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Minimal Clinically Important Differences of Three Patient-Rated Outcomes Instruments

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Abstract

Purpose—Patient-rated instruments are increasingly used to measure orthopaedic outcomes. However, the clinical relevance of modest score changes on such instruments is often unclear. This study was designed to define the minimal clinically important differences (MCID) of the Disabilities of the Arm, Shoulder, and Hand (DASH), QuickDASH, and Patient Rated Wrist Evaluation (PRWE) for atraumatic conditions of the hand, wrist, and forearm.

Methods—One hundred two patients undergoing nonoperative treatment for isolated tendonitis, arthritis, or nerve compression syndromes from the forearm to the hand were analyzed prospectively. Patients completed the DASH, Quick DASH (subset of DASH), and PRWE at enrollment, 2 weeks (n=78 used in analysis), and 4 weeks (n=24 used in analysis) after initiating treatment by telephone. Patients reporting clinical improvement each contributed a single data point categorized as no change (n=41), minimal improvement (n=30), or marked improvement (n=31) via a validated anchor-based approach. The minimal clinically important difference was calculated as the mean change score for each outcome measure in the minimal improvement group.

Results—The MCID (95%CI) for the DASH was 10 (5-15). The MCID for the Quick DASH was 14 (9-20). The MCID was 14 (8-20) for the PRWE. MCID values were significantly different from changes in these outcome measures at times of either no change or marked improvement. MCID values positively correlated with baseline outcome measure scores to a greater degree than final outcome measure scores.

Discussion—Longitudinal changes on the DASH of 10 points, the Quick DASH of 14 points, and the PRWE of 14 points represent minimal clinically important changes. We recommend application of these MCID values for group-level analysis when conducting research and interpreting data examining groups of patients as opposed to assessing individual patients. These MCID values may provide a basis for sample size calculations for future investigation using these common patient-rated outcome measures.

Level of Evidence: Diagnostic III

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Key Terms

DASH; difference; minimal clinically important; PRWE

Introduction

Patient-rated outcome assessments are increasingly emphasized in orthopedic surgery. The field has progressed from outcomes defined by joint motion and bony union to standardized assessments of function and disability completed by the patients. This change has occurred in part secondary to a shift in treatment goals for patients and improved understanding of human illness and behavior. The Disabilities of the Arm Shoulder and Hand (DASH), the Quick DASH, and the Patient Rated Wrist Evaluation (PRWE) are 3 widely referenced upper extremity measures that have been scored to quantify treatment effect for a wide variety of conditions.^(1,2) A multitude of publications attest to the validity and responsiveness of these measures, but minimal clinically important differences (MCID) have been less well defined.

Judging treatment effect through change in a patient-rated outcome measure score requires an understanding of the MCID of that outcome measure in the specific population of interest. Jaeschke et al in 1989 defined the MCID as “the smallest difference that patients perceive as beneficial...”.⁽³⁾ Thus, the MCID defines that change in an outcome score that would correspond to a change in clinical status appreciated by the patient.^(4,5) The MCID should represent a true change whose magnitude exceeds the test-retest variation (measurement error) for an outcome measure.

The purpose of this investigation was to define, through an anchor-based approach, the minimal clinically important difference for the DASH, Quick DASH, and PRWE in patients treated nonoperatively for atraumatic hand and forearm conditions.

Materials and Methods

This prospective cohort trial was approved by our institutional review board prior to study initiation. We enrolled 113 adult patients (> 18 years) presenting with atraumatic upper extremity conditions to 1 of 2 hand-fellowship trained orthopedic surgeons from June 2010 through December 2011. For study inclusion patients were required to be diagnosed with and have nonoperative treatment provided for an isolated tendonitis, arthritis, or nerve compression syndrome from the elbow to the hand (Table 1). Exclusion criteria included a lack of English proficiency or mental status prohibiting consent for research participation. Diagnoses of tendonitis required a clinical examination with appropriate location of tenderness as well as positive clinical signs and provocative maneuvers. All diagnoses of arthritis were confirmed radiographically. Nerve compression syndromes were clinically diagnosed based on distribution of paresthesias and positive provocative maneuvers and confirmed with electrodiagnostic data. Conservative management for these conditions included, but was not limited to, immobilization, oral or topical nonsteroidal anti-inflammatory drugs, oral or injected steroids, and occupational therapy. Enrollment was non-consecutive for eligible patients secondary to competition with other ongoing research studies. Following enrollment, 11 patients were excluded. Three patients were treated for traumatic diagnoses, and 1 patient demonstrated multiple active diagnoses. Seven patients were excluded for baseline patient-rated outcome measure scores <10 due to the ceiling effect when assessing improvement in these patients. This produced a final cohort of 102 patients. Additional exclusion criteria that were specified but did not affect any enrolled

patients included change in mental status prohibiting completion of study surveys or operative management during study follow up.

All patients completed the DASH, Quick DASH (calculated as subset of DASH questions), and PRWE by phone after providing consent for participation in the office. Each outcome measure was repeated by phone at 2 weeks (± 5 days) and 4 weeks (± 7 days). Follow up at 2 weeks was 87% (n=89), and at 4 weeks was 73% (n=74). At each follow up time-point, patients also completed a standardized set of anchor questions to determine the degree of clinical change appreciated by the patient (Table 2). These anchor questions assessed degrees of change for pain, function, and response to treatment. These anchor questions (2 15-item questions and 1 4-item question) were derived from anchor questions used by Juniper et al, Tubach et al, and Tashjian et al to determine the MCID of other outcome measures.⁽⁶⁻⁸⁾

Statistical Analysis

Patient-rated outcome measure scores were calculated at baseline, 2 weeks, and 4 weeks according to published algorithms.⁽⁹⁻¹¹⁾ Missing data were excluded from analysis on a pairwise basis. One way analysis of variance was used to examine for differences in baseline outcome measure scoring according to diagnostic category (i.e., tendinitis, arthritis, nerve compression). Descriptive statistics and graphical examination of data were used to evaluate the performance of anchor questions. At follow up, outcome measure change scores were calculated as the difference between current outcome measure score and baseline scores for each patient. Despite potentially being contacted at 2 weeks and 4 weeks, each patient contributed a single follow up data point to the final analysis. The data point chosen for analysis was the first follow up period in which a patient reported either minimal improvement or no change. If a patient was markedly improved at each point, the first data collected were analyzed.

On each 15-item anchor question of function and pain, responses of somewhat better and moderately better were considered to be minimally improved. On the 4-item anchor question of response to treatment, a response of good-satisfactory effect was considered to be minimally improved. Final clinical categorization classification for data analysis was that category established by at least 2 of 3 anchor questions. This final categorization of data points separated patients as experiencing no change, minimal improvement, and marked improvement groups.

Because few patients reported worsening on the clinical anchor questions, the 6 follow up points (6 patients) at times of worsening according to anchor classifications were excluded from analysis in order to maximize data consistency. Patients reporting no change on clinical anchor questions were not excluded on a basis of poorer outcome measure scores.

The MCID was calculated as the mean change score for each outcome measure in the minimal improvement group. One way analysis of variance testing evaluated differences in outcome measure scoring across each level of clinical improvement classification (i.e., no change, minimal improvement, marked improvement). Descriptive statistics were examined to identify differences in outcome measure performance according to diagnostic category (i.e., tendinitis, arthritis, nerve compression). Quantitative statistics were not produced for individual diagnoses due to limited number of data points.

Secondary analysis was performed to determine the impact of follow-up duration and that of the absolute values of outcome scores (baseline and follow up) on the estimated MCID values. Pearson correlation coefficients were calculated to quantify the correlation between change scores in the minimally improved group on each outcome measure and absolute

outcome measure scores at baseline and follow up. Correlation coefficients were interpreted as follows: no association ($-0.3 < r_p < 0.3$), weak positive association ($0.3 < r_p < 0.5$), strong association ($0.5 < r_p < 0.7$), or very strong association ($r_p > 0.7$).⁽¹²⁾

An a priori sample size estimation was made based on documented performance of the outcome measures of interest and a conservatively estimated minimal clinically important difference of 10 points on each scale.⁽¹³⁻¹⁵⁾ To achieve $\alpha=0.05$ and $\beta=0.8$ with a standard deviation of 12 on each outcome measure, we needed to collect 24 data points representing no change and 24 data points representing minimal improvement.

Results

Baseline patient-rated scores on each outcome measure were similar across diagnoses ($P=0.12-0.70$) (Table 3). At follow up, the data points analyzed included follow up when patients reported no change ($n=41$), minimal improvement ($n=30$), and marked improvement ($n=31$). The anchor-based questions demarcated incremental improvement on each outcome measure. Figure 1 presents improvement on the DASH according to answers to the function anchor question at 2 weeks. Figure 2 depicts the improvement on each outcome measure according to answers on the 4-item response to treatment anchor at 2 weeks.

Based on change in mean outcome measure scores at times of minimal improvement, the MCID for the DASH was 10 (95% CI: 5-15). The MCID for the Quick DASH was 14 (95% CI: 9-20). The MCID was 14 (95% CI: 8-20) for the PRWE. The MCID values that represent the mean change in outcome measure scores at minimally improved time-points were significantly different from change in outcome measure scores at times of either no change or marked improvement (analysis of variance $P<0.001$ for each outcome measures with all pairwise comparisons $P<0.05$) (Table 4).

When examining changes in outcome measures for each diagnosis there was variation in exact values but overall patterns were maintained. Table 5 presents the improvement in each outcome measure according to final clinical change classification stratified by diagnosis.

Stratifying data according to duration of follow up (i.e., 2 week ($n=78$) versus 4 week ($n=24$)) produced similar MCID values of the DASH (10 versus 9), Quick DASH (14 versus 14), and PRWE (14 versus 15). MCID values were weakly correlated with absolute baseline scores on the DASH ($r_p=0.48$) and PRWE ($r_p=0.40$) with stronger correlation noted between baseline and MCID values on the QuickDASH ($r_p=0.55$). No more than weak association ($r_p<0.30$) was found between the MCID value and follow up score on any outcome measure.

Discussion

This investigation determined the MCID for 3 commonly referenced patient-rated outcome measures for nonoperative treatment of atraumatic upper extremity conditions. Notably, there is no consensus approach to determining MCID values. We used anchor questions to produce an externally-referenced MCID established by independent questioning as opposed to distribution-based calculations, which are internally-referenced.⁽¹⁶⁾ Global transition questions (i.e., anchor questions) are the most commonly used method and have been applied to orthopedic patients with rotator cuff disease.⁽⁸⁾ However, use of anchor questions with multiple answer options requires a choice of cut-points to define degrees of clinical improvement. Our choices for cut-points between change categories were established a priori based on a reasonable interpretation of the anchor answers and subsequently confirmed appropriate through examination of outcome measure change scores according to anchor question responses. Consistent with Hays et al, we did not adjust MCID values established in the minimal improvement group by subtracting the score change in the no

change group.⁽¹⁷⁾ We confirmed that the MCID values were statistically distinct from changes in outcome measure scores at points of no clinical change and marked improvement. Thus, we confirmed that our MCID change in the minimal improvement group exceeded the score variation in the no change group without reducing our MCID estimate.

Alternative methods of determining MCID values include distribution-based calculations based on the standard error of measurement and effect size estimations. Calculation by standard error of measurement determines MCID values based on variance in an outcome measure score and test-retest reliability of that measure. Similarly, effect size estimations have been used to describe MCID values based on mean change values following treatment divided by standard deviation of the outcome measure score. Therefore, these methods may detect change that exceeds that expected if the same group of patients was repeatedly measured in the absence of clinical change. However, neither of these methods takes into account any external reference for clinical change that is appreciated by patients. For this reason, we agree with Hays et al and believe that an anchor-based approach to determining MCID is optimal.⁽¹⁷⁾

Schmitt et al examined the minimal important difference (MID) in the DASH and PRWE in physical and occupational therapy clinics.⁽¹³⁾ MID values were defined as the mean change outcome measures associated with a single point change on a global disability rating completed by the patient. In 20 patients with diagnoses distal to the shoulder, the MID for the DASH was 17 points and 24 points for the PRWE. Difference in methodology between our study and that of Schmitt include duration of follow-up (2-4 weeks versus 3 months), diagnoses included (distal to elbow versus including shoulder), and our exclusion of injuries. The effect of duration of follow up has been noted by Tashjian et al in a study of rotator cuff disease where increased duration of follow-up was associated with larger estimates of MCID.⁽⁸⁾ This may be 1 reason why our estimated MCID values for these outcome measures are less than that of Smidtt. We chose the limited duration of follow-up and the exclusion of patients undergoing surgery to maximize the number of patients who would be only minimally improved.

Our estimation of the MCID for the QuickDASH (14 points) was similar to the mean change reported by Polson et al among a group of 8 patients with upper extremity conditions who reported minimal clinical improvement (13 points).⁽¹⁵⁾ Mintken et al calculated a smaller MCID of 8 points for the QuickDASH.⁽¹⁴⁾ Patients in Mintken's series all experienced shoulder pain and were followed for approximately 4 weeks. Mintken's calculations were based on 1 clinical anchor question but were determined using receiver operator characteristic curves, which while maximizing sensitivity and specificity of a cutoff value are expected to produced estimates of the MCID smaller than global transitions based on anchor questions.⁽¹⁸⁾

Table 6 details prior investigations into the DASH, QuickDASH, and PRWE in comparison with our study. As most investigations use a small subset of subjects who are improved to specified degrees to calculate the MCID, we include this information. We have noted recommendations listed on the official DASH website as they represent a synthesis of literature by those who designed the DASH.⁽⁹⁾

Several limitations are inherent to this study. Secondary to the number of patients reporting marked improvement during follow-up, our study has determined MCID for this population without diagnosis-specific MCID values due to a limited number of patients with minimal improvement and no change. Based on our finding of similar baseline measures and similar patterns of improvement across diagnoses, we expect only modest differences in absolute

MCID values for individual diagnoses. Further supporting this concept is the relatively small range of estimated MCID values for these outcome measures across investigations noted above despite variation in diagnoses included. Second, the choice of follow-up intervals may affect the estimate of the MCID. Our follow-up intervals were chosen to maximize follow-up prior to more marked improvement and yet allow for some effect from prescribed treatment. Third, determining MCID values requires recall of a prior health state and may be disproportionately affected by current health as opposed to health change over time.^(19,20) We identified greater correlation of MCID values with baseline values than final outcome measure scores, although this effect may reverse with greater follow-up duration. Additionally, all data were collected verbally by phone, which, although consistent across all data points, may have affected results as these surveys were designed for self-administration on paper. Finally, we do not presume that our data can be generalized to patients treated for injuries or for those undergoing surgery for atraumatic conditions.

Patient-rated outcome measures provide 1 avenue to quantify longitudinal changes in patient health and function. The MCID places small changes on outcome measures in perspective. During this investigation it was clear that population level assessment of the MCID for this cohort was in line with our expectations and was relatively consistent across these similar outcome measures. Notably, individual variation prohibits interpreting any single patients change in outcome score as definitively representing a clinically relevant change for that patient. Explanations for such variability would include differences in patient expectations, as well as the fact that answers to standardized questions on these outcome measures may only variably reflect the functional deficits or pain with the most impact for a given patient. Therefore, we recommend application of the MCID values we have determined for group-level analysis when conducting research and interpreting data examining groups of patients as opposed to assessing individual patients.

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References

1. Calfee RP, Adams AA. Clinical research and patient-rated outcome measures in hand surgery. *J Hand Surg Am.* 2012; 37(4):851–855.
2. Smith MV, Calfee RP, Baumgarten KM, Brophy RH, Wright RW. Upper extremity-specific measures of disability and outcomes in orthopaedic surgery. *J Bone Joint Surg Am.* 2012; 94(3): 277–285. [PubMed: 22298061]
3. Jaeschke R, Singer J, Guyatt GH. Measurement of health status. Ascertaining the minimal clinically important difference. *Control Clin Trials.* 1989; 10(4):407–415. [PubMed: 2691207]
4. Guyatt GH, Osoba D, Wu AW, Wyrwich KW, Norman GR. Clinical Significance Consensus Meeting G. Methods to explain the clinical significance of health status measures. *Mayo Clin Proc.* 2002; 77(4):371–383. [PubMed: 11936935]
5. Schunemann HJ, Guyatt GH. Commentary--goodbye M(C)ID! Hello MID, where do you come from? *Health Serv Res.* 2005; 40(2):593–597. [PubMed: 15762909]
6. Juniper EF, Guyatt GH, Willan A, Griffith LE. Determining a minimal important change in a disease-specific Quality of Life Questionnaire. *J Clin Epidemiol.* 1994; 47(1):81–87. [PubMed: 8283197]
7. Tubach F, Ravaud P, Baron G, et al. Evaluation of clinically relevant changes in patient reported outcomes in knee and hip osteoarthritis: the minimal clinically important improvement. *Ann Rheum Dis.* 2005; 64(1):29–33. [PubMed: 15208174]

8. Tashjian RZ, Deloach J, Green A, Porucznik CA, Powell AP. Minimal clinically important differences in ASES and simple shoulder test scores after nonoperative treatment of rotator cuff disease. *J Bone Joint Surg Am.* 2010; 92(2):296–303. [PubMed: 20124055]
9. DASH Outcome Measure - Disabilities of the Arm, Shoulder and Hand. <http://www.dash.iwh.on.ca>
10. Quick DASH Outcome Measures. <http://www.dash.iwh.on.ca/system/files/quickdashinfo2010.pdf>
11. MacDermid JC. The Patient-Rated Wrist Evaluation (PRWE) User Manual. 2007
12. Calkins, KG. Andrews University. Applied Statistics - Lesson 5: Correlation Coefficients. <http://www.andrews.edu/~calkins/math/edrm611/edrm05.htm>
13. Schmitt JS, Di Fabio RP. Reliable change and minimum important difference (MID) proportions facilitated group responsiveness comparisons using individual threshold criteria. *J Clin Epidemiol.* 2004; 57(10):1008–1018. [PubMed: 15528051]
14. Mintken PE, Glynn P, Cleland JA. Psychometric properties of the shortened disabilities of the Arm, Shoulder, and Hand Questionnaire (QuickDASH) and Numeric Pain Rating Scale in patients with shoulder pain. *J Shoulder Elbow Surg.* 2009; 18(6):920–926. [PubMed: 19297202]
15. Polson K, Reid D, McNair PJ, Larmer P. Responsiveness, minimal importance difference and minimal detectable change scores of the shortened disability arm shoulder hand (QuickDASH) questionnaire. *Man Ther.* 2010; 15(4):404–407. [PubMed: 20434942]
16. Osoba, D.; King, M. Interpreting QOL in individuals and groups: meaningful differences. In: Fayers, P.; Hays, R., editors. *Assessing Quality of Life in Clinical Trials: Methods and Practice.* Oxford, UK: Oxford University Press; 2005. p. 243-257.
17. Hays RD, Farivar SS, Liu H. Approaches and recommendations for estimating minimally important differences for health-related quality of life measures. *COPD.* 2005; 2(1):63–67. [PubMed: 17136964]
18. King MT. A point of minimal important difference (MID): a critique of terminology and methods. *Expert Rev Pharmacoecon Outcomes Res.* 2011; 11(2):171–184. [PubMed: 21476819]
19. Knox SA, King MT. Validation and calibration of the SF-36 health transition question against an external criterion of clinical change in health status. *Qual Life Res.* 2009; 18(5):637–645. [PubMed: 19330463]
20. Norman GR, Stratford P, Regehr G. Methodological problems in the retrospective computation of responsiveness to change: the lesson of Cronbach. *J Clin Epidemiol.* 1997; 50(8):869–879. [PubMed: 9291871]
21. Beaton DE, Katz JN, Fossel AH, Wright JG, Tarasuk V, Bombardier C. Measuring the whole or the parts? Validity, reliability and responsiveness of the Disabilities of the Arm, Shoulder, and Hand outcome measure in different regions of the upper extremity. *J Hand Therapy.* 2001; 14(2): 128–146.

Figure 1. DASH score improvement (Y-axis) according to response on the function anchor question (x-axis) (n=78). As patients reported greater improvement in function, their DASH scores improved by greater amounts.

Figure 2.

Outcome measure score improvements (Y-axis) according to response on the treatment anchor question (X-axis) (n=78). As patients indicated greater response to treatment on the anchor question, their DASH, QuickDASH, and PRWE scores improved by greater amounts.

Table 1

Distribution of diagnoses among the study cohort.

Diagnosis	Patients
Tendinitis	53
Trigger digit	26
Lateral epicondylitis	13
Medial epicondylitis	3
Dequervain tendinitis	10
Extensor carpi ulnaris tendinitis	1
Osteoarthritis	25
Thumb carpometacarpal	12
Distal interphalangeal joint	1
Proximal interphalangeal joint	2
Radiocarpal/Intercarpal/DRUJ	10
Nerve Compression	24
Carpal tunnel syndrome	12
Cubital tunnel syndrome	11
Radial tunnel syndrome	1
Total	102

Table 2
Anchor Questions

1	Since your first evaluation [2 or 4 weeks ago], has there been any change in the function of your treated hand or forearm?
a.	A very great deal worse
b.	A great deal worse
c.	A good deal worse
d.	Moderately worse
e.	Somewhat worse
f.	A little worse
g.	Almost the same, hardly any worse
h.	No change
i.	Almost the same, hardly any better at all
j.	A little better
k.	Somewhat better
l.	Moderately better
m.	A good deal better
n.	A great deal better
o.	A very great deal better
2	Since your first evaluation [2 or 4 weeks ago], has there been any change in the pain of your treated hand or forearm?
a.	A very great deal worse
b.	A great deal worse
c.	A good deal worse
d.	Moderately worse
e.	Somewhat worse
f.	A little worse
g.	Almost the same, hardly any worse
h.	No change
i.	Almost the same, hardly any better at all
j.	A little better
k.	Somewhat better
l.	Moderately better
m.	A good deal better
n.	A great deal better
o.	A very great deal better
3	Since your first evaluation [2 or 4 weeks ago], please rate your response to treatment
a.	None – no good at all, ineffective treatment
b.	Poor – some effect but unsatisfactory
c.	Good – satisfactory effect with occasional episodes of pain or stiffness
d.	Excellent – ideal response, virtually pain-free

Table 3

Baseline outcome measure scoring according to diagnostic category.

Outcome Measure	Arthritis	Nerve Compression	Tendonitis	<i>P</i> value
DASH	45 ($\pm$ 17)	41 ($\pm$ 18)	36 ($\pm$ 17)	0.14
Quick DASH	50 ($\pm$ 19)	48 ($\pm$ 19)	41 ($\pm$ 20)	0.12
PRWE	55 ($\pm$ 21)	52 ($\pm$ 19)	51 ($\pm$ 22)	0.70

Table 4

Improvement in outcome measures according to final clinical change classification.

	Final Clinical Change Classification		
	No Change	Minimal Improvement (MCID)	Marked Improvement
DASH Improvement *	-2 ($\pm$ 13)	10 ($\pm$13)	31 ($\pm$ 17)
QuickDASH Improvement *	0 ($\pm$ 14)	14 ($\pm$14)	34 ($\pm$ 22)
PRWE Improvement *	0 ($\pm$ 11)	14 ($\pm$15)	47 ($\pm$ 22)

* All pairwise comparisons (for a given outcome measure) across final change classifications $P < 0.05$ by Tukey B testing

Table 5

Improvement in outcome measures stratified by diagnosis.

	Final Clinical Change Classification		
	No Change	Minimal Improvement	Marked Improvement
Osteoarthritis			
DASH Improvement	-4 (± 13)	15 (± 20)	41 (± 23)
QuickDASH Improvement	0 (± 12)	19 (± 19)	48 (± 29)
PRWE Improvement	1 (± 12)	10 (± 20)	49 (± 26)
Nerve Compression			
DASH Improvement	-2 (± 10)	6 (± 14)	*
QuickDASH Improvement	0 (± 14)	10 (± 16)	*
PRWE Improvement	0 (± 14)	9 (± 11)	*
Tendonitis			
DASH Improvement	-1 (± 14)	10 (± 10)	30 (± 15)
QuickDASH Improvement	0 (± 17)	16 (± 13)	33 (± 20)
PRWE Improvement	-1 (± 9)	17 (± 15)	48 (± 22)

* Only 1 patient in this category so no mean value reported

Table 6

Reported MCID values of DASH, QuickDASH, and PRWE

Author	Instrument	Total Subjects	Subjects Contributing to MCID	Diagnoses	Follow up Duration	MCID method	MCID	Additional Notes
Schmitt et al ⁽¹³⁾	DASH	211	44 minimally improved; 16 with diagnosis distal to elbow	Any upper extremity	3 months	Anchor based	13	MCID = 17 for diagnosis distal to elbow
Beaton et al ⁽²¹⁾	DASH	200	172	Atraumatic: upper extremity	12 weeks	Statistical (MDC) [*]	MDC 95%: 13	
DASH Website: Summary analysis indicating minimal detectable change approximates MCID value for DASH with resultant MCID mean 13 (range, 8-17)								
Current Study	DASH	102	29 minimally improved	Atraumatic: forearm to hand	24 weeks	Anchor based	10	
Polson et al ⁽¹⁵⁾	QuickDASH	35	15 much improved	Any upper extremity	up to 6 weeks	Anchor based	19	8 subjects minimally improved with mean QuickDASH change 13
Mintken et al ⁽¹⁴⁾	QuickDASH	101	79 improved	Shoulder pain	mean 27 days	ROC Curve ^{**}	8	Mean difference in QuickDASH score between stable and improved patients = 15
DASH Website: Summary analysis using minimal detectable change approximates MCID value for QuickDASH with resultant MCID mean 18 (range, 16-20)								
Current Study	QuickDASH	102	29 minimally improved	Atraumatic: forearm to hand	2-4 weeks	Anchor based	14	
Schmitt et al ⁽¹³⁾	PRWE	211	16 minimally improved	Any upper extremity	3 months	Anchor based	24	
Current Study	PRWE	102	29 minimally improved	Atraumatic: forearm to hand	2-4 weeks	Anchor based	14	

* Minimal Detectable Change

** Receiver Operator Characteristics curve