Action Research Arm Test

Description

The Action Research Arm Test (ARA or ARAT) is an observational test used to determine upper limb function. It was first described in 1981 as a modification of an earlier test, the Upper Extremity Function Test (UEFT) (Carroll, 1965) and was designed to assess recovery in the upper limb following cortical damage.

Test procedure: The test takes approximately 10 minutes to administer (de Weerdt and Harrison 1985) and while no special training is necessary it does require considerable non-standard equipment (various sized blocks of wood, cricket ball, stone, jug and glass, tube, washer and bolt, ball bearing, marble). The test consists of 19 items grouped in subtests (grasp, grip, pinch, and gross arm movement) and performance of each item is rated on a 4-point scale ranging from 0 (no movement possible) to 3 (movement performed normally). If subjects scores the maximum on the first, most difficult item of each subtest, they are credited with having scored 3 on all items of the subtest without having to be tested. If the patient scores less than 3, then the second item is tested. This is the easiest item, and if patients score 0 then they are unlikely to achieve a score above 0 for the remainder of the items and are credited with a zero for the other items and the assessor moves onto the next subtest. For example, in the Grasp subtest the first item is lifting a 10 cm^3 block onto a shelf and the second item is lifting a 2.5 cm^3 block. If the patient scores less than 3 for the first item and more than 0 for the second item then all items in the subtest should be assessed. The maximum obtainable score is 57.

Reliability and validity: Inter-rater and retest reliability have been shown to be high (ICC > 0.98) in studies involving patients with stroke (Van der Lee et al 2001). A small systematic difference was noted between two raters in one study (Van der Lee et al 2001) with a mean difference of 0.75 points and 95% CI 0.02 to 1.48. This same study also proposed a somewhat arbitrary value of 10% of the total range of the scale (i.e. 5.7 points) as the minimum clinically important difference, and then confirmed that a difference of this magnitude could be distinguished from measurement error. Concurrent validity has been confirmed by comparison with the upper limb component of the Fugl-Meyer Assessment and the Motor Assessment Scale (MAS) (Van der Lee et al 2001).

Commentary

It is equally important for clinicians and researchers to choose outcome measures that are valid, reliable and responsive to change. The ARAT is more frequently being used in both scenarios due to its ability to detect clinically-relevant changes in upper arm ability in the acute phase following stroke and in trials involving patients with a chronic condition. An advantage of the ARAT in the acute phase when upper limb function is limited is the ability to discontinue testing after failure of the least demanding items without sacrificing a valid score. During development, Lyle (1981) used Guttman scale analysis to ensure that items were truly hierarchical. This shortens by over 50% the time taken to complete the test. This is an advantage over an alternative outcome measure, the MAS (Hand Movements and Advanced Hand Activities Scales), where each item must be tested as the ordering of items is not truly hierarchical (Sabari et al 2005). Although the scoring of the ARAT appears complex, experience with the test confirms the comment by Lyle (p. 491) 'This sounds complicated to explain, but is easy in practice'.

Another perceived limitation of the ARAT is that the scoring is subjective with respect to a score of 2 ('can complete the test but takes abnormally long or has great difficulty') or 3 ('movement performed normally'). The original paper provided no operational definitions to elaborate on this, but subsequent studies have set time limits for each item as twice the standard deviation of the performance times of a sample of healthy adults (Van der Lee et al 2001) and comprehensive instructions have been published to ensure a standardised approach to performing the test (Yozbatiran et al 2008). An advantage of the ARAT is the possibility of videotaping assessment for scoring at a later date, or by another tester, without affecting reliability.

In summary, the ARAT is a responsive and valid measure of upper limb functional limitation and is a useful measure for use in upper limb rehabilitation and clinical research. A standardized approach to testing should be used to reduce variance between therapists and when conducting multisite research trials.

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Patient Rated Wrist Evaluation

Description

The Patient Rated Wrist Evaluation (PRWE) is a region-specific outcome measure that evaluates wrist-related disability. It contains 15 items: five of which evaluate pain (intensity and frequency) and 10 evaluate function (specific activities and usual activities). Information gained from the PRWE can be used to determine the magnitude of wrist-related disability at one point in time and to identify change in disability over time (MacDermid 2007). The PRWE has been translated into Chinese (Wah et al 2006) and German (Angst et al 2005).

Instructions and scoring: Clients are instructed to answer all questions by rating their average pain and level of function over the past week on an 11-point scale ranging from 0 (no pain /never experiences pain / no difficulty) to 10 (worse pain, always experiences pain / unable to do activity). If any of the activities have not been performed, clients are requested to provide their best estimate of their pain or function. Pain and function subscale scores can be produced in addition to a total PRWE score. The pain subscale score, which is computed by summing the responses to the five pain items, produces a score ranging from 0 (no pain) to 50 (continuous, severe pain). To produce the function subscale score, the responses to the 10 functional items are tallied and divided by two. This produces a score which ranges from 0 (no difficulty performing specific or usual activities) to 50 (unable to perform specific or usual activities). Adding the pain and function subscale scores produces the total PRWE score, where 0 is the best score (no pain or difficulty performing activities) and 100 is the worse score (severe continuous pain and unable to perform activities) (MacDermid 2007).

Reliability and validity: The test-retest reliability of the PRWE is high (ICC > 0.90) over the short and long term in patients with a variety of wrist diagnoses (MacDermid et al 1998, Schmitt and Di Fabio 2004). Construct, and convergent validity as well as responsiveness of the PRWE have been evaluated in a various wrist populations, such as in patients with distal radius fractures or carpal fractures, osteoarthritis, rheumatoid arthritis and Kienbock's disease (MacDermid 2007). The total PRWE score is strongly associated with the Disabilities of Arm Shoulder and Hand (DASH) score (Angst et al 2005) and has moderate to poor strength associations with impairments (eg. grip strength, wrist motion, dexterity) (MacDermid et al 2002), general health (MacDermid et al 1998, Angst et al 2005), age (Jupiter et al 2002, Murphy et al 2003) and radiological findings (Jupiter et al 2002, Karnezis et al 2005). The PRWE has a similar responsiveness to that of the DASH (MacDermid and Tottenham 2004, Schmitt and Di Fabio 2004, 2005). The smallest change in the total PRWE score that reliably reflects change in disability rather than measurement error is 12 points, where as the smallest difference in the PRWE score which patients perceive as benefit is 24 points (Schmitt and Di Fabio 2004).

Commentary

The PRWE is an outcome measure that is a simple, brief and easy to score. It was systematically developed where by its items were generated from a number of sources, including patients with wrist injuries and clinical experts, the biomedical literature and published upper limb outcome measures. These items were subsequently refined and reduced by expert consensus and pilot testing (MacDermid 1996). The psychometric properties of the PRWE are acceptable and these have been comprehensive examined by its developers and independent researchers (MacDermid 1996).

The PRWE evaluates two components of disability: pain and function. An advantage of using this outcome measure is that it evaluates both pain intensity and frequency. Moreover, pain intensity is evaluated across various activities, such as during repetitive movements and lifting, as well as at rest and when it is at its worse. This provides a more comprehensive picture of pain behaviour. Function is assessed across specific and usual activities. This means that both activity limitations and participation restrictions are evaluated. The specific activities section contains items that may be influenced by the dominance of the wrist injury. This means that the hand that is normally used to perform the specific activities may be uninjured or not affected. Although this may contribute to missing data, instructions have been provided on how to deal with unanswered items (MacDermid 2007).

The PRWE was developed for use on clients with wrist disorders. However clients often present with both wrist and hand disorders. The Patient Rated Wrist/Hand Evaluation (PRWHE) has subsequently been developed to address this issue. It contains the same pain and function items as the PRWE but its items refer to the wrist/hand instead of the wrist in isolation. In addition, it contains two questions on hand esthetics (MacDermid and Tottenham 2004). The PRWHE is scored in an identical matter to the PRWE, and as such the esthetics items do not contribute to the total PRWHE score.

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