Identification of Potential Care Management Savings Using Chronic and Acute Impact Indices

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Patent pending for Acute and Chronic Impact Indices
AGENDA

- Problem /Solution /Methodology
- Health Cost Components
- Evidence Based Guideline Gaps
- ROI Methods
- Chronic Impact Index
- Acute Impact Index
Problem

- Problem
  - Identifying members for Care Management
- Create solution for Care Management that
  - Identifies Impactable Members
  - Easy to Rank/prioritize members
  - Forecast Resources separately
  - Provides followup actions
  - Integrates Members information
  - Integrates into CM workflow
  - Results in ROI
Solution

• High-risk Identification
  • Only Step 1
  • Catastrophic Members often not impactable

• Forecasting Inpatient Stays, ER visits, Rx$
  • Individualized action plans per member

• Forecasting Acute Care Cost
  • Identifies members with potential for high acute-cost

• Forecasting Savings
  • Identifies members with the greatest opportunity for chronic savings
  • Highest Impactability & ROI

• Implementing Forecast via Impact Index
  • Acute & Chronic Index
  • Easily Ranks Members

• Implement into Care Management tool
  • detailed Member Profiles & data mining integrated
Study Methodology - Overview

- **Acute Index**
  - Create Model to forecast acute-cost
- **Chronic Index**
  - Create Model to forecast Savings based on Yr2 Chronic Cost – Yr1 Chronic Cost
  - Evaluates members following guidelines vs those not
  - Applies weights to gaps & diseases in order to forecast savings opportunity
  - Forecasted Savings based on member’s
    - Disease
    - Severity
    - Compliance to evidence based guidelines
HEALTH COST COMPONENTS
Health Cost Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total $</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute $</td>
<td>Nonrepeatable $ - 20%</td>
<td></td>
</tr>
<tr>
<td>Chronic $</td>
<td>Repeatable $ - 80%</td>
<td></td>
</tr>
<tr>
<td>Misc Preventive$</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

• For 70% of members, the difference between Yr1 & Yr2 chronic cost is < $500
• 15% of members, hospitalized during Yr1 also Yr2;
• 27% of members with ER Yr1 also Yr2;
• 30% of members with IP/ER visits during Yr1 also Yr2
Health Cost Components

• Acute $
  • Inpatient Care
    • facility charges
    • professional services related to facility care
  • Emergency Room Services
  • Facility Based Outpatient Care
    • ambulance
    • ambulatory surgery
    • observation and treatment room charges
    • costly radiology and nuclear medicine
    • CT and MRIs
Health Cost Components

• Misc Preventive $
  • Non-routine preventive services
  • Immunizations - long immunity periods
    • Hepatitis vaccine / Tetanus booster
  • Sports insurance / Physicals / Drug testing
  • Antigen testing
    • Detecting hereditary cancer
  • Colonoscopy

• Chronic $
  • All $ besides acute and above preventive
Diseases and Guidelines
Diseases

Diseases In Current Chronic Impact Index

Diabetes
CAD
CHF
Hyperlipidemia
CVA/TIA
Asthma
COPD
Depression

Potential Diseases for future Chronic Impact Index

Preventative
Osteoporosis
Schizophrenia
HIV/AIDS
Rheumatoid Arthritis
Migraine
Multiple Sclerosis
Chronic Renal Failure
High Risk Pregnancy
Diabetes Guidelines

- Diabetes with eye exam
- Diabetes with HGBA1C testing
- Diabetes with microalbuminuria testing
- Diabetes with ACE inhibitor
- Diabetes with LDL testing
- Diabetes w/hypertension used appropriate Rx
- Diabetes missing multiple guidelines
CHF Guidelines

- CHF w/ hypertension & using appropriate Rx
- CHF with hypertension and received ECG
- CHF and received ACE, ARB or beta blockers
- CHF on digoxin and received a digoxin level
- Inpatient for CHF and received ECG
- CHF and received appropriate medications
- CHF with hypertension and received ACE/ARB
- CHF with diuretics and received a chemistry panel
- CHF with atrial Fib on coumadin
CVA/TIA Guidelines

• CVA with atrial fib on Coumadin
• CVA on coumadin or clot inhibitor
• CVA and received lipid lab testing
• CVA w/ hypertension & using appropriate Rx
• CVA on Coumadin and received a protime test
## GAPS - Statistics

<table>
<thead>
<tr>
<th>Disease</th>
<th>Count</th>
<th>%</th>
<th>Y1$</th>
<th>Y2$</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHF</td>
<td>4,498</td>
<td>0.5</td>
<td>9.45</td>
<td>6.54</td>
</tr>
<tr>
<td>CVA</td>
<td>3,625</td>
<td>0.4</td>
<td>8.00</td>
<td>4.89</td>
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<tr>
<td>CAD</td>
<td>19,334</td>
<td>2</td>
<td>5.82</td>
<td>4.05</td>
</tr>
<tr>
<td>COPD</td>
<td>13,225</td>
<td>2</td>
<td>4.79</td>
<td>3.76</td>
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<tr>
<td>Diabetes</td>
<td>41,111</td>
<td>5</td>
<td>3.38</td>
<td>3.15</td>
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<tr>
<td>Depression</td>
<td>27,544</td>
<td>3</td>
<td>2.89</td>
<td>2.54</td>
</tr>
<tr>
<td>Asthma</td>
<td>28,777</td>
<td>3</td>
<td>2.58</td>
<td>2.25</td>
</tr>
<tr>
<td>HyperLipidemia</td>
<td>126,846</td>
<td>14</td>
<td>2.45</td>
<td>2.29</td>
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<tr>
<td><strong>Total Diseases</strong></td>
<td><strong>183,128</strong></td>
<td><strong>20</strong></td>
<td><strong>2.49</strong></td>
<td><strong>2.28</strong></td>
</tr>
<tr>
<td>Gaps=0 compliant</td>
<td>63,933</td>
<td>7</td>
<td>2.26</td>
<td>2.13</td>
</tr>
<tr>
<td>Gaps&gt;0 noncompliant</td>
<td>119,234</td>
<td>13</td>
<td>2.61</td>
<td>2.35</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>892,577</strong></td>
<td><strong>100%</strong></td>
<td><strong>$2,282</strong></td>
<td><strong>$2,616</strong></td>
</tr>
</tbody>
</table>
Disease Management
ROI Methodologies
Calculation of Cost Savings - ROI

- Choosing Disease Management programs based on ROI
- Two Calculation Approaches
  - Direct Approach
    Total cost for disease-specific member
  - Indirect Approach
    Utilization measures like admits, ER visits, procedures
ROI Methods

• Pretest–posttest design
  • before & after DM implementation
  • most common method
  • no control group for outcome comparisons
  • several sources of bias
  • competing extraneous confounding factors
  • difficult to conclude difference due to program intervention

• Randomized Control Trial
  • ideal for overcoming above issues
  • not practical
    • DM already underway
    • time and effort
    • control group ethical/legal considerations
ROI Methods

• Comparison Study vs Control Group
  • reliable
  • control & study group may be reasonably similar, but not identical/randomized-selection as in randomized control

• Propensity Score
  • Study/managed group vs control/non-managed group
    • with differences on their covariates
    • leads to biased estimates of cost savings
  • Propensity Score - the conditional probability of being managed given the covariates
    • Used to balance covariates in the two groups & reduce bias
    • To create this balancing PS uses:
      matching, stratification, regression adjustment or combination
ROI Methods

Predictive Model Adjustment – MEDai’s approach

• Instead of comparing 2 groups
• Build predictive model that accounts for differences between them
• Control group data used to develop model that calculates expected-costs for study group
• Predictive model avoids differences between both groups.
• Predictive model blind to differences because
  • We build expected costs model using the control group and apply it on the study group

Savings for study group = Actual$ - Expected$
Predictive Model
Approach –
Chronic Impact Index
Predictive Model – Chronic Impact Index

- **Problem:**
  - 8 diseases with 42 gaps
  - decision support system that identifies compliance to guidelines using
    - Medical/ Rx claims/ lab results
  - Create model to calculate
    - member-level savings for any combination of gaps and diseases.
  - **Savings based on:**
    - gap disease(s)
    - gaps’ count
    - severity of the member’s health status
    - demographics (sex, age)
Predictive Model – Chronic Impact Index

- **Dependent Variable – Chronic Savings**

- **-1**
  - Does not have one of the chronic diseases/conditions
  - Indicates NA

- **0$**
  - No savings opportunity
  - Has disease but is following all recommended guidelines

- **>0$**
  - Has savings opportunities
  - Patients with one of the chronic diseases
  - Not following guidelines
  - Patients with catastrophic disease or outlier-cost are weighted down
• No strict separation of members into study vs control
  • Diabetic Member
  • Compliant with guidelines 3 thru 7
    • part of the control group
  • Noncompliant with guidelines 1&2
    • part of the study group for calculation of the cost savings for guidelines 1&2
• Members participated in different DM programs. Therefore we have to reduce the bias at the individual level, not only at group level
Predictive Model – Chronic Impact Index

• To create generalizable model across 8 diseases:
  • Requires many disease/gap combinations
  • Large number of members with gaps and without gaps

• Working Hypothesis:
  • The 8 diseases/gaps have different influences on cost components according to forecast period
    • Short Forecast Period (1-2 yrs)
      Gaps main influence are on chronic cost
    • Longer forecast (4+ yrs)
      Gaps lead to more severe diseases / much higher cost - acute cost
Chronic Impact Index – The Model

Overall Study Group Savings =
  • Actual$ - Expected$
  • Future Actual Chronic$
    • is not only the result of guideline compliance
    • Other factors
    • therefore can’t use Chronic$ of non-compliant members but instead must smooth this cost to avoid uncertainty/bias thru modeling
  • Model should use
    • expected Cost if member 100% compliant
    • gap diseases/gaps/Chronic$/demographics if pt noncompliant

Individual Savings =
  • Expected$(non-compliant) - Expected$(compliant)
Chronic Impact Index – Data

• Data
  • 2 years claims data
    • 671,513 members at least one disease
      • Compliant Members - 210,472
      • Non compliant - 461,041
    Randomly Split into two datasets A&B
  • Many cost savings studies use only a few hundred - few thousands members (max <50k)

• Training Set
  • Compliant Member Dataset
  • Noncompliant dataset A

• Validation Set
  • Noncompliant dataset B
Chronic Impact Index – Modeling Steps

• **Step 1**
  - Use Compliant Member dataset to develop model to calculate Compliant-Expected-Chronic$
  - non-linear model many clusters
  - interactions/transformations of the predictors
  - mini-models for more than 18 different body systems

• **Step 2**
  - Apply Step 1 model on Noncompliant members Data Set A to calculate their Compliant-Expected-Chronic$
    as if they had no gaps
Chronic Impact Index – Modeling Steps

• **Step 3**
  - Use NonCompliant Dataset A to develop model to calculate NonCompliant-Expected-Chronic$
  - Basically adjust Compliant-Expected-Chronic$ for the non-compliant members using predictors that describe gaps/diseases/severity

• **Step 4:**
  - Apply Step 3 model on NonCompliant Dataset B Validation Set

• **Individual Savings =**
  
  Non-CompliantExpectedChronic$ - CompliantExpectedChronic$
Chronic Impact Index – Modeling Steps

• Step 5: Adjustment based on
  • Catastrophic disease presence
  • Severity according to year 1 chronic cost

• Parameters
  • Catastrophic & chronic year 1 \( \geq \$25k \)
  • Catastrophic & chronic year 1 $5-$25k
  • No catastrophic but chronic year 1 \( \geq \$50k \)
  • No catastrophic but chronic year 1 $35-50k
### Chronic Impact Index – Formulate the Index

- **Create Easy to use Index**
  - Convert $ Savings to percentile ranking
  - Percentile Ranges:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Does not have one of the 8 diseases Indicates NA</td>
</tr>
<tr>
<td>10</td>
<td>No savings opportunity</td>
</tr>
<tr>
<td>70-100</td>
<td>Has savings opportunities</td>
</tr>
</tbody>
</table>

- Patients with one of the chronic diseases
- Not following guidelines
- Range typically around 70-100 but can be 66-100 or 93-100 etc. depending on your plan’s percentage of noncompliant patients.
Results – from Chronic Impact Model
### Results

- **Validation set**
  - **Truncation - $50k**
  - **Forecasting Year2 Chronic $**

<table>
<thead>
<tr>
<th>Model</th>
<th>Corr</th>
<th>R2</th>
<th>Sn(10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic1$</td>
<td>.611</td>
<td>.301</td>
<td>50.16%</td>
</tr>
<tr>
<td>CompliantChronic$</td>
<td>.643</td>
<td>.407</td>
<td>53.34%</td>
</tr>
<tr>
<td>Non-CompliantChronic$</td>
<td>.644</td>
<td>.414</td>
<td>53.76%</td>
</tr>
</tbody>
</table>
### Results

<table>
<thead>
<tr>
<th>Gaps</th>
<th>Count</th>
<th>Chr1$</th>
<th>Chronic Savings$</th>
<th>Guidelines</th>
<th>Diseases</th>
<th>Claims#</th>
<th>Body System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>114102</td>
<td>1851</td>
<td>214</td>
<td>1.58</td>
<td>1.08</td>
<td>15.50</td>
<td>5.04</td>
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<tr>
<td>2</td>
<td>84243</td>
<td>1977</td>
<td>270</td>
<td>1.45</td>
<td>1.19</td>
<td>16.17</td>
<td>4.99</td>
</tr>
<tr>
<td>3</td>
<td>63171</td>
<td>2076</td>
<td>282</td>
<td>1.83</td>
<td>1.34</td>
<td>17.38</td>
<td>4.91</td>
</tr>
<tr>
<td>4</td>
<td>33626</td>
<td>2745</td>
<td>374</td>
<td>2.57</td>
<td>1.61</td>
<td>20.70</td>
<td>5.50</td>
</tr>
<tr>
<td>5</td>
<td>26962</td>
<td>2664</td>
<td>429</td>
<td>1.88</td>
<td>1.64</td>
<td>19.46</td>
<td>5.18</td>
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<tr>
<td>6</td>
<td>11865</td>
<td>3201</td>
<td>426</td>
<td>2.69</td>
<td>2.12</td>
<td>24.79</td>
<td>6.06</td>
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<tr>
<td>7</td>
<td>7315</td>
<td>3352</td>
<td>435</td>
<td>2.81</td>
<td>2.41</td>
<td>27.92</td>
<td>6.32</td>
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<tr>
<td>8</td>
<td>3856</td>
<td>4003</td>
<td>438</td>
<td>3.26</td>
<td>2.67</td>
<td>32.89</td>
<td>6.85</td>
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<tr>
<td>9</td>
<td>2158</td>
<td>4399</td>
<td>441</td>
<td>3.93</td>
<td>3.07</td>
<td>39.45</td>
<td>7.40</td>
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<tr>
<td>10</td>
<td>3438</td>
<td>4621</td>
<td>464</td>
<td>3.53</td>
<td>3.35</td>
<td>46.48</td>
<td>7.72</td>
</tr>
<tr>
<td>Total</td>
<td>350,736</td>
<td>2213</td>
<td>289</td>
<td>1.83</td>
<td>1.36</td>
<td>18.02</td>
<td>5.18</td>
</tr>
</tbody>
</table>
**Chronic Impact Index:**

- Higher potential savings when you can close the gap on patients with numerous noncompliant guidelines.
- Weights vary among diseases & guidelines.
- Catastrophic conditions show less savings potential

![Chronic Impact Index Graph]

- **NonCatastrophic Conditions**
- **Catastrophic Conditions**
Results

Potential savings generally increases with noncompliance

\%

\text{Gaps} = 100 \times \frac{\text{Gaps}}{\text{Gaps} + \text{Guidelines}}
More opportunity for savings with less severe chronic patients
Results

Gaps Count - 93,094 Diabetic Members with Chronic1$ <= $10,000

Savings increase with noncompliance until Rx uncontrolled
Results

Diabetes Gaps

Chronic Savings $ vs. Percentile of Chronic1$ (by 5%)

- Diabetes With Microalbuminuria Testing
- Diabetes With HGBA1C Testing
- Diabetes With Eye Exam


Results

Asthma gaps

Asthma and received primary treatment medications
Asthma and received inhaled steroid
Asthma and received PFT's
Chronic Impact Index - Summary

• Identifies members producing highest level of future savings by adherence to guidelines
• Members Ranked using Chronic Impact Index
• Implement via Care Management application
  • Integrated Member Profiles
  • Diagnosis / RX / Lab History
  • Risk Driver Profile
  • Guideline Compliance Profile
• Data mining capability
• Employer Reporting
• Physician Profiles
Acute Impact Index
Acute Impact Index

- Ranks individuals by opportunity to avoid high cost acute care
- Reflects IP and ER component of overall prediction
- Score of 97 or greater identifies patients with greatest potential for controlling cost

Calculation

- Each Member receives Forecasted ER Visits / Inpatient LOS
- Normalized to Dollars
- Creating a forecasted Acute Care Cost
- Cost Ranked Ascending
- Then Transformed to Percentile 1-100

- Acute Index used for care management ranking
  - 0–79.99 – Members in the 0-95% of forecasted acute events
  - 80-100 – Members in the top 5% of forecasted acute events
Models used for creating Acute Index

- Models for predicting
  - Inpatient LOS (Yr2)
  - ER Visits (Yr2)
- Models built on
  - 2 yrs medical & Rx claims
  - From repository of 14 million lives
- Independent Variables
  - Yr1 - Diagnoses/Comorbidities/Drugs/Visits…
- Non-linear models
  - interactions/transformations of the predictors
  - mini-models for more than 18 different body systems
- Statistical procedures used
  - decision trees /nonlinear regressions/nearest neighbors
  - spline estimators
New Prediction – Acute Cost

- Care Management reduction of IP and ER visits create substantial cost reduction

- Potential savings are typical for IP/ER events

- We decided to predict simultaneously both of them, creating a model for Acute Cost. Such an approach has its pros and cons, however it is innovative and summarizing all acute dollars
Acute Models – Model Decision Tree

- **Commercial**
  - **Non-Users**
    - **2< Age <64**
    - **Age < 64**

- **Medicare**
  - **Users**
    - **Not in union of costly diseases**
      - **Diagnosis Count > 100**
        - **Non-dialysis Non-cancer**
          - **Diagnosis Count < 100**
            - **Cancer**
            - **Dialysis**

**Model Decision Tree**

- **Babies (Age <2)**
- **Male Members – Spline Function (Age)**
- **Female Members – Spline Function (Age)**
- **Model**

**Model**

- **Neural Severity** = Nearest Neighbor Model (ALS, Other Neuron Dis., Brain Abscess, GuillBarre, Encephalitis…)

**Linear Regression**

- Age, Gender, Year 1 Cost, Rx Count, # co-morbidities, “Neural Severity “mini-model), interaction
<table>
<thead>
<tr>
<th>Cluster</th>
<th>Count</th>
<th>Actual</th>
<th>Predicted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Non-HMO Non-Users</td>
<td>279,859</td>
<td>423</td>
<td>444</td>
</tr>
<tr>
<td>Medicaid Non-Users</td>
<td>92,715</td>
<td>603</td>
<td>622</td>
</tr>
<tr>
<td>Baby &amp; EC</td>
<td>13,351</td>
<td>1,981</td>
<td>2,001</td>
</tr>
<tr>
<td>Baby &amp; No EC</td>
<td>16,992</td>
<td>1,165</td>
<td>1,073</td>
</tr>
<tr>
<td>DiagCnt=0 &amp; Chronic$ &lt;$120</td>
<td>27,592</td>
<td>822</td>
<td>778</td>
</tr>
<tr>
<td>DiagCnt=0 &amp; Chronic$ ≥$120</td>
<td>26,387</td>
<td>2,003</td>
<td>1,906</td>
</tr>
<tr>
<td>Medicaid, No Drugs, EC, CM &lt;4</td>
<td>26,829</td>
<td>1,143</td>
<td>1,148</td>
</tr>
<tr>
<td>Medicaid, No Drugs, EC, CM ≥4</td>
<td>21,190</td>
<td>3,171</td>
<td>3,012</td>
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<tr>
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<td>42,144</td>
<td>619</td>
<td>603</td>
</tr>
<tr>
<td>Medicaid, No Drugs, No EC, CM ≥2</td>
<td>50,401</td>
<td>1,121</td>
<td>1,125</td>
</tr>
<tr>
<td>Medicaid, Drugs, EC, CM &lt;5</td>
<td>41,922</td>
<td>1,250</td>
<td>1,298</td>
</tr>
<tr>
<td>Medicaid, Drugs, EC, CM ≥5</td>
<td>69,957</td>
<td>3,235</td>
<td>3,305</td>
</tr>
<tr>
<td>Medicaid, Drugs, No EC, CM &gt;3</td>
<td>32,185</td>
<td>651</td>
<td>668</td>
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<tr>
<td>Medicaid, Drugs, No EC, CM ≥3</td>
<td>47,935</td>
<td>1,206</td>
<td>1,221</td>
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<td>Commercial, No Drugs, EC, CM &lt;3</td>
<td>36,680</td>
<td>1,122</td>
<td>1,142</td>
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<tr>
<td>Commercial, No Drugs, EC, CM ≥3</td>
<td>48,501</td>
<td>2,849</td>
<td>2,851</td>
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<tr>
<td>Commercial, No Drugs, No EC, CM &lt;2</td>
<td>65,151</td>
<td>769</td>
<td>768</td>
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<td>45,410</td>
<td>1,263</td>
<td>1,195</td>
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<td>127,084</td>
<td>2,531</td>
<td>2,477</td>
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<tr>
<td>Commercial, Drugs EC, CM ≥4</td>
<td>147,105</td>
<td>5,515</td>
<td>5,486</td>
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<td>Commercial, Drugs No EC, CM &lt;3</td>
<td>148,110</td>
<td>1,483</td>
<td>1,513</td>
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<tr>
<td>Commercial, Drugs No EC, CM ≥3</td>
<td>71,026</td>
<td>2,590</td>
<td>2,594</td>
</tr>
</tbody>
</table>
Results
Validation set: Commercial / 893k members

- **LOS**
  - Frequency = 3.83%
  - Truncation = 60 days

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Correlation</th>
<th>R2</th>
<th>Sensitivity (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>.281</td>
<td>.075</td>
<td>20.6%</td>
</tr>
<tr>
<td>Year1≥$500</td>
<td>.291</td>
<td>.081</td>
<td>21.8%</td>
</tr>
<tr>
<td>Year1≥$3,000</td>
<td>.320</td>
<td>.100</td>
<td>25.8%</td>
</tr>
</tbody>
</table>

- **Emergency Room Visits**
  - Frequency = 12%
  - Truncation = 15 visits

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Correlation</th>
<th>R2</th>
<th>Sensitivity (10%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>.380</td>
<td>.144</td>
<td>28.7%</td>
</tr>
<tr>
<td>Year1≥$500</td>
<td>.400</td>
<td>.160</td>
<td>23.9%</td>
</tr>
<tr>
<td>Year1≥$3,000</td>
<td>.471</td>
<td>.221</td>
<td>29.9%</td>
</tr>
</tbody>
</table>
## Results

### Inpatient Admissions

<table>
<thead>
<tr>
<th>Predictive Model</th>
<th>Accurate Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top0.5%</td>
</tr>
<tr>
<td>Acute Cost (new)</td>
<td>39.1%</td>
</tr>
<tr>
<td>Acute Impact Index</td>
<td>38.7%</td>
</tr>
<tr>
<td>LOS</td>
<td>38.3%</td>
</tr>
<tr>
<td>Total Cost</td>
<td>35.8%</td>
</tr>
<tr>
<td>Emergency Room Visits</td>
<td>29.3%</td>
</tr>
<tr>
<td>Total Members</td>
<td>4,463</td>
</tr>
</tbody>
</table>

*Green – the best result*  
*Yellow – the second best result*
# Results

## Emergency Room Visits

<table>
<thead>
<tr>
<th>Predictive Model</th>
<th>Accurate Prediction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top 0.5%</td>
</tr>
<tr>
<td>Emergency Room Visits</td>
<td>65.1%</td>
</tr>
<tr>
<td>Acute Cost (new)</td>
<td>41.0%</td>
</tr>
<tr>
<td>Acute Impact Index</td>
<td>38.6%</td>
</tr>
<tr>
<td>LOS</td>
<td>37.0%</td>
</tr>
<tr>
<td>Total Cost</td>
<td>35.4%</td>
</tr>
</tbody>
</table>

| Total members                     | 4,463     | 8,925  | 17,852 |

Green – the best result
Yellow – the second best result
# Results

## Acute Cost

<table>
<thead>
<tr>
<th>Predictive Model</th>
<th>Avg Actual Acute Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Top0.5%</td>
</tr>
<tr>
<td><strong>Acute Cost (new)</strong></td>
<td>$18,349</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>$16,466</td>
</tr>
<tr>
<td><strong>Acute Impact Index</strong></td>
<td>$16,391</td>
</tr>
<tr>
<td><strong>LOS</strong></td>
<td>$16,149</td>
</tr>
<tr>
<td><strong>Emergency Room Visits</strong></td>
<td>$10,524</td>
</tr>
</tbody>
</table>

| **Total members**                  | 4,463    | 8,925  | 17,852 |

**Potential savings over**

- **$4.2M**
- **$6.07M**
- **$4.7M**

*Green – best result / Yellow – second best*
Conclusions

- Problem
  - Identifying impactable members for Care Management

- Solution
  - Indexes very useful for identifying members in order to produce highest level of future savings & ROI
    - Chronic Impact Index
    - Acute Impact Index
      - New model for Prediction of Future Acute Cost

- Implemented
  - Into Care Management application
  - Detailed Member Profiles
  - Data mining integrated
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