Predictive Modeling to Predict Outcomes
Target High-Risk Populations and Increase Compliance
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Where you can find me

Agenda

- Introduction
- Health Declines in the Context of Life
- Undiagnosed Conditions in our Population
- Is Data Analytics in Use Elsewhere
- The Invisible Patient
- Population Targeting
- Questions
**Undiagnosed Silent Preventable Killers**

- Uncontrolled hypertension leading cause of heart disease and stroke
- 1 in 3 U.S. adults (79 Mil) have Hypertension
- 13 million U.S. adults aren’t even aware they have Hypertension
- 84 million people suffer from cardiovascular disease - causing about 2,200 deaths a day, averaging one death every 40 seconds
- 8 million adults have undiagnosed diabetes and 87 million have pre-diabetes

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**Consumer Statistics**

- 387 Million globally live with diabetes
- 10 million live with Parkinson’s
- 14 Million new cancer cases added each year
- 17 Million people will die annually from heart disease
A Word on Bias

- Reproduce the inherent biases present in the data they are provided with
- Disproportionately creating a ‘feedback loop’ by which the predicted outcome simply becomes a self-fulfilling prophecy
- Models Created with the Bias of the Builders either intentionally or unintentionally

Modifiable Health

- 60-80% Lifestyle
Finding the Invisible Patient

Financial Risk within Populations

**Known Risk**
We all know this and are effectively managing it.
Members with a significant claims history and a correspondingly high risk classification, who will likely utilize significant healthcare resources.

**Unknown Risk**
We know little about this and are doing little to manage it.
Members with an insignificant claims history, with a correspondingly low risk classification, who are likely to utilize significant healthcare resources.

“Unknown” Risk is the Deal Breaker

By 2025, 49% of Americans Will Have Chronic Diseases

Cost of treatment due to progression from risk to disease in a population of 1000 individuals

<table>
<thead>
<tr>
<th>Disease</th>
<th>Percentage</th>
<th>Annual Progression Risk to Disease</th>
<th>Additional Annual Cost Risk to Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression</td>
<td>75</td>
<td>110%</td>
<td>$325,000</td>
</tr>
<tr>
<td>Allergic Rhinitis</td>
<td>56</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>32</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Heart Disease</td>
<td>12</td>
<td>20%</td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>7</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Type 2 Diabetes</td>
<td>6</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>Cancer</td>
<td>2</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

The Best Use of Resources

Finding the illusive ROI in population health management

- The migration of membership between years and the danger of Unknown Risk
- This underscores the imperative of closely identifying who within your population is destined for higher utilization of health care services
- Stated differently: Unless you first know who it is that would best benefit from clinical intervention, nothing else matters

Actionable Management “Unknown” Risk

Current high-acuity members are the most expensive, with limited risk ROI

Turning Information into Knowledge

BaseHealth Analytics Engine

- Thousands of Chronic Conditions
- Machine Learning
- Predictions for better outcomes

- Medical Revenue
- Healthier Lives
- Customized for patients
Common Complex Diseases

- Allergic immuno- & Inflammation
- Cardiovascular Disease
- Bone, Mineral & Musculoskeletal Disease
- Brain & Nervous System Disease
- Pulmonary Disease
- Gastroenterology Disease
- Renal Disease
- Hematology & Oncology

- Allergy
- Gout
- Rheumatoid Arthritis
- Osteoporosis
- Back Pain
- Osteoarthritis
- Age-related Macular Degeneration
- Alzheimer's Disease
- Migraine
- Sudden Cardiac Arrest
- Abdominal Aortic Aneurysm
- Atrial Fibrillation
- Coronary Artery Disease
- Deep Venous Thrombosis
- Ischemic Stroke
- Hypertension
- Congestive Heart Failure
- General Asthma
- Sleep Apnea
- Hair Loss
- Endometriosis
- Premature Ovarian Failure
- Crohn’s Disease
- Gallstone
- Primary Biliary Cirrhosis
- Ulcerative Colitis
- Colorectal Cancer
- Severe Periodontitis
- Kidney Stone
- Erectile Dysfunction
- Prostate Cancer
- Endometrial Cancer
- Melanoma
- Ovarian Cancer
- Breast Cancer
- Lung Cancer
- Hypothyroidism
- Obesity
- Type 2 Diabetes
- Anxiety
- Depression
- Alcohol Dependence
- Predictive Value of Personalized Risk Assessment to Prevent Multifactorial, Complex and Chronic Disease
- Application of Personalized Risk Assessment to Prevent Chronic Diseases Using Aggregate Population Based Data
- Utilization of Genetic Data Can Improve the Prediction of Type 2 Diabetes Incidence in a Swedish Cohort

Independently validated and Published

- Validated Accuracy Comparing Actual to Predicted Conditions

Published Studies

- Predictive Value of Personalized Risk Assessment to Prevent Multifactorial, Complex and Chronic Disease

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Interventional Analytics

Catalyst to Population Health Value

- Patient & Member Engagement
- Effective Interventional Clinical and Health Management Pathways
### Interventionsal Population Health Management Overview

<table>
<thead>
<tr>
<th>Population Description</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>46,320</td>
</tr>
<tr>
<td>With usable data</td>
<td>41,386</td>
</tr>
<tr>
<td>With clinical intervention potential</td>
<td>28,310</td>
</tr>
<tr>
<td>High value T2D/CAD risk factor intervention potential</td>
<td>2,243</td>
</tr>
</tbody>
</table>

**Targeted Intervention Population and Value**

- Total Predicted Savings: $13,259,153
- PMPY Average Savings: $5,911
- Average ROI: 1,078%

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### Interventionsal PHM: Representative Members

### Reviewing the Population for Health Indicators
Right Patient, Right Time at the Point of Care

What Might this Future Look Like?

Final Thoughts
• The Biggest Risk are the Patients We have Not Seen
• Supermarkets Know More About our Nutrition than the Healthcare System Does
• Prioritization for the Application of Clinical Resources = Triage
• Innovation and Augmentation ≠ Replacing People
• Genomics and the Biome will revolutionize our Diagnosis and Treatment of Disease – This Includes Surgery
• We Don’t Go Online – We Live Online
Questions

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Thank you