

Validity, Reliability & Responsiveness of ‘Shortened Disability Arm Shoulder Hand’ (Quick DASH) Questionnaire in Measuring Functional Incapacity in Individuals with Upper Extremity Injuries

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Abstract: *The (Quick DASH) Quick Disabilities of the Arm, Shoulder, and Hand questionnaire is considered one of the widely used questionnaires for assessing and evaluating the functional ability of the patients in terms of upper extremity diseases. This study is done to evaluate the reliability and responsiveness of the shortened Quick DASH questionnaire functional measures in health care. The study was a secondary databased, cross-sectional, longitudinal study of patients with upper extremity injuries. Reliability observed in the analysis by calculating an Intraclass Correlation Coefficient. Responsiveness observed in the analysis by calculating the Effect Size and Standard Response Mean. The Minimal Clinical Importance Difference (MCID) also observed in the review to assess responsiveness. Intraclass Correlation Coefficient observed in the study as a correlating factor between the physiotherapist and patient-perceived level of the overall condition of upper extremity disability. Results demonstrated the inconclusive test-retest reliability. In the research, the responsiveness measured as 0.01 as small 0.06 as moderate and 0.14 as large. The MCID was determined to 19 points. There was a strong correlation found between patient and therapist perception, the overall present condition of upper extremity disability with the ICC of 0.91.*

Keywords: Quick DASH questionnaire, upper extremity, upper limb, outcome measures and functional outcome measures

1. Introduction

While objective measures still have a place in clinical settings, recent debate has surfaced challenging the sole use of objective measures as outcome measurements (Cieza & Stucki, 2005; Jette, 1993; Kirkley & Griffin, 2003). There is a current trend towards evaluating the efficacy of treatment by measuring functional outcomes that are relevant to the patient. Further, it suggested that measuring functional status discriminates severity and predicts subsequent disability better than physical examination or laboratory measures (Jester, Harth, Wind et al., 2005; Stover, 2004). In clinical practice, using subjective measures, such as questionnaires or functional outcome tools that assess the ability to function in daily life plus psychological aspects of health ensures the focus of treatment is on the patient rather than the disease. This considered relevant in a clinical physiotherapy setting (Higginson & Carr, 2001). Further, in relation to the upper extremity, evidence suggests that a clinical objective test and patient function are poorly correlated (Hopkins, 2000; Jost, Zumstein, Pfirmann, 2005).

Musculoskeletal injuries to the upper extremity can leave patients functionally impaired. Functional impairment can be defined as a person's inability to perform activities of daily living (ADL) such as personal hygiene, dressing and housework plus work and recreational activities (Giang, 2006). Disability can arise from symptoms such as pain,

numbness, tingling, weakness or stiffness to any part of upper limb. Measuring the degree of functional incapacity at any given point in time over a patient's recovery may be assisted by the use of functional outcome measures. Functional outcome measures may involve the use of self-reported questionnaires that rely on the patient's perception of their functional ability.

Effective functional outcome measures must also be valid and reliable instruments and be adapt at assessing change over time, specifically change that is considered important to the patient (Laing, Lew, Stucki, 2002; Schmitt & Fabio, 2004; Terwee, Dekker, Wiersinga, 2003). Assessing function is in keeping with the promotion of World Health Organisation (WHO) core values where Health Related Quality of Life (HRQOL) assessment of injury or disease consequence, as they affect the person, is applied to rehabilitation principles in the health sector, inclusive of physiotherapy practice (Cieza & Stucki, 2005; Horner & Larmer, 2006; Jette, 1993).

1.1 Objective of the Study

The purpose of this study is to examine the literature in context to review functional outcome measures used in the upper extremity and to understand the reliability and responsiveness of the QuickDASH questionnaire.

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2. Methodology

2.1 Selection Criteria

A literature search using Medline via Pubmed, CINAHL and Cochrane Controlled Trial Register databases was performed using key words: upper extremity, upper limb, outcome measures and functional outcome measures. A further search included key words: validity, reliability and responsiveness. An inclusion criterion was structured to include instruments that were whole limb measures and had studies published on their validity, reliability and responsiveness. The instrument specifically had to be self-completed in order to interpret the patient's perception of their functional capacity, therefore any instrument that included a physical examination as a critical component was also excluded.

2.2 Initial Filter

While there is an evolving classification of functional outcome measures, two main categories emerged from the literature: generic health profiles (Cieza & Stucki, 2005), and, more recently, whole limb outcome measures (Beaton et al., 2001). Generic health status instruments such as Nottingham Health Profile (NHP) (Hunt, McEwan, & McKenna, 1985) which measures illness behaviour, Sickness Impact Profile (Bergner, Bobbit, Carter, & Gilson, 1981) and Medical Outcomes Study Short Form (SF-36) (Ware & Sherbourne, 1992); Two summary scales: Physical Component Summary Score (PCS) and Mental Component Summary Score (MCS) (Ware & Sherbourne, 1992), however, have limitations that may affect physiotherapy practice. They are costly to access and are time consuming to complete. Further, generic instruments are limited in that they are very broad and may not focus enough on aspects of quality of life that are of relevance to a particular disease or treatment. For example, there is not one question in the SF-36 that is specific to shoulder conditions. This inadequate focus may neglect a small but clinically significant change in the quality of life to the patient with the disease (Kirkley & Griffin, 2003).

Cieza & Stucki (2005) recently reviewed a range of commonly used generic health profiles against the ICF classification framework. They identified that not one individual generic health profile met all the concepts of the ICF and that when selecting health status outcome measures additional information may be required specific to a condition or patient population.

2.3 Disability Arm Shoulder Hand Index (DASH)

Validity

Beaton and co-workers (2001) examined validity of DASH with specific reference to the upper limb acting as a single functional unit by evaluating patients with a variety of upper limb pathologies over a three-month period. The patients that had shoulder conditions were compared with Shoulder Pain and Disability Index (SPADI) and those that had hand conditions were compared with the Brigham questionnaire (disease specific to hand conditions). DASH was found to correlate well with the other questionnaires ($r = >0.69$) and

to discriminate well, for example between patients who were working and those who were not (Beaton et al., 2001).

Additional support for construct validity was demonstrated by evaluating DASH with both physical (PCS) and mental (MCS) components of SF-36 in patients with upper limb pathologies over a four-month period (SooHoo et al., 2002). Using Pearson correlation coefficients DASH revealed moderate correlation (-0.3 to -0.6) to several of the subscales in SF-36, irrespective of anatomical area of complaint, supporting construct validity of DASH as a measure of health status. This result also encourages a broader use of function versus focusing on the anatomical area of shoulder or hand. Floor and ceiling effects were only viewed with comparison to the MCS subscales. However, there were a large number of participant dropouts during this study, which potentially affects results. An extensive number of studies document validity of DASH involving a wide range of sample populations, including postoperative rotator cuff rehabilitation (Skutek et al., 2000), humeral fracture (Robinson & Page, 2003), hand and elbow conditions (MacDermid & Tottenham, 2004), different cultures (Imaeda et al., 2006), non-clinical populations (Jester, Harth, & Germann, 2005) and prognostic evaluations (Jester, Harth, Wind et al., 2005).

Reliability

Beaton et al., (2001) established a test-retest ICC of 0.96 in a study population of 86 patients, a subgroup of a study population of 172 patients with upper extremity dysfunction. Further support for test-retest reliability has come from Schmitt & Fabio (2004) with an ICC rating of 0.91 and MacDermid & Stratford (2004) where the ICC ratings exceed 0.9. This provides strong evidence that DASH is a reliable instrument in a variety of sample populations.

Responsiveness

In summary, DASH is a widely used outcome measure for the upper limb. It has evidence of validity, reliability and responsiveness in upper extremity conditions as shown in Table 2. DASH has been assessed across a variety of sample populations with a degree of consistency among the results. Its limitations are that it has a moderately complex scoring system, as previously defined and it is considered a lengthy questionnaire. This has led development of the shortened version, QuickDASH.

2.4 Shortened Disability Arm Shoulder Hand (QuickDASH)

Validity

Research to date has determined validity of QuickDASH as an instrument to assess upper extremity musculoskeletal disorders (Beaton et al., 2005; Gummesson et al., 2006; Imaeda et al., 2006). Beaton et al. (2005), as part of the item retention research on DASH, established construct validity with further validity being substantiated by Gummesson and co-workers (2006) using a similar technique of analysing the correlation coefficients between DASH and QuickDASH in a large post-operative study population. Additional validation however has been documented by comparing QuickDASH responses with SF-36 subscales demonstrating construct validity of QuickDASH in both a cross-cultural

population (Japanese) (Imaeda et al., 2006) and in a large working population (n = 559) with both non symptomatic and varied upper extremity disorders populations in the study group (Stover, 2004). There is however a scarcity of research that analyses validity of work and sport/music sections of both DASH and QuickDASH. Stover (2004) assessed validity QuickDASH as a measure of screening upper extremity disorders in workplace with population including workers from industrial and sedentary environments plus a range of experience, repetition and forces present in the job descriptions. The work module score was assessed separately and compared to SF-12 physical and mental component scores. Results confirmed that work module could discriminate well between groups based on diagnosis and symptom severity status. Interestingly, workers reported less effect from upper extremity disorders on their work, as addressed in the work module, than on household chores and other ADL's as addressed by QuickDASH, for all but the most severe symptoms. The author proposed that this may be due to workers being reluctant to reveal the degree or impact their disorder may have on their work to their employers (Stover, 2004).

Reliability

Whilst there is a paucity of research on QuickDASH, initial findings reveal that it has a strong reliability in the population groups studied. Beaton et al., (2005) reported an ICC ≥ 0.94 and Cronbach's alpha ≥ 0.92 , which is supported by Gummesson et al. (2006) with an ICC of > 0.9 .

Recently, QuickDASH was researched in a Japanese society, to review the psychometric properties following translation, with a slightly lower reliability being established (ICC 0.82 and Chronbach's alpha 0.88) (Imaeda et al., 2006).

Responsiveness

In summary, QuickDASH is reported to be a more efficient version of DASH while retaining the psychometric properties as it can be seen in Table 2. If further research supports this concept then, QuickDASH is likely to have more clinical benefits as an upper limb outcome measure.

3. Conclusion

These results advocate the QuickDASH is a responsive instrument in measuring the patient-perceived functional change over a particular period in primary health care. Reliability was not conclusively being established whereas support was observed that therapists were in agreement with the patients as to a certain level of functional impairment over a six-week timeframe.

4. Clinical Implications

The clinical implications of results of this study are that physiotherapists using QuickDASH for upper limb pathologies can be confident that when a score change occurs from a baseline measure by 19 points then a true change has occurred in patient's perceived health status.

Table 1: Difference between DASH shortened Quick DASH

Functional Outcome Measure	Validity	Reliability	Responsiveness	Advantages	Limitations
Disability Arm Shoulder Hand Index (DASH) (Hudak et al., 1996)	Repeated evidence of Validity established	Repeated evidence of Reliability established	Repeated evidence of responsiveness established. MCID 15 pts	Extensive body of Supporting research	Lengthy Questionnaire. Moderately complex to score.
Shortened DASH Quick DASH (Beaton et al., 2005)	Moderate validity established	Moderate reliability established	Limited responsiveness established	Quick to complete. Evolving body of Supportive research	Limited research to date

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