Improving Public Programs: Advanced Analytics for Better Decision Making

Center for Improving Research Evidence (CIRE) Forum
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Welcome

Ann Person, CIRE director
About CIRE

• Designs and uses an array of scientific research and evaluation approaches in diverse settings

• Has more than 40 years of experience conducting a wide range of rigorous applied research using cutting-edge qualitative and quantitative methods

• Strives to bridge the gap between policy research and practice
Forum Roadmap

• Panel 1: Introduction to Advanced Analytics
• Panel 2: Analytics in Action
• Panel 3: The Analytics Frontier
Advanced Analytics—What Is It?

- Social Network Analysis
- Data Mining
- Fraud and Abuse Detection
- Predictive Modeling
- Natural Language Processing
- Bayesian Analysis
- Performance Analysis Scoring
- Machine Learning
- Descriptive Reporting
- Statistical Learning
- Text Mining
- Visualization
- Rapid Cycle Evaluation
Data Analytics—What Is It?

• Google Maps is not analytics; Google Maps with the traffic layer is analytics

• Data analytics and big data are not synonyms
Basic Analytics—What Is It?

• Decision support in near-real time

• Metrics linked directly to decisions

• Descriptive data presented accessibly
  – Graphical: understand the analytic findings at a glance
  – Interactive online dashboards

• Operational: embedded in production systems
Health Care Quality Dashboard for Accountable Care Organizations

Mathematica is creating an electronic dashboard that will:

- Provide opportunities to assess trends
- Compare performance on key cost metrics:
  - Total costs, costs by line of service; also reported as percentages
  - Cost data to be aggregated at ACO level; blinded data for peers
  - Drill-downs of cost metrics
- Compare performance on 33 GPRO/PQRS quality measures
- For Pioneers; ESCOs to be added next year
- ACOs to see their own data compared to benchmarks; CMS to have program-wide view
Advanced Analytics—What Can It Do?

• Forecast performance

• Predict an outcome variable that is not observed

• Generate a hypothesis, as opposed to testing a hypothesis

• Make rapid-cycle experimentation possible
Advanced Analytics Methods

- Forecasting models
- Predictive models
- Simulation models
- Network models
- Machine-learning models
- Data mining
- Text mining, natural language processing
- Pattern recognition
- Outlier/anomalies detection
- Signal processing
- Operations research
- Geospatial analysis
Why Is It Important?
Examples in Health (1)

• Predict fraud and abuse now that payment amounts are determined by both claims and quality data (quality data is a new venue for cheating)

• Use electronic health records (EHRs) to measure the quality of the care delivered by each provider in the past 24 hours, and provide feedback the next day

• Conduct rapid-cycle experiments with alternative feedback information for doctors, with an eye toward making feedback reports more actionable at the bedside

• Discover why some sites in multi-site demos are more successful than others by mining a warehouse of claims and provider data
Why Is It Important?  
Examples in Health (2)

• Forecast a state’s Medicaid budget a year in the future by predicting the service use of beneficiaries and combining with program coverage and benefit rules

• Improve patient compliance by combining EHR data with social media and web search data to give patients individualized technical assistance and other behavioral interventions

• Measure the effectiveness of outreach to beneficiaries about a new program, and predict the number who will sign up by analyzing social media and web searches

• Conduct rapid-cycle experiments with alternative approaches to hospital discharge planning to reduce readmissions
Leveraging CMS Data to Accelerate Health System Change

Niall Brennan
Chief Data Officer
Centers for Medicare & Medicaid Services

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Introduction

- CMS is the largest single payer for health care services in the US
  - Expected to serve over **123 million individuals** in 2016 between the:
    - Medicare program (health insurance for individuals age 65 and older, as well as those with disabilities)
    - Medicaid program (health insurance managed by the states for individuals with lower incomes)
  - Over **11 million plan selections** during the 2015 open enrollment period for the federal and state health insurance marketplaces
  - **2.5 billion claims** submitted annually for the Medicare FFS program alone
- Significant new data sources
  - Meaningful use of health information technology
  - Provider quality information
  - Health Insurance Marketplace data
- Trusted to protect beneficiary privacy
CMS Data and Delivery System Transformation

- CMS data is critical to decision making for the agency and other stakeholders in the health care system.
- The big data revolution has given CMS the capabilities to use and share data in new and innovative ways.
- To promote delivery system transformation, CMS is:
  - Employing advanced analytics to create actionable information products, accelerate transparency, inform policy decisions and evaluate programs.
  - Routinely and safely sharing data with numerous stakeholders to drive health care quality and efficiency improvements and lower health care costs.
  - Driving unprecedented efforts around health data transparency.
Variation in Prevalence and Spending for Beneficiaries with Multiple Chronic Conditions

Medicare Chronic Conditions Dashboard: County Level
Medicare Spending & Utilization by Number of Chronic Conditions, 2012

Number of Chronic Conditions (6+) Prevalence: State to National Ratio

Florida: 6+ Chronic Conditions by County

Per Capita Spending  ED Visits  Readmission Rate

Produced by the CMS/Office of Information Products and Data Analytics (OIPDA), May 2014

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Percent of Opioid Claims by HRR in Part D
New Hepatitis C Drug Episodes in Part D by Regimen

- Memoria Day
- July 4
- Thanksgiving
- Christmas & New Year's
Tracking Medicare FFS Readmissions

Medicare 30-Day, All-Condition Hospital Readmission Rate
January 2007 - December 2014

Mean Rate for Period

Monthly Readmission Rate

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Cumulative % Change in Index Stays and Readmissions
(Q1 2007 = 0)
Hospital outpatient services growing more slowly than readmissions have been declining.
Change in Medicare Readmission Rate
2014 Rates to 2007-2011 Mean, by HRR

Change in national rate = -1.1 percentage point
Total Number of Individuals with Plan Selections during 2015 Marketplace Open Enrollment
Oregon and Nevada switched to the healthcare.gov platform in 2015 so all consumers were classified as “new”.
Percent of 2015 Consumers Receiving Cost Sharing Reduction (CSR)
Panel 2: Analytics in Action

Stuart Buck, Laura and John Arnold Foundation
Moderator

David Weaver, Social Security Administration

Irma Perez-Johnson, Mathematica

Jeffrey Ballou, Mathematica
## Analytics in Action: Physician Value-Based Payment Reform and Confidential Reporting

### 1. Acquire and Review External Data Sources

- **25** distinct data sources provide
- **2+ BILLION** Medicare claims
- **35 MILLION** beneficiary enrollment records
- **323,000** medical groups' and solo practitioners' quality and cost data

### 2. Process Data

- Data processing involves
- **50,000** lines of code
- **198** interlinked programs
- **38** programming modules

### 3. Produce Payment Adjustments and Reports

- We provide performance data to
- **160,000+** medical groups and solo practitioners from **76** specialties
- via...
- **34** exhibits in printable reports and interactive dashboard displays
- drawn from...
- **6,000+** data fields

### 4. Provide Technical Assistance

- Each year report recipients have access to
- **1 FULL YEAR** of dedicated help desk assistance
- **10 GUIDES** on payment adjustment methodology, measure information, and frequently asked questions

### Challenges Include

- **1. Data Size**
- **2. Rapid Execution**
- **3. Customization**
- **4. Complex Methods**
Questions?
Panel 3: The Analytics Frontier

J.B. Wogan, *GOVERNING* Magazine
Moderator

Jennifer Brooks, National Governors Association

Scott Cody, Mathematica

Mark Peterson, USAID
Questions?
For More Information

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Networking Reception Starts Now
Mathematica Building Lobby, 12th Floor
4:30–5:30 p.m.