Predictive Analytics for Data-Driven Care Management

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Conflict of Interest

Sarika Aggarwal, MD, MHCM
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Have no real or apparent conflicts of interest to report.
Agenda

• Learning Objectives
• Beth Israel Deaconess Care Organization
• Our Vision for Care Management
• Our Approach
• Predictive Analytics to Identify Impactable Patients
• Lessons Learned
Learning Objectives

• Describe the challenges with a traditional approach to Care Management

• Assess factors that can be used in a predictive algorithm to determine whether a patient will benefit from a care management program

• Recognize the importance of an underlying high-quality data asset to a data-driven care management program

• Evaluate benefits of standardizing patient assessment and care planning tools across a large care management staff

• Illustrate the importance of clinical-IT partnership at every stage of a transformational project
Beth Israel Deaconess Care Organization
Our Mission

Our mission is to move health care forward by engaging providers in their communities to achieve success in a value-based delivery system.

We are committed to creating innovative, industry-leading best practices in the clinical, administrative, and financial aspects of health care.

BIDCO is a value-based physician and hospital network and Accountable Care Organization (ACO) in Massachusetts.
BIDCO at a Glance

200K
Covered lives

500
PCPs

100
Employees

40
EHR platforms supported

2.2K
Specialists

8
Hospitals

35.6M
Patient encounters

$1.5B
Value-based revenue
<table>
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<tr>
<th>Service</th>
<th>Description</th>
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<tbody>
<tr>
<td><strong>Population Health</strong></td>
<td>Hybrid model for community-based, high-risk complex care management and disease management; homecare and SNF Quality Collaborative for care coordination; ED utilization for avoidable admits</td>
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<tr>
<td><strong>Performance Improvement</strong></td>
<td>Performance Improvement Facilitator for each practice; EHR Optimization program; practice redesign facilitation for quality, TME programs; facilitate understanding of medical economics dashboards</td>
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<tr>
<td><strong>Analytics and Reporting</strong></td>
<td>Quarterly financial performance reporting for Risk Units; desktop access to population health management tools; medical economics dashboards; data surveillance</td>
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<td><strong>Contracting + Network Management</strong></td>
<td>Provide exceptional customer service to our network; negotiate risk and non-risk contracts; negotiate reinsurance contracts; liaison between BIDCO members and health plans</td>
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<td><strong>Enrollment</strong></td>
<td>Initial enrollment in BIDCO with health plans; recredentialing; enrollment data management between BIDCO systems, and between BIDCO and other entities (HPC, GIC, etc.)</td>
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Our Vision for Care Management
Increasing Prevalence of Chronic Disease

1. About 133 million Americans – 45% of the population – have at least one chronic disease

2. Chronic diseases are responsible for 7 out of 10 deaths in the U.S.

3. Chronic diseases can be disabling and reduce a person’s quality of life

4. Chronic disease accounts for 81% of hospital admissions; 91% of all prescriptions filled; and 76% of all physician visits
BIDCO Population Health Strategy

Population Health Management

Goal: Improve care, reduce costs, and promote wellness.

Focus on entire health care continuum

Focus interventions appropriate for each risk category

Leverage an interdisciplinary team

Leverage technology to generate necessary analytic data and measure performance

Target Population

- Medicare
- Medicare Advantage
- Commercial - Self Insured
- Commercial - Fully Insured
- Medicaid

Moderate Risk
Disease Management

15%

Transitions of care (30 days)
End of life care

High Risk
Complex Case Management

5%

Low Risk
Primary Prevention

80%

Wellness/Prevention Programs

DATA ANALYTICS

5%

15%

80%
BIDCO’S POPULATION HEALTH PROGRAMS

**Care management**
- Transitions of care
- Complex Care Management
- Palliative care management
- ED management
- Advanced care planning

**Rising risk management**
- Pharmacy Collaborative program
- Depression Collaborative program
- Medication management activities including polypharmacy
- Self Management Action plan program

**Quality & performance improvement**
- Performance Improvement facilitation
- Risk Unit, Pod & practice meetings
- Patient outreach and engagement
- Payer formulary management
- Medication adherence program

**Acuity documentation**
- Education and training
- Workflow redesign
- Acuity gap tool training

**Medical Neighborhood management**
- Preferred SNF and homecare network
- 3-day SNF Waiver
- Post-acute Self Management Action plan program
- Community partner programs

BIDCO’S POPULATION HEALTH PROGRAMS

#HIMSS19
RN-led care management program to facilitate care coordination and medical management for complex patients

- **Team**: Consists of Social Workers, pharmacists, non-clinical workers
- **Delivery Model**: Delegated/Non-Delegated, Embedded, Telephonic
- **Risk Stratification**: Payer, BIDCO, Provider groups
- **Documentation for Care Management**: Free text notes in EMR, multiple non-standardized assessments
Traditional Care Management Challenges

1. **Limited Resources**
   Valuable part of population health management, but not enough resources for all rising risk or high risk patients.

2. **Patient Selection**
   Traditional morbidity-based risk algorithms do not incorporate data needed to select patients likely to benefit.

3. **Inconsistent Approaches**
   Each care manager has an individual approach to assessment and care plan development – meaning best practices may not be consistently applied.

4. **Multiple EMRs/Platforms**
   Multiple EMRs and other systems mean that there are multiple areas of documentation for care management.

5. **Unmeasured Performance**
   Limited insight into outcomes of various approaches to care management – or of individual care manager performance.

6. **Throttled Throughput**
   Non-standardized documentation limits the efficiency of a care management operation, reducing the number of patients it can serve.
Our Vision for Care Management

1. Leverage clinical data asset

2. Identify **impactable** patients

3. Match appropriate patient with appropriate program

4. Implement **consistent, standardized, evidence-based** workflows and care paths

5. Measure **outcomes** to identify best practices

6. **EMR-agnostic**: integrate across multiple EMRs

7. Manage **performance** (operations/throughput and care management outcomes)
BIDCO’s Implementation

1. Establish strong clinical-IT partnership
2. Leverage existing investment in technical architecture
3. Work with Care Managers to identify needed data elements
4. Ensure NCQA standard elements for payer delegation
5. Standardized detailed assessments and templated approaches
6. Establish policies, procedures, care paths and self management action plans for each program
7. Automate routine tasks
8. Build program-wide reporting and performance monitoring
9. Leverage predictive analytics to customize risk stratification for each distinct program
10. Use risk stratification to align program resources with patient case loads
Our Implementation
1. Strong Clinical-IT Partnership

CMO-CIO Collaboration
Tight partnership at the leadership level fosters collaboration between teams.

Day 1 Input
Care Management team had direct input at the very start of the IT project.

Weekly Meetings
Regular communications between clinical and IT team members throughout the project.

Job Shadowing
IT team spent days shadowing care managers for a first hand look at challenges and tasks.
2. Leverage Technical Architecture

**BIDCO’s Data Foundation**
- Pioneer in EHR data aggregation
- High quality clinical data asset trusted by providers

**BIDCO Goals for Care Management**
- Use clinical data asset to support better care management
- Better identify actionable patients
- Capture structured care management data in for analysis and reporting
2. Leverage Technical Architecture

Care Managers see a **longitudinal patient record** with clinical, claims-based, and care management history from our core analytics platform.
3. Identify the Right Data Elements

CLINICAL-IT COLLABORATION

Patient Experience
IT worked with care managers to identify data elements that would help them create a more positive experience for patients.

- ADT
- Labs
- Radiology
- Hospital Inpatient
- Scheduling
- Transfer/Discharge

CORE ANALYTICS PLATFORM

CARE MANAGEMENT APPLICATION
NCQA certifies payers for care management, but supports standardization for providers. NCQA’s 8 key elements to support care management are truly clinically impactful.
5. Standards and Templates

User experience is guided by standardized, consistent, templated care plans and workflows that yield structured information.
5. Standards and Templates

Care managers can customize prebuilt care plans for individual patients.
6. Policies Established for Programs

It’s not just about the technology. BIDCO implemented and documented an operational infrastructure.

**Policies and Procedures**
- CM Enrollment & Assessment
- Case Closure
- Med Reconciliation
- Care Planning
- Hospital Transition of Care
- ER Transition of Care
- Medical Neighborhood
- Advance Directives
- SNF Waiver Admission and Transition of Care
- Referral to IDT Team
- Elder Abuse
- Home Safety
- Delegation Policy

**Workflows and Care Paths**
- Asthma
- COPD
- Hypertension
- DM
- Heart Failure
- Enrollment and Case Closure Workflow
- Admission and Non-Admission Care Path

**Self-Management Action Plans**
- Asthma
- COPD
- Hypertension
- DM
- Heart Failure
- Tobacco Use
- Hyperlipidemia
Care managers have an activity feed of scheduled and assigned tasks.
8. Program-Wide Monitoring

Using structured data for care plans and our central analytics platform enables us to provide detailed performance reporting and monitoring.
9. Predictive Analytics

It’s not about finding out things that are happening right now.

“How often are my diabetics going to the ED?”

It’s not about finding out exact outcomes in the future.

“Which diabetics are going to end up in the ED next year?”

It is about using existing information to identify patterns and to infer trends and potential outcomes in the future.

“Which diabetics are likely to use the ED – but could be steered elsewhere?”
9. Predictive Analytics

Which patients are most likely to respond to care management?

- improvements in condition
- reductions in cost and utilization

A subset of patients are highly impactable – but we need to be able to identify them.
Highest risk/cost patients are not generally impactable with care management (cancer, accidents)

Traditional risk algorithms are designed for risk adjustment more than population stratification

Traditional risk algorithms do not include all the data needed to predict who will benefit from care management

Population Stratification

Traditional, morbidity-based approach

Predictive analytics-based approach

Does not attempt to identify the sickest or highest cost patients.

Can be used in a variety of contexts and populations.

Can be used to report on diverse individuals regardless of background.

Can help clinicians identify clusters of patients within a population for inclusion in programs
9. Predictive Analytics

Given available demographic, clinical, and historical information, which patients would benefit most under care management?

**UNMANAGED POPULATION**

A. INPUTS
   - Demographics
   - Morbidity Risk
   - Condition Types
   - Utilization (OP/IP)
   - Census Factors
   - Care Coordination
   - Population Flags

B. OUTPUTS
   - Cost
   - Utilization
   - Outcomes

**ENROLLED AND MANAGED**

PROJECTED IMPACT OF CARE MANAGEMENT

Given available demographic, clinical, and historical information, which patients would benefit most under care management?
9. Predictive Analytics

Given available demographic, clinical, and historical information, which patients would benefit most under care management? …and which patients are most appropriate for which care management programs?

- **EXPECTED CM VALUE:**
  - Cost
  - Utilization
  - Health Outcomes

- **PROJECTED IMPACT OF CARE MANAGEMENT**

- **IMPACT SCORE**

The impact score describes the relative benefit projected for this patient from care management.
## 9. Predictive Analytics

### Census Variable Inputs to Risk Model

| Census Block Group in Cambridge, MA | Population | % Males | % Females | % Under 18 | % 18 - 44 | % 45 - 64 | % 65+ | % High School | % Bachelors | % Graduate Degree | Median Earnings (Real Dollars) | Female Earning Ratio (Median Female Earnings/Median Male Earnings) | % Population by Race - Native Hawaiian or Pacific Islander | % Population by Race - American Indian or Alaskan Native | % Population by Race - Asian | % Population by Race - Hispanic | % Population by Race - Black | % Population by Race - White Non-Hispanic | Persons per Housing Unit | % Families w/ Incomes < 100% of Federal Poverty Level | % Families w/ Incomes < 200% of Federal Poverty Level | % Adults who are Unemployed | % Households Receiving Public Assistance | % Households w/ No Car | % Households with Children and a Single Parent | % People Age 25+ w/o High School Degree |

DATA POINT | SCORING RANGE
--- | ---
Morbidity Score | 0-8
Care Coordination Risk | 0-3
Cancer Counterweight | 0, -8
Polypharmacy | 0-3
12-Month IP Utilization Rates | 0-3
12-Month ED Weight | 0-3
Frailty Weight | 0, 3
NSS7: Income, Employment, Public Assistance, Transportation, Education, Household Structure | 5
MAX THEORETICAL | 28

Morbidity Predictor. The cone indicates patients whose morbidity is a major driver of their risk score. Those higher on the Y-Axis within this cone have been shown to have better success rates from a Care Management engagement.

Cancer Patients. Patients have been given a large counterweight when the primary contributor to their utilization and morbidity-based risk is high-impact cancer.

Rising Risk. May be older, frail patients with many medications and some recent ED/IP usage who live in poorer undeveloped neighborhoods. Have multiple comorbidities, but not in the top 1% based on those factors.

Self Managed. This quadrant represents those with serious multiple comorbidities, but who have avoided acute events, live in more developed neighborhoods, and are less likely for disease exacerbation.
BIDCO uses risk stratification to align program resources with patient case loads. Every system needs to maximize use of limited resources. Use a risk score based on predictive analytics to assign panels to care managers without manual chart review.

**10. Align Program Resources**

**Example: complex case management**

### PATIENTS EACH CARE MANAGER CAN MANAGE FOR 3-6 MONTHS.

### CARE MANAGERS EMPLOYED BY HEALTHCARE SYSTEM

### TOTAL PATIENTS IN A PROGRAM

**ADJUST RISK SCORE THRESHOLD TO PRIORITIZE PATIENTS FOR EACH PROGRAM.**

Sample Patient Distribution: Low risk/impactability to high risk/impactability.

Ideal population for program yields too many patients for available care managers.

Phase 1: Prioritize highest-scoring patients.
Lessons Learned

**Clinical-IT Partnership**
Physicians and nurse champions should be part of decision making at every stage so clinical stakeholders trust the solution.

**Look Beyond Disease-Based Approaches**
Stratify and enroll patients in programs using a range of information beyond traditional morbidity-based risk scoring. Leverage investments in clinical data assets to feed predictive analytics.

**Use Structured Data**
Capturing care management plans in a structured format enables analysis – especially when other clinical data is integrated.
Questions

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