

Adaptation of DASH outcome measures to the slovenian population – functionality of the arm, shoulder and hand

Prilagoditev vprašalnika DASH outcome measures za slovensko populacijo – funkcionalnost zgornjega uda, ramena in roke

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Izvleček

Izhodišče: V Sloveniji ni testa za funkcijo zgornjega uda, ki bi bil enoten za vse ustanove in bi omogočal primerjavo rezultatov terapij, rehabilitacije zgornjega uda z medicinskimi centri.

Metode: Po pregledu obstoječih testov za funkcijo roke in strokovne literature, v kateri se uporabljajo rezultati testov, smo se v SB Celje odločili za prevod testa DASH – Disabilities of Arm, Shoulder and Hand. Vprašalnik smo prevedli in prilagodili v skladu z navodili za medkulturno prilagoditev ter testirali na populaciji bolnikov ambulate za kirurgijo roke SB Celje.

Rezultati in razpravljanje: Prevod in prilagoditev DASH testa slovenski populaciji je dolgotrajen postopek, ob katerem je potrebno upoštevati tako jezikovne kot kulturne razlike. Testiranje na populaciji v ambulanti za kirurgijo roke Splošne bolnišnice Celje je pokazalo dobro veljavnost, zanesljivost in odzivnost testa.

Zaključek: Prevode DASH testa, QuickDASH testa in navodil za izračunavanje rezultatov je odobril Institute for Work and Health, Toronto, Kanada, ki je skrbnik izvirnika in internetne strani. Prevodi so objavljeni na njihovi strani in dostopni za uporabo.

Abstract

Background: In Slovenia, there is no test for upper limb function, which would be uniform for all institutions and would allow comparison of the results of therapy and upper limb rehabilitation between medical centers.

Methods: After reviewing the existing hand function tests and current literature we decided to translate the DASH test–Disabilities of Arm, Shoulder and Hand. The adaptation was tested on a patient population in the outpatient hand clinic, General Hospital Celje, and showed good validity, reliability and responsiveness.

Results and discussion: In the procedure of adapting DASH test to the Slovenian population language and cultural differences must be considered. Testing the adapted DASH in the general population showed good validity, reliability and responsiveness of the adapted test.

Conclusion: Translations of the DASH test, QuickDASH test and instructions for scoring the DASH outcome measures are approved by the Institute for Work and Health, Toronto, Canada. The translations are published on their web site and available for use.

Introduction

The hand is one of the more complex parts of the human body. It is an organ of sensation, used for work, it is often the first physical contact with another person. Anatomically, there are a number of structures of diverse properties such as skin, blood vessels, nerves, tendons, muscles and bone collected on a small area.¹

From the experience gathered in working with patients with hand injuries we know that the perception of the hand depends on a personality. A patient with an explosive hand injury that has almost no fingers left is happy because he has his thumb preserved and is able to do the work he performed prior to the injury. The patient with amputation of the distal phalange of the second finger

perceives himself as a disabled person who cannot use his hand.

For evaluating the status and treatment of patients with hand injuries or degenerative hand diseases we have a number of objective tests, for example measurements of mobility, strength, radiological investigations.² The tests can assess hand status, but cannot assess and monitor the actual hand function, which is subject to personal perception, flexibility, requirements of the patient (manual worker, intellectual, retired, hobbies ...) but also to objective facts, such as impairment of the dominant or non-dominant hand.

In order to achieve a more accurate assessment of the actual functioning of a patient in everyday life, better monitoring of intervention and rehabilitation as well as the possibility of comparing the results of interventions with other medical centers, we are looking for a test that is easy to reproduce, is understandable to the patient and the doctor, enables the assessment of different conditions of the hand, allows for comparison of the results with other institutions and is economically feasible (no additional charge for the use of the test, no cost for acquiring the equipment needed for the test, no need for additional training of the personnel who will carry out the test).

Methods

Hand function tests and current literature

With the help of search engines, we found a variety of tests used to assess hand function and in PubMed we searched for articles that evaluate and compare tests to each other, and articles where tests are used to assess the effectiveness of interventions.

Translation and adaptation of DASH

Before starting the translation, the Institute for Work and Health (IWH) based in Toronto, Canada, which is the administrator of the original questionnaire and of the web site where all the adaptations of the DASH are published, must be notified of the intention. They verify whether a translation or

intent of translation already exists, and then issue their consent to the translation.³

After approving the Slovenian adaptation, we began by translating and adapting the DASH questionnaire following the instructions.^{3,4}

The first step is direct translation into the Slovenian language. Two translators translate all the parts, i.e., the instructions for answering the questionnaire, all questions of general and optional modules, answers used and instructions for calculating the result.

The second step in the adaptation is the synthesis of the two translations by a third person—a synthesis recorder is added to a group of translators.

The third step is back-translation of T12 into the source language, in this case English. This time both translators are laymen in medicine and native speakers of the source language of the questionnaire.

In the fourth stage, an expert committee consisting of a methodologist, a healthcare professional, all translators, a language expert and the translation synthesis recorder reviews all the translations and reports and produces a questionnaire, instructions for use and instructions for calculating the results, as will be used for certification by the IWH. The committee aims to achieve the equivalence of original and adaptation in several points:

1. semantics
2. idioms
3. experience
4. concepts.

Any discrepancies in the translations must be resolved with the agreement of all participants, the contradictions and their solutions have to be written in a report. If necessary, the whole process of translation from the original has to be repeated to create a new and different translation and assess how the new translation is understood in comparison with the previous one. The aim is to produce a questionnaire understandable to anyone who has achieved the literacy level of a twelve-year-old.

The fifth step includes testing the questionnaire on the target population. The goal is

primarily to estimate understanding of the questionnaire by the users. We also tested:

- validity – whether the questionnaire estimates what it is intended for;
- reliability – whether the result remains the same if the patient does not change;
- responsiveness – whether the questionnaire detects the difference when the patient's condition changes.

Testing the adapted DASH

In testing, we included 48 patients who were visiting outpatient clinic for hand surgery due to hand problems. At two consecutive visits, the patients completed the questionnaires, had measurements of motion and strength of the affected limb performed, and were interviewed by the treating doctor, both to assess their understanding of the questionnaire as well as their subjective feeling, pain and everyday activities. The patient and the doctor together assessed how much the patient's quality of life is preserved compared to life before the injury or surgery on a scale of 1 to 100 %.

Results and discussion

Hand function tests and current literature

Since we were looking for a test that would allow assessment of all hand states we discarded tests designed to assess the function of hands connected to medical conditions such as scleroderma (HAMIS test)⁵, carpal tunnel syndrome (Brigham and Women's Hospital test-CTQ)⁶, rheumatic diseases (Arthritis Hand Function Test (AHFT)⁷, The Duruöz Hand Function Index (DHI)⁸, distal radius fracture (Mayo wrist score⁹, Modified Gartland and Werley score¹⁰, patient rated wrist evaluation (PRWE)¹¹).

The remaining tests are divided into two options.

In the first option the patient performs certain activities (turning a key in a lock, collecting objects of different shape or weight from a surface, using a cooking knife ...) and the speed of performing each activity is measured. Additional training of the

personnel to perform and interpret the test, buying the test kit and spending extra time to perform the test is needed (Jebsen Hand Function Test¹², Sollerman Hand Function Test¹³). The other option is the test where the patient answers questions. Tests do not require additional equipment other than paper and pen, the patient solves questionnaire mostly without assistance or supervision, calculating the result is simple.

Hand Function Sort is designed to assess the capability of the upper limbs. The test consists of 26 descriptions of activities to which drawings of the described activities are added to facilitate the understanding of the activities. Patients estimate how they perform each activity. The calculation of the results requires a specific program. The test is available in English only.^{14,15}

Disability of Arm, Shoulder and Hand (DASH) provides estimation of upper limb function through questions about daily or weekly activities, hobbies, as well as work or a specific use of hand (sport, performing arts).¹⁶

In an article on the measurement of hand function in adults, Poole compared the usefulness of the four tests (Arthritis Hand Function Test (AHFT), Grip Ability Test (GAT), Jebsen Test of Hand Function and The Rheumatoid Hand Functional Disability Scale (DHI)) in patients with hand problems due to rheumatoid arthritis and osteoarthritis. The author compared the usability (the necessary material, additional training prior to use, the time needed for execution), the calculation of the result and the psychometric characteristics (sensitivity, validity, reliability). The author finds all the described tests useful, but with restrictions.¹⁷

Changulani and colleagues conducted a comprehensive analysis of the most commonly used tests for hand function in the articles published in PubMed, Medline and Science Citation Index, and compared the DASH test, PRWE (patient rated wrist evaluation), Brigham and Women's carpal tunnel questionnaire (CTQ) and the Gartland and Werley test. PRWE test is limited to the evaluation of wrist function, typically after fractures of the distal radius. Brigham and Women's CTQ is used to assess hand functi-

on in patients with carpal tunnel syndrome. Gartland and Werley test is often used to assess the function of hand and wrist, because in addition to the subjective opinion of the patient it includes objective measurements. The authors did not find studies that would confirm the validity of the test. DASH is a universal test for impairment of the upper limb, especially when more of the joints are affected.¹⁸

When reviewing articles on hand surgery using Medline and PubMed, we found that the DASH is the most widely used test to estimate the results of surgery and to compare them with other institutions.

The Disabilities of the Arm, Shoulder and Hand (DASH) Outcome Measure or the Slovenian–Functionality of upper limb, shoulder and hand (Funkcionalnost zgornje okončine, ramena in roke) is a questionnaire designed to assess the status and symptoms in patients with upper limb musculoosseous disorders. It was first published in 1996. The questionnaire was developed jointly by the Institute for Work and Health (Toronto, Canada) and the American Academy of Orthopaedic Surgeons (AAOS, Rosemont, Illinois, USA), supported by the American Society for Hand Surgery, the American Orthopaedic Society for Sports Medicine, the American Shoulder and Elbow Surgeons, the American Society for Surgery of the Hand, the Arthroscopy Association of North America and the American Society of Plastic and Reconstructive Surgeons.¹³

The questionnaire was developed as a tool for the evaluation of the upper limb disability, as well as for monitoring changes in the status and symptoms over time. The clinician and the researcher use a single instrument in assessing the ability at various levels of the upper limb from the shoulder to the hand or the limitations of the upper limb as a whole. It consists of a general part, 30 questions designed to estimate problems in everyday life, and the two optional modules designed to specify the problems in individuals with special requirements such as professional athletes, artists in the field of expressive arts (especially musicians) and heavy demand workers. On the basis of the questionnaire, the level of disability is cal-

culated according to the number of points accumulated. Each answer is rated on a scale from one to five. All the points are added, the one is subtracted and the sum is divided by four. The result is multiplied by 25 to get a value between one and hundred. Lower values show better functioning or less disability of the upper limb. The result allows the monitoring of changes in the status and the individual performance as well as comparison of treatment between individuals or institutions.

Due to the precise instructions and the complex process of translation and cross-cultural adaptation, the DASH questionnaire is the only test that allows international comparison of the results; patients have no problems understanding it as they answer it in their native language with a description of the activities specific to their local culture.

Over time, with regular use of the questionnaire and statistical processing of the results of the test, the authors found that a good estimate of the status and symptoms can be achieved with a smaller number of questions, and a QuickDASH with eleven questions in the general module was created with both optional modules preserved. The authors of the questionnaires recommend the use of the QuickDASH in larger groups of patients (eg. research), while for monitoring an individual it is better to choose DASH for greater precision.

Use of the questionnaire is free. The only condition for its use is translation in the native language of the country where the questionnaire will be used. The questionnaire and instructions are available on the home page <http://www.dash.iwh.on.ca/home> where a link to all the translations is added.

Translation and adaptation of DASH

The purpose of the translation is not just literally translate the questionnaire, but to adapt it to the characteristics of the population where the adaptation will be used.^{3,4}

In the initial translation, the first translator T1 is a clinician who is familiar with the concept of a questionnaire and the translation is medically oriented. The second translator T2 is a layperson, who will use

the language of the general population and will more likely perceive the words that have ambiguous meaning in the general population—for example, how do we use the word hand in health care and in the general population. It is also necessary to adapt the activities according to the population where the questionnaire will be used. For example, one of the questions aimed at carrying out heavy housework such as washing floors or walls. In some cultures the housework is a task of one gender only, so we need to find a replacement for the more difficult task, which is performed by both genders about once a week. In addition to the translation, translators prepare a report on the difficulties in translation and explain how such problems have been resolved.

In the next step, a synthesis of translations of T1 and T2 is created, the synthesis is labeled T12. Both translators and a third person – synthesis recorder review both translations and decide which translation is better from clinical, cultural and linguistic point of view.

Translating the T12 back into the source language is achieved by two translators who are native speakers of the source language, in this case English. Neither translator is familiar with the concept of a questionnaire. The purpose of these translations is validity checking – whether the translated version accurately reflects the content of the original version. The back translation process often magnifies unclear or ambiguous wording in the translations. Both translators also write a report on the possible lack of clarity and how they have resolved these ambiguities.

The last stage of translation and adaptation is aimed at achieving equivalence in translation in:

1. semantics—whether words mean the same or may have a double meaning, and grammatical issues. For example, the word SCORE may be translated as result, value or points according to what it means in the sentence. We used all three translations to make the sentences meaningful and understandable.
2. idioms—understanding phrases: whether the translated word or phrase is consistent with the meaning of phrases in the

original version. For example, MAKING BED may mean making bed after sleeping in it every day or making bed with changing sheets weekly. In the Slovenian language there are two different words for this phrase – postiljanje and pospravljanje. As they are used interchangeably in the population, we used both in the questionnaire.

3. experience—whether the activities in the questionnaire are actually present in the target population, for example, use of forks or chopsticks. There were no differences found between the activities described in the original DASH and those performed in the Slovenian population.
4. concepts—words have different conceptual meanings in different cultures, for example, family can be considered as the basic unit of parents and their children or as an extended family with all the near and distant relatives. We also found no difference in concepts.

The expert committee has to resolve inconsistencies in the mentioned areas and, if necessary, repeat the whole process of translation and adaptation of the original to produce new and different translations and assess how they are understood in comparison with the previous translations. If necessary, the administrator of the original may be contacted for additional clarification. For example, 'disability' means a reduced or limited ability; this phrase is rarely used in Slovenian. The closest translation in Slovenian language would be inability—a word that does not have the same meaning; other options are impairment, invalidity—both words have a negative connotation. In agreement with the authors, we used the word functionality as this word out of all possible synonyms best sums up the concept of the questionnaire.

To confirm the understanding and usability of the translated questionnaire it has to be tested in the target population. In case of problems with the use of the questionnaire or if it is not possible to confirm its reliability, accuracy and sensitivity, it is necessary to repeat the whole process of adapting the

questionnaire into another language and to another population.

The result is a questionnaire that is understandable to anyone with literacy at the level of a twelve-year-old.

Testing adapted DASH

At two consecutive visits, the patients answered the questionnaires, had measurements of motion and strength of the affected and unaffected limb performed, and were interviewed by the attending physician, both in terms of understanding the questionnaire as well as their subjective feeling, pain and everyday activities. The patient and the doctor together assessed how much the patient's quality of life is preserved compared to life before the injury or surgery on a scale of 1 to 100 %.

Patients did not have any problems understanding the questionnaire. Three did not answer a question because they had not performed and they could not imagine performing certain activities (two playing badminton, frisbee, one chopping wood or playing golf). After talking to the doctor, they receive a more detailed description of how the activity should be performed and there were no more problems.

Measurements of mobility were presented as the percentage of the retained mobility compared to the unaffected limb. These percentages and subjective evaluation of the quality of life were compared with the results of the DASH. Higher values of preserved motility and subjective well-being are reflected in lower values of DASH. The difference was present in four patients who

had low values of mobility and assessment of subjective well-being as well as low DASH results. According to the estimates by the attending physicians, patients had no interest in completing the rehabilitation and re-starting work.

We compared the objective measures and the subjective feeling of the patient with the results obtained from the DASH questionnaire in two consecutive visits. In seven patients we did not detect clinical improvement and their DASH score remained unchanged. One patient had increased mobility, but there was no change in the DASH outcome. Forty patients had improved mobility and had better DASH scores. Thirty-two of the patients also stated subjective improvement.

Conclusion

Translations of the DASH test, the Quick-DASH test and the instructions for calculating results into the Slovenian language have been approved by the Institute for Work and Health, Toronto, Canada, which is the administrator of the original questionnaire and of the website. Translations are accessible on their site <http://www.dash.iwh.on.ca/home> and are available for use. With precise instructions for translation and cross-cultural adaptation, and considering the results of clinical testing performed at the Outpatient Clinic for Hand Surgery of Celje General Hospital, the test adapted to the Slovenian population is understandable and it reflects well the current status of the upper extremity and detects changes at follow-up status of the upper limb.

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