

Psychometric Properties of Patient-Reported Outcome Measures Assessing Recovery from Hand Fractures: A Systematic Review

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INTRODUCTION:

Hand fractures are a common injury, particularly in young, employed men, that affect a person's ability to engage successfully in day-to-day self-care, work, and leisure activities. Patient-reported outcome measures (PROMs) are instruments used to reflect the patient's perception of health status and are commonly used to assess outcomes after hand fracture and evaluate the effectiveness of treatments. The Consensus-based Standards for the Selection of Health Status Measurement Instruments (COSMIN) guidelines are used to evaluate the methodological quality of studies of measurement properties and synthesize evidence regarding the quality of PROMs for use in a target population. Researchers must perform rigorous testing to establish the measurement properties of PROMs and confirm they are clinically useful. Studies of hand fractures predominantly sample patients with distal radius fractures and thumb fractures, while less evidence is available for those with metacarpal and phalangeal fractures, despite the fact they are distinct injuries. Determining whether PROM scores are reliable, valid, and responsive in patients with metacarpal and phalangeal fractures is important to guide interpretation of outcomes within this population. Therefore, the aim of this study was to extensively review PROMs used to assess outcomes in persons with metacarpal and phalangeal fractures to assess their psychometric properties. The objectives of the study were to: (1) identify research investigating at least 1 psychometric property of a PROM, (2) determine the methodological quality of the studies, (3) evaluate the quality of PROMs based on their psychometric evidence, and (4) summarize the methodological quality and psychometric evidence to provide an overall assessment of evidence for each PROM.

METHODS:

This systematic review was conducted according to the COSMIN guidelines. Studies were eligible for this review if they: 1) included a PROM assessing recovery from hand fracture; 2) Evaluated at least one of eight measurement properties of interest (internal consistency, reliability, measurement error, content validity, structural validity, hypothesis testing, cross-cultural validity, and responsiveness); 3) Included a population of adults with hand fractures, defined as a finger metacarpal or phalangeal fracture, before or after treatment. A research librarian (AM) with Western Libraries designed the search strategy with input from other members of the research team. Six electronic databases were searched (Medline, Embase, Scopus, Web of Science, PsycINFO, CINAHL) for eligible studies from inception until March 21st, 2023. Titles and abstracts, full text review, quality assessment and data extraction were performed by two independent reviewers (CM and AF). Any disagreements were resolved after review by a third, expert reviewer (JG). Quality assessment of included studies was performed using the COSMIN guidelines.

RESULTS:

This COSMIN review found that there were only 4 studies that fulfilled the inclusion criteria in terms of assessing measurement properties of PROMs in hand fractures. The four studies included in this review assessed the measurement properties of six PROMS: The Patient Specific Functional Scale (PSFS) 19, the Disabilities of the Arm, Shoulder, and Hand (DASH) questionnaire, the Quick DASH (QDASH), which is a shortened version of the DASH, the Michigan Hand Outcomes Questionnaire (MHQ), the Patient-Rated Wrist Evaluation (PRWE), and the Durouo Hand Index (DHI). These four studies included two studies assessing the construct validity of DASH and QDASH and two studies assessing the responsiveness of PSFS, DASH, PRWE, and MHQ. The risk of bias, criteria for good measurement properties, and overall quality of evidence available, rated poorly (Table 1).

Table 1: Summary of findings

Measurement property and outcome measure	Study	Risk of bias	Criteria for good measurement properties	Overall rating	Quality of evidence
Construct Validity					
DASH	Van Oosterom	Very good	Insufficient	Insufficient	Moderate
Quick-DASH	Akkaya	Sufficient	Indeterminate	Indeterminate	Low
DHI	Akkaya	Sufficient	Indeterminate	Indeterminate	Low
Responsiveness					
PSFS	Novak	Inadequate	Indeterminate	Indeterminate	Very low
DASH	Weinstock-Zlotnick	Doubtful	Indeterminate	Indeterminate	Very low
PRWHE	Weinstock-Zlotnick	Doubtful	Indeterminate	Indeterminate	Very low
MHQ	Weinstock-Zlotnick	Doubtful	Indeterminate	Indeterminate	Very low

DISCUSSION/CONCLUSIONS:

The most important finding from our COSMIN review was that little evidence supporting the measurement properties of PROMs exists for patients with metacarpal and phalangeal fractures, and the available evidence is of poor methodological quality. Many important measurement properties, such as reliability, content validity, and structural validity, were not assessed in this population. During full-text review, we excluded 30 studies that assessed measurement properties in patients with upper extremity or hand fractures, as they predominantly included patients with fractures in locations other than the metacarpals and phalanges. Including studies that mostly sample patients with other fractures had the potential to bias our results. One factor affecting the quality of evidence obtained from this review were the methods used to assess responsiveness. Responsiveness is arguably the most important measurement property, thus particular care should be taken to choose appropriate methods of assessment.

SIGNIFICANCE/CLINICAL RELEVANCE:

This study identified that there is a lack of evidence in the medical literature with regards to the measurement properties of PROMs in patients with hand fractures. This has important consequences for how outcomes will be measured in clinical studies in hand research and in clinical practice. There is a need for more evidence in this field.