DISCUSSION TOPICS

Population Health: What & Why Now?

Technology for Population Health Analytics

Population Health Analytics in Action

- Electronic Health Records
- Disease Registries
- Demographics
- Labs
- Public Health
- Genomics
- Claims
- Socio-Economic
- Rx
- Patient Reported

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A program to address health needs at all points along the continuum of health and well-being through participation of, engagement with and targeted interventions for the population.

GOAL: Maintain or improve the physical and psychosocial well-being of individuals through cost-effective and tailored health solutions.
Applying advanced analytics to healthcare and related data of individuals and larger populations to yield insights that drive improved health outcomes and reduced cost of care.
EMPOWERED CONSUMERS: Proliferation of Digital Data

EXPLOSION OF DATA: Big Data – EHR, 'Omics, Claims, Devices

ACTIVATED CARE TEAMS: Data Enabled, Analytically – Driven Decision Support

BIG DATA IS SHAPING THE LANDSCAPE OF HEALTHCARE
VALUE-BASED HEALTHCARE

Risk Shift
Pop Health Focus
Data & System Integration
Care & Cost Variance
Episode Analysis
Government Driven Programs

WHY NOW? TRANSFORMATION IS UNDERWAY
MOVEMENT TO VALUE

Fee-for-Service

Value-Based Payment

Provider ACO
ANALYZING AN
EPISODE OF CARE

EXAMPLE:
KNEE REPLACEMENT EPISODE

Claims for
John Doe

Relevant claims are
grouped together

Trigger

Pre-op
» Office visits
» Labs
» Imaging

Procedure
» Knee replacement
» Hospitalization

Post-op
» Rx medications
» Therapy
HOW MODELS ARE CHANGING
WHY NOW?  MULTIPLE OPPORTUNITIES FOR INTERVENTION

Care Team Related Causes

Inpatient  Care Transition  PCP  Specialist

Communication
Stratification
Intervention

Severity  Comorbidity  Cognition  Environment  Motivation  Ability

Patient Related Causes
POPULATION HEALTH ANALYTICS FRAMEWORK

SOURCE DATA
- Social
- Biometric
- Economic
- Hospitals
- Claims
- Pharmacy
- Ambulatory

INTEGRATED DATA STORE
- RISK MODULES
- ACTION AND RULES
- PATIENT PROFILE
- PREDICTIVE ANALYTICS
- INTEGRATED DATA STORE

ACTION AND RULES

PATIENT PROFILE

RISK MODULES

PREDICTIVE ANALYTICS

INTEGRATED DATA STORE

Patients

Analysts

Clinicians

Campaigns

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PATIENT PROFILE

Descriptive Dimensions

Psychosocial Dimensions

Patient Experience Dimensions
Increasing complexity and sophistication of understanding
Population

Segmentation Process

Diagnosed
- Reduce Costs
- Quality of Life
- Promote self-management

Un-diagnosed
- Identify earlier
- Limit progression
- Quality of Life
- Reduce Costs

At Risk
- Prevent or delay disease
- Eliminate or reduce future cost

Healthy
- Quality of Life
- Maintain wellness
- Maintain cost
POPULATION STRATIFICATION FROM SEGMENTS TO INDIVIDUALS
# Advanced Analytics Using Multiple Methods

## For known patterns
- **Rules**
  - Rules to surface known issues

  **Examples:**
  - Relevant diagnosis code recorded
  - Prescription not filled

## For unknown patterns
- **Anomaly Detection**
  - Algorithms to surface unusual (out-of-band) behaviors

  **Examples:**
  - New symptom presents
  - # patients with event exceeds expected

## For complex patterns
- **Predictive Models**
  - Identify patterns and event relationships to indicate potential future events

  **Examples:**
  - Patterns of patient behavior for known issues
  - Drivers for high cost buckets

## For unstructured data
- **Text Mining**
  - Leverage unstructured data elements in analytics

  **Examples:**
  - Static data elements (e.g., address) used for linking regional behavior
  - Integration of rich case file information

## For optimizing
- **Simulation & Optimization**
  - Simulate scenarios of care models, financial and other constraints; optimize actions

  **Examples:**
  - Compare various interventions for target populations
  - Measure simulated responses
  - Optimize interventions

## Hybrid Approach
- Proactively applies combination of all approaches at entity and network levels
EXAMPLE  PATIENT RISK, CHANNEL PREFERENCE AND BEHAVIOR

SOURCE DATA

RISK MODULES

ACTION AND RULES

PATIENT PROFILE

PREDICTIVE ANALYTICS

INTEGRATED DATA STORE

Campaigns

Patients

Analysts

Clinicians
MEET THE PATIENT

Profile Patients

Predict Risk Score

Inform Clinical Decisions

Prevent

Treat

Identify Care Gaps

Personalize Care Plan

Execute Outreach Campaigns

Track, Adapt Optimize

Coordinate

Engage

Reward & Sustain

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INSIGHTFUL ENGAGEMENT

- Develop campaigns and optimize selection
  - Identify population with highest probability of responding to a beneficial intervention
- Approach using the most appropriate channel
- Ensure program compliance
ENGAGE CLOSING THE LOOP

• Was the model effective?
• Did the patient respond?
• Did the patient engage?
• Did the patient change behavior?
• Did cost decrease?
• Is the patient happy?
POPULATION HEALTH ANALYTICS

- Integrate and Prepare Data
- Assess Risks and Profile Patients
- Define Cohorts and Identify Gaps in Care
- Assess and Report Performance Across Continuum
- Optimize Care
- Improve Care Delivery Performance
- Design Interventions and Programs
- Engage Patients and Deliver Care

Support Index:
- Demographics
- Segment ID
- Social
- Activation Level
- Rx
- Propensity to Engage in home monitoring
- Support Index
DIGNITY HEALTH INSIGHTS OPPORTUNITIES

• Plan care for individuals and populations, including predictive disease management.
• Define and apply best practices to reduce readmission rates.
• Predict the risk of sepsis or kidney failure, and intervene early to reduce negative outcomes.
• Better manage pharmacy costs and outcomes.
• Create tools to improve each patient’s experience.

• 39 Hospitals
• > 9000 Providers
SEPSIS BIO SURVEILLANCE WITH DIGNITY HEALTH INSIGHTS

Analyze Sepsis Alerts

By Mortality Rate

By Provider Response

By Length of Stay

By Facilities

Sample dashboard using Hadoop and SAS Visual Analytics
“At Dignity Health, we want to set an example in lifting the walls on data. We believe that sharing information and technology among doctors, hospitals, and health care providers will lead to a more positive patient experience, higher quality, and reduced health care costs.”
**Goal:**
Make meaningful decisions about using wearable devices to monitor health and timely intervention for patients at risk of serious illness

**Technology:**
- Developed a SAS-based platform, **Theon**
  - Brings together all available data sources
  - Uses advanced analytical models
  - Helps identify and care for patients and populations in accountable care organizations (ACOs)
GENEIA

One ACO client found

- A targeted list of patients discharged who would benefit from home monitoring to avoid future ER visits and potential readmission
- One patient currently in the hospital who had 13 prior admissions as well as more than 200 specialty visits and 150 prescriptions
- Ten patients with > $100,000 in medical costs who had not been seen by their primary care physician in > 12 months
- Two physician practices with significantly higher prescription costs than their peers and information to remedy the situation
"One big data fabric"

- See episodes of care for each patient
- Identify gaps in care
- Learn better care at home
- Help aging population remain active
- Show them their own biometric info
FUTURE ROADMAP

• More data – air quality
• Devices with accelerometer
• Less exposure to viruses and disease

• New technology, machine learning
• Use big data, relationships, find precursors to early onset of disease
• Be more productive earlier, stave off onset of illness
POPULATION HEALTH ANALYTICS

- Improve Population Health
- Target Appropriate Care
- Lessen Chronic Disease
- Sustain Wellness
- Reduce Avoidable Costs