Together2Goal®
AMGA Foundation
National Diabetes Campaign
Monthly Campaign Webinar
October 19, 2017
TODAY’S WEBINAR

• **Together 2 Goal® Updates**
  – Webinar Reminders
  – November 2017 Monthly Webinar
  – Goal Post October Newsletter Highlights

• **Patient-Reported Outcomes in Diabetes**
  – Nirav Vakharia, M.D. and Irene Katzan, M.D., M.S., of Cleveland Clinic

• **Q&A**
  – Use Q&A or chat feature
• Webinar will be recorded today and available the week of October 23rd
  – Together2Goal.org Website
    (Improve Patient Outcomes → Webinars)
  – Email distribution
• Participants are encouraged to ask questions using the “Chat” and “Q&A” functions on the right side of your screen
• **Date/Time:** Thursday, November 16, 2-3pm Eastern

• **Topic:** Community-Wide Diabetes Initiatives

• **Presenters:** Leon Jerrels, M.B.A., M.H.A., R.N., CPHQ, Director of Quality Improvement, of Kelsey-Seybold Clinic
Second Annual National Day of Action
November 9, 2017

- Sign the online pledge
- Watch our provider video
- Stream our Facebook Live, co-hosted with the American Diabetes Association (ADA)

Check back on our website on November 1 for links to these and other actions you can take on our National Day of Action!
GOAL POST NEWSLETTER: OCTOBER UPCOMING DATES

Upcoming Dates

- **November 9:** Together 2 Goal® National Day of Action
- **November 16:** Monthly campaign webinar on Community-Wide Diabetes Initiatives
- **January 8:** Deadline for abstracts for ADA’s Scientific Sessions
CALL FOR ABSTRACTS | Deadline: January 8, 2018—5:00 p.m. EST

Abstract submission for the 78th Scientific Sessions is now open!

Each year, only the best new basic and clinical science related to diabetes and its complications is presented at the Scientific Sessions, providing the latest research and investigative methods not found at any other meeting.

The committee encourages submissions that are innovative, challenge current treatment paradigms, and represent the latest advances in basic, clinical, and translational science. This is your opportunity to shape the scientific program and help ensure that the most relevant spectrum of topics is presented at the meeting.

Submit your research today!

Visit scientificsessions.diabetes.org for the most up-to-date meeting information.
Campaign Spotlight

Jerry Penso, M.D., M.B.A.
Named AMGA President and CEO

"I'm committed to ensuring AMGA becomes an even stronger voice in changing and improving health care, and supporting our members in meeting the needs of patients."
GOAL POST NEWSLETTER: OCTOBER RESOURCE OF THE MONTH

Resource of the Month

email Together2Goal@amga.org for slides!
Nirav Vakharia, M.D.  
Associate Chief Quality Officer  
Cleveland Clinic

Irene Katzan, M.D., M.S.  
Vascular Neurologist  
Cleveland Clinic
Agenda

• Who we are

• Our approach to diabetes care

• Patient-entered data at Cleveland Clinic

• Assessing the value of PED in diabetes
Health Care Provider for...
NOT Health Care Provider for...
Vital Statistics

- 53,000 caregivers
- 220,000 admissions
- 14,000 surgeries/month
- 7.1M visits/yr
- 3600 physicians
- 2000 residents/fellows
- Single electronic record
- US$8B revenue
Adult Primary Care
Who We Are

400k adult patients
300 PCPs
50 care coordinators
51 ambulatory sites
10 social workers
10 clinical pharmacists
Our Approach to Diabetes Care
Our Quality Performance

Transparency
"Trying harder"
Reactive

Teams, teams, teams
Tools (technology)
Proactive

time
“Teamlets” within Practices

Shared Resources
Pharmacy, Behavioral Health, Social Work, etc.
Tools (Technology)

- Registries
- Care pathways
- Patient portal (MyChart)
- Virtual visits & education
- Home device integration
BP Control <140/90
(n=150,000)

66%

75%

Jan 2015  |  Jul  |  Jan 2016  |  Jul  |  Jan 2017  |  Jul
Uncontrolled Diabetes HbA1c>9
(n=59,000)

26%

---|---|---|---|---|---|
26% | | | | | 17%
Patient Entered Data at the Cleveland Clinic
Rationale for PRO Collection
Value-based Care

1) Improve (patient-centered) care
   - Screen for conditions, monitor outcomes
   - The question patients ultimately care about is:
     “Do I feel better?

2) Value-based care
   \[ \text{Value} = \frac{\text{Outcome}}{\text{Cost}} \]
   - Measuring, reporting, and comparing outcomes are perhaps the most important steps toward rapidly improving outcomes and making good choices about reducing costs

3) Generation of new knowledge

4) Quality
Patient-entered Data Collection at Cleveland Clinic

- Knowledge Program - system that electronically collects and tracks patient reported outcomes within existing clinical work flows
- Began 2007 within the Neurological Institute and has expanded
- Currently an agnostic platform
- Integrates with EHR

**Standard Questions**

**Custom Questions**
<table>
<thead>
<tr>
<th>Questionnaire Name</th>
<th>Score</th>
<th>Interpretation</th>
<th>Flowsheet</th>
<th>Sig Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Health Questionnaire (PHQ-9)</td>
<td>27</td>
<td>Severe Depression</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Pain Disability Questionnaire</td>
<td>135</td>
<td>(Range 0-150): Higher score indicates greater disability</td>
<td></td>
<td>ND</td>
</tr>
</tbody>
</table>

Score: Patient Health Questionnaire (PHQ-9) score is 27, indicating Severe Depression.

Score interpretation: The score indicates greater disability.

Longitudinal data display: Displays a graph with a line.

Clinically meaningful change from prior score: Indicates a significant change from a prior score.
Provider Display

Patient Health Questionnaire (PHQ-9)
Score: 27
Interpretation: Severe Depression

Graph

Patient Health Questionnaire (PHQ-9)
KP HSM scores

Select options: 5 Months, 1 Year, 2 Years, 5 Years, All
Patient-entered data can flow into the clinic note:

Scores over time:

07/25/17 - PHQ-2 Score: 0  PHQ-9 Score: 2

Detailed results:

Patient Health Questionnaire (PHQ-9)

PHQ-9 Levels:

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-4</td>
<td>Minimal depression</td>
</tr>
<tr>
<td>5-9</td>
<td>Mild depression</td>
</tr>
<tr>
<td>10-14</td>
<td>Moderate depression</td>
</tr>
<tr>
<td>15-19</td>
<td>Moderately severe depression</td>
</tr>
<tr>
<td>20-27</td>
<td>Severe depression</td>
</tr>
</tbody>
</table>

PHQ-9 Score: 2
PHQ-2 Score: 0 (0-3)

Daily difficulty level due to depression (0-3): 0

1. Little interest or pleasure in doing things? Not at all
2. Feeling down, depressed, or hopeless? Not at all
3. Trouble falling or staying asleep, or sleeping too much? Several days
4. Feeling tired or having little energy? Several days
5. Poor appetite or overeating? Not at all
6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down? Not at all
7. Trouble concentrating on things, such as reading the newspaper or watching television? Not at all
8. Moving or speaking so slowly that other people could have noticed. Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual? Not at all
9. Thoughts that you would be better off dead, or of hurting yourself in some way? Not at all
10. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people? Not difficult at all
Clinical Decision Support

Epic Best Practice Alert - displayed at encounter open

PHQ-9 screening suggests possible depression

Recommended actions: (Final decision depends on your clinical judgment)
1. Provide depression literature to patient (family)
2. Encourage patient (family) to seek further assessment from PCP or behavioral healthcare specialist
3. Consider initiating antidepressant treatment and following patient

Open SmartSet  Do Not Open  MEDICINE INSTITUTE CLINICAL DEPRESSION preview

View Graphs of Patient Scores

Can click Hyperlink to view graphs of patient scores over time

Acknowledge Reason

- No Depression Literature Needed
- On Depression Meds
- Seeing Behavioral Health Provider
- Both on Depression Meds and Seeing Behav...

Apply Selected

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Clinical Decision Support

“Graph of Patient Scores” Link from within BPA
Knowledge Program
Enterprise Coverage

Live

Lake Erie

Cuyahoga County

Cleveland Clinic Lorain
Cleveland Clinic Avon
Cleveland Clinic Westlake
Cleveland Clinic Lakewood
Fairview Hospital
Lakewood Hospital

Lake County

St. John Health Center
Euclid Hospital
Euclid Willoughby Hills

Geauga County

Hillcrest Hospital

Lorain County

Lou Ruvo
Reno
Elkhart

Medina County

Cleveland Clinic Brunswick
Medina Hospital

Summit County

Cleveland Clinic Broadview Heights
Cleveland Clinic Independence

Summit County

Cleveland Clinic Beachwood
Sports Health at the JCC

Summit County

Cleveland Clinic Solon

Summit County

Cleveland Clinic Twinsburg

Wayne County

Cleveland Clinic Wooster

Wayne County

Medina Hospital

Westin, Florida
Patient-entered Data

- ~115,000 encounters each month contain HSM data
- Over 3.9 million patient visits contain PRO data
- Over 1,000 providers actively use the KP system across 89 centers/departments
- 197 patient or provider validated questionnaires (additional 351 individual questions)
Medicine Institute
Patient-Entered Data Collection

- Pilot in 2 clinics beginning 2015
- Implementation across ~45 clinics 2016-2017
- Content:
  - PROMIS Global Health
    - Collected across all areas
  - Patient Health Questionnaire
    - PHQ-2 → PHQ-9
      - Collected in Neurological, Heart & Vascular, Rheumatology, Cancer
  - Generalized Anxiety Disorder (GAD)
    - GAD-2 → GAD-7
      - Collected in Neurological, Heart & Vascular
  - Social Needs Questionnaire
    - 16 questions

Clinical decision support:
- BPAs
- Ordersets
PROMIS Global Health (aka PROMIS-10)

- 10 items, each measuring a separate domain of health
- Summated into 2 separate scores for **physical health** and **mental health**
- Scores are standardized to the general population:
  - Mean t-score = 50, Standard Deviation = 10
- Higher scores indicate better function.
- Percentiles allow more direct comparison to the general population.
  - Example: percentile of 33.5 indicates that the patient’s score is better than 33.5% of the population
PRO Bank Person Score

M = 50, SD = 10
This patient’s physical health score is 60, significantly better than average (50).
**PROMIS Score Distributions**

*Patient’s score of 45 is worse than average (50).*

*Patient better than 30.8% of the general population.*

<table>
<thead>
<tr>
<th>T-scores</th>
<th>Cumulative Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>20</td>
<td>0.1%</td>
</tr>
<tr>
<td>30</td>
<td>2.3%</td>
</tr>
<tr>
<td>40</td>
<td>15.9%</td>
</tr>
<tr>
<td>50</td>
<td>50%</td>
</tr>
<tr>
<td>60</td>
<td>84.1%</td>
</tr>
<tr>
<td>70</td>
<td>97.7%</td>
</tr>
<tr>
<td>80</td>
<td>99.9%</td>
</tr>
</tbody>
</table>

Percentage of cases in 8 portions of the curve:

- .13%
- 2.14%
- 13.59%
- 34.13%
- 34.13%
- 13.59%
- 2.14%
- .13%
PROMIS Score Distributions

Score range
46 – 54 can be considered within “normal” range

Percentage of cases in 8 portions of the curve

<table>
<thead>
<tr>
<th>T-scores</th>
<th>20</th>
<th>30</th>
<th>40</th>
<th>50</th>
<th>60</th>
<th>70</th>
<th>80</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cumulative Percentages</td>
<td>0.1%</td>
<td>2.3%</td>
<td>15.9%</td>
<td>50%</td>
<td>84.1%</td>
<td>97.7%</td>
<td>99.9%</td>
</tr>
</tbody>
</table>

Patient’s score of 60 is better than average (50).
Patient better than 84.1% of the general population.

Score range 46 – 54 can be considered within “normal” range.
Why collect a standard measure of health?

1. As an aid during the clinical encounter (individual-level):
   - Provides a better understanding of patients’ well-being (they often have multiple conditions)
   - Allows tracking of changes in a patient’s health
   - Can be helpful to initiate conversation about a patient’s physical or mental health

2. To allow evaluation of patient outcomes (group-level):
   - Assess outcomes of care across different conditions
     • Provide comparison to the general U.S. population
     • Use in risk stratification models
   - Aid in compliance to growing list of nationally endorsed performance measures for assessment of functional status
   - Negotiate with payers
Comparison of health status across populations using PROMIS Global Health

- **N=14,418** Medicine
- **N=22,456** Taussig
- **N=3,731** Cardiology
- **N=4,779** Functional Med
- **N=14,681** DDI
- **N=10,538** Psychiatry/Psychology
- **N=72,508** PT/OT
- **N=1,129** Pulmonary
- **N=6,433** Rheumatology
- **N=125,509** Neuro/Neurosurgery

(n represents visits)
Assessing the Value of PED in Diabetes Care
Central Questions

Does patient-entered data (PROMIS and PHQ) help us better understand our population of diabetic patients, above and beyond EHR and claims data?

Does patient-entered data help to predict outcomes?
Approach

1. Define diabetes cohort
2. Assess PED data availability for cohort
3. Categorize 2016 PROMIS & PHQ responses (one-time scores & trends)
4. Identify associations between PED responses and 2017 outcomes
Data Sources

• Clinical (EHR) & billing data
• PED data (Knowledge Program)
• Claims data (medical + pharmacy)
Diabetes Cohort Definition
(n=59,000)

- Adults, type 2 diabetes only
- Have Cleveland Clinic primary care
- Criteria:
  - DM on problem list, or
  - ≥2 encounters with DM code (office, ER, inpatient, obs), or
  - On relevant DM medications, or
  - Any HbA1c ≥ 6.5, AND
  - exclude steroid-induced & gestational DM
# Diabetes Cohort (n=59k)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Females, n (%)</td>
<td>28,525 (49%)</td>
</tr>
<tr>
<td>Age, Mean ± SD</td>
<td>63.2 ± 13.5</td>
</tr>
<tr>
<td>Range</td>
<td>18 – 105</td>
</tr>
<tr>
<td>Race, n (%)</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>42,585 (72%)</td>
</tr>
<tr>
<td>Black</td>
<td>11,780 (20%)</td>
</tr>
<tr>
<td>Other</td>
<td>2,193 (4%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>2,374 (4%)</td>
</tr>
<tr>
<td>Diagnosed Depression in 2016 (EHR problem list and/or billing codes)</td>
<td>8,767 (15%)</td>
</tr>
<tr>
<td>Highest A1c Score, Mean ± SD</td>
<td>7.7 ± 1.7</td>
</tr>
<tr>
<td>LDL, Mean ± SD</td>
<td>89.3 ± 34.0</td>
</tr>
</tbody>
</table>
Do we have enough PED data availability in this cohort?

What does the PED data tell us about their health as compared to the general population?
PED Coverage in DM Cohort

**PROMIS**

- **Mental**
  - 44,353 scores
  - 20,107 pts (34%)
  - Mean: 46.3 ± 9.2

- **Physical**
  - 43,710 scores
  - 19,693 pts (33%)
  - Mean: 41.6 ± 8.4

**PHQ-2 and PHQ-9**

- **PHQ-2**
  - 70,750 scores
  - 43,673 pts (74%)

- **PHQ-9**
  - 25,167 scores
  - 8,366 pts (14%)
Distribution of PROMIS Scores

- PROMIS-10 Mental Summary Score
  - Better functioning
  - Slightly better functioning
  - Normal functioning
  - Slightly worse functioning
  - Worse functioning

- Promis-10 Physical Summary Score
  - Better functioning
  - Slightly better functioning
  - Normal functioning
  - Slightly worse functioning
  - Worse functioning
Distribution of PHQ Scores

PHQ-2
- <3
- 3+

PHQ-9
- <10
- 10-14
- 15+

Legend:
- Negative screen
- Positive screen
- Severe Screen
Do we have enough PED data availability in this cohort?  
YES

What does the PED data tell us about their health as compared to the general population?  
Poorer self-rated health
Comparably lower PHQ scores
Is there a link between concurrent PED scores and ED/inpatient utilization?
### 2016 PED Data & 2016 Outcomes

<table>
<thead>
<tr>
<th></th>
<th>ED Visit in 2016?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>PROMIS-10 Mental Score</td>
<td>46.5 ± 9.0</td>
</tr>
<tr>
<td>PROMIS-10 Physical Score</td>
<td>41.0 ± 7.9</td>
</tr>
<tr>
<td>PHQ2 Score (q1, q3)</td>
<td>0 (0, 2)</td>
</tr>
<tr>
<td>PHQ9 Score (q1, q3)</td>
<td>9 (4, 14)</td>
</tr>
</tbody>
</table>

*ED visits to any Cleveland Clinic ED (via billing data)*
Inpatient admits to any Cleveland Clinic hospital (via billing data)

<table>
<thead>
<tr>
<th></th>
<th>Inpatient Admit in 2016?</th>
<th></th>
<th></th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PROMIS-10 Mental</td>
<td>46.7 ± 9.2</td>
<td>48.4 ± 9.0</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PROMIS-10 Physical</td>
<td>40.7 ± 8.1</td>
<td>43.6 ± 8.2</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PHQ2 Score (q1, q3)</td>
<td>0 (0, 2)</td>
<td>0 (0, 1)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PHQ9 Score (q1, q3)</td>
<td>8 (4, 15)</td>
<td>7 (3, 13)</td>
<td>&lt;0.01</td>
<td></td>
</tr>
</tbody>
</table>
PROMIS Mental & ED Utilization
Portion of patients with 1+ ED visit in 2016

<table>
<thead>
<tr>
<th>Functioning Level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worse functioning (≤40)</td>
<td>48%</td>
</tr>
<tr>
<td>Slightly worse functioning (41-45)</td>
<td>44%</td>
</tr>
<tr>
<td>Normal functioning (46-54)</td>
<td>36%</td>
</tr>
<tr>
<td>Slightly better functioning (55-59)</td>
<td>32%</td>
</tr>
<tr>
<td>Better functioning (≥60)</td>
<td>29%</td>
</tr>
</tbody>
</table>

P<0.01
PROMIS Mental & Inpatient Utilization
Portion of patients with 1+ inpatient stay in 2016

- Worse functioning (≤40): 28%
- Slightly worse functioning (41-45): 24%
- Normal functioning (46-54): 22%
- Slightly better functioning (55-59): 19%
- Better functioning (≥60): 18%

P < 0.01
PROMIS Physical & ED Utilization
Portion of patients with 1+ ED visit in 2016

- Worse functioning (≤40): 48%
- Slightly worse functioning (41-45): 39%
- Normal functioning (46-54): 30%
- Slightly better functioning (55-59): 25%
- Better functioning (≥60): 16%

P < 0.01
PROMIS Physical & Inpatient Utilization
Portion of patients with 1+ inpatient stay in 2016

- Worse functioning (≤40): 29%
- Slightly worse functioning (41-45): 21%
- Normal functioning (46-54): 17%
- Slightly better functioning (55-59): 14%
- Better functioning (≥60): 11%

P<0.01
PHQ-2 & ED/Inpatient Utilization

Portion of patients with 1+ ED/inpt in 2016

- Negative PHQ-2 screen (<3)
- Positive PHQ-2 screen (3+)

**ED**
- 27%
- 46%

**Inpatient**
- 15%
- 28%

P<0.01
Is there a link between concurrent PED scores and ED/inpatient utilization?

YES
Does a single PED response in 2016 predict outcomes in 2017?
<table>
<thead>
<tr>
<th>ED Visits in 2017</th>
<th>1st 2016 Response</th>
<th>Odds Ratio</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROMIS Mental</td>
<td>0.97</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PROMIS Physical</td>
<td>0.96</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PHQ-2</td>
<td>1.09</td>
<td>&lt;0.01</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Inpatient Admissions in 2017</th>
<th>1st 2016 Response</th>
<th>Odds Ratio</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROMIS Mental</td>
<td>0.98</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PROMIS Physical</td>
<td>0.95</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PHQ-2</td>
<td>1.04</td>
<td>&lt;0.01</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DM Med Compliance in 2017</th>
<th>1st 2016 Response</th>
<th>Odds Ratio</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PROMIS Mental</td>
<td>1.02</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PROMIS Physical</td>
<td>1.02</td>
<td>&lt;0.01</td>
<td></td>
</tr>
<tr>
<td>PHQ-2</td>
<td>0.92</td>
<td>&lt;0.01</td>
<td></td>
</tr>
</tbody>
</table>
Does a single PED response in 2016 predict outcomes in 2017?

YES
Are trends in PED responses in 2016 predictive of outcomes in 2017?
Change in 2016 PROMIS Mental & 2017 ED Utilization

Portion of patients with 1+ ED visit in 2017

- **Remain good (≥46 both scores)**: 19%
- **Start poor (<46) but improve**: 24%
- **Start good (≥46) but worsen**: 26%
- **Remain poor (<46 both scores)**: 30%

Reference OR: 1.37 [1.06 – 1.76]  
OR 1.54 [1.22 – 1.93]  
OR 1.87 [1.61 – 2.02]  

Brackets = 95% CI
Change in 2016 PROMIS Mental & 2017 Inpatient Utilization

Portion of patients with 1+ inpatient visit in 2017

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Reference</th>
<th>OR 1.17 (0.88 – 1.57)</th>
<th>OR 1.15 (0.89 – 1.51)</th>
<th>OR 1.35 (1.14 – 1.59)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remain good (≥46 both scores)</td>
<td>14%</td>
<td>17%</td>
<td>16%</td>
<td>19%</td>
</tr>
<tr>
<td>Start poor (&lt;46) but improve</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Start good (≥46) but worsen</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Remain poor (&lt;46 both scores)</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Change in 2016 PROMIS Physical & 2017 ED Utilization
Portion of patients with 1+ ED visit in 2017

<table>
<thead>
<tr>
<th>Change in Scores</th>
<th>Odds Ratio (95% CI)</th>
<th>2017 Portion of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Remain good (≥46 both scores)</td>
<td>OR 1.26 (0.95 – 1.67)</td>
<td>16%</td>
</tr>
<tr>
<td>Start poor (&lt;46) but improve</td>
<td>OR 1.50 (1.09 – 2.04)</td>
<td>19%</td>
</tr>
<tr>
<td>Start good (≥46) but worsen</td>
<td>OR 2.18 (1.79 – 2.65)</td>
<td>22%</td>
</tr>
<tr>
<td>Remain poor (&lt;46 both scores)</td>
<td></td>
<td>29%</td>
</tr>
</tbody>
</table>
Change in 2016 PROMIS Physical & 2017 Inpatient Utilization
Portion of patients with 1+ inpatient visit in 2017

9% (Remain good (≥46 both scores))
11% (Start poor (<46) but improve)
16% (Start good (≥46) but worsen)
20% (Remain poor (<46 both scores))
Change in 2016 PHQ-2 Score & 2017 ED Utilization
Portion of patients with 1+ ED visit in 2017

- Remain negative (both scores): 25%
- Start depressed but improve: OR 1.22 [1.05 – 1.41], 29%
- Start negative but worsen: OR 1.57 [1.29 – 1.91], 35%
- Remain depressed (both scores): OR 1.45 [1.22 – 1.73], 33%
Change in 2016 PHQ-2 Score & 2017 Inpatient Utilization

Portion of patients with 1+ inpatient visit in 2017

- Remain negative (both scores): 17%
- Start depressed but improve: 20%
- Start negative but worsen: 21%
- Remain depressed (both scores): 20%

Reference: OR 1.18 [0.99 – 1.40]
OR 1.30 [1.03 – 1.63]
OR 1.21 [0.99 – 1.48]
2017 DM Medication Compliance

- Measured via pharmacy claims data
  - Compliant = on-time refills ≥80%
  - Data available for 11k of 59k patients

<table>
<thead>
<tr>
<th>2016 PED Response</th>
<th>Odds Ratio</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>First PROMIS Mental</td>
<td>1.02</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>2 or more PROMIS Mental &lt;46</td>
<td>0.73</td>
<td>0.03</td>
</tr>
<tr>
<td>First PROMIS Physical</td>
<td>1.02</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>First PHQ-2</td>
<td>0.92</td>
<td>0.02</td>
</tr>
</tbody>
</table>
Are changes in PED responses in 2016 predictive of outcomes in 2017?

YES

PROMIS Physical >> Mental
ED >> Inpatient
Key Takeaways

- PED = simpler approach to prediction?
- Associations appear stronger with ED
- One-time scores and trends both useful
- Useful for patient care and pop health
- Comparison to other models warranted
Every life deserves world class care.