Assessment of Outcome Scores of the Ankle

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Outcome scoring systems are common throughout orthopaedics. Hunt and Lakey define patient-reported outcome metrics as tools that capture the health status of a patient throughout an episode of care for treatment of an injury [1]. Outcome metrics entered the medical field as early as the nineteenth century with Florence Nightingale during the Crimean War, in which she implemented simple safety measures to reduce infection risk [2]. By reducing soldier mortality from 43% to 2% in 5 months, she is considered one of the founders of evidence-based medicine. From 1990 to 2001, Button and Pinney found that 49 outcome scoring systems had been mentioned in published literature [3]. Only 18 were mentioned more than once. From 2002 to 2011, Hunt and Hurwit found 139, and Safavi et al. found 74 between 2012 and 2017 [4, 5].

Of the many scoring systems, Scott and Huskisson are known for developing the well-known visual analog scale (VAS) [6]. This pain assessment system is used throughout medicine but was validated for orthopaedic pathology in 1980 [6]. According to Safavi et al., VAS is the second most common scoring system with roughly 21,000 patients evaluated and used in 308 articles between January 2012 and July 2017 [5]. VAS has been the second most common scoring system since 2001 [4]. Previous literature supports this scoring system's validity, reliability, and acceptability [7]. Although commonly used and validated for orthopaedics, VAS is known to have low specificity [8]. According to Safavi et al., 3000 more patients and 85 more articles used the American Orthopaedic Foot and Ankle Society Ankle-Hindfoot (AOFAS-AH) outcome scoring system compared to VAS between January 2012 and July 2017 [5].

An AOFAS subcommittee developed the AOFAS-AH outcome scoring system in 1994 [9]. To date, it is the most commonly used outcome scoring for ankle pathology [3, 5]. In addition to the ankle-hindfoot pathology, the subcommittee developed outcome scoring systems for the mid-foot, hallux, and lesser toes [9]. The committee's goal was to design accessible systems which allowed for the comparison of results of different methods of treatment in patients with the same

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disorder. An additional goal is to enable the surgeon to follow the clinical progression of their patients before and after treatment [9]. The AOFAS scoring system has a max score of 100 points and focuses on function, pain, and alignment. It requires input from both the patient and clinician [9]. The maximum amount of points is given in the following scenarios: full range of sagittal and hindfoot motion, no ankle or hindfoot instability, ability to walk more than six blocks, ability to ambulate on any walking surface, no limitation of daily or recreational activities, no discernable limp, no assistive devices needed for ambulation, no pain, and good alignment. The maximum points for function, pain, and alignment are 50, 40, and 10, respectively. Although there were several scoring systems prior to the AOFAS metric [10–14], the AOFAS subcommittee's system has stood the test of time and its long-standing use has led to many clinicians and researchers investigating its usability. Button and Pinney found the AOFAS-AH scoring system to lack reliability, responsiveness, and both criterion and construct validity. Madeley et al. included that there is no literature available stating a clear minimal clinical important difference (MCID) for this scoring system [15].

The following scoring systems are disease-specific outcome systems for ankle pathology: Foot Function Index (FFI), Ankle Osteoarthritis Scale (AOS), Foot and Ankle Disability Index (FADI), Foot and Ankle Ability Measure (FAAM), Short Musculoskeletal Function Assessment (SMFA), and Foot and Ankle Outcome Score (FAOS). Recent publications have reported FFI use for rheumatoid arthritis and osteoarthritis of the ankle [3, 4, 16]. AOS is also known to report ankle arthritis outcomes [3, 17]. The athlete with chronic ankle instability would benefit from FADI [18]. Both FAAM and FAOS are also validated for use in patients with chronic ankle instability, while SMFA is validated generally for musculoskeletal disease [5]. Although it is not a disease-specific outcome scoring system, the general patient-reported Short Form-36 (SF-36) is frequently used throughout orthopaedics (e.g., ankle osteoarthritis, orthopaedic trauma, and knee osteoarthritis) [5].

There are a plethora of outcome scoring systems for foot and ankle pathology, and those which are validated are not the most frequently used. The accessibility and ease of the AOFAS-AH may be a primary factor for its high use rate while being an unvalidated scoring system. Even the AOFAS called for the termination of its use due to insufficient reliability and validity [19]. Along with supporting disease-specific outcome scoring systems, this leading society for foot and ankle surgeons supports the use of recently introduced patient-reported outcome instruments such as the Patient-Reported Outcomes Measurement Information System (PROMIS) [20, 21], Physical Function Computerized Adaptive Test (PF CAT) [22–24], and Lower Extremity Computerized Adaptive Test (LE CAT) [24]. These systems aim to standardize scoring and ameliorate the crowded field of outcome scoring systems. Fidai et al. published a systematic review that compared PROMIS to commonly used scores (e.g., FAAM, FFI, and SF-36) [25]. They found PROMIS to correlate strongly with older scoring systems in foot and ankle pathology. Importantly, Fidai et al. reported quicker administration and a broader patient population for PROMIS when compared to older scoring systems.

We believe that there is a clear need for standardized scoring throughout foot and ankle pathology, especially since healthcare reimbursement shifted from volume-based to value-based practice after the signing of the Patient Protection and Affordable Care Act in 2015 [26]. Additionally, an effective and nationally supported outcome scoring system has the potential to augment orthopaedic surgery practice and compensation. Having such a system provides an opportunity for current and future registries to improve health outcomes. Ferguson et al. emphasize the transformational potential of access to patient-reported outcome research and total costs of a complete cycle of care [27]. Understanding these two components could increase the quality of care for future patients. Clinicians developing foot and ankle outcome scoring systems ought to learn from the benefits and limitations of the many outcome scoring systems available to date.

Therefore, we support the position of the AOFAS in regard to moving forward with disease-specific and valid outcome scoring systems. Not doing so would be in opposition to providing quality care to our patients.

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