Disabilities of the Arms, Shoulder and Hand Questionnaire

Summary

Description: The Disabilities of the Arms, Shoulder and Hand (DASH) (www.dash.iwh.on.ca/index.htm) is a 30-item questionnaire, developed in the mid 1990s to describe disability experienced by individuals with upper limb disorders, and to monitor changes in symptoms and function over time (Hudak et al 1996). It is therefore a region-specific outcome measure for individuals with one or more upper limb musculoskeletal disorder. The DASH assesses six domains: daily activities, symptoms, social function, work function, sleep, and confidence. It contains two optional 4-item modules that evaluate symptoms and function in people whose work requires a high physical performance, such as athletes and musicians. It takes less than five minutes to complete (Bot et al 2004).

Instructions to the client and scoring: Clients are instructed to complete every question by circling the number that best represents their condition during the last week. If they have not performed an activity during this time, clients are requested to provide their best estimate response. Responses range from 1 (no difficulty/not at all/not limited/none/strongly disagree) to 5 (unable/extremely/so much difficulty that I can’t sleep/strongly agree). At least 27 of the 30 items must be answered to compute the total score, which is produced by summing the values of all the completed items and dividing this by the number of items answered. This produces a score out of five, which is transformed to a score out of 100 by subtracting 1 and multiplying by 25. The high physical performance modules are scored separately, in the same manner: 0 indicates no disability, 100 indicates complete disability. Hunsaker et al (2002) suggest that norms for the DASH (established on 1700 individuals from the general USA population) are 10.10 (SD = 14.68) for 30 items relating to symptoms and disability, 9.75 (SD = 22.72) for the optional sports module, and 8.81 (SD = 18.37) for the optional work module.

Reliability and validity: The test-retest reliability is high over a five day period (ICC = 0.96) (Beaton et al 2001). Construct, discriminate, and convergent validity, and responsiveness of the DASH have been evaluated in numerous upper limb populations (eg, following rotator cuff repair, non-specific elbow pain, distal radius fracture) in outpatient clinics and hospital settings (Bot et al 2004). The DASH has good construct validity, and negligible ceiling and floor effects. It can discriminate between different levels of clinician and patient rated levels of severity, and between those who can and cannot work due to their upper limb problem (Solway et al 2002). The DASH correlates highly with global pain and function scores (Turchin et al 1998). A 10-point difference in DASH scores over time represents minimal important change (Gummesson et al 2003).

Commentary

The DASH conceptualises the upper limb as a single functional unit. Functional items contained in the DASH require the co-ordinated action of all upper limb joints and musculature, and are considered to be representative of activities of daily living (ADLs). Consequently, the DASH hypothesis is that difficulties with ADLs will occur irrespective of the location or nature of upper limb problem. This hypothesis has clinical appeal, as the DASH can be used to evaluate symptoms and function for any type of upper limb problem. Thus the DASH can be used to compare outcome between different types of upper limb disorders. The DASH has been translated into 19 languages with additional clinimetric evaluation of the translated versions.

A limitation of the DASH is its length. It contains 30 items – double the number of items in other upper limb outcome measures, such as the Patient Rated Wrist Evaluation (MacDermid 1996). However, item reduction techniques have been used to shorten the DASH and the QuickDASH contains 11 items, plus the two optional high performance modules. Clinimetric testing indicates that the QuickDASH has high internal consistency, test-retest reliability, convergent validity, and responsiveness. However the DASH offers greater confidence of the accuracy of scores.

Physiotherapists who use the DASH in clinical practice often report that clients have difficulty estimating their performance on activities that have not been undertaken during the last week. Research has shown that estimates of performance often exceed actual ability (Young et al 1996). Moreover, clients often alter the way in which they perform ADLs by using compensatory mechanisms (Bialocerkowski 2002). This has the potential to influence the magnitude of disability and therefore the DASH score (Heaton and Bamford 2001). Information regarding compensatory mechanism use is not elicited in the DASH. In addition, the DASH may provide only a summary of symptoms and function. It was based on items contained in 13 existing upper limb outcome measures, which were mainly generic or shoulder-specific (Hudak et al 1996). Therefore the DASH may not include the most important difficult activities for all clients. These issues should be kept in mind when interpreting the DASH score.

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References

Goniometry via the internet

Description

The difficulty in performing objective, accurate, and reliable patient assessment at a distance using telecommunications technologies has been one of the major challenges which has limited the adoption of eHealth technologies in the rehabilitation sciences. Researchers from the Telerehabilitation Research Unit at the University of Queensland have developed a telerehabilitation system specifically to overcome this issue by enabling the remote measurement of patients via the internet. The internet-based goniometer is one tool from a suite of measurement tools making up this system. The internet-based goniometer enables a physiotherapist to measure joint range of motion of their patients accurately and reliably, regardless of their physical location or their condition.

Instructions to the client and scoring: With a telerehabilitation system at both the physiotherapist’s and the patient’s location, a videoconference is established via a low-speed dial-up internet connection, or a broadband internet connection if available. The videoconference enables the physiotherapist to communicate both visually and audibly with the patient in real time. The physiotherapist uses the videoconference to instruct the patient to perform the desired movement and a high quality video clip or still image of the patient is made by the telerehabilitation system. Using the video clip or still image, the physiotherapist identifies relevant landmarks on the image which corresponds to the axis of the movement, and the landmarks conventionally used to align the stationary and moveable arms of a goniometer. Using calibrated algorithms, the telerehabilitation system accounts for various factors such as patient alignment to the video camera, and calculates the angle present at the joint. The system is able to measure static joint angles or change in joint angle with movement. Once the videoconference is established, the range of motion measurements can be made within a few seconds and due to the intuitive software interface, minimal training is required.

Reliability and validity: The criterion-related validity, or instrument validity of the internet-based goniometer as well as reliability coefficients has been established in a number of studies, on both simulated and real patients, across simulated and real telecommunication links, on various joints in the body, and across various patient diagnostic groups (Hoffmann et al submitted, Russell et al 2003, Russell et al 2002). The validity of the internet-based goniometer in three studies was established by comparing the magnitude of the measurement performed via the internet-based goniometer with measurements performed using a standard 30cm universal goniometer. Limits of agreement statistics (Bland and Altman 1986), which provide an estimate of the difference between the two measurement techniques and hence a measure of the validity of the new device, range from –1.66 to 1.76 degrees in the knee joint (Russell et al 2002) and -5.3 to 6.1 degrees in measuring wrist extension (Hoffmann et al submitted). This degree of measurement error is consistent with that associated with repeated measurements made by a goniometer (Boone et al 1978) indicating that the internet-based goniometer is a valid tool for measuring joint angle. Intra-class correlation coefficients have been calculated for the internet-based goniometer and have been found to be high, with coefficients ranging from 0.97 to > 0.99 for intra-tester and 0.93 to > 0.99 for inter-tester reliability (Hoffmann et al submitted, Russell et al 2003, Russell et al 2002). Further studies are underway to establish the validity and reliability of the internet-based goniometer against more accurate measurement systems such as the Fastrack instrument.

Commentary

The development of telerehabilitation services has largely been driven by the concept of providing equitable access to rehabilitation services for individuals who are geographically or physically isolated from rehabilitation specialists. However, to be contemporary with the current ethos of evidence-based practice, such models of service delivery must be shown to be diagnostically accurate and to produce treatment outcomes which are equivalent to conventional face-to-face services. Such evidence is sparse in the literature which has no doubt contributed to a slow uptake of these technologies in the rehabilitation sciences. The internet-based goniometer is an example of a tool which has been demonstrated to be valid and reliable for the remote assessment of joint range of motion via low-cost, low-speed dial-up internet connections.

To date, validity and reliability data of the internet-based goniometer are available for the shoulder, elbow, forearm (supination/pronation), wrist and knee joints. Although not representative of all joints, the current evidence indicates the potential utility of the tool. Given that goniometry is one of the most commonly used evaluation methods in physiotherapy practice (Boone et al 1978), the internet-based goniometer represents a significant step towards establishing the evidence base for the remote management of patient via telecommunications technology. As further evidence is obtained through clinical research, it is time for the physiotherapy profession to adopt these technologies to remain contemporary in a changing healthcare landscape and provide the best possible clinical services to all.

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References