ORIGINAL RESEARCH

Validity of the Michigan Hand Outcomes Questionnaire in Patients With Stroke

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Abstract

Objective: To investigate the measurement properties of the Dutch version of the Michigan Hand Outcomes Questionnaire (MHQ) in patients with stroke.

Design: Validation study.

Setting: Outpatient rehabilitation clinic.

Participants: Consecutive patients with stroke (N=51; mean age, 60±11y; 16 women [31%]).

Interventions: Patients were asked to complete the MHQ (57 items) and Medical Outcomes Study 36-Item Short-Form Health Survey (SF-36). Additional assessments included the Barthel Index and performance tests for hand function (Action Research Arm Test, Nine Hole Peg Test, Frenchay Arm Test, Motricity Index).

Main Outcome Measures: Associations between the MHQ and other outcome measures were determined using Spearman correlation coefficients and the internal consistency of the MHQ using Cronbach α. Floor or ceiling effects were present if >15% of the patients scored minimal or maximal scores, respectively. Test-retest reliability was established by the intraclass correlation coefficient.

Results: The mean MHQ total score was 70.0±22.4, with Cronbach α being .97. The MHQ total score correlated significantly with the physical component summary of the SF-36, the Barthel Index, and all hand function performance tests ($P<.01$). The MHQ total score showed no floor or ceiling effects. The test-retest intraclass correlation coefficient was .97.

Conclusions: This study provides preliminary evidence that the MHQ is an internally consistent, valid, and reliable hand function questionnaire in outpatients after stroke, although these results need to be further confirmed.

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Despite important advances in acute medical care, stroke accounts for >6 million deaths per year worldwide and has a major impact on multiple areas of life in many of the survivors.[1] Regarding the consequences for upper extremity function, it was found that 69% of the patients experience hand function problems directly after stroke, leading to permanent limited function in half of them.[2] Moreover, the initial impairment of the upper extremity was found to be the strongest prognostic factor for the outcome of stroke.[3] The comprehensive International Classification of Functioning, Disability and Health (ICF) core set for patients with stroke comprises all aspects of health status that are important for

patients with this condition,[4] including fine hand use as well as hand and arm use.

Until now, hand function problems in patients with stroke are usually identified and monitored by means of instrumented performance tests, such as the Nine Hole Peg Test (NHPT),[5] the Frenchay Arm Test (FAT),[6] or the Action Research Arm Test (ARAT).[7] Such instrumented tests are, however, time-consuming in terms of administration, preparation, and travel time for patients to attend face-to-face sessions and require specific equipment as well as trained clinicians. These requirements can form a barrier to assess poststroke hand function in a proper and timely manner in daily practice. Self-administered questionnaires have an important advantage in this respect, although questionnaires are subjective in their nature and some patients might not be able to complete a questionnaire without assistance. Self-reported

outcome measures may cover information that is not obtained from the capacity outcome measures of upper limb function and vice versa.[8] In general, the aim and nature of a study will determine the type of the outcome measure to be chosen.

Ideally, a hand function questionnaire should include aspects of hand function not only in the ICF domains body functions and body structures but also in the domains activities and participation. Currently, there is no single valid and reliable outcome measure available to capture the full range of daily function in the hemiparetic upper limb.[9] This observation is in accordance with a systematic review on the topic of instruments for arm/hand assessment,[10] concluding that there is a need for instruments to measure hand function that are easy to administer, covering aspects of body functions as well as daily activities. The Stroke Impact Scale[11] and the ABILHAND[12] are outcome questionnaires that comprise hand-related questions, but only with respect to some aspects of the ICF. The Stroke Impact Scale focuses on strength and daily activities and the ABILHAND on daily activities. The Michigan Hand Outcomes Questionnaire (MHQ) covers the ICF core sets for stroke to a much larger extent than do the aforementioned questionnaires.

The MHQ[13] is a patient-reported outcome measure focusing on hand performance in daily life, but also takes such aspects into account as underlying impairments, work, and satisfaction. Apart from bimanual tasks, it includes an assessment of each hand separately. Its validity and responsiveness have been proven for various hand conditions, for example, in patients with rheumatoid arthritis, metacarpal phalangeal joint arthroplasty, carpal tunnel syndrome, hand injury, and distal radius fracture.[14-19] The MHQ was recently used in a study on the effect of botulinum toxin on spasticity in patients after acquired brain injury,[20] but is not validated for this patient group to date. Therefore, the present study aimed to investigate the measurement properties of the MHQ in patients with stroke receiving outpatient rehabilitation care.

Methods

Study design

This cross-sectional study was conducted from May 1, 2013 to February 1, 2014 in the Sophia Rehabilitation Center, The Hague. The study was judged to be nonmedical research by the Medical Ethics Review Committee of the Leiden University Medical Center. All participants gave written informed consent, and the study was conducted according to the Declaration of Helsinki.[21]

List of abbreviations:

ARAT	Action Research Arm Test
ICF	International Classification of Functioning, Disability and Health
FAT	Frenchay Arm Test
MCS	mental component summary
MHQ	Michigan Hand Outcomes Questionnaire
MI	Motricity Index
NHPT	Nine Hole Peg Test
PCS	physical component summary
SF-36	Medical Outcomes Study 36-Item Short-Form Health Survey

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Patients

Consecutive adult patients with stroke who received multidisciplinary rehabilitation treatment in the Sophia Rehabilitation Center were selected using the following inclusion criteria: first stroke no longer than 5 years ago; 18 years or older; participating in an outpatient multidisciplinary rehabilitation program; being able to read and comprehend the Dutch language; being in a sufficient physical and emotional status to take part in assessments and to complete questionnaires.

Potentially eligible patients were invited by their treating physician to participate.

Rehabilitation treatment

All patients received a regular stroke rehabilitation treatment, not necessarily focused on hand problems. This comprises a multidisciplinary, goal-oriented, individualized treatment program. National evidence-based guidelines were followed with respect to the type and intensity of individual treatment modalities.[22]

Assessment methods

Procedure

Stroke characteristics were collected from the medical record, including the nature of stroke (hemorrhagic/ischemic), time since stroke, and type of paresis (left/right).

Patients were invited to a 1-hour assessment on a regular treatment day. The assessment comprised the Barthel Index, a set of questionnaires (sociodemographic characteristics and the MHQ), and 4 instrumented tests. In case of bilateral involvement, the most affected site was tested. Patients whose treatment schedule allowed a retest 2 weeks after the first administration of the MHQ were asked to complete the MHQ for a second time (21 patients); they all complied. The clinical assessments and data extraction from the medical records were executed by a trained and experienced health professional (S.K.), who was not involved in the treatment of the patients.

Sociodemographic characteristics

Sociodemographic characteristics included age, sex, educational level (low: up to and including lower technical and vocational training; medium: up to and including secondary technical and vocational training; and high: up to and including higher technical and vocational training and university), and employment status (in patients younger than 65y).

The MHQ

The MHQ is a self-administered, 57-item questionnaire covering 6 domains: overall hand function, activities of daily living, pain, work performance, aesthetics, and patients' satisfaction with hand function.[13,23] It covers the relevant ICF categories to describe the effect of stroke on hand function.[4] The function of the left and right hand is recorded separately (except for the domains pain and work performance). Each item is scored on a 1 to 5 scale, with the domain scores ranging from 0 to 100. For every domain, a higher score indicates better hand function. The pain scale is reversed (100−pain score) to obtain a range from worst (0) to best (100). The total score (the average of all domains) ranges from 0 to 100, with higher scores indicating better hand function.[13,23] This total score is obtained by summing the scores for all 6 scales and then dividing by 6. For scales