Using Predictive Analytics to Build a World Class Healthcare System

Swati Abbott
CEO, Blue Health Intelligence

Doug Porter
SVP and CIO, Blue Cross/Blue Shield Association
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The Blue System

The Blue Cross and Blue Shield Association (BCBSA) protects our brand, preserves our market and serves our independent licensees.

1 in 3 Americans

39 independent companies

90% of hospitals & 80% of physicians

56 data centers & 100+ claims processing systems
Blue Investment in Healthcare Analytics

• A sampling of the analytics investment being made within the Blue system to inform healthcare:
  – Plan-to-Plan interoperability analytics in support of claims processing
  – Understanding the market
  – Shaping policy, regulatory environment
  – Consumerism
  – Provider innovations
  – Care Management & Services
  – National Accounts
  – Blue Health Intelligence (BHI) – today’s discussion, predictive analytics
BHI / NDW High-Level Architecture

BCBSA

- Data Service Bus (DSB)
  - Conformed historical Plan data
  - Partner data
  - Third party data

- National Data Warehouse (NDW)
  - Conformed Blue Plan data
  - Plan data submissions

BHI

- Customer Access
  - Plan-facing portal
  - Internet-facing portal

- Applications
  - BHI and partner studies
  - BHI analytical apps
  - Partner analytical apps

110M members, de-identified information

3.5B member months
Introducing Swati Abbott

• President and CEO of Blue Health Intelligence
BHI Overview

• Represents the largest health information database in the U.S.
  – Contains claim line level detail on more than 110 million lives
  – Reflects national coverage representing medical utilization in every U.S. ZIP code
  – Captures seven years of longitudinal claims experience

• Focus on Quality of data
  – Undergoes four levels of certification, including independent external actuarial review

• Enhanced and transformed data to facilitate analytics and predictive modeling

• Complies fully with HIPAA regulatory requirements
The State of Healthcare

• Healthcare Cost Rising
  – United States spends **more than twice** as much on each person for health care as most other industrialized countries. But it has fallen to last place among those countries in preventing deaths through use of timely and effective medical care.¹

• Healthcare Quality is not improving
  – The World Health Organization's ranking of the world's health systems places the United States at #37²

• Patient Safety clearly remains a concern

• Fragmentation continues to plague the system

**Spending on health**

**Average spending on health per capita ($US PPP*)**

- United States
- Germany
- Canada
- Netherlands
- France
- Australia
- United Kingdom

Where is the industry today?

- A disproportionate share of medical costs are incurred by chronic care patients.
- Limited resources requires effective allocation and management.
- Sufficient data exists but many players do not have the analytical tools to generate accurate, actionable insights.
- Providers do not have the infrastructure in place to become engaged in the care management process (i.e., identify their patients by disease state, utilize and comply with disease management guidelines).
Chronic care drives healthcare costs

Patients with chronic medical conditions account for:

- 76% of inpatient admissions\(^1\)
- 88% of prescription drug use\(^1\)
- 96% of home care visits\(^1\)
- 72% of physician visits\(^1\)

Population Contribution to Total Health Care Costs\(^2\)

- Membership: 45%
- Medical Costs: 27%
  - 95%
  - 4%
  - 1%

- Chronic Disease – 50-75% of US healthcare spend
- Chronic Diseases – 125mm Americans with at least 1 chronic disease, 45mm with >2 chronic conditions

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Prior Cost Identification Results

Members in Top 1% Current Year

- Percentage in top 1% prior year: 24.19%
- Percentage Not in top 1% prior year: 75.81%
So, what do we need?

*Predictive Modeling to Facilitate Quality Improvement & Contain Costs*

- Predict high-risk/high-impact members who are motivated in order to provide appropriate care
- Addresses Prevention & Wellness initiatives
- Promotes effective disease management initiatives
Impact of Diabetes

• Diabetes cost the country an estimated $194 billion in 2010\(^1\)

• If current trends continue:
  – More than half of all Americans will have diabetes or pre-diabetes by 2020\(^1\)
  – Diabetes will account for an estimated 10 percent of total healthcare\(^1\) spending, or almost $500 billion
  – Distribution of Diabetes healthcare expenditures is highly skewed to Acute Care\(^1\)

1. The United States of Diabetes: Challenges and Opportunities in the Decade Ahead Working Paper 5 November 2010
What do we really know about Joe?

- Is Joe at risk for future complications of his diabetes that could result in a hospitalization?
- Can we quantify his risk for the next 12-months?
- How does his risk compare to that of other persons with diabetes?
- What about Joe’s delivery system?
- What can Joe’s primary care physician do to reduce his risk?
- What can Joe do to reduce his risk?
- What can Joe’s Health Plan do?
Health Management – What would Joe, his physician & employers want to know?

- What is his risk of hospitalization?
  - Due to short-term complications of his Diabetes?
  - Due to long-term complications of his Diabetes?

- What factors put him at risk?

- What factors can we do something about to reduce his risk?

- How many “Joes” are out there?
What if we had a tool that told us about Joe?

• Joe is in the high-risk group relative to his peers for both short-term and long-term diabetic complications
  – He has a 26% chance of a hospitalization for any reason
  – He has a 24% chance of a diabetic hospitalization
  – He is in the top 5th percentile (relative to other individuals with diabetes) for risk of a diabetic hospitalization that AHRQ has defined as avoidable
  – The mean annual medical and pharmacy costs of peers in his risk group are in the $17,000 - $25,000 range

• Joe’s high risk of an avoidable diabetic complication is driven by modifiable factors, such as:
  – Lack of regular, evidence-based primary care such as he might get from a patient-centered medical home
  – Lack of compliance with diabetic drug therapy
  – Behaviors that seem to keep him from managing his diabetes well
**BHI models score sheets: Joe’s scored Risk Profile**

### Risk Scoring for Short-Term Complications

<table>
<thead>
<tr>
<th>Adding Up the Points by Category</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetic Phenotype</td>
<td>0</td>
</tr>
<tr>
<td>Sociodemographics</td>
<td>4</td>
</tr>
<tr>
<td>Co-Morbidities</td>
<td>2</td>
</tr>
<tr>
<td>Ambulatory Care</td>
<td>7</td>
</tr>
<tr>
<td>Diabetes Pharmacy Care</td>
<td>9</td>
</tr>
<tr>
<td>Emergent Care</td>
<td>3</td>
</tr>
<tr>
<td>Inpatient Care</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Risk Points</strong></td>
<td><strong>25</strong></td>
</tr>
</tbody>
</table>

**Risk Ranking** High

### Risk Scoring for Long-Term Complications

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<tr>
<td>Co-Morbidities</td>
<td>3</td>
</tr>
<tr>
<td>Ambulatory Care</td>
<td>5</td>
</tr>
<tr>
<td>Diabetes Pharmacy Care</td>
<td>8</td>
</tr>
<tr>
<td>Emergent Care</td>
<td>1</td>
</tr>
<tr>
<td>Inpatient Care</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total Risk Points</strong></td>
<td><strong>19</strong></td>
</tr>
</tbody>
</table>

**Risk Ranking** High

### Computed Risk for Short-Term Complications

<table>
<thead>
<tr>
<th>Risk Points</th>
<th>Joe’s Risk Profile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk Points</td>
<td>Risk Points: 14 - 49</td>
</tr>
<tr>
<td>Risk Category</td>
<td>High Risk</td>
</tr>
<tr>
<td>Risk Percentile Rank (vs. all diabetics)</td>
<td>95th - 99th</td>
</tr>
<tr>
<td>Predicted Risk of STC Hospitalization</td>
<td>2.19%</td>
</tr>
<tr>
<td>Predicted Risk of Diabetes Hospitalization</td>
<td>12.07%</td>
</tr>
<tr>
<td>Predicted Risk of Any Hospitalization</td>
<td>20.83%</td>
</tr>
</tbody>
</table>

### Computed Risk for Long-Term Complications

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<tr>
<td>Risk Points</td>
<td>Risk Points: 11 - 34</td>
</tr>
<tr>
<td>Risk Category</td>
<td>High Risk</td>
</tr>
<tr>
<td>Risk Percentile Rank (vs. all diabetics)</td>
<td>95th - 99th</td>
</tr>
<tr>
<td>Predicted Risk of LTC Hospitalization</td>
<td>2.67%</td>
</tr>
<tr>
<td>Predicted Risk of Diabetes Hospitalization</td>
<td>24.49%</td>
</tr>
<tr>
<td>Predicted Risk of Any Hospitalization</td>
<td>26.25%</td>
</tr>
</tbody>
</table>
What it all means

What we **KNOW** about Joe’s risks

- Care (emergent, ambulatory, inpatient, Rx) history factors that places him at higher risk
- Co-morbidities
- For **any** hospitalization
- For hospitalization of short-and long-term complications
- Percentile ranking
- What factors put him at risk that cannot be controlled
- What factors can we (Blue Plans), Joe, and his physician **do** something about to reduce his/Joe’s risk

What can we **DO** to assist Joe & his physician to **REDUCE HIS RISKS**

- Prioritize interventions for members at highest risk, with modifiable risk factors
- Targeted health management strategies (case management, diabetes, wellness)
- Hospitalization – active case management strategies
- Physician /provider engagement identifying Joe’s risk factors
- Physician member population profiling
- Educate and engage Joe, providing him information, education and support specific to his risk factors he can impact
Pediatric Diabetes: Predicting Trends, Care Management and Hospitalization Risk

- Pediatric Diabetes claims prevalence increased 4% over 3 years\(^1\)
  - Highest trends in observed 15-19 age groups\(^1\)
  - Less than 60% of pediatric diabetes members met appropriateness of diabetes care\(^1\)
- Obesity and Depression predicts high risk of hospitalization
- Obesity and Depression predicts lower probability of meeting appropriate diabetes care guidelines

### Diabetic Care Metrics

<table>
<thead>
<tr>
<th>N</th>
<th>DM-related Hospitalization(s)</th>
<th>5-9 OP Visits</th>
<th>5-9 HbA1c</th>
<th>1+ Flu Shot</th>
</tr>
</thead>
<tbody>
<tr>
<td>7323</td>
<td>11.9%</td>
<td>56.1%</td>
<td>42.9%</td>
<td>42.5%</td>
</tr>
</tbody>
</table>

* Recommended management: 5-9 outpatient, 5-9 HbA1c measurements, and >=1 influenza vaccination during 2006-2007. Population identified in Year 1 and measured during 2 year continuously eligible period.

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1. Diabetes prevalence was identified for those aged 0-19 in each of 2005, 2006, & 2007. Members with at least one inpatient or outpatient claim; all BHI members aged 0-19 with at least one day of enrollment comprised the denominator.
BHI Spinal Surgery Study: 
*Predicting Rates, Costs and Complications*

- Prevalence rate for spinal surgery is high and growing 
  - 1.54 per 1,000 members (65% lumbar and 35% cervical)
- People who underwent surgeries and had complications cost twice as much ($27,669 vs. $13,707)
- What if we could predict those people who were more likely to have a complication with surgery? 
  
  **WE CAN**

- Predictors of complications:
  - Diabetes, Cancer, Mental health disorder and substance abuse increase risk of complications 
  - Predictions hold for both lumbar and cervical spine surgeries

*LLLCC short for Laminectomy/Laminotomy/Laminoplasty with Copropectomy*
Power of BHI through Predictive Modeling

“This type of data does not exist anywhere else.”
– Physician Advisory Group Member

“This information can inform policy development.”
– Plan Medical Officer, Medical Policy

“Finally, we have a way of obtaining directional insights.”
– Physician Advisory Group Member

“We should share this information with accounts to promote the concept of promoting child health in the workplace.”
– Employer Advisory Group Member
THANK YOU!