SCIENTIFIC ARTICLE

Efficacy of PROMIS Pain Interference and Likert Pain Scores to Assess Physical Function

Matthew J. St. John, BA, MS,* David Mitten, MD,† Warren C. Hammert, MD‡

Purpose The Patient Reported Outcome Measurement Information System (PROMIS), developed by the National Institutes of Health, utilizes a health domain related to Pain Interference (PI). We evaluated this domain and its association with physical function (as determined by PROMIS Physical Function [PF]), administered as a computer adaptive test (CAT), and secondarily its association to a numerical 0 to 10 pain score. Our null hypothesis was that PI, as measured by CAT, has no correlation to PF and thus, there is no difference between comparisons of numerical pain scores and PROMIS PF.

Methods Adult patients presenting to an upper extremity clinic from February to December 2015 completed PROMIS PF, PI, and numerical 0 to 10 pain score questionnaires. The PROMIS modules were completed electronically in their computer adaptive form. Mean population scoring on each module is defined at 50. Patients were also asked to rate their pain on a 0 to 10 scale. These data were collected as routine clinical care and were extracted from the electronic health record for cross-sectional evaluation. Bivariate Pearson correlation analysis defined the association between the PROMIS modules and the numerical pain scores. Correlations between PF and PI were compared with correlations between PF and pain scores.

Results We recorded data from patients' 10,574 first, 5,210 second, 2,633 third, 1,382 fourth, and 722 fifth visits. The PROMIS PI was negatively correlated to the PROMIS PF. Numerical pain scores were also negatively correlated to PROMIS PF. Numerical pain scores were less correlated than PROMIS PI through time relative to PF.

Conclusions Both PROMIS PI and numerical pain scores had significant correlations with PF for each office visit. The PI had a larger correlation to PF than did numerical pain scores. The PI and numerical pain scale scores are also correlated.

Clinical relevance Patient-reported pain using a 0 to 10 pain score can be a predictor of patients' level of function, and although pain score does not replace other patient-reported outcomes, it can provide useful information, particularly when other patient-reported outcomes are not available. *(J Hand Surg Am. 2017;■(■):1.e1-e6. Copyright © 2017 by the American Society for Surgery of the Hand. All rights reserved.)*

Key words CAT, Likert, pain interference, physical function, PROMIS.

Online Exclusive

Measuring outcomes is of paramount importance in our health care environment. The objective is often 2-fold, with aims to increase the quality of care and to create payment models when determining the value of treatment. Two important reports of outcome in upper extremity care are physical function and pain. Several modalities have been used to measure similar outcomes,

*From the *University of Rochester School of Medicine and Dentistry; the †Department of Orthopaedics and Biomedical Engineering; and the ‡Department of Orthopaedics and Rehabilitation, University of Rochester School of Medicine and Dentistry, Rochester, NY.*

Received for publication September 2, 2016; accepted in revised form June 7, 2017.

No benefits in any form have been received or will be received related directly or indirectly to the subject of this article.

Corresponding author: Warren C. Hammert, MD, Department of Orthopaedics and Rehabilitation, University of Rochester School of Medicine and Dentistry, 601 Elmwood Ave., Rochester, NY 1462; e-mail: Warren_hammert@urmc.Rochester.edu.

0363-5023/17/■ ■-0001$36.00/0
http://dx.doi.org/10.1016/j.jhsa.2017.06.004

such as Disabilities of Arm, Shoulder, and Hand (DASH) for patient-reported disability and visual analog, Likert, or numerical scores for pain. There is a difference, however, between measuring patient-reported disability and measuring physical function. Questionnaires measuring functional outcomes contain items that ask about an ability to perform specific tasks. Items used to measure disability, like DASH, may attempt to quantify symptoms relating to pain and weakness or to measure the impact of those symptoms on specific activities.[1] Although DASH has shown to be both reliable and valid, its nonadaptive nature requires answering a set number of questions.[1] Numerical pain scores, although useful in many clinical settings, may be suboptimal for validity in outcome measurement.[2] This is at least in part due to the individual variability on interpretation of what a specific number/score means.

The Patient-Reported Outcomes Measurement Information Systems (PROMIS) was developed by the National Institutes of Health in an effort to create a reliable and reproducible outcome instrument, which can be administered as a computer adaptive test (CAT). This probability-based computer algorithm allows for a minimal number of adaptive questions, drawn from a pool of 124 potential questions, while still achieving high measurement precision.[1,3–5] Computer adaptive test domains like PROMIS Physical Function (PF), have shown to be valid and reliable with high correlation to classic patient-reported outcomes, such as DASH, but without fixed questionnaire limits.[1,5] In addition, completion is up to 75% quicker with a range of 4 to 12 questions required for completion of the PF scale relative to the 30 questions in the DASH.[5–7] Legacy measurement tools like DASH have an advantage of being region-specific and have been commonly used to assess upper extremity outcomes in the literature. The PROMIS PF is not region-specific and includes questions related to both upper and lower extremities. A PROMIS Upper Extremity (UE) questionnaire has since been created and is now available for use. Beckmann and colleagues[1] have reported that PROMIS UE (version 1) and the PF CAT compare favorably with each other and DASH.[1]

PROMIS Pain Interference (PI) CAT is a domain that is utilized to assess how pain may compromise daily activities. It has been demonstrated that PROMIS PI is a psychometrically sound questionnaire for assessing the negative effects of pain on function in the range experienced by most patients who experience pain.[8] Pain, however, is a personal perception, variable among patients, but seems to be helpful for the same patient over time. It can be elusive in its direct link to pathophysiology, and therefore, the measurement of pain itself is difficult to isolate and quantify as an independent entity. The PROMIS PI questionnaire is highly correlated to coping strategies,[9] similar to pain catastrophizing. Numerical pain scales have also shown a relationship to outcome measures, such as DASH, in clinical settings.[10–12]

The aim of this study was to evaluate the PROMIS PI and PROMIS PF scales through several outpatient clinic visits, regardless of the patient's condition or reason for seeking care. Our null hypothesis was that there is no correlation between PROMIS PI and PF. Our secondary hypothesis was that PI scores consistently maintain a stronger relationship to PF than a numerical pain score in a cohort of patients presenting to a tertiary-care orthopedic outpatient upper extremity surgery clinic.

METHODS

This study was approved by our institutional review board. New and established adult patients presenting to the upper extremity clinic from February to December 2015 were asked to complete the PROMIS PF, PI, and a numerical 0 to 10 pain score questionnaires. The PROMIS scales were completed electronically, in their computer adaptive form, via tablet. Mean population scoring on each module is defined at 50 (SD, 10; range, 0–100) with larger scores indicating greater amounts of each health element (100 = maximal function and most pain). Therefore, if a patient had high physical function and low pain intensity, the observation would be negatively correlated. Patients were also asked to rate their current pain on a numerical 0 to 10 scale with 0 being no pain and 10 being the worst pain possible. If, during this time period, the patient presented to the clinic on separate occasions, he or she was asked to repeat this same procedure at each subsequent appointment. Therefore, some patients presented and completed CAT questionnaires only once, whereas others completed the questionnaires multiple times. These data were collected during routine clinical care and were extracted from the electronic health record for cross-sectional evaluation. Only completed CAT PI, and CAT PF were included in analysis. Univariate descriptive analyses explored each module's scores in the cohort. Bivariate Pearson correlation analysis defined the directional association between the modules and the numerical 0 to 10 pain score. We were interested in the magnitude of the relationships,