Enabling transformation

Using Analytics to Improve Outcomes at the Point of Care

Nav Ranajee
Global Marketing Leader, Healthcare Analytics
IBM
Presenters

- Nav Ranajee
  - Global Marketing Leader, Healthcare Analytics
  - IBM

- Steve Steppe
  - Director Corporate Engineering and Informatics
  - PinnacleHealth System

- Matt Sabo, Ph.D.
  - Healthcare Data Science Practice Lead
  - Waypoint Consulting
Disease and cost of care progression

- Early intervention
  - Opportunities identification

Health status

- Healthy low risk
- At risk
- High risk
- Early clinical symptoms
- Active disease

Healthcare spending

Time

Early intervention
- Opportunities identification

20% of people generate 80% of costs

70% of US deaths are from chronic diseases

© 2015 IBM Corporation
The Analytics Journey

Basic Reporting
- What happened?
- When and where?
- How much?

Foundational Analytics
- What is happening?
- Who is at risk?
- What is cost of care?
- How can we improve?
- What is the right data?
- Where to capture data?

Predictive & Prescriptive
- What will happen?
- How can we pre-empt?
- What actions to take?
- Who would be best at managing this patient?
- How to get a 360 degree view of the patient?

Dynamic Learning for Optimal Care Guidance
- Natural language understanding
- Guided consumer experience
- Clinical Content Analysis
- Personalized Healthcare
- Watson Health

Enterprise-wide Data Insights
- Data Governance
- Centralize Data
- Structured and Unstructured
- Data Sharing
- Cost of Care Intelligence
- Performance/Quality Metrics

Retrospective Reporting
- High latency reporting
- Spreadsheets
- Limited view reports
- Departmental data marts

Cognitive
- What is the optimal treatment based on the latest literature for my patient’s clinical profile?
- Why is this the best protocol?

Proactive Interventions and Improved Outcomes
- Population Health Analytics
- Evidence-based medicine
- Resource Allocation
- Streaming Analytics
- Similarity Analytics
- Claims Fraud Management
- Consumer Insights
Predictive Analytics Applications

- Reduce costs for all stakeholders - payers, providers, employers, hospitals, and governments
- Better allocate resources to align with optimized treatments
- Better screen patients for specific treatments
- Predict likelihood of a specific health outcome
- Predict treatment/medication or rehabilitation effectiveness
- Predict patient compliance/non-compliance with treatment plans
- Predict patient risk levels based on known risk factors

**Predict likelihood of Readmission**

- Predict patients at-risk of health issues
- Deliver recommendations and associated interventions at the point of interaction
- Improve patient quality care and satisfaction
Using Analytics to Improve Outcomes at the Point of Care

**PinnacleHealth’s Approach**

Steve Stepp (sstepp@pinnaclehealth.org)
Director, Business Informatics & Engineering, PinnacleHealth

Matthew Sabo, Ph.D. (msabo@waypointco.com)
Predictive Analytics Practice Director, Waypoint Consulting
PinnacleHealth System - Regional Provider

• PinnacleHealth is the result of four hospital mergers between 1987 and 1998
• 718 beds in 3 hospitals
• 35,000 discharges
• 115,000 ED visits
• Readmission rate 11.9%
• Each year:
  • Deliver more than 4,000 babies
  • Perform 22,000 surgical procedures
  • Perform more than 600 open heart surgeries
  • Perform more than 43 kidney transplants
• Past Several Years - Grew from 2 acute care hospitals and 2 Ambulatory Surgery Centers to 3 acute care hospitals and a pending merger with Penn State Hershey Medical Center, plus started RiverHealth ACO
• Participating in MSSP ACO and Bundled Payment initiatives
• Competition for funding - typical financial constraints of other providers.
Pinnacle’s use of Analytics

• The Goal: (Closed Loop Awareness Systems) - altering the system’s behavior in response to patient patterns in ways that make the system more successful at pursuing its goals.

• System must identify and fulfill a new market need for a patient-often before the patient knows themselves.
  • To do so, new data points will have to be collected to identify and simulate patient patterns.
  • For example, medical systems, scheduling systems or customer resource systems capture patient treatment and milestones. If managed properly, these systems can be developed to capture a patient’s wants and how medical decisions are made.

• By modeling the difference between patient wants and usage, patterns of differences will emerge. Understanding the interconnected relationships give rise to new cost effective and high-quality care models.
Pinnacle Analytic Environments: Epic and Pulse

Source Data
- Kronos
- Teletracking
- Epic Chronicles
  - Shadow

Real Time & Big Data
- Epic Cogito
- PeopleSoft
- Scarian
- Signature
- DSS
  - 200+ Source systems currently utilized by PinnacleHealth

Integrations
- Real Time Translation
- Enterprise Data Warehouse
  - EDW
  - Purpose Built Data Marts

Analytics
- Epic Radar
- IBM Cognos
- SPSS
- PULSE

Decision Support
- Epic Radar
- PULSE

Waypoint
Pinnacle Analytic Environments: Epic and Pulse

- Physicians
- Patient Satisfaction
- Resources
- Weather, Traffic, etc.

LOCATION

ACUITY

REAL-TIME

FUTURE

PATIENTS

NURSING

PULSE

Epic

Waypoint
Current Prescriptive Analytic Initiatives - COPD Example

- Setting targets for predicting outcomes and taking action
  - Predictions help apply action at points where outcomes can be impacted
  - Not chasing after a specific metric or numerical target

- For example, one goal is to extend time between acute events (COPD, Heart Failure)
  - A positive byproduct of this should be the reduction of readmissions

- Define pathways of disease progression in patient populations
  - A positive byproduct of this would be deviation of individual patients from population trends
Example - Extending time between COPD acute events

- 1,832 patients admitted for COPD, 2010-2013
- 327 of these patients readmitted within 30 days
- 17.8% Readmission Rate (higher than overall rate)
- If positively address the causes that influence the duration between acute events, can address those that can be influenced and explain those that cannot be be
Care-point Definition and Analysis

- Status of patient at care point
- What decisions will be made at care point?
- Who will be receiving the report?
- What insight into patient status will impact decision making?
- Target: First morning after admission.
- Focus on clinical inputs - variables that can be acted on
- Engage the clinicians and care-management from the beginning
Prediction of Readmission - CHAID Results

- Test Partition 40% of population flagged
- Test Partition 59% of actual readmissions identified
Model Criteria for Readmission

Admission History
Risk Cat. 4

Ages 69-77 And > 77

Cardiac Comorbidity Score <= 80%

General Health Score 4-80%

Albu. and Hemo. Normal

Cardiac Comorbidity Score > 80%

General Health Score > 80%

Albu. or Hemo. Outlier

Admission History
Risk Cat. 5

Age < 69
This would predict the point when 25% of the patients in each sub-population would have their next event.
When Patients are Flagged, COPD High Risk Protocol put in action:

- CAT Score Completed
- Smoking Cessation Consult Completed
- COPE Participant - indication
- Respiratory Completed Inhaler/Respiratory Medication Education
- PAM Survey Completed (future)
- COPD Action Plan Completed by Patient and Reviewed on Rounds
- Patient Physically has all Medications Prior to Discharge
- Medication Teach Back Completed
- PCP Appointment Scheduled within 7 Days of Discharge
- Pulmonary Appointment Scheduled within 4 Weeks of Discharge
- PFT Scheduled for Post Discharge
Evaluation

- Evaluating in one unit
- Treatment and Control groups to evaluate application of protocol
- Educate and train staff to insure consistent application
- All part of closing the loop
Evaluation (continued)

• Review next event reasons to augment protocol to further define effective interventions, including beyond COPD

• Partner with Home Health/SNF/LTACH to develop appropriate interventions and care protocol to prevent next event

• Develop a cross functional interventional process for chronic patients with frequent exacerbations and acute care visits
Current Prescriptive Analytic Initiatives - Staffing

• Another one goal is to staff with the goal of maintaining staff-to-patient ratio within one standard deviation from the mean

• Positive byproducts of this would be
  • Improved patient experience
  • Minimized need for staff overtime
  • Improve staff moral
  • Lower overall cost of care
Staffing in Relation to Patient Volume

- Predict with 90% certainty likely patient count in 2-week forecast
- Staff appropriately to minimize variation
Variables in question

- **Dependent variable:** Hourly patient census count

- **Independent variables:**
  - Hospital
  - Nursing station
  - Month of year
  - Week of month
  - Day of week
  - Hour of day
  - Beds available
Daily Forecast for Cardio-Thoracic Unit
Hourly Forecast - Cardio-Thoracic, 1-week out
Closing the Loop

- Expose the forecast

- Standardize the staffing estimate process

- Evaluate the impact on staff-to-patient ratio and overtime
  - Does staff to patient variance decrease?
  - Does overtime volume decrease?
Commitment to Prescriptive Analytics

• Commitment to necessary technology infrastructure, IBM SPSS and Cognos
• Commitment to developing the competency to implement prescriptive analytics in all facets
• Our definition of analytics is prediction
• “Prescriptive” means that the prediction can be explained and acted upon
• Development plan:
  • Define the Problem and How we Measure Success
  • Develop the Dataset to Support the Project
  • Develop, Evaluate and Test the Model
  • Reengage and Expand the Clinical Team
  • Develop Process or Protocol to Address High Risk Population
  • Pilot and Evaluate - Change as Needed
  • Rollout
  • Track, Evaluate and Update as Needed
Thank you for your time

Nav Ranajee
Global Marketing Leader, HC Analytics
ranajee@us.ibm.com
(773) 425-8362

JR Defeo
Healthcare Executive
jrdefeo@waypointco.com
(267) 358-0984