Reducing 30 Day Heart Failure Readmissions

Wednesday September 7, 2016
12:00pm – 1:00pm Central

Presenter: Gregg C. Fonarow, MD, FACC, FAHA, FHFSA

Amgen Cardiovascular proudly sponsors Heart Science Amplified: An Online Speaker Series and Get With The Guidelines™-Heart Failure.
October 18, 1-2pm Central
Improving Guideline-Directed Heart Failure Care
Presented by Dr. Clyde Yancy, MD, MSc
Register:
https://engage.vevent.com/rt/ahaevents~101816

November 8, 12-1pm Central
Transitions of Care
Presented by Dr. Nancy Albert, PhD, CCNS, CHFN, CCRN, NE-BC
Register:
https://engage.vevent.com/rt/ahaevents~110816
Gregg C. Fonarow, MD, FACC, FAHA, FHFSAThe Eliot Corday Professor of Cardiovascular Medicine and Science
UCLA Division of Cardiology
Director, Ahmanson-UCLA Cardiomyopathy Center
Co-Chief, UCLA Division of Cardiology
Los Angeles, California
Prevention of Readmissions

DISCLOSURE INFORMATION:
The following relationships exist related to this presentation:

Gregg C. Fonarow, MD, FACC – AHRQ, NHLBI, Amgen, Medtronic, Novartis: Research, Consultant

No off label use of medications will be discussed
Rehospitalizations in Heart Failure

• Nearly one in four patients hospitalized with HF is rehospitalized within 30 days of discharge

• 30 day rates of rehospitalizations in HF have risen over the past 2 decades

• Rehospitalizations for HF vary widely by hospital, even after adjusting for case mix and other factors

• HF rehospitalizations may be preventable, but effective strategies to prevent rehospitalizations were traditionally underutilized due to lack of incentives

• Most of the cost associated with the care of HF patients is attributable to these rehospitalizations
Traditional Heart Failure Admission

- Tune up with diuretics
- A little bit of education
- List of discharge prescriptions
- Push patient out the door & wave good-bye

See you soon!!

Bye-bye...Don’t come back within 30 days!!
Readmissions in HF on the Rise

30-Day Readmission Rates in HF
1993 17.3%
2006 20.1%

Costs of HF Hospitalizations
30-35 Billion Dollars/Year

Bueno et al. JAMA. 2010;303(21):2141-2147
## Trends in Crude and Adjusted Mortality Rates

<table>
<thead>
<tr>
<th>Year</th>
<th>N</th>
<th>Crude Mortality (%)</th>
<th>Adjusted Mortality (OR, 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>30-day</td>
<td>1-year</td>
</tr>
<tr>
<td>1992</td>
<td>483,560</td>
<td>11.0</td>
<td>32.5</td>
</tr>
<tr>
<td>1993</td>
<td>509,549</td>
<td>10.9</td>
<td>33.9</td>
</tr>
<tr>
<td>1994</td>
<td>509,245</td>
<td>10.6</td>
<td>31.7</td>
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<td>1995</td>
<td>510,529</td>
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<td>1996</td>
<td>505,661</td>
<td>10.3</td>
<td>31.4</td>
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<tr>
<td>1997</td>
<td>507,986</td>
<td>10.2</td>
<td>31.7</td>
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<tr>
<td>1998</td>
<td>436,257</td>
<td>10.2</td>
<td>31.8</td>
</tr>
<tr>
<td>1999</td>
<td>494,733</td>
<td>10.3</td>
<td>31.7</td>
</tr>
</tbody>
</table>

1992 to 2008: 1-year mortality 32.5% to 32.0%, adjusted OR 0.94

National sample of 3,957,520 Medicare beneficiaries ≥65 who were hospitalized with HF between 1992 and 1999 Kosiborod AJM 2006;119:e1-e7.

All-Cause Mortality After Each Subsequent Rehospitalization for HF

The risk of death is greatest in the early period after hospital discharge and is directly related to the frequency of HF hospitalizations.

Estimated Direct and Indirect Costs of HF in US

If one assumes all costs of cardiac care for HF patients are attributable to HF (no cost attribution to comorbid conditions), the 2030 projected cost estimates of treating patients with HF will be $160 billion in direct costs.

Circ Heart Fail. 2013
30-Day Rehospitalization Rates in HF Vary Widely Between Hospitals

“Practitioners who care for patients with HF are challenged daily with preventing common, recurrent rehospitalizations for exacerbations”

“Most of the staggering cost associated with the care of HF patients is attributable to these hospitalizations”

“As many as one-half to two-thirds of hospital readmissions are thought to be preventable with attention to modifiable factors”

# Evidence-Based, Guideline-Recommended Heart Failure Therapies

<table>
<thead>
<tr>
<th>Guideline Recommended Therapy</th>
<th>Relative Risk Reduction in Mortality</th>
<th>Number Needed to Treat for Mortality</th>
<th>NNT for Mortality (standardized to 36 months)</th>
<th>Relative Risk Reduction in HF Hospitalizations</th>
</tr>
</thead>
<tbody>
<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>Ivabradine</td>
<td>10%</td>
<td>100 over 23 months</td>
<td>64</td>
<td>26%</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>
</tbody>
</table>

ADHERE Quality of Care

Conformity to JCAHO HF Performance Indicators

- Discharge Instructions: Lagging 70%, Leading 72%
- LV Function Measurement: Lagging 97%, Leading 58%
- ACEI use: Lagging 88%, Leading 85%
- Smoking Cessation: Lagging 1%, Leading 8%
- Length of Stay (median): Lagging 5.0, Leading 3.1
- Mortality: Lagging 6.1, Leading 1.4

81,142 admissions between 6/2002 – 12/2003 at 223 hospitals
Grouped by Leading (90th percentile) and Lagging (10th percentile)

All P<0.0001

Risk-Treatment Mismatch in HF

Use rates in absence of contraindications. For all drug classes, $P<.001$ for trend.

Hospital Variation in Follow-up Visit within 7 Days After Heart Failure Hospitalization

Median Follow-up Visit within 7 days = 37.5%

225 Hospitals

Hernandez et al. JAMA 2010;303:1716-1722.
Timing of 30-Day Readmissions After Hospitalization

Of all readmissions within 30 days of hospitalization, the majority occurred within 15 days of hospitalization: 61.0%, HF cohort.

The proportion of patients readmitted for the same condition was 35.2% after the index HF hospitalization.
Causes of Hospital Readmission for Heart Failure

As many as two thirds of hospitalizations may be preventable

- Diet Noncompliance: 24%
- Inappropriate Rx: 16%
- Failure to Seek Care: 19%
- Rx Noncompliance: 24%
- Other: 17%

Annals of Internal Medicine 1995;122:415-21
Defining Quality of Care

Institute of Medicine Definition of Quality:

*The degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge*
The IOM Definition of Quality Care

• **Timely**: rapid identification and treatment
• **Effective**: with right drugs / procedures and improves outcomes
• **Safe**: at right dose and / or done right
• **Equitable**: in all eligible patients
• **Patient centered**: considers the risks and benefits for the individual patient
• **Efficient / cost-effective**: avoiding over-treatment, use of futile therapies, and unnecessary procedures / hospitalizations
Heart Failure Process Based Performance Measures and Outcomes

Real or Illusory Gains

Temporal Trends in Process Measures and Clinical Outcomes for Medicare Patients Hospitalized With Heart Failure, 2002-2006

2.6 million HF hospitalizations in fee-for-service Medicare beneficiaries

An Example of Perfect HF Care as Judged by CMS Core Process Measures

• 65 year old male with prior MI hospitalized with HF for the 3rd time this year
• Had LVEF measured again and documented at 20%, discharged on ACE inhibitor (enalapril 5 mg daily), counseled to quit smoking, and provided all 6 discharge instructions measure components with a copy in the chart
• CMS core measure assessment: 4/4, defect free care
• Was also discharged on high dose loop diuretics without potassium supplementation. Not treated with beta blocker. No scale at home. First follow-up visit scheduled for 4 weeks after discharge
• Post discharge day 8: readmitted with fatigue, worsened HF, and hypokalemia (K+ of 2.6 meq/L)
Center of Excellence in Heart Failure Care?

• Excellent reputation
• High volume
• Performs many Heart Txs
• Ranked highly by US News
• Well known faculty
• Many publications
• Advertises extensively

• Invested heavily in IT
• All CMS core measures checked off
• Touts providing the highest quality of care

• Risk standardized 30-d readmission rate of 28.0%, substantially worse than US national rate (24.7%)
Preserving the Status Quo or Transforming Care?

• Hospitals previously did not have a compelling reason to try to prevent early readmissions

• Hospitals were typically paid a flat sum for each inpatient stay—shorter stays equal higher profits and early readmission mean getting paid twice for the same patient with the same problem

• Most hospitals viewed early readmissions as out of their control and placed their major focus on keeping length of stay short and performing as many cardiovascular procedures as possible
Barriers to Improving HF Care

• No incentive to focus on care transitions
• No incentive to coordinate HF care
• No incentives for multidisciplinary teams
• No incentive to fund HF disease management programs
• No incentive to fund palliative care programs
• No incentive for meaningful quality improvement
• No incentive for systems of care
• No incentive to track and improve outcomes
• No incentive to investigate better models of care
• Until recently........
Affordable Care Act

- 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
- Expanded to COPD and hip/knee replacements in 2015
- 10 year decrease in reimbursement to hospitals $7.1 billion
- The proposed prospective payment systems began October 2012 (beginning of fiscal year 2013)
Affordable Care Act

- In FY 2016, Medicare is penalizing 2592 hospitals
- Hospitals receive lower payments for every Medicare patient that stays in the hospital – readmitted or not
- Total penalties FY 2016 are $420 million
- Average payment reduction is 0.61%
- Maximum penalty of 3% for 38 hospitals
- A total of 506 hospitals will lose 1% or more of their Medicare payments
# Medicare Readmissions Penalties by Hospital  
*(Year 4, FY 2016)*

<table>
<thead>
<tr>
<th>Hospital</th>
<th>FY2013 Readmission Penalty</th>
<th>FY2014 Readmission Penalty</th>
<th>FY2015 Readmission Penalty</th>
<th>FY2016 Readmission Penalty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ronald Reagan-UCLA</td>
<td>0.18%</td>
<td>0.19%</td>
<td>0.24%</td>
<td>0.13%</td>
</tr>
<tr>
<td>Stanford</td>
<td>0.00%</td>
<td>0.18%</td>
<td>0.15%</td>
<td>0.06%</td>
</tr>
<tr>
<td>UCSD</td>
<td>0.21%</td>
<td>0.27%</td>
<td>0.21%</td>
<td>0.23%</td>
</tr>
<tr>
<td>Brigham and Women’s</td>
<td>0.55%</td>
<td>0.30%</td>
<td>0.27%</td>
<td>0.04%</td>
</tr>
<tr>
<td>Cleveland Clinic</td>
<td>0.74%</td>
<td>0.33%</td>
<td>0.38%</td>
<td>0.29%</td>
</tr>
<tr>
<td>Massachusetts General</td>
<td>0.51%</td>
<td>0.25%</td>
<td>0.24%</td>
<td>0.29%</td>
</tr>
<tr>
<td>Yale</td>
<td>0.90%</td>
<td>0.51%</td>
<td>0.71%</td>
<td>1.03%</td>
</tr>
<tr>
<td>Duke</td>
<td>0.45%</td>
<td>0.28%</td>
<td>0.02%</td>
<td>0.03%</td>
</tr>
<tr>
<td>Beth Israel</td>
<td>1.00%</td>
<td>1.09%</td>
<td>1.79%</td>
<td>1.94%</td>
</tr>
<tr>
<td>Northwestern</td>
<td>0.72%</td>
<td>0.38%</td>
<td>1.98%</td>
<td>0.65%</td>
</tr>
<tr>
<td>U Pennsylvania</td>
<td>1.00%</td>
<td>0.35%</td>
<td>3.00%</td>
<td>2.50%</td>
</tr>
</tbody>
</table>
Value Based Purchasing

• The Hospital VBP program, established by the Affordable Care Act, implements a pay-for-performance approach to the payment system.

• Under Hospital VBP, Medicare adjusts a portion of payments to hospitals beginning in Fiscal Year (FY) 2013 based on either:
  – How well they perform on each measure compared to all hospitals, or how much they improve their own performance on each measure compared to their performance during a prior baseline period.

• HF measures as part of VBP include discharge instructions, 30 day mortality rates, patient experience surveys, and costs of care.

• The Total Performance Score (TPS) is comprised of the clinical process of care domain score (20%), the patient experience of care domain (30%), the outcome domain score (30%), and the efficiency domain score (20%).
Value of Care as Reported by Medicare in Hospital Compare

- Looking at payment measures together with quality-of-care measures (such as death rates) allows you to assess the value of care in hospitals.
- The payment measures add up the payments for care starting the day the patient enters the hospital and continuing for the next 30 days. For example, this can include payments to the hospital, doctor’s office, skilled nursing facility, hospice, as well as patient co-pays made during this time.

| Death rate for heart failure patients | No different than the National Rate |
| Payment for heart failure patients   | Greater than the National Average Payment |

The National Death Rate for HF patients this reporting period was 11.6%. The National Average Payment for HF patients this reporting period was $15,223.
Challenges in Preventing Rehospitalization in Heart Failure

• Not all rehospitalizations are preventable
• Not all rehospitalizations are unnecessary
• Not all rehospitalizations are for HF
• Multiple care providers and unshared responsibility
• Other outcomes including survival, symptoms, health status are also important
Challenges in Improving Care Transitions in Heart Failure

• Typical HF patient is older
• Typical HF patient has multiple comorbid conditions
• Many HF patients are frail
• Many HF patients have cognitive impairment
• Many HF patients have limited social, financial, and caregiver support
List of Typical Breakdowns in Transitions

Typical breakdowns associated with patient assessment:
• Failure to actively include the patient and family caregivers in identifying needs, resources, and planning for the discharge
• Unrealistic optimism of patient and family to manage heart failure regimen at home
• Failure to recognize worsening clinical status prior to discharge from the hospital
• Lack of understanding of the patient’s physical and cognitive functional health status resulting in discharge/transfer to a care venue that does not meet the patient’s needs
• Not identifying or addressing comorbid conditions (underlying depression, anemia, hypothyroidism etc.)
• No advance directive or planning
• Medication errors and adverse drug events caused by patient and family-caregiver confusion
• Multiple drugs and/or doses exceed patient’s ability to manage

Typical breakdowns found in patient and family caregiver education:
• Written discharge instructions that were confusing, contradictory to other instructions, or not tailored to a patient’s level of health literacy or current health status
• Failure to clarify if patient and caregiver understood instructions and plan of care
• Failure to address prior non-adherence about self-care, diet, medications, therapies, daily weights, follow-up and testing
List of Typical Breakdowns in Transitions

**Typical breakthroughs in handoff communication:**
- Inadequate heart failure care (evidence-based care missing/incomplete)
- Medication discrepancies and lack of reconciliation
- Discharge plan not communicated in a timely fashion or adequately conveying important anticipated next steps
- Poor communication of the care plan to the nursing home team, home health care team, primary care physician, or family caregiver
- Current and baseline functional status of patient rarely described, making it difficult to assess progress and prognosis
- Discharge instructions missing, inadequate, incomplete, or illegible
- Patient returning home without essential equipment (e.g., scale, supplemental oxygen, other)
- Having the care provided by the facility unravel as the patient leaves the hospital (e.g., poorly understood cognition issues emerge)
- Poor understanding that social support was lacking

**Typical breakthroughs following discharge from the hospital:**
- Medication errors
- Patient lack of adherence to self-care, e.g., medications, therapies, diet (sodium restriction), and/or daily weights because of poor understanding or confusion about needed care, how to get appointments, or how to access or pay for medications
- Discharge instructions that are confusing, contradictory to other instructions, or are not tailored to a patient’s level of health literacy
- No follow-up appointment or follow-up needed with additional physician expertise
- Follow-up too long after hospitalization (beyond 7 days)
- Follow-up appointment scheduling was left to the patient
- Inability to keep follow-up appointments because of illness or transportation issues
- Inability to keep follow-up appointments because of financial issues
- Lack of a plan if worsened heart failure with the physician/number the patient should call first
- Lack of adequate social support
Bridging the Gap Between Knowledge and Routine Clinical Practice

- Implement evidence-based care
- Improve communications
- Ensure compliance

- Improve quality of care
- Improve outcomes

ACC/AHA/HFSA Guidelines

- Clinical trial evidence
- National guidelines

Systems

Clinical Practice

Evidence Based Interventions to Reduce 30 Day Rehospitalization in HF

- Pre-discharge use of certain GDMT
- Pre-discharge HF education by trained educators
- Discharge medication programs
- Comprehensive discharge planning
- Early post-discharge physician follow-up
- Home visits by RNs and/or physicians
- Comprehensive HF disease management programs
- Implantable hemodynamic sensors
### Evidence-Based HF Therapies and Hospitalizations/Rehospitalization

<table>
<thead>
<tr>
<th>Evidence-Based Therapy</th>
<th>Mortality</th>
<th>Hospitalization/Rehospitalization</th>
<th>30 Day Hospitalization/Rehospitalization</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI/ARB</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Aldosterone Antagonist</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Hydralazine/Nitrate (AA patients)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>ARNI (sacubitril/valsartan)</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Ivabradine</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Digoxin</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>ICD</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CRT</td>
<td>+</td>
<td>+</td>
<td>-</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.

30 Day All Cause Readmission
Odds Ratio: 0.74;
95% CI 0.56-0.97

30 Day HF Readmission
Odds Ratio: 0.62;
95% CI 0.45-0.87

Ahmanson-UCLA Cardiomyopathy Center Comprehensive HF Disease Management Program

UCLA Multidisciplinary Team:
Advance Practice Nurses, HF Specialists, CT Surgery, MSW, Others

- Comprehensive assessment
- Optimization of heart failure treatment regimen
- Detailed patient and family education
- Daily measuring and recording of weights
- Sodium restricted diet with detailed guidelines
- Two liter (64 oz) fluid restriction (if congestion)
- Patient self-monitored flexible-loop diuretic regimen
- Alcohol and smoking abstinence
- Progressive walking exercise program
- Vigilant monitoring, care coordination, and follow-up by advance practice nurses and physicians

HF Disease Management Program: Impact on Treatment and Hospitalizations

- **Conventional Management 6 Months Pre-comprehensive**
  - ACE Inhibitor Use: 77%

- **HF Management System at Discharge**
  - ACE Inhibitor Use: 95%
  - *P=0.05 vs conventional management

- **HF Management 6 Months Post-comprehensive**
  - ACE Inhibitor Use: 92%

- **Cumulative Hospitalizations (6 months)**
  - Conventional Care: 429
  - Post-comprehensive Rx: 63

85% Reduction in Hospitalizations, *P<0.0001

214 Patients, 6 months conventional treatment pre- vs 6 months post-comprehensive management.
Total medical costs: Pre ($18,808) vs Post ($9,555), *P<0.0001.
Multidisciplinary Intervention to Prevent Readmission of Elderly HF Patients

282 patients with CHF  mean NYHA 2.4, mean LVEF .41
Intervention of education, diet, social service consult, intensive f/u

Rich NEJM 1995;333:1190
Randomized Trial of Education/Support Intervention to Prevent Readmission in HF

88 patients hospitalized with HF, Nurse education and support, home visit or phone contact
Krumholtz J Am Coll Cardiol 2002;39:83-9
# Randomized Trials of Disease Management Programs for Heart Failure

<table>
<thead>
<tr>
<th>Sensitivity analysis</th>
<th>Mortality</th>
<th>All-cause readmission</th>
<th>HF-related readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OR</td>
<td>CI</td>
<td>OR</td>
</tr>
<tr>
<td>Overall</td>
<td>0.80</td>
<td>0.69–0.93</td>
<td>0.76</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>High quality studies</td>
<td>0.70</td>
<td>0.53–0.91</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>Low quality studies</td>
<td>0.85</td>
<td>0.71–1.03</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.58</td>
</tr>
<tr>
<td>Multidisciplinary</td>
<td>0.58</td>
<td>0.44–0.75</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.51</td>
</tr>
<tr>
<td>Nurse</td>
<td>0.93</td>
<td>0.77–1.11</td>
<td>0.82</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.61</td>
</tr>
<tr>
<td>Short intervention (0–3 m)</td>
<td>0.88</td>
<td>0.66–1.16</td>
<td>0.61</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.61</td>
</tr>
<tr>
<td>Medium intervention (3–6 m)</td>
<td>0.84</td>
<td>0.63–1.12</td>
<td>1.05</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.68</td>
</tr>
<tr>
<td>Long intervention (&gt; 6 m)</td>
<td>0.73</td>
<td>0.59–0.91</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.47</td>
</tr>
</tbody>
</table>

33 Randomized Trials, 5308 patients  
• $P <0.01$
Institutional Heart Failure Discharge Medication Program Reduces Readmissions and Mortality

![Bar chart showing treatment rates and mortality rates before and after intervention.](chart.png)

Pre-Intervention (n=11,038) vs. Post-Intervention (n=8,045)

- **ACEI Rx**
  - Pre-Intervention: 65%
  - Post-Intervention: 46%
  - HR 0.80, p<0.0001
- **Readmissions**
  - Pre-Intervention: 95%
  - Post-Intervention: 38%
  - HR 0.77, p<0.0001
- **1 year Mortality**
  - Pre-Intervention: 18%
  - Post-Intervention: 18%
  - HR 0.80, p<0.0001

Intermountain Health Care: 10 Hospitals Pre 1/96-12/98 n=11,038 to 1/99-3/00 n=8,045

Pearson Circulation 2001;104:II-838
AHA GWTG-HF Web Based Patient Management Tool

Demographics
- Gender: Male, Female, Unknown
- Hispanic Ethnicity: Yes, No, UTD
- External Tracking ID
- Payment Source

Labs
- BMP: 1723 pg/mL
- BUN: 43 mg/dL
- troponin: [select one]

Discharge Medications
- Beta Blocker
- Contraindicated?
- *If yes, Contraindication:
  - Asthma/Generic reactive airway disease
  - Beta blocker allergy
  - Medication
  - Symptomatic Bradycardia

Discharge Interventions
- Weight Monitoring
- Referred to Outpatient Cardiac Rehab Program
- Obesity Weight Management
- Activity Recommendation

Interactively checks patient's data with the AHA guidelines.
PrCI tool use (admission order set or discharge checklist) was reported during hospitalization in 45.3% of patients (n=22,017/48,612).

GWTG-HF Participation, Quality of Care and Clinical Outcomes

<table>
<thead>
<tr>
<th>Measure</th>
<th>GWTG Hospitals (n=355)</th>
<th>Non-GWTG Hospitals (n=3909)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>LVEF documented</td>
<td>92.8%</td>
<td>83.0%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>ACEI/ARB in LVSD</td>
<td>85.6%</td>
<td>81.4%</td>
<td>0.001</td>
</tr>
<tr>
<td>Discharge Instructions</td>
<td>67.7%</td>
<td>55.3%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Smoking Cessation Counseling</td>
<td>85.7%</td>
<td>81.3%</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Risk-adjusted 30-day mortality for HF was lower in GWTG hospitals compared to non-GWTG hospitals

Hospital Compared data 2005-2006
Heidenreich PA et al Am Heart J 2009;158:546-53
Relationship Between Early Physician Follow-up and 30-day Readmission Among Medicare Beneficiaries Hospitalized for HF

<table>
<thead>
<tr>
<th>Early Follow-up</th>
<th>Unadjusted HR</th>
<th>95% CI</th>
<th>P Value</th>
<th>Adjusted HR</th>
<th>95% CI</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quartile 1</td>
<td>1.0 (REF)</td>
<td></td>
<td></td>
<td>1.0 (REF)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Quartile 2</td>
<td>0.86</td>
<td>0.78-0.94</td>
<td>&lt;.01</td>
<td>0.85</td>
<td>0.78-0.93</td>
<td>&lt;01</td>
</tr>
<tr>
<td>Quartile 3</td>
<td>0.85</td>
<td>0.76-0.94</td>
<td>&lt;.01</td>
<td>0.87</td>
<td>0.78-0.96</td>
<td>&lt;01</td>
</tr>
<tr>
<td>Quartile 4</td>
<td>0.87</td>
<td>0.79-0.95</td>
<td>&lt;.01</td>
<td>0.91</td>
<td>0.83-1.0</td>
<td>.05</td>
</tr>
</tbody>
</table>

Hospitals in the lowest quartile of early physician follow-up had higher rates of rehospitalization within 30-days, than those in the other 3 quartiles, independent of other factors.
Continuity of HF Care

Reliable Care: Not Missing the Steps

Hospital ED
- Diagnosis
- Admit
- CCU?
- Acute Rx
- Evaluation

CCU Telemetry
- Intravenous Meds
- Oral Meds
- LV Function
- Echo and/or Cath?
- Other Evaluation
- Transfer to Floor

Discharge
- Oral Meds
- Other Treatment?
- Other Eval
- Patient Education
- Follow-up
- Disease Management

Early Post DC
- Right Meds?*
- Titration?*
- Patient Education
- Disease Management
- Continuity Device?

Outpatient
- On Right Meds?
- On Right Dose?
- Volume Status
- Re-assess EF
- Device?
- Self Manage?
- Other Issues?

*Who is responsible?
### Hospital Discharge: Transitions of Care

<table>
<thead>
<tr>
<th>Recommendation or Indication</th>
<th>COR</th>
<th>LOR</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>I B</td>
<td></td>
<td></td>
<td>Performance improvement systems in the hospital and early post discharge outpatient setting to identify HF for GDMT</td>
</tr>
</tbody>
</table>

Before hospital discharge, at the first post discharge visit, and in subsequent follow-up visits, the following should be addressed:

- A. Initiation of GDMT if not done or contraindicated;
- B. Causes of HF, barriers to care, and limitations in support;
- C. Assessment of volume status and blood pressure with adjustment of HF therapy;
- D. Optimization of chronic oral HF therapy;
- E. Renal function and electrolytes;
- F. Management of comorbid conditions;
- G. HF education, self-care, emergency plans, and adherence; and
- H. Palliative or hospice care

# Hospital Discharge: Transitions of Care

<table>
<thead>
<tr>
<th>Recommendation or Indication</th>
<th>COR</th>
<th>LOR</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>I B</td>
<td>Multidisciplinary HF disease-management programs for patients at high risk for hospital readmission are recommended</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I B</td>
<td>Effective systems of care coordination with special attention to care transitions should be deployed for every patient with chronic HF that facilitate and ensure effective care that is designed to achieve GDMT and prevent hospitalization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIa B</td>
<td>A follow-up visit within 7 to 14 days and/or a telephone follow-up within 3 days of hospital discharge is reasonable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIa B</td>
<td>Use of clinical risk-prediction tools and/or biomarkers to identify higher-risk patients is reasonable</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Examples of Readmission Reduction Projects

<table>
<thead>
<tr>
<th>Project</th>
<th>When</th>
<th>What</th>
<th>How</th>
<th>Who</th>
<th>Which</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transitional Care</td>
<td>During stay + Post-Discharge (up to 12 mo.)</td>
<td>Patient Education &amp; Self-Mgt Support</td>
<td>Hospital visits + Home visits + Phone calls</td>
<td>Advanced Practice Nurse</td>
<td>65+ with CHF</td>
</tr>
<tr>
<td>Care Transitions</td>
<td>Pre-Discharge + 1 Mo. Post-Discharge</td>
<td>Self-Mgt Support</td>
<td>Hospital visit + Home visit + 3 phone calls</td>
<td>Nurses or Lay Coaches</td>
<td>All</td>
</tr>
<tr>
<td>Project RED</td>
<td>Discharge + Immediate Post-Discharge</td>
<td>Patient Education + Medication Assistance</td>
<td>Hospital visit + Phone call</td>
<td>Nurse (or simulation) + Pharmacist</td>
<td>All</td>
</tr>
</tbody>
</table>

The multitude of initiatives that relate to payment, policy, and care transitions leave many hospitals struggling with where to begin when it comes to reducing readmissions.
Care Transitions Intervention Model

- Nurse “transition coach”
  - Visits patient in hospital, at home within 48 hours of discharge, then calls the patient 3 times
  - Provides information and guidance to the patient and/or family for an effective care transition, improved self management skills and enhanced patient-practitioner communication
  - Does not fix problems and does not provide skilled care
  - Models and facilitates new behaviors and communication skills for patients and families to feel confident that they can successfully respond to common problems

University of Colorado  http://www.caretransitions.org
Interventions to Reduce HF Readmissions

HF Patient Arrives
- Presents to ED for eval
- Triaged and if needed admitted to HF Unit

HF Unit Admission
- Standardized evidence-based HF Admission Order Set is implemented including clinical protocols & prompts for post-discharge follow-up

Readmission Risk Assessment
- Risk Assessment Tool
- “Readmission Rounds”
  - Early detection of higher need for transitional care
  - Multidisciplinary Action Plan

Phone Call Follow-up
- HF RN Coordinator calls patients 7 days post-discharge to address any outstanding items

Post-Discharge Planning
- Dedicated post-discharge clinic appointment slots
- Goal is to have follow-up in 7-10 days

HF RN Coordinator Evaluation
- 1:1 Education
- Coordination of post-discharge care
Interventions to Reduce HF Readmissions

- Providing full 30 day supply of discharge medications
- Delivery of low sodium prepared meals for the first 30 days post hospital discharge
- Camp heart failure: group classes in the first 30 days post discharge
- Use of observation units to keep patients in outpatient status
- Financial incentives offered to patients to stay out of hospital for 30 days
Evidence Based Interventions to Reduce 30 Day Readmission Rates

(1) Partnering with community physicians or physician groups to reduce readmission

(2) Partnering with local hospitals to reduce readmissions

(3) Having nurses responsible for medication reconciliation

(4) Arranging follow-up appointments before discharge

(5) Having a process in place to send all discharge paper or electronic summaries directly to the patient’s PCP

(6) Assigning staff to follow up on test results after the patient is discharged

Strategies independently associated with lower risk-standardized 30-day readmission rates

Multiple Interventions are Required to Reduce Readmission Rates

Relationships Between Domain Scores and 30-day Risk-Standardized Readmission Rates

From 100 US GWTG-HF hospitals deploying quality improvement programs

Kociol R D et al. Circ Heart Fail 2012;5:680-687
H2H: Hospital to Home

The goal is a 20% relative reduction in the national 30 day all-cause readmission rate for those patients discharged with a diagnosis of heart failure by December 2012.

AHA Target: Heart Failure

To improve quality, care transitions, and outcomes for patients with heart failure with a targeted initiative and leveraging the American Heart Association’s premier quality improvement suite of resources including Get With The Guidelines-Heart Failure.
Medications + Appointment + Symptom Mgt = Transition

- Medication Management Post-Discharge: Is the patient familiar and competent with his or her medications and is there access to them?
- Early Follow-up: Does the patient have a follow up appointment scheduled within a week of discharge and is he or she able to get there?
- Symptom Management: Does the patient fully comprehend the signs and symptoms that require medical attention and whom to contact if they occur?

http://www.h2hquality.org
Target: HF Optimal Care Transitions Follow-up, and Patient Education:

- Discharge use of ACEI/ARB, evidence-based beta blocker, and aldosterone antagonist in all eligible heart failure patients with reduced LVEF, in absence of documented contraindications, intolerance, or patient/system reasons

- Early post-discharge follow-up with visit or phone call scheduled to occur within 7 days of hospital discharge

- Enhanced patient education as evidenced by referral to heart failure disease management program, provision of at least 60 minutes of heart failure education by a qualified heart failure educator, or provision of AHA heart failure interactive workbook
1653 patients who had recently been hospitalized for HF randomized to undergo either telemonitoring (826 patients) or usual care (827 patients).

Effectiveness of Remote Patient Monitoring After Discharge of Hospitalized Patients With Heart Failure

The Better Effectiveness After Transition-Heart Failure (BEAT-HF) Randomized Clinical Trial


Abstract

Objective: To evaluate the effectiveness of a case transition intervention using remote patient monitoring in reducing 180-day all-cause readmissions among a broad population of older adults hospitalized with HF.

Design, setting, and participants: We randomized 1447 patients hospitalized for HF between October 12, 2011, and September 30, 2013, to the intervention arm (716 patients) or to the usual-care arm (722 patients) of the Better Effectiveness After Transition-Heart Failure (BEAT-HF) study and observed them for 180 days. The dates of our study analyses were March 30, 2014, to October 1, 2015. The setting was academic medical centers in California. Participants were hospitalized individuals 50 years and older who received active treatment for decompressed HF.

Interventions: The intervention included health coaching telephone calls and telemonitoring. Telemonitoring used electronic equipment that collected daily information about blood pressure, heart rate, symptoms, and weight. Centralized registered nurses conducted telemonitoring reviews, protocolized actions, and telephone calls.

Main outcomes and measures: The primary outcome was readmission for any cause within 180 days after discharge. Secondary outcomes were all-cause readmission within 30 days, all-cause mortality at 30 and 180 days, and quality of life at 30 and 180 days.

Results: Among 1447 participants, the median age was 73 years. Overall, 46.2% (664 of 1437) were female, and 22.2% (316 of 1437) were African American. The intervention and usual care groups did not differ significantly in readmissions for any cause 180 days after discharge, which occurred in 30.3% (164 of 541) and 35.2% (172 of 489) of patients, respectively (adjusted hazard ratio, 0.89; 95% CI, 0.68-1.17; P = .34). In secondary analyses, there was no significant difference in 30-day readmission or 180-day mortality, but there was a significant difference in 180-day quality of life between the intervention and usual care groups. No adverse events were reported.

Conclusions and relevance: Among patients hospitalized for HF, combined health coaching telephone calls and telemonitoring did not reduce 180-day readmissions.

Trial registration: clinicaltrials.gov identifier: NCT01395223

Published online February 8, 2016.
Implantable Wireless Heart Sensor

No batteries or internal power source, sensor is powered by RF-energy provided by an external electronics module.

Coil and a pressure sensitive capacitor encased in a hermetically sealed silica capsule covered by silicone. The device has no leads or batteries. Two nitinol loops at the ends of the capsule serve as anchors in the pulmonary artery. The coil and capacitor form an electrical circuit that resonates at a specific frequency, and pressure applied to the sensor causes deflections of the pressure-sensitive surface. An external antenna provides power to the device, continuously measuring its resonant frequency, which is then converted to a pressure waveform. The interrogating device has an atmospheric barometer which automatically subtracts the ambient pressure from that measured from the implanted sensor.
Wireless Pulmonary Artery Hemodynamic Monitoring in Chronic Heart Failure: CHAMPION

Wireless Pulmonary Artery Hemodynamic Monitoring in Chronic Heart Failure: CHAMPION

550 patients with NYHA Class III HF, irrespective of LVEF, and a previous HF hospital admission were enrolled in 64 centers the US

Randomly assigned to management with a wireless implantable hemodynamic monitoring (W-IHM) system (treatment group) or to a control group for at least 6 months

Clinicians used daily measurement of pulmonary artery pressures in addition to standard of care versus standard of care alone in the control group, with goal of keeping PAD pressures normal and specific recommendations provided

The primary efficacy endpoint was the rate of HF related hospitalizations at 6 months

Wireless Pulmonary Artery Hemodynamic Monitoring in Chronic Heart Failure: CHAMPION

Usual Care

Patient regularly scheduled office visits 2-12 times a year.
PRN calls, unscheduled office visits, ER visits if worsened symptoms

Weight, symptoms

Hemodynamic Monitored and Guided Home Care

Weight, symptoms hemodynamics

Daily Monitoring

Weight, symptoms

Scheduled and PRN Assessments

Physical examination, laboratories, echocardiogram

Patient regularly scheduled office visits 2-12 times a year. PRN calls, unscheduled office visits, ER visits if worsened symptoms

Less frequent need for physical exam, laboratories, echo

Opportunity for remote visits. Office visits only when needed. Less need for unscheduled office visits and ER visits

Visits

Therapy

Empiric and/or reactive adjustments in therapy

Proactive, guided, personalized adjustments in therapy

Bui A, Fonarow GC, JACC 2012: 59(2):97-104
Targeting Interventions to Patients at Highest Risk for Readmission

• Clinical risk models
  o CMS Risk Model
  o OPTIMIZE-HF Post Discharge Risk Model
  o GWTG-HF Post Discharge Risk Model
  o LaCE Index

• Biomarkers
  o BNP / NT-BNP
  o Galectin-3

• Time limited disease management
  o First 30 days of discharge

Am Heart J 2012;164:365-72
Predischarge BNP Assay for Identifying Patients at High Risk of Readmission After Decompensated Heart Failure


Follow-up (days)

<table>
<thead>
<tr>
<th>Death or readmission (%)</th>
<th>Predischarge BNP &gt;700ng/L</th>
<th>Predischarge BNP 350 - 700ng/L</th>
<th>Predischarge BNP &lt;350ng/L</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n =41, events =38</td>
<td>n =50, events =30</td>
<td>n =111, events =18</td>
</tr>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hazard ratios of 2nd and 3rd versus 1st BNP range

- Predischarge BNP >700ng/L: 15.2
- Predischarge BNP 350 - 700ng/L: 5.1
- Predischarge BNP <350ng/L: 1

*P < .0001*
Not all Readmissions in HF Patients are Preventable: Goal is to Reduce the Ones that Are Preventable

“You can’t manage what you don’t measure”
That Center of Excellence with Excessive HF Readmission Rates...

After the HF 30 Day Readmission Measure:

This center invested in a transition of care program and providing medications prior to hospital discharge

Representatives from this center stated “the hospital is working hard to prevent readmissions and agrees that doing so results in better patient care”

The center originally faced a 0.74% penalty but based on it’s quality improvement activities this has now fallen by more than half to 0.29% this year
The average 30-day hospital readmission rate fell to 18.4% in calendar year 2012 from 19.0% during the previous five years, according to an analysis by CMS.

This translates to about 70,000 fewer readmissions for 2012.

Payment reforms aimed at reducing avoidable readmissions are starting to have a measurable impact on provider behavior and are resulting in improved care.

http://www.cms.gov/mmrr/Briefs/B2013/mmrr-2013-003-02-b01.html
Going Back to the Hospital

As the percentage of hospital patients readmitted after 30 days declined, follow-up ‘observation stays,’ which don’t count as readmissions, rose for conditions in Medicare’s penalty program. At the 319 hospitals that account for half the increase in follow-up observation stays, readmission rates fell more sharply.

Rates of ‘readmissions’ and ‘observation stays’ within 30 days of a hospitalization

Note: Analysis includes only readmissions and observation stays that began with an ER visit. Penalty-program conditions include heart failure, chronic obstructive pulmonary disease and pneumonia. The fourth quarter of 2013 includes only claims from Oct. 1 through Dec. 1.

Source: WSJ analysis of Medicare claims records
Has Public Reporting of Hospital Readmission Rates and Penalties Affected Patient Outcomes?

No Significant Changes in Adjusted Trends for 30-Day Readmission Rates for Heart Failure
Key Take Away Points

• Identify key precipitating factors for hospitalization and rehospitalization and address prior to discharge
• Optimize evidence based HF medication and device therapy
• Provide pre-discharge HF patient education by trained educators
• Begin comprehensive discharge planning right away
• Schedule *early* post-discharge physician follow-up
• For higher risk patients, refer to comprehensive HF disease management programs
• When appropriate consider palliative care services
• Systems of care approaches (join GWTG-HF)
## Potential Impact of Optimal Implementation of Evidence-Based HFrEF Therapies on Mortality

<table>
<thead>
<tr>
<th>Guideline Recommended Therapy</th>
<th>HF Patient Population Eligible for Treatment, n*</th>
<th>Current HF Population Eligible and Untreated, n (%)</th>
<th>Potential Lives Saved per Year</th>
<th>Potential Lives Saved per Year (Sensitivity Range*)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACEI/ARB</td>
<td>2,459,644</td>
<td>501,767 (20.4)</td>
<td>6516</td>
<td>(3336-11,260)</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>2,512,560</td>
<td>361,809 (14.4)</td>
<td>12,922</td>
<td>(6616-22,329)</td>
</tr>
<tr>
<td>Aldosterone Antagonist</td>
<td>603,014</td>
<td>385,326 (63.9)</td>
<td>21,407</td>
<td>(10,960-36,991)</td>
</tr>
<tr>
<td>Hydralazine/Nitrate</td>
<td>150,754</td>
<td>139,749 (92.7)</td>
<td>6655</td>
<td>(3407-11,500)</td>
</tr>
<tr>
<td>CRT</td>
<td>326,151</td>
<td>199,604 (61.2)</td>
<td>8317</td>
<td>(4258-14,372)</td>
</tr>
<tr>
<td>ICD</td>
<td>1,725,732</td>
<td>852,512 (49.4)</td>
<td>12,179</td>
<td>(6236-21,045)</td>
</tr>
<tr>
<td>Total</td>
<td>-</td>
<td>-</td>
<td>67,996</td>
<td>(34,813-117,497)</td>
</tr>
<tr>
<td>ARNI (replacing ACEI/ARB)</td>
<td>2,287,296</td>
<td>2,287,296 (100)</td>
<td>28,484</td>
<td>(18,230-41,017)</td>
</tr>
</tbody>
</table>

Conclusions

• Significant opportunities exist to improve the quality of care, care transitions, and outcomes for patients hospitalized with HF

• Improving care transitions and reducing preventable rehospitalizations in HF is a national focus but very challenging

• Some programs and strategies have been successful in reducing 30-day rehospitalizations

• New approaches and strategies are needed to reduce preventable rehospitalizations in the first 30 days and beyond as well as improve survival and other patient centered outcomes
Questions?
THANK YOU

More Questions about Get With The Guidelines?
Visit heart.org/QualityHF to find your local Get With The Guidelines representative.

Liz Olson, CVA
Program Manager, Get With The Guidelines® - Resuscitation & Heart Failure
Liz.Olson@heart.org  Phone 214-706-1528