Validation of the Danish version of the Quick-Disabilities of Arm, Shoulder and Hand Questionnaire

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ABSTRACT

INTRODUCTION: The Quick Disabilities of Arm, Shoulder and Hand (QuickDASH) questionnaire is an 11-item region-specific questionnaire used to measure the effect of clinical treatment of disorders and injuries to the upper extremity. During its original development, it was shown that the QuickDASH is a valid and reliable outcome measure.
The purpose of this study was to validate the Danish version of the QuickDASH in patients with wrist fractures, using the Nottingham Health Profile (NHP) as an evaluation tool.

METHODS: We included patients with wrist fractures. They all answered the QuickDASH and the NHP during their ambulatory follow-up. We investigated time to complete questionnaire. Internal consistency was tested with Cronbach's alpha and test-retest reliability was tested using the intraclass correlation coefficient, Bland-Altmans 95% limits of agreement and difference of mean. Convergent validity was calculated as correlation with the domains of Pain and Physical mobility in the NHP, and content validity was tested to reveal floor and ceiling effects.

RESULTS: We included 61 patients. The time burden, Cronbach's alpha and the intraclass correlation coefficient were excellent. Pearson's correlation for convergent validity was high for both Pain and Physical mobility, and we recorded a divergent validity for the remaining domains of the NHP (Sleep and Social isolation). Furthermore, we found a good distribution of items showing no floor or ceiling effect.

CONCLUSION: The Danish version of the QuickDASH is a valid and practical questionnaire for use in Danish wrist fracture patients.

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Fracture of the wrist is one of the most common forms of fractures and its incidence increases with age [1, 2]. A range of wrist fracture treatments are available [3, 4], but all strive to restore normal anatomical conditions and movement [5, 6]. The results of treatment are typically based on objective criteria such as grip strength, range-of-motion and radiological parameters [7], but patient-reported outcomes are increasingly used for assessment of treatment. It is therefore important that the patient-reported outcome measures ensure a correct, non-biased measurement of a given treatment, and studies describing the validity of these outcome measures are therefore necessary. The Disabilities of Arm, Shoulder and Hand (DASH) Questionnaire [8, 9], a 30-item questionnaire, and its derivative QuickDASH [10], an 11-item questionnaire, are widely used in the orthopaedic clinical setting. In their original form and during cross-cultural adaption, the validity evidence of both the Dash and the QuickDash was considered strong regarding treatment of injuries or disabilities in the upper extremities [11]. The DASH has previously been validated for Danish patients with wrist fractures, and the purpose of the present study was to validate the Danish version of the QuickDASH in patients with fractured wrists, using the Nottingham Health Profile (NHP) [12], the Danish translation of which has previously been validated for patients with wrist fractures [13, 14] as an evaluation method.

METHODS

The Danish version of the QuickDASH is available for download on the official website of the QuickDASH questionnaire. No articles have been published regarding the translation procedure and no articles exist on the validation of the Danish version of the QuickDASH in patients with wrist fractures, but an article on the validity in patients with total wrist arthroplasty has previously been published [15].

At our Hospital's Orthopaedic Department, we included 61 consecutive patients who were treated for fractures of the distal radius. Patients were excluded if they were under 18 years of age, were mentally unfit to participate, if they were unable to read or write Danish, had known disorders to the upper extremities or other disabling medical conditions or if they declined to participate. Patients either received conservative (five weeks with a dorsal cast) or operative treatment prior to their first ambulatory follow-up at one week. They all answered the QuickDASH and the NHP at this visit and then again at their last ambulatory follow-up visit at six weeks. Furthermore, at the last follow-up, a QuickDASH-questionnaire was handed out along with a postage-paid return envelope that patients were instructed to complete at home one day after their last follow-up in order

TABLE 1

Pearson´s correlation coefficient for the Quick-DASH and NHP.

NHP domain	1st control (p-value)	Last control (p-value)
Sleep	0.33 (< 0.01)	0.27 (< 0.01)
Pain	0.47 (< 0.01)	0.46 (< 0.01)
Physical mobility	0.61 (< 0.01)	0.66 (< 0.01)
Social isolation	0.36 (< 0.01)	0.33 (< 0.01)

DASH = Disabilities of Arm, Shoulder and Hand; NHP = Nottingham Health Profile.

to facilitate calculation of test-retest reliability. If any items were missing, patients were contacted either in the ambulatory facility or by phone, and the items were completed.

We investigated patient-burden and feasibility expressed as time used to complete the questionnaire (measured in 15 patients) and completeness at the first follow-up, at which point none of the patients had completed the QuickDASH before.

We estimated internal consistency by calculating Cronbach's alpha [16, 17], describing the homogeneity of the questionnaire, where a value above 0.9 was considered excellent. We furthermore estimated the questionnaire's test-retest reliability assessed by the intra-class correlation coefficient, estimating the degree of concordance between results and Bland Altman's 95% limits of agreement, where a high concordance of results presents as a small interval between the results [18, 19], with mean difference representing the bias. Validity parameters were expressed by convergent validity (expecting a higher correlation for the pain and physical domains of the NHP) and divergent validity (expecting a lower correlation for Sleep and Social isolation domains of the NHP). Furthermore we calculated content validity which shows whether a questionnaire has enough items and covers the area of interest adequately. This allowed us to calculate the proportion scoring the maximal and minimal score (floor and ceiling effect) at both controls, thereby demonstrating whether a proportion of the patients is in the extreme range of scoring and therefore unable to measure a meaningful improvement or deterioration in their condition. Responsiveness, i.e. the ability to measure sensitivity to change over time, would be expressed as effect size calculated by Cohen's d, which is the ratio of the mean change in first and last control divided by the standard deviation of the score at first control, where an effect size of > 0.8 is considered large and > 0.5 is moderate [20]. p-values < 0.05 were considered statistically significant.

Trial registration: not relevant.

RESULTS

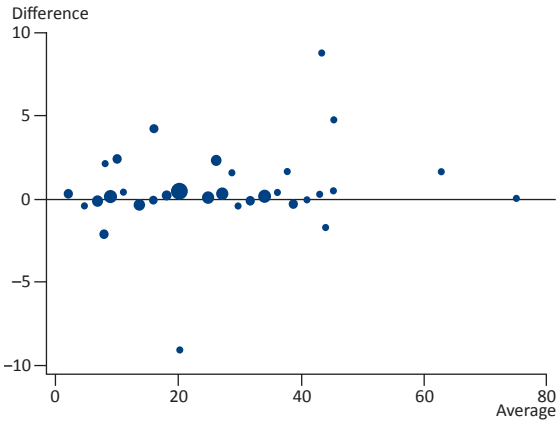
We included 61 patients with a mean age of 59 years (range: 19-84 years), 71% were female. A total of 23 patients were operated with open reduction and internal fixation with a volar plate. All patients answered the QuickDASH questionnaire at their first and last control (after an average of nine and 44 days, respectively) and 44 patients answered the QuickDASH questionnaire at 44 + 1 days. We measured the time used to complete the questionnaire at the first follow-up with the first 15 patients. At this point, none of the patients had ever answered the QuickDASH before. The mean time employed to answer the questionnaire was four (range: 2-11) minutes. Furthermore, we received no questionnaires with missing items at any follow-up. Cronbach's alpha was 0.96, displaying internal consistency from the total patient inclusion. The test-retest reliability was tested with 44 patients returning the questionnaire after the last follow-up and showed an intra-class correlation coefficient of 0.94 and a difference of mean of 0.39 (95% confidence interval: 0.13-0.91; p > 0.05) (**Figure 1**). We found a high correlation with the domains of Pain and Physical mobility which underpins the validity of the questionnaire (**Table 1**). Additionally, we found no floor or ceiling effect at either follow-up. Sum score at the first follow-up was 50.3, and at the last follow-up it was 24.1 (p < 0.05). The effect size was 1.1.

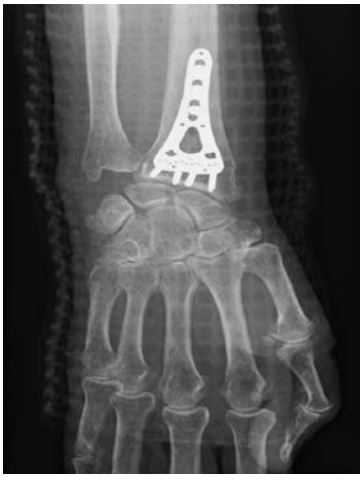
DISCUSSION

We consider the patient burden and the questionnaire's feasibility acceptable with an average of four minutes for answering the questionnaire and given that we recorded no missing items. We did not experience that patients required any particular help answering the ques-

FIGURE 1

Bland-Altman plot. X-axis: average of two measures. Y-axis: difference of two measures.





Validated outcome measures are important in the follow-up on distal radius fractures.

tionnaire, but staff members were available if they had any questions, and this might explain why no missing items were recorded. We found an excellent internal consistency with a Cronbach's alpha of 0.96 as well as a high degree of concordance with an intra-class correlation coefficient of 0.94 and no systematic bias demonstrated by the Bland-Altman plot. Furthermore, we recorded a good convergent validity with the domains of Pain and Physical mobility of the NHP as demonstrated by the Pearson correlation coefficient and an expected divergent validity with the domains of Sleep and Social isolation. These parameters are similar to those reported in other studies [10]. The content validity was high since we found no floor or ceiling effects. Construct validity was demonstrated by a significant decline in sum score between the first and the last control as we anticipate that patient discomfort diminishes over time, which is then reflected in a lower score, and accordingly responsiveness is high. A limitation of this study is our small patient cohort and the fact that we only investigated wrist fractures, even though the QuickDASH is a region-specific patient-reported outcome covering the whole upper extremity. We followed our patients for an average of only 44 days, and therefore cannot draw any conclusions about the longitudinal construct of the questionnaire. Furthermore, we consulted our patients early in their treatment and rehabilitation period knowing that they were probably not in a stable period of their recovery, but we obtained our results in order to validate the questionnaire rather than to estimate an outcome for this patient category. Our validation is also limited by the fact that we had an excess share of women and a rather low average age in our study population, which does not allow for further sub-group analysis. Additional studies are needed to estimate the long-term use of the questionnaire and to describe validity and reliability in other conditions involving the upper extremity.

CONCLUSION

We conclude that the Danish version of the QuickDASH is a valid and reliable patient-reported outcome in patients with wrist fractures.

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