Feasibility of Using Computerized Adaptive Testing To Capture Patient Reported Outcomes in an Outpatient Setting: A Pilot Evaluation of PROMIS-CAT in Neurosurgery

Anshit Goyal, MBBS
Research Fellow, Mayo Clinic Neuro-Informatics Laboratory
Department of Neurologic Surgery, Mayo Clinic, Rochester, MN

Mohamad Bydon, MD; Anshit Goyal, MBBS; Kelsey Wolff, MBA; Allie Canoy Illies, MPH; Atul Dhanorkar, MS; Mohammed Ali Alvi, MBBS; Sandy Goncalves, MS; Aaron Biedermann, MA, MBA; Travis Paul, MBA; Carolyn Macken, MS; Janine Kamath, MBA; Andrea Cheville, MD; Mark Nyman, MD
Disclosures

• None
Introduction: Patient Reported Outcomes

• The FDA defines a patient reported outcome (PRO) as a measurement based on a report that comes directly from the patient about their condition without interpretation by anyone else.

• PRO’s help patients, clinicians, and researchers assess patient reported health status for social, emotional, mental and physical wellbeing.

• PRO’s have been widely accepted as a valuable way to quantify patient experiences.


Gliklich RE, Dreyer NA, Leavy MB, editors.
Rockville (MD): Agency for Healthcare Research and Quality (US); 2014 Apr.
PROMIS: Patient Reported Outcome Measurement Information System

- PROMIS was established by the NIH as a resource to improve measuring PROs across multiple health domains
- NIH’s goal to create highly valid, reliable, and precise patient reported health measures
- PROMIS measures have been found to be more efficient in comparison to other scores, with studies showing decreased time required for completion.
- PROMIS scores are given as a T-score.
Why PROMIS?

- Cross-cutting/specialty agnostic
- PROMIS measures have been found to be more efficient in comparison to other scores, with studies showing decreased time required for completion.
- Domain T-scores for physical, mental and social health instead of disease specific measures
Available domains

PROMIS® Adult Self-Reported Health

Physical Health
- Fatigue
- Pain Intensity
- Pain Interference
- Physical Function
- Sleep Disturbance

Mental Health
- Anxiety
- Depression

Social Health
- Ability to Participate in Social Roles & Activities

PROMIS Profile Domains

PROMIS Additional Domains

-Dyspnea
-Gastrointestinal Symptoms
-Itch
-Pain Behavior
-Pain Quality
-Sexual Function
-Sleep-related Impairment

-Dyspnea
-Gastrointestinal Symptoms
-Itch
-Pain Behavior
-Pain Quality
-Sexual Function
-Sleep-related Impairment

-Alcohol
-Anger
-Cognitive Function
-Life Satisfaction
-Meaning & Purpose
-Positive Affect
-Psychosocial Illness Impact
-Self-efficacy for Managing Chronic Conditions
-Smoking
-Substance Use

-Companionship
-Satisfaction with Social Roles & Activities
-Social Isolation
-Social Support

Available at:
http://www.healthmeasures.net/explore-measurement-systems/promis/obtain-administer-measures
Comparison with other PROs in neurosurgery

PROMIS PF CAT Outperforms the ODI and SF-36 Physical Function Domain in Spine Patients

Darrel S. Brodke, MD, Vadim Coz, MD, Maren W. Voss, MS, Brandon D. Lawrence, MD, William Ryan Spiker, MD, and Man Hung, PhD

Correlation of PROMIS Physical Function and Pain CAT Instruments With Oswestry Disability Index and Neck Disability Index in Spine Patients

Mark O. Papuga, PhD,1,2,3 Addisu Mesfin, MD,1,2 Robert Molinari, MD,1,2 and Paul T. Rubery, MD,1,2

Quality of life outcomes in patients presenting for evaluation of CNS tumors

Alexander Chatoff, MPH, Nehaw Sarmey, MD, Nicolas R. Thompson, MS, Youran Fan, PhD, Manmeet Atwal, MD, and Irene L. Katz, MD, MS

Neurology: Clinical Practice February 2019 vol. 9 no. 1 32-40 doi:10.1212/CPJ.0000000000005571
Computerized Adaptive Testing

• Advances in item response theory (IRT) and computing capabilities has led to interest in item banking and computer adaptive testing (CAT)

• Utilizing IRT, CATs make it possible to choose the most informative items from the item bank

• CATs reduce patient response burden while maintaining higher precision measurement

• Added ease of use and shortened questions may increase use of PROs in routine care

• Tailored content; irrelevant questions avoided.
Challenges to PRO administration

• Increased encounter times
• Increased costs
• Survey fatigue and decreased outpatient satisfaction
• Providers may be reluctant to transition to a PROMIS based registry
Aim

• To determine the feasibility of PROMIS-CAT collection in an outpatient neurosurgery clinic (all subspecialties)
  • Before arrival to the clinic
  • Upon arrival to the desk
• Assess impact of implementing PROMIS-CAT on outpatient satisfaction as measured by Press-Ganey survey
Domains

• Anxiety
• Depression
• Physical Function
• Fatigue
• Pain Interference
• Sleep Disturbance
• Social Roles
• Upper Extremity Function
Integration with EHR
Integration with EHR
ePRO Pilot in Neurosurgery
PROMIS-CAT and Patient Online Services

• Prior to arrival
  • Epic automatically assigns PROMIS-CAT to all Neurosurgery patients based on appointment type.
  • Patients sent email reminder to complete questionnaire in their patient online services account (MyChart)
  • Pre-appointment phone calls by return to work resource

• Upon arrival
  • Schedulers and Desk Staff assist patients in setting up Patient Online Services accounts to allow patients to complete PROMIS-CAT and any remaining questionnaires.
    • All desk staff were trained by a health systems engineer
Results:

- Two month pilot: February 2019-March 2019
- 3426 patients assigned PROMIS-CAT questionnaires
- 2212 (64.5%) completed at least one domain.
Results-Completion rates by domain
Results: Number of questions asked

The average number of total questions answered by each patient was 45.2. Mean time to completion~10 minutes
Results: Counter-balance

- As counterbalance measures, we aimed to preserve patient satisfaction as measured by top box scoring on the access and patient movement questions in the Press Ganey survey. As indicated by the top-box scores below, the pilot did not negatively impact access or patient movement.
Next steps

• Reduce questionnaire burden
  • 4 domains only - Physical Function, Pain Interference, Depression and Social Roles

• Addition of PROMIS-CAT to Epic Welcome Tablets

• One stop shop: Integration with all necessary pre-visit questionnaires

• Implementation of EHR alerts
Experience in other ambulatory settings

Feasibility of PROMIS CAT Administration in the Ambulatory Sports Medicine Clinic With Respect to Cost and Patient Compliance

A Single-Surgeon Experience

Vincent A. Lizzio,* MD, Jacob Blanchett,* BS, Peter Borowsky,* BS, Jason E. Meldau,* BS, Nikhil N. Verma,† MD, Stephanie Muh,* MD, Vasilios Moutzouros,* MD, and Eric C. Makhni,** MD, MBA

Investigation performed at Henry Ford Hospital, Detroit, Michigan, USA

- N=581
- **4 domains**: PF, Pain Interference, Upper Extremity Function, Depression
- Completion rate: 90%
- Cost of establishing a PROMIS-based registry: $2045, monthly cost: $100
- Mean questions asked : 15.3
- Mean time: 2.6 minutes
Experience in other ambulatory settings

Original Article

Bringing PROMIS to Practice: Brief and Precise Symptom Screening in Ambulatory Cancer Care

Lynne I. Wagner, PhD^{1,2}; Julian Schink, MD^{3}; Michael Bass, MS^{1}; Shalini Patel, BS^{1}; Maria Varela Diaz^{1}; Nan Rothrock, PhD^{1,2}; Timothy Pearman, PhD^{1,2}; Richard Gershon, PhD^{1}; Frank J. Penedo, PhD^{1,2}; Steven Rosen, MD^{4}; and David Cella, PhD^{1,2}

- N=636 (gynecologic oncology clinic)
- 5 domains: PF, Pain Interference, Fatigue, Anxiety, Depression
- Integration with EHR

<table>
<thead>
<tr>
<th>TABLE 3. Assessment Completion Rates</th>
</tr>
</thead>
<tbody>
<tr>
<td>MyChart Messages Sent, n</td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td>Total for all assessments</td>
</tr>
<tr>
<td>Total for first assessments only</td>
</tr>
</tbody>
</table>
Discussion

• Computerized adaptive testing is a viable PRO collection mechanism in the outpatient setting

• Does not significantly alter outpatient satisfaction

• EHR integration may bypass common patient-provider communication barriers by collecting pre-visit ePROs and delivering results in real time at the point of care
Conclusion

EHR linked CAT may represent a valid tool to increase PRO collection rates. Selective domain administration may alleviate patient burden
Acknowledgements

- Department of Neurologic Surgery, University of Minnesota
- Department of Neurologic Surgery, Mayo Clinic
- Department of Management Engineering and Internal Consulting, Mayo Clinic
- Department of Physical Medicine and Rehabilitation, Mayo Clinic
- ePRO Task Force, Mayo Clinic
- Neuro-Informatics Laboratory
  - PI-Mohamad Bydon, MD
Thank you

Questions & Discussion