

## Construct validity of the DynaPort<sup>®</sup> KneeTest: a comparison with observations of physical therapists<sup>1</sup>

Lidwine B. Mokkink M.Sc.†, Caroline B. Terwee Ph.D.†\*, Rob C. van Lummel M.Sc.‡, Simon J. de Witte P.T.§, Leo Wetzels P.T.||, Lex M. Bouter Ph.D.† and Henrica C. W. de Vet Ph.D.†  
† Institute for Research in Extramural Medicine, VU University Medical Center, Amsterdam, The Netherlands  
‡ McRoberts B.V., The Hague, The Netherlands  
§ Department of Physical therapy, Gemini Hospital, Den Helder, The Netherlands  
|| Department of Physical therapy, Atrium Medical Center, Brunssum, The Netherlands

### Summary

**Objective:** To assess the construct validity of the DynaPort<sup>®</sup>KneeTest (KneeTest), which is a performance-based test to assess functioning of patients with knee osteoarthritis (OA). Scores on the KneeTest (KneeScore) were compared with observations of physical therapists of the patients' functional disability. The reliability of these observations was also assessed.

**Method:** Twelve physical therapists received identical video tapes showing the performance of 33 patients on the KneeTest. Each physical therapist rated the functional disability of each patient, performing the 23 activities of the KneeTest, on 23 Visual Analogue Scales (VAS<sub>activity</sub>). The 23 VAS<sub>activity</sub> scores were averaged into a VAS<sub>average</sub> score. At the end of the test, an overall rating for the general performance of the patient was given on a VAS<sub>overall</sub>. Inter-observer Reliability was assessed for the VAS<sub>activity</sub> scores, VAS<sub>average</sub>, and the VAS<sub>overall</sub>.

**Results:** Inter-observer reliability of the VAS<sub>average</sub> was higher (ICC 0.85, 95% CI 0.74–0.92) than the VAS<sub>overall</sub> (ICC 0.65, 95% CI 0.51–0.77). The correlation between the KneeScore and the VAS<sub>average</sub>, averaged over the 12 physiotherapists, was 0.86.

**Conclusion:** The construct validity of the KneeTest was supported by the strong correlation with the ratings of the patients' disability by physical therapists. Given these findings and the high test–retest reliability of the KneeTest that was found in our previous study, we conclude that the KneeTest is a valid measure for assessing functioning in orthopedic and physical therapy research in patients with knee-OA before and after total knee replacement. Longitudinal validity has to be evaluated yet.

© 2005 OsteoArthritis Research Society International. Published by Elsevier Ltd. All rights reserved.

**Key words:** Performance-based test, DynaPort<sup>®</sup>KneeTest, Validity, Reliability, Physical therapist.

### Introduction

A number of measures are available to assess functioning of patients with knee osteoarthritis (OA). These can be divided into self-report questionnaires, clinical rating scales, and performance-based tests. A self-report questionnaire consists of items describing daily activities for which an individual is asked to indicate his/her perceived level of functioning. A clinical rating scale, a checklist or a one-dimensional scale, in which a professional rates the patient in a standardized way. A performance-based test is one in

which an individual is asked to perform one or more specific tasks that are evaluated in a standardized manner using predefined criteria, such as counting repetitions or timing of the activities<sup>1</sup>.

Self-report questionnaires, e.g., the Western Ontario and McMaster University Osteoarthritis Index (WOMAC)<sup>2</sup> and the Medical Outcomes Study Short Form-36 Health Survey (SF-36)<sup>3</sup>, measure the perceived limitations of patients in performing daily activities. Clinical rating scales, e.g., the Knee Society Score (KSS)<sup>4</sup>, often include measures of functioning, e.g., limitations in walking and stair climbing, mostly based on self-report from patients. A variety of performance-based tests exist to measure functioning more objectively. In a systematic literature review (not published yet), we found tens of different walking tests, e.g., the 6-min walk test<sup>5</sup> and gait analyses<sup>6</sup>, stair climb tests<sup>5,7</sup>, and chair tests<sup>8</sup>, and several different multiple-item tests, such as the test battery for physical activity restrictions (PAR)<sup>9</sup>, the Iowa Level of Assistance Scale (ILAS)<sup>10</sup>, and the method of Steultjens<sup>11</sup>, that have been used to measure functioning of patients with knee-OA.

Because of the conceptual differences between self-report questionnaires, clinical rating scales, and performance-based

<sup>1</sup>This study was financially supported by McRoberts B.V., and by the Royal Dutch Society for Physical Therapy (KNGF, Wetenschappelijk Fonds Fysiotherapie). Rob van Lummel (McRoberts B.V.) was involved in the design and execution of the study and commented on the manuscript, but he never had a veto on any decision and was not involved in the data analyses.

\*Address of correspondence and reprint requests to: C. B. Terwee, Institute for Research in Extramural Medicine (EMGO Institute), VU University Medical Center, Van der Boechorststraat 7, 1081 BT Amsterdam, The Netherlands. Tel: 31-20-4448187; Fax: 31-20-4446775; E-mail: [cb.terwee@vumc.nl](mailto:cb.terwee@vumc.nl)

Received 13 September 2004; revision accepted 12 April 2005.

tests, it has been suggested that self-report questionnaires as well as performance-based measures are required to evaluate function in patients with knee-OA comprehensively<sup>12,13</sup>. In our systematic review, we found that none of the performance-based measures has been tested for all relevant measurement properties, i.e., content validity, internal consistency, reproducibility (both reliability and agreement), construct validity, responsiveness, floor and ceiling effects, and interpretability, and none of the measures received adequate ratings for the measurement properties that were tested.

The DynaPort<sup>®</sup>KneeTest (KneeTest)<sup>14</sup> seems to be a promising performance-based measure for patients with knee-OA, undergoing total knee replacement (TKR). The test can be performed in a corridor in about 30 min. Patients perform a standardized set of activities, while accelerometers are used to measure functional parameters. In contrast to, e.g., gait analysis or more simple performance-based tests, the KneeTest contains multiple activities—e.g., walking, stair climbing, sitting and rising, lifting and carrying objects, and picking up objects from the floor—that were selected to represent activities of daily living that are considered to be difficult for patients with knee problems and that have been identified as important by patients in focus group discussions<sup>9</sup>. The scoring of the KneeTest is based on those test parameters that could significantly discriminate between patients and controls, such as accelerations, angles, durations, step number, step frequencies, relative speed and asymmetry, an approach that has been shown to be efficient and useful for the evaluation of function in TKR patients<sup>15</sup>. Therefore, the content validity of the KneeTest is likely to be good.

Recently, we determined the reproducibility and construct validity of the DynaPort<sup>®</sup>KneeTest (KneeTest)<sup>16</sup>. We concluded that the KneeTest is a useful performance-based measure for research in patients with knee-OA, with good reliability and construct validity. Intraclass Correlation Coefficients (ICCs) for inter-observer and intra-observer reliability were 0.90 (0.83–0.94) and 0.95 (0.83–0.98), respectively. Construct validity was confirmed by expected correlations, expressed as Pearson's correlation coefficients ( $r$ ), with the Western Ontario and McMaster University Osteoarthritis Index (WOMAC) physical functioning ( $r = 0.55$ ), Medical Outcomes Study Short Form-36 Health Survey ( $r = SF-36$ ) physical functioning ( $r = 0.62$ ) and KSS function ( $r = 0.64$ ). While this is a generally accepted method for assessing construct validity, the results are not very convincing. Moderate correlations between self-reported functioning and performance-based functioning are to be expected, but there are no accepted criteria for how large these correlations should be. We therefore decided that an alternative, more convincing validation approach was warranted.

There is no gold standard available that measures 'quality of movement' to validate the KneeTest against. In our opinion the observations of physical therapists of a patient's disability can be considered as a 'silver' standard. Therefore, the aim of this study was to determine construct validity of the KneeTest by assessing correlations between the 'quality of movement' measured with the KneeTest (expressed in the KneeScore) and the observations of physical therapists about the patient's functional disability during the performance of the test. Because we use this 'silver' standard to validate the KneeTest, the ratings of the physical therapists must have a satisfactory inter-observer reliability. Therefore, our second aim was to determine the reliability of the physical therapist's disability ratings.

## Methods

### PATIENTS AND PROCEDURES

Data were obtained from a reproducibility study in 92 patients<sup>16</sup>, who were included if they (1) were diagnosed to have knee-OA, (2) were on the waiting list for a primary TKR or had received a TKR between 3 months and 5 years ago, (3) were able to speak and read Dutch, and (4) signed informed consent. All 92 patients included in the study were randomly assigned to one of the six physical therapists involved in the study. All 33 patients, who were assigned to two pre-determined physical therapists were asked if their performance of the KneeTest could be recorded on video, agreed. These 33 video registrations are the subject of this study. Our study was approved by the medical ethics committee of the VU University Medical Center.

### KNEETEST

Patients performed the KneeTest under supervision of a physical therapist. During the test, patients perform 23 activities (Appendix A), while acceleration sensors are strapped around the trunk and legs. Standardized equipment is supplied such as wooden blocks, stairs of three steps, and a slope. For each activity, a selected set of functional parameters is being extracted from the signals of the acceleration sensors and the values of these parameters are being transformed and averaged into 23 activity scores. The activity scores were averaged into four cluster scores (locomotion, rise and descend, transfers, and lift and move objects, cf. Table I) and one total KneeScore, using a norm-based scoring procedure. Since the absolute measurement error of the four cluster scores is rather large<sup>16</sup>, we suggest using only the total KneeScore in patient care. A score of 50 means that a patient scores similar to the mean of a "healthy" control group, a score of, e.g., 30 means that a person scores one standard deviation below the mean of the control group. Scoring of the test is done by an automated procedure in SPSS. The KneeTests were recorded on digital video with two fixed camera positions using the same camera for all patients. In advance, we determined the best camera positions and marked these spots. The digitalized video recordings of the performances of the KneeTest were copied on CD ROM in

Table I  
Patient characteristics

	Patients (n = 33)
Men (%)	9 (27%)
Age in years—mean (SD)	68 (9.7)
Preoperative patients (n)	14
Postoperative patients (n)	19
Number of patients with both legs affected (%)	8 (24%)
Education status	
Low	22
Middle	11
High	0
WOMAC pain score—mean (SD)	31.3 (24.5)
WOMAC stiffness score—mean (SD)	39.8 (23.7)
WOMAC function score—mean (SD)	40.0 (24.0)
KSS pain score—mean (SD)	57.0 (36.2)
KSS function score—mean (SD)	123.8 (45.6)

Download English Version:

<https://daneshyari.com/en/article/9271586>

Download Persian Version:

<https://daneshyari.com/article/9271586>

[Daneshyari.com](https://daneshyari.com)