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ORIGINAL ARTICLE

Correlation of PROMIS Physical Function Upper Extremity Computer Adaptive Test with American Shoulder and Elbow Surgeons shoulder assessment form and Simple Shoulder Test in patients with shoulder arthritis

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Background: The purpose of this study was to evaluate the Patient-Reported Outcomes Measurement Informative System Physical Function Upper Extremity Computer Adaptive Test (PROMIS PFUE CAT) measurement tool against the already validated American Shoulder and Elbow Surgeons (ASES) shoulder assessment form and the Simple Shoulder Test (SST) in patients with shoulder arthritis.

Methods: Fifty-two patients with the primary diagnosis of shoulder arthritis were asked to fill out the ASES, SST, and PROMIS PFUE CAT. The time for completion of each survey was measured to determine responder burden, and correlation between the 3 instruments was defined as excellent (>0.7), strong-moderate (0.61 – 0.7), moderate (0.31 – 0.6), and poor (0.2 – 0.3).

Results: The PROMIS PFUE CAT showed a strong-moderate correlation with the SST ($r = 0.64$; $P < .001$) and a moderate correlation with the ASES ($r = 0.57$; $P < .001$). The average times to complete the SST, ASES, and PROMIS PFUE CAT were determined to be 96.9 ± 25.1 seconds, 160.6 ± 51.5 seconds, and 62.6 ± 22.8 seconds, respectively. The time to complete the PROMIS PFUE CAT was significantly less than the time to complete the SST ($P < .001$) and the ASES ($P < .001$).

Conclusion: In patients with shoulder arthritis, The PROMIS PFUE CAT demonstrated strong-moderate correlation with the SST and moderate correlation with the ASES. The time savings of the PROMIS PFUE CAT were small compared with the ASES and SST but demonstrate that moving forward, using the PROMIS PFUE CAT would not place any additional burden on the patient filling out the survey. These findings indicate that the PROMIS PFUE CAT is an appropriate measurement tool for patients with shoulder arthritis.

Level of evidence: Basic Science Study; Validation of Outcome Instruments

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Keywords: PROMIS; shoulder; arthritis; outcomes; ASES; SST; upper extremity; CAT

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The shoulder is a complex joint, and there are myriad pathologic entities that can result in pain and dysfunction, either in isolation or in an aggregate. Many patients with shoulder joint disease present in clinic with shoulder pain as their main complaint. Shoulder pain is the third most common musculoskeletal complaint, ranked only behind back and knee pain, and studies have reported lifetime prevalence of shoulder pain ranging from 7% to 66%.^{11,13} Two common diagnoses for patients who present with shoulder pain are osteoarthritis (OA) and rotator cuff tear arthropathy (CTA).^{11,12} OA is a degenerative disease in which the cartilage in the shoulder joint breaks down, leading to abnormal joint function and pain that gradually increases over time. CTA occurs when the rotator cuff is torn, leading to the loss of a major glenohumeral joint stabilizer. This loss creates instability in the joint, altering the biomechanics, which ultimately leads to degeneration of the glenohumeral joint.^{9,12} Both OA and CTA can result in dysfunction of the shoulder joint, limiting a patient's ability to work and to carry out normal household and sport or leisure activities. In addition to these limitations, patients commonly report an inability to sleep comfortably, all of which results in a negative impact on the patient's quality of life.^{13,20,21}

Multiple tools have been developed to evaluate patients presenting with upper extremity complaints such as shoulder arthritis. These tools focus on patient-reported outcomes, which are meant to help guide treatment toward improving the patient's quality of life. These measures enable physicians to monitor the effectiveness of treatment and give patients an opportunity to express their interpretation of their abilities, allowing patient-centered health care.⁸ Two instruments specifically used to evaluate patients with shoulder arthritis are the American Shoulder and Elbow Surgeons (ASES) shoulder assessment form and the Simple Shoulder Test (SST). Both tests have been validated and accepted in the United States as measures for patients with shoulder arthritis.¹ The ASES was developed specifically for patients with any shoulder complaints, regardless of diagnosis, and includes a patient self-evaluation of the activities of daily living. Patients are given 4 answer choices to describe their ability to perform common actions, and the test is scored 0-100, worst to best, respectively. The SST was developed to assess a patient's disability as a result of shoulder pain and dysfunction. This test is also a self-evaluation for the patient and contains 12 questions related to function, pain, strength, and range of motion. The questions are on a dichotomous scale (1 = yes and 0 = no). Scores range from 0 to 12, where 12 is the best function a patient can have.¹

The ASES and SST are just 2 of the many questionnaires that have been designed and validated to evaluate patients with shoulder arthritis. With many different choices for measurement tools and no common practice for which tool is the most effective with the least responder burden, physicians have no guidance as to which measure is most appropriate for evaluating their patients. This lack of a standard method of measurement creates confusion, which is most apparent in trying to compare recent research studies of a spe-

cific diagnosis using different measurement tools.¹⁴ This confusion led to the creation of an initiative by the National Institutes of Health to establish a national standard for efficient measurement of patient-reported outcomes.⁶ The initiative was called the Patient-Reported Outcomes Measurement Informative System (PROMIS), and the main goal was to create a standard tool for the research community to use so the results from multiple studies could be compared with less confusion.⁶

The PROMIS initiative led to the creation of multiple questionnaires centered around mental, social, and physical health. Physicians and researchers can select the tool that is right for the patient on the basis of the patient's diagnosis and the outcome that is being measured. The specific PROMIS tool that was created to evaluate activities of the shoulder is the PROMIS Physical Function Upper Extremity (PROMIS PFUE).^{2,3} A large advantage of the PROMIS tools is the ability to administer them with the aid of a Computer Adaptive Test (CAT). The goal of the CAT is to reduce the burden placed on the patient in completing the PROMIS tools. An algorithm that optimizes the questionnaire by administering only the relevant questions based on the patient's previously answered questions allows minimization of responder burden.^{6,7,14-16} For example, if a patient answers no to the question Are you able to lift a heavy object (over 4.5 kg)?, the CAT will not ask the question Are you able to lift a heavy object (over 4.5 kg) above your head?, eliminating unnecessary questions and decreasing the burden placed on the patient. With the advent of the PROMIS measurement tool, it is necessary not only to validate this as a measurement tool for shoulder arthritis but also to compare the tool with the multiple patient-reported outcome questionnaires that are currently being used. Previous studies have correlated the PROMIS Physical Function tool with the shortened version of the Disabilities of the Arm, Shoulder, and Hand questionnaire in patients with unspecified upper extremity illness.^{16,18} The PROMIS physical function tool also shows an excellent correlation with the ASES, Marx shoulder activity scale, and Western Ontario Shoulder Instability Index in patients presenting with shoulder instability.² To our knowledge, no other studies have evaluated the PROMIS PFUE CAT in patients with shoulder arthritis. The purpose of this study was to determine the correlation between the PROMIS PFUE CAT and both the ASES and SST in patients with diagnosed shoulder arthritis as well as to determine the responder burden for each of the 3 surveys. We hypothesize that the PROMIS PFUE CAT will show a good to excellent correlation with both the ASES and SST and that the PROMIS PFUE CAT will demonstrate a lower responder burden in comparison with the ASES and SST.

Materials and methods

This is a prospective cross-sectional study comparing the PROMIS PFUE CAT with the currently accepted ASES and SST in the evaluation of patients with shoulder arthritis. Patients diagnosed with shoulder arthritis (OA and CTA) were enrolled in the study by the

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