



Predictive Analytics for Value Based Care

HIMSS 2017

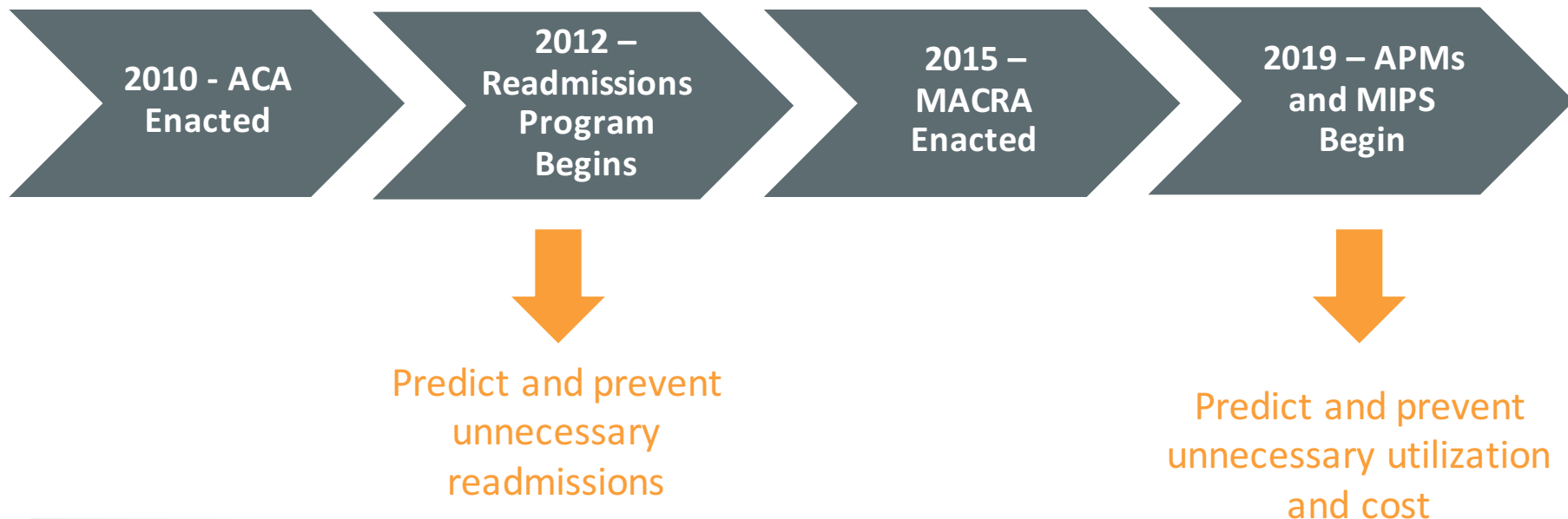
February 21, 2017

Agenda

- CMS Value-Based Care Programs
- Predictive Risk Care Approaches
- Case Study

CMS Value-Based Programs

The CMS Value-Based Programs reward providers for the quality of care they provide to Medicare beneficiaries.



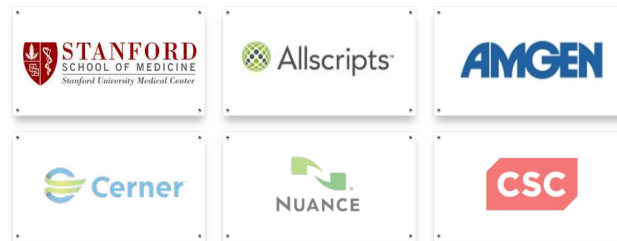


- Healthcare analytics company located in Palo Alto
- Leader in real-time patient risk and precision health solutions
- Solutions are used by health systems, health plans, ACOs and HIEs

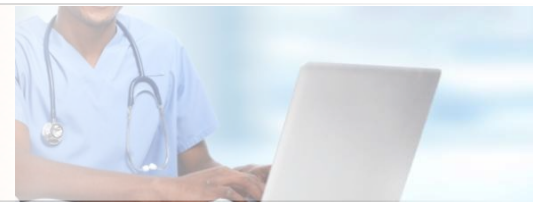
Unique talent and experience

- Stanford researchers and data scientists
- Frontline physicians
- Performance improvement practitioners
- Healthcare IT executives

HBI Team Collective Experience



Mission: Improve population health using data science to predict and prevent disease and unnecessary cost and utilization.



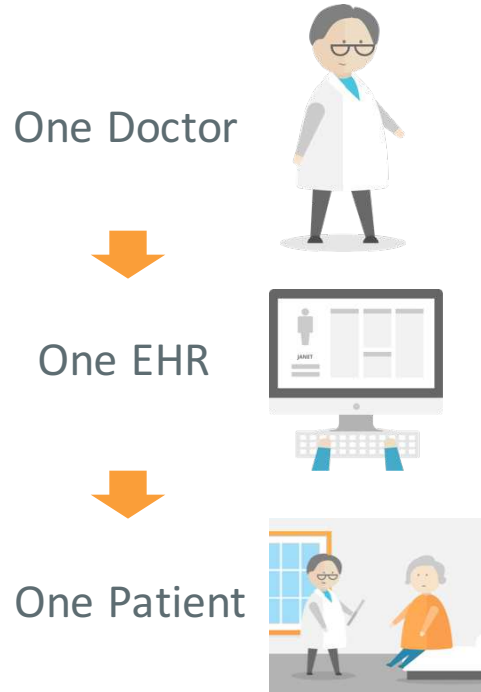


Differentiation

- Machine learning as a service; algorithms calibrated specifically to client data
- Real time predictive risk engine
- Population and acute episode risk scores
- Live on over 20 million patients
- Methods published in peer reviewed journals
- Integrated natural language processing
- Focus on care management and intervention automation

Population Health Model

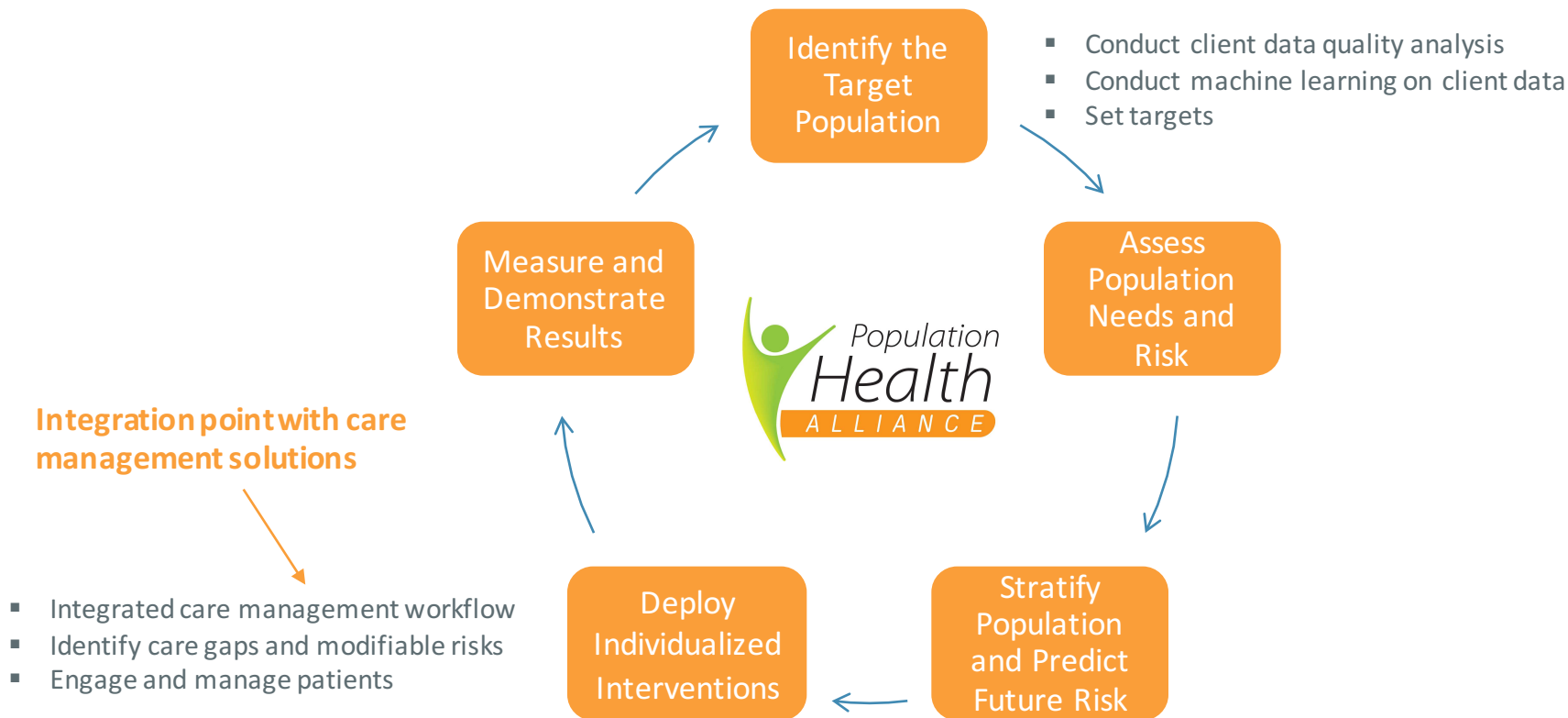
Traditional Care Model



Population Health Care Model



Population Health Framework



Source: <http://populationhealthalliance.org/research/understanding-population-health.html>

Patient History

Patient Risk of Event or Outcome

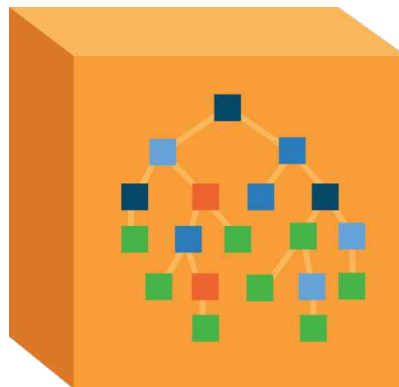
Risk Model Development

Available Risk Models

1000s of Patient Features

- Age
- Gender
- Geography
- Income
- Education
- Race
- Diagnoses
- Procedures
- Chronic conditions
- Visit and admission history
- Outpatient medications
- Vital signs
- Lab orders and results
- Radiology orders
- Social characteristics
- Behavioral characteristics

Multivariate Statistical Modeling / Machine Learning



Population Risk Models (predicts future 12 months)

- Predicted future cost
- Risk of inpatient admission
- Risk of emergency dept (ED) visit
- Risk of acute myocardial infarction (AMI) event
- Risk of cerebrovascular accident (CVA) event
- 100s of chronic disease models, including:
 - Risk of asthma, CHF, COPD, diabetes, hypertension, 100+ more
- Risk of mortality

Admission Triggered Risk Models (predicts future 30 days post discharge)

- Risk of 30 day readmission
- Risk of 30 day ED re-visit
- Sepsis
- Mortality

Our Customers



Today: Large scale data experience. Live in production on over 20 million patients.



Maine HIE - 1.4 million



Mass Data Services - 6.6 million



NYC / Long Island HIE – 16 million



Population Health Case Study



Source: <http://populationhealthalliance.org/research/understanding-population-health.html>

Population Health Case Study



- HealthInfoNet is a Maine-based health ISO that operates Maine's only statewide health information exchange (HIE)
- Provides a secure, standardized electronic system, where healthcare providers can share important patient health information for treatment purposes
 - Real-time data from provider electronic health record systems
 - 36 hospitals and over 400 ambulatory sites
 - 1.4 million patients (EMPIs)
 - 6,000,000+ annual encounters (admissions and visits)
- In 2014, started offering predictive risk solutions to its members



- St. Joseph Healthcare System, Bangor, Maine
 - 112 bed acute care community hospital
 - Primary care and specialty physician practices
 - 25,000 covered lives
 - Partner with local health centers
 - Part of Maine HIE, using HBI risk solutions
- **Value Based Programs - ACO Participation**
 - Medicare shared savings
 - Medicaid
 - Commercial Insurers

Population Health Case Study: Identify the Target Population



St. Joe's 18,000 Member ACO

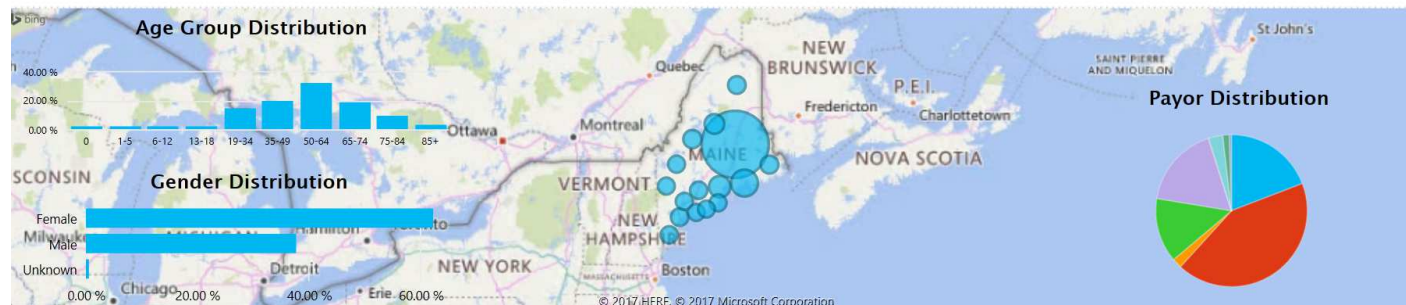
Total Patients

18,360

Population Utilization Risk

Data Updated Through

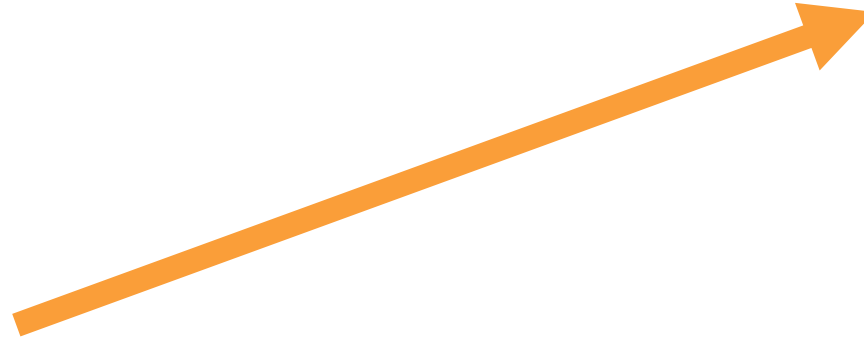
2017-02-15 17:02:13



Population Health Case Study: Assess Population Needs and Risk

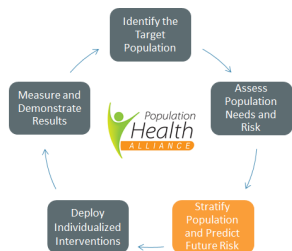


ACO ED Utilization



- 2014 – leadership interviews showed emergency department was overutilized by patients using it for primary care

Population Health Case Study: Stratify Population and Predict Future Risk



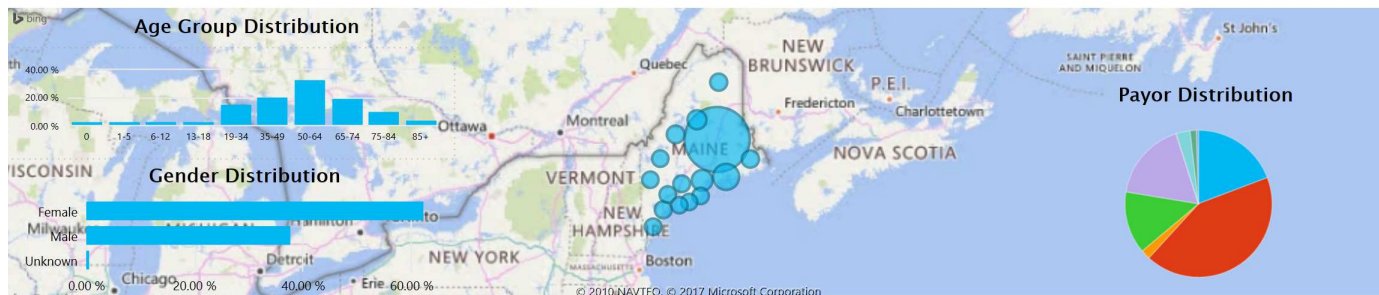
Total Patients

18,359

Population Utilization Risk

Data Updated Through

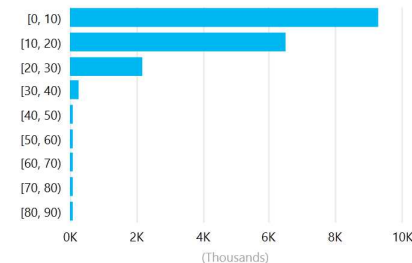
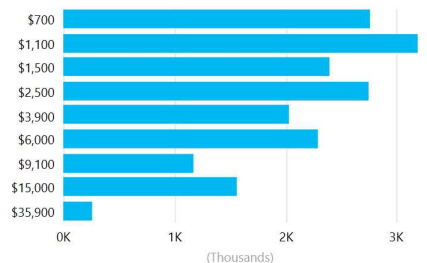
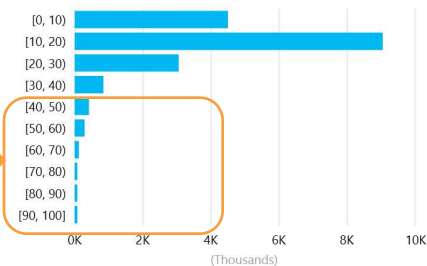
2017-02-16 17:01:46



Risk - ED Visit

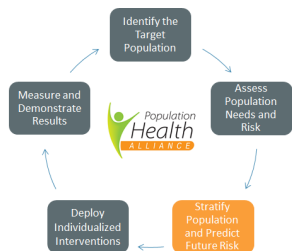
Risk - Cost

Risk - IP Admission



Target ACO
patients > 40%
likelihood of
future ED visit

Population Health Case Study: Stratify Population and Predict Future Risk



Total Inpatient and Emergency Encounters
41,510

Readmission / Return Risk

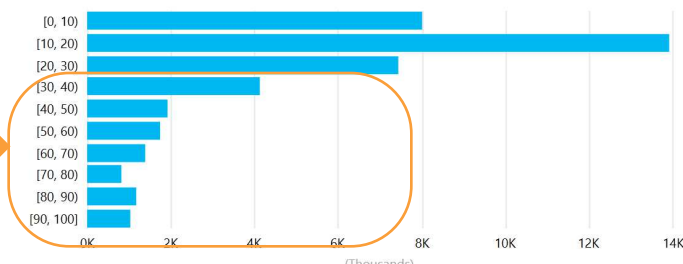
Data Updated Through
2017-02-16 17:01:46



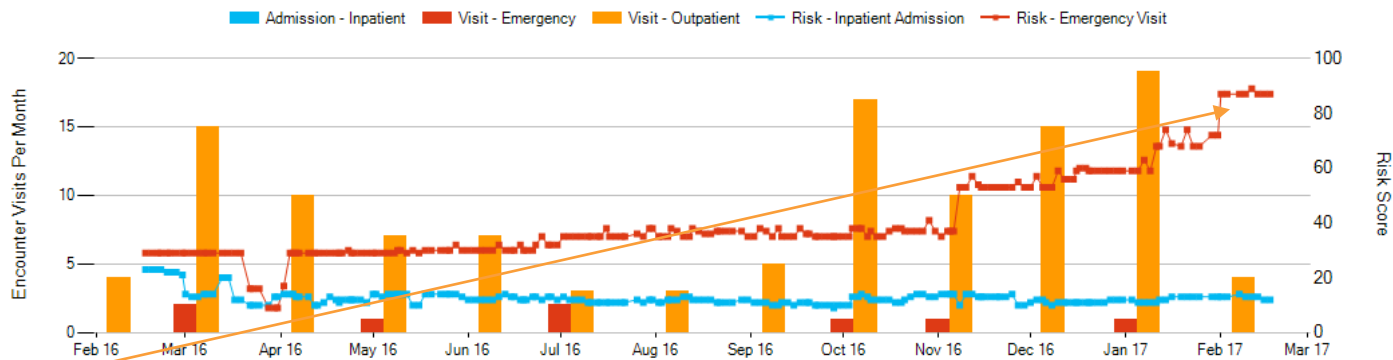
Target patients
in the ED > 30%
likelihood of
return ED visit



Risk – Emergency 30 Day Return Visit



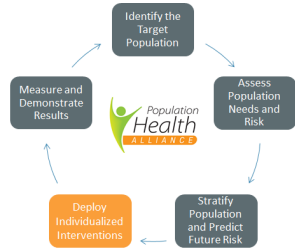
Population Health Case Study: Stratify Population and Predict Future Risk



Target patients
rising in ED visit
risk

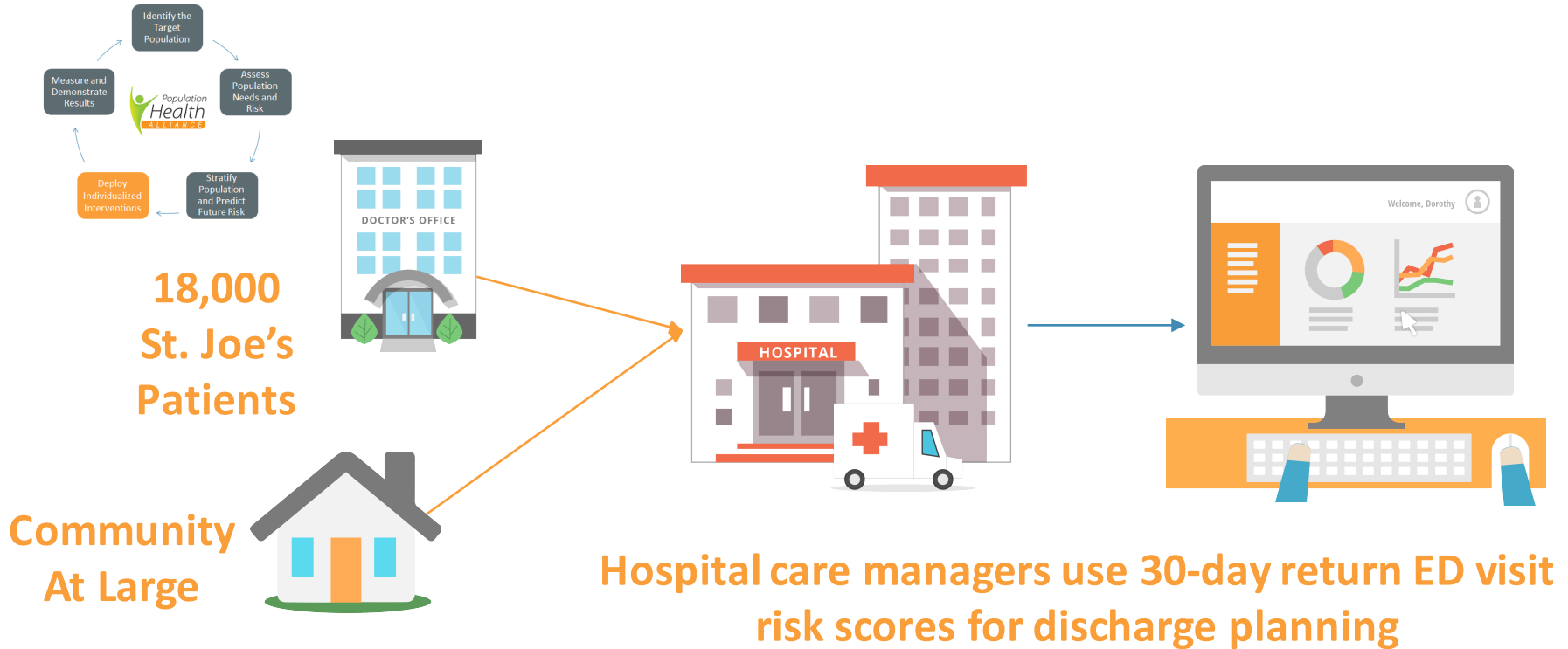
Population Health Case Study: Deploy Individualized Interventions

St. Joe's Staffing and Process



- RN care managers across the continuum
- 3 ambulatory (25,000 patients)
- 1 on each inpatient floor (4200 annual admissions)
- 2 in ER (27,000 annual visits)
- Ambulatory care managers assess risk scores
- Practice sets thresholds for each risk category
- Care managers call high-risk patients to educate and manage care gaps

Population Health Case Study: Deploy Individualized Interventions



Population Health Case Study: Deploy Individualized Interventions



ED risks and care gaps

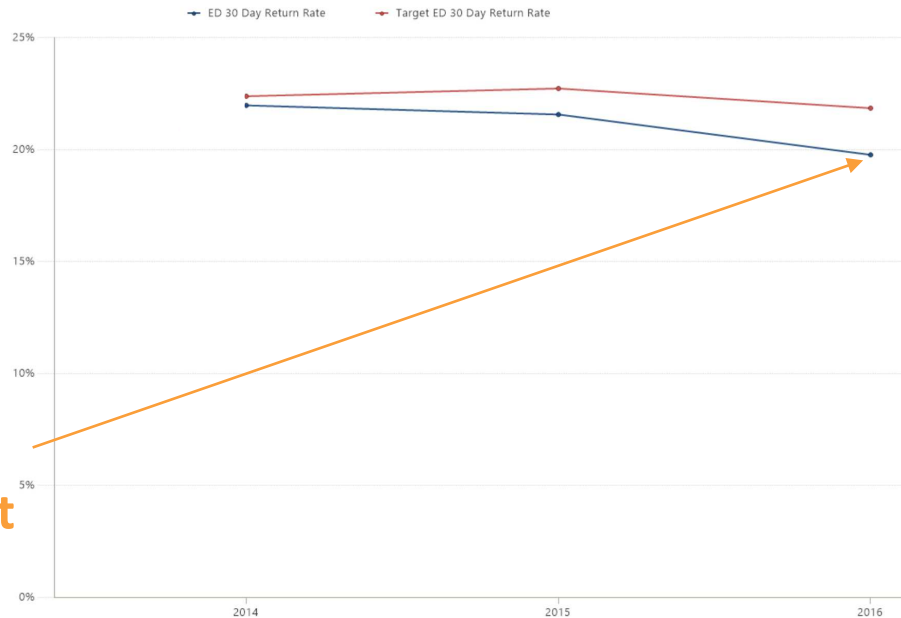
Summary	Patient Future 12 Month Risks	Inpatient 30 Day Readmission Risk	ED 30 Day Revisit Risk
Allergies & Alerts	Patient Future 12 Month Risks		
History	Future Cost	Modifiable Risks and Care Gaps	Model Features \$35900
Documents	Inpatient Admission	Modifiable Risks and Care Gaps	Model Features 46
Lab Results	Emergency Department Visit	Modifiable Risks and Care Gaps	Model Features 90
Radiology Results	Acute Myocardial Infarction	Modifiable Risks and Care Gaps	Model Features 7
Medications	Asthma	Modifiable Risks and Care Gaps	Model Features 100
Vaccinations	Cerebrovascular Accident	Modifiable Risks and Care Gaps	Model Features 0
Conditions	Congestive Heart Failure	Modifiable Risks and Care Gaps	Model Features 15
Procedures	Chronic Obstructive Pulmonary Disease	Modifiable Risks and Care Gaps	Model Features 100
Discharge Summaries	Diabetes	Modifiable Risks and Care Gaps	Model Features 1
Physical Exams	ED Risk Score Care Gaps and Interventions		
Plan	Modifiable Risk or Care Gap Measure		
Encounters	Blood pressure	•Coded as: ICD9 79.62 Elevated blood pressure reading without diagnosis of hypertension	Intervention <ul style="list-style-type: none"> • Assess and improve diet. Limit fat, sugar, sodium, and alcohol. Start heart-healthy diet: increased fruits and vegetables, whole grains, fish, lean meats, and low or non-fat dairy. Avoid foods high in saturated fat. • Lose weight if overweight, increase physical activity including exercising regularly. • Improve stress management. • Consider alternative contraceptive method, if on birth control pill. • Quit smoking if smoking. • Assess medications for managing hypertension.
Appointments			
Care Team			
Programs			
Patient Risk			

Population Health Case Study: Measure and Demonstrate Results



St. Joe's 3 year results:

- 10% decline in ED returns
- 10% below adjusted target



Population Health Case Study: Measure and Demonstrate Results



“One of the biggest uses of the analytics software for St. Joseph has been to reduce readmissions....that includes a 15 percent drop in ED readmissions in a six-month period.

Healthcare IT News

TOPICS SIGN UP MAIN MENU

Population Health

HIE analytics key to filling population health gaps, hospital executives say

St. Joseph Hospital in Bangor, Maine, makes use of data and analytics on the state's health information exchange to help reduce readmissions.

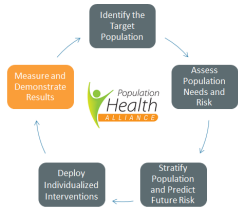
By [Jessica Davis](#) | April 28, 2016 | 11:37 AM

SHARE 205



St. Joseph Hospital in Bangor, Maine

Population Health Case Study: Measure and Demonstrate Results



St. Joe's Performance against State Norms

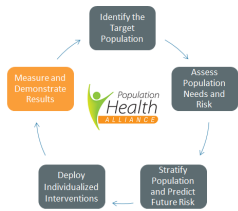
- 15.0% below target in emergency room visits
- 9.5% below target in 30-day ED return rate
- 4.2% below target in admissions
- 13.0% below target in 30-day readmissions
- 12.1% below target in inpatient days
- 5.0% below target in cost per person
- 37.3% below target in hospital mortality

Population Health Case Study: Measure and Demonstrate Results



Predictive Risk Score Use Cases	Benefits
Accurately identify those at risk	Eliminate manual efforts, intervene early
Manage 30-day readmits & ED revisits	Reduce unnecessary readmissions or revisits
Identify risk for high cost events	Reduce unnecessary cost and utilization
Identify risk of specific conditions	Prevent or better manage conditions like diabetes, COPD, AMI, or stroke.

Population Health Case Study: Measure and Demonstrate Results



Predictive Risk Score Use Cases	Benefits
Identify patients for palliative care with mortality scores	Prepare patients and families for end of life
Manage provider panels by risk score	Level load provider work
Preadmission testing planning	Improve patient post-op outcomes and discharge planning

Population Health Framework



Source: <http://populationhealthalliance.org/research/understanding-population-health.html>