Beyond the limits of predictive models: responding to patients’ self-identification of residual readmission risk

Ferries E, Barreto T, Blasch R, Hall B
Healthcare Economics, Humana Inc., Louisville, KY

Abstract
Predictive models can identify patients with higher risk of hospital readmission who could benefit most from a targeted post-discharge intervention. However, patients not identified for intervention may have additional healthcare needs and an elevated risk of readmission. This 2014 claims review demonstrated that low-risk patients with a low risk of readmission and Medicare coverage, who requested a post-discharge follow-up call, were simultaneously self-identifying readmission risk that was not identified by predictive modeling. Of the 7,074 patients with low-risk who were successfully contacted post-discharge, those requesting additional clinical follow up had higher readmission rates compared with those requesting no follow up. Patients receiving a follow-up call had fewer readmissions compared to matched controls without follow up.

Background
Efforts to reduce readmissions often involve intensive resource management. Post-discharge telephonic surveys administered by a nurse/clinician can effectively reduce hospital readmissions but can be costly. Data show that patients identified as low-risk (predictive model risk score <152) are less likely to benefit from these surveys. Using voice activated technology (VAT) to contact patients with low-risk of readmission after hospital discharge is an efficient option for assessing patient needs and potential readmission risk. The objective of this study was to evaluate the ability of patients to self-identify readmission risk and to evaluate the impact of a post-discharge VAT call on readmission rates and healthcare utilization.

Methods
Study Design: Propensity-score matched case-control study
Data Source: Administrative medical, pharmacy and enrollment data for individuals with Medicare coverage from Humana Inc., a health and well-being company providing insurance for 13.8 million individuals across the United States (2014).
Study Period: January 1 to December 31, 2014
Inclusion and Exclusion Criteria:
- Patients discharged to home or a home health program after an acute hospital admission were studied
- A VAT call was made to patients after hospital discharge to ask if they wanted a follow-up call from a clinician
- Post-discharge follow-up calls were conducted via phone by a Humana clinician
- Patients who were readmitted before receiving the VAT call and those with hospice or other long-term care were excluded
Participants: Patients who completed the post-discharge VAT call
Controls: Patients who were called but did not answer or could not be reached, matched to participants based on PM risk scores

Outcome Measures:
- Readmission rates
- Total study population
- Those requesting follow up
- Healthcare utilization (ER visits, PCP visits, non-PCP visits), measured as event/1000 individuals
- Student’s t-tests were used to assess differences in utilization between participant and controls.

Results

Table 1. Population Demographics

<table>
<thead>
<tr>
<th>Measure</th>
<th>Participants (n=7,074)</th>
<th>Controls (n=7,074)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean ± SD</td>
<td>70.9</td>
<td>70.7</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3,128 (44.2)</td>
<td>3,353 (47.4)</td>
</tr>
<tr>
<td>Female</td>
<td>3,946 (55.8)</td>
<td>3,721 (52.6)</td>
</tr>
<tr>
<td>PM score, mean ± SD</td>
<td>145.5 (± 4.9)</td>
<td>145.5 (± 10.1)</td>
</tr>
<tr>
<td>CMS risk score*, mean ± SD</td>
<td>0.65 (± 0.51)</td>
<td>0.65 (± 0.78)</td>
</tr>
<tr>
<td>Index admission from ED, n (%)</td>
<td>1,485 (21.0)</td>
<td>1,485 (21.0)</td>
</tr>
</tbody>
</table>

CMS, Centers for Medicare and Medicaid; ED, emergency department; PM, predictive model
*CMS risk score is a risk-adjusted predictive score calculated based on factors such as age, gender, diagnosis.

Table 2. Healthcare Utilization, 30 days Post-Discharge

<table>
<thead>
<tr>
<th>Outcomes per 1000 individuals</th>
<th>Participants</th>
<th>Controls</th>
<th>Difference</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Readmissions</td>
<td>532.6</td>
<td>758.3</td>
<td>225.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>ED visits</td>
<td>972.0</td>
<td>1,116.2</td>
<td>144.2</td>
<td>0.33</td>
</tr>
<tr>
<td>PCP visits</td>
<td>4,761.7</td>
<td>4,140.8</td>
<td>-620.9</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Non-PCP visits</td>
<td>8,039.0</td>
<td>9,231.6</td>
<td>1,192.6</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

Table 2. Healthcare Utilization, 30 days Post-Discharge

Discussion
- For low-risk populations (risk score <152), post-discharge VAT calls offering additional follow up provides an effective and efficient intervention.
- Patients identified as low-risk by the predictive model were able to self-identify residual readmission risk by requesting direct clinical follow up.
- Some bias may remain since the specific reason propensity score matched controls did not complete the VAT call is unknown. In addition, propensity-score matching only controls for measured confounders, and differences due to unmeasured confounders may remain.
- These data suggest that telephonic clinical contacts can reduce the risk of readmission.

Figure 1. Overall Readmission Rates

Patients who completed a VAT call experienced lower hospital readmission rates across all timeframes analyzed.

Figure 2. Readmission Rates Among Patients Requesting Follow Up

Patients requesting follow up had higher readmission rates 30 days post-discharge compared to those requesting no follow up.

References