Predictive Analytics: Turning your Data into Intelligence

Jodi Blomberg, SAS
Agenda

• What are “Analytics”?  
• Why do you need them?  
• Medicaid Fraud Applications
What are Analytics?

- Statistical & Quantitative Analysis
- Exploratory & Predictive Models
- Forecasting
- Data & Text Mining
- Optimization

in contrast to…

- Static Reports
- Summary Statistics
- Graphs, Charts
- OLAP, slicing & dicing

fact-based decision making

facts
Queries vs. Analytics

• Query: Which physicians billed Medicaid the most this month?
  – Answer: list of physicians

• Data Mining Question: Is this type of Medicaid billing suspicious?
  – Answer: list of outliers, reasons why they are outliers
Types of Medicaid Fraud

• Upcoding
• Services not rendered
• Unbundling
• Kickbacks or Collusion
Query and Reporting

- Review highest billers
- Review largest beneficiaries
- Flagging exceptions to obvious rules:
  - Time between procedures
  - Timed procedures
  - Many deviations away from peers
Exploratory vs. Predictive

- **Predictive Analytics:**
  - Take the fraud you know about and find more cases like it

- **Exploratory Analytics**
  - What kind of fraud is going on that you don’t know about?
Predictive Analytics

• Build a model on known cases of fraud
• Predict if a provider is fraudulent based on variables such as:
  – Procedure modifiers
  – Total units
  – Action codes
  – Unique recipients
  – Allowed services
Predictive Analytics Process

- Formulate Problem
- Accumulate Data
- Data Quality Analysis
- Transform and Select Predictive Model
- Evaluate Model
- Deploy Model
- Monitor Results

Questions:
- Can I generate new cases?
- What data do we need to get?
- What kind of model should we use?
- Is the model any good?
- What will do with the information we get?
- What are we trying to model?
- Is the data any good?
- Is it useful?
Exploratory Analytics

• No data on what you want to predict
• Looking for fraud that you don’t know about
• Use methods such as:
  – Outlier detection
  – Visualization of abnormal patterns
  – Association analysis
  – Clustering
Outlier Detection

• Predict something you do have
• Look for outliers
• For example:
  – Predict how much a provider should be making
  – Independent variables are things like patient volume
  – Detect providers who are outliers from this model
Outlier Detection

Predicted Billing Amount: $53,273
Actual Billing Amount: $308,600
Clustering

• Organize observed data into meaningful segmentations called clusters

• For example, organize providers into clusters by:
  • Number of unique patients served
  • Number of billing codes not under their specialty
  • Ratio of denied services to billed services
  • Number of treatment locations
  • Percentage of charges billed in last week of billing cycle
Clustering Example

Avg Percentage Charges Billed in Last Week

Average Denied Units

ClusterID

Low Risk

Medium Risk

Very Low Risk

Low Risk

Medium Risk

Very Low Risk
Association Analysis

- Reveal potential collusion and/or kickbacks
- Detect excessive referrals between physicians
- Detect patients seeing a possibly excessive number of physicians
Association Analysis
Taking it Further

- Predict differences between abuse and fraud
- Determine what types of processes are effective in reducing fraud
Advanced Analytics

• Everybody’s doing it!
  – Junk mail
  – Political campaigns
  – Credit card approve/decline decisions

• What might you discover in your data?