

# 2018 WPI MIST Workshop

## *Data Analytics in Population Health*

Presented by:

Elisa Rosales, Senior Data Analyst

July 17<sup>th</sup>, 2018



- UMass Memorial - Clinton Hospital
- UMass Memorial - Community Healthlink
- UMass Memorial - HealthAlliance Hospital
- UMass Memorial - Marlborough Hospital
- UMass Memorial Medical Center
- UMass Memorial Medical Group
- UMass Memorial Accountable Care Organization, Inc.



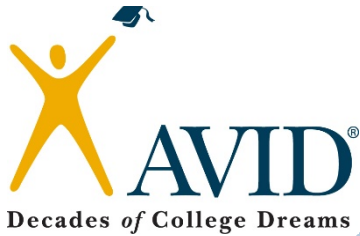
*Best place to give care,  
Best place to get care*

# Agenda

- About Me
- About UMass Memorial Health Care
- What is population health?
- About the Office of Clinical Integration
- Current Analytics Projects
- Recommendations
- Questions



# About Me



## 2008

Graduated from Wichita High School North  
4 Years in the AVID Program  
AP Calculus  
AP Statistics



## 2012

Graduated with B.S. in Mathematics from the University of Kansas  
3 Years teaching College Algebra to undergraduates  
Research experience with IMSD, SACNAS, MSRI



*Advancing Chicanos/Hispanics  
& Native Americans in Science*



# WPI

## 2015

Graduated with an M.S. in Applied Statistics from Worcester Polytechnic Institute  
Adjunct Instructor for M.S.E. Course  
Analytics Consultant at Silverlink Communications  
Application/Systems Analyst II for Epic Healthy Planet (UMMHC IS)



## 2017

Senior Data Analyst in the Office of Clinical Integration (OCI) at UMass Memorial Health Care (UMMHC)



# About UMass Memorial Health Care

- One of the largest health care systems in Central Massachusetts
- Partnered with the UMass Medical School
- Hospitals:
  - UMass Memorial Medical Center
  - Clinton Hospital
  - Health Alliance Hospital
  - Marlborough Hospital
- Fully accredited by the Joint Commission
- UMass Memorial Health Care by the numbers:
  - 1,600 physicians on our active medical staff
  - 3,000 registered nurses
  - 12,000 total employees
  - 1,125 beds in our hospitals
- Provide a variety of services from Heart & Vascular Care to Emergency Medicine & Trauma
- Other areas:
  - UMass Memorial Medical Group
  - UMass Memorial Medicare Accountable Care Organization



# UMMHC 2020 Vision

We will become the best academic health system in America based on measures of patient safety, quality, cost, patient satisfaction, innovation, education and caregiver engagement.

	2014 Increase Focus	2015-2018 Consolidate Wins	2020 Vision Position Ourselves for Future
<b>I</b> Deliver exceptional quality, service and value to the patients we serve	<ul style="list-style-type: none"> <li>Deliver world class access to our services through our 855-UMASS-MD platform</li> <li>Improve patient flow and reduce ED boarders</li> <li>Be completely transparent about our quality and service results</li> <li>Standardize care to enhance quality, efficiency and the educational experience of our students, residents and fellows</li> </ul>	<ul style="list-style-type: none"> <li>Expand 855-UMASS-MD hours and include on-line appointment scheduling capabilities for existing (portal) and new patients (Zoc Doc)</li> <li>Develop and implement entity/dept level quality and service improvement plans</li> <li>Expand our capacity to deliver low acuity care at a lower cost (ASC, Urgent Care and virtual visits)</li> </ul>	<ul style="list-style-type: none"> <li>24/7/365 electronic and telephonic patient access to all of our services</li> <li>Patient and family-centered, cost effective, high-quality care</li> <li>Efficient, contemporary facilities for our patients and providers</li> <li>Elimination of ED boarders</li> <li>Top decile quality/service</li> </ul>
<b>II</b> Invest in the best	<ul style="list-style-type: none"> <li>Programmatic service line review and initial investments in new MDs and resources based on the clinical and academic quality of current program, profitability and growth potential</li> </ul>	<ul style="list-style-type: none"> <li>Service line investments analyzed and adjusted annually based on clinical and academic quality and efficiency of program, profitability and growth potential</li> </ul>	<ul style="list-style-type: none"> <li>Innovative, select specialty services that are internationally recognized</li> </ul>
<b>III</b> Increase our community presence	<ul style="list-style-type: none"> <li>Grow community-based primary care</li> <li>Increase private physicians in MCN</li> <li>Increase community-based specialist programs</li> </ul>	<ul style="list-style-type: none"> <li>Continued growth of owned (CMG) and affiliated (MCN) community based primary and specialty care practices</li> </ul>	<ul style="list-style-type: none"> <li>Academic health system with a strong community presence</li> </ul>
<b>IV</b> Build our population health capabilities	<ul style="list-style-type: none"> <li>Governmental payer pilots (duals)</li> <li>Shared savings and quality-focused shared risk (AQC) with commercial populations</li> <li>Build HCC coding and quality infrastructure</li> </ul>	<ul style="list-style-type: none"> <li>Become a Medicare ACO, enhance TME management capabilities, expand successful pilot programs (My Link)</li> <li>Align with payers and employers</li> <li>Create an ACO laboratory with UMMS</li> </ul>	<ul style="list-style-type: none"> <li>A fully integrated delivery system (Payer/Provider) managing the overall cost and quality of care for defined populations</li> </ul>
<b>V</b> Create an enabling culture of ownership	<ul style="list-style-type: none"> <li>Improve IT dependability, speed and usability and open the patient portal</li> <li>Employee wellness program</li> <li>World-class employee idea system</li> <li>Executive rounding program</li> </ul>	<ul style="list-style-type: none"> <li>Enhance employee development and recognition programs</li> <li>Partner with UMMS to build an IT system that integrates all available clinical data, is fast, dependable and easy to use from a secure mobile platform</li> </ul>	<ul style="list-style-type: none"> <li>Top decile employee satisfaction</li> <li>Patient and provider-centric integrated EHR</li> </ul>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>Doable &amp; financially feasible</li> <li>Path critical</li> </ul>	<ul style="list-style-type: none"> <li>Time and/or capital intensive</li> <li>Dependent on Phase I</li> </ul>	<ul style="list-style-type: none"> <li>Time and/or capital intensive</li> <li>Dependent on Phase II</li> </ul>

# What is Population Health?

## Definition

Overall management of the physical, mental health & well being of the communities we serve.

## Vision

A fully integrated delivery system (Payer/Provider/Patient) managing the overall cost and quality for defined populations.

## Mission

Provide the highest quality of care and wellness in the most cost effective and efficient manner.

# The Current Direction of Healthcare Reimbursement



## The Creation of OCI

*“Achieving meaningful clinical integration will be crucial to the future success of UMass Memorial Health Care as the health care industry evolves.*

*Clinical integration is a model of practice bringing together physicians and other providers to standardize, improve and coordinate care across our entities with the goal of safer, more effective and more efficient patient care.*

*The importance of a robust clinical integration effort to our long-term success is so significant that we are establishing a system-level **Office of Clinical Integration.**”*

- Excerpt from May 11, 2011 e-mail communication  
To Physicians and System Leaders  
From John O’Brien, UMMHC President and CEO



# How does the Office of Clinical Integration support UMMHC Population Health initiatives?

Collaborate with participants to:

- Improve Quality
- Manage Total Medical Expense (TME) with emphasis on community-based care
- Reduce Ambulatory Care Sensitive Conditions (ACSC) Admissions and Re-admissions
- Manage complex patients more effectively
- Affect state and federal policy development
- Develop innovative pilots and programs

# Services Provided to Our Value Based Programs:

## ■ Quality Reporting & Analytics

- Medicare quality measure performance reporting via GPRO (Group Practice Reporting Option)
- Commercial payer contract quality performance modeling
- Physician Quality Incentive plan development & administration
- Risk adjusted panel size development
- Care management reporting
- Ad hoc reporting as requested

## ■ Total Medical Expenditure Analysis

- Government payer claims analysis
- Care management analysis

## ■ Practice Improvement Facilitation

- Account management
- Process improvement
- Practice support and education
- Triage and communication
- Quality metrics intervention reengineering

## ■ Behavioral Health Integration

## ■ Outreach

- Panel hygiene
- Patient Communication
- Testing medication compliance
- Evaluation of new outreach tools
- Support for PIF identified gaps

# Services Provided to Our Value Based Programs:

## ■ Coding/Medical Record Auditing

- HCC and Medicare quality measure documentation

## ■ ACO Operations

- Participation agreements
- Certifications
- Customer relationship management
- Network development
- Program compliance support

## ■ Care Management

- Support for complex patients – both socially and medically complex
- Post Acute Care Network development
- Focus on improving transitions of care
- Longitudinal care management
- CommunityHELP

## ■ IT & Data Management

- Building capabilities in: EHR data aggregation; analytics; claims management and predictive modeling – Mirth, Optum, DataGen, Verscend
- Enhancing internal tools - SharePoint
- Implementing new tools – PatientPing, Salesforce (CRM)
- Epic Support - Provider Network integration, Healthy Planet

## ■ Program Compliance & Training

## ■ Policy Analysis & Support

- ACA/MACRA/MIPS

# Current Analytics Projects



# What is my Risk Adjusted Panel Size?

## PCP Panel Profile and Risk Adjusted Panel Calculation

### FM Practices

Group Name  
(All)

Practice1  
(All)

NP/Resident Pts  
No

Data Update Through  
June\_2017

**Top 10 FM PCPs with High Risk Score**

PCP Name	T..
1	4.33
2	3.59
3	3.54
4	3.52
5	3.12
6	2.74
7	2.40
8	2.34
9	2.34
10	2.30

**Top 10 FM PCPs with High Risk Adjusted Panel**

PCP Name	T..
1	7,434
2	3,880
3	3,400
4	2,957
5	2,931
6	2,887
7	2,888
8	2,599
9	2,429
10	2,407

**FM Practices Average Risk Score by Pt Population**

Pt Population	N of Pts	Risk Score
COMMERCIAL	48,143	1.11
MEDICAID	7,531	1.97
MEDICARE	8,805	4.19
OTHERS	1,716	1.34
Grand Total	64,195	1.84

**PCP Patient Population Profile**

**Average Risk Score by Pt Population**

Pt Population	N of Pts	Risk Score
COMMERCIAL	198	1.74
MEDICAID	187	2.13
MEDICARE	53	5.27
OTHERS	15	1.17
Grand Total	453	2.30

**Patient Population**

**Patient Gender**

**Patient Age Distribution**

**PCP Risk Adjusted Panel Calculation**

N of Patient Panel	453
Medicaid	187
Risk Score	2.30
Adjusted Risk Score	1.24
PCP Bookable Clinical Time FTE Rate	0.45
Medicaid Social Complexity Factor Rate	0.25

**PCP Risk Adjusted Panel**

$$= \frac{(N_{All Pts} \times PCP \text{ Adjusted Risk Score}_{Medicaid \text{ adjustment factor}})}{(Bookable \text{ Clinical Hours FTE Rate})}$$

$$= 1,252$$

Report Developed by Office of Clinical Integration, Massachusetts General Hospital, Harvard Medical School

Confidential - Not for Distribution

12

# How is my Practice Performing on Ambulatory Quality Measures?

Measurement Period **CY2017**

Process Measure CY2017 HMO BCBS, TUFTS and HPHC claims data through 03/31/2018; CY2016 commercial payor data used as comparison.

Outcome Measure CY2018 collected outcomes for 2017 as of 6/26/2018; CY2017 collected final outcomes for 2016 used as comparison.

Patient Experience.. MHQP 2016 Survey received 9/1/2017; MHQP 2015 survey results used as comparison; Benchmarks are from MHQP 2015 Statewide Result..

NCQA Benchmarks NCQA 2015 Regional (25th-75th) and National (90th) benchmarks; NCQA 2016 National benchmarks (25th-90th) for Diabete Statin.

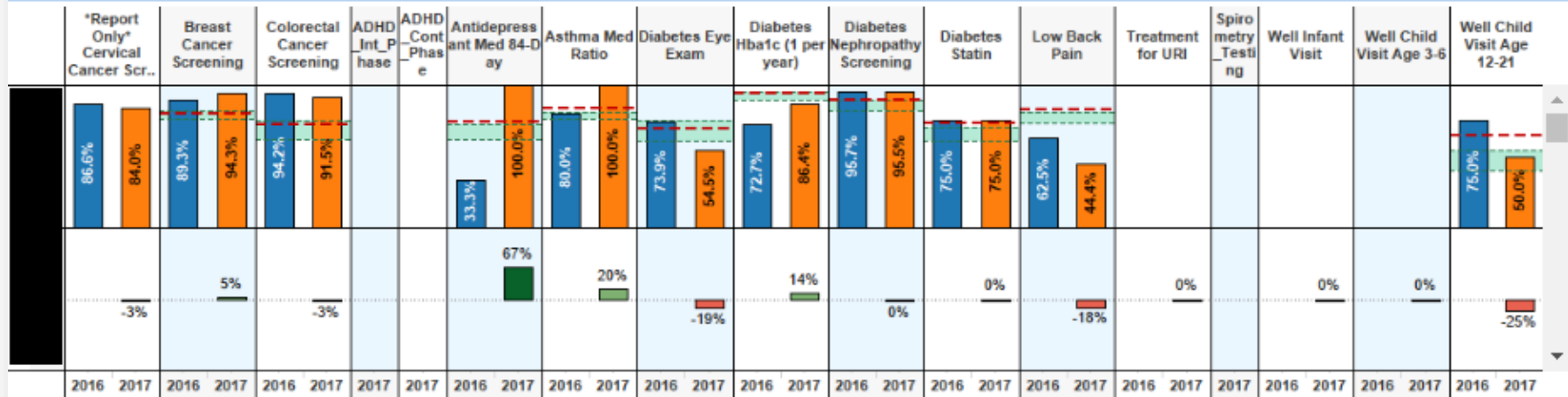
NCQA Benchmarks  
25th & 75th Regional

Ambulatory Quality Score

90th National

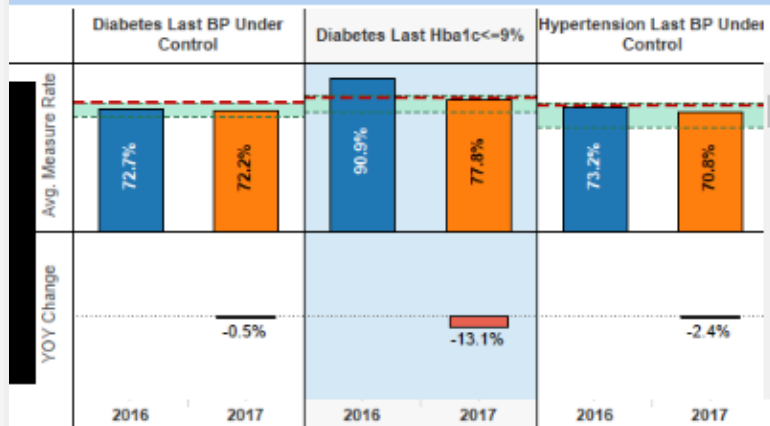
## Process Measures

2016 End-Year Performance VS. 2017 YTD Performance



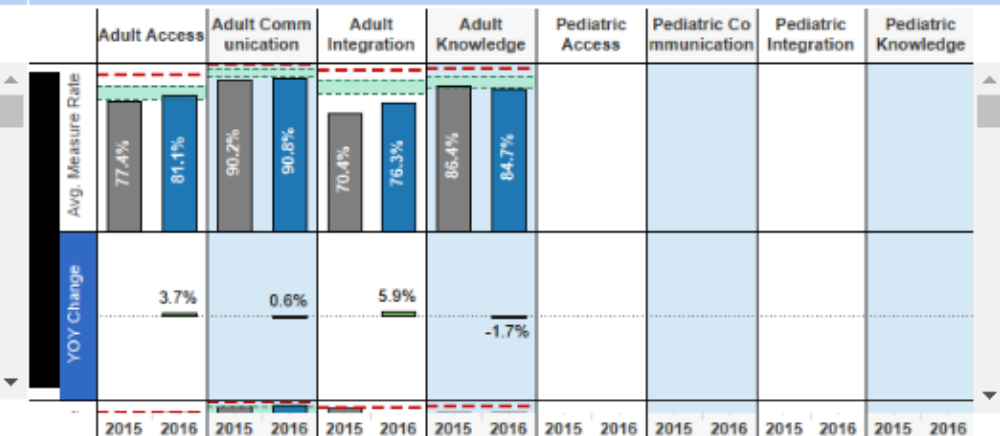
## Outcome Measures

2016 End-Year Performance VS. 2017 Collection Performance



## MHQP Patient Experience Measures

2015 End-Year Performance VS. 2016 End-Year Performance



Contact Office Clinical Integration for Questions: OCIA@analysis@umassmemorial.org

Health Care

UMASS Medical School

# How is my Practice Performing on Ambulatory Quality Measures?

Measurement Period **CY2017**

Process Measure CY2017 HMO BCBS, TUFTS and HPHC claims data through 03/31/2018; CY2016 commercial payor data used as comparison.

Outcome Measure CY2018 collected outcomes for 2017 as of 6/26/2018; CY2017 collected final outcomes for 2016 used as comparison.

Patient Experience.. MHQP 2016 Survey received 9/1/2017; MHQP 2015 survey results used as comparison; Benchmarks are from MHQP 2015 Statewide Result..

NCQA Benchmarks NCQA 2015 Regional (25th-75th) and National (90th) benchmarks; NCQA 2016 National benchmarks (25th-90th) for Diabete Statin.

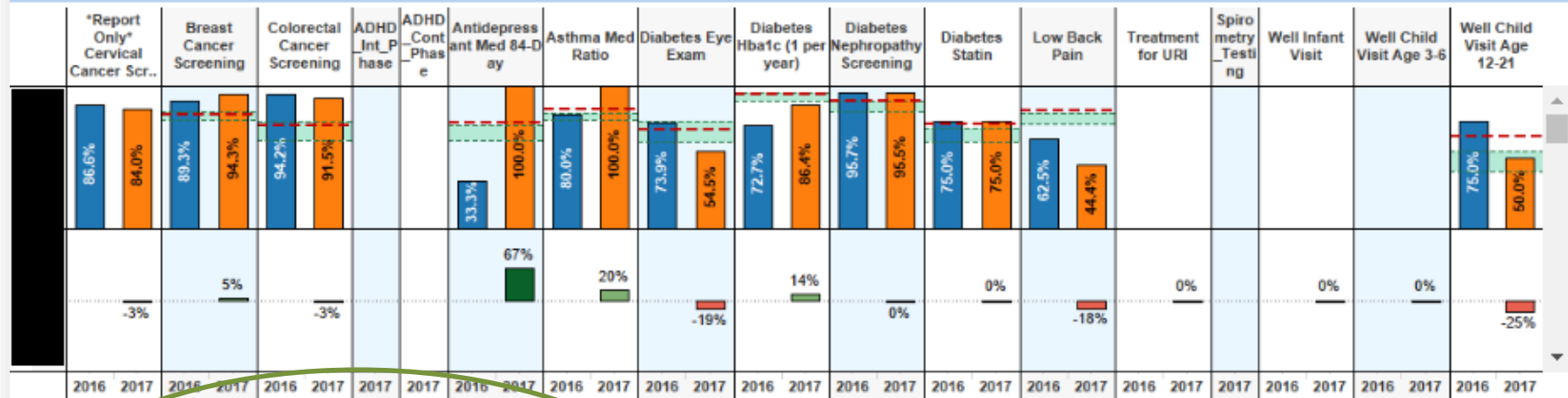
NCQA Benchmarks  
25th & 75th Regional

Ambulatory Quality Score

90th National

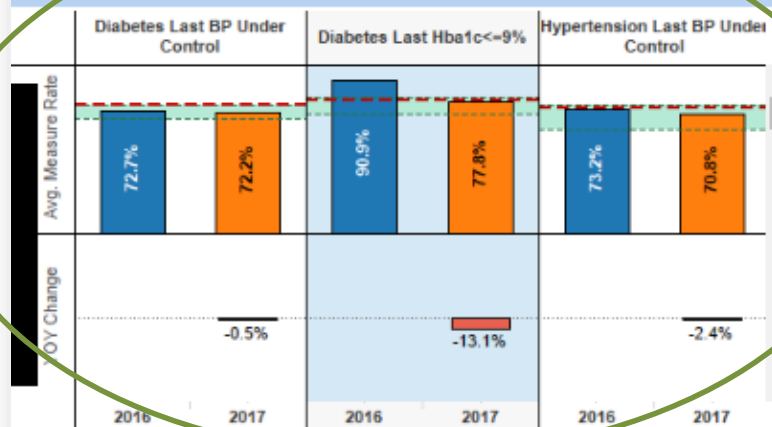
## Process Measures

2016 End-Year Performance VS. 2017 YTD Performance



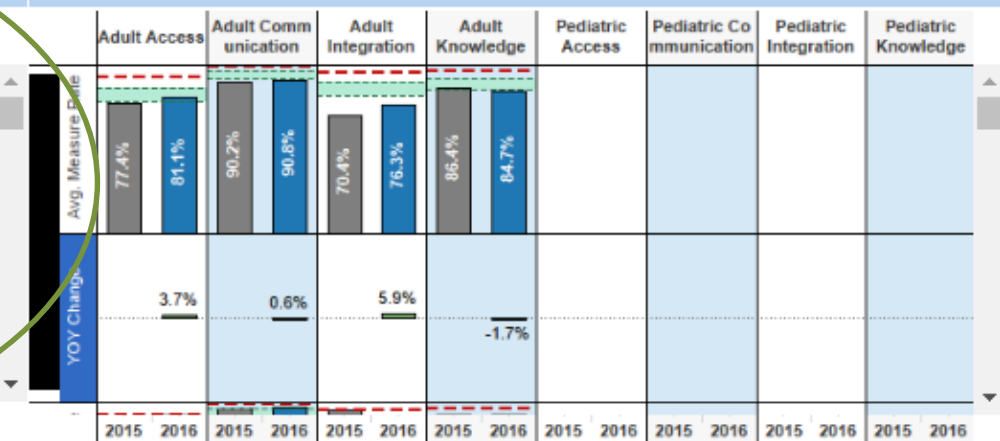
## Outcome Measures

2016 End-Year Performance VS. 2017 Collection Performance



## MHQP Patient Experience Measures

2015 End-Year Performance VS. 2016 End-Year Performance



Contact Office Clinical Integration for Questions: OCIA@analysis@umassmemorial.org

Health Care

UMASS Medical School

# Sampling for Outcome Measures

*How many patients should we sample to be within 5% of the true measure performance for a given practice with 95% confidence?*

Practice Name	CY 2017 Measure Name	CY 2017 Measure Population Size	CY 2016 Measure Performance
Practice A	Diabetes A1C Outcome	246	83.1%



# Sampling for Outcome Measures

*How many patients should we sample to be within 5% of the true measure performance for a given practice with 95% confidence?*

Practice Name	CY 2017 Measure Name	CY 2017 Measure Population Size	CY 2016 Measure Performance
Practice A	Diabetes A1C Outcome	246	83.1%

Suppose we ignored the small N:

$$n = \frac{\hat{p}(1 - \hat{p})}{\left(\frac{ME}{z^*}\right)^2}$$

# Sampling for Outcome Measures

*How many patients should we sample to be within 5% of the true measure performance for a given practice with 95% confidence?*

Practice Name	CY 2017 Measure Name	CY 2017 Measure Population Size	CY 2016 Measure Performance
Practice A	Diabetes A1C Outcome	246	83.1%

Suppose we ignored the small N:

$$n = \frac{\hat{p}(1 - \hat{p})}{\left(\frac{ME}{z^*}\right)^2}$$

ME=0.05

$z^* = 1.96$

$\hat{p} = 0.831$

Then,

$$n = \frac{0.831(1-0.831)}{\left(\frac{0.05}{1.96}\right)^2} = 215.3 \rightarrow 216$$

# Sampling for Outcome Measures

*How many patients should we sample to be within 5% of the true measure performance for a given practice with 95% confidence?*

Practice Name	CY 2017 Measure Name	CY 2017 Measure Population Size	CY 2016 Measure Performance
Practice A	Diabetes A1C Outcome	246	83.1%

Now, let's apply the finite population correction factor (fpc):

$$n = \frac{n_0 N}{n_0 + (N - 1)}$$

Where,

$$n_0 = \frac{\hat{p}(1 - \hat{p})}{\left(\frac{ME}{z^*}\right)^2}$$

# Sampling for Outcome Measures

*How many patients should we sample to be within 5% of the true measure performance for a given practice with 95% confidence?*

Practice Name	CY 2017 Measure Name	CY 2017 Measure Population Size	CY 2016 Measure Performance
Practice A	Diabetes A1C Outcome	246	83.1%

Now, let's apply the finite population correction factor (fpc):

$$n = \frac{n_0 N}{n_0 + (N - 1)}$$

Where,

$$n_0 = \frac{\hat{p}(1 - \hat{p})}{\left(\frac{ME}{z^*}\right)^2}$$

ME=0.05,  $z^* = 1.96$ ,  $\hat{p}=0.831$ ,  $n_0=215.3$

$$n = \frac{215.3 * 246}{215.3 + (246 - 1)} = 115.1 \rightarrow 116$$

# Which patients are High ED Utilizers?

### ED Visit Count

PrimaryMRN	LastName	FirstName	CMSStatus	PCP Name	Practice Name	ED Visits Per Patient
			currently e..			22
			currently e..			21
			closed			21
						21
						21
						19
						19
						18
						17
			closed			17
			currently e..			16
						15
						15
						14
						13
			currently e..			13
			currently e..			13
			currently e..			12
						12
			currently e..			12
						11
			currently e..			11
						11

### ED Primary Diagnoses

### Overview

Number of ED Visits	9,642
Number of Patients	5,641
ED Visits per Patient	1.71

#### CM Enrollment Status\*

	5,326
closed	82
currently enrolled	223
in process	4
Patient Declined	1
patient refused	6

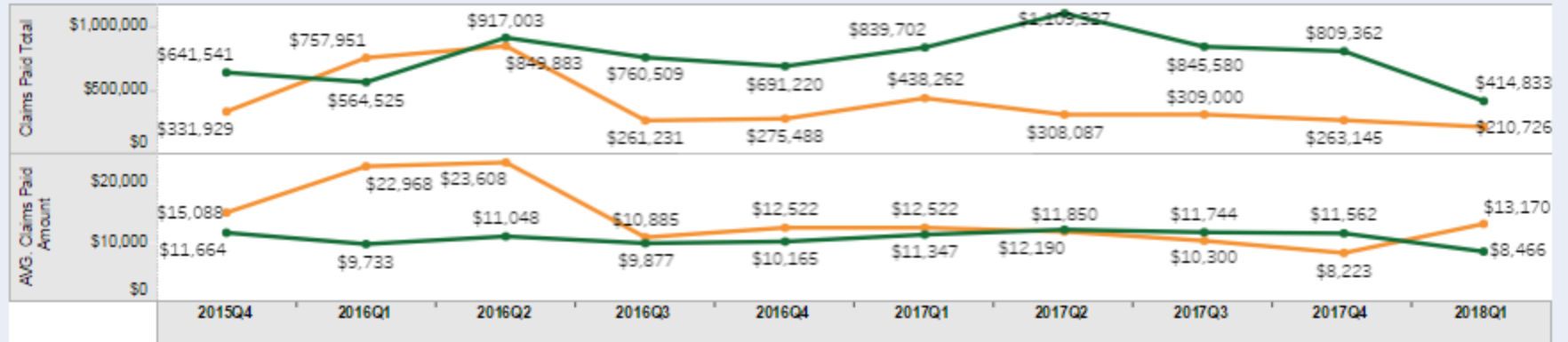
*\* Note: Not all care management enrollment statuses are captured in dashboard. Please verify enrollment in patient's chart.*

### ED Visit Detail

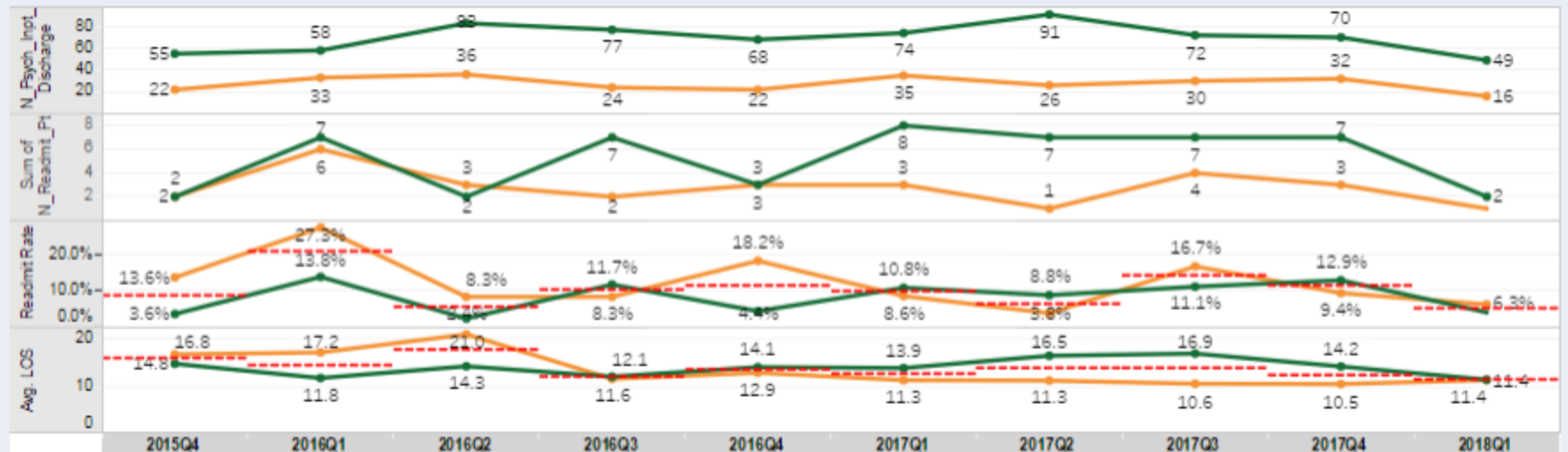
PrimaryMRN	LastName	FirstName	DepartmentExternalName	EncounterKey	ArrivalInstant	DepartureInstant	EDPrimaryDiagnosisName
			University Campus	83896873	1/26/2018 9:57:00 AM	1/26/2018 4:02:00 PM	Hypoglycemia
				86841380	4/10/2018 12:25:00 PM	4/10/2018 4:58:00 PM	Low back pain, unspecified back pain laterality, unspecified chronicity, with sciatica presence unspecified
			University Campus	84817902	2/19/2018 5:20:00 PM	2/20/2018 1:01:00 AM	*Unspecified
				89874530	7/1/2018 7:38:00 PM	7/2/2018 1:07:00 AM	Respiratory distress
			University Campus	83366036	1/14/2018 9:55:00 AM	1/14/2018 7:54:00 PM	Sepsis, due to unspecified organism (CMS/HCC)
				83902956	1/26/2018 11:24:00 AM	1/26/2018 6:02:00 PM	Status epilepticus due to refractory epilepsy (CMS/HCC)
			Memorial Campus	87510133	4/28/2018 11:10:00 PM	4/29/2018 1:47:00 AM	Abdominal pain, unspecified abdominal location
				87847778	5/10/2018 11:15:00 AM	5/10/2018 12:21:00 PM	Chest pain, unspecified

# Do target facilities perform better than non-target on Psychiatric/Behavioral Health Inpatient Admissions?

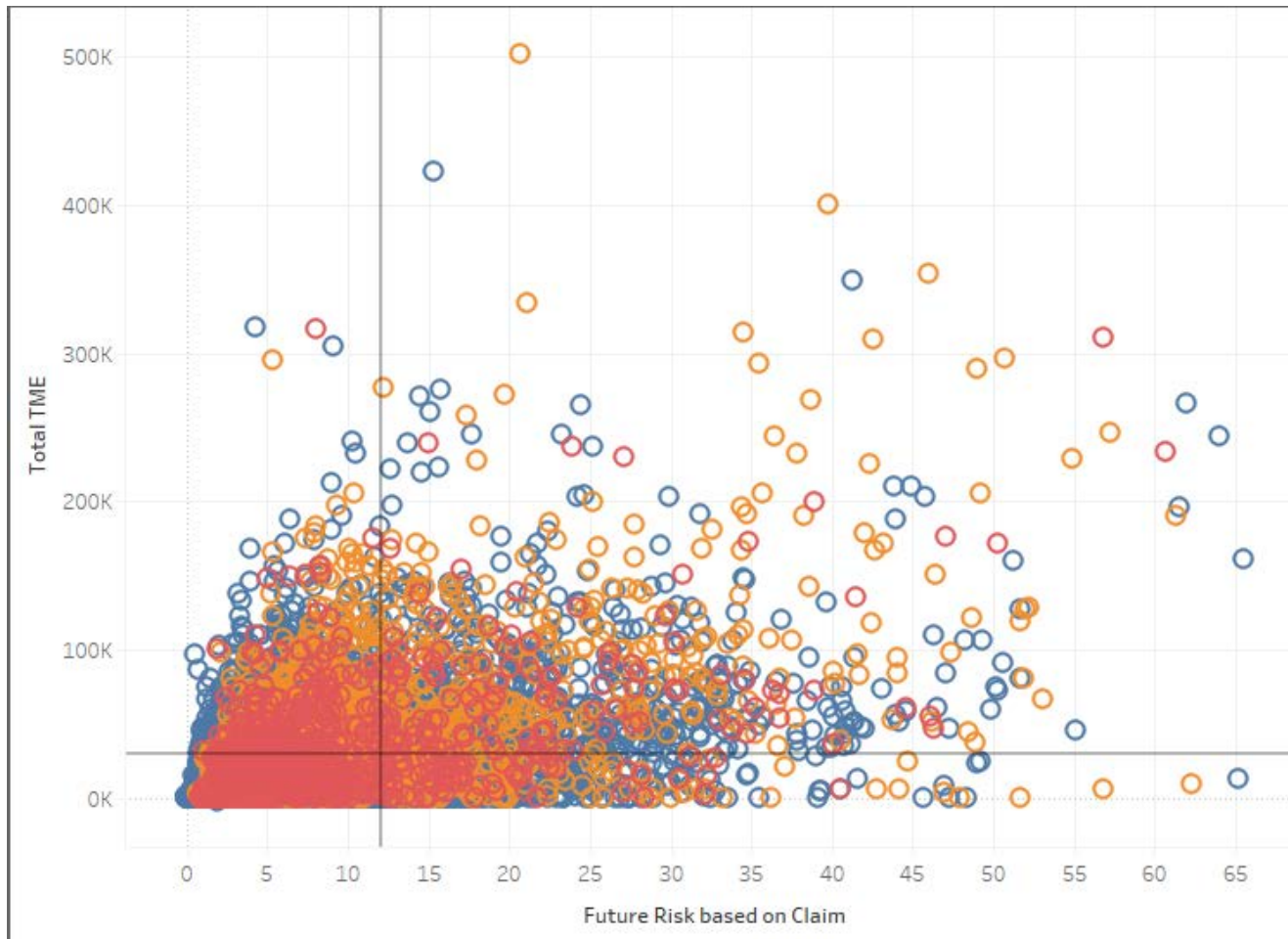
Psych Facility Expenditure



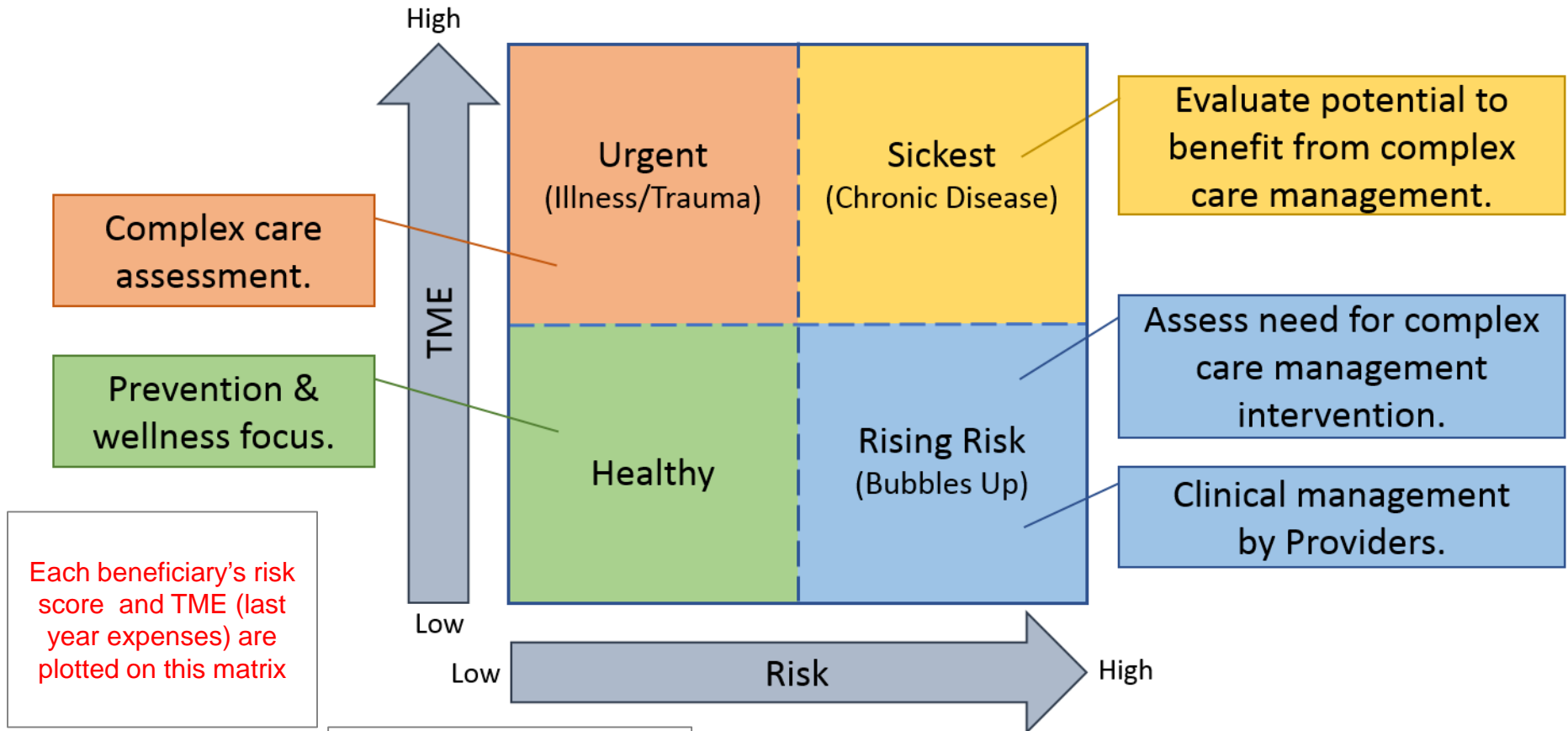
Psych Facility Utilization Measures



# How can we stratify the patient population to provide the highest quality care in the most cost effective and efficient manner?



# The 4 Quadrant Patient Risk/Total Medical Expense (TME) Matrix



Each beneficiary's risk score and TME (last year expenses) are plotted on this matrix

More efficient way to find the patients needing care management assessment and/or primary care physician intervention.



# How do my patients progress through quadrants across different time periods?

CLAIM DATE\_1: DEC17 | CLAIM DATE\_2: MAR18 | Group Name: (All) | Provider Practice Name: (All)

N of Selected: 54,187 | CMS PCP: (All) | Bene Type: (All) | CM Pts: (All) | Care Manager: (All)

Patient Under Active CM in the last 12 months as of: Apr18

Please refer to FAQ tab for Risk Analytics and TME data date

Feb18 claim\_date data is not available due to claim issue

CLAIM_DATE1 \ CLAIM_DATE2	Not Categorized	Quad1	Quad2	Quad3	Quad4
Not Categorized	13,041	310	9	1	5
Quad1	1,236	33,881	217	310	48
Quad2	164	580	2,137	39	197
Quad3	32	188	9	438	36
Quad4	121	24	213	98	851

**Progression Category**

- CM Recommended
- Positive Change
- Potential Assessment Recommended
- No Change

**Quadrant 2:** Low Risk, High TME

**Quadrant 4:** High Risk, High TME

**Quadrant 1:** Low Risk, Low TME

**Quadrant 3:** High Risk, Low TME

High Risk: risk score > 12  
High TME: TME > \$30,000

**Count of Beneficiaries by Progression Category**

Total Categorized Bene: 39,266

CM Recommended	808
Potential Assessment Recommended	146
Positive Change	1,005
No Change	37,307

**Percent (%) of Bene by Progression Category - Practice**

CM Recommended	3.57%
Potential Assessment Recommended	1.79%
Positive Change	2.14%
No Change	1.67%

**Percent (%) of Bene by Progression Category - Network**

CM Recommended	2.06%
Potential Assessment Recommended	0.37%
Positive Change	2.56%
No Change	95.01%

**Count of Beneficiries Not Categorized in Both Month** 13,041

**Count of Bene Dropped from CLAIM DATE\_1 by Quadrant**

Total Bene Dropped from CLAIM DATE\_1: 1,553

Drop From Quad1	1,236
Drop From Quad2	164
Drop From Quad3	32
Drop From Quad4	121

**Count of Bene New to CLAIM DATE\_2 by Quadrant**

Total Bene New to CLAIM DATE\_2: 327

New to Quad1	310
New to Quad2	9
New to Quad3	3
New to Quad4	5

# What skills are needed to be a successful data analyst?

**Knowledge of data flow** and ability to manipulate and clean data

## Key tools:

- SQL
- SPSS
- Excel
- Optum One
- Epic Reporting Workbench, WeBI, Caboodle

**Data visualization** skills

## Key tools:

- SPSS
- Tableau

Ability to **interpret statistical** results

## Key tools:

- SPSS
- Tableau

# Recommendations

- Let students explore datasets that interest them
  - Kaggle, Census, baseball stats
- Use free tools like Dbeaver to build databases and manipulate data
- Use free tools like R to give students exposure to statistics programming language
- Give students stats projects and have them interpret results to the class

# Questions?