Relative risk reduction 74.0%, Absolute risk reduction: 25.9%, NNT = 3.9

What about device based therapies?
Cardiomems: implantable pulmonary artery sensor

CHAMPION Trial Lancet 2011
Mitraclip?

**Hospitalization for Heart Failure**

- **Control group**
- **Device group**

Hazard ratio, 0.53 (95% CI, 0.40–0.70)

P < 0.001

<table>
<thead>
<tr>
<th>No. at Risk</th>
<th>Control group</th>
<th>Device group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>312</td>
<td>302</td>
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<tr>
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<td>294</td>
<td>286</td>
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<td>271</td>
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<td></td>
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<td>176</td>
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<td>145</td>
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<td></td>
<td>121</td>
<td>161</td>
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<tr>
<td></td>
<td>88</td>
<td>124</td>
</tr>
</tbody>
</table>

**Months since Randomization**

**COAPT NEJM 2018**
CRT?

MADIT- CRT NEJM 2009
Remember acronym to assist in decision-making for referral to advanced heart failure specialist:

I-NEED-HELP (also see Table 6)

I: IV inotropes
N: NYHA IIIB/IV or persistently elevated natriuretic peptides
E: End-organ dysfunction
E: Ejection fraction ≤35%
D: Defibrillator shocks
H: Hospitalizations >1
E: Edema despite escalating diuretics
L: Low blood pressure, high heart rate
P: Prognostic medication: progressive intolerance or down-titration of GDMT
Sensible Medical Reds Vest

SMILE Trial JCF 2019
Summary

• We need to get past stumbling blocks and stop ignoring what works

• WE KNOW GDMT WORKS!!!!!!!!!!!!
  • DECADES AND DECADES OF DATA, REPRODUCED IN NEARLY EVERY TRIAL THAT GDMT IMPROVES MORBIDITY AND MORTALITY

• High Risk Patients need to be evaluated by a heart failure physician and assessed for advanced therapies, newer technologies and clinical trials that may benefit them
**CENTRAL ILLUSTRATION:** Use and Dosing of Guideline-Directed Medical Therapy Among Patients With Chronic HFrEF in Contemporary U.S. Outpatient Practice

![Chart showing the percent of frequency for different medications among patients with chronic HFrEF.](chart)

<table>
<thead>
<tr>
<th>Medication Type</th>
<th>Without Contraindication and Not Treated</th>
<th>Treated</th>
<th>With Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI/ARB</td>
<td>1374</td>
<td>2107</td>
<td>37</td>
</tr>
<tr>
<td>ARNI</td>
<td>3029</td>
<td>452</td>
<td>37</td>
</tr>
<tr>
<td>ACEI/ARB/ARNI</td>
<td>920</td>
<td>2536</td>
<td>62</td>
</tr>
<tr>
<td>Beta-Blocker</td>
<td>1159</td>
<td>2351</td>
<td>8</td>
</tr>
<tr>
<td>MRA</td>
<td>2317</td>
<td>1163</td>
<td>38</td>
</tr>
</tbody>
</table>
Real Summary:

• USE GDMT!!!!!!!!!!!!
  • IT WORKS!!!!!!!!!
• Make sure we are assessing for things like CRT, mitraclip, clinical trials, etc.
• Consider invasive and non-invasive assessments of volume status
• Strongly consider a Heart Failure consultation!
Thank you!

• Scott.Feitell@rochesterregional.org