Implementation of Measurement Based Care using PROMIS PROs at the Behavioral Health *Point-of-Care*

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about Sheppard Pratt Health System

#1 private, non profit provider of psychiatric services in the nation

more than 160 programs across 16 counties

over 80,000 patients/year including over 12,000 inpatient admissions
Sheppard Pratt Health System: Providing the Most Comprehensive Continuum of Psychiatric and Community Services in the Nation

HOSPITAL-BASED SERVICES
- Urgent Assessment Services
- Acute Inpatient Services
- Day Hospital & Intensive Outpatient Services
- Telespsychiatry Services
- Outpatient Services
- Residential Treatment Centers
- Addiction Services
- Neuromodulation Services

COMMUNITY-BASED SERVICES
- Mobile Crisis
- Crisis Beds
- Telespsychiatry Services
- Services for Serious Mental Illness (SMI)
- Outpatient Services
- School-Based Health Initiatives
- Veterans Services
- Residential Services
- Child Development Services
- Supported Employment Services
- Addiction Services
- Intellectual & Developmental Disability Services

Sheppard Pratt Health System
Systematic use of PROs in behavioral healthcare has many benefits…

Patient Reported Outcomes in Behavioral Health

Standard of Care

Measurement-based Care
... but PROs are **underutilized** in behavioral healthcare.

Only 18% of psychiatrists and 11% of psychotherapists use symptom rating scales to monitor treatment.

- new Joint Commission requirements for PROs in behavioral health
- America Psychiatric Association Measurement Based Care efforts
- CMS QPP and other value-based care efforts
Sheppard Pratt Health System is using data to optimize treatment and outcomes.

Point of Care
Research & Innovation

Jan 2018
Patient Reported Outcomes Initiative

Goal: Implement MBC using PROs throughout SPHS
<table>
<thead>
<tr>
<th>Program</th>
<th>Type</th>
<th>Population Age</th>
<th>Population</th>
<th>LOS</th>
<th>Avg. Caseload</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program 1</td>
<td>day program</td>
<td>adult</td>
<td>general</td>
<td>weeks</td>
<td>39</td>
</tr>
<tr>
<td>Program 2</td>
<td>day program</td>
<td>C&amp;A</td>
<td>general</td>
<td>1 week</td>
<td>21</td>
</tr>
<tr>
<td>Program 3</td>
<td>IOP</td>
<td>adult</td>
<td>general</td>
<td>1 week</td>
<td>7</td>
</tr>
<tr>
<td>Program 4</td>
<td>inpatient unit</td>
<td>adult+C&amp;A</td>
<td>subspecialty</td>
<td>weeks</td>
<td>70</td>
</tr>
<tr>
<td>Program 5</td>
<td>day Program</td>
<td>adult+C&amp;A</td>
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<td>weeks</td>
<td>35</td>
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<td>subspecialty</td>
<td>weeks</td>
<td>15</td>
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<tr>
<td>Program 7</td>
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<td>general</td>
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<td>57</td>
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<td>day program</td>
<td>adult</td>
<td>general</td>
<td>weeks</td>
<td>19</td>
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<tr>
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<td>inpatient unit</td>
<td>adult</td>
<td>general</td>
<td>weeks</td>
<td>22</td>
</tr>
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<td>Program 10</td>
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<td>adult</td>
<td>general</td>
<td>month</td>
<td>4</td>
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<td>day program</td>
<td>adult</td>
<td>subspecialty</td>
<td>weeks</td>
<td>20</td>
</tr>
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<td>Program 12</td>
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<td>adult</td>
<td>subspecialty</td>
<td>long-term</td>
<td>&gt;2500</td>
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<tr>
<td>Program 13</td>
<td>outpatient</td>
<td>adult</td>
<td>general</td>
<td>long-term</td>
<td>&gt;4500</td>
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</tbody>
</table>

**Patient Reported Outcomes Initiative**

Phase 1: 13 programs
Vision for Patient Reported Outcomes at the Point-of-Care:

collection

utilization
Implementation of Measurement Based Care using Patient Reported Outcomes at the Point-of-Care.

collection

utilization
Implementation of MBC at the Point-of-Care must **minimize burden** to patients, staff and providers and **ensure clinical utility**.

**Point-of-Care Implementation**

- burden workflow-time-effort
- clinical utility relevance-current-available-interpretable

- psychiatry specific challenges
- SPHS specific challenges
We use **DevOps** processes based on LEAN, theory of constraints, agile software development, safety culture and similar frameworks.

Our implementation process:

- **optimal workflow**
- **fast feedback**
- **continuous learning**

**2-week scrum sprints**

- Point-of-Care teams
- MBC facilitator
- **digital services**
- **DevOps team**

*also ISOQOL, 2015*
We develop our solutions using open source technology and our solutions are also open-source and freely available.

Point-of-Care
• Dashboards
• Automation
• Reporting Toolkit

Why not build inside the EHR?
• too slow • poor interoperability (APIs) • poor UI/UX
• tightly vs loosely coupled architecture • soon to be disrupted
Dashboards facilitate coordination of PROM data collection.
Automation & Integration

JDBC → REDCap

REDCap → R

R → RTF Reporter

R → ETL

ETL → Data Lake

Unity API → MS-SQL

MS-SQL → Shiny (by RStudio)

Shiny (by RStudio) → dashboards

dashboards → email/txt

email/txt → print

print → LDAP

LDAP → Drupal

Drupal → HTML/CSS

HTML/CSS → PROM questionnaires

PROM questionnaires → Allscripts

Allscripts → Unity API

Unity API → ETL

ETL → R

R → RTF Reporter

RTF Reporter → JDBC
Wide range of needs/requirements to optimize workflow integration

<table>
<thead>
<tr>
<th>Program</th>
<th>access</th>
<th>mode</th>
<th>user</th>
<th>frequency</th>
<th>PROs</th>
<th>PROMIS</th>
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<tbody>
<tr>
<td>Program1</td>
<td>dashboard</td>
<td>KIOSK</td>
<td>patient</td>
<td>adm-wk-dsc</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>Program2</td>
<td>print</td>
<td>tablet</td>
<td>RN</td>
<td>adm-dsc</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Program3</td>
<td>dashboard</td>
<td>chromebook</td>
<td>RN</td>
<td>adm-dsc</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Program4</td>
<td>dashboard</td>
<td>tablet</td>
<td>MHW</td>
<td>adm-2wk-dsc</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Program5</td>
<td>dashboard</td>
<td>tablet</td>
<td>MHW</td>
<td>adm-2wk-dsc</td>
<td>3</td>
<td>2</td>
</tr>
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<td>Program6</td>
<td>dashboard</td>
<td>tablet</td>
<td>MHW</td>
<td>adm-2wk-dsc</td>
<td>3</td>
<td>2</td>
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<tr>
<td>Program7</td>
<td>dashboard</td>
<td>tablet</td>
<td>LCSW</td>
<td>adm-2wk-dsc</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Program8</td>
<td>print</td>
<td>tablet</td>
<td>RN</td>
<td>adm-wk1-dsc</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Program9</td>
<td>dashboard</td>
<td>chromebook</td>
<td>MHW</td>
<td>adm-2wk-dsc</td>
<td>2</td>
<td></td>
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<td>Program10</td>
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<td>Program11</td>
<td>dashboard</td>
<td>tablet</td>
<td>RN</td>
<td>adm-2wk-dsc</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Program12</td>
<td>Email/txt,</td>
<td>tablet</td>
<td>patient*</td>
<td>120d</td>
<td>13*</td>
<td>12</td>
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<td>tablet</td>
<td>LCSW</td>
<td>182.5d</td>
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<td>1</td>
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### Enrollment by Program

<table>
<thead>
<tr>
<th>Program</th>
<th>% (current)</th>
<th>total (last 12m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program1</td>
<td>92%</td>
<td>1024</td>
</tr>
<tr>
<td>Program2</td>
<td>100%</td>
<td>955</td>
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<tr>
<td>Program3</td>
<td>100%</td>
<td>368</td>
</tr>
<tr>
<td>Program4</td>
<td>55%</td>
<td>205</td>
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<tr>
<td>Program5</td>
<td>15%</td>
<td>102</td>
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<tr>
<td>Program6</td>
<td>92%</td>
<td>96</td>
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<tr>
<td>Program7</td>
<td>89%</td>
<td>167</td>
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<tr>
<td>Program8</td>
<td>94%</td>
<td>546</td>
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<tr>
<td>Program9</td>
<td>86%</td>
<td>152</td>
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<tr>
<td>Program10</td>
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<td>Program11</td>
<td>73%</td>
<td>197</td>
</tr>
<tr>
<td>Program12</td>
<td>39%</td>
<td>1111</td>
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<tr>
<td>Program13</td>
<td>43%</td>
<td>2137</td>
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<tr>
<td>Total</td>
<td>74%</td>
<td>7070</td>
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</table>
Enrollment details (example Program12)

- Requires assistance – 4% of enrolled
Completion rate by program

<table>
<thead>
<tr>
<th>Program</th>
<th>% (last 12m)</th>
<th>total (last 12 month)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program1</td>
<td>86%</td>
<td>3,032</td>
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<tr>
<td>Program2</td>
<td>86%</td>
<td>1,664</td>
</tr>
<tr>
<td>Program3</td>
<td>90%</td>
<td>664</td>
</tr>
<tr>
<td>Program4</td>
<td>47%</td>
<td>236</td>
</tr>
<tr>
<td>Program5</td>
<td>47%</td>
<td>107</td>
</tr>
<tr>
<td>Program6</td>
<td>67%</td>
<td>257</td>
</tr>
<tr>
<td>Program7</td>
<td>64%</td>
<td>780</td>
</tr>
<tr>
<td>Program8</td>
<td>79%</td>
<td>1,169</td>
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<tr>
<td>Program9</td>
<td>72%</td>
<td>379</td>
</tr>
<tr>
<td>Program10</td>
<td>43%</td>
<td>22</td>
</tr>
<tr>
<td>Program11</td>
<td>76%</td>
<td>428</td>
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<tr>
<td>Program12</td>
<td>89%</td>
<td>1,111</td>
</tr>
<tr>
<td>Program13</td>
<td>59%</td>
<td>2,543</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>70%</strong></td>
<td><strong>12,392</strong></td>
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</table>
Completion detail - monitoring

<table>
<thead>
<tr>
<th>Program</th>
<th>Status</th>
<th>Type</th>
<th>Service</th>
<th>Active</th>
<th>Total</th>
<th>Enrolled</th>
<th>Completion</th>
<th>Missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult Day Hospital</td>
<td>active</td>
<td>Partial Hospitalization</td>
<td>Adult</td>
<td>45</td>
<td>977</td>
<td>45/46</td>
<td>85%</td>
<td>5%</td>
</tr>
<tr>
<td>Behavioral Health Partners</td>
<td>active</td>
<td>Outpatient</td>
<td>Outpatient</td>
<td>2095</td>
<td>2110</td>
<td>2095/6348</td>
<td>100%</td>
<td>0%</td>
</tr>
<tr>
<td>Child &amp; Adolescent Day Hospital</td>
<td>active</td>
<td>Partial Hospitalization</td>
<td>Child &amp; Adolescent</td>
<td>22</td>
<td>956</td>
<td>22/22</td>
<td>84%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Completed
77% surveys
527 total
7.00/week (median)

Know when the champion leaves

Identify the constraint
Reporting tools allow visual and text based reports of PRO data.

EMR integration via RTF document

Visualizations
Utilization rate by program

- Program1: 43%
- Program2: 47%
- Program3: 10%
- Program4: 10%
- Program5: 10%
- Program6: 21%
- Program7: 5%
- Program8: 5%
- Program9: 39%
- Program10: 33%
- Program11: 67%
- Program12: 33%
Utilization details (example program 12)

by provider

documented PRO use

missing
Utilization details (example program 12)

Do the results of the PROM affect the current treatment plan?

- No
- Yes

Comments:
- Missing
- Complex
- Simple
stable, good. Patient has MDD, recurrent so hopefully onset of a future episode can be detected earlier with PRO

PROM results are consistent with what client is reporting to clinician in session. Mood and anxiety will continue to be monitored and skills/supports developed.

CL is diagnosed with Anxiety and her data solidifies the stress that she relays she wants to begin to address in session. She describes noticing that she is in stress at home most often, and wants to learn ways of coping with her own needs recognizing she cannot control others. She is open for feedback and tools to help her better manage.

Ct PROMS score indicating "moderate impairment" in emotional management; ct's treatment goals seek to improve his mood through increasing coping skills and illness management which should contribute to increased PROM score.
continue

client

symptoms
reported
results
planning
states

patient

mood
family

anxiety
concerns

stress

safety

prom

goals

issues

survey

pt.

plan

review

medication

suicidal

incorporated

pt.
Utilization details – survey selection (program 12 only)

<table>
<thead>
<tr>
<th>Survey</th>
<th>Utilization</th>
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<tbody>
<tr>
<td>PROMIS Depression</td>
<td>100%</td>
</tr>
<tr>
<td>PROMIS Sleep Disturbance</td>
<td>99%</td>
</tr>
<tr>
<td>AUDIT-C</td>
<td>99%</td>
</tr>
<tr>
<td>PROMIS Anxiety</td>
<td>41%</td>
</tr>
<tr>
<td>PROMIS Life Satisfaction</td>
<td>20%</td>
</tr>
<tr>
<td>PROMIS Meaning-Purpose</td>
<td>19%</td>
</tr>
<tr>
<td>PROMIS Emotional Support</td>
<td>19%</td>
</tr>
<tr>
<td>PROMIS Cognitive</td>
<td>14%</td>
</tr>
<tr>
<td>PROMIS Anger</td>
<td>14%</td>
</tr>
<tr>
<td>PROMIS Ability to Participate (Social)</td>
<td>11%</td>
</tr>
<tr>
<td>PROMIS Physical Function</td>
<td>9%</td>
</tr>
</tbody>
</table>
**PRO data - population level**

**Depression (PROMIS)**
- Means: adm 63.53 | dsc 55.99 | Δ 7.54
- Effect size (d): 0.88 | Large | p < 0.01
- Avg. duration: 27.95 seconds

**Emotional Support (PROMIS)**
- Means: adm 48.72 | dsc 49.88 | Δ 1.16
- Effect size (d): 0.21 | Small | p: 0.01
- Avg. duration: Insuff.

**Anxiety (PROMIS)**
- Means: adm 65.5 | dsc 57.35 | Δ 8.15
- Effect size (d): 0.97 | Large | p: 0.01
-Avg. duration: 31.57 seconds

**Pediatric Anger (PROMIS)**
- Means: adm 57.03 | dsc 48.02 | Δ 9.01
- Effect size (d): 0.84 | Large | p: 0.01
- Avg. duration: Insuff.

**Sleep Disturbance (PROMIS)**
- Means: adm 55.5 | dsc 49.15 | Δ 6.35
- Effect size (d): 0.71 | Medium | p: 0.01
- Avg. duration: 27.15 seconds

**Ped. Life Meaning & Purpose (PROMIS)**
- Means: adm 47.68 | dsc 51.32 | Δ 3.64
- Effect size (d): 0.55 | Medium | p: 0.02
- Avg. duration: 30.24 seconds
**PRO data population level (use case quality monitoring)**

**Pediatric Stress Exp. (PROMIS)**
- Means: adm 63.76 | dsc 56.07 | Δ 7.69
- Effect size (d): 0.87 large | p: < 0.01* 
- Avg. duration: 27.01 seconds

**Depression (PHQ9)**
- Means: adm 13.99 | dsc 5.63 | Δ 8.36
- Effect size (d): 1.4 large | p: < 0.01* 
- Avg. duration: 99.05 seconds
Conclusions & Future Directions

**Future Directions**

- **Scale & Sustain**
- **New Features:** Patient engagement, notifications, clinical decision making...
- **Predictive Analytics**
Thank you!

team
Andrew Ready, MS – Data Engineer
Alexander Maclay, BS – Data Engineer
Emily Berich, BS – Research Coordinator

P-o-C stakeholders
Sheppard Pratt IT
Sheppard Pratt LEAN transformation
Healthmeasures
...and many more

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