REHOSPITALIZATION RATE AND PREDICTORS OF REHOSPITALIZATION

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Cleveland, Ohio

OBJECTIVES

Why the emphasis on transitioning from hospital to home?
1. State the rehospitalization rate for patients with an index visit of heart failure
2. Describe the predictors of rehospitalization
3. Raise awareness of the importance in the Hospital to Home core concept questions
4. State current issues

Hospital Discharges for HF by Sex; 1979-2006

Source: NHDS/NCHS & NHLBI / AHA Heart Disease and Stroke Statistics, 2010 Update

National Trends in Readmission Rates after HF Hospitalization

RSRRR, Risk-standardized 30 D all-cause readmission rate

ADHERE: Hospital Discharge Status

N=182,898 patient episodes 10/2001 - 12/2005

Hospitalizations, %

62.1
14.8
17.6
3.9
1.6

Home
Home
Other
Hospital
Hospice
Discharges in thousands

700
600
500
400
300
200
100
0

1979
1980
1985
1990
1995
2000
2006

Presenter Disclosure Information

• Nancy Albert PhD, RN
• REHOSPITALIZATION RATE AND PREDICTORS OF REHOSPITALIZATION

FINANCIAL DISCLOSURE: None

UNLABELED/UNAPPROVED USES DISCLOSURE: None
ADHERE: Pt Characteristics; N=182,898 patient episodes 10/2001 - 12/2005

- All P<.001 unless specified: *P<.001; †P<.01; ‡P not significant; §P=.02.

Discharge Status
- Home (n=113,539)
- Home Additional care (n=27,013)
- Hospital (n=32,269)
- Hospice (Care n=3,010)
- Variable

- Age, mean ± SD, y
  - 80.2±10.8
  - 79.4±11.5*
  - 75.3±12.8
  - 69.3±14.2

- Female sex
  - 54.1
  - 62.9
  - 57.0†
  - 47.2

- Medical history
  - Active malignant neoplasm
    - 12.7
    - 5.5
    - 5.8
    - 4.5
  - Atrial fibrillation
    - 44.9
    - 31.7
    - 36.0
    - 29.1
  - Hypertension
    - 66.5
    - 74.0
    - 75.0
    - 74.7
  - Renal insufficiency
    - 43.5
    - 35.7
    - 33.4
    - 27.2
  - TIA or CVA
    - 20.8
    - 22.9†
    - 18.8†
    - 14.1
  - Diabetes mellitus
    - 30.7
    - 43.7
    - 35.9
    - 34.6
  - COPD
    - 35.9
    - 33.0*†
    - 35.2‡
    - 29.6
  - ICD
    - 36.0
    - 33.0†
    - 35.21
    - 29.6

Effect-HF: Rehospitalization Events

- N = 9,138

- Time from initial HF discharge to hospitalized event (days)
  - % of patients
  - Heart failure
  - Ischemic heart disease
  - Any CV disease

Effect-HF: Time to Rehospitalization in 1-yr Survivors, Stratified by Risk of Death

- N = 9,138
- % Survival
  - 0 Hospital
  - 1 Hospital
  - ≥ 2 Hospital

Prevalent Symptom Clusters - Seeking Acute Cause in Chronic HF

- * Diaphoresis, hot flashes, freezing, lip cyanosis,
  † Tiredness, feebleness, lack of stamina, lack of strength, hard to sit up, unable to do ADL’s, wanting to sleep,
  § Nausea, vomiting, diarrhea, poor appetite, tightness in stomach,
  ‡orthopnea, nocturnal dyspnea, fear of not getting air, anxiety / nervousness about not getting to sleep

No. Hospitalization from 1987-2006 per Person After HF Diagnosis until Death or Last Follow-up End of 2007, Olmsted Cty, MN


No. HF & Non-HF Hospitalizations in the Year Before Death Among Patients Who Died During Follow-up (n = 798), Olmsted Cty, MN

Primary Cause of Hospitalization
By Year of Diagnosis and Sex, Olmsted Cty, MN

<table>
<thead>
<tr>
<th>Year of HF diagnosis</th>
<th>HF Other CV No-CV</th>
<th>Total</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>713 (16.5)</td>
<td>936 (21.6)</td>
<td>2,679 (61.9)</td>
</tr>
<tr>
<td>Year of HF diagnosis</td>
<td>1987-1991</td>
<td>210 (19.4)</td>
<td>200 (18.5)</td>
</tr>
<tr>
<td></td>
<td>1992-1996</td>
<td>225 (16.8)</td>
<td>299 (22.3)</td>
</tr>
<tr>
<td></td>
<td>1997-2001</td>
<td>184 (15.7)</td>
<td>399 (24.6)</td>
</tr>
<tr>
<td></td>
<td>2002-2006</td>
<td>94 (12.8)</td>
<td>149 (20.3)</td>
</tr>
</tbody>
</table>

Sex

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Year of HF diagnosis</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF Other CV No-CV</td>
<td>Total</td>
<td>HF Other CV No-CV</td>
<td>Total</td>
<td>HF Other CV No-CV</td>
</tr>
<tr>
<td>Overall</td>
<td>713 (16.5)</td>
<td>936 (21.6)</td>
<td>2,679 (61.9)</td>
<td>4,328</td>
</tr>
<tr>
<td>Year of HF diagnosis</td>
<td>1987-1991</td>
<td>210 (19.4)</td>
<td>200 (18.5)</td>
<td>670 (62.0)</td>
</tr>
<tr>
<td></td>
<td>1992-1996</td>
<td>225 (16.8)</td>
<td>299 (22.3)</td>
<td>819 (61.9)</td>
</tr>
<tr>
<td></td>
<td>1997-2001</td>
<td>184 (15.7)</td>
<td>399 (24.6)</td>
<td>699 (59.7)</td>
</tr>
<tr>
<td></td>
<td>2002-2006</td>
<td>94 (12.8)</td>
<td>149 (20.3)</td>
<td>491 (66.9)</td>
</tr>
</tbody>
</table>

Multivariable Predictors of Hospitalization After HF Dx

<table>
<thead>
<tr>
<th></th>
<th>Diabetes mellitus</th>
<th>COPD</th>
<th>Anemia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard ratio (95% CI)</td>
<td>1.53 (1.31, 1.79)</td>
<td>1.47 (1.26, 1.72)</td>
<td>1.20 (1.06, 1.36)</td>
</tr>
</tbody>
</table>

Creatinine clearance (mL/min)

<table>
<thead>
<tr>
<th></th>
<th>30-60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard ratio (95% CI)</td>
<td>1.41 (1.09, 1.82)</td>
</tr>
</tbody>
</table>

Patient Characteristics-OPTIMIZE-HF

<table>
<thead>
<tr>
<th>Characteristics at Admission</th>
<th>LVSD (n = 20,118)</th>
<th>PSF (n = 21,149)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute pulmonary edema</td>
<td>3%</td>
<td>2%</td>
</tr>
<tr>
<td>Chest pain</td>
<td>23%</td>
<td>24%</td>
</tr>
<tr>
<td>Uncontrolled HTN</td>
<td>9%</td>
<td>12%</td>
</tr>
<tr>
<td>Dyspnea at rest</td>
<td>44%</td>
<td>44%</td>
</tr>
<tr>
<td>Dyspnea on exertion</td>
<td>63%</td>
<td>62%</td>
</tr>
<tr>
<td>Rales</td>
<td>63%</td>
<td>65%</td>
</tr>
<tr>
<td>Lower extremity edema</td>
<td>62%</td>
<td>68%</td>
</tr>
<tr>
<td>Jugular venous distension</td>
<td>35%</td>
<td>26%</td>
</tr>
<tr>
<td>Serum sodium, mEq/L</td>
<td>127.7 (14.6)</td>
<td>137.9 (14.8)</td>
</tr>
<tr>
<td>Serum creatinine, mg/dL</td>
<td>1.4 (1.1, 1.8)</td>
<td>1.1 (0.9, 1.8)</td>
</tr>
<tr>
<td>Serum hemoglobin, g/dL</td>
<td>12.5 ± 2.0</td>
<td>11.9 ± 2.0</td>
</tr>
<tr>
<td>BNP, pg/mL</td>
<td>1,170 (603, 2,280)</td>
<td>601.5 (320, 1,190)</td>
</tr>
<tr>
<td>SBP mm Hg</td>
<td>135 ± 31</td>
<td>149 ± 33</td>
</tr>
</tbody>
</table>

Patterns Pre-Hospitalization

Daily weight changes before hospitalization: P < 0.001

Lead Time of Dx Testing for ADHF Hospitalization

May be Hemodynamic Congestion; NOT always Clinical Congestion
While “congestion” is the marker that (a) brings patients to the ED/hospital and is (b) the acute focus of treatment... we need to find the root cause of congestion as that is the real problem.
PATIENT MISPERCEPTIONS

• Don’t recognize worsening symptoms & take action:
  - Don’t routinely prevent exacerbation
  - Symptoms are vague/bothersome…not monitored
  - Don’t recognize/address escalating symptoms
    - Restrict Na+ in diet…but think its due to hypertension
    - Don’t understand rationale for weighting self
    - Don’t perceive the need to seek help as symptoms become worse
    - Don’t believe they can control symptoms
    - Believe its the doctors job to control symptoms


Time to Emergency Department Visit Based on Accuracy of Illness Beliefs about HF

12 month P = 0.039


Social Isolation is associated with

• Increased mortality1-3
  - More in women than men3
• Increased CV hospitalization4
• More physical symptoms5
• Limitations in ADLs and social activities6
• Nonadherence to diet??
• Nonadherence to follow up visits??


Psychosocial Issues

Dietary Sodium Knowledge and 90 Day HF Hospitalization

Kollipara UK, Am J Cardiol 2008;102:1212-1215.

Low Dietary Sodium Knowledge and 90-Day Hospital Readmission in Multivariate Logistic Regression

<table>
<thead>
<tr>
<th>Low dietary sodium knowledge</th>
<th>OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alone in model</td>
<td>3.9 (1.2-12)</td>
<td>0.02</td>
</tr>
<tr>
<td>+ adjusted for age, gender, and race</td>
<td>5.9 (1.5-23)</td>
<td>0.01</td>
</tr>
<tr>
<td>+ adjusted for age, gender, race, &amp; HR</td>
<td>5.8 (1.5-23)</td>
<td>0.01</td>
</tr>
<tr>
<td>+ adjusted for sodium, creatinine, &amp; SBP</td>
<td>6.0 (1.5-23)</td>
<td>0.01</td>
</tr>
<tr>
<td>+ adjusted for age, SBP, B-type natriuretic peptide, &amp; sr. creatinine</td>
<td>5.0 (1.3-19)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

CI = confidence interval; OR = odds ratio.

*Depicted is OR associated with low dietary sodium knowledge for 90-day HF hospital readmission.

Kollipara UK, Am J Cardiol 2008;102:1212-1215.

Dietary Sodium Knowledge and Health Literacy

Kollipara UK, Am J Cardiol 2008;102:1212-1215.
Treatment (Refill) Adherence Associate w Exacerbation of HF

Ability to Read & Interpret Prescription Container Label Associate w Exacerbation of HF

HF Discharge Education: Time to 1st Hospitalization or Death

Does Timing of Follow-Up after Discharge Matter?

• OPTIMIZE-HF & GWTG-HF patients
  - Enrolled in fee-for-service Medicare at least 30 days before index hospitalization for HF
  - Discharged to home
  - 225 hospitals and 30,136 patients
  - 21.3% re-admitted within 7 days
  - Is early follow up (within 7 days) to an outpatient office for management important?

30-Day Rehospitalization by 7 Day Follow-up; in Quartiles

Follow-up by Physician Type
Follow-up by Same Physician who Provided Hospital Care

<table>
<thead>
<tr>
<th>Days</th>
<th>7</th>
<th>14</th>
<th>21</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td>Same Physician</td>
<td>18.7</td>
<td>35.6</td>
<td>45.6</td>
<td>50.8</td>
</tr>
<tr>
<td>Same Cardiologist</td>
<td>3.4</td>
<td>14</td>
<td>17.3</td>
<td></td>
</tr>
</tbody>
</table>

Hospital to Home – Core QUESTIONS

1. Medication management post-discharge:
   - Is the patient familiar and competent with their medications?
   - Does the patient have access to medications?

2. Early follow-up:
   - Does the patient have a follow-up visit scheduled within one week of discharge?
   - Does the patient have a way to get to the appointment?

3. Symptom management:
   - Does the patient fully comprehend the signs and symptoms that require medical attention?
   - Does the patient know whom to contact if symptoms occur or worsen?

CURRENT ISSUES

- Lack of attention to assessing issues
  - What general system, structure or process issues are easily modifiable?
  - What works and how much resources does it take to make an impact?
  - How do we work around non-modifiable issues (age)?
- Multiple social, economic and other issues
- Multiple comorbid conditions

Hospital to Home – Core QUESTIONS

Observed 30-Day Outcomes

30-Day Mortality $P = 0.44$; 30-Day Readmission $P < 0.01$
**CURRENT ISSUES**

Intervention “Dose”
- How much of what (amount) is needed to achieve outcomes?
- What intensity (level of detail/depth) is really needed?
- How long should intervention last?
- Is the intervention feasible after discharge or must it be carried out before discharge (dose = cost)?
  - Little / no reimbursement (hospital DRG or fixed ambulatory payment)

**CURRENT ISSUES**

- The JC and ACC/AHA discharge instructions performance measure is:
  - Process oriented
  - No quality control in “education” delivery, just documentation
  - Motivational interviewing / coaching?
- 6 content themes are broadly stated; no specific definitions or scope
- Interpretation is variable

**Collaboration - Teamwork**

**Create Sustainable Linkages**

**Tailoring**

*Expect results that measure up.*