Using Predictive Analytics to Ensure Coding Accuracy & Maximize Charge Capture

Daniel Ward, VP – Strategy
Paul Bradley, PhD, Chief Data Scientist
Presenters

**Dan Ward**
- Vice President of Strategy at ZirMed
- Prior to its acquisition by ZirMed, Dan was Vice President of Revenue Integrity at MethodCare
- Worked in health care policy, as well as a CDM Coordinator, Charge Services Director, and Revenue Cycle Director

**Paul Bradley, Ph.D.**
- Chief Data Scientist at ZirMed
- Co-founder and the chief data scientist of MethodCare before its acquisition by ZirMed
- Consulted on data mining algorithm integration with Microsoft Research and SQL Server, and led data analysis solution implementations for a number of Microsoft divisions
Overview

- ZirMed Predictive Analytics
- Charge Capture
- Data, Models, and Predictions
- Results
Healthcare Data Mining Leaders

- **Nationally recognized leader in healthcare data mining**
  - Leverage applied mathematics and statistics
  - Identify hard to find pockets of revenue
  - Automate repetitive non-value added tasks

- **Financial Opportunity**
  - Identifies net revenue improvements
  - Drives immediate cash acceleration opportunities
  - Increases staff efficiency and reduces outsourcing costs

- **Operational Benefits**
  - Advanced analytics to proactively uncover root-cause issues
  - Routes the right accounts at the right time to the right people
  - Measures workforce productivity on value and dollars collected
• 2-time National Case Study Winner (2012 and 2014)

• Voted on by nationwide healthcare finance professionals and peers

• Contest included 12 of the top healthcare revenue cycle and financial management companies

• Selected for “creativity of approach, magnitude of results, and impact on hospital’s reform readiness and financial performance”

Overview
To address growing economic and regulatory pressures, Presbyterian Healthcare Services, an eight-hospital health system and pioneering ACO located in Albuquerque, N.M., sought to increase efficiencies and cost savings in the revenue cycle. Presbyterian leadership honed in on optimizing its AR follow up, denial processing, payment variance, and reporting tools. Presbyterian leadership wanted one comprehensive revenue cycle solution that could increase net revenue and achieve the following goals:

• Modeling AR to predict the likelihood of on-time payment
• Automating the clean up of outstanding low balance AR
• Implementing intelligent work queues to minimize follow up steps
• Configuring workflow to expedite claim resolution
• Benchmarking and measuring point-of-service collections
• Establishing real-time reporting to support proactive decision-making

Solution
Presbyterian selected MethodCare’s Revenue Cycle Solution that uses data mining to automate the detection of missed charges, underpayments, resolution of credit balances, and enhancement of AR. The MethodCare solution produced a combined 3% net revenue increase, 150% productivity improvement, and 1.150% overall return on investment.

Presbyterian’s revenue cycle leadership partnered with MethodCare on each step of the solution implementation: from customizing reporting metrics, to automating inefficient manual account reviews, and configuring workflow to increase follow up productivity. Critical to Presbyterian was the fact that MethodCare’s comprehensive cloud solution was accessible by the web and professionally run, maintained, and updated 24/7.

As a result, Presbyterian’s information technology resources were not burdened by the upgrade.

MethodCare’s solution integrated all of Presbyterian’s patient account and financial data to provide an accurate and complete view of its revenue cycle. “For the first time both our Finance and Revenue Cycle departments could utilize the same reporting, saving countless hours in reconciling disparate systems each month,” said Dave Hennigan, Vice President, Revenue Cycle. Presbyterian. MethodCare’s data mining and advanced analytic dashboards provided an accurate and real-time view of key metrics, such as outstanding AR by financial class, total underpayments by payer and contract term violations, credits balances broken out by adjustments and refunds, and missed charges by revenue codes and service lines. Detailed reporting also provided granular operational insights to make process improvements, like high-dollar write-offs by staff member.
Providers Primed for Disruption

- Predicts credit score based on past and present personal data
- Collects data from various sources and creates a score from 300 to 850

- Recommends products of likely interest
- Utilizes past purchase history and correlates with other shopper purchases

- Recommends friends and groups
- Utilizes data from social network to make behavioral predictions

- Returns search results from petabytes of content within milliseconds
- Presents targeted content and advertising based on behavioral characteristics

- Identifies revenue improvement and drives operational efficiencies
- Presents the right accounts at the right time to the right staff
### Solutions for Revenue Cycle and Population Health

ZirMed helps healthcare organizations optimize revenue and patient outcomes with end-to-end, data-driven software solutions for revenue cycle and population health management.

<table>
<thead>
<tr>
<th>PATIENT ACCESS</th>
<th>CHARGE INTEGRITY</th>
<th>CLAIMS &amp; A/R MANAGEMENT</th>
<th>COST &amp; UTILIZATION</th>
<th>POPULATION RISK MGMT</th>
<th>PATIENT ENGAGEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Pre-Registration</td>
<td>▶ Missing Charges</td>
<td>▶ Coding Tools</td>
<td>▶ Risk Stratification</td>
<td>▶ Care Gaps</td>
<td>▶ Patient Communications</td>
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<td>▶ Registration Integrity</td>
<td>▶ Coding Variances</td>
<td>▶ Professional Claims</td>
<td>▶ Disease Registry Mapping</td>
<td>▶ Referral Mgmnt.</td>
<td>▶ Patient Notebook Secure Portal</td>
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<td>▶ Insurance Verification</td>
<td>▶ Overcharging</td>
<td>▶ Institutional Claims</td>
<td>▶ Mapping</td>
<td>▶ Provider-to-Provider</td>
<td>▶ Patient Statements</td>
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<td>▶ Financial Counseling</td>
<td>▶ Detection</td>
<td>▶ Remittances</td>
<td>▶ Provider Attribution</td>
<td>Communications</td>
<td>▶ eStatements</td>
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<td>▶ Eligibility Verification</td>
<td>▶ CDM Analytics</td>
<td>▶ Contract Mgmnt.</td>
<td>▶ Provider Benchmarking</td>
<td>▶ Readmission Analytics</td>
<td>▶ Care Team</td>
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<td>▶ Patient Estimation</td>
<td>▶ DRG Anomaly Detection</td>
<td>▶ Denial Mgmnt.</td>
<td>▶ Physician Analytics</td>
<td>▶ Readmission Analytics</td>
<td>▶ Workflow Management</td>
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<td>▶ Propensity to Pay</td>
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<td>▶ Underpayment Recovery</td>
<td>▶ Patient Analytics</td>
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<td>▶ P-O-S Collections</td>
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<td>▶ Self-pay Mgmnt.</td>
<td>▶ Patient Safety and Quality Analytics</td>
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<td>▶ Payment Plans</td>
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<td>▶ A/R Followup</td>
<td>▶ P4P/FFV Reimbursement</td>
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<td>▶ A/R Intelligence</td>
<td>▶ Cost &amp; Utilization</td>
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<td>Reporting</td>
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### PREDICTIVE ANALYTICS

### WORKFLOW & REPORTING

### SYSTEM INTEGRATION
Comprehensive RCM Platform

- Financial Benefits
  - Prioritizes at-risk account follow up
  - Increases new cash and acceleration
  - Drives expenses down w/productivity gains

- Operational Benefits
  - Integrates disparate data sources
  - Customizes workflow and workdrivers
  - Provides data access across entire system
  - Automates non-value manual tasks
  - Measures staff effectiveness and ROI
  - Insights into physician and cost variances
  - Segments patients and tracks migrations
  - Drives proactive improvements with analytics
  - Sends alerts to drive early intervention
Charge Integrity

Missing Charge Recovery
Coding Variances
Overcharging Detection
Charge Integrity Evolution

Evolution

Manual Audits

Billing Editors

Rules Software

Data Mining

Revenue Recovery
## Charge Integrity Predictive Analytics

<table>
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<tr>
<th>#</th>
<th>Condition</th>
<th>Value</th>
<th>Probability of Missing Charge</th>
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<tbody>
<tr>
<td>1</td>
<td>IF Charge Type 'GENERAL/SPINAL/EPIDURAL SUPPLY' Is Present</td>
<td>Is Present</td>
<td>13.5%</td>
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<td>2</td>
<td>IF Charge Type 'XR Guidance Spine Injection' (CPT = 77003) Is Present</td>
<td>Is Present</td>
<td>32.5%</td>
</tr>
<tr>
<td>3</td>
<td>IF Charge Type 'Implantable Device – Carbon Fiber Rod' Is NOT Present</td>
<td>Is NOT Present</td>
<td>50.5%</td>
</tr>
<tr>
<td>4</td>
<td>IF DRG 460 'Spinal fusion except cervical w/o MC' Is Present</td>
<td>Is Present</td>
<td>93.6%</td>
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</tbody>
</table>
• Goal: Integrate, aggregate and verify source data to accurately capture charging practices

• Data Elements
  - Type of visit (inpatient, outpatient, emergency)
  - Admit and discharge dates
  - Diagnosis and procedure codes
  - Admit source
  - Charges and reimbursements
  - Costs
  - Physicians

• Number of attributes: between 5,000 – 9,000
Based upon collected patient-level data elements, predict within close probability the likelihood of certain events

- Likelihood of:
  - A charge is missing
  - A claim will be denied
  - A patient will pay their portion of a bill

- Algorithms – Identifying patterns from data
  - Decision Trees: Learn conditionally dependent rules
  - Neural Networks: Learn non-linear relationships
  - Regression: Learn linear relationships
  - Association Rules: Learn all rules, then prune unlikely ones
  - Naïve Bayes: Learn joint probability distributions to predict membership
  - Clustering: Learn data-driven sub-populations existing in underlying data
Optimizing Predictions

**Training Set**

- Patient-level Data Elements with Observed Events

**Test Set**

Randomly sample Test Set and Learning Set

**Learning Set**

Apply algorithms to Learning Set

**Predictive Model**

Evaluate Performance of model over Test Set

Re-run over numerous samplings, adjusting algorithms for optimal predictions
Consensus Predictions

• Build models with different algorithms
  ▪ Capture different correlation “types” within source data

• Determine where predictions agree
• Model building
  - Build predictive models for each chargeable entity
  - Thousands of models already created and stored
  - Typically model builds take many hours to create

• Scoring
  - Executed daily
  - For each patient /visit, predict the likelihood that a given charge is missing
  - Typically runs in minutes
Dashboards and Analytics

- Comprehensive Dashboards
  - In-depth charge analysis
  - Recovery revenue statistics
  - Compliance risk analysis

- Proactive Management
  - Charge timeliness
  - Charge fluctuations
  - Procedure fluctuations
  - Rev Code fluctuations
  - Revenue projections
  - Charge composition by patient
  - Charge recovery performance

- Operational Benefits
  - Uncovers charge leakage trends
  - Drives proactive improvements
  - Provides ICD-10 safety net
  - Provides HIS upgrade baseline
Results

Increase
Net Revenue

3%

8 Hospital Health System
Pioneering ACO

Highlights:

• $100M+ generated through Charge Integrity, Denials Management, and Underpayment Recovery

• 150% productivity improvement

• 11 to 1 ROI
Results

ROI
Achieved in 18 months

600%

Highlights:

• In the first month, identified cash equaling the first year fees

• Rebilled $1.3M net within first 3.5 months

• Turned $2.5M net to-date w/ 4 part-time business office users

National Health System
100+ Hospitals
Conclusions

• Utilize provider’s own data assets
  ▪ HIS
  ▪ Clinical services
  ▪ Payer contracts
  ▪ Chargemaster

• Predictive modeling flexibility
  ▪ Accurately identify anomalies in charging
  ▪ Proactively prevent charge capture leakage
  ▪ Naturally adjusts to changes in care delivery and demographics

• Real results
  ▪ Millions in net-revenue
  ▪ Large ROI multiples
Thank You!

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