Journal of Hand Therapy xxx (2017) 1–3

Contents lists available at ScienceDirect

Journal of Hand Therapy

journal homepage: www.jhandtherapy.org

Practice Forum

The Arm Function in Multiple Sclerosis Questionnaire was successfully translated to German

Saskia Steinheimer MD [a], Moritz Wendel [a], Tim Vanbellingen PhD [b,c,d], Laurens T. Westers MD [e], Julius Hodak MD [a], Verena Blatter MD [a], Bernard M.J. Uitdehaag MD [f], Christian P. Kamm MD [a,b,*]

[a] Department of Neurology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland
[b] Neurology and Neurorehabilitation Center, Luzerner Kantonsspital, Lucerne, Switzerland
[c] Departments of Neurology and Clinical Research, University Hospital, Inselspital, Bern, Switzerland
[d] ARTORG Center for Biomedical Engineering Research, University of Bern, Bern, Switzerland
[e] Neurologische Praxis, Medizinisches Versorgungszentrum Birkenallee, Papenburg, Germany
[f] Department of Neurology, Amsterdam Neuroscience, VUmc MS Center Amsterdam, VU University Medical Center, Amsterdam, The Netherlands

Rationale

Impaired manual dexterity is frequent in multiple sclerosis (MS) interfering with activities of daily living (ADL) and quality of life (QoL).[1,2] Therefore, manual dexterity should be routinely evaluated in the daily care of patients with MS as well as in clinical trials, which implies the need for valid, reliable, and convenient measurement methods.

The Arm Function in Multiple Sclerosis Questionnaire (AMSQ) is the first patient-reported outcome (PRO) measure specifically developed to evaluate manual dexterity in MS. It was developed in Dutch showing good validity and reliability.[3,4] The aim of this study was to develop the German version of the AMSQ and to evaluate its psychometric properties in assessing manual dexterity and its impact on ADL and QoL. To do so, the AMSQ was correlated to performance-based tests and PROs evaluating similar constructs. Test-retest reliability was assessed as well. We hypothesized that the measurement properties of the German version are similar to the Dutch version of the AMSQ.[3,4]

Original measure

Dutch Version of the AMSQ.[3,4]

Construct measured

The construct measured was impaired manual dexterity in MS patients and ist impact on ADL and QoL.

Structure

The AMSQ contains 31 questions on a unidimensional scale.

Scoring

Questions are formulated as “during the past 2 weeks, to what extent has MS limited your ability to …?” Response categories are from 1 to 6 (not at all, a little, moderately, quite a lot, extremely, and no longer able to). One final sum score is obtained (range, 31-186) with higher scores indicating more dexterous difficulties (Appendix A).

Current language and cultural context

The AMSQ was translated from its original Dutch version to German version. Both cultures and languages are very similar. In fact, Dutch is grouped within the Germanic languages and originates from the Old Frankish dialects.

Crosscultural translation process

The translation was performed as recommended by the World Health Organization’s procedures for crosscultural validation and adaption of self-report measures.[5]

Contributors

Translation was performed by 4 bilingual health professionals (neurologist, family doctor, physical therapist, and clinical neuroscientist) and the German-speaking principal investigator (neurologist).

Forward translation

Forward translation was done by a bilingual neurologist (LTW). An expert panel consisting of the original translator (LTW), 2

Conflict of interest: All named authors hereby declare that they have no conflicts of interest to disclose.

Funding: The study was supported by the Swiss Multiple Sclerosis Society (SMSG) by a restricted grant.

* Corresponding author. Department of Neurology, Inselspital, Bern University Hospital, University of Bern, Bern, Switzerland. Tel.: +41 31 632 2111; fax: +41 31 632 0321.
E-mail address: christian.kamm@luks.ch (C.P. Kamm).

0894-1130/$ – see front matter
https://doi.org/10.1016/j.jht.2017.09.010

bilingual health professionals (family doctor [Johanna C.E. Westers] and physical therapist [Emelina Westers]), and the German-speaking principal investigator (CPK) reviewed and adapted the initial translation on consensus.

Backward translation

Backward translation was performed by a bilingual clinical neuroscientist with expertise in neurologic rehabilitation and in the development of standardized questionnaires (TV).

Reconciliation and harmonization

This version was compared with the original version by all involved translators to find consensus. At this point, no additional adaptions were necessary.

Cognitive debriefing or pilot testing

This version was tested on 10 patients with MS to investigate their understanding of the items and cognitive equivalence of the translation, followed by debriefing. Afterward, a final version was created by consensus.

Adaption of items

Due to the similarity of languages, only grammatical adaptions were made throughout the translation process. With regard to content, no adaptions were made. Patients understood the questionnaire without consistent critiques.

Validation sample

From September 2014 to November 2015, 100 consecutive patients with MS were included. Mean age was 40.67 years (standard deviation [SD], ±10.72; range, 20-60), mean disease duration was 10.45 years (SD, ±8.44; range, 0.5-40), and mean Expanded Disability Status Scale was 3.6 (SD, ±2.0; range, 1-9). About 69% of patients were females, 94% of patients were right handed, 87% had relapsing-remitting MS, 8% had secondary progressive MS, 4% had a clinically isolated syndrome, and 1% had a primary progressive MS. About 88% of patients were treated with immunomodulatory drugs (natalizumab, fingolimod, interferon beta, or glatiramer acetate). Written informed consent was obtained from all participants before study entry. The study was performed in accordance with the 1964 Helsinki declaration and its later amendments and approved by the Ethics Committee, Bern, Switzerland.

Procedures for validation

This was a cross-sectional study. Demographic data were collected, and the Expanded Disability Status Scale and Modified Ashworth Scale were performed. In addition, performance-based tests (9-hole peg test and coin rotation task) and PROs (AMSQ, Guy's Neurological Disability Scale upper extremities, Multiple Sclerosis Impact Profile-ADL, Multiple Sclerosis Impact Scale-29 [MSIS-29], and 36-Item Short Form Health Survey [RAND-36]) were performed.[6]

Construct validity was assessed by means of principal component analysis. Cronbach alpha was calculated as a measure of internal consistency. Convergent and divergent validity was analyzed by means of Pearson correlation analyses between AMSQ and the other measurements.[7]

Test-retest reliability was assessed comparing 2 AMSQs performed 2 weeks apart using intraclass correlation coefficient (2-way analysis of variance random effect model for agreement). The measurement error was determined by calculating the standard error of measurement (SEM), which is a measure of within-subject variability defined as the SD in the baseline measure adjusted for the internal consistency ($SEM = SD \times \sqrt{[1-\alpha]}$). Based on the SEM, the minimum detectable change (MDC; $MDC_{95} = SEM \times 1.96 \times \sqrt{2}$) was determined, which describes the amount of true change in subject status beyond measurement error with 95% certainty.

Validation results

Construct validity

Principal component analysis revealed that the AMSQ measures 1 construct, which is demonstrated by 1 component with an eigenvalue above 1.0, explaining 77% of the variance. Communalities were between 0.64 and 0.88, also indicating substantial common variance. The internal consistency of the 31 items was high (Cronbach α, 0.98).

High and significant correlations were found between the AMSQ and the performance-based tests (9-hole peg test and coin rotation task) as well as the physical scores of the MSIS-29 and RAND, the RAND subscore physical functioning, the Multiple Sclerosis Impact Profile-ADL, and the Guy's Neurological Disability Scale upper extremities indicating good construct and convergent validity of the AMSQ (all r values above 0.60, all $P < .0001$).

Only moderate to low correlations were found between the AMSQ and the psychological score of the MSIS-29, the mental score of the RAND, and the RAND subscores *vitality*, *social functioning*, *physical health*, *mental health*, and *role emotional*, indicating good divergent validity (r values, all between −0.13 and −0.59).

Reliability

About 74% of patients filled out and returned the AMSQ Global Perceived Effect questionnaire 2 weeks after initial examination. Two patients reported *much better* on the Global Perceived Effect questionnaire and were therefore excluded from reliability analysis. Comparing the 2 performed AMSQs, the intraclass correlation

Table 1
Comparison of measurement properties across translations

Measurement property of the AMSQ	Present study	Original
Cronbach α	0.98	0.98
Test-retest reliability (ICC)	0.95	0.96
Construct validity: correlation to (r values)		
9HPT	0.83*	0.77
9HPT dominant	0.82*	
9HPT nondominant	0.81*	
CRT	0.77*	0.77
CRT dominant	0.81*	
CRT nondominant	0.68*	
MAS	0.69*	
MAS dominant	0.67*	
MAS nondominant	0.65*	
MSIP-ADL	0.78*	0.81
RAND-36 physical	−0.70*	−0.81
RAND-36 mental	−0.51*	0.02
MSIS-29 physical	0.80*	0.77
MSIS-29 psychological	0.37*	0.17
GNDS upper extremities	0.77*	0.84

AMSQ = Arm Function in Multiple Sclerosis Questionnaire; ICC = intraclass correlation coefficient; r values = Pearson correlation coefficients of AMSQ with other measurements; 9HPT = 9-hole peg test; CRT = coin rotation task; MAS = Modified Ashworth Scale; MSIP-ADL = Multiple Sclerosis Impact Profile-activities of daily living; RAND-36 = 36-Item Short Form Health Survey; MSIS = Multiple Sclerosis Impact Scale; GNDS = Guy's Neurological Disability Scale.
*$P < .0001$.