How well do you know your population's health risk and How to Manage it?

Session ID: PCM2, February 19th 2017
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Speaker Introduction

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Speaker(s) will provide their own brief introduction – 2-3 minutes max
Conflict of Interest

Gowtham Rao, MD PhD
Has no real or apparent conflicts of interest to report.
Salary: BlueCross BlueShield of South Carolina
Royalty: None
Consulting fees: None
Ownership interests: None

Did not accept speaking honorarium from HIMSS
Learning Objectives

• Define and identify patient population attributable to your system
• Stratify level of risk in population (e.g. chronic conditions, repeat ED visits/high LOS, medication non-adherence)
• Define data and algorithms needed to determine gaps or variations in care
• Employ systems and processes (e.g. registries, alerts to patient/care coordinators, consumer/community education) to translate information into improved outcomes. Measure outcomes and compare against goals
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Agenda

Foundational definitions and concepts
• Concept 1: What is population health?
• Concept 2: What is a risk and what determines risk?
• Concept 3: Framework to stratify risks

History - Epidemiologic transitions

Tactical - strategy and interventions
• Tactic 1: Stratify and Attribute
• Tactic 2: Population health informatics and analytics
• Tactic 3: Population health interventions
An Introduction of How Benefits Were Realized for the Value of Health IT
Who is more likely to be hospitalized?
Agenda

**Foundational definitions and concepts**
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**Tactical - strategy and interventions**
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Concept 1: What is population health?

**Health** - “the capacity of people to adapt to, respond to, or control life’s challenges and changes”.

Health is not a “diagnosis”; it is a state of well-being

**Population** - are people grouped by some common element

Having a common medical condition, Employees of same organization, Belonging to same ethnic group

Population health is defined as:

Distribution of health outcomes within a population
Health determinants that influence this distribution
Policies and interventions that affect those determinants

Concept 1: What is population health?

Individual health
- Reactive medicine
- Mainstream medicine
- Most $$$$$

Population health
- Proactive medicine
- Cohort with similar characteristics

Public health
- Multiple populations
- Government
- Least $
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Concept 2: Population and Risk
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Concept 3: Population Risk Stratification
Concept 3: Population Risk Stratification

1. Those who are well
   a. Stay physically fit, maintain social connections, keep emotionally stable

2. Those who are at risk of becoming sick
   a. Overcome obesity, smoking, drug or alcohol abuse and sedentary lifestyles

3. The acutely sick
   a. Treat promptly, address early

4. The chronically sick
   a. Condition management support, mitigate potential complications (diabetes + annual eye exam)

5. Those with catastrophically sick
   a. Centers of excellence, compassionate care; not just intensive and expensive medical management but care coordination and social services; avoid futile care and advance life-directives
Concept 3: Population Risk Stratification (Disease Financial model)
Concept 3: Population Risk Stratification

Disease Financial model

People

Probability of undesired outcome
Concept 3: Population Risk Stratification (Determinants)

**Health** - “the capacity of people to **adapt** to, **respond** to, or **control** life’s challenges and changes”.

Health is **not** a “diagnosis”; it is a state of well-being

| Humans are complex and adaptive systems with the **freedom to act in unpredictable ways** |
| Biological | Psychological | Social | Cultural | Ecological |

**Health Disparity**: difference in health based on socioeconomic status, education, age, race, ethnicity, geography, disability, sexual orientation, or special needs
Concept 3: Population Risk Stratification (Determinants)

Concept 3: Population Risk Stratification - Overlay
Concept 3: Population Risk Stratification - Behavior

“The greatest contributor for premature death from preventable chronic illness is patient behavior” - Population Health Promise, Fabius, Pracilo, Nash, Clarke

Humans are irrational and exhibit inconsistent patterns in decision making based on emotions, social environment, and immediate circumstances. Heuristic decision making is the rule, not the exception.

An average human can only hold about 3 concepts at the same time while making a decision - a sick individual much less.

People participate in medical care as part of a complex adaptive relationship

People's experience of health are a self-organizing property of a complex-adaptive human system

Concept 3: Population Risk Stratification - Behavior

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Humans are complex and adaptive systems with the freedom to act in unpredictable ways

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<th>Biological</th>
<th>Psychological</th>
<th>Social</th>
<th>Cultural</th>
<th>Ecological</th>
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</table>

Health Determinants

Understand the chaotic decision making and then nudge
- Inform then activate
- Self-management strategies
- Adopt healthy behavior

Anchoring
Status quo
Bandwagon effect
Hyperbolic discounting
Present bias
Law of small numbers
Relativity of choice
Message framing

Concept 3: Population Risk Stratification – Behavior (change)

Transtheoretical model for high impact population programs

Stage of change
- Index of readiness
- When will people change
- Who will change successfully
- Patient-treatment matching

“Collaborative filtering”

Decisional balance  Self Efficacy

By Abyounan (Own work) [CC BY-SA 3.0 (http://creativecommons.org/licenses/by-sa/3.0)], via Wikimedia Commons
Concept 3: Population Risk Stratification - Overlay
Health Risk is Multidimensional
Burden of disease + health determinants + health behavior change
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Epidemiologic transitions

**Disease-oriented model** - biological model, human as biological machine, emphasis is preventing/curing disease without addressing social context of health/illness. Most measures were mortality reduction.

**Stage 1: Acute (infectious/communicable) disease epidemiology**; 1900 to 1970s - control of communicable diseases; developing vaccines and antibiotics, sanitation methods.

**Stage 2: Chronic disease epidemiology** - cardiovascular, cancer.

Transition from “mortality reduction” to “impact reduction”.

Transition from “disease centered approach” to “person centered approach”
Population health

Promise to close the key gaps in health care delivery

Impact Reduction

Health - “the capacity of people to adapt to, respond to, or control life’s challenges and changes”.

Health is not a “diagnosis”; it is a state of well-being

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Tactic 1 - stratify and attribute

Attribution - the methodology used to assign patients, and their quality outcomes, to providers or clinicians.

Attribution models help identify patient-provider relationship that may be used to establish accountability for quality and cost.

Assignment of patients to provider entities
• Provider entities: organizations or humans
• Responsible entities: individual or joint

Assignment of responsibility - accountable provider entity
• Cost, quality or experience outcomes

https://www.qualityforum.org/ProjectDescription.aspx?projectID=80808
Tactic 1 - stratify and attribute

**Financial risk score** (Predicts future costs)
- Medical diagnosis
- Medical treatment
- Medical coverage
- Member segmentation
- Medical possession data

**Opportunity score** (Predicts future worsening of disease)
- Disease progression
- Gaps in care
- Prevention care gaps
- Medication
- PCP visits
- Medication adherence rates

**Intervenability score** (Predicts future reactivity to intervention)
- Member segmentation
- Social determinants
- Technology & innovation
- Behavioral & lifestyle
- Social norms
- Normative patterns

**Impactability score**
- Different score by different business program
- Use user input to retain model a priori information
- Compare observed to predicted - validate

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1. Build resolvable data assets (EDW) with API algorithms.
2. Build multiple component models: Model scoring using regression coefficients, expert opinion based rules or other methods.
3. Score individual members into composite score - Progress toward interventional score.
4. Members are rated by the composite impactability score - members above selected threshold are recommended for intervention.
5. Recommendation are validated - feedback loop - a priori information for model improvement (scoring model).

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Tactic 1 - stratify and attribute

Financial risk score
(Predicts future costs)

- Financial
- Historical payout
- Medical coverage
- Comorbid burden (250+ categories)
- Short-term
- Chronic
- Utilization
- Medically necessary
- Potentially avoidable
- Claims and clinical data

- Member segmentation
- Demographic
- Medication
- Medication possession ratio
Tactic 1 - stratify and attribute

Opportunity score
(Predicts future worsening of disease)

- Disease progression
- CKD, CHF, Stroke risk
- Disease prioritization by ROI
- Gaps in Care
- Chronic care gaps
- Prevention care gaps
- PCP visit
- Attributed PCP quality rank
- No attributed PCP
- Claims and clinical data
- Primary cost category
- Gap prioritization
- Medication Possession ratio
Tactic 1 - stratify and attribute

Intervenability score
(Predicts future receptivity to intervention)

- Environment/geographical factors
- Access to care - distance
- Societal norms
- Normative patterns
- Individuals' life style
- Social determinants
- Self-efficacy measure
- Food behaviors
- Self-efficacy & improvement
- Activity vs. inactivity
- Stress indicators
- Member segmentation
- Demographic

Non-clinical data
Tactic 1 - Bringing all three together

Validate, Evaluate, Calibrate

Observed vs. Predicted

Feedback loop - Questionnaire

Impactability score

Self-learning model
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Tactic 2 – Population Health Informatics and Analytics

Patient Registry
Population Registry

Tactic 2 – Population Health Informatics and Analytics

Predictive Models

Conditions
Drugs
Procedures
Measurement

Baseline time 0 Follow-up time

Person time

Disease Treatment Outcome

Source: Journey towards clinical characterization, Patrick Ryan, PhD
<table>
<thead>
<tr>
<th>Person 1</th>
<th>Conditions</th>
<th>Drugs</th>
<th>Procedures</th>
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**Predictive Models**
Who are more likely to be admitted?

Not likely to be compliant with medications?

May have a bad outcome like a fall?

Most likely to not have social support at home?

Probability of complications and dissatisfaction?

May benefit from community support?

Will avoid Primary care because of costs?

Predictive Models
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http://www.populationhealthalliance.org/research/understanding-population-health.html

Population Health Alliance - Trade organization - representing for profit organization
Tactic 3: Population health interventions (Determinants)

- Proactive
- Coordinated
- Collaborative
- Evidence-based
- Self-care
- Activation
- Shared decision making

- Engagement
- Adherence

Disease Management: A system of coordinated healthcare interventions and communications for populations with conditions in which patient self-care efforts are significant
Tactic 3: Population health interventions (Determinants)

• “Information Therapy” is the prescription of the
  o the **right information** (customized care plan)
  o to the **right person** (stratification using predictive model)
  o at the **right time** (right stage of change)
  o using the **right modality** (secure messaging, smartphone, phone call, home visit)

*Health education may be “prescribed” just like medical treatments such as drugs.*

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<th>Precontemplation</th>
<th>Contemplation</th>
<th>Preparation</th>
<th>Action</th>
<th>Maintenance</th>
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**Tactic 3: Population health interventions (Behavior change)**
Tactic 3: Population health interventions (Behavior)

Patient Engagement

Inform Me
Engage Me
Empower Me
Partner with Me
Support My e-Community
Tactic 3: Population health interventions (Behavior)
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Impactability score
Different score by different business program

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Questions

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