Acute Decompensated Heart Failure: Preventing Bounce-backs

Juanita (Nita) Reigle MSN, ACNP-BC, CHFN
University of Virginia Health System
Charlottesville, VA
Disclosures

Consultant to Boston Scientific
Objectives

1. Describe the impact of pre-discharge self-management education in reducing 30-day readmission for the heart failure patient

2. Identify the role of remote monitoring on reducing 30-day heart failure readmission rates
Strategies to Reduce HF Readmissions

• Patient education
• Remote monitoring
• Early follow-up
• General nursing strategies
Current Hospital Readmission Reduction Program (HRRP)

• Penalized higher than expected 30 day readmissions for:
  – Heart Failure
  – Pneumonia
  – Acute Myocardial Infarction (AMI)
  – Chronic Obstructive Pulmonary Disease (COPD)
  – Total Hip and/or Knee Arthroplasty

• All-cause readmissions (some planned exceptions and Observation stays do not count)

• FFY 2016 includes hospital discharges between July 1, 2011 and June 30, 2014.
What is happening nationally?

• In FFY 2015:
  – 78% of hospitals were penalized (2,638 facilities)
  – 1.2% of hospitals were at maximum penalty
  – 92% of major teaching hospitals were penalized
  – 76% of non-teaching hospitals were penalized
  – The total amount of penalties estimated by CMS was $428 million

SOURCE: Kaiser Family Foundation analysis of CMS Final Rules and Impact files for the Hospital Inpatient Prospective Payment System
TIMING AND CAUSES OF READMISSIONS
Timing of Readmission

Heart Failure

- 13.4% readmitted within 0-3 days
- 31.7% readmitted within 0-7 days
- 61% admitted within 0-15 days

Dharmarajan K. et al. JAMA 2013. Vol 309, No. 4
<table>
<thead>
<tr>
<th>D/C dx</th>
<th>30 day readm rate</th>
<th>Most frequent</th>
<th>2nd</th>
<th>3rd</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Failure</td>
<td>26.9</td>
<td>Heart failure</td>
<td>Pneumonia</td>
<td>Renal failure</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>20.1</td>
<td>Pneumonia</td>
<td>Heart failure</td>
<td>COPD</td>
</tr>
<tr>
<td>Surgical (all)</td>
<td>15.6</td>
<td>Heart failure</td>
<td>Pneumonia</td>
<td>GI problems</td>
</tr>
<tr>
<td>COPD</td>
<td>22.6</td>
<td>COPD</td>
<td>Pneumonia</td>
<td>Heart failure</td>
</tr>
</tbody>
</table>

Why are patients with HF readmitted?

- **Disease related factors**
  - arrhythmia, ACS, HTN, hypotension, worsening renal function, heart failure, etc

- **System factors**
  - Inadequate follow-up
  - Inadequate discharge planning
  - Medication issues (nonoptimal dose)

- **Patient factors**
  - Nonadherence with medications, diet, fluid restriction
  - Failure to seek medical attention when symptoms recurred
  - Poor health literacy

- **Failed social support system**

---

4. Robinson s, et al. Circ. 2012;126 (A10658)
PATIENT EDUCATION
# Recommendations for Hospital Discharge

<table>
<thead>
<tr>
<th>Recommendations or Indications</th>
<th>COR</th>
<th>LOE</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance improvement systems in the hospital and early postdischarge outpatient setting to identify HF for GDMT</td>
<td>I</td>
<td>B</td>
<td>82, 365, 706, 792–796</td>
</tr>
<tr>
<td>Before hospital discharge, at the first postdischarge visit, and in subsequent follow-up visits, the following should be addressed:</td>
<td>I</td>
<td>B</td>
<td>204, 795, 797–799</td>
</tr>
<tr>
<td>a. initiation of GDMT if not done or contraindicated;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. causes of HF, barriers to care, and limitations in support;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. assessment of volume status and blood pressure with adjustment of HF therapy;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. optimization of chronic oral HF therapy;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. renal function and electrolytes;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. management of comorbid conditions;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. HF education, self-care, emergency plans, and adherence; and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n. palliative or hospice care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary HF disease-management programs for patients at high risk for hospital readmission are recommended</td>
<td>I</td>
<td>B</td>
<td>82, 800–802</td>
</tr>
<tr>
<td>A follow-up visit within 7 to 14 d and/or a telephone follow-up within 3 d of hospital discharge are reasonable</td>
<td>Iia</td>
<td>B</td>
<td>101, 803</td>
</tr>
<tr>
<td>Use of clinical risk-prediction tools and/or biomarkers to identify higher-risk patients are reasonable</td>
<td>Iia</td>
<td>B</td>
<td>215</td>
</tr>
</tbody>
</table>

COR indicates Class of Recommendation; GDMT, guideline-directed medical therapy; HF, heart failure; and LOE, Level of Evidence.
First – Educate the Educator

• 45 RNs given pretest before participating in a 30 minute PowerPoint educational program about HF guidelines and patient self-care management.

• Significant improvement in nurses posttest scores (p <0.001) for nurses’ knowledge of HF

• HF readmission rates also improved following the intervention

## Heart Failure Readmission Rates at Study Institution

<table>
<thead>
<tr>
<th>Date Range</th>
<th>Month</th>
<th>Patients Discharged (n)</th>
<th>Patients Readmitted &lt; 30 days (n)</th>
<th>Patients Readmitted (%)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 day</td>
<td>May</td>
<td>18</td>
<td>5</td>
<td>27.8%</td>
<td></td>
</tr>
<tr>
<td>30 day</td>
<td>June</td>
<td>17</td>
<td>3</td>
<td>17.6%</td>
<td></td>
</tr>
<tr>
<td>30 day</td>
<td>July</td>
<td>26</td>
<td>8</td>
<td>30.8%</td>
<td></td>
</tr>
<tr>
<td>Intervention</td>
<td>August</td>
<td>__________</td>
<td>__________</td>
<td>__________</td>
<td>25.4%</td>
</tr>
<tr>
<td>30 day</td>
<td>September</td>
<td>20</td>
<td>1</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>30 day</td>
<td>October</td>
<td>19</td>
<td>2</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>30 day</td>
<td>November</td>
<td>16</td>
<td>2</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>9%</td>
</tr>
</tbody>
</table>

Patient Education and Readmissions

- Literacy has been linked to all-cause mortality\(^1\), all-cause hospitalizations\(^2\), HF related hospitalizations\(^3\)
- Patients with better health care self confidence have better outcomes \(^4\)
- Better knowledge of self-management and self-maintenance skills results in better quality of life \(^5\)

5. Tung HH, et.al. Congest Heart Fail. 2013 ;19(4)
Relationship of Understanding TJC Discharge Instructions to Readmission

Regalbuto R, Maurer MS, et al. J of Cardiac Fail. 2014 20;9
Fig. 2. The percentage answering correctly for each of the 6 individual questions.

Ricky Regalbuto, Mathew S. Maurer, David Chapel, Jenniliz Mendez, Jonathan A. Shaffer

Joint Commission Requirements for Discharge Instructions in Patients With Heart Failure: Is Understanding Important for Preventing Readmissions?

http://dx.doi.org/10.1016/j.cardfail.2014.06.358
Discharge Education

• N=223 HFrEF patients, randomized study
• Control group: Standard d/c education and written information
• Intervention: 60 minute, one-on one teaching with nurse educator. Information included causes of intravascular volume overload, reasons for medications, mechanism of diuretic action, and rationale for self-care behaviors.
• Phone call follow-up at 30,90 and 180 days

Koelling TM, et al. Circ 2005;111(2)
Figure 3. Event-free survival defined as time to first hospitalization or death for control (blue) and education (red) subjects.

Results

• 35% reduction in combined endpoint of death or rehospitalization in education group
• 51% reduction in HF rehospitalization in education group
• Higher proportion of patients in education group performing self-care practices

Koelling TM, et al. Circ 2005;111(2)
Telemonitoring

• Definition: the transmission of physiological data from the patient’s home to a health-care provider

• A meta analysis of 25 studied (8328 patients) suggested that telemonitoring may provide better clinical outcomes

• Quality of studies varied and many had small enrollment

Impact of Remote Telemedical Management on Mortality and Hospitalizations in Ambulatory Patients With Chronic Heart Failure (TIM-HF)

- 710 patients with NYHA Class II or III and EF ≤ 35% - randomized usual care (356) or tele (354) and followed over 2 years

- Intervention: Daily remote monitoring (3 lead ECG, BP and weight) and 24/7 physician medical telephone support

- No difference between groups in hospital readmission or all-cause mortality

Randomized Trial of Telemonitoring to Improve Heart Failure Outcomes (Tele-HF)

- 1653 patients randomized to automated self-reported monitoring of daily symptoms and weight or usual care
- Patients information reviewed by every weekday by site coordinators. Variances triggered clinician responses
- No significant differences between groups in readmission, all-cause death, hospitalization for HF, number of days in the hospital, or time to readmission or death

Chaudhry SL, et al. NEJM 2010;363:2301-2309
Better Effectiveness After Transition - Heart Failure (BEAT-HF)

- 1437 patients with HF randomized to remote monitoring and telephone nurse coaching intervention or usual care.
- Intervention group received patient education using the ‘teach-back’ method and telemonitoring equipment. After hospital discharge, patients received nine scheduled health coaching telephone calls over 6 months from nurses. Nurses also called patients and their physicians for telemonitoring alerts.
- No significant difference in 30 day or 180 day readmission rates or mortality. QoL scores were higher in intervention group at 180 days ($p < 0.02$).

Remote Device Monitoring
PMs, ICDs, CRT-P, CRT-D

• Devices can monitor thoracic impedance, heart rate, arrhythmias, % pacing, respiratory rate and other variables
• 269,471 patients with a device. 47% used remote monitoring
• Remote monitoring was associated with improved survival. The greater the adherence to remote monitoring, the greater the survival.

Thoracic Impedance
Remote Monitoring in Patients with HF

• Retrospective analysis of 4 studies (combined n=1,561)

• Impedance, atrial fibrillation, ventricular rate in A-fib, loss of CRT pacing, night HR, HR variability

Scoring to Risk Stratify

## Diagnostic Parameter Thresholds

### Table 2
Criteria used for defining risk category for each diagnostic parameter

<table>
<thead>
<tr>
<th>Diagnostic Variable</th>
<th>Criteria Details</th>
<th>Criteria Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intra thoracic Impedance</td>
<td>Mean (impedance-reference) (&lt;-5.5 , \Omega) and (\geq 1) day with fluid index (\geq 60)</td>
<td>Impedance much lower than reference</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>Reference, (&gt;\delta , \Omega)</td>
</tr>
<tr>
<td>Intermediate</td>
<td>Mean (impedance reference) (&lt;+1.0 , \Omega) and first criteria not met</td>
<td>Impedance not much higher than reference</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Impedance, (&lt;1 , \Omega)</td>
</tr>
<tr>
<td>Low</td>
<td>First 2 criteria not met</td>
<td>Impedance is much higher than reference</td>
</tr>
<tr>
<td>AF burden and rapid ventricular rate</td>
<td></td>
<td>AF-RVR criteria (\geq 1) day with AF &gt; 6 h and VR-AF &gt; 90 beats/min 1–6 days with AF &gt; 6 h ≥ 1 day with %VP &lt; 90%</td>
</tr>
<tr>
<td>High</td>
<td>(&gt;1) AF-RVR criterion met</td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>1 AF-RVR criterion met</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>0 AF-RVR criterion met</td>
<td></td>
</tr>
<tr>
<td>Night heart rate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intermediate</td>
<td>(\geq 1) day with NHR &gt; 80 beats/min</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>First criterion not met</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(\geq 1) day with NHR &gt; 80 beats/min</td>
</tr>
</tbody>
</table>
Readmissions Based on Scores

Hazard Ratios (30-day readmission for HF):
0 vs 1-2: 5.5 (0.8-40.8); p = 0.084
0 vs ≥3: 22.7 (3.2-161.7); p = 0.002
1-2 vs ≥3: 4.1 (2.0-8.4); p < 0.001

Number at risk
Score ≥ 3 54
Score = 1, 2 145
Score = 0 55

Days after discharge from index hospitalization
0 46 121 117 26 46
10 42 131 113 32 46
20 35 54 54 54 48
30 32 54 54 48 46
40 26 26 26 26 26
50 23 23 23 23 23
60 23 23 23 23 23

Whellan DJ, et al The American Journal of Cardiology Volume 111, Issue 1 2013 79 - 84
Remote Device Monitoring
PA pressure

• CardioMEMS™ - wirelessly measures and monitors pulmonary artery pressures and heart rate

• Champion study ¹
  – NYHA Class III
  – HFrEF or HFpEF
  – follow-up over 15 months
  – 37% reduction in HF-related hospitalizations

¹ Abraham WT, et.al. Lancet. 2011;377(9766)
EARLY FOLLOW-UP
### Recommendations for Hospital Discharge

<table>
<thead>
<tr>
<th>Recommendations or Indications</th>
<th>COR</th>
<th>LOE</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Performance improvement systems in the hospital and early postdischarge outpatient setting</td>
<td>I</td>
<td>B</td>
<td>82, 365, 706, 792–796</td>
</tr>
<tr>
<td>to identify HF for GDMT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before hospital discharge, at the first postdischarge visit, and in subsequent follow-up</td>
<td>I</td>
<td>B</td>
<td>204, 795, 797–799</td>
</tr>
<tr>
<td>visits, the following should be addressed:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. initiation of GDMT if not done or contraindicated;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. causes of HF, barriers to care, and limitations in support;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. assessment of volume status and blood pressure with adjustment of HF therapy;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. optimization of chronic oral HF therapy;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. renal function and electrolytes;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>f. management of comorbid conditions;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. HF education, self-care, emergency plans, and adherence; and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. palliative or hospice care</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multidisciplinary HF disease-management programs for patients at high risk for hospital</td>
<td>I</td>
<td>B</td>
<td>82, 800–802</td>
</tr>
<tr>
<td>readmission are recommended</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A follow-up visit within 7 to 14 d and/or a telephone follow-up within 3 d of hospital</td>
<td>Ila</td>
<td>B</td>
<td>101, 803</td>
</tr>
<tr>
<td>discharge are reasonable</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use of clinical risk-prediction tools and/or biomarkers to identify higher-risk patients</td>
<td>Ila</td>
<td>B</td>
<td>215</td>
</tr>
<tr>
<td>are reasonable</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

COR indicates Class of Recommendation; GDMT, guideline-directed medical therapy; HF, heart failure; and LOE, Level of Evidence.
Follow-Up After Hospitalization

- 38% of early rehospitalizations in elderly patients with HF were judged to be preventable.¹
- Outpatient follow-up within 7 days of hospitalization for heart failure is associated with a lower risk of hospitalization²,³ and death.³

¹ Vinson JM, et al. JAGS. 1990;38(12)
² Hernandez AF, et al. JAMA. 2010;303(17)
³ McAlister FA, et al. CMAJ. 2013;185(14)
## UVA HF Nurse Practitioner Clinic Results

<table>
<thead>
<tr>
<th></th>
<th>H2H (614)</th>
<th>Non-H2H (4,296)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charleston Comorbidity Index</td>
<td>4.16 ± 3.32</td>
<td>3.50 ± 2.88</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Readmission within 30 days</td>
<td>14.6%</td>
<td>21.9%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Died within 30 days</td>
<td>1.8%</td>
<td>5.18%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Cost at 30 days</td>
<td>$5,767</td>
<td>$21,743</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

Mazimba S, et. al. ACC Abstract 2016
Welch T, et.al. ACC Abstract 2016
Nurse Staffing and Readmissions

- Analyzed 2,826 hospitals (1,413 low staffing and 1,413 high staffing)
- Matched hospitals and patient population characteristics
- Nurse staffing in hours/patient day
- Hospitals with higher nurse staffing had 25% lower odds of CMS readmission penalties compared to similar hospitals with lower staffing

McHugh MD, et al. Health Affairs 2013
Nurse Work Environment and Readmissions

- Surgical population (general, orthopedic, or vascular) n= 220,914
- Nurse work environment measured using Practice Environment Scale of the Nursing Work Index
  - Nurse participation in hospital affairs
  - Nurse foundations for quality of care
  - Nurse manager ability, leadership and support
  - Staffing and resource adequacy
  - Collegial nurse-physician relationships

Ma C, et al. Medical Care. 2015
Results

• Hospitals with better nurse staffing were 25% less likely to have CMS penalty
• The odds of readmission increased by 3% with each additional patient per nurse
• Lower odds of readmissions in hospitals with better nurse work environments (independent of staffing)
• No association between proportion BSN and readmission (except for pneumonia population)
• In 25% of cases, HF was either the most frequent or second most frequent reason for readmission
Summary

• Discharge patients on GDMT
• Focused HF patient education of at least 60 minutes prior to discharge
• Early follow-up (within 7 days) is best
• Remote monitoring can help identify patients at risk
• Nursing staffing and environments are important factors in reducing readmissions
• Reducing readmissions is a shared responsibility between patients, caregivers, healthcare providers, and the community