Measuring Value Based Care with Patient Reported Outcomes

Session #49, February 20, 2017

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Scott Bradley, MBA, OM1

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Speaker Introduction

Laurence Higgins, MBA, MD
Chief of Sports Medicine/Shoulder Service, Dept. Orthopedic Surgery
Brigham and Women’s Hospital

Scott Bradley, MEM, MBA
VP Product Strategy
OM1
Conflict of Interest

Scott Bradley, MEM, MBA

Salary: Employed by OM1
Royalty: None
Receipt of Intellectual Property Rights/Patent Holder: None
Consulting Fees (e.g., advisory boards): None
Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers’ bureau): None
Contracted Research: None
Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): Equity ownership in OM1
Conflict of Interest

Laurence Higgins, MD, MBA

Salary: Advisor for OM1
Royalty: None
Receipt of Intellectual Property Rights/Patent Holder: None
Consulting Fees (e.g., advisory boards): None
Fees for Non-CME Services Received Directly from a Commercial Interest or their Agents (e.g., speakers’ bureau): None
Contracted Research: None
Ownership Interest (stocks, stock options or other ownership interest excluding diversified mutual funds): None
Agenda

Scott Bradley, VP Product Strategy
- The missing link in value-based care
- Design for Success
- “Behind the Scenes”

Larry Higgins, MD
- Value-Based Care: CJR Bundle
- Using PROs in practice
Learning Objectives

• Describe Patient Reported Outcomes, their history, and how they differ from patient satisfaction ratings.
• Assess the clinical use-cases for patient reported outcomes supporting value-based care.
• Evaluate and critique technology and design using principles of patient outcomes measurement.
An Introduction of How Benefits Were Realized for the Value of Health IT

Include one slide at the beginning of the presentation that links and frames the presentation to demonstrate the benefits realized for one or more STEPS™ value categories. Use metrics where possible.

Please see STEPS™ slide templates & guidelines for detailed instructions on utilizing the STEPS™ framework in your HIMSS17 presentation.
Involving patients in patient reported outcomes and shared-decision making leads to improved patient and provider satisfaction.

Measuring PROs supports patient engagement. Individual outcomes are fundamental to managing populations.

Success with Value-Based Care plans requires a quantified measure of outcomes. You can’t improve what you can’t measure.
Val D’Isere - Edelweiss
What is Value? It's personal...

ME - Outcome

OTHERS -
  - Cost?
  - Time?
  - Resources?
  - Payment?

VALUE = outcome/cost
Our future?

HHS set an explicit target to make 50% of Medicare payments through Value-Based Alternative Payment Models by 2018.

How do you measure Value?
HHS Goals

The most powerful way to reduce costs (and make room to expand coverage) is to shift away from ‘volume-based’ reimbursement (the more you do, the more money you make) to ‘value-based’ reimbursement.

Bill Frist, MD & Senate Majority Leader

PAYMENTS THROUGH ALTERNATIVE MODELS
CATEGORIES 3 & 4

30% 2016
50% 2018

FEE-FOR-SERVICE LINKED TO QUALITY & VALUE
CATEGORIES 2-4

85% 2016
90% 2018
The Relationship Between Surgeon and Hospital Volume and Outcomes for Shoulder Arthroplasty

Economic evaluations in shoulder pathologies: a systematic review of the literature

Influence of provider volume on length of stay, operating room time, and discharge status for rotator cuff repair

Total arthroplasty versus hemiarthroplasty for glenohumeral osteoarthritis: Role of provider volume

Surgeon Volume is Associated With Cost and Variation in Surgical Treatment of Proximal Humeral Fractures
Physician Overview for the Year 2014:

1. Dr. Higgins performed 522 surgeries throughout the year 2014 – 9 patients (1.72%) experienced a complication.
2. Of the 522 operations, 120 were revisions and 402 were primary surgeries.
3. Dr. Higgins had an infection rate of 0.38% in 2014.
Dr. Higgins' Complications 2014

- Total Surgeries = 522
- 1.72% = 9 Complications

<table>
<thead>
<tr>
<th>Complication</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nerve</td>
<td>1</td>
</tr>
<tr>
<td>Infection</td>
<td>2</td>
</tr>
<tr>
<td>Failed Rotator Cuff Repair</td>
<td>0</td>
</tr>
<tr>
<td>Failed Hardware</td>
<td>2</td>
</tr>
<tr>
<td>Failed Fixation of Proximal Humerus Fracture</td>
<td>1</td>
</tr>
<tr>
<td>Failed Instability</td>
<td>0</td>
</tr>
<tr>
<td>Adhesive Capsulitis</td>
<td>1</td>
</tr>
<tr>
<td>Other</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>9</td>
</tr>
</tbody>
</table>

Surgical Breakdown 2014

- Knee arthroscopy 4%
- Reverse-shoulder replacement 11%
- Shoulder fracture repair 5%
- Shoulder instability 5%
- Misc. shoulder arthroscopy 22%
- Rotator cuff repair 32%
- Total or hemi shoulder replacement 15%
- Misc. shoulder open 3%

2014 Infection Rate

- 0.38% = 2 Infections
- Total Surgeries = 522
Overriding Goals

- Re-evaluate and improve
- Determine true cost of care
- Foster collaboration through IPU
- Encourage transparency in outcomes

“If you can’t measure it, you can’t manage it. If you can’t manage it, you can’t improve it.”

Galileo, Lord Kelvin, Peter Drucker, Edward Deming, Bob Kaplan & Dave Norton.
Rotator Cuff Disease TDABC Project

TDABC Study Care Cycle

1. Map 1: Surgical Consult
2. Map 2: Schedule Surgery w/ Pre-Op Authorization
3. Map 3: Patient Registration
5. Map 5: Patient Paperwork/Call
6. Map 6: Pre-Op DOS
7. Map 7: OR Prep
8. Map 8: Surgery
9. Map 9: OR Clean Up
10. Map 10: Central Processing (Sanitization)
11. Map 11: PACU + Discharge
12. Map 12: Family Waiting Services
14. Map 14: RX Refill
15. Map 15: PA Post-Op @ 2 weeks
16. Map 16: PT Initial Eval @ 4 weeks
17. Map 17: PT Regimen
18. Map 18: MD Post Op @ 6 weeks
MD Post Op @ 3 months

Pt. ends care cycle

MD Follow Up @ 1 Year

MD Follow up @ 6 month

No 50%

Yes 50%

100%
Determined Resources

For each process step we must identify:
1. Time to perform activity
2. Personnel
3. Consumable supplies
4. Equipment
5. Space

RESOURCE CONSUMPTION EQUATION:

Time (min) x Probability (%) x Resources incurred (qty)
- Personnel
- Space
- Equipment
- Consumables
- Allocated overhead

Capacity Cost Rate ($/min)
- Personnel
- Space
- Equipment
- Consumables
- Allocated overhead
TDABC Output: Total Care Cycle Cost for RCR

Per process

<table>
<thead>
<tr>
<th>Map</th>
<th>Process</th>
<th>Total Cost</th>
<th>Personnel</th>
<th>Space</th>
<th>Equip</th>
<th>Supplies</th>
<th>Freq of Map</th>
<th>TOTAL COST</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Surgical consult</td>
<td>$310</td>
<td>$284</td>
<td>$5.47</td>
<td>$1.40</td>
<td>19</td>
<td>1</td>
<td>$310</td>
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<tr>
<td>2</td>
<td>Surgical Scheduling</td>
<td>$54</td>
<td>$51</td>
<td>$2.36</td>
<td>$0.27</td>
<td>-</td>
<td>-</td>
<td>$54</td>
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<td>3</td>
<td>Registration</td>
<td>$9</td>
<td>$9</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$9</td>
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<tr>
<td>4</td>
<td>CPE (Pre-Op Exam)</td>
<td>$171</td>
<td>$168</td>
<td>$2.66</td>
<td>$0.65</td>
<td>-</td>
<td>-</td>
<td>$171</td>
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<tr>
<td>5a</td>
<td>Patient Management- Calls</td>
<td>$323</td>
<td>$317</td>
<td>$5.79</td>
<td>$0.65</td>
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<td>-</td>
<td>$323</td>
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<tr>
<td>5b</td>
<td>PT. Mgmt - Images/Paperwork</td>
<td>$519</td>
<td>$518</td>
<td>$1.17</td>
<td>$0.13</td>
<td>-</td>
<td>-</td>
<td>$519</td>
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<tr>
<td>6</td>
<td>Pre-Op DOS</td>
<td>$275</td>
<td>$253</td>
<td>$14.14</td>
<td>$3.00</td>
<td>5</td>
<td>1</td>
<td>$275</td>
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<tr>
<td>7</td>
<td>OR Prep</td>
<td>$273</td>
<td>$243</td>
<td>$19.81</td>
<td>$9.64</td>
<td>-</td>
<td>-</td>
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<tr>
<td>8</td>
<td>Surgical Procedure</td>
<td>$3,565</td>
<td>$1,353</td>
<td>$66.03</td>
<td>$32.12</td>
<td>2,114</td>
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<td>$3,565</td>
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<tr>
<td>9</td>
<td>OR Clean Up</td>
<td>$53</td>
<td>$34</td>
<td>$12.74</td>
<td>$6.16</td>
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<td>$53</td>
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<tr>
<td>10</td>
<td>Central Processing (Sterilization)</td>
<td>$253</td>
<td>$61</td>
<td>$4.08</td>
<td>$55.90</td>
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<td>$253</td>
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<td>11</td>
<td>PACU + Discharge</td>
<td>$587</td>
<td>$530</td>
<td>$20.88</td>
<td>$4.83</td>
<td>31</td>
<td>1</td>
<td>$587</td>
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<tr>
<td>12</td>
<td>Family Waiting</td>
<td>$87</td>
<td>$83</td>
<td>$3.98</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>$87</td>
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<tr>
<td>13a</td>
<td>OR Billing (FH)</td>
<td>$20</td>
<td>$15</td>
<td>$3.30</td>
<td>$1.61</td>
<td>-</td>
<td>-</td>
<td>$20</td>
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<tr>
<td>13b</td>
<td>OR Billing (BWPO)</td>
<td>$83</td>
<td>$82</td>
<td>$0.50</td>
<td>$0.06</td>
<td>-</td>
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<td>$83</td>
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<tr>
<td>14</td>
<td>Prescription Refills</td>
<td>$17</td>
<td>$70</td>
<td>$0.20</td>
<td>$0.02</td>
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<td>$17</td>
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<tr>
<td>15</td>
<td>PA Post Op Visit</td>
<td>$76</td>
<td>$41</td>
<td>$1.71</td>
<td>$0.39</td>
<td>32</td>
<td>1</td>
<td>$76</td>
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<tr>
<td>16</td>
<td>Physical Therapy Evaluation</td>
<td>$173</td>
<td>$162</td>
<td>$1.40</td>
<td>$2.74</td>
<td>7</td>
<td>1</td>
<td>$173</td>
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<tr>
<td>17</td>
<td>Physical Therapy Treatment Visit</td>
<td>$112</td>
<td>$2,254</td>
<td>$20.02</td>
<td>$31.02</td>
<td>148</td>
<td>22</td>
<td>$2,453</td>
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<tr>
<td>18</td>
<td>MD Post-Op Visit</td>
<td>$253</td>
<td>$701</td>
<td>$8.67</td>
<td>$2.03</td>
<td>49</td>
<td>3</td>
<td>$760</td>
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<tr>
<td>19</td>
<td>Anesthesia</td>
<td>$900</td>
<td>$900</td>
<td>$900</td>
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<td>1,132</td>
<td>$1,132</td>
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<tr>
<th>Resource Category Totals</th>
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<th>$195</th>
<th>$153</th>
<th>$2,769</th>
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<tr>
<td>% of total Cost</td>
<td>72%</td>
<td>2%</td>
<td>1%</td>
<td>25%</td>
</tr>
</tbody>
</table>

Grand Total: $1,132

Note: Surgical event includes all typical associated procedures (biceps tendon, SAD, debridement)
Note: Surgical event includes all typical associated procedures (biceps tendon, SAD, debridement)
# RCR Post Op Care of the Future- Simulation

## POST OP CARE OF THE FUTURE

<table>
<thead>
<tr>
<th>Treatment Type</th>
<th>Single Visit</th>
<th>CURRENT MODEL</th>
<th>HIGH VALUE RESOURCE MODEL</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Cost</td>
<td>#</td>
<td>Total Cost</td>
</tr>
<tr>
<td>PA POST-OP VISITS</td>
<td>$ 76</td>
<td>1</td>
<td>$ 76</td>
</tr>
<tr>
<td>MD POST-OP VISIT</td>
<td>$ 253</td>
<td>3</td>
<td>$ 760</td>
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<tr>
<td>PT EVALUATION</td>
<td>$ 173</td>
<td>1</td>
<td>$ 173</td>
</tr>
<tr>
<td>PT TREATMENT VISIT</td>
<td>$ 112</td>
<td>22</td>
<td>$ 2,453</td>
</tr>
<tr>
<td>PAPERWORK RELATED TO PT</td>
<td>$ 12</td>
<td>22</td>
<td>$ 268</td>
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<tr>
<td>PAPERWORK RELATED TO OTHER POST-OP CARE</td>
<td>$ 12</td>
<td>3</td>
<td>$ 37</td>
</tr>
<tr>
<td>MD PHONE CALL TO PATIENT/Therapist</td>
<td>$ 171</td>
<td>1</td>
<td>$ 171</td>
</tr>
<tr>
<td>POD#1 - FELLOW/PA PHONE CALL TO PATIENT</td>
<td>$ 22</td>
<td>1</td>
<td>$ 22</td>
</tr>
<tr>
<td>FELLOW/PA PHONE CALL TO PATIENT</td>
<td>$ 22</td>
<td>3</td>
<td>$ 65</td>
</tr>
<tr>
<td>PA - RX REFILL</td>
<td>$ 18</td>
<td>3</td>
<td>$ 53</td>
</tr>
<tr>
<td>X-BOX</td>
<td>$ 399</td>
<td>0</td>
<td>$ -</td>
</tr>
<tr>
<td>GROUP PHYSICAL THERAPY</td>
<td>$ 22</td>
<td>0</td>
<td>$ -</td>
</tr>
</tbody>
</table>

**Saving $ 21%**
For patient responses in October 2015 (excluding pre-op surveys)

- Shoulder Arthroscopy outliers: 2/108 = 1.85%
- Shoulder Arthroplasty outliers: 2/70 = 2.86%
- 4/178 (2.25%) Total patient responses for the month of October reported pain score 2 SD outside the mean VAS
Recovery Curve

Patient MY, Age: 64, M
Procedure: Primary R-side RCR
Dec 2014
Patient sustained a fall @ 7 weeks
Outcome delivered
Value delivered
Birthday on the Bering Sea

Ice cave near Mutnovsky Volcano, Russia

Her Hollywood Walk of Fame star

China erects a giant cock statue that looks a lot like Donald Trump

I gave my nephew a bedspread I used in a photoshoot for Christmas. The next morning I got this picture from my sister.

My parents' pet stray cat was lying down near the car, assumingly in some kind of insurance scam.
The best part of this trip is watching my kids be fascinated by our nation’s history and proud to be Americans.
A man who answered the phone for a number listed online for the Pioneer Point compound said it was a wrong number, before adding that he did not speak English.

On Thursday, U.S. officials would not confirm the location of the New York compound being shut down — saying only that it was a 14-acre property on Long Island that had been purchased by the Soviet government in 1954. However, a number of Russia-watching bloggers pointed towards the Killenworth estate on Dosoris Lane in Glen Cove, which acts as the country home for Moscow's delegation to the United Nations. The grand country house was once owned by American philanthropist George Dupont Pratt.

Julie Tate contributed to this report.

Read more:

Kremlin spokesman vows retaliation against U.S. sanctions
I. The missing link in value-based care
II. Design for Success
III. “Behind the Scenes”
Are health-outcomes putting your hospital financially “at risk”?

Do you know which of your patients’ health-outcomes are “at risk”?

determinantsofhealth.org
Session Title: “Measuring Value Based Care with Patient Reported Outcomes”

\[ \text{Value} = f(\text{Outcomes}) \]
CMS CJR Bundle includes PROs

“We will encourage the voluntary submission of data to support the development of a hospital-level measure of patient-reported outcomes.”

“We intend to publicly report this information…”

“We will use the measures in the model pay-for-performance payment methodology.”
The Value Equation

Value = \frac{\text{Outcomes}}{\text{Cost}}
“…quality measurement focuses overwhelmingly on care processes. For example, of the 78 Healthcare Effectiveness Data and Information Set (HEDIS) measures… all but 5 are clearly process measures, and none are true outcomes. Process measurement, though a useful internal strategy for health care institutions, is not a substitute for measuring outcomes.”
Patient-reported outcome (PRO): The concept of any report of the status of a patient’s health condition that comes directly from the patient, without interpretation of the patient’s response by a clinician or anyone else. PRO domains included in this project encompass:

- health-related quality of life
- symptom and symptom burden
- experience with care; and
- health behaviors.

Reported Outcomes Measurement Information System (PROMIS). While PROMIS and other initiatives have validated patient-level outcome measures and instruments, there are major challenges to using them for purposes of accountability and performance improvement:

1. They are not in widespread use in clinical practice.
2. Little is known about aggregating these patient-level outcomes for measuring performance of the healthcare entity delivering care.

While there has been great interest in using PROs, foundational work needs to be done to address methodologic and data challenges. Efforts are currently underway to develop and test mechanisms for collecting patient-reported data. Accordingly, this is an opportunity...
Challenges for PRO Collection in Practice

- Clinicians lack of familiarity with instruments
- PRO administration is too time-consuming
- Patients reluctance due to technical barriers or inconvenience
- Integrating PRO collection within the clinical workflow
- Lack of standardization with measurement
- Putting the data to good use
Sky R.  
Brooklyn, NY  
1 review  

11/25/2016  
This emergency room deserves 0 Stars!! This is the worst hospital I have EVER been to. I waited 7 Hours just for them to tell me that I need to go back to my original doctor. They did an X-ray and then had the nerve to be concerned about whether I was pregnant or not AFTER the test. And then when the nurse gave me pain meds, He gave me some hot water to drink the pill with. When the doctor finally came to check me, he tried to examine me with the Door open. This is the worst hospital with the worst, rudest and laziest staff ever!! Never again.

Edward T.  
Manhattan, NY  
3 reviews  

8/12/2016  
Wow...what a change this place has made. Staff and doctors are friendly, helpful and caring. I started off going to Urgent Care...great, clean place. But, I needed more care so had to go across the street to the hospital. The staff helped me get through process quickly. I never would have thought it could change so much. Great to have in the community.
Creating a PRO Instrument

- **Health Concepts**: Conceptual framework for a condition
- **Focus Groups**: Groups of Patients with a condition, Structured interviews to determine areas of focus
- **Items**: Structured questions e.g. Likert, VAS, Factor Analysis
- **Item Reduction**: Number of items reduced by removing redundancy and items that don’t matter
- **Reliability**: Are there consistent results obtained from use of the tool?
- **Validity**: Does it measure what its intended to measure?
- **Responsiveness**: Is the tool sensitive to real clinical change?
In developing a draft plan under [section 1848(s)(1) of the Act], the Secretary shall give priority to the following types of measures:

(i) Outcome measures, including patient-reported outcome and functional status measures.

(ii) Care coordination measures.

(iii) Measures of appropriate use of services, including measures of over use.
The 90-day episode for CJR
No Reconciliation

- Below acceptable: 3% discount (0 points)
- Acceptable: 2.5% discount (4 points)
- Good: 2% discount (6 points)
- Excellent: 1.5% discount (13.2 points)

Eligible for increase in target price +2 points (PRO)

Twenty-Point Quality Score

<table>
<thead>
<tr>
<th>MEASURE</th>
<th>POINTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Reported Outcomes (PRO)</td>
<td>2</td>
</tr>
<tr>
<td>HCAHPS</td>
<td>8</td>
</tr>
<tr>
<td>Risk Standardized Complication Rate (RSCR)</td>
<td>10</td>
</tr>
</tbody>
</table>
Details of the CMS CJR Bundle

**Patients report PRE-Op and 1-year POST-op**
- KOOS-JR/HOOS-JR (6-7 questions)
- Pain Scale (1)
- PROMIS-Global Health (10)
- SILS2 (1)
- Lower Back Pain (1)
- Total Joint Count (1)

20 to 21 questions total

**Clinicians Collect Risk Variable Data**
- Needed for a hospital-level risk-adjustment model to PRO scores
- Includes age, gender, BMI, narcotic use, race, ethnicity, tobacco use
### 2017 MIPS Measures

#### Optimal Asthma Control

Patients ages 5-50 (pediatrics ages 5-17) whose asthma is well-controlled as demonstrated by one of three age appropriate patient reported outcome tools.

| Varicose Vein Treatment with Saphenous Ablation: Outcome Survey: Percentage of patients treated for varicose veins (CEAP C2-S) who are treated with saphenous ablation (with or without adjunctive tributary treatment) that report an improvement on a disease specific patient reported outcome survey instrument after treatment. |
| Psoriasis: Clinical Response to Oral Systemic or Biologic Medications: Percentage of psoriasis patients receiving oral systemic or biologic therapy who meet minimal physician- or patient-reported disease activity levels. It is implied that establishment and maintenance of an established minimum level of disease control as measured by physician- and/or patient-reported outcomes will increase patient satisfaction with and adherence to treatment. |
I. The missing link in value-based care
II. Design for Success
III. “Behind the Scenes”
## KOOS, JR. KNEE SURVEY

**INSTRUCTIONS:** This survey asks for your view about your knee. This information will help us keep track of how you feel about your knee and how well you are able to do your usual activities.

Answer every question by ticking the appropriate box, only one box for each question. If you are unsure about how to answer a question, please give the best answer you can.

### Global Health

Please respond to each item by marking one box per row.

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<tr>
<th>Item</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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</thead>
<tbody>
<tr>
<td>In general, would you say your health is:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Quality of life:</td>
<td></td>
<td></td>
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<tr>
<td>Physical health:</td>
<td></td>
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<tr>
<td>Mental health:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Social activities and relationships:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How well you can carry out your usual social activities and roles:</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

In general, please rate how well you can carry out your everyday physical activities such as walking, climbing stairs, carrying groceries, or moving a chair.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Excellent</th>
<th>Very good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
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<tbody>
<tr>
<td>Rising from sitting:</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bending to floor pick up an object</td>
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</tbody>
</table>

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KOOS, JR. KNEE SURVEY

INSTRUCTIONS: This survey asks for your view about your knee. This information will help us keep track of how you feel about your knee and how well you are able to do your usual activities. Answer every question by ticking the appropriate box, only one box for each question. If you are unsure about how to answer a question, please give the best answer you can.

Stiffness
The following question concerns the amount of joint stiffness you have experienced during the last week in your knee. Stiffness is a sensation of restriction or slowness in the ease with which you move your knee joint.

1. How severe is your knee stiffness after first wakening in the morning?
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

Pain
What amount of knee pain have you experienced the last week during the following activities?

2. Twisting/pivoting on your knee
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

3. Straightening knee fully
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

Scoring
None 0
Mild 1
Moderate 2
Severe 3
Extreme 4
KOOS, JR. KNEE SURVEY

INSTRUCTIONS: This survey asks for your view about your knee. This information will help us keep track of how you feel about your knee and how well you are able to do your usual activities. Answer every question by ticking the appropriate box, only one box for each question. If you are unsure how to answer a question, please give the best answer you can.

Stiffness
The following question concerns the amount of joint stiffness you have experienced during the last week in your knee. Stiffness is a sensation of restriction or stiffness in the sense with which you move your knee joint.

1. How severe is your knee stiffness after first awakening in the morning?
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

Pain
What amount of knee pain have you experienced the last week during the following activities?

2. Twisting/turning on your knee
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

3. Straightening knee fully
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

4. Going up or down stairs
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

5. Standing upright
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

Function, daily living
This following questions concern your physical function. By this we mean your ability to move around and to look after yourself. For each of the following activities please indicate the degree of difficulty you have experienced in the last week due to your knee.

6. Rising from sitting
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

7. Bending to floor pick up an object
   - None
   - Mild
   - Moderate
   - Severe
   - Extreme

   X

Total = 12

KOOS, JR. SCORING INSTRUCTIONS

The KOOS, JR was developed from the original long version of the Knee Injury and Osteoarthritis Outcome Score (KOOS, JR) survey using Rasch analysis. The KOOS, JR contains 7 items from the original KOOS survey. Items are coded from 0 to 4, none to extreme respectively.

KOOS, JR is scored by summing the raw responses (range 0 to 100) using the table provided below. The interval score ranges 0 to 100 and 100 represents perfect knee health.

Table for converting raw summed scores to interval level scores in 2017

<table>
<thead>
<tr>
<th>Raw summed score</th>
<th>Interval score</th>
</tr>
</thead>
<tbody>
<tr>
<td>(0-28)</td>
<td>(0 to 100 scale)</td>
</tr>
<tr>
<td>0</td>
<td>100.000</td>
</tr>
<tr>
<td>1</td>
<td>91.975</td>
</tr>
<tr>
<td>2</td>
<td>84.500</td>
</tr>
<tr>
<td>3</td>
<td>79.914</td>
</tr>
<tr>
<td>4</td>
<td>76.332</td>
</tr>
<tr>
<td>5</td>
<td>73.342</td>
</tr>
<tr>
<td>6</td>
<td>66.994</td>
</tr>
<tr>
<td>7</td>
<td>63.776</td>
</tr>
<tr>
<td>8</td>
<td>61.583</td>
</tr>
<tr>
<td>9</td>
<td>59.381</td>
</tr>
<tr>
<td>10</td>
<td>57.140</td>
</tr>
<tr>
<td>11</td>
<td>54.840</td>
</tr>
<tr>
<td>12</td>
<td>52.645</td>
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<td>13</td>
<td>50.012</td>
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<tr>
<td>14</td>
<td>47.467</td>
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<tr>
<td>15</td>
<td>44.906</td>
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<tr>
<td>16</td>
<td>42.281</td>
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<td>17</td>
<td>39.625</td>
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<td>23</td>
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<tr>
<td>24</td>
<td>16.939</td>
</tr>
<tr>
<td>25</td>
<td>8.281</td>
</tr>
<tr>
<td>26</td>
<td>0.000</td>
</tr>
</tbody>
</table>

57.140
## Instrument Design

**Global Health**

Please respond to each item by marking one box per row.

<table>
<thead>
<tr>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In general, would you say your health is: 

- Excellent
- Very Good
- Good
- Fair
- Poor
### Anxiety

**In the past 7 days...**

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 I felt fearful</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 I found it hard to focus on anything other than my anxiety</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 My worries overwhelmed me</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 I felt uneasy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Depression

**In the past 7 days...**

<table>
<thead>
<tr>
<th></th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **My worries** overwhelmed me: Sometimes

- **Anxiety:**
  - I felt fearful: Never
  - I found it hard to focus: Sometimes
  - My worries overwhelmed: Sometimes
Chest Pain

Over the past 4 weeks, how much has your chest pain, chest tightness or angina limited your enjoyment of life?

- Extremely
- Quite a bit
- Moderately
- Slightly
- Not at all

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Next
Previous
In the past 7 days

How often have you been bothered by emotional problems such as feeling anxious, depressed or irritable?

- Never
- Rarely
- Sometimes
- Often
- Always
Numeric Rating Scale (NRS) for Pain Intensity

Due Date: May 15, 2015

On a scale from 0 to 10, with 0 being "no pain" and 10 being the "most severe pain", what number would you give your leg pain right now?

- 0 - No Pain
- 1 - Mild Pain
- 2 - Mild Pain
- 3 - Mild Pain
- 4 - Moderate Pain

How severe is your pain today? Click on the scale to indicate how bad you feel your pain is today.

No pain  |  Moderate pain  |  Worst possible pain
I have a question for you today. Please remember to hit “Send” when you're done.

1. How would you describe the pain in your knee?

- Minimal pain
- Decreasing pain
- Increasing pain
- Severe pain

Anything else you’d like to share?
Check In

Remember to practice your quad-set exercises 3 times per day. From a sitting position, press your knee down against the floor and hold for 6 seconds. Repeat 15 times.

- Thanks, the reminder is helpful
- I'm already doing this exercise every day

Back Skip Next
Please answer the questions below:

- Did your doctor ever diagnose you with depression prior to your Parkinson’s Disease diagnosis? Yes ☑ No

- Did your doctor ever diagnose you with anxiety prior to your Parkinson’s Disease diagnosis? Yes ☑ No

Before you were diagnosed with Parkinson’s Disease, had you ever been told, or suspected yourself, that you seem to “act out your dreams” while asleep (for example, punching, flailing your arms in the air, making running movements etc.)? Yes ☑ No

At what age was your Parkinson’s Disease diagnosed?

- 59 years old

At what age did your Parkinson’s Disease motor symptoms (e.g. rigidity, tremour, slowness of movement) start?

- 60 years old
In general, how would you rate your mental health, including your mood and your ability to think?

- Excellent
- Very Good
- Good
- Fair
- Poor

En general, ¿cómo calificaría su salud mental, incluidos su estado de ánimo y su capacidad para pensar?

- Excelente
- Muy buena
- Buena
- Pasable
- Mala
Success Factors

- Enterprise-strategy to PRO use in practice
- Automation
- Multilingual
- Consumer-friendly (UX) and spam-free*
- Surrogate data-entry

- Multiple data-entry modalities
- Clinical integration, including EMR integration
- Secure and scalable technology
- Reasonable cost
- Supports MIPS, APM and value-based programs
Common Modalities of PRO Collection

- Email/Web
- Text/Web
- Voice, i.e. Alexa (Amazon Echo)
- Mobile Apps (in-office or personal)
- Assisted Entry (call-center or clinician)
- Paper Forms
I. The missing link in value-based care
II. Design for Success
III. “Behind the Scenes”
**Scenario:** Create a web-based version of the ODI (Oswestry Disability Index) for Lower Back Pain.

- License to use the ODI (from copyright holder)
- We have the paper version of the questionnaire

**Team:**

- Product Owner
- UX Designer
- Developers (2)
- VP Research
- Translation Vendor
- Copyright holder
Section 2 - Personal care (washing, dressing, etc.)

- I can look after myself normally without causing additional pain.
- I can look after myself normally but it is very painful.
- It is painful to look after myself and I am slow and careful.
- I need some help but manage most of my personal care.
- I need help every day in most aspects of my personal care.
- I do not get dressed, I wash with difficulty and stay in bed.

Section 3 - Lifting

- I can lift heavy weights without additional pain.
- I can lift heavy weights but it gives me additional pain.
- Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned, e.g. on a table.
- Pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- I can only lift very light weights.
- I cannot lift or carry anything at all.

Section 4 - Walking

- Pain does not prevent me from walking any distance.
- Pain prevents me from walking more than one mile.
- Pain prevents me from walking more than a quarter of a mile.
- Pain prevents me from walking more than 100 yards.
Section 3 - Lifting
Please answer by selecting ONE box for the statement that best applies to you.

I can lift heavy weights without extra pain

I can lift heavy weights but it gives extra pain

Pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently placed eg. on a table

Scroll to review all responses

Section 2 – Personal care (washing, dressing etc)

I can look after myself normally without causing extra pain

I can look after myself normally but it causes extra pain

It is painful to look after myself and I am slow and careful

I need some help but manage most of my personal care

I need considerable assistance with aspects of self care

Scroll to review all responses

Select the statement that best applies to you.

Lifting

I can lift heavy weights without additional pain.

I can lift heavy weights but it gives me additional pain.

Pain prevents me from lifting heavy weights off the floor but I can manage if they are conveniently positioned, eg. on a table.

Scroll to review all responses

Previous
Section 4 - Walking

- ○ Pain does not prevent me from walking any distance.
- ○ Pain prevents me from walking more than one mile.
- ○ Pain prevents me from walking more than a quarter of a mile.
- ○ Pain prevents me from walking more than 100 yards.
ODI version 2.1a

This questionnaire is designed to give us information as to how your back (or leg) trouble affects your ability to manage in everyday life.

Please answer every section. Mark one box only in each section that most closely describes you today.

Section 1 - Pain intensity

- [ ] I have no pain at the moment.
- [ ] The pain is very mild at the moment.
10 Usability Heuristics for User Interface Design

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation
Involving patients in patient reported outcomes and shared-decision making leads to improved patient and provider satisfaction.

Measuring PROs supports patient engagement. Individual outcomes are fundamental to managing populations.

Success with Value-Based Care plans requires a quantified measure of outcomes. You can’t improve what you can’t measure.
Questions

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Please complete the online session evaluation