Clinimetric properties of the Dutch URAM and its ability to measure change due to Dupuytren disease progression compared to the MHQ

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Submitted
ABSTRACT

Background
This study aimed: 1) to determine whether the Unité Rheumatologique des Affections de la Main (URAM) scale and Michigan Hand Questionnaire (MHQ) are able to detect change in hand function due to Dupuytren disease progression and to compare their abilities, 2) to determine the clinimetric properties of the Dutch URAM.

Methods
Data of 233 Dupuytren patients participating in a cohort study were used. Concurrent validity (Spearman's rho), reliability (Cronbach's alpha, ICC, SEM, SDC, Bland-Altman plot), responsiveness (Mann-Whitney U test, floor- or ceiling effects) and the interpretability (MIC) were calculated for both questionnaires, except for the reliability measures (ICC, SEM, SDC, Bland-Altman plot), that were not determined for the MHQ.

Results
The URAM and MHQ were both able to distinguish those who did show disease progression from those who did not (resp. $U = 1252.5$, $p = 0.008$, and $U = 1086.0$, $p < 0.001$). Boundary effects were present in 13.9% for the URAM, and in 4.7% for the MHQ. For the URAM the ICC agreement was 0.76 [95% CI: 0.64 ; 0.87] and the SEM was 2.1 [1.7 ; 2.5], and the SDC was 5.7 [4.8 ; 7.1]. The internal consistency was high (Cronbach's alpha [95% CI] = 0.91 [0.88 ; 0.92] and 0.90 [0.87 ; 0.91]).

Conclusions
The URAM and MHQ are suitable to measure change in functional restraints due to Dupuytren disease progression on a group level. The MHQ suffers less from boundary effects than the URAM, but is less clinically applicable due to the length. The Dutch URAM has good clinimetric properties.
INTRODUCTION

The flexion deformities in Dupuytren disease can be very disabling, for example during shaking hands, typing, or putting on gloves. In recent years there has been increasing attention to the patient perceived hand function.¹⁻⁴ Despite this, there is no patient reported outcome measure (PROM) that is universally used in Dupuytren patients.⁵ The Disability of Shoulder, Arm and Hand questionnaire (DASH) is the most frequently used PROM in Dupuytren patients, followed by the Michigan Hand Questionnaire (MHQ).⁵ Both PROMs were tested in a Dupuytren population.⁶⁻⁸ The DASH was found to be unsuitable for application in this population, since it lacked validity, discriminative ability, and interpretability.⁶,⁹ The MHQ¹⁰ has been tested in a Dutch Dupuytren population that had undergone percutaneous needle fasciotomy.⁷ Overall, a high test-retest reliability (ICC = 0.89) was found, and the smallest detectable change was 16. The authors concluded that the MHQ is suitable for use in Dupuytren patients.

However, the MHQ carries a major disadvantage, namely its length. The MHQ consists of 57 items. Although application of this PROM in a research setting is possible, it is difficult to use in a clinical setting. In 2011, a new 9-item PROM was developed that was designed especially for patients with Dupuytren disease.¹¹ This PROM (Unité Rhumatologique des Affections de la Main, URAM) was validated in a French population of Dupuytren patients who had undergone surgical treatment. It was found to be valid, reliable and responsive to measure change in hand function after treatment, although this has been questioned by Rodrigues et al.¹² Their main criticism was that the URAM fails to assess many activities in which their British population of Dupuytren patients report functional problems, such as putting on gloves or problems with finger hooking, and therefore, that the URAM is not culturally generalizable. Despite this, they used the URAM in a recent study, and conclude that it is responsive to detect improvement after treatment, and has acceptable interpretability.⁹

Although the MHQ and URAM have been validated in a Dupuytren population, this was always done in a population undergoing treatment. It has never been investigated whether these PROMs are able to detect change in hand function due to natural disease progression. It can be expected that change over time due to disease progression is much more subtle than change after treatment. Hence, the aim of this
study was to determine whether the URAM and MHQ are able to detect change due to natural disease progression and to compare their abilities. A secondary aim of this study was to determine the clinimetric properties of the Dutch language version of the URAM.

METHODS

Participants
Data of 262 adults with Dupuytren disease who were included in a cohort study on disease course, were used in the current study. Exclusion criteria were upper-extremity problems that are likely to influence the outcome, and more missing values than allowed by the questionnaire instructions. All participants gave written informed consent in accordance with the Helsinki Declaration. The institutional ethics committee approved this study.

Outcome measures and instruments
Clinically important disease progression was defined as change in total passive extension deficit (TPED) > 15° in one finger, since previous research has shown that the TPED has a maximum measurement error of 15° per finger. TPED was measured using a finger goniometer, except for the thumb. The thumb was not measured, since the TPED cannot be measured the same way due to anatomical differences of the thumb compared with other fingers. Additionally, contractures that are present in the first web space are not captured in the TPED measure of the thumb.

The instruments used to measure self-reported hand function were the URAM and the MHQ. The URAM is a questionnaire that covers one domain (i.e. functional outcome) containing 9 items. Each item can be awarded 0 to 5 points. The overall score is calculated by summation of the scores on the 9 items which can range between 0 and 45 points, and where 0 points indicate no disability. The original French URAM was translated to Dutch, according to the linguistic validation guidelines of MAPI. The final version is shown in Appendix 6.1. In case of bilateral disease, the URAM was filled out for the most severely affected, untreated hand.
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The MHQ\(^{10}\) is a questionnaire developed to measure hand function and related outcomes of patients with various hand conditions. It contains 57 items that cover 6 different domains: overall hand function, activities of daily living, work-related activities, pain, aesthetics, and satisfaction with hand function. Except for the domains of work and pain, each domain is answered for both hands separately. Each item can be awarded 1 to 5 points. Subscores per domain are calculated by reversing the scores on negatively stated items (e.g. How often were you unable to work?), and then normalized to generate a score between 0 and 100. Higher overall scores represent a better outcome. Although the MHQ provides subscores for each domain, it is also possible to calculate an overall score for each hand separately. In our analyses, we used the overall score for the most severely affected hand with primary disease, in case there was bilateral disease.

**Study design and procedures**

The measurements took place in the context of a cohort study on natural disease course of Dupuytren disease.\(^{13}\) During all measurements, the participants visited the outpatient clinic of the Department of Plastic Surgery, their hands were physically examined, and TPED was measured. They also filled out the Dutch language version of the MHQ. When the URAM became available, this PROM was used temporarily parallel to the MHQ. Later on, the URAM was used instead of the MHQ (Figure 1). Since for both PROMs two measurements (T1/T1a and T2) were available with an interval of 6 to 24 months, disease progression as defined above, could be determined. For the URAM, there was an extra measurement (T1b) 2 to 4 weeks after the first measurement, to determine the test-retest reliability. A subsample of 53 participants took part in this additional measurement. This number is large enough to obtain an agreement of at least 80% with a maximum confidence interval (CI) of 0.20 with 0.90 probability assurance.\(^{16}\)

**Statistical analyses**

**Concurrent validity**

Concurrent validity indicates the extent to which the scores of an instrument are related to the scores of another instrument measuring a similar construct. This was assessed for the URAM by calculating Spearman's correlation coefficient between the scores of the URAM at time point T1a and MHQ at time moment T2 (see Figure 1). After Fisher's z-transformation,\(^{17}\) 95% confidence intervals were determined.
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**Figure 1.** Study design. MHQ = Michigan Hand Questionnaire; URAM = Unité Rhumatologique des Affections de la Main Scale; PE = Physical Examination of hands.

**Internal consistency, reliability and measurement error**

The internal consistency is a measure that indicates how well the items of the instrument that measure the same construct, are interrelated. The URAM covers one domain, so the internal consistency was calculated for all items using Cronbach’s alpha. The internal consistency for the MHQ was calculated for each domain separately. For the pain domain, the internal consistency was calculated after excluding those who answered ‘Never’ on question 1 (i.e. ‘How often did you have pain in your hand(s)/wrist(s)?’). Cronbach’s alpha was calculated at both measurement time (T1a and T2), including 95% CIs. The CI calculations were based on F-tests. A Cronbach’s alpha between 0.70 and 0.95 was considered good.18

As a measure of test-retest reliability for the URAM total score or scale, the intraclass correlation (ICC) for agreement was used. This indicates whether the questionnaire provides the same results when it has been filled out twice in absence of a real change. A one-way random-effects model, with a random effect for participant ($\sigma^2_{participant}$) and a random error for repeats ($\sigma^2_{residual}$), was estimated with restricted maximum likelihood. The ICC was determined by formula [1]:

\[
[1] \text{ICC}_{agreement} = \frac{\sigma^2_{participant}}{\sigma^2_{participant} + \sigma^2_{residual}}
\]
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A 95% CI on the $\text{ICC}_\text{agreement}$ is determined with the beta-approach.\textsuperscript{19} For the $\text{ICC}_\text{agreement}$, an estimated value of 0.70 or higher was considered good.\textsuperscript{18}

The standard error of measurement (SEM) is a measure to indicate the absolute measurement error in the scale and it was determined by calculating with a 95% CI determined through Satterthwaite approach.\textsuperscript{20} The smallest detectable change (SDC) is a measure that indicates how large a difference in score must be, to be detected by the instrument as a real change. It can be calculated using formula [2]:

$$[2] \text{SDC}_{\text{individual}} = 1.96 \times \sqrt{2} \times \text{SEM}$$

with an 95% confidence interval borrowed from the interval for SEM. In addition, the absolute measurement error was visualized using a Bland-Altman plot,\textsuperscript{21} providing 95% prediction limits of agreement.

**Responsiveness**

The responsiveness indicates how well the instrument is able to detect a change over time. To determine this, participants who had undergone progression were separated from those who did not have undergone progression, according to the definition as stated earlier. The change scores ($T2 - T1$) of the two groups were tested for differences using a Mann-Whitney U test. This was done for both the URAM and MHQ scores. In addition, boundary (ceiling or floor) effects were determined. Boundary effects were defined as the percentage of participants having extension deficits in the fingers, but who report the best possible score. Large boundary effects indicate that the instrument is not responsive in this particular population. Note that, due to the fact that lower URAM scores represent better outcome, the best possible score is the minimal score (floor effects) for the URAM, while it is a maximal score (ceiling effects) for the MHQ.

**Interpretability**

Interpretability is defined as ‘the degree to which one can assign qualitative meaning to an instrument’s quantitative scores or change in scores.’\textsuperscript{22} Therefore, the minimal important change (MIC) was calculated. The MIC is the smallest change score that can be considered as relevant. It was derived from the Receiver Operating Curve (ROC) at the point that lies most closely to the left upper corner of the graph. At this point, both the sensitivity and specificity are the largest. From the ROC
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analysis, the corresponding change score was derived. For all hypothesis tests a significance level of 5% was applied.

RESULTS

In the first 2 years of the study the MHQ was used, and 233 participants filled out the MHQ at T1 (Figure 1). Then, 11 participants were excluded from analyses (due to drop-outs, hand-injury or missing data), so at T2, 222 participants filled out the MHQ. Thus, the analyses on responsiveness and interpretability of the MHQ were done using data of 222 participants, as for these analyses the change over time should be determined. At this moment the URAM was introduced, and URAM data of 208 participants was available at T1a. Fifty-three participants took part in the additional URAM measurement (T1b). Thereafter, 6 participants withdrew from participation, so at T2, 202 participants filled out the URAM. So, analyses on the responsiveness and interpretability were done using data of 202 participants.

The majority of the participants was male (65.3%), and their mean age was 66.1 (SD 10.7). Twenty-one participants in the URAM dataset had shown clinically important progression, compared to 22 participants in the MHQ dataset (Table 1).

The maximal TPED in the URAM dataset ranged between 0 and 118°, and in the MHQ dataset between 0 and 138°. The scores of the URAM ranged between 0 and 30, and of the MHQ between 41.8 and 100.0.

URAM

Concurrent validity

The URAM and MHQ scores showed a strong correlation (rho = -0.65 [-0.72; -0.56], p < 0.001). This correlation is negative, since for the URAM a lower score represents better function, while for the MHQ a lower score represents better function.

Internal consistency, reliability, and measurement error

The Cronbach’s alpha was calculated for all items of the URAM and was 0.91 [0.88 ; 0.92] at T1a and 0.90 [0.87 ; 0.91] at T2. The test-retest reliability of the URAM was 0.76 [0.64 ; 0.87]. The SEM was found to be 2.1 [1.7 ; 2.5], so the SDC was 5.7 [4.8 ; 7.1]. The Bland-Altman upper and lower 95% limits of agreement were 5.0 and -6.3 respectively (Figure 2).
Table 1. Characteristics of the participants, presented for those who showed clinically important progression and those who did not show clinically important progression, for each PROM separately.

<table>
<thead>
<tr>
<th></th>
<th>URAM</th>
<th></th>
<th>MHQ</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Importantly progressed</td>
<td>Not importantly progressed</td>
<td>Importantly progressed</td>
<td>Not importantly progressed</td>
</tr>
<tr>
<td>N</td>
<td>21</td>
<td>181</td>
<td>22</td>
<td>200</td>
</tr>
<tr>
<td>Gender (M/F, % M)</td>
<td>16/5 (76)</td>
<td>116/65 (64)</td>
<td>19/3 (86)</td>
<td>128/72 (64)</td>
</tr>
<tr>
<td>Age in years (mean (SD))</td>
<td>62.5 (8.9)</td>
<td>65.9 (10.4)</td>
<td>68.0 (8.3)</td>
<td>65.6 (10.3)</td>
</tr>
<tr>
<td>Time between T1 and T2 in months (median (IQR))</td>
<td>18.0 (17.5 – 18.0)</td>
<td>18.0 (17.0 – 18.0)</td>
<td>17.0 (12.0 – 19.0)</td>
<td>18.0 (12.0 – 24.0)</td>
</tr>
<tr>
<td>Max. TPED at T1 in ° (median (IQR))</td>
<td>0.0 (0.0 – 10.0)</td>
<td>0.0 (0.0 – 6.3)</td>
<td>10.0 (5.0 – 20.0)</td>
<td>0.0 (0.0 – 21.3)</td>
</tr>
<tr>
<td>Max. TPED at T2 in ° (median (IQR))</td>
<td>28.0 (20.0 – 43.0)</td>
<td>0.0 (0.0 – 7.0)</td>
<td>42.0 (26.0 – 68.0)</td>
<td>0.0 (0.0 – 18.5)</td>
</tr>
<tr>
<td>Score at T1 (median (IQR))</td>
<td>3.0 (1.0 – 6.0)</td>
<td>0.0 (0.0 – 4.0)</td>
<td>91.0 (87.0 – 99.2)</td>
<td>92.5 (78.6 – 99.7)</td>
</tr>
<tr>
<td>Score at T2 (median (IQR))</td>
<td>6.0 (0.0 – 8.5)</td>
<td>0.0 (0.0 – 3.0)</td>
<td>85.9 (73.5 – 95.8)</td>
<td>90.4 (78.7 – 98.9)</td>
</tr>
</tbody>
</table>

URAM: Unité Rhumatologique des Affections de la Main scale; MHQ: Michigan Hand Questionnaire; N: number of participants; M/F: male/female; SD: standard deviation; IQR: interquartile range; TPED: total passive extension deficit.
Responsiveness

The median change score in the group that showed clinically important progression, was larger than the change score in the group that showed no clinically important progression (resp. 2.0 and 0.0 points; $U = 1252.5, p = 0.008$). This indicates that the URAM is able to discriminate between the group that had shown disease progression and the group that did not have shown progression. Almost half of the participants, 101/208 (48.6%), had a total score of 0 at T1a, which represents no functional problems. Among them, 87 participants showed no extension deficits. Fourteen participants had a maximum TPED ranging between 4 and 35°, although they reported no functional problems defined by an URAM score of 0. So, ceiling effects were present at T1a in 13.9%. At T2, more than half of the participants (111/208,
53.4%) had a total URAM score of 0, and 88 participants showed no extension deficits. Twenty-three participants had a maximum TPED ranging between 6 and 66°, reporting no functional problems in the URAM. So, at T2, ceiling effects were present in 23/111 (20.7%). None of the participants reported a total score of 45, which is the worst possible score in this PROM, neither at T1 nor at T2.

**Interpretability**

We determined the optimal cut-off point (MIC) for disease progression. The MIC was 1.5, corresponding with a sensitivity of 0.52 and specificity of 0.86. The SDC was larger than the MIC (SDC = 5.7, MIC = 1.5). When taking the SDC as cut-off point, the sensitivity was 0.24 and the specificity was 0.96.

**MHQ**

**Internal consistency, reliability, and measurement error**

Since the internal consistency was not determined in the previous study, we determined the internal consistency by calculating a Cronbach’s alpha for each domain specified in the MHQ (Table 2). The reliability, SEM and SDC of the MHQ have already been determined in Dupuytren patients by others.7

**Responsiveness**

The change score in the group that showed clinically important progression, was lower than the change score in the group that showed no clinically important progression (resp. -6.9 and 0.0 points, U = 1086.0, p < 0.001). This indicates that the MHQ is able to discriminate between those who had undergone disease progression and those who did not have undergone progression.

A quarter of the participants, 54/234 (23.1%), had a total score of 100 at T1, representing no functional problems. Among them, 43 showed no extension deficits, while 11 participants had a maximum TPED ranging between 5 and 25°, although they reported no functional problems defined by an MHQ score of 100. So, ceiling effects were present at T1 in 20.4%. At T2, 43/208 (17.9%) had a total MHQ score of 100, and of these 43, 40 participants had no extension deficits. Two participants had a maximum TPED of 25 and 52°, reporting no functional problems in the MHQ. So, at T2, ceiling effects were present in 2/43 (4.7%). None
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Table 2. Internal consistency (Cronbach’s alpha) presented for each domain, separately for the left and right hand at T1 and T2.

<table>
<thead>
<tr>
<th>Domain</th>
<th>Cronbach’s alpha [95%CI]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>T1</td>
</tr>
<tr>
<td>Overall hand function</td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>0.93 [0.91 ; 0.94]</td>
</tr>
<tr>
<td>Left hand</td>
<td>0.94 [0.93 ; 0.95]</td>
</tr>
<tr>
<td>Activities of Daily Living</td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>0.88 [0.85 ; 0.90]</td>
</tr>
<tr>
<td>Left hand</td>
<td>0.90 [0.88 ; 0.92]</td>
</tr>
<tr>
<td>Both hands (^a)</td>
<td>0.85 [0.82 ; 0.88]</td>
</tr>
<tr>
<td>Work performance</td>
<td>0.94 [0.93 ; 0.95]</td>
</tr>
<tr>
<td>Pain</td>
<td>0.74 [0.63 ; 0.81]</td>
</tr>
<tr>
<td>Aesthetics</td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>0.73 [0.66 ; 0.78]</td>
</tr>
<tr>
<td>Left hand</td>
<td>0.68 [0.61 ; 0.74]</td>
</tr>
<tr>
<td>Satisfaction with hand function</td>
<td></td>
</tr>
<tr>
<td>Right hand</td>
<td>0.90 [0.88 ; 0.92]</td>
</tr>
<tr>
<td>Left hand</td>
<td>0.93 [0.91 ; 0.94]</td>
</tr>
</tbody>
</table>

\(^a\) This is a separate part of the questionnaire, in addition to the ADL part for the right and left hand.

of the participants had a total score of 0, which is the worst score possible in this PROM, neither at T1 nor at T2.

**Interpretability**

The MIC for progression was -1.4, corresponding with a sensitivity of 0.82 and specificity of 0.61. The SEM and SDC for the MHQ were already determined by others (SEM = 6 and SDC = 16).\(^7\) Using SDC as cut-off value for the MHQ, the sensitivity and specificity would be 0.14 and 0.97 respectively.

**DISCUSSION**

This study was done (1) to determine whether the URAM and MHQ are able to detect change due to natural disease progression and to compare their abilities, and (2) to determine the clinimetric properties of the Dutch language version of the URAM.
The results show that the URAM is a reliable instrument to measure hand function in patients with Dupuytren disease. The ICC score for the test-retest reliability was lower than previously reported values, but still good.\textsuperscript{11} Half of the participants had the lowest possible score on the URAM, but this could be largely explained by the absence of extension deficit in the majority of these participants. However, some participants who had extension deficit still reported the minimal score. Therefore, scale boundary effects were present in the URAM.

The SDC was larger than the MIC, so one might conclude that the URAM is not able to detect change due to natural disease progression. However, this holds true for the individual level, since the SDC and MIC are measures that can be applied to individual scores. When using these measures as cut-off, high specificity was found. When we compared the URAM change scores of the group that showed clinically important progression with the group that did not show clinically important progression, the change scores differed significantly.

Although the MHQ suffered less from scale boundary effects, the results we found with respect to the interpretability are comparable to the URAM. At an individual level, the MHQ is also not able to detect change due to natural disease progression. It has similar sensitivity and specific values as the URAM. However, at group level, the change scores of the group that showed clinically important progression differed significantly from the group that did not show clinically important progression.

So, URAM and MHQ are both able to detect functional restrains caused by disease progression, at a group level. These results cannot be compared to previous papers, since it has never been investigated whether the questionnaires can measure change due to progression. In all previous studies, improvement after treatment was measured instead.\textsuperscript{1,4,9,23} The MHQ seems to be the best instrument to measure change due to progression, since the test-retest agreement was good and the ceiling effects were acceptable.\textsuperscript{7} The smaller scale boundary effects of the MHQ compared with the URAM, might be a logical consequence of the length of this questionnaire: the MHQ consists of 57 items, while the URAM consists of only 9 items. So, with the MHQ it is less likely to get the maximal score.

However, the length of the MHQ can also be considered as a major drawback. Many participants were complaining about the length of this questionnaire and the difficulty of some double-negative items. Some participants refused to fill out
the MHQ repeatedly, while others were not able to fill it out independently without help of the researcher. Additionally, reverse-worded items were frequently filled out incorrectly (e.g. if a participant responds to have no functional restraints in the positive items and responds to have maximal restraints in the negative items). So, routine use of the MHQ in a clinical setting is limited. On the contrary, the URAM was easily accepted by the participants, and is therefore, more clinically applicable.

This study has some limitations. First of all, we used the maximal TPED as cut-off variable to determine the presence of progression. We chose for the maximal TPED instead of the sum of TPEDs in one hand, because we assume that one finger with a large TPED will result in equally large functional restraints compared to two or more fingers with a large TPED. However, the two variables were highly correlated ($r = 0.96$, $p < 0.001$), so it is likely that the results would be similar when the sum of TPEDs was used as cut-off. We checked this by repeating the analyses using the sum of TPEDs as cut-off, and similar results were found indeed. A second limitation is that by choosing change in maximal TPED of 15° as cut-off value for the definition of progression, participants with a change in TPED < 15° in all fingers would end up in the same group as the participants without any contractures at both measurements. It is likely that the participants with contractures would report different PROM scores than those without. Thirdly, one could argue that the overall scores of the MHQ and URAM are not comparable, since the MHQ covers domains about pain and aesthetics, in addition to hand function. However, we expected that the pain and the participant’s feelings about the aesthetics of the hand, are correlated with function. After all, pain might limit the functional ability. Next to that, the larger the contractures, the larger the functional restraints and the larger the visible deformities. To examine this assumption, we calculated a Spearman’s correlation coefficient between the total score on the MHQ and the total score minus the scores on the subscales pain and aesthetics. These correlations were very strong ($\rho = 0.97$, $p < 0.001$ at both T1 and T2). Therefore, we think that our choice to use the overall score of the MHQ is justified. Lastly, the time between T1 and T2 was short (15 – 25 months). It is likely that the number of patients who showed clinically important progression will become larger when the time between T1 and T2 is longer. However, the median number of months between T1 and T2 was equal for those with clinically important progression compared to those
without clinically important progression, or even smaller for those with progression (MHQ). So, it seems that the time between T1 and T2 is long enough for disease progression to occur.

**CONCLUSION**

In conclusion, the results of this study show that the Dutch language version of the URAM has good clinimetric properties. Both the URAM and MHQ are suitable to measure change in hand function due to natural disease progression in patients with Dupuytren disease, at a group level. However, the length of the MHQ makes this PROM less clinically applicable.
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REFERENCES


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MAPI INSTITUTE; 2012: 151.


**Appendix 6.1.** The Dutch Language Version of the URAM

<table>
<thead>
<tr>
<th>Kunt u …</th>
<th>Zonder moeite ( (0) )</th>
<th>Met weinig moeite ( (1) )</th>
<th>Met enige moeite ( (2) )</th>
<th>Met veel moeite ( (3) )</th>
<th>Vrijwel onmogelijk ( (4) )</th>
<th>Onmogelijk ( (5) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. zich met een washandje wassen?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>2. uw gezicht wassen?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>3. met één hand een fles vastpakken?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>4. iemand een hand geven?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>5. iets of iemand strelen?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
</tr>
<tr>
<td>6. applaudisseren?</td>
<td>□</td>
<td>□</td>
<td>□</td>
<td>□</td>
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<td>7. uw vingers spreiden?</td>
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<tr>
<td>8. op uw hand steunen?</td>
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<tr>
<td>9. kleine voorwerpen tussen duim en wijsvinger vastpakken?</td>
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</tbody>
</table>

URAM-schaal. \( 0-45, 45 = \) volledig niet in staat).

**Referentie**


Part III

Natural course of Dupuytren disease