Impact of Psychiatric Comorbidity on Length of Stay and Readmissions

CHARLES HEBERT, M.D.
Chief, Psychiatric Consultation Service
Departments of Internal Medicine and Psychiatry
Rush University Medical Center
Chicago, Illinois

Case Management Society of America
23rd Annual Conference
April 14, 2016
Outline

• The Problem of Readmissions

• Contributions of Psychiatric Comorbidity to Readmission and Length of Stay
  – Who is at risk?

• Depression as a Potential Target:
  – Impact of Depression on Common Inpatient Conditions

• Opportunities for Intervention
  – Proactive Psychiatric Consultation
  – Collaborative Care from “Time Zero”
The Problem of Readmissions

- Readmissions to the general hospital are **common**
- Readmissions to the general hospital are **costly**
- Readmissions to the general hospital are being **scrutinized heavily**
- Readmissions to the general hospital **occur early**
Timing of Readmissions to the General Hospital

61% of heart failure readmissions occur in the first two weeks following discharge.

67.6% of acute myocardial infarction readmissions occur in the first two weeks following discharge.

62.6% of pneumonia readmissions occur in the first two weeks following discharge.

Prediction Models for Readmission

- **HOSPITAL**: (JAMA 2013)
  - H emoglobin at discharge (<12 g/dL)
  - O ncology service admission
  - S odium level at discharge (<135 mEq/L)
  - P rocedure during index admission
  - I ndex T ype of admission (nonelective)
  - Number of A dmissions during last year
  - L ength of stay of index admission (> 5 days)

Captures ~ 27% of patients at high risk for readmission

Prediction Models for Readmission

- LACE: (CMAJ 2010)
  - Length of stay (days)
  - Acuity of admission (ie, emergent)
  - Charlson comorbidity score
  - Emergency department visits in last six months

“the median absolute difference between expected and observed rates [of readmission] was small, at 1.6%”

Source: CMAJ 2010 182(6):551-557
What about Psychiatric Comorbidity?

• Readmission prediction tools do not routinely account for contributions from psychiatric illness:
  – Psychiatric patients stay one day longer in the inpatient medical setting on average than their counterparts
  – Use of outpatient psychotropic medications is associated with increased 30-day readmission risk:
    • Anxiolytics ~ 16% risk

Source: Journal of Hospital Medicine 2013;8:450-455
Psychiatric Comorbidity Increases 30-Day Readmission Risk

- Heart Failure – 22.9% vs 19%
- Acute MI – 12.1% vs 9.2%
- Pneumonia – 20.2% vs 16.2%
- HF, AMI, & PNA – 21.7% vs 16.5%:
  - Patients with comorbid psychiatric illness are readmitted within 30 days 3-5% more often than those without

Source: Psychiatric Services 2015; 66:134-140
Which Psychiatric Diagnoses are at Risk?

- Variable and disparate findings exist:
  - Anxiety disorders?
  - Schizophrenia?
  - Bipolar disorder?
  - Substance use disorders?
  - Neurocognitive disorders? (eg, dementia)
Psychiatric Diagnoses Increase Risk of 30-day Readmission

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>HF Readmitted</th>
<th>AMI Readmitted</th>
<th>Pneumonia Readmitted</th>
<th>HF, AMI, and pneumonia Readmitted</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Individuals</td>
<td>89,406</td>
<td>34,515</td>
<td>72,438</td>
<td>160,169</td>
</tr>
<tr>
<td>No psychiatric diagnosis</td>
<td>64,240</td>
<td>25,975</td>
<td>48,893</td>
<td>113,029</td>
</tr>
<tr>
<td>Psychiatric diagnosis</td>
<td>25,166</td>
<td>8,540</td>
<td>23,545</td>
<td>47,140</td>
</tr>
<tr>
<td>Anxiety disorder</td>
<td>5,771</td>
<td>1,765</td>
<td>6,039</td>
<td>11,400</td>
</tr>
<tr>
<td>Bipolar disorder</td>
<td>696</td>
<td>194</td>
<td>1,020</td>
<td>1,644</td>
</tr>
<tr>
<td>Dementia</td>
<td>710</td>
<td>150</td>
<td>501</td>
<td>1,191</td>
</tr>
<tr>
<td>Depressive disorder</td>
<td>14,280</td>
<td>3,683</td>
<td>12,843</td>
<td>25,301</td>
</tr>
<tr>
<td>Other psychosis</td>
<td>502</td>
<td>N/A</td>
<td>460</td>
<td>885</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>257</td>
<td>48</td>
<td>346</td>
<td>588</td>
</tr>
<tr>
<td>Substance use disorder</td>
<td>8,368</td>
<td>4,181</td>
<td>9,293</td>
<td>18,160</td>
</tr>
</tbody>
</table>

*p<.05, **p<.001, compared with patients without a psychiatric diagnosis

Source: Psychiatric Services 2015; 66:134-140
Depression is a Target to Reduce Readmission Risk . . . .

Table 4. Adjusted Odds Ratios of Risk Factors for Rehospitalization

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Adjusted Odds Ratio (95% CI)</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1 (general risk factors) (N = 143)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>1.00 (0.98 to 1.02)</td>
<td>.97</td>
</tr>
<tr>
<td>Length of index hospital stay</td>
<td>1.01 (0.96 to 1.06)</td>
<td>.70</td>
</tr>
<tr>
<td>No. of hospital admissions in prior year</td>
<td>1.27 (1.05 to 1.54)</td>
<td>.02*</td>
</tr>
<tr>
<td>Charlson Comorbidity Index score</td>
<td>1.19 (0.99 to 1.43)</td>
<td>.06</td>
</tr>
<tr>
<td>Model 2 (psychosocial and functional status risk factors)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHQ-9 score (major depression)</td>
<td>4.64 (1.06 to 20.3)</td>
<td>.04*</td>
</tr>
<tr>
<td>AUDIT score (alcohol abuse)</td>
<td>1.80 (0.50 to 6.38)</td>
<td>.37</td>
</tr>
<tr>
<td>DAST-10 score (drug abuse)</td>
<td>0.95 (0.10 to 9.14)</td>
<td>.97</td>
</tr>
<tr>
<td>NSSQ score (social support)</td>
<td>1.60 (0.99 to 1.01)</td>
<td>.67</td>
</tr>
<tr>
<td>SF-12 score (physical functional status)</td>
<td>0.97 (0.92 to 1.02)</td>
<td>.27</td>
</tr>
<tr>
<td>SF-12 score (mental functional status)</td>
<td>1.02 (0.97 to 1.08)</td>
<td>.39</td>
</tr>
<tr>
<td>Model 3b</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of hospital admissions in prior year</td>
<td>1.21 (0.97 to 1.50)</td>
<td>.08</td>
</tr>
<tr>
<td>Charlson Comorbidity Index score</td>
<td>1.16 (0.91 to 1.47)</td>
<td>.22</td>
</tr>
<tr>
<td>SF-12 score (physical functional status)</td>
<td>0.97 (0.93 to 1.02)</td>
<td>.26</td>
</tr>
<tr>
<td>PHQ-9 score (major depression)</td>
<td>3.34 (1.20 to 9.25)</td>
<td>.02*</td>
</tr>
</tbody>
</table>

*Data may not be available for all 144 subjects for individual analysis.

*bIncludes risk factors found to be significant at the p = .05 level in preceding bivariate and logistic regression analyses.

*Statistically significant, p < .05.

Abbreviations: AUDIT = Alcohol Use Disorders Identification Test, DAST-10 = 10-item Drug Abuse Screening Test, NSSQ = Norbeck Social Support Questionnaire, PHQ-9 = 9-item Patient Health Questionnaire, SF-12 = Short Form-12 Health Survey.

Depression **triples** the risk of 90-day readmission to the inpatient medical ward.
Depression is a Target to Reduce Readmission Risk . . . In Pneumonia

Table 4. Pneumonia 30-Day Readmission Logistic Regression Results

<table>
<thead>
<tr>
<th>Percent</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean ± SD years &gt; 65</td>
<td>15.7 ± 8.5</td>
<td>-0.008</td>
<td>0.013</td>
<td>0.99</td>
<td>0.97–1.02</td>
</tr>
<tr>
<td>Stay, mean ± SD d</td>
<td>5.3 ± 4.0</td>
<td>0.008</td>
<td>0.023</td>
<td>1.01</td>
<td>0.96–1.05</td>
</tr>
<tr>
<td>Male</td>
<td>42.1</td>
<td>0.463</td>
<td>0.221</td>
<td>1.59</td>
<td>1.03–2.45</td>
</tr>
<tr>
<td>Nursing home resident</td>
<td>41.3</td>
<td>0.300</td>
<td>0.208</td>
<td>1.35</td>
<td>0.90–2.03</td>
</tr>
<tr>
<td>History of heart failure</td>
<td>35.5</td>
<td>0.106</td>
<td>0.213</td>
<td>1.11</td>
<td>0.73–1.69</td>
</tr>
<tr>
<td>Chronic lung disease</td>
<td>44.9</td>
<td>0.489</td>
<td>0.214</td>
<td>1.63</td>
<td>1.07–2.48</td>
</tr>
<tr>
<td>Renal disease</td>
<td>15.2</td>
<td>0.311</td>
<td>0.252</td>
<td>1.36</td>
<td>0.83–2.24</td>
</tr>
<tr>
<td>Cancer</td>
<td>10.0</td>
<td>0.780</td>
<td>0.288</td>
<td>2.18</td>
<td>1.24–3.84</td>
</tr>
<tr>
<td>Immunosuppressive therapy</td>
<td>22.3</td>
<td>0.174</td>
<td>0.233</td>
<td>1.19</td>
<td></td>
</tr>
<tr>
<td>Creatinine ≥ 2.5 mg/dL</td>
<td>5.5</td>
<td>0.111</td>
<td>0.385</td>
<td>1.12</td>
<td>0.53–2.38</td>
</tr>
<tr>
<td>Hematocrit &lt; 30%</td>
<td>8.6</td>
<td>0.620</td>
<td>0.281</td>
<td>1.86</td>
<td>1.07–3.23</td>
</tr>
<tr>
<td>Major psychiatric disorders</td>
<td>8.1</td>
<td>0.622</td>
<td>0.385</td>
<td>1.86</td>
<td></td>
</tr>
<tr>
<td>Median income ≤ $43,000</td>
<td>25.2</td>
<td>0.608</td>
<td>0.210</td>
<td>1.84</td>
<td></td>
</tr>
<tr>
<td>≥ 3 previous admissions</td>
<td>25</td>
<td>0.608</td>
<td>0.210</td>
<td>1.84</td>
<td></td>
</tr>
</tbody>
</table>

Marital status

<table>
<thead>
<tr>
<th>Percent</th>
<th>Coefficient</th>
<th>Standard Error</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single (reference)</td>
<td>9.5</td>
<td>-0.329</td>
<td>0.320</td>
<td>0.72</td>
<td>.30</td>
</tr>
<tr>
<td>Married</td>
<td>33.8</td>
<td>-0.706</td>
<td>0.415</td>
<td>0.49</td>
<td>.09</td>
</tr>
<tr>
<td>Divorced</td>
<td>14.9</td>
<td>-0.152</td>
<td>0.322</td>
<td>0.86</td>
<td>.64</td>
</tr>
<tr>
<td>Widowed</td>
<td>39.9</td>
<td>1.123</td>
<td>0.590</td>
<td>3.07</td>
<td>.24</td>
</tr>
<tr>
<td>Separated</td>
<td>2.0</td>
<td>0.481</td>
<td>0.225</td>
<td>1.62</td>
<td>1.04–2.52</td>
</tr>
<tr>
<td>Anxiety/depression</td>
<td>2.0</td>
<td>0.481</td>
<td>0.225</td>
<td>1.62</td>
<td>1.04–2.52</td>
</tr>
<tr>
<td>Constant</td>
<td>-2.976</td>
<td>0.426</td>
<td>0.05</td>
<td>&lt; .001</td>
<td></td>
</tr>
</tbody>
</table>

Source: Respir Care 2014;59(2): 199-208
Depression is a Target to Reduce Readmission Risk . . . . . . In COPD

- COPD patients with HADS-D scores greater than 10 incur a **72% increased risk of hospitalization within 12 months**
- COPD patient with HADS-A scores of greater than 10 incur a **63% increased risk of hospitalization within 12 months**

*Source: Am J Respir Crit Care Med 2008;178:913-920*
Depression increases hospital length of stay in COPD patients

Source: Arch Intern Med 2007;167:60-67
Depression increases post-discharge mortality in COPD patients

Source: Chest 2002; 121:1441-1448
Depression is a Target to Reduce Readmission Risk . . . . . In Acute MI

Source: Circ Cardiovasc Qual Outcomes 2011;4:626-633
Depressed patients have increased levels of cytokines during CHF exacerbations relative to controls:
- Interleukin-6
- TNF-alpha

PHQ-9 score of 10 or greater is associated with increased 30-day readmission rates in CHF patients (50% vs 26%)

Source: Amer Heart J 2005;150(1): 132-6
Psychosomatics 2014; 55:45-50
Depression is *more strongly associated* with adverse cardiac outcomes than *age, gender, diabetes, and hypertension*.

*For every one-point increase from baseline PHQ-9 score, risk of cardiac readmission increases by nine percent.*

*Source: Journal of Psychosomatic Research 2013;75:409-413*
Am I addressing this at my home institution?

Should I be addressing this at my home institution?

HOW CAN I POSSIBLY TACKLE THIS AT MY HOME INSTITUTION?
Cardiovascular Symptoms are Strongly Correlated with Emotional Distress

<table>
<thead>
<tr>
<th></th>
<th>Presyncope</th>
<th>Angina</th>
<th>Palpitations</th>
<th>Dyspnea</th>
<th>Fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Depression</strong></td>
<td>0.176*</td>
<td>0.156*</td>
<td>0.249**</td>
<td>0.257**</td>
<td>NA</td>
</tr>
<tr>
<td><strong>Somatization</strong></td>
<td>NA</td>
<td>NA</td>
<td>0.565***</td>
<td>NA</td>
<td>0.604***</td>
</tr>
<tr>
<td><strong>Obsessive-Compulsiveness</strong></td>
<td>0.320***</td>
<td>0.289***</td>
<td>0.428***</td>
<td>0.287**</td>
<td>0.473***</td>
</tr>
<tr>
<td><strong>Interpersonal Sensitivity</strong></td>
<td>0.162*</td>
<td>0.187*</td>
<td>0.339***</td>
<td>0.232**</td>
<td>0.364***</td>
</tr>
<tr>
<td><strong>Anxiety</strong></td>
<td>0.303***</td>
<td>0.330***</td>
<td>NA</td>
<td>0.328***</td>
<td>0.425***</td>
</tr>
<tr>
<td><strong>Hostility</strong></td>
<td>0.261**</td>
<td>0.269**</td>
<td>0.275**</td>
<td>0.234**</td>
<td>0.354***</td>
</tr>
<tr>
<td><strong>Phobic Anxiety</strong></td>
<td>0.287***</td>
<td>0.205*</td>
<td>0.426***</td>
<td>0.248**</td>
<td>0.355***</td>
</tr>
<tr>
<td><strong>Paranoia</strong></td>
<td>0.056</td>
<td>0.145</td>
<td>0.298***</td>
<td>0.148</td>
<td>0.285**</td>
</tr>
</tbody>
</table>

*p<0.05; **p<0.01; ***p<0.001

Source: Psychosomatics 2008;49:230-234
Interventions in the Inpatient Setting: Proactive Psychiatric Consultation

• Patients with psychiatric comorbidity have longer lengths of stay and higher risk of readmission:
  
  – Psychiatric consultation in the general hospital is generally delayed to the end of the inpatient stay for:
    • Women
    • Surgical patients
    • Consultations for depression

    -- Consultation requests arrive too late to be maximally useful

Source: Psychosomatics 2004; 45:470-476
Interventions in the Inpatient Setting: Collaborative Care

- **Management of Sadness and Anxiety in Cardiology Randomized Controlled Trial (JAMA Intern Med 2014):**
  - 24-week collaborative care intervention for patients admitted with acute cardiac illness:
    - Targets: depression, panic disorder, generalized anxiety disorder:
      - HADS-A > 8; PHQ-9 > 10
    - All patients were admitted for a **primary diagnosis of ACS, CHF, or cardiac arrhythmia**

MOSAIC: Design and Implementation

• Intervention Group:

  – Care manager met with patient while inpatient:
    • Provided psychoeducation about depression and anxiety disorders
    • Reviewed treatment recommendations with patient after discussion with consulting psychiatrist
    • Reviewed first portion of a manualized CBT workbook with patient while hospitalized

  – Care manager contacted treating physicians in BOTH inpatient and outpatient setting with recommended plan of care

MOSAIC: Design and Implementation

- SSRI’s considered first-line pharmacotherapy:
  - Sertraline or citalopram
  - Buspirone offered for GAD patients not wanting to receive SSRI treatment
- **15-30 minute follow-up’s** performed by care manager via telephone post-discharge:
  - Initial follow-up within two weeks
  - Remaining follow-up’s dependent on treatment plan:
    - CBT done by phone
    - Medications titrated until response was achieved

MOSAIC: Design and Implementation

• Comparator group: “Enhanced care”
  – For all anxious and depressed patients, psychiatrist recommended adjustments to treatments until clinical response was achieved

MOSAIC: Outcome Measures

• Primary Outcomes:
  – In-Hospital Adequate Mental Health Treatment at Discharge:
    • Rx for a standard dose of an established first-line treatment for a given condition
    • Referral to evidence-based psychotherapy provider
  – Mental HRQoL:
    • Measured at 24 weeks by SF-12 Mental Component Score

Collaborative care participants had:

- significantly greater improvements in HRQoL scores
- Greater likelihood of attaining adequate mental health treatments by time of discharge
- Significantly greater improvements in PHQ-9

MOSAIC: Results

• No significant differences in cardiac readmission rates at six months follow-up
• No significant differences in time to cardiac readmission over six months

Summary and Conclusions

• Psychiatric comorbidity significantly contributes to length of stay and readmission risk for the inpatient setting:
  – Readmission prediction models should account for burden of psychiatric disease:
    • Are other scales better-suited for this purpose? (INTERMED)

• Depression is a viable target for interventions aimed at decreasing readmission and reducing length of stay:
  – Other targets: anxiety, chronic pain, substance abuse

• Collaborative care interventions delivered in the inpatient setting effectively treat clinical inertia

• We need collaborative care interventions that join inpatient and outpatient efforts