“Using Clinically-Enhanced Claims Data to Guide Treatment of Acute Heart Failure”
An AHRQ Grant to MHA

Background & Research Design

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Overarching Goals

• Improve the scope and quality of the Minnesota hospital discharge database
• Evaluate the practicality of studying comparative effectiveness of alternative drug therapies using clinically-enhanced hospital claims data
• Determine the comparative effectiveness of alternative drug therapies for patients hospitalized for acute decompensated heart failure
• Recommend alterations in current practices to improve clinical outcomes for patients hospitalized for acute decompensated heart failure
Minnesota’s Hospital Discharge Database

- Standard hospital claims data
  - Patient demographic data
  - Principal and secondary diagnosis codes
  - Inpatient procedures
- Full implementation of Present-on- Admission codes
  - Screens for accuracy of coding
  - Use in measuring risk-adjusted clinical outcomes
- Previous pilot adds numerical laboratory test results
- Proposed addition of a limited set of pharmacy data
Screens for Accuracy of POA Coding

• Fifteen individual screens
  – Three general screens
  – Four screens for high-risk acute medical admissions
  – Four screens for elective surgical cases
  – Four screens for obstetrical cases

• Aggregate scores characterize overall performance
  – Very good to excellent - >90%
  – Satisfactory – >80% to 90%
  – Marginal - <70% to 80%
  – Unsatisfactory - ≤70%
Distribution of Hospital POA Scores
Screening and Improving POA Coding

POA Screening

Intervention in Process

Plan for Improvement

Performance Evaluation

Process Analysis

Identification of Opportunities for Improvement

Process Analysis

Identification of Opportunities for Improvement

Plan for Improvement

Intervention in Process

POA Screening
Databases for Outcomes Assessment

- Clinical Data
  - Other Clinical Data
  - Vital Signs
  - Numerical Laboratory
  - Present-on-Admission

- Enhanced Claims Data
  - Standard Claims

- Clinically-Enhanced Claims Data
Risk-adjusted Hospital Mortality

Measured Performance

- Good
- Average
- Poor

-2 Std Dev
+2 Std Dev

MORTALITY IN PERCENT

0% 2% 4% 6% 8%

Hospital A
Hospital B
Hospital C

>2.0 Std Dev
>1.0 Std Dev
>0.5 Std Dev
Pred (hybrid)
Obs
Bias from Suboptimal Data

Systematic Error

<table>
<thead>
<tr>
<th>Problematic</th>
<th>OK</th>
<th>Problematic</th>
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<tbody>
<tr>
<td>- 0.5 Std Dev</td>
<td>+0.5 Std Dev</td>
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PREDICTED MORTALITY IN PERCENT

- Hospital A
- Hospital B
- Hospital C

Legend:
- >2.0 Std Dev
- >1.0 Std Dev
- >0.5 Std Dev
- Pred (hybrid)
- Obs
Measured Hospital-level Bias

Percent Exceeding Upper Threshold vs. Upper Threshold for Bias in Standard Deviations

- RAW
- CLAIMS
+ POA
+ LAB

0% 10% 20% 30% 40% 50% 60% 70%
0.5 1.0 1.5 2.0
Measures of Inpatient Complications

• Reported events (e.g., surgical wound infection)
  – are clinically meaningful
  – are subject to reporting biases

• Objective surrogates (e.g., prolonged hospitalization)
  – are more difficult to interpret
  – are less subject to reporting bias

• Combined measures (e.g., coded complication with prolonged risk-adjusted length of stay)
Complications & Long Post-op LOS

- High-Risk (>4% †) 50%
- Moderate-Risk (2-4% †) 20%
- Low-Risk (<2% †) 10%
- None 0%

Type of Complication

% with Long Post-op LOS
Long Post-op LOS & Complications

- **Good Agreement**: 55%
- **Poor Agreement**: 35%
- **Hospitals Agreement**: 40%
- **Complete Disagreement**: 10%

<table>
<thead>
<tr>
<th>Category</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Coded Compl = Long LOS</td>
<td>55%</td>
</tr>
<tr>
<td>Coded Compl Outlier; Long LOS Average</td>
<td>30%</td>
</tr>
<tr>
<td>Coded Compl Average; Long LOS Outlier</td>
<td>15%</td>
</tr>
<tr>
<td>Both Outliers with 1 High &amp; 1 Low (color = long LOS)</td>
<td>0%</td>
</tr>
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</table>

Legend:
- High Outlier
- Low Outlier
- Average
Risk-adjustment & Mortality

- **Good Agreement**
  - Raw = Clin
  - Raw Outlier; Clin Average
  - Raw Average; Clin Outlier
  - Both Outliers with 1 High & 1 Low (color = Raw)

- **Poor Agreement**

- **Complete Disagreement**

Legend:
- Red: High Outlier
- Green: Low Outlier
- Blue: Average
Laboratory Results & Clinical Outcomes

% Change in Test Result

WBC
Na-120
K-2
Hgb-5
BUN

Alive, Routine LOS
Alive, Long LOS
Dead
External and Internal Monitoring

**External Monitoring**
- Assesses Performance
- Provider Selection
- Accountability
- Payment Reform
- Strategic Planning
- Marketing

**Internal Monitoring**
- Links Processes to Outcomes
- Quality Control
- Quality Improvement
- Cost Management
Databases for Process Assessment

Idiosyncratic

ChargeMaster
(All Billable Services)

Pharmacy
(Drugs)

Standard Claims
(Major Procedures)

Data Specifications

Standardized

Clinically-Enhanced Claims Data
Research Design

• Characterize intrinsic patient & disease characteristics
  – Initial drug therapy for nature of heart failure
  – Risk-adjustment for outcomes of interest
  – Propensity analyses for treatments of interest

• Characterize treatment protocols

• Evaluate alternative treatment protocols
  – Timing of drug administration indicates response to therapy
  – Clinically-enhanced claims data support analyses
Carpe Diem!