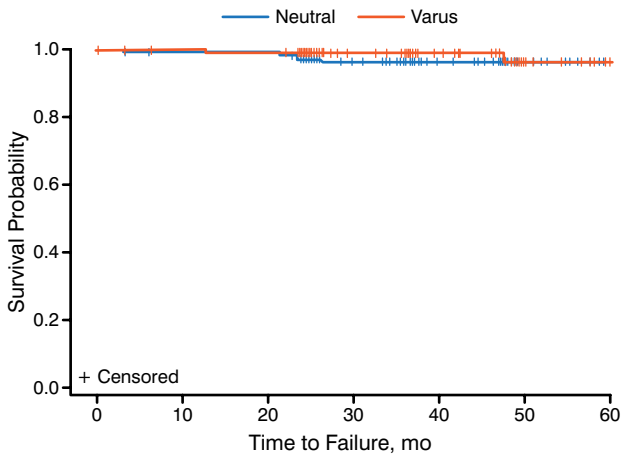




Figure 1. Kaplan–Meier Curve With Revision End Point



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arthritis in patients with moderate to severe varus alignment vs neutral alignment. The outcomes of TAA for end-stage ankle arthritis were similar in patients with preoperative varus deformity >20°. The contraindicated limits of varus deformity may need to be redefined based on current evidence.

PROMIS PF CAT Provides Consistent Outcomes Assessment With Excellent Precision and Efficiency

Written by Toni Rizzo

There is a tangible need for improved tools to measure patient outcomes after treatment of foot and ankle disorders. Numerous clinical outcome measures are used to evaluate foot and ankle disorders and procedures, but consensus on these measures has not been reached. Evidence of validity, reliability, and responsiveness for foot and ankle disorders has been published only for a few scores designed for foot and ankle patient-reported outcome (PRO) measures. Of these few scores, only the Foot Function Index (FFI) and Foot and Ankle Ability Measure (FAAM) have been used in published studies ≥ 5 times in the last decade [Hunt KJ, Hurwit D. *J Bone Joint Surg Am.* 2013; Martin et al. *J Orthop Sports Phys Ther.* 2007].

The Patient-Reported Outcomes Measurement Information (PROMIS) physical function computerized adaptive testing (PF CAT) has been validated for orthopaedic patients, as well as for lower extremity patients specifically [Hung M et al. *Foot Ankle Int.* 2013]. However,

Table 1. Person and Item Reliability

Instrument	Person Reliability	Item Reliability
PF CAT	0.96	0.99
FAAM	0.95	0.99
FFI	0.93	0.99

FAAM, Foot and Ankle Ability Measure; FFI, Foot Function Index; PF CAT, physical function computerized adaptive testing.

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the responsiveness of the PF CAT has not been determined in foot and ankle patients. This study, presented by Kenneth J. Hunt, MD, Stanford University, Stanford, California, USA, compared the psychometric properties and efficiency of the PF CAT with the FAAM and FFI.

Ten participating US sites enrolled 328 patients undergoing ankle, hindfoot, or forefoot surgery. Preoperative and 6-month PROs were collected through the National Orthopaedic Foot and Ankle Outcomes Research Network using the FAAM, FFI, and PF CAT.

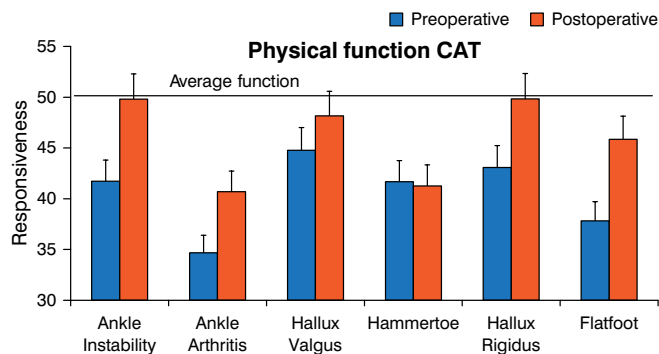
The patients underwent surgery for ankle instability, ankle arthritis, hallux valgus, hammertoe, hallux rigidus, and flatfoot; 56% completed the 6-month surveys. Construct validity, determined using the Rasch model, was high for all 3 instruments. Pearson correlations showed that the PF CAT was highly correlated with the FFI 5-point verbal rating scale (FFI-5pt) ($r=0.685$) and the FAAM Activity of Daily Living subscale (FAAM_ADL) ($r=0.792$). All 3 measures demonstrated excellent item reliability, suggesting that the order of item difficulty would be comparable across various patient samples. Person reliability was also high, suggesting similar ordering of individuals' function levels with repeated measures (Table 1).

Paired t tests showed that the PF CAT had a preoperative responsiveness measure of -1.6965 and a postoperative responsiveness measure of -0.2476 , resulting in a change score of 1.44888 (95% CI, 0.47119 to 2.42657 ; $t=2.930$; $P=.004$; Figure 1).

For the FAAM_ADL, the preoperative (1.2693) and postoperative (3.9964) measures resulted in a change score of 2.72717 (95% CI, 2.19813 to 3.25620 ; $t=10.207$; $P=.000$). Both the PF CAT and FAAM_ADL change scores indicated that patients had significantly improved physical function at 6 months.

The FFI-5pt had a preoperative measure of 0.4866 and a postoperative measure of 0.1828 , resulting in a change score of -0.30381 (95% CI, -0.58721 to -0.02040 ; $t=-2.120$; $P=.036$), indicating that patients had significantly deteriorated function at 6 months. All 3 instruments were responsive to change, but the FFI-5pt change was in the opposite direction.

Figure 1. Psychometric Properties



CAT, computer adaptive testing.

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The item counts (number of questions) for the 3 instruments were 4.3 for the PF CAT, 28.0 for the FAAM, and 23.0 for the FFI. Patients completed the PF CAT in 44 seconds, the FAAM_ADL in 179 seconds, and the FFI-5pt in 194 seconds, showing that the PF CAT was significantly more efficient than both other measures ($P < .000$).

Dr Hunt concluded that the PROMIS PF CAT allows for consistent outcomes assessment across orthopaedic subspecialties, while providing a high degree of precision and efficiency. However, it is important to remember that physical function is not the only domain to measure; mental and social health can also affect disease burden and outcomes, and should be considered during outcomes assessment.

Comparable Outcomes With Total Ankle Arthroplasty and AAA

Written by Toni Rizzo

End-stage ankle arthritis is a disabling condition, with similar morbidity, pain, and loss of function as hip arthritis. Open ankle arthrodesis (OAA) has been the gold standard for treatment of end-stage ankle arthritis, but better outcomes have been obtained with arthroscopic ankle arthrodesis (AAA). Total ankle replacement (TAR) and fusion outcomes depend on the involvement of the surrounding joints and the presence of intra-articular or extra-articular deformity. Historically, the results and longevity of TAR have been less reproducible. Ankle replacement is gaining in popularity with the availability of newer designs.

The aim of this study, presented by Andrea Nicole Veljkovic, MD, University of Toronto, Toronto, Ontario,

Canada, was to compare the outcomes of TAR, AAA, and OAA in patients with isolated, nondeformed ankle arthritis. This prospective study enrolled 104 women and 134 men aged > 17 years with Canadian Orthopedic Foot and Ankle Society type 1, isolated, nondeformed arthritic ankles, with < 10° of intra-articular and extra-articular deformity and no arthritis in the triple-joint complex.

The patients underwent TAR ($n = 88$), AAA ($n = 50$), or OAA ($n = 100$). The primary outcome measure was substantial reoperation and Ankle Osteoarthritis Scale (AOS) total change score. The secondary outcome measures were physical and mental component summary change scores. End points included survivorship with removal of the metal components for TAR, revision of the arthrodesis, and substantial reoperation. The patients were followed for an average of 3.57 ± 1.60 years.

The primary outcome results showed that there were more reoperations in and about the ankle for TAR. There was a trend toward substantial revision rates in patients who underwent TAR and OAA. Patients with TAR had more substantial reoperation rates than did those with AAA or OAA ($P = .0003$).

An analysis of the effects of surgery type on substantial reoperation rates—controlling for age, body mass index, and sex—found that patients with TAR had more reoperations ($Pr > ChiSq = .0112$). There were significant differences among the groups in the AOS change score ($P = .0050$), AOS pain difference ($P = .0486$), and AOS difficulty difference ($P = .0013$), with the TAR and AAA groups faring better than the OAA group.

There were no significant differences between TAR and AAA in AOS total difference, AOS pain difference, AOS difficulty difference, physical component summary difference, or mental component summary difference. The TAR group had more substantial reoperations versus the AAA group ($P = .0019$). There were significant differences with AAA versus OAA in mean AOS total difference (38.31 vs 25.82; $P = .0043$), AOS pain difference (36.12 vs 25.64; $P = .0278$), and AOS difficulty difference (40.50 vs 25.99; $P = .0017$) but not in substantial reoperation (4.0% vs 7.0%; $P = .7183$). Significant differences were observed between TAR and OAA in mean AOS total difference (34.41 vs 25.82; $P = .0163$), AOS difficulty difference (36.66 vs 25.99; $P = .0045$), and substantial reoperation (23.86% vs 7.00%; $P = .0017$).

Based on the AOS total, pain, and difficulty change scores, TAR and AAA had significantly better outcomes than OAA. There were significantly fewer revisions and substantial reoperations with AAA and OAA than with TAR. TAR and AAA are relatively comparable options for the treatment of end-stage type 1 ankle arthritis with regard to outcomes.