

Development of quality indicators for nonspecific low back pain in Dutch  
primary physiotherapy care.

## Master thesis

Physiotherapy Science

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"ONDERGETEKENDE

Renske Maria Schapendonk

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## **ABSTRACT**

**Background:** Improving the quality of care is an important goal in physiotherapy practice. Physiotherapists use patient-reported outcomes measurements (PROMs) for shared decision-making, goal setting and evaluating outcomes in clinical processes. PROMs could be eligible variables to develop quality indicators to provide physiotherapists insight into outcomes of treatment and to use these outcomes in continuous quality improvement.

**Aim:** To develop and test quality indicators to evaluate differences in outcomes of physiotherapy care using PROMs in patients with nonspecific low back pain in the Netherlands and to describe different ways to quantify and present quality indicators.

**Methods:** Data from the physiotherapy national registry was used (n=213.245). Data was checked for robustness. Possible indicators were change scores and minimal clinically important differences. Hierarchic multilevel analyses were used to test the ability to differentiate between physiotherapists or physiotherapist practices. Selected PROMs were Numeric Pain Rating Scale (NPRS), Quebec Back Pain Disability Scale (QBPDS), Patient Specific Complaints questionnaire (PSC). Selected case-mix adjusters were age, sex, chronicity and severity. When adjusted mean of physiotherapists or practices differed from the nationwide mean, the quality indicator had the ability to differentiate. The differences between physiotherapists or practices were measured with an Interclass Correlation Coefficient (ICC). Two ways of presentation were developed to inform the physiotherapists of their outcomes.

**Results:** 16.7%-40.5% of the physiotherapists had adjusted means that differed from the nationwide mean (ICC=0.16-0.36). 26.5%-45.6% of the practices had adjusted means that differed from the nationwide mean (ICC=0.15-0.20).

**Conclusion:** PROMs have the ability to differentiate between physiotherapists or practices for indicators. It is possible to develop quality indicators based on routine measurement of outcomes using PROMs. Both ways of presenting quality indicators give insight into the differentiation between physiotherapists or practices.

Further development of national registries, possible quality indicators, subgroup analyses, and presentation is recommended before quality indicators can be implemented in daily practice.

Clinical Relevance: Quality indicators based on PROMs could be used as an opportunity to reflect on outcomes achieved and to create a learning cycle of continuous improvement.

Keywords: Quality indicators, Patient-reported outcome measurements, Development, Internal quality improvement, External transparency.

## INTRODUCTION

### Quality indicators

Improving the quality of care is an important goal in physiotherapy practice<sup>1-3</sup>. Quality of care is defined as *"the level of attainment of health systems' intrinsic goals of health improvement and responsiveness to legitimate expectations of the population"*<sup>4-6</sup> and can be evaluated with quality indicators<sup>7</sup>. Quality indicators are explicitly defined specifications of elements of care, who measure items referring to structures, processes, or outcomes that give an indication of the quality of care<sup>8</sup>. Quality indicators are often derived from recommendations in evidence-based guidelines<sup>9</sup>. To develop quality indicators, potential indicators need to be tested for their ability to differentiate between caregivers. They are most reliable when tested with robust populations<sup>10,11</sup>. Thereafter, each draft indicator needs to be selected and rephrased in a numerator and a denominator by expert panels, to facilitate comparisons between caregivers<sup>9</sup>. Physiotherapists use outcome measurements to evaluate outcomes in the clinical process. These measurements support shared decision-making and goal setting in daily practice. Aggregated outcome measurements of multiple patients could be used to develop quality indicators<sup>12</sup>. Outcome quality indicators gain insight into the quality of the results of treatment. With that insight, physiotherapists can improve the quality of primary physiotherapy care<sup>7</sup>. However, little is known about how these outcomes can be presented for physiotherapists and practices.

### Patient-reported outcome measurements (PROMs)

Physiotherapists use patient-reported outcomes (PROs) for shared decision making and to evaluate outcomes in the clinical process<sup>12,13</sup>. PROs represent the patients' experienced health and are measured with PROMs, who assess domains like pain and physical function<sup>13,14</sup>. PROMs are questionnaires or single-item scales measuring generic or condition-specific outcomes and are recommended by the guidelines of the Royal Dutch Society of Physical Therapy (KNGF)<sup>12,13,15-17</sup>. Despite recommendations in evidence-based guidelines, the routinely use of PROMs has been shown to be inadequate<sup>15,18-20</sup>. In clinical practice, 6%-39.5% of the physiotherapists use PROMs to evaluate patients' goals and guide decisions during

treatment<sup>12,19-21</sup>. To improve the routinely use, it is important to integrate the collection of PROMs data for multiple purposes<sup>12,15</sup>.

The outcomes of PROMs can be aggregated across different levels of care<sup>18,22</sup>. Aggregation levels are levels wherein patients are clustered. At physiotherapist level, patients are clustered according to their physiotherapist. At practice level, patients are clustered within the combined outcomes of all physiotherapists within a practice<sup>16,18,22</sup>. These aggregated outcomes could be used as quality indicators for internal quality improvement (physiotherapist level) and external transparency (practice level)<sup>12,19</sup>.

Although the use of aggregated outcomes of PROMs is in its early state of development, the possibility of using PROMs at aggregated levels has been shown<sup>12,23</sup>. Therefore outcomes using PROMs could be eligible for developing quality indicators. However, it remains unknown whether PROMs have the ability to differentiate between physiotherapists or practices.

#### Nonspecific low back pain (NSLBP)

Patients with NSLBP are the largest group of patients treated in physiotherapy practice<sup>16,24</sup>. NSLBP is pain between the lower rib and sacrum, for which no specific physical cause can be demonstrated in a valid way<sup>16</sup>. The KNGF-guideline low back pain recommends three PROMs to evaluate the outcome of treatment: 1) Numeric Pain Rating Scale (NPRS), 2) Quebec Back Pain Disability Scale (QBPDS), 3) Patient Specific Complaints questionnaire (PSC)<sup>16</sup>.

Thus, outcomes of physiotherapy care measured with PROMs in patients with NSLBP, provide an excellent opportunity to test whether these PROMs can be used to develop quality indicators.

## **AIM**

The primary aim is to develop and test quality indicators to evaluate differences in outcomes of physiotherapy care by using PROMs in patients with NSLBP in the Netherlands, and to describe different ways to quantify and present quality indicators. To achieve this aim, the following research questions were formulated:

- Is it feasible to develop quality indicators to evaluate the outcome of physiotherapy treatment by using PROMs in patients with NSLBP, based on routine data collection in Dutch physiotherapy practice?
- Can quality indicators based on PROMs be used to identify differences in outcomes between physiotherapists or physiotherapy practices?
- What are possible ways to quantify and present the quality indicators for internal quality improvement and external transparency?

The secondary objective is to test whether stratification of the population in subgroups leads to different results in identifying differences in outcomes of physiotherapy care by using PROMs in patients with NSLBP.



## **METHODS**

### Study design, setting and participants

For an explorative retrospective cohort design, we used data from a national registry ("Landelijke Database Fysiotherapie" (LDF)). In 2013 the KNGF started the program "Quality in Motion" (KIB). KIBs' aim was to develop and implement a system to evaluate the quality of physiotherapy care, based on PROMs<sup>3,15,25,26</sup>. The data for this program was collected in the LDF by primary physiotherapy practices, from January 2013 until January 2018<sup>16,24</sup>. Each month, the participants uploaded data from electronic health records systems (EHR-systems) to the registry<sup>24</sup>. Data in the LDF included: identification number of physiotherapy practices and physiotherapists, date of birth, gender, complaints of patients, duration of complaints, duration of treatment and PROMs<sup>24</sup>. For this study, we included patients with NSLBP as defined by the Diagnose Classificatie Systeem Paramedische Hulp codes 3300-4000 (DCSPH 3300-4000). DCSPH is a Dutch system that classifies diagnoses based on body- and pathology location<sup>27</sup>.

### Recruitment and consent

The participating physiotherapists filled in an informed consent at the beginning of KIB. Patients were informed via a brochure and provided consent for including their data in the database for KIB. Data of practices, physiotherapists and patients was collected anonymously. Data of patients was not included when they personally refused to participate in the study.

### Inclusion- and exclusion criteria

We included patients  $\geq 18$  years with NSLBP, with a completed treatment episode and had pre- and post-treatment measurements on the NPRS, QBPDS or PSC. Selected patient characteristics for case-mix adjustment based on literature were age, gender, chronicity (duration of complaints before treatment) and severity (severity of the complaints at pre-treatment measurement)<sup>16,22,28-32</sup>. Patients with missing data on any of the case-mix adjusters were excluded. For robustness, only physiotherapists or physiotherapy practices with minimal 30 patients (who met the inclusion criteria) were included<sup>10</sup>. In table 3, the characteristics are presented separately for physiotherapist level and practice level.

## Sample size

A sample size calculation of Twisk was performed for the domains pain intensity (ICC=0.55) and physical function (ICC=0.56)<sup>33-35</sup>. This resulted in a minimum of 1963 patients treated by 66 physiotherapists (physiotherapist level) or in 66 primary physiotherapy practices (practice level) (see Appendix I).

## PROMs

Pre- and post-treatment measurements of NRPS, QBPDS and PSC were used for development of quality indicators. The NPRS is a measurement of pain, using an 11-point scale ranging from 0-10 (no pain–worst pain imaginable). The Minimal Clinically Important Difference (MCID) for pre- and post-treatment change score on the NPRS is estimated as 2 points<sup>36-38</sup>. The MCID is the smallest significant difference, while patients experience improvement. The test-retest reliability is high (Intra Class Coefficient (ICC)=0.85)<sup>38</sup>. The QBPDS is a 20-item questionnaire measuring limitations in daily living<sup>39</sup>, scoring 0-5 per question (no disability-total disability), with a total score between 0-100. The MCID is estimated at 20 points for acute, and 15 points for chronic NSBLP<sup>37,39</sup>. The test-retest reliability of the Dutch adaptation of QBPDS is high (ICC=0.90)<sup>39</sup>. The PSC measures problems with function or activities. Patients identify three activities they can't perform as usual and rate each activity on a scale with a range from 0-10 (no problems to perform-unable to perform). The MCID is estimated at 2 points<sup>15,40</sup>. The score of each patients' first activity was used. Other studies present MCID scores for different PROMs as 30% change compared to the pre-treatment measurement<sup>37,41</sup>.

For the secondary objective, the study population was stratified by subgroups (see table 1)<sup>28</sup>.

**Table 1: subgroups of Hirsch et al (2014)<sup>28</sup>**

<b>subgroups based on criteria defined by Hirsch et. al (2014).</b>	
<b>1.</b>	Adults with acute NSLBP
<b>2.</b>	Adults with chronic NSLBP
<b>3.</b>	Elderly patients (>65 years) with acute NSLBP
<b>4.</b>	Elderly patients with chronic NSLBP
<b>5.</b>	All patients with less than 20 appointments;
<b>6.</b>	All patients with more than 20 appointments

## **Development of quality indicators**

The development of quality indicators was divided into phases. The first phase defined the eligible outcomes for developing quality indicators and checked the feasibility of calculating indicator scores (research question 1)<sup>18,22</sup>. The feasibility depended on the robustness of the data<sup>18,22</sup>. The second phase tested whether the variables have the ability to differentiate between physiotherapists or practices (research question 2). The third phase explored possible ways to present the quality indicators (research question 3)<sup>18,22</sup>.

### Phase 1: Defining variables

First, possible quality indicators were described using PROMs scores, based on change scores between pre- and post-treatment measurements and MCID. At physiotherapist level (internal quality improvement), quality indicators were aimed at providing information by comparing aggregated outcomes of physiotherapists with the nationwide mean. At practice level (external transparency), the aggregated outcomes of practices were compared with the nationwide mean (see table 2).

**Table 2: Defining quality indicators**

Physiotherapist level

**1. Presenting change scores on the PROMs between the pre- and post-treatment measurement**

Indicator I: "Physiotherapist change score": Mean change scores are presented with confidence intervals.

**2. Presenting the percentage of patients that achieved MCID<sup>36</sup>.**

- Indicator II<sup>a</sup>: "MCID absolute": The percentage of the patients with a change score on the NPRS, QBPDS or PSC that achieved the MCID (in absolute number<sup>37,41</sup>. NPRS: 2 points, QBPDS: 15 points for chronic patients, QBPDS: 20 points for acute patients, PSC: 2 points.

$$\text{Indicator IIa} = \frac{\text{Total of patients who achieved the absolute MCID}}{\text{Total patients with a change score}}$$

- Indicator II<sup>b</sup>: "MCID percentage": The percentage of the patients with a change score on the NPRS, QBPDS or PSC that improved >30% compared to pre-treatment measurement<sup>37,41</sup>.

$$\text{Indicator IIb} = \frac{\text{Total of patients who improved > 30\% compared to baseline}}{\text{Total patients with a change score}}$$

Practice level

**3. Change score between the baseline and the endpoint measurement are categorized into categories of quality**

Indicator III: "Practice change score": Mean change scores are presented with confidence intervals.

Quality indicators are often presented as percentage scores, in which the denominator is the population of interest and the numerator is the total number of successful proceedings<sup>18,22</sup>. Such percentage scores can be used to identify relative differences between physiotherapists or practices and may be compared to benchmarks or norm values<sup>18,22</sup>. The MCID can then be used to define a 'successful proceeding' (see box 1)<sup>17,33,35</sup>.

**Box 1: Quality indicators for physiotherapy practice X**

**Example of quality indicators:**

In practice X, two physiotherapists treated each 100 patients. Both physiotherapists used the NPRS to evaluate pain intensity in all their patients. Three quality indicators provide information about the differences between those physiotherapists and the overall score of the practice.

**Example 1: Physiotherapist change score**

Physiotherapist A has a mean change score of 4 points on the NPRS (the mean change score of pre- and post-measurement of 100 patients).

Physiotherapist B has a mean change score of 6 points on the NPRS (the mean change score of pre- and post-measurement of 100 patients).

**Example 2<sup>a</sup>: MCID (absolute)**

50 patients of physiotherapist A achieved the MCID of 2 points. Thus physiotherapist A scores 50%.

70 patients of physiotherapist B achieved the MCID of 2 points. Thus physiotherapist B scores 70%.

**Example 2<sup>b</sup>: MCID (percentage)**

30 patients of physiotherapist A achieved the MCID of 30% change score. Thus physiotherapist A scores 30%

60 patients of physiotherapist B achieved the MCID of 30% change score. Thus physiotherapist B scores 60%.

**Example 3: Practice change score**

Practice X has a mean change score of 5 points on the NPRS (pre- and post-measurements of 200 patients from both physiotherapist A and B).

## **Ability to differentiate**

To test the ability of quality indicators to differentiate between physiotherapists or physiotherapy practices, hierarchic multilevel analyses were performed at both levels. Adjusted mean change scores and percentages of physiotherapists or practices were compared to the nationwide mean. The analyses were performed in IBM SPSS Statistics Data Editor version 24 and in SAS Data Management.

### Descriptive statistics

Descriptive statistics (number of patients with NSLBP and with pre- and post-treatment measurement in PROMs of interest, gender, age, duration of the complaints pre-treatment) were analysed to characterize the study population. The results of the descriptive statistics are described in table 4 as mean and standard deviation (sd).

### Assumptions

The following assumptions were checked: normal distribution (Kolmogorov-Smirnov test), homogeneity (Levene's statistic), uncorrelated residuals, linear relationships. In multilevel analyses, the assumptions are moderately violated, but this only leads to inaccurate parameter estimation or standard errors when the sample size is small<sup>42</sup>. Here the sample size was robust and the violation did not affect the parameter estimation<sup>42</sup>.

### Hierarchic multi-level analyses

The independent variables were age, gender, chronicity and severity. These variables were continuous or categorical. The dependent variables were the change scores between pre- and post-treatment measurement of NPRS, QBPDS and PSC and were continuous variables<sup>32</sup>.

Separate univariate linear regression analyses were performed to examine the association between case-mix adjusters and PROMs. Case-mix adjusters with a significant association were included in a multi-level model ( $p < 0.05$ ).

Quality indicators were analysed separately for each PROM. For change scores, a hierarchic linear multi-level model and for MCID, a hierarchic logistic multi-level model was used. This resulted in adjusted mean change scores or percentages for each physiotherapist and adjusted mean change scores for each practice with a confidence interval of 80% (CI=80%)<sup>43-46</sup>. Because

of the large number of included patients, a robust, complete case analysis was performed. In this study, this means complete patient characteristics and for the specific PROM a complete pre- and post-treatment measurement.

### Differences

When PROMs had the ability to differentiate between physiotherapists or practices, the adjusted mean change scores or percentages with a CI would differ from the nationwide mean (see table 3). When PROMs did not have the ability to differentiate between physiotherapists or practices, all adjusted mean change scores or percentages would lay around the average mean. In figure 1-3, graphics are presented using red, blue and green colours for lower, average or higher scores with respect to national averages.

**Table 3: differences between physiotherapists or practices presented**

Position of the CI compared to nationwide average score <sup>44,47</sup>	Colour
Higher limit of CI < nationwide average score	➤ Red
Lower limit of CI < nationwide average score < higher limit of CI	➤ Blue
Lower limit of CI > nationwide average score	➤ Green
CI= Confidence Interval	

### ICC

Based on the variance of intercepts and the remaining error variance, the ICC was estimated<sup>48</sup>. The ICC was defined as the variance between physiotherapists or practices, divided by the total variance (sum of variance between physiotherapists or practices and variance within physiotherapists or practices)<sup>48</sup>. In most studies, the ICC for multilevel analyses is lower than 0.20<sup>48</sup>. For quality indicators, an ICC >0.10 is considered as high<sup>43,44,48</sup>.

### Secondary analysis for stratified populations

The descriptive statistics and the check for assumptions were identical to the primary analyses. Independent-samples T-tests were performed for acute and chronic patients (total population included). The groups were tested for differences in age, sex, severity and change score, in order to provide information about the potential need to stratify ( $p < 0.05$ ). The univariate analyses and hierarchic linear multi-level analyses were performed with the stratified populations<sup>28</sup>.

## **Presentation**

The first presentation was based on previous studies<sup>3,18,22</sup>. In these graphics, physiotherapists were presented randomly, compared to the nationwide mean. A red line represents the nationwide average change score or percentage achieved MCID, and blue dots represent the adjusted mean change scores or percentage achieved MCID, with a CI for each physiotherapist or practice.

The second presentation, physiotherapists or practices were ordered based on their adjusted mean change score or percentage achieved MCID compared to the nationwide average change score. Different colours represent differences between physiotherapists or practices<sup>44,47</sup>. A blue line represents the nationwide average change score or percentage achieved MCID.

## **Ethical considerations**

### Regulation statement

This study was conducted according to the principles of the Declaration of Helsinki (version October 2013) and in accordance with the Medical Research Involving Human Subjects Act (WMO). The study protocol was approved by the Medical Ethical Committee of Radboud University Medical Centre (METC protocol number 2013/151).



## RESULTS

### Feasibility

#### Characteristics

At physiotherapist level, data of 167.442 patients, treated by 1968 physiotherapists in 197 practices was used. Physiotherapists treated on average 84 patients. 54.2% of the patients was female, the average age was 53 years and 78.1% suffered from acute NSLBP (see table 3).

At practice level, data of 213.245 patients, treated by 6499 physiotherapists in 865 practices was used. The average treated patients number of one practice was 247. 55.0% of the patients was female, the average age was 52 years and 77.5% suffered from acute NSLBP (see table 3). Patients with uncompleted treatment episodes, no repeated measurement of PROMs, outcomes of PROMs in different scales, aged under 18 years or treated by physiotherapists or in practices who treated < 30 patients were excluded. Patient characteristics gender and age comprised a representative sample compared to national reference data<sup>15,49</sup>. The percentage of acute NSLBP differed: 78% in this study compared to 48% in reference data<sup>15,49</sup>. The data was robust and reached the required sample size.

#### Characteristics PROMs

##### Physiotherapist level

NPRS: 31.716 patients treated by 507 physiotherapists, had completed a pre- and post-treatment measurement. The unadjusted mean difference score with standard deviation (SD) was 4.25 (2.47).

QBPDS: 11.880 patients treated by 195 physiotherapists, had a completed pre- and post-treatment measurement. The unadjusted mean difference score was 28.26 (20.08).

PSC: 44.346 patients treated by 705 physiotherapists, had a completed pre- and post-treatment measurement. The unadjusted mean difference score was 5.04 (2.65) (see table 4).

##### Case-mix adjusters

There was a significant association between NPRS and case-mix adjusters age and severity ( $p < 0.001$ ), between QBPDS and case-mix adjuster severity ( $p < 0.001$ ) and between PSC and

case-mix adjusters age, severity and chronicity ( $p < 0.015$ ). All these case-mix adjusters were included in the multi-level models.

#### Practice level

NPRS: 54.905 patients treated in 405 practices, had a completed pre- and post-treatment measurement. The unadjusted mean difference score was 4.16 (2.52).

QBPDS: 21.757 patients treated in 204 practices, had a completed pre- and post-treatment measurement. The unadjusted mean difference score was 26.97 (19.82).

PSC: 73.553 patients treated in 500 practices, had a completed pre- and post-treatment measurement. The unadjusted mean difference score was 4.98 (2.73) (see table 4).

#### Case-mix adjusters

The association between the NPRS, QBPDS and case-mix adjusters were the same as at physiotherapist level. The association between the PSC and case-mix adjusters age and severity were significant ( $p < 0.001$ ). All these case-mix adjusters were included in the multi-level models.

**Table 4: baseline characteristics, robust >=30 cases**

		<b>Total (Physiotherapist level)</b>		
<b>Practices</b>	N	197		
<b>Physiotherapists</b>	N	1986		
<b>Patients</b>	N	167442		
	Sex (v)	90759 (54.2%)		
	Age*	53.25 (16.91)		
	Duration of complaints (< 3months)	130727 (78.1%)		
		<b>PROMs</b>		
		<b>NPRS</b>	<b>QBPDS</b>	<b>PSC</b>
<b>Practices</b>	N	281	128	367
<b>Physiotherapists</b>	N	507	195	705
<b>Patients</b>	N	31716	11880	44346
	Sex (v)	16925 (53.4%)	6228 (52.4%)	23776 (53.6%)
	Age*	52.67 (16.69)	52.58 (16.65)	52.88 (16.78)
	Duration of complaints (< 3months)	25437 (80.2%)	9555 (80.4%)	35006 (78.9%)
	Severity at baseline*	6.30 (1.77)	40.49 (18.65)	6.80 (1.90)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	4.25 (2.47)	28.26 (20.08)	5.04 (2.65)
*Age, Severity at baseline and difference between T <sub>0</sub> and T <sub>end</sub> are presented with mean and standard deviation				
		<b>Total (Practice level)</b>		
<b>Practices</b>	N	865		
<b>Physiotherapists</b>	N	6499		
<b>Patients</b>	N	213245		
	Sex (v)	117317 (55.0%)		
	Age*	52.39 (17.19)		
	Duration of complaints (< 3months)	165248 (77.5%)		
		<b>PROMs</b>		
		<b>NPRS</b>	<b>QBPDS</b>	<b>PSC</b>
<b>Practices</b>	N	405	204	500
<b>Physiotherapists</b>	N	3328	1573	4172
<b>Patients</b>	N	54905	21757	73553
	Sex (v)	30248 (55.1%)	11550 (53.1%)	40695 (55.3%)
	Age*	52.96 (17.09)	53.00 (16.77)	53.20 (17.21)
	Duration of complaints (< 3months)	43467 (79.2%)	17399 (80.0%)	57284 (77.9%)
	Severity at baseline*	6.33(1.80)	40.03 (18.40)	6.89 (1.92)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	4.16 (2.52)	26.97 (19.82)	4.98 (2.73)
*Age, Severity at baseline and difference between T <sub>0</sub> and T <sub>end</sub> are presented with mean and standard deviation				

## **Ability to differentiate**

At physiotherapist level and practice level, all included case-mix adjusters had a significant influence on the results of the PROMs ( $p < 0.001$ ) (see tables 5-6). All PROMs showed the ability to differentiate between physiotherapists or practices (figure 1-3).

### Physiotherapist level

For indicator I (physiotherapist change score), the adjusted mean difference score was 4.25 (0.05) for the NPRS, 28.26 (0.72) for the QBPDS, 5.04 (0.04) for the PSC. Of all physiotherapists, 33.1% (NPRS), 46.6% (QBPDS), 34.5% (PSC) had adjusted mean change scores lower than the nationwide mean. 35.5% (NPRS), 32.3% (QBPDS), 36.0% (PSC) of the physiotherapists had adjusted mean change scores higher than the nationwide mean.

For indicator II<sup>a</sup> (MCID absolute), on average 88.6% (NPRS), 77.7% (QBPDS, acute patients), 68.8% (QBPDS, chronic patients), 91.5% (PSC) of the patients achieved the MCID. Of all physiotherapists, 17.8% (NPRS), 20.5% (QBPDS, MCID=15), 26.1% (QBPDS, MCID=20), 15.0% (PSC) had percentages less than the nationwide average. 27.8% (NPRS), 30.4% (QBPDS, MCID=15), 31.1% (QBPDS, MCID=20), 27.4% (PSC) of the physiotherapists had percentages higher than the nationwide mean.

For indicator II<sup>b</sup> (MCID percentage), on average 58.4% (NPRS), 61.8% (QBPDS), 69.0% (PSK) of the patients achieved the MCID. Of all physiotherapists, 21.7% (NPRS), 24.2% (QBPDS), 24.7% (PSK) had percentages less than the nationwide average. 18.3% (NPRS), 29.8% (QBPDS), 39.4% (PSK) of the physiotherapists had percentages higher than the nationwide mean (see figure 1-3).

The ICCs for all quality indicators were considered high (0.12-0.36) (see table 7)<sup>43,44</sup>.

### Practice level

For indicator III (practice change score), the adjusted mean difference score was 4.06 (0.04) for the NPRS, 26.11 (0.51) for the QBPDS, 4.90 (0.04) for the PSK. Of all practices, 32.3% (NPRS), 41.2% (QBPDS), 32.0% (PSK) had adjusted mean change scores lower than the nationwide mean. 37.5% (NPRS), 31.9% (QBPDS), 35.2% (PSK) of the practices had adjusted mean change scores higher than the nationwide mean (see figure 1-3, indicator III).

The ICC for quality indicator III was considered high (0.15-0.20) (see table 7)<sup>43,44</sup>.

### Secondary analyses

Between acute and chronic patients, significant differences ( $p < 0.000$ ) were found for age, sex severity (only NPRS) and change score (see Appendix II, table A). The patient characteristics for the subgroups are presented in Appendix II, table B. The sample size of each subgroup was not robust. Therefore it was not possible to compare acute patients with chronic patients (see Appendix II, table B).

Table 5: results physiotherapist level

Physiotherapy Level												
Change score					MCID absolute				MCID percentage			
	Estimate	P-value	80% Confidence Interval		Estimate	Standard Error	P-value		Estimate	Standard Error	P-value	
			Lower Bound	Upper Bound								
<b>NPRS</b>					<b>NPRS</b>				<b>NPRS</b>			
<u>Intercept</u>	4.256	0.000*	4.167	4.345	<u>Intercept</u>	2.229	0.047	<0.0001*	<u>Intercept</u>	0.366	0.045	<0.0001*
<u>Age</u>	0.010	0.000*	0.008	0.011	<u>Age</u>	-0.009	0.0011	<0.0001*	<u>Age</u>	-0.012	0.0008	<0.0001*
<u>Severity</u>	-0.808	0.000*	-0.820	-0.796	<u>Severity</u>	0.513	0.037	<0.0001*	<u>Severity</u>	0.165	0.008	<0.0001*
<b>QBPDS</b>					<b>QBPDS (MCID: 15)</b>				<b>QBPDS</b>			
<u>Intercept</u>	28.263	0.000*	26.852	29.675	<u>Intercept</u>	1.411	0.0870	<0.0001*	<u>Intercept</u>	0.550	0.086	<0.0001*
<u>Severity</u>	-0.723	0.000*	-0.738	-0.707	<u>Severity</u>	0.203	0.017	<0.0001*	<u>Severity</u>	-0.040	0.054	<0.0001*
					<b>QBPDS (MCID: 20)</b>							
					<u>Intercept</u>	0.9123	0.086	<0.0001*				
					<u>Severity</u>	0.2268	0.017	<0.0001*				
<b>PSC</b>					<b>PSC</b>				<b>PSC</b>			
<u>Intercept</u>	5.277	0.000*	5.190	5.363	<u>Intercept</u>	2.5822	0.042	<0.0001	<u>Intercept</u>	0.923	0.041	<0.0001*
<u>Age</u>	0.009	0.000*	0.008	0.010	<u>Age</u>	-0.009	0.001	<0.0001	<u>Age</u>	-0.012	0.0007	<0.0001*
<u>Chronicity</u>	0.972	0.000*	0.925	1.020	<u>Chronicity</u>	-1.018	0.038	<0.0001	<u>Chronicity</u>	-0.956	0.028	<0.0001*
<u>Severity</u>	-0.784	0.000*	-0.795	-0.772	<u>Severity</u>	0.318	0.009	<0.0001	<u>Severity</u>	0.081	0.007	<0.0001*

The results of the influence of case-mix adjusters (Age, severity, chronicity) on the quality indicators by using Patient Reported Outcome Measurements (PROMs) (NPRS, QBPDS, PSC) at physiotherapist level.

Physiotherapist level= patients were aggregated (clustered) within physiotherapists.

NPRS= Numeric Pain Rating Scale, QBPDS = Quebec Back Pain Disability Scale, PSC= Patient Specific Complaints questionnaire.

\*= Significant (case-mix adjuster has a significant influence on the quality indicator of interest)

MCID= Minimal Clinically Important Difference, MCID: 15= MCID for chronic patients (complaints > 3 months before treatment), MCID: 20= MCID for acute patients (complaints <= 3 months before treatment, MCID absolute= absolute change score that needs to be achieved, MCID percentage = ≥30% improvement compared to pre-treatment measurement.

**Table 6: Results at practice level**

Practice Level				
Change score				
	Estimate	P-value	80% Confidence Interval	
			Lower Bound	Upper Bound
<b>NPRS</b>				
<u>Intercept</u>	4.056	0.000*	3.975	4.138
<u>Age</u>	0.011	0.000*	0.010	0.012
<u>Severity</u>	-0.795	0.000*	-0.805	-0.786
<b>QBPDS</b>				
<u>Intercept</u>	26.109	0.000*	25.099	27.119
<u>Severity</u>	-0.691	0.000*	-0.702	-0.680
<b>PSC</b>				
<u>Intercept</u>	4.889	0.000*	4.792	4.986
<u>Age</u>	0.012	0.000*	0.011	0.013
<u>Severity</u>	-0.777	0.000*	-0.788	-0.766

The results of the influence of case-mix adjusters (Age, severity, chronicity) on the quality indicators by using Patient Reported Outcome Measurements (PROMs) (NPRS, QBPDS, PSC) at practice level.

Practice level= patients were aggregated (clustered) within primary physiotherapy practices.

NPRS= Numeric Pain Rating Scale, QBPDS = Quebec Back Pain Disability Scale, PSC= Patient Specific Complaints questionnaire.

\*= Significant (case-mix adjuster has a significant influence on the quality indicator of interest)

**Table 7: ICC quality indicators**

		ICC		
		NPRS	QBPDS	PSK
<b>Physiotherapist level</b>	<b>Indicator I</b>		0.23	0.36
	<b>Indicator II</b>		0.16	0.12*
	<b>Absolute</b>			0.21**
	<b>Percentage</b>		0.20	0.21
<b>Practice level</b>	<b>Indicator III</b>		0.15	0.20

ICC= Intra Class Correlation coefficient, which part of the variance can be explained by the quality indicator  
NPRS= Numeric Pain Rating Scale, QBPDS = Quebec Back Pain Disability Scale, PSC= Patient Specific Complaints questionnaire.

Physiotherapist level= patients were aggregated (clustered) within physiotherapists.

Practice level= patients were aggregated (clustered) within primary physiotherapy practices.

\*= MCID: 15= MCID for chronic patients (complaints > 3 months before treatment),

\*\*= MCID: 20= MCID for acute patients (complaints <= 3 months before treatment),

MCID= Minimal Clinically Important Difference

Indicator I= Change score at physiotherapist level

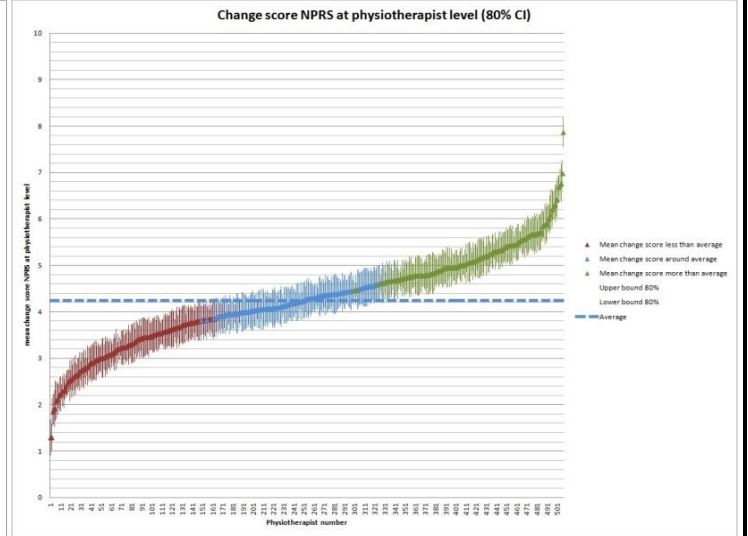
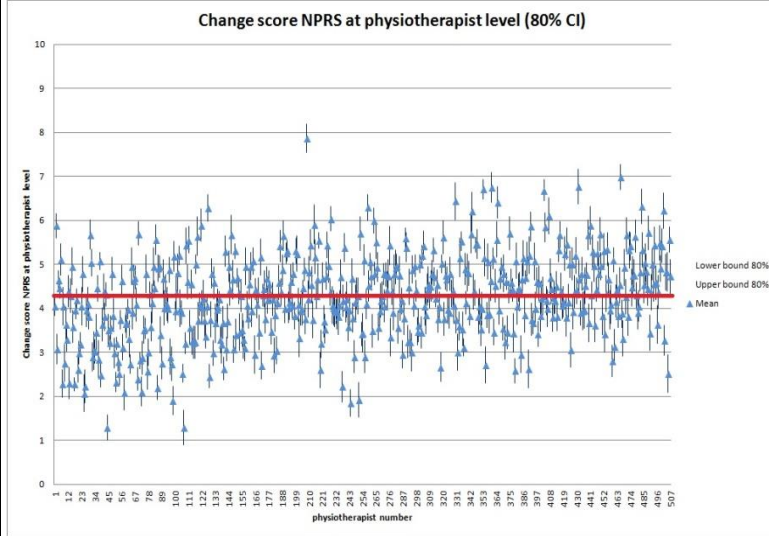
Indicator II absolute= absolute change score that needs to be achieved, Indicator II percentage = ≥30% improvement compared to pre-treatment measurement.

Indicator III= Change score at practice level

Presentation

Figure 1: Representation of indicators NPRS

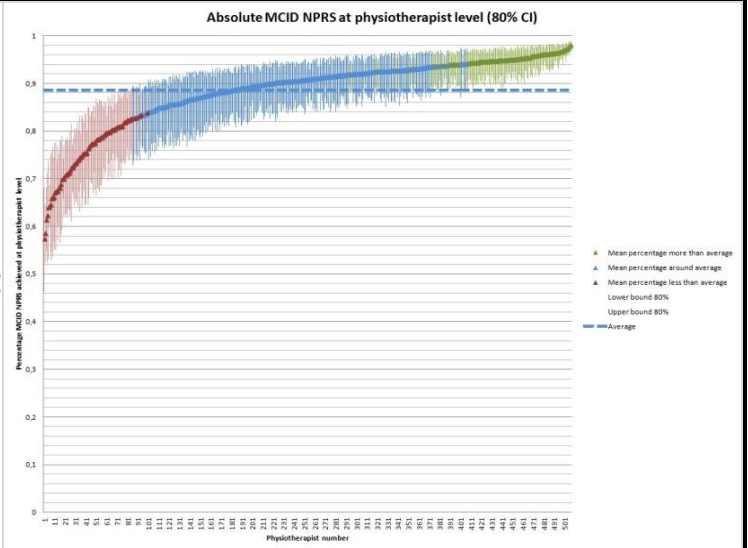
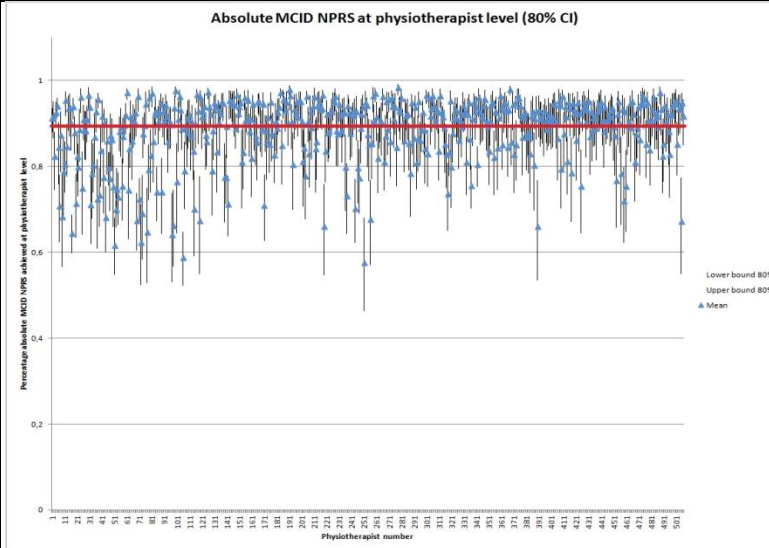
**NPRS: Indicator I (physiotherapist change score)**



- Average change score=4.25
- ▲ 507 physiotherapists with a mean score with an 80% confidence interval

- Average change score= 4.25
- ▲ 33.1% of the physiotherapists (n=168) had a mean change score lower than average
- ▲ 31.4% physiotherapists (n=159) had an average mean change score
- ▲ 35.5% physiotherapists (n=180) had a mean change score higher than average

**NPRS: Indicator II<sup>a</sup> (MCID absolute)**



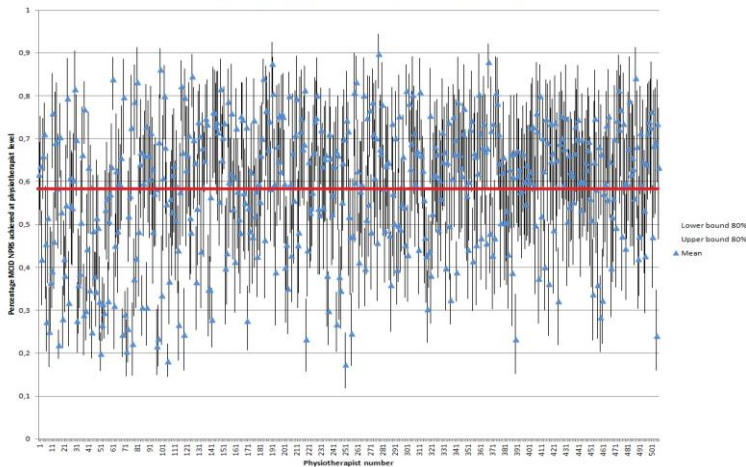
- Average percentage patients who achieved the absolute MCID (2.00 points) =88.6%
- ▲ 507 physiotherapists with a mean percentage of patients who achieved the absolute MCID ( 2.00 points) with an 80% confidence interval

- Average percentage patients who achieved the absolute MCID (2.00 points) =88.6%
- ▲ 17.8% of the physiotherapists (n=90) had a mean percentage lower than average
- ▲ 54.4% of the physiotherapists (n=276) had an average mean percentage
- ▲ 27.8% of the physiotherapists (n=141) had a mean percentage higher than average

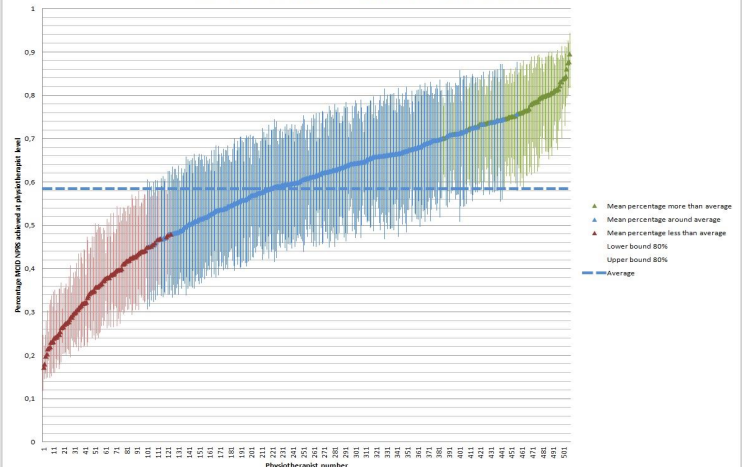


**NPRS: Indicator II<sup>b</sup> (MCID percentage)**

MCID (30% change) NPRS at physiotherapist level (80% CI)



MCID (30% change) NPRS at physiotherapist level (80% CI)

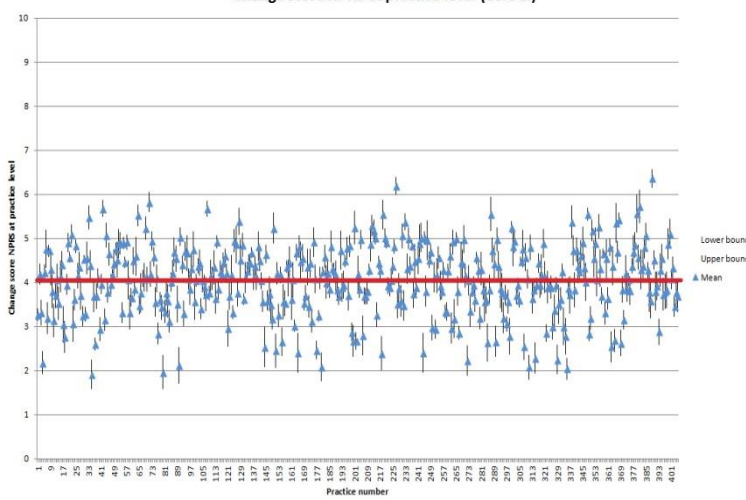


- Average percentage patients who achieved the percentage MCID (30.0%) = 58.4%
- ▲ 507 physiotherapists with mean percentage patients who achieved the percentage MCID (30.0%) with an 80% confidence interval

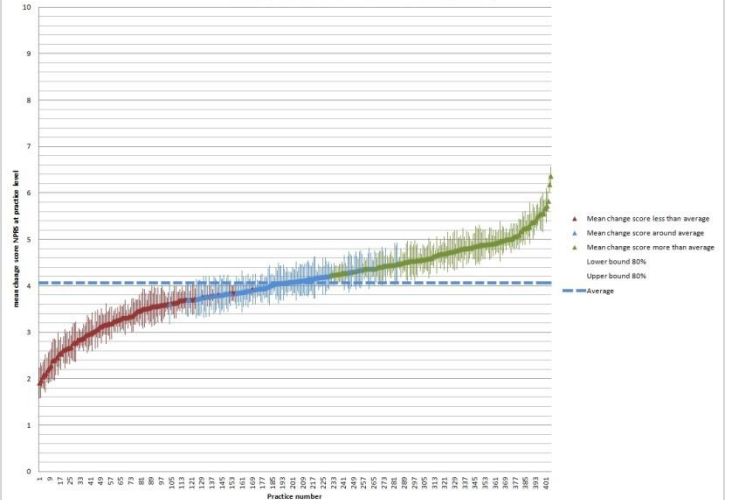
- Average percentage patients who achieved the percentage MCID (30.0%) = 58.4%
- ▲ 21.7% of the physiotherapists (n=110) had a mean percentage lower than average
- ▲ 60.0% of the physiotherapists (n=304) had an average mean percentage
- ▲ 18.3% of the physiotherapists (n=93) had a mean percentage higher than average

**NPRS: Indicator III (practice change score)**

Change score NPRS at practice level (80% CI)



Change score NPRS at practice level (80% CI)



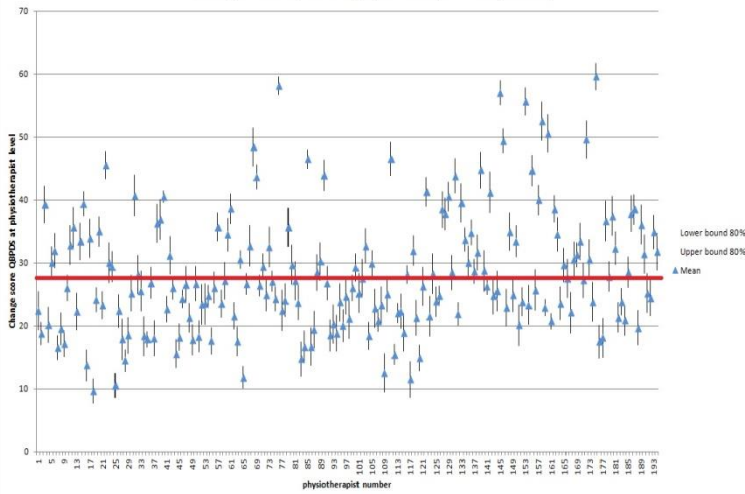
- Average change score= 4.06
- ▲ 405 primary physiotherapy practices with a mean score with an 80% confidence interval

- Average change score= 4.06
- ▲ 32.3% of the primary physiotherapy practices (n=131) had a mean change score lower than average
- ▲ 30.2% of the primary physiotherapy practices (n=122) had an average mean change score
- ▲ 37.5% of the primary physiotherapy practices (n=152) had a mean change score higher than average

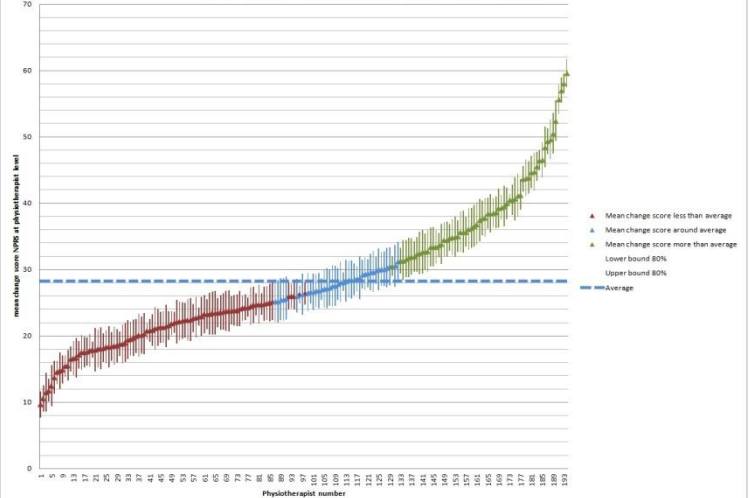
Figure 2: representation of indicators QBPDS

**QBPDS: Indicator I (physiotherapist change score)**

Change score QBPDS at physiotherapist level (80% CI)



Change score QBPDS at physiotherapist level (80% CI)

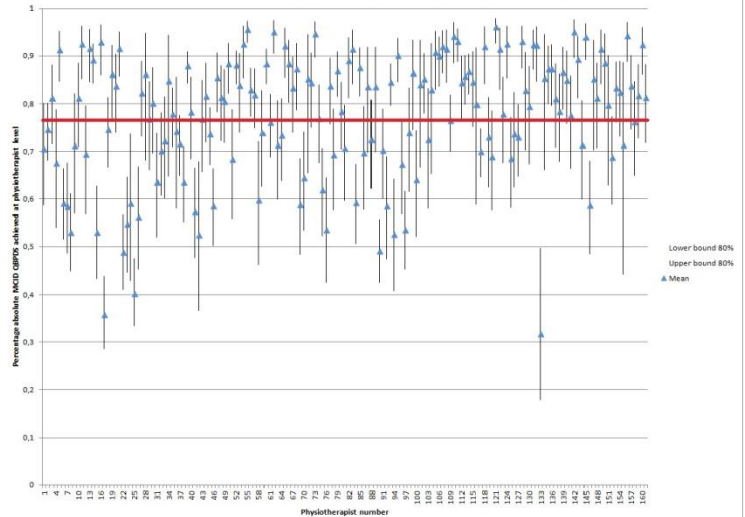


- Average change score=28.26
- ▲ 195 physiotherapists with a mean score with an 80% confidence interval

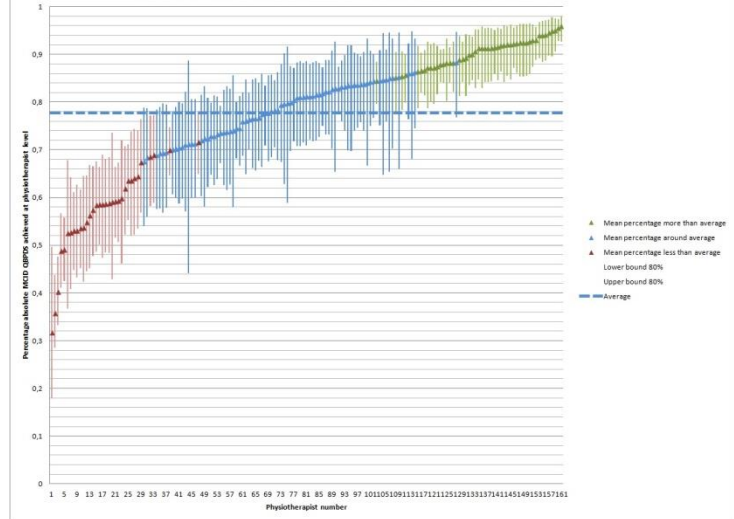
- Average change score= 28.26
- ▲ 46.6% of the physiotherapists (n=91) had a mean change score lower than average
- ▲ 21.1% of the physiotherapists (n=40) had an average mean change score
- ▲ 32.3% of the physiotherapists (n=63) had a mean change score higher than average

**QBPDS: Indicator II<sup>a</sup> (MCID absolute (chronic patients, MCID=15))**

Absolute MCID QBPDS at physiotherapist level (80% CI) for chronic patients



Absolute MCID QBPDS at physiotherapist level (80% CI) for chronic patients

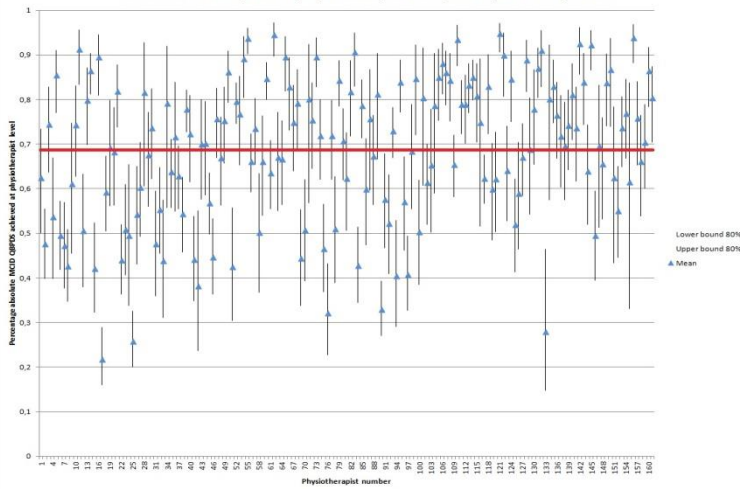


- Average percentage of chronic patients who achieved the absolute MCID (15.00 points) =77.7%
- ▲ 161 physiotherapists with a mean percentage of chronic patients who achieved the absolute MCID (15.00 points) with an 80% confidence interval

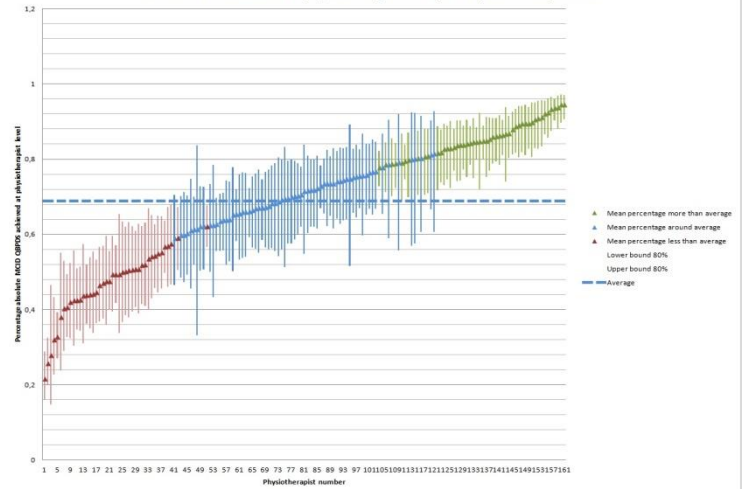
- Average percentage of chronic patients who achieved the absolute MCID (15.00 points) =77.7%
- ▲ 20.5% of the physiotherapists (n=33) had a mean percentage lower than average
- ▲ 49.1% of the physiotherapists (n=79) had an average mean percentage
- ▲ 30.4% of the physiotherapists (n=49) had a mean percentage higher than average

**QBDS: Indicator II<sup>a</sup> (MCID absolute (acute patients, MCID=20))**

Absolute MCID QBDS at physiotherapist level (80% CI) for acute patients



Absolute MCID QBDS at physiotherapist level (80% CI) for acute patients

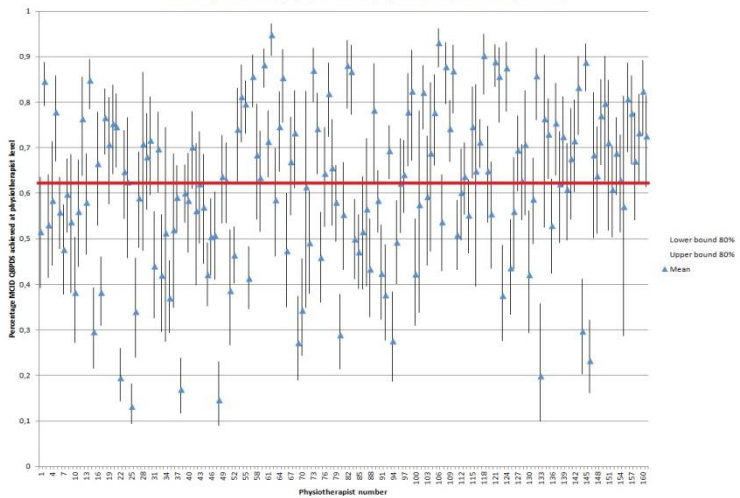


- Average percentage acute patients who achieved the absolute MCID (20.00 points) =68.8%
- ▲ 161 physiotherapists with a mean percentage of acute patients who achieved the absolute MCID (20.00 points) with an 80% confidence interval

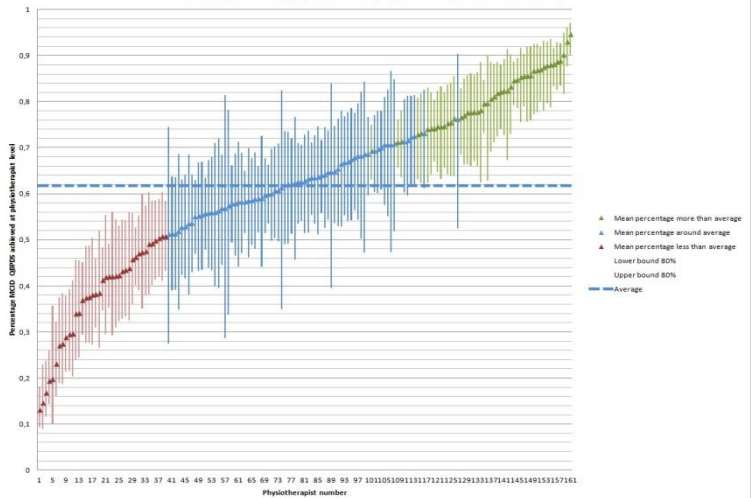
- Average percentage acute patients who achieved the absolute MCID (20.00 points) =68.8%
- ▲ 26.1% of the physiotherapists (n=42) had a mean percentage lower than average
- ▲ 42.8% of the physiotherapists (n=69) had an average mean percentage
- ▲ 31.1% of the physiotherapists (n=50) had a mean percentage higher than average

**QBDS: Indicator II<sup>b</sup> (MCID percentage)**

MCID (30% change) QBDS at physiotherapist level (80% CI)



MCID (30% change) QBDS at physiotherapist level (80% CI)

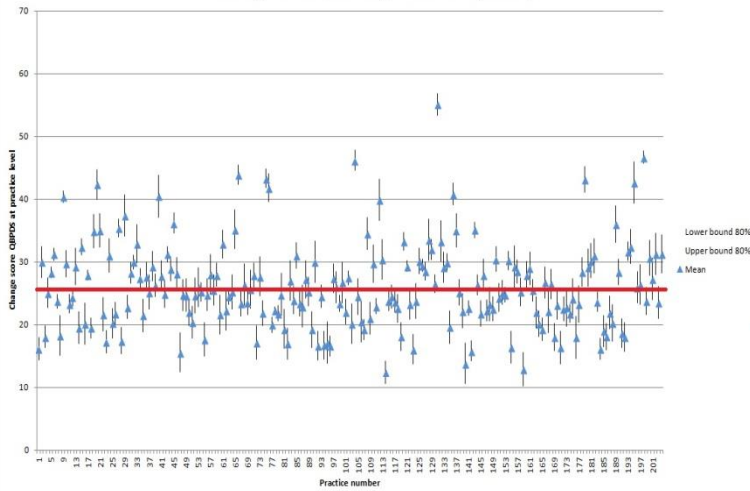


- Average percentage patients who achieved the percentage MCID (30.0%) =61.8%
- ▲ 161 physiotherapists with mean percentage of patients who achieved the percentage MCID (30.0%) with an 80% confidence interval

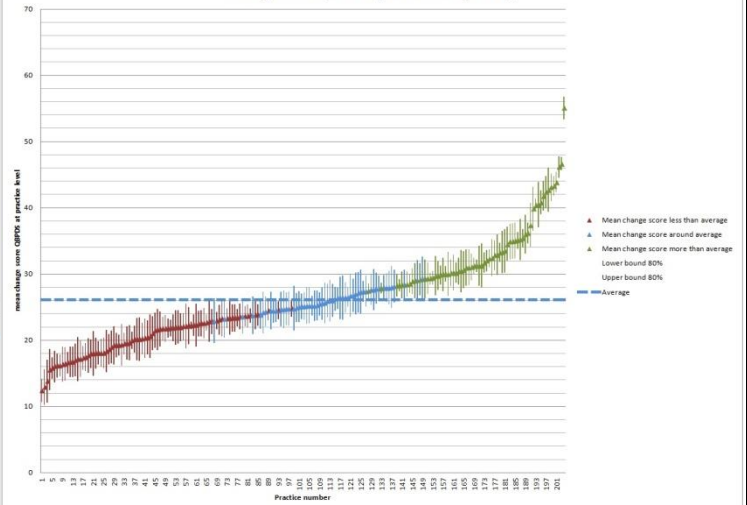
- Average percentage patients who achieved the percentage MCID (30.0%) =61.8%
- ▲ 24.2% of the physiotherapists (n=39) had a mean percentage lower than average
- ▲ 46.0% of the physiotherapists (n=74) had an average mean percentage
- ▲ 29.8% of the physiotherapists (n=48) had a mean percentage higher than average

**QBPD5: Indicator III**

Change score QBPD5 at practice level (80% CI)



Change score QBPD5 at practice level (80% CI)

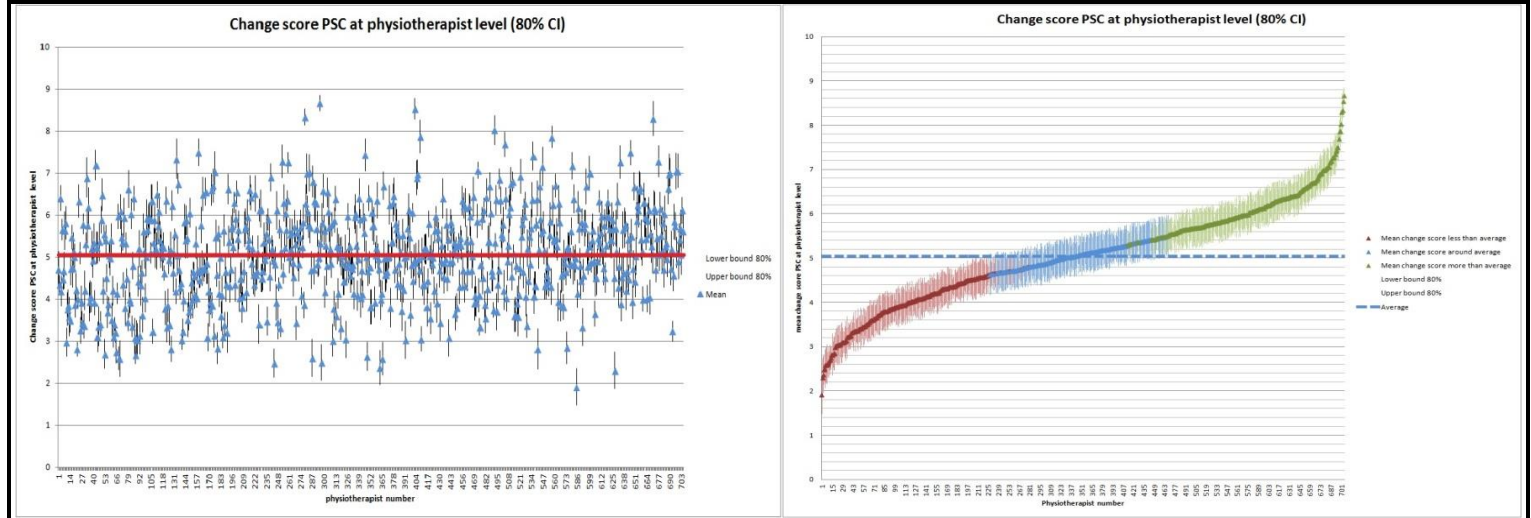


- Average change score=26.11
- ▲ 204 primary physiotherapy practices with a mean score with an 80% confidence interval

- Average change score= 26.11
- ▲ 41.2% of the primary physiotherapy practices (n=84) had a mean change score lower than average
- ▲ 26.9% of the primary physiotherapy practices (n=55) had an average mean change score
- ▲ 31.9% of the primary physiotherapy practices (n=65) had a mean change score higher than average

Figure 3: representation of indicators PSC

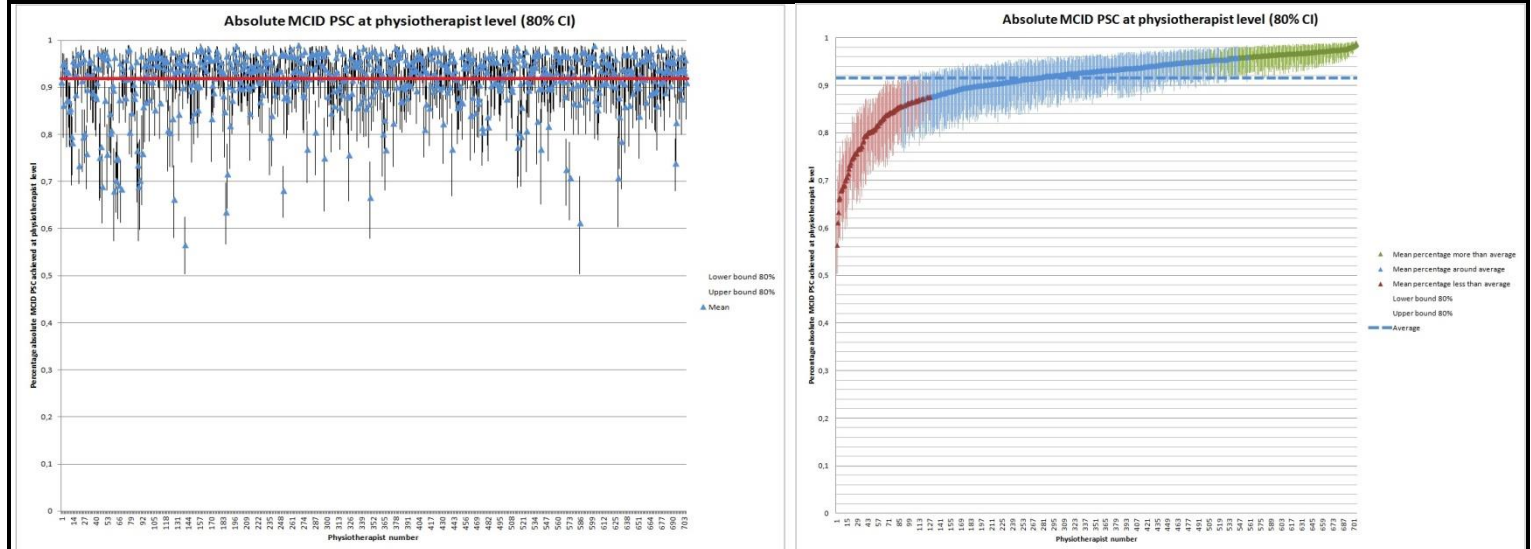
**PSC: Indicator I (physiotherapist change score)**



- Average change score=5.04
- ▲ 705 physiotherapists with a mean score with an 80% confidence interval

- Average change score= 5.04
- ▲ 34.5% of the physiotherapists (n=243) had a mean change score lower than average
- ▲ 29.5% of the physiotherapists (n=208) had an average mean change score
- ▲ 36.0% of the physiotherapists (n=254) had a mean change score higher than average

**PSC: Indicator II<sup>a</sup> (MCID absolute)**

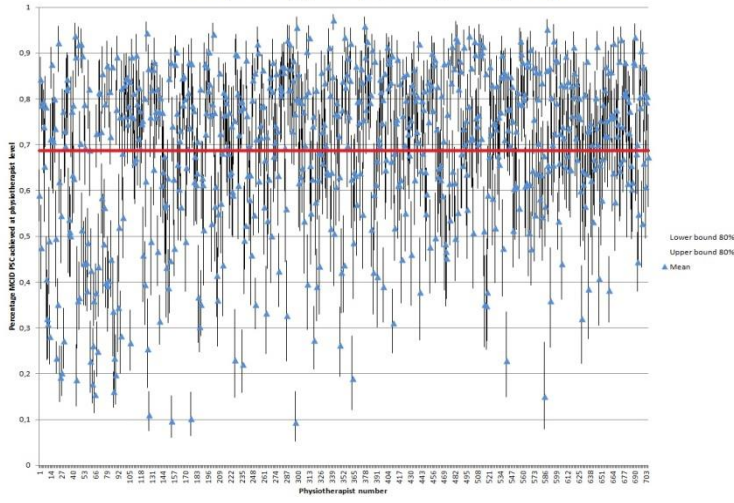


- Average percentage of patients who achieved the absolute MCID (2.00 points) =91.5%
- ▲ 705 physiotherapists with a mean percentage of patients who achieved the absolute MCID (2.00 points) with an 80% confidence interval

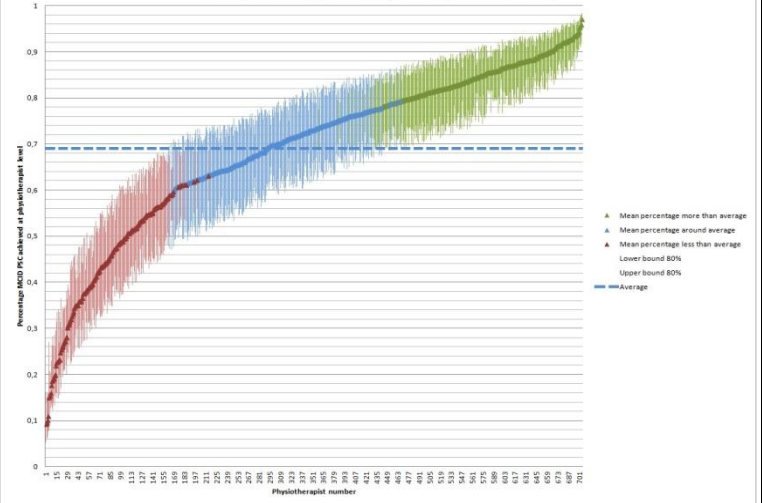
- Average percentage patients who achieved the absolute MCID (2.00 points) =91.5%
- ▲ 15.0% of the physiotherapists (n=106) had a mean percentage lower than average
- ▲ 57.6% of the physiotherapists (n=406) had an average mean percentage
- ▲ 27.4% of the physiotherapists (n=193) had a mean percentage higher than average

**PSC: Indicator II<sup>b</sup> (percentage)**

MCID (30% change) PSC at physiotherapist level (80% CI)



MCID (30% change) PSC at physiotherapist level (80% CI)

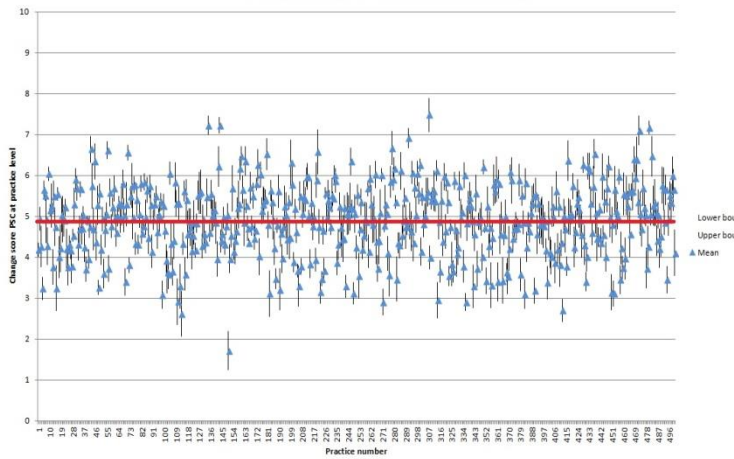


- Average percentage patients who achieved the percentage MCID (30.0%) =69.0%
- ▲ 705 physiotherapists with a mean percentage of patients who achieved the percentage MCID (30.0%) with an 80% confidence interval

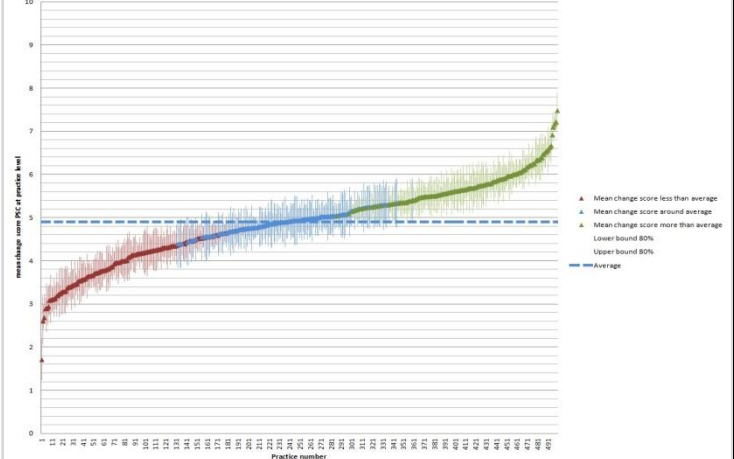
- Average percentage patients who achieved the percentage MCID (30.0%) =69.0%
- ▲ 24.7% of the physiotherapists (n=174) had a mean percentage lower than average
- ▲ 35.9% of the physiotherapists (n=253) had an average mean percentage
- ▲ 39.4% of the physiotherapists (n=278) had a mean percentage higher than average

**PSC: Indicator III**

Change score PSC at practice level (80% CI)



Change score PSC at practice level (80% CI)



- Average change score=4.90
- ▲ 500 primary physiotherapy practices with a mean score with an 80% confidence interval

- Average change score= 4.90
- ▲ 32.0% of the primary physiotherapy practices (n=160) had a mean change score lower than average
- ▲ 32.8% of the primary physiotherapy practices (n=164) had an average mean change score
- ▲ 35.2% of the primary physiotherapy practices (n=176) had a mean change score higher than average

## DISCUSSION

The results show that it is feasible to develop quality indicators based on routine measurement of outcomes using PROMs<sup>12,19</sup>. PROMs have the ability to differentiate between physiotherapists or practices for all indicators. All three PROMs showed the same trend, despite the different domains. For change score (indicator I and III), physiotherapists and practices were equally divided in three colours. For MCID (indicator II<sup>a+b</sup>), the largest group scored around the nationwide mean. Both ways of presenting quality indicators (randomly placed and ordered) give insight into the differences between physiotherapists or practices. There are differences between acute and chronic patients, but the data is not robust to compare stratified outcomes.

This study is the first study that tests PROMs for the ability to differentiate with these presentations. One study uses patient-reported experience measures (PREMs) to calculate a quality indicator and measured a variance between physiotherapists ( $ICC < 0.15$ )<sup>43</sup>.

The data was robust to develop quality indicators by using PROMs<sup>12,19</sup>. However, the data in the registry showed that pre- and post-treatment PROMs were still limited<sup>12</sup>. Studies reveal that 23% of the physiotherapists in primary physiotherapy practices use a pain rating scale and 6% use QBPDS or PSC<sup>15,20</sup>. This shows that there is room for improvement in the implementation of PROMs in physiotherapy practices<sup>3,12,18,19,22,26</sup>. To become more transparent innovative policy requires implementation of programs with quality indicators<sup>50</sup>. An agreement for such a program is signed in 2017 by paramedic federations in the Netherlands<sup>50</sup>. It encourages the implementation of PROMs for multiple purposes and evaluates quality of care provided with quality indicators using PROMs<sup>50</sup>.

PROMs have the ability to differentiate between physiotherapists or practices. The next step is to discuss and rephrase draft quality indicators by expert panels. Possible thresholds could then be defined. Without those, even when physiotherapists improve, differences could continue to exist<sup>3</sup>. An example of a set of quality indicators is the CQ-index which uses PREMs<sup>43</sup>. The CQ-index uses a threshold to divide outcome of PREMs in poor, moderate and good quality of care<sup>43</sup>. Because of the lack of context, this threshold receive a lot of criticism. In order to explain the differences in outcome of quality indicators, the use of context as well as the debate between physiotherapists is of the utmost importance.

Quality indicators using PROMs might cause stress for clinical judgement and selection<sup>51</sup>. Implementation should be carried out with as little additional burden for physiotherapists and patients as possible<sup>18</sup>.

### Strength and limitations

This studies strength is its large sample of “real-patient” data. This robust data represents the entire Dutch population with NSLBP.

Several aspects may have limited the generalizability of this study. Firstly, patients were selected based on DCSPH. It is possible that some included patients had specific low back pain (SLBP), instead of NSLBP. Secondly, besides the LDF being a national registry and the sample size, pre- and post-treatment measurements were not robust enough to perform subgroup analyses. Significant but small differences were found between acute and chronic patients. The clinical relevance of the differences is questionable and therefore the relevance to stratify requires more research. Thirdly, the influence of physiotherapists on filling in the PROMs might result in different outcomes<sup>51,52</sup>. This influence could become less when PROMs are filled in, in absence of the physiotherapist. Finally, only two possible ways to present quality indicators were described in this study.

### Implementation for practice and recommendations

This study describes the first steps in the development and implementation of quality indicators by using PROMs in primary physiotherapy care. Before implementation is possible, several steps need to be explored. Firstly, each draft indicator needs to be selected and rephrased in a numerator and a denominator by expert panels<sup>9</sup>. Also, these panels would discuss to what extent these quality indicators and presentations are clear and relevant for physiotherapists (internal quality improvement) and for patients (external transparency).

Secondly, the implementation of PROMs and collection for different purposes needs to be simulated further, so that national registries could facilitate more robust PROMs data from primary physiotherapy practices for internal quality improvement and external transparency<sup>19,53</sup>. Thirdly, benchmarks based on PROMs results and context should be developed, providing a continues feedback to facilitate quality improvement<sup>12</sup>. Fourthly, more



ways of presenting the quality indicators need to be explored. A possible presentation to physiotherapists is added in appendix III. Finally, the goal of quality indicators using PROMs should be clear. Outcomes of quality indicators should be placed in the right context and should provide opportunities to start dialogues with colleagues in order to improve the quality of primary physiotherapy care.

## **CONCLUSION**

This study shows that it is feasible to develop quality indicators based on routine measurement of outcomes using PROMs. PROMs have the ability to differentiate between physiotherapists or primary physiotherapy practices in the Netherlands. Further development of national registries, possible quality indicators, subgroup analysis and presentation is recommended before quality indicators can be implemented in daily practice.

Quality indicators based on PROMs should be used as an opportunity to reflect on outcomes achieved and to create a learning cycle of continuous improvement.

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## APPENDIX I: Sample size calculation of Twisk

Based on the literature, a general calculation can be executed with the rule of thumb for multilevel analyses with fixed parameters (30/30 rule)<sup>33,34</sup>. This means 30 practices with 30 patients in each practice →  $n=900$ <sup>33,34</sup>. Because the included PROMs evaluate domains pain intensity and physical functioning, the sample size of this research was calculated specifically on domains pain intensity and physical functioning with the calculation of Twisk<sup>48</sup>. Using the sample-size of the general calculation, the number of practices can be calculated for each domain. Based on the article of Perreault the ICC between patients with low back pain (LBP) and physiotherapists in the domain pain= 0.55 and for the domain physical functioning= 0,56<sup>35</sup>.  
Sample-size (domain pain intensity):

Calculation of Twisk

$$m = \frac{N}{(1 + (n - 1)(1 - \rho)}$$

$$N_{effective} = m * n$$

m= number of practices

N= number of patients according to the rule of thumb

n= number of patients for each practice according to the rule of thumb

ρ= Interclass Correlation Coefficient (ICC)

N<sub>effective</sub>= Effective sample size by a given "general" sample size

$$m = \frac{900}{(1 + (30 - 1)(1 - 0.55))} = 64.05 \approx 65 \text{ practices}$$

$$N_{effective} = 64.05 * 30 = 1921.5 \approx 1922 \text{ patients}$$

Sample-size (domain physical functioning):

$$m = \frac{900}{(1 + (30 - 1)(1 - 0.56))} = 65.41 \approx 66 \text{ practices}$$

$$N_{effective} = 65.41 * 30 = 1962.2 \approx 1963 \text{ patients}$$

Based on the calculation of Twisk, the sample-size required for this study is 1963 patients in 66 primary physiotherapy practices.



## APPENDIX II: SECONDARY ANALYSES

**Table A: T-test acute vs chronic patients**

NPRS			
	Acute patients	Chronic patients	P-value
Age	52.3 (17.82)	52.8 (17.80)	<0.000
Sex (v)	53.0%	62.0%	<0.000
Severity	6.17 (3.23)	6.09 (2.04)	<0.000
Difference between T <sub>0</sub> and T <sub>end</sub> *	4.35 (2.47)	3.41 (2.57)	<0.000
QBPDS			
	Acute patients	Chronic patients	P-value
Age	52.3 (17.82)	52.8 (17.80)	<0.000
Sex	53.0%	62.0%	<0.000
Severity	37.17 (26.27)	37.51 (18.79)	0.179
Difference between T <sub>0</sub> and T <sub>end</sub> *	28.31 (19.70)	19.94 (18.71)	<0.000
PSC			
	Acute patients	Chronic patients	P-value
Age	52.3 (17.82)	52.8 (17.80)	<0.000
Sex	53.0%	62.0%	<0.000
Severity	6.76 (1.97)	6.75 (2.02)	0.148
Difference between T <sub>0</sub> and T <sub>end</sub> *	5.20 (2.66)	4.17 (2.86)	<0.000

**Table B: Characteristics for sub-analyses**

Total (Physiotherapist level, robust and stratified)				
		Indicator I		
		PROMs (age <= 65 years and acute complaints)		
		NPRS	QBPDS	PSC
Practices	N	175	62	226
Physiotherapists	N	244	95	352
Patients	N	13617	5086	18966
	Sex (v)	9623 (50.8%)	2557 (50.3%)	9680 (51.0%)
	Age*	45.93 (12.34)	46.02 (12.41)	45.82 (12.38)
	Severity at baseline*	6.27 (1.74)	39.32 (18.52)	6.76 (1.90)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	4.45 (2.40)	29.52 (19.89)	5.28 (2.57)
		PROMs (age <= 65 years and chronic complaints)		
		NPRS	QBPDS	PSC
Practices	N	21	6	53
Physiotherapists	N	14	7	52
Patients	N	608	474	1138
	Sex (v)	309 (50.8%)	250 (52.7%)	624 (54.8%)
	Age*	45.38 (12.77)	45.57 (12.73)	44.97 (12.65)
	Severity at baseline*	6.12 (1.77)	39.14 (19.99)	6.55 (1.94)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	3.50 (2.69)	28.03 (21.29)	4.69 (2.68)

<b>PROMs (age &gt; 65 years and acute complaints)</b>				
		<b>NPRS</b>	<b>QBPDS</b>	<b>PSC</b>
<b>Practices</b>	N	38	10	355
<b>Physiotherapists</b>	N	34	11	697
<b>Patients</b>	N	1552	439	2188
	Sex (v)	897 (57.8%)	266 (60.6%)	1229 (56.2%)
	Age*	73.00 (69.00 - 79.00)	73.00 (69.00 - 79.00)	73.00 (69.00 - 79.00)
	Severity at baseline*	7.00 (5.00 - 8.00)	48.00 (36.00 - 60.00)	7.00 (6.00 - 8.00)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	4.00 (2.00 - 6.00)	35.00 (17.00 - 51.00)	5.00 (3.00 - 7.00)
<b>PROMs (age &gt; 65 years and chronic complaints)</b>				
		<b>NPRS</b>	<b>QBPDS</b>	<b>PSC</b>
<b>Practices</b>	N	-	1	1
<b>Physiotherapists</b>	N	-	1	1
<b>Patients</b>	N	-	32	33
	Sex (v)	-	20 (62.5%)	20 (60.6%)
	Age*	-	75.03 (7.90)	75.36 (8.01)
	Severity at baseline*	-	61.59 (20.73)	7.27 (1.66)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	-	39.56 (23.63)	4.85 (2.54)
<b>PROMs (&lt;= 20 appointments)</b>				
		<b>NPRS</b>	<b>QBPDS</b>	<b>PSC</b>
<b>Practices</b>	N	271	121	345
<b>Physiotherapists</b>	N	485	182	659
<b>Patients</b>	N	29864	11107	41329
	Sex (v)	15799 (52.9%)	5772 (52.0%)	219551 (53.1%)
	Age*	52.50 (16.65)	52.48 (16.58)	52.70 (16.74)
	Duration of complaints (< 3months)	24581 (80.6%)	9291 (81.0%)	33865 (79.5%)
	Severity at baseline*	6.30 (1.76)	40.23 (18.55)	6.78 (1.89)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	4.30 (2.45)	28.75 (20.02)	5.11 (2.62)
<b>PROMs (&gt; 20 appointments)</b>				
		<b>NPRS</b>	<b>QBPDS</b>	<b>PSC</b>
<b>Practices</b>	N	1	1	1
<b>Physiotherapists</b>	N	1	1	1
<b>Patients</b>	N	30	40	35
	Sex (v)	22 (73.3%)	18 (45.0%)	20 (57.1%)
	Age*	55.13 (16.77)	49.75 (17.51)	53.51 (12.26)
	Duration of complaints (< 3months)	30 (100.0%)	11 (27.5%)	35 (100.0%)
	Severity at baseline*	6.27 (2.18)	39.58 (1.65)	6.11 (2.42)
	Difference between T <sub>0</sub> and T <sub>end</sub> *	3.33 (2.06)	11.68 (9.96)	1.97 (3.33)
*Age, Severity at baseline and difference between T <sub>0</sub> and T <sub>end</sub> are presented with mean and standard deviation				

## **APPENDIX III: PROTOTYPE PROM DASHBOARD PRACTICE “BACK TO MOVE”**

### **Introduction**

IQ Healthcare has executed a quality check for the practice “Back to move”. This dashboard presents the results of each physiotherapist in the primary physiotherapy practice “back to move”. Six physiotherapists are employed in this practice and treated more than 30 patients in the last 5 years.

In chapter 1, the quality indicators are described in general. In chapter 2, the mean patient characteristics are described for each physiotherapist. In chapter 3, the results of each physiotherapist compared to the nationwide mean are described.

### **1. Quality indicators**

#### **PROMs**

Quality indicators based on patient-reported outcome measurements (PROMs) are standardized tools to measure patients’ reported results in healthcare, to analyze these outcomes and to report them to primary physiotherapy practices. PROMs are questionnaires that are commonly used in primary physiotherapy practices and are measured at the start of the treatment and thereafter periodically until the end of treatment.

In this case, NPRS is used as PROM to execute the quality check. NPRS is a measure of pain and is an 11-points questionnaire ranging from 0-10 (no pain – worst pain imaginable). The MCID is 2 points for all patients with nonspecific low back pain (NSLBP).

#### **Quality indicators**

To give insight in the results of treatment compared to the nationwide mean results the PROM NPRS is used to measure the quality indicators mean change score and MCID (absolute number: 2 points change and percentage: 30% change adjust to the baseline outcome).

## **1. Presenting change scores on the PROMs between the baseline and the endpoint measurement**

Mean change scores are presented with confidence intervals.

\*Indicator I: *"Physiotherapist change score"*

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## **2. Presenting the percentage of patients that reached MCID.**

- The percentage of the treated patients treated by the same physiotherapist that reached the MCID were analysed in absolute number (2 points)<sup>37,41</sup>.

\*Indicator II<sup>a</sup>: *"MCID absolute"*

- The percentage of the treated patients treated by the same physiotherapist that reached the MCID were analysed in 30% improvement compared to baseline.

\*Indicator II<sup>b</sup>: *"MCID percentage"*

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## **2. Characteristics**

### **Data collection**

Data from the "Landelijke Database Fysiotherapy (LDF) collected from 2013 until January 2018. In the LDF database, nationwide data is collected routinely from the electronic patient dossiers (EPD) of primary physiotherapy practices. The LDF collected data about: primary physiotherapy practices, physiotherapists, patients (date of birth, gender, complaints, duration of the complaints), treatment, duration of the treatment, treatment measurements<sup>24</sup>. For this quality check, patients with NSLBP which were defined by the Diagnose Classificatie Systeem Paramedische Hulp codes 3300 - 4000 (DCSPH 3300-4000), who received usual primary care physiotherapy. DCSPH is a Dutch system that classifies diagnoses in categories.

## Characteristics

Table 1: Characteristics of patients with a NPRS change score.

	Number of patients	Gender (Female)	Age (years)*	Duration of complaints (< 3 months complaints before start treatment = acute complaints)	Severity at baseline*	Change score between start treatment and end treatment*
<b>Nationwide</b>	31716	53.4%	52.67 (16.69)	80.2%	6.30 (1.77)	4.25 (2.47)
<b>Practice "Back to move"***</b>	969	58.5%	49.48 (16.41)	89.8%	5.71 (1.29)	4.52 (2.09)
<b>Marc**</b>	268	59.3%	52.35 (15.65)	89.9%	5.61 (1.11)	4.12 (1.71)
<b>Koen**</b>	87	59.8%	45.11 (17.55)	82.8%	5.37 (1.71)	4.00 (2.40)
<b>Simone**</b>	190	66.3%	50.99 (15.15)	93.7%	5.28 (1.10)	4.47 (1.91)
<b>Philippe**</b>	285	53.7%	48.56 (19.60)	88.4%	6.00 (1.31)	4.70 (2.31)
<b>Juliette**</b>	67	59.7%	49.78 (16.03)	92.5%	5.82 (1.30)	4.94 (2.03)
<b>Anne**</b>	72	51.4%	43.50 (16.90)	90.3%	6.42 (1.50)	5.63 (2.04)

\*Age, Severity at baseline and difference between T0 and Tend are presented with mean and standard deviation

\*\*Names of the practice and the physiotherapists are not the real names of the physiotherapists, but examples

### 3. Results

#### Quality Indicator I: Physiotherapist change score

Figure I: Quality results of all Dutch physiotherapists with a NPRS change score

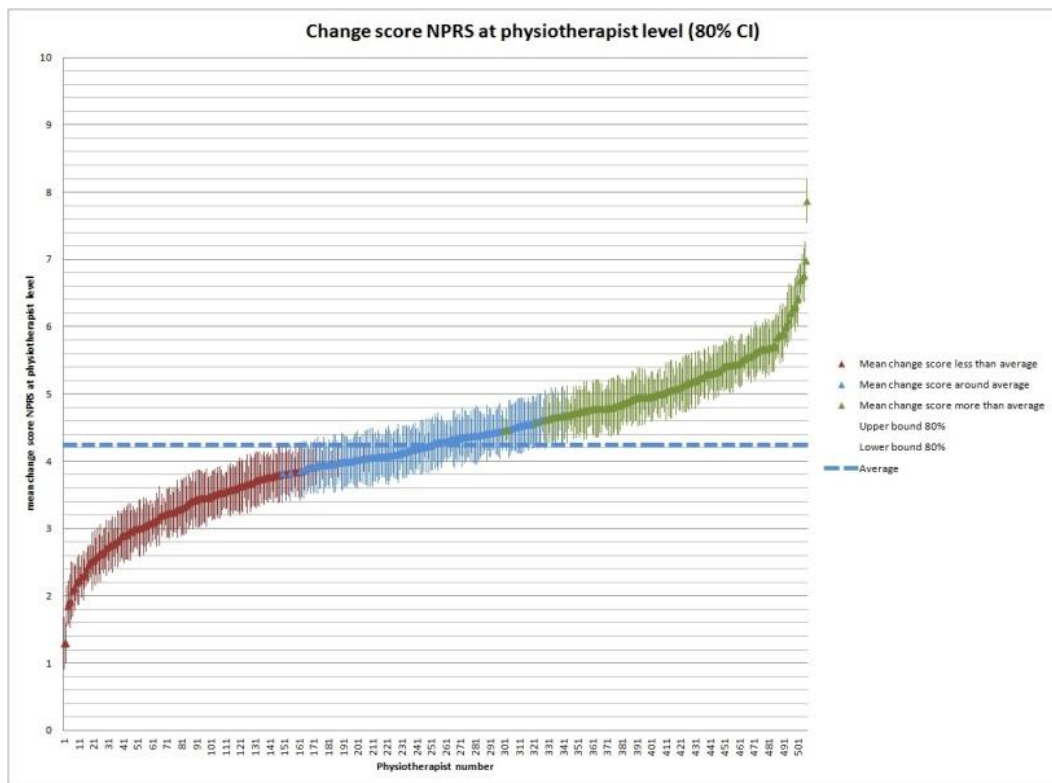
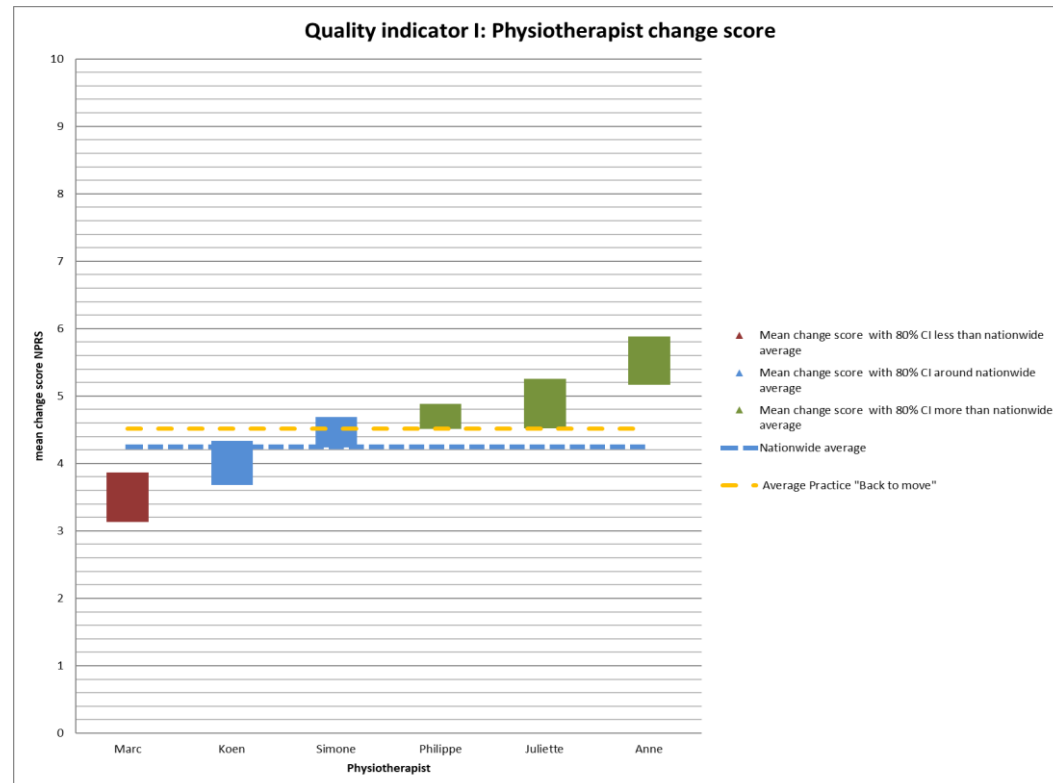


Figure II: Quality results of physiotherapist employed at "Back to move"



### Quality indicator II<sup>a</sup>: MCID absolute

Figure III: Quality results of all Dutch physiotherapists with a NPRS change score

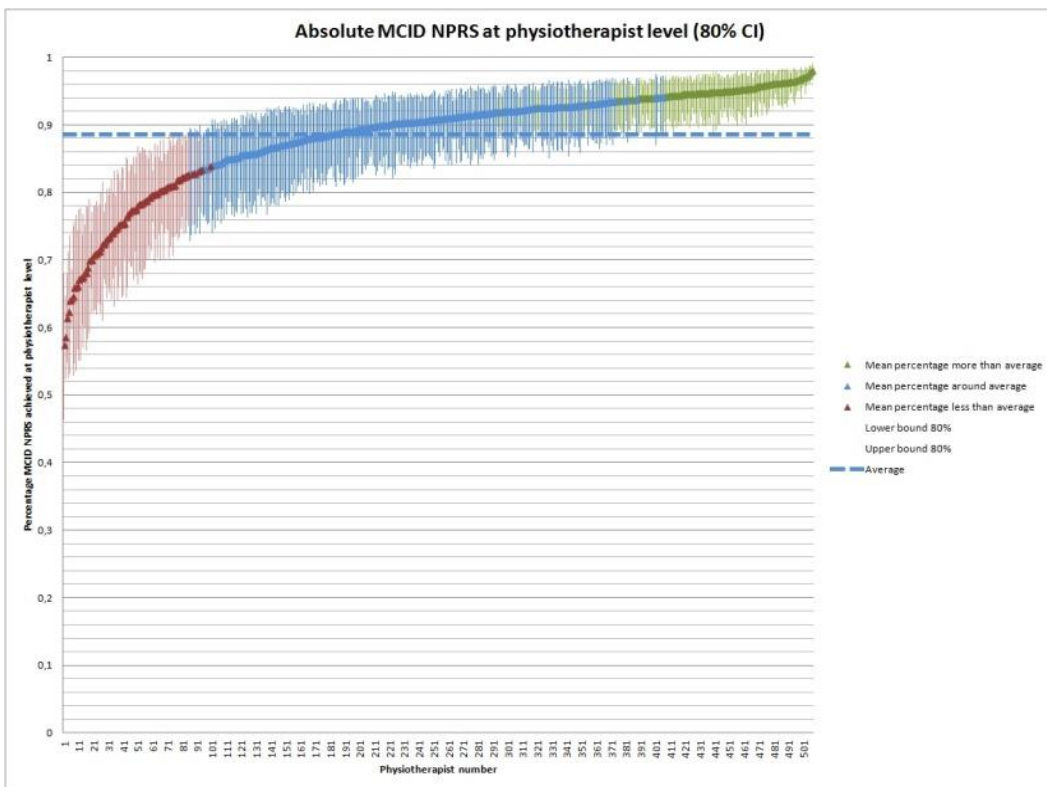
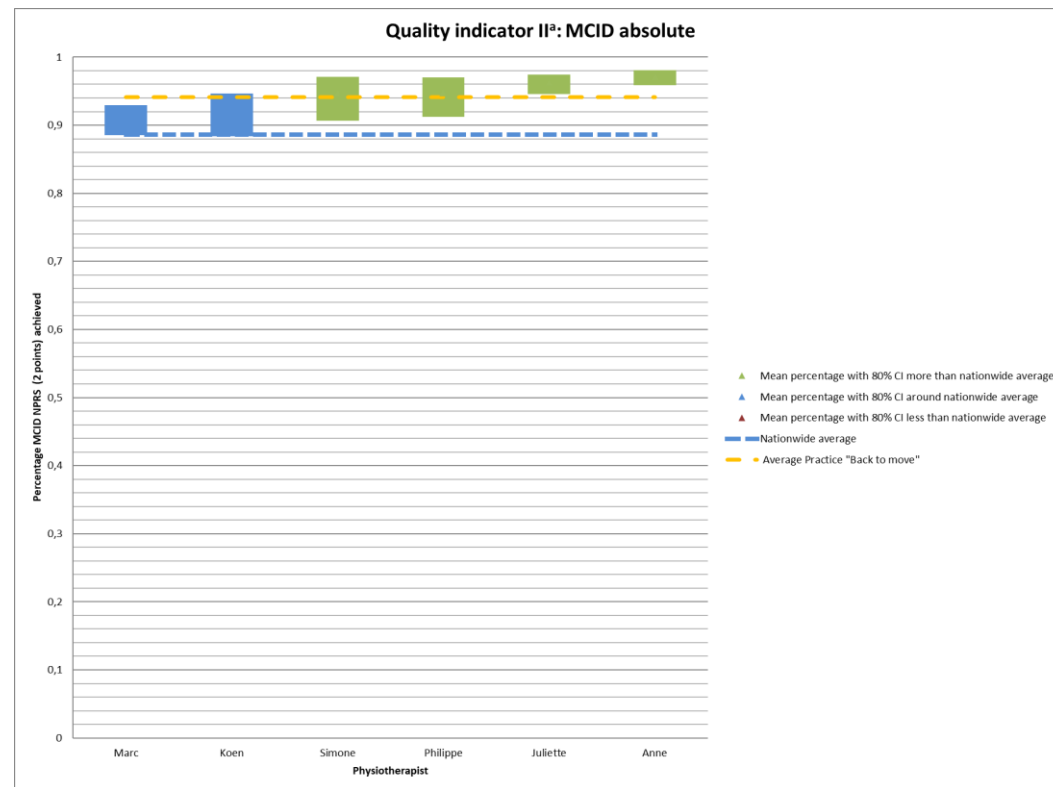


Figure IV: Quality results of physiotherapist employed at "Back to move"

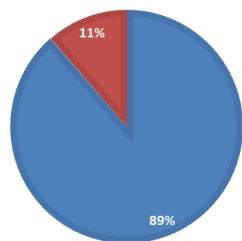


### Quality indicator II<sup>a</sup>: MCID absolute

#### Percentage MCID absolute achieve

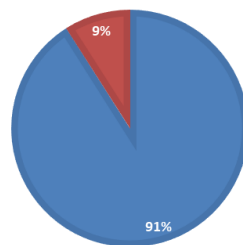
**NATIONWIDE AVERAGE**

■ MCID absolute achieved ■ MCID absolute not achieved



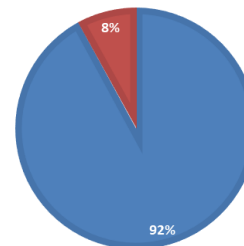
**MARC**

■ MCID absolute achieved ■ MCID absolute not achieved



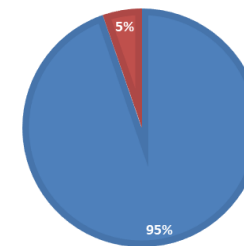
**KOEN**

■ MCID absolute achieved ■ MCID absolute not achieved



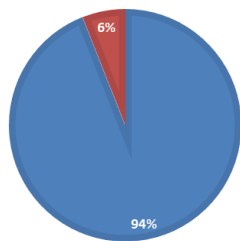
**SIMONE**

■ MCID absolute achieved ■ MCID absolute not achieved



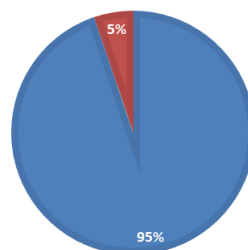
**PRACTICE "BACK TO MOVE"**

■ MCID absolute achieved ■ MCID absolute not achieved



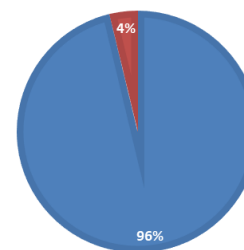
**PHILIPPE**

■ MCID absolute achieved ■ MCID absolute not achieved



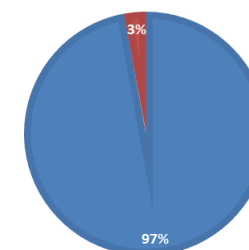
**JULIETTE**

■ MCID absolute achieved ■ MCID absolute not achieved



**ANNE**

■ MCID absolute achieved ■ MCID absolute not achieved





### Quality indicator II<sup>b</sup>: MCID percentage

Figure V: Quality results of all Dutch physiotherapists with a NPRS change score

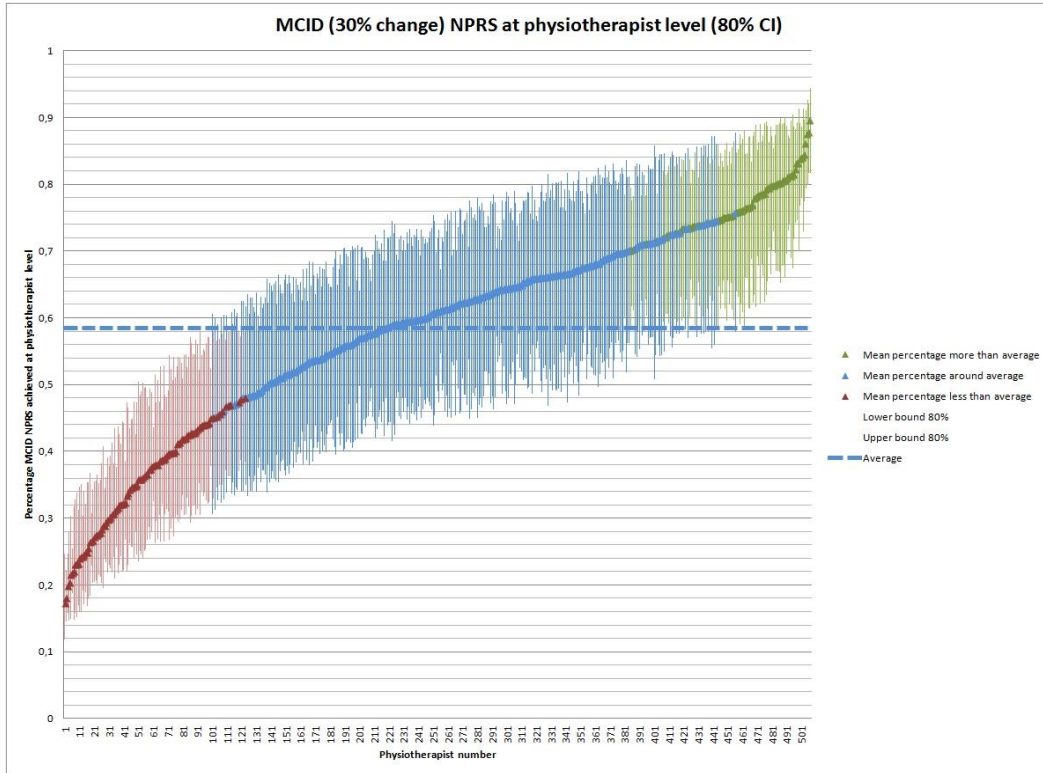
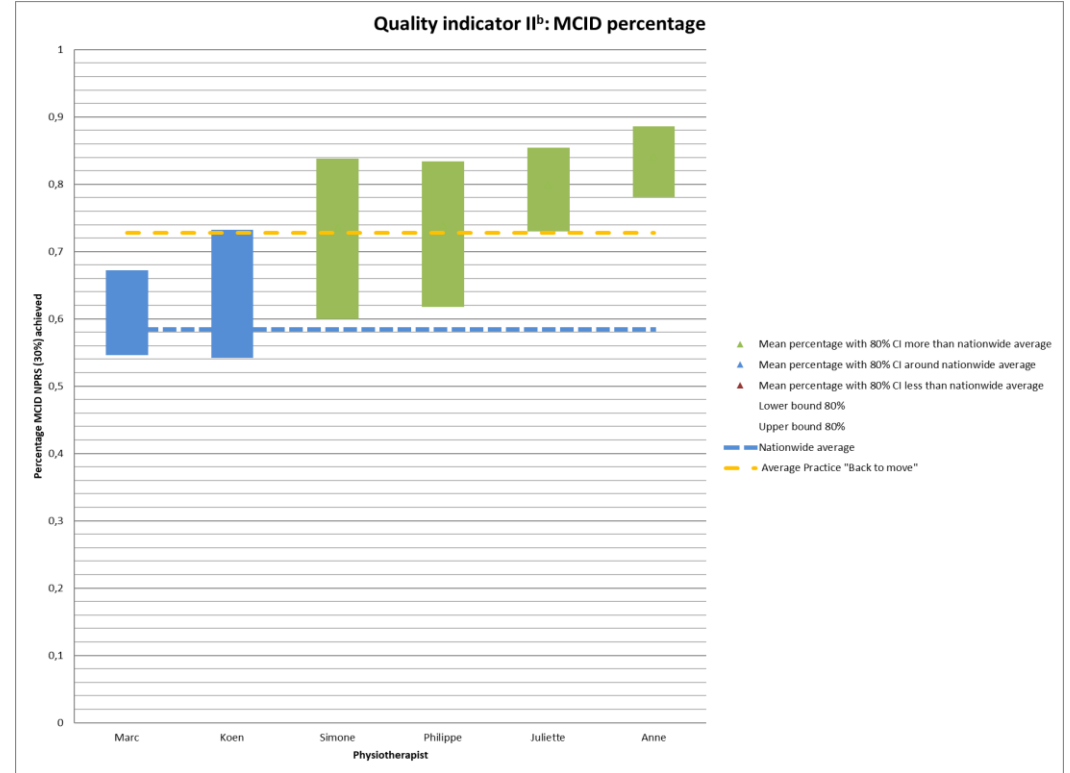


Figure VI: Quality results of physiotherapist employed at "Back to move"

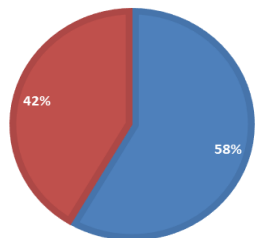


### Quality indicator II<sup>a</sup>: MCID percentage

#### Percentage MCID percentage achieved

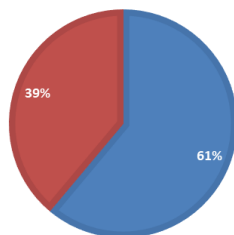
**NATIONWIDE AVERAGE**

■ MCID percentage achieved ■ MCID percentage not achieved



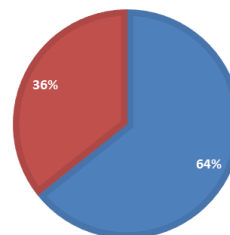
**MARC**

■ MCID percentage achieved ■ MCID percentage not achieved



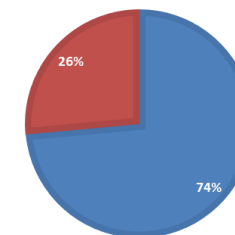
**KOEN**

■ MCID percentage achieved ■ MCID percentage not achieved



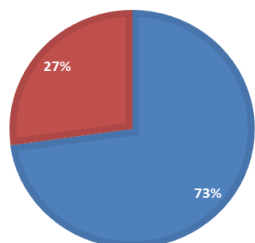
**SIMONE**

■ MCID percentage achieved ■ MCID percentage not achieved



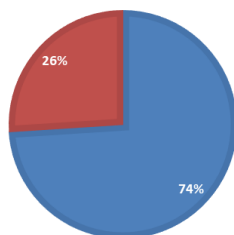
**PRACTICE "BACK TO MOVE"**

■ MCID percentage achieved ■ MCID percentage not achieved



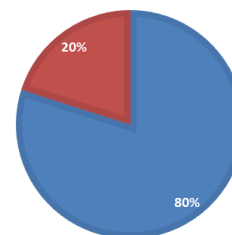
**PHILIPPE**

■ MCID percentage achieved ■ MCID percentage not achieved



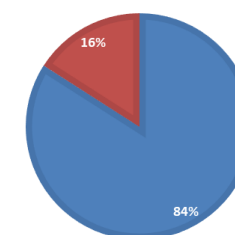
**JULIETTE**

■ MCID percentage achieved ■ MCID percentage not achieved



**ANNE**

■ MCID percentage achieved ■ MCID percentage not achieved



## **SAMENVATTING**

Inleiding: Kwaliteitsverbetering is een belangrijk doel in de fysiotherapie. Kwaliteitsindicatoren ondersteunen fysiotherapeuten in het opstellen van het behandelplan, het monitoren van de behandelresultaten en maken het voor fysiotherapeuten mogelijk om resultaten transparant weer te geven. Fysiotherapeuten gebruiken patient-reported outcome measurements (PROMs) om behandelresultaten te evalueren. PROMs zouden geschikte variabelen kunnen zijn om kwaliteitsindicatoren te ontwikkelen en fysiotherapeuten inzicht te geven in de behandelresultaten.

Doelstelling: Het ontwikkelen en testen van PROM-kwaliteitsindicatoren, om verschillen in resultaten tussen fysiotherapeuten of praktijken te evalueren bij patiënten met aspecifieke lage rugklachten in Nederland en daarnaast het beschrijven van verschillende presentatiemogelijkheden van de kwaliteitsindicatoren.

Methode: Data uit de Landelijke Database Fysiotherapie (LDF) werd getest op robuustheid. Hiërarchische multi-level analyses werden gebruikt om te testen of PROMs verschillen tussen fysiotherapeuten en praktijken kunnen differentiëren. Drie PROMs zijn geselecteerd (Numeric Pain Rating Scale (NPRS), Quebec Back Pain Disability Scale (QBPD), Patient Specifieke Klachten vragenlijst (PSK)). Tijdens de analyses is gecorrigeerd voor leeftijd, geslacht, chroniciteit en ernst van de klacht. Wanneer een kwaliteitsindicator verschillen kan aantonen, zullen gecorrigeerde gemiddelden van fysiotherapeuten of praktijken afwijken van het landelijk gemiddelde. Twee soorten presentaties werden ontwikkeld om fysiotherapeuten te informeren.

Resultaten: PROMs zijn in staat om verschillen tussen fysiotherapeuten en praktijken te differentiëren. 20,4%-40,5% van de fysiotherapeuten had lagere gecorrigeerde gemiddelden dan het landelijke gemiddelde en 16,7%-38,6% had hogere gecorrigeerde gemiddelden dan het landelijke gemiddelde. De Intraclass Correlatie Coëfficiënten (ICCs) waren 0,12-0,36. 29,9%-45,6% van de praktijken had lagere gecorrigeerde gemiddelden dan het landelijke gemiddelde en 26,5%-41,0% had hogere gecorrigeerde gemiddelden dan het landelijke gemiddelde. De ICCs waren 0,15-0,20.

Conclusie: Het is haalbaar om PROMs-kwaliteitsindicatoren te ontwikkelen op basis van geroutineerd gemeten uitkomstmaten. PROMs zijn in staat om verschillen tussen fysiotherapeuten en praktijken te differentiëren en beide soorten weergave geven inzicht in de verschillen tussen fysiotherapeuten of praktijken.

Klinische relevantie: Kwaliteitsindicatoren dienen ingezet te worden als een kans om te reflecteren op de behaalde resultaten, zodat een continue cyclus van verbetering ontstaat.

Kernwoorden: Kwaliteitsindicatoren, Patient-reported outcome measurements, Ontwikkeling, Interne kwaliteitsverbetering, Externe transparantie.