The implementation of a clinical registry in Dutch physiotherapy care

Stimulating quality improvement via feedback of patient reported outcomes

Guus Meerhoff

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Guus Albertus Meerhoff
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Promotoren
Prof. dr. P.J. (Philip) van der Wees
Prof. dr. M.W.G. (Ria) Nijhuis-van der Sanden

Copromotor
Dr. S.A. (Simone) van Dulmen

Manuscriptcommissie
Prof. dr. B.W. (Wim) Schreurs
Prof. dr. C. (Cindy) Veenhof (UMC Utrecht)
Prof. dr. J.S. (Jako) Burgers (Maastricht University)

Paranimfen
Marieke Wouters
Alwin van den Broek

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by

Guus Albertus Meerhoff
born on March 4, 1985
in Stadskanaal (the Netherlands)

Supervisors

Prof. dr. P.J. (Philip) van der Wees
Prof. dr. M.W.G. (Ria) Nijhuis-van der Sanden

Co-supervisor

Dr. S.A. (Simone) van Dulmen

Manuscript Committee

Prof. dr. B.W. (Wim) Schreurs
Prof. dr. C. (Cindy) Veenhof (UMC Utrecht)
Prof. dr. J.S. (Jako) Burgers (Maastricht University)

Paranimfen

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Contents

Chapter 1

General introduction

Every person has the right to receive healthcare of high quality. Individual healthcare professionals challenge themselves every day to provide their patients with such high quality healthcare. Professional bodies of healthcare professionals have a responsibility in formulating and executing policies that stimulate the quality of individual healthcare professionals. In my day to day job at the Royal Dutch Society for Physical Therapy (KNGF), the professional body for physiotherapists in the Netherlands, I am involved in the development and implementation of such national quality policy. After having worked in clinical physiotherapy practice for eight years I decided to contribute to the further development of the quality policy of our profession from a policy and research perspective. In my current position it is my goal to achieve the optimal quality of healthcare for the patient in close cooperation with all members of the professional body. In pursuit of achieving optimal healthcare quality, the views on healthcare quality evolve over time and require continuous innovation of the national quality policy. To achieve this continuous innovation, in 2013 KNGF initiated a program called Quality In Motion (QIM). This quality program has been the origin of this dissertation, in which I aim to contribute to the further development of the quality of service delivery of physiotherapists within the Dutch healthcare system.

This introduction chapter describes the definition of quality in healthcare, thereafter I explain the current quality system of the Dutch physiotherapy, which is the context of the studies described in this dissertation. Thereafter I elaborate on the drivers for innovation of this quality system and I zoom in on a promising innovation to the quality system: *transparency of service delivery*. This transparency, as a potential add-on to the Dutch quality system for physiotherapists, is the main topic studied in this dissertation. Before finally describing the overall aim and specific objectives of this dissertation, I explain what system has been implemented that enables transparency of service delivery in Dutch physiotherapy and elaborate on the collected data that enabled us to study the potential of transparency of service delivery.

1.1
Definition

The definition of healthcare quality is complex and multidimensional. In this dissertation we use the definition of healthcare quality formulated by the Institute of Medicine (IOM). They state that healthcare quality is: “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge”.[1 (p.5)] This definition identifies six domains to define healthcare quality. According to the IOM, healthcare of high quality must be *safe, effective, patient-centered, timely, efficient* and *equitable*.[2] Below the definition of these domains introduced by the IOM are provided. Overall the national quality policy of a professional body should focus on all six aspects identified by the IOM. Given the specific societal and political focus on the domains *effectiveness*, patient centeredness and *efficiency*, we decided that the QIM program should primarily focus on these specific domains.

The definition of the domains that define healthcare quality according to the Institute of Medicine[2]

Safe	Avoiding injuries to patients from the care that is intended to help them.
Effective	Providing services based on scientific knowledge to all who could benefit, and refraining from providing services to those not likely to benefit.
Patient-centered	Providing care that is respectful of and responsive to individual patient preferences, needs, and values, and ensuring that patient values guide all clinical decisions.
Timely	Reducing waits and sometimes harmful delays for both those who receive and those who give care.
Efficient	Avoiding waste, including waste of equipment, supplies, ideas, and energy.
Equitable	Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

1.2
Quality system of the Dutch physiotherapy

Over the years a solid quality system has been built in the Dutch healthcare system. There is one overarching national government-run quality register for all healthcare professionals, the BIG-register, which is based on the law '*Beroepen in de individuele gezondheidszorg*' (BIG).[3] To remain registered, a healthcare professional needs to comply with a work experience requirement that is generally expressed in a minimum of hours that one needs to work in clinical practice per given period of 5 years. This number differs per profession, for physiotherapists for example, it is set at 2.080 hours (about 8 hours a week).[3,4] In addition, healthcare professionals including medical doctors[5], physiotherapists[6], nurses[7] and dentists[8] have a separate quality registry for their own profession. Physiotherapists have such a registry since 1997.[9] Within the profession-specific register for physiotherapists, named House of Quality for physiotherapists [Kwaliteitshuis Fysiotherapie][10], participating physiotherapists are obliged to: be registered in the previously mentioned BIG-register[3], take part in the 'Healthcare Quality, Complaints and Disputes Act' (WKKGZ)[11], participate in accredited continuous professional development activities, comply with the professional standard[12,13] and comply with national clinical practice guidelines (CPGs).[14]

The professional standard in physiotherapy is defined by two documents: 1) the *Professional profile*, describing the profession and its role within the healthcare system, the required knowledge and competencies of physiotherapists at entry-level and relevant developments in the society and healthcare system that influences the context, the profession and roles of the physiotherapist.[12] and 2) the *Professional code*, describing the practical values and norms of the physiotherapy profession.[13] The CPGs have been developed and implemented by the KNGF since 1998.[15] As defined by the National Health Care Institute in the Netherlands: “CPGs are documents with recommendations that support healthcare professionals and healthcare users, aimed to improve the quality of care, based on systematic summary of scientific research and a critical appraisal of the advantages and disadvantages of the different care options, supplemented with expertise and experiences of healthcare professionals and healthcare users”[16 (p.12)].

1.3
Drivers for innovation of the quality system

Innovations to healthcare quality systems are stimulated by both intrinsic and extrinsic drivers. An example of an intrinsic driver is the fact that professionals want to provide the best care for their patients, based on the state of the art knowledge using the principles of evidence-based medicine.[17] Research has shown that the implementation of evidence-based medicine improves healthcare quality.[18] The quality system in physiotherapy aims to support physiotherapists in the implementation of evidence-based medicine through mandatory continuous professional development and the use of CPGs.[14] Despite the ambition of professionals to provide care based on the principles of evidence-based medicine, research also shows that the implementation of recommendations from guidelines is suboptimal.[19-23] Moreover, new knowledge generated by randomized controlled trials need an average of 17 years to be incorporated into practice by healthcare professionals.[2] Therefore the existing quality system must continue to look for innovations that fit the intrinsic motivation of professionals to reduce the time it takes to incorporate scientific findings into clinical practice.

An important extrinsic driver for continuous efforts to innovate the quality system is the rising cost of healthcare expenditure.[24-26] In 2006, a healthcare reform that introduced regulated competition in the Dutch healthcare system[27] was implemented to get more grip on the total expenditure. Within this system insurance companies have the responsibility to incentivise competition between healthcare professionals and purchase healthcare that has the best price-quality ratio.[25] Despite these efforts in 2018 it was still predicted that the total healthcare expenditure in the Netherlands would be twice as high as the growth of the economy in the coming years.[24] Such growth is not tenable and forms a threat to the solidarity principles of the Dutch healthcare system.[24] Therefore additional measures need to be taken to prevent that the predicted growth of the total healthcare expenditure would become reality. These additional measures should focus on how the price-quality ratio could actually be defined, since several studies have shown that actually purchasing healthcare on this ratio is still insufficiently done.[25,28-31] At the moment, purchasing healthcare based on the best price-quality ratio is particularly complicated because there is no well-defined and generally accepted definition on quality of care, and consequently healthcare is mainly purchased using the 'price' component.[32] Therefore it is important to get insight in the quality of care.

1.4

Transparency of service delivery

A promising aspect for both intrinsic and extrinsic drivers for innovation of the quality system is transparency of service delivery. In theory, transparency enables monitoring to what extent state of the art evidence-based medicine is applied in clinical practice, and thus it enables to quantify the price-quality ratio of service delivery.

Due to the high potential of transparency of service delivery, in recent years this topic has gained interest. In healthcare systems in the UK, Canada, Australia and the US, transparency has been used as a basis for the deployment of performance measurement.[26] Kelley et al. (2006) noted a widespread perception that in the context of healthcare there is poor value for the money and effort spent. This has led to a focus on transparency of process and outcomes and performance measurements.[23]

Strategies for improving transparency have also been introduced in the field of Dutch physiotherapy. Insurance companies have included transparency requirements within the contracts they conclude with care providers.[33,34] In addition, transparency also forms an important component of the so-called 'bestuurlijke afspraken paramedische zorg'.[35] These are national agreements between patient-representatives, allied healthcare providers, health insurers and the government, which are aimed at improving the quality and transparency of care.[35]

When transparency is used as a basis for the deployment of performance measurement, it theoretically enables to monitor to what extent state of the art evidence-based medicine is applied. Consequently, this offers the opportunity to actually define quality and thus it enables insurers to actually purchase healthcare that has the best price-quality ratio, which in turn leads to a better balance between the different stakeholders in the system of regulated competition.

Transparency of service delivery can be achieved by collecting data about the care that has been provided. Using the Donabedian framework, there are three types of data that can be used to provide this transparency about the quality of service delivery.[36,37] These are: data about the structure, - process and - outcome of healthcare.[36,37] *Structure*, represents all aspects that affect the context where care is delivered, e.g. the physical facility, equipment, and human resources.[38] *Process*, being all activities undertaken within healthcare, such as diagnosis, treatment, preventive care, and patient education.[38] And *outcome*, being all achieved results of the provided healthcare, on both patients and/or populations (e.g. changes in health status, behaviour, knowledge as well as patient satisfaction and health-related quality of life).[38]

In order to provide transparency of clinical care delivered, data on structure, process and outcome of care should be collected and made available for providing insight in the quality of care. Almost all record keeping in physiotherapy practices in the Netherlands is done in electronic health record software systems. These systems have the ability to upload the registered clinical data to an external cloud storage, which seemingly makes collecting clinical data about structure, process and outcome of care relatively easy to achieve. Collecting data in such cloud storage creates the opportunity to develop a national registry in which potentially all Dutch physiotherapists can upload clinical data about the care they have provided.

Aiming to improve the quality system for Dutch PTs on the domains effectiveness, *patient centeredness* and *efficiency* of IOM's definition of healthcare quality, as a part of the QIM program, the KNGF decided to develop and implement such a national clinical registry in 2013.[39] This registry was built to transparently monitor, reflect and evaluate on the quality of the provided care and stimulate improvement when necessary. As introduced by Fleuren et al. (2004) the success of the implementation of such innovation in healthcare is influenced by many different determinants. These determinants are factors that facilitate or impede the required change to implement an innovation.[40] Determinants can be divided over the following four domains: 1) characteristics of the socio-political context (e.g. rules, legislation, and patient characteristics); 2) characteristics of the organization (e.g. staff turnover or decision-making processes in the organization); 3) characteristics of the user of the innovation (e.g. knowledge, skills, and perceived support from colleagues); and 4) characteristics of the innovation itself (e.g. complexity or relative advantage).[41]

Within the clinical registry of KNGF, the main focus was on collecting outcome data related to the service delivery, patient reported outcomes to be more precise. The focus was put on these outcomes reported by patients as this includes the perceived intervention-effect according to the person of primary importance; the patient. These outcome data were based on Patient Reported Outcome Measures (PROMs) that were recommended in the CPGs of the KNGF.[39] PROMs are questionnaires or single-item scales measuring outcomes that may focus on a generic domain, for example, pain; or are condition-specific, and focus for example on components of patients' functioning related to a specific disease or condition.[42] In the clinical process, PROMs are considered important for aspects that stimulate patient-centeredness such as shared decision-making, goal setting and monitoring of outcomes.[43-53] Additionally, when aggregated across patients, PROMs data can be used for monitoring and quality improvement, and for public reporting of outcomes for accountability purposes to external stakeholders, such as insurance companies and policy makers.[49,52,54-57] In addition to the outcome data, structure- and process data related to the service delivery are also collected in the registry. This data were selected based on the Dutch CPG for record keeping in physiotherapy practices.[58] Collecting structure and process data is important because structure and process data are of crucial importance for the interpretation of the outcome data. For example, when outcome data of a PROM are used to objectify the effect of a series of visits to a physiotherapist, for a correct interpretation of the cost-quality ratio, knowledge of the process variable number of treatment sessions is crucial. If a large number of data can be collected, insight in the relationship between outcome and costs and the influence of patient variables can be used as guidelines: for instance one might expect that the optimal PROM outcome takes a certain average number of treatment sessions, more sessions will not lead to a better outcome, while less sessions will decrease the outcome. However, in certain patient subgroups (e.g. elderly or the presence of multimorbidity or low social-economic status) a greater number of treatments may need to be provided to reach the optimal PROM outcome. In this way transparency stimulates both: personalized care and an optimal cost-quality ratio.

1.5
Aim

The overall aim of this dissertation was to improve the quality system for Dutch physiotherapists by facilitating them to become more transparent on their service delivery using a national clinical registry.

We decided to focus on collecting patient reported outcomes (PRO) with patient reported outcome measures (PROMs). The collected data in the national clinical registry must be converted into relevant feedback information for participating physiotherapists, facilitating them to improve insight in their quality of service delivery by comparing their own data with the data of others. We hypothesized that the development of such a national clinical registry with an active implementation strategy, including education of physiotherapists assisting them to achieve the necessary behavioural change, would improve the quality system and stimulate quality improvement. The provided education focussed on how the collected outcomes can be used to formulate and evaluate improvement goals in plan-do-check-act cycles by reflecting on the obtained outcomes in relation to the provided treatment. Continuous data sampling in the clinical registry offers the opportunity to monitor the impact of the plan-do-check-act cycles and thus to improve the quality of service delivery in a cyclical way.

For this dissertation, the following sub-objectives were formulated:

- To develop core sets of short and easily applicable measurement instruments for physiotherapists, to develop an educational program for the implementation of these core sets; and to evaluate the effects of the implemented educational program on the attitude of physiotherapists towards the core sets and their actual use.
- To describe an evidence-informed process of development and adaptation of the implementation strategy focussing on the use of PROMs and data delivery to the national registry in daily clinical physiotherapy practice.
- To identify influencing factors that stimulate or hinder the use of PROMs in Dutch primary care physiotherapy practice.
- To uncover the perspectives of patients visiting physiotherapists with musculoskeletal health problems on using PROMs to stimulate patient-centeredness.
- To test the reliability, validity and discriminative ability of the data collected in the national clinical registry.

These specific objectives uncover different aspects that influence the success of the implementation of transparency in physiotherapy services, using a national clinical registry. This knowledge could be used to inform the further implementation of transparency as innovation to the quality system for Dutch physiotherapists, but also provides knowledge that can be used for the implementation of similar initiatives in other countries or for other healthcare professionals.

1.6
Outline of this thesis

After this *introduction*, chapter two presents a study that describes the development of two core sets of short and easily applicable measurement instruments (including PROMs) for physiotherapists working in primary care and nursing homes, and the development of an educational program for the implementation of these core sets. In addition, chapter two investigates whether the educational intervention leads to an improved attitude of physiotherapists towards the use of the core sets in clinical practice. The use of standardised instruments in clinical practice is necessary to be able to compare outcomes between practices or professionals or patients, which stimulates reflection, evaluation and continuous improvement of the quality of the provided service delivery.

Chapter three describes the development of an implementation strategy for the QIM program and evaluates the feasibility of building the national clinical registry using PROMs in physiotherapist practice. The implementation strategy focussed on increasing the awareness of physiotherapists that collecting data in a national clinical registry promotes transparency and can be used to improve quality of care.

Chapter four aims to identify factors influencing PROMs use in Dutch primary care physiotherapy practices. Although PROMs can potentially be used to stimulate healthcare quality, their implementation in physiotherapy practice is suboptimal. Insight in influencing factors can be used to optimize the implementation strategies.

In chapter five, we explore the perspectives of patients with musculoskeletal health problems on using PROMs for quality improvement in primary care physiotherapy practice, and determine what barriers and facilitators patients perceive. Their views are of crucial importance since they need to complete the PROMs that are used for quality improvement purposes.

In chapter six we focus on the psychometric properties of the clinical data that are collected in the national registry. It is tested if the data are reliable, valid, and able to discriminate outcomes between different practices, which are important prerequisites to use the national clinical registry to stimulate quality improvement through transparency of service delivery.

Finally, in chapter seven we summarize the main findings of the different chapters, elaborate on the lessons learned, and reflect on the strengths and limitations resulting in recommendations for future research and policy-making.

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Chapter 2

Using outcome measures in daily practice. Development and evaluation of an implementation strategy for physiotherapists in the Netherlands

Raymond A.H.M. Swinkels
Guus A. Meerhoff
Jan W.H. Custers
Roland P.S. van Peppen
Anna J.H.M. Beurskens
Harriet Wittink

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Abstract

Purpose | To describe the development of an educational program for physiotherapists in the Netherlands, two toolkits of measurement instruments, and the evaluation of an implementation strategy.

Method | Thie study used a controlled pre- and post-measurement design. A tailored educational program for the use of outcome measures was developed that consisted of four training sessions and two toolkits of measurement instruments. Of 366 invited physiotherapists 265 followed the educational program (response rate 72.4%) and 235 randomly chosen control physiotherapists who did not (28% response rate). The outcomes measured were participants' general attitude towards measurement instruments; their ability to choose measurement instruments; their use of measurement instruments; the applicability of the educational program; and the changes in physiotherapy practice achieved as a result of the program.

Results | Consistent (not occasional) use of measurement instruments increased from 26% to 41% in the intervention group; in the control group, use remained almost the same (45% vs 48%). Difficulty in choosing an appropriate measurement instrument decreased from 3.5 to 2.7 on a 5-point Likert-type scale. Finally, 91% of respondents found the educational program useful, and 82% reported that it changed their physiotherapy practice.

Conclusions | The educational program and toolkits were useful and had a positive effect on physiotherapists' ability to choose among many possible outcome measures.

2.1
Introduction

Since 1993, the Royal Dutch Society for Physical Therapy (KNGF, Koninklijk Nederlands Genootschap Fysiotherapie) has used specific guidelines as a standard for physiotherapy interventions. In 2012, 18 such guidelines were published, 14 of which have already been translated into English.[1] All have the goal of increasing evidence-based practice among Dutch physiotherapists. An evidence-based approach is important to achieving optimal quality and uniform standards for physiotherapy interventions. In addition to describing the most suitable treatment according to the latest evidence, the KNGF guidelines recommend using various outcome measures to determine objectively whether a treatment has produced the desired outcome.[2] The use of accepted outcome measures is important for both physiotherapists and their clients.

While there has been some research on methods of implementing clinical practice guidelines in health care,[2] until recently there were few studies on the implementation of outcome measures in physiotherapy clinical practice.[3-7] Abrams and colleagues' study found that implementation of outcome measures was significantly improved by an active implementation approach consisting of lectures, educational seminars, peer contact, and online publications.[8] This active approach is an important element of any implementation strategy, since we know that relatively passive approaches (e.g., sending information) are unlikely to change practitioners' behaviour.[9-11]

Both Jette and colleagues and Van Peppen and colleagues investigated the actual use of the outcome measures recommended by the guidelines;[3,12] they found that only 48% and 52% of respondents, respectively, were using outcome measures consistently in their practice. This indicates a real need for a more active approach to implementing the use of measurement instruments.[3,12] In the Netherlands, implementation of outcome measures in general took a relatively passive approach until 2008, when the KNGF, having made active implementation of outcome measures a key aspect of its quality policy in 2007, launched its Measurement in Clinical Practice project in cooperation with two research centres in the Netherlands. This project targeted physiotherapists in private practice and those working in nursing homes, two groups that differ in several ways: in addition to treating dissimilar populations, and therefore needing different measurement instruments, they operate within different organizational infrastructures (e.g., nursing homes are characterized by a more hierarchical management policy) and are compensated in different ways of payment (nursing homes employ physiotherapists and are paid a salary, whereas private practitioners' income depends on their productivity). The project group adopted Grol and Wensing's[5] model of systematic implementation,[13] which emphasizes that a thorough analysis of improvement goals and of the current situation in the intended setting is essential for successful implementation and advises targeting strategies to specific barriers and facilitators of the desired change.

Therefore, the first phase of the project, described in an earlier article,[14] documented the current use of outcome measures, barriers and facilitators in the implementation of outcome measures, and proposed strategies to improve the use of outcome measures. The barriers were classified into four categories: (1) physical therapist factors (competence and attitude; e.g., lack of knowledge); (2) organizational factors (practice and colleagues; e.g., lack of time); (3) patient/client factors (e.g., patients unaccustomed to the use of questionnaires); and (4) measurement instrument factors (e.g., instruments that are too long).[14] The most important facilitators identified in this study were physiotherapists' positive attitude towards outcome measures and conviction of the benefits of their use; the most important barriers identified were physiotherapists' lack of competence in using the instruments within the process of clinical reasoning, perceived problems in changing behaviour, limitations at the level of practice organization (no room, no time), and unavailability of outcome measures.[14] Strategies for overcoming barriers to implementation were chosen based on these findings and on the implementation literature. The proposed strategy focused on (1) an educational program tailored specifically toward implementing outcome measures into clinical reasoning and organizational structures (practice) and (2) a toolkit of short and easily applicable instruments and user descriptions.[14]

The purpose of this article is, first, to describe the development of the tailored educational program and the toolkit; and, second, to describe the initial effects of the combined synergetic application of both the program and the toolkit on physiotherapists' attitudes towards and use of outcome measures in their daily practice.

2.2
Method

We studied the effects of the tailored educational program we developed and used a controlled pre- and post-measurement design study with a follow-up 8 months after the first measurement.

Recruitment

We invited members of the KNGF who were working in private practices or working in nursing homes to participate in the educational program.

A total of 366 physiotherapists registered voluntarily to attend the educational program. We divided them into 23 groups of approximately 16, acting as the intervention group. This group was invited to complete an online survey before the course began. We also sent 1,000 invitations to a random sample of the KNGF 15,785 members to complete the same survey; those who responded constituted the control group for the study. To ensure that none of these 1,000 physiotherapists had attended the educational program, we later checked the list against the course registration lists.

Development of educational program and toolkits

Based on the most frequently mentioned barriers and literature, we developed two toolkits: one consisted of measurement instruments intended for physiotherapists working in private practice, and the other was geared toward physiotherapists working in nursing homes. Our intention was to restrict each toolkit to a maximum of 10–20 measurement instruments, which should be appropriate for 70–80% of clients seen from day to day, because one problem identified in our earlier study was physiotherapists' inability to select the most appropriate instrument from the large number of outcome measures available. We formulated criteria related to feasibility (e.g., short, easy to administer, easy to understand), quality (e.g., reliability, validity, responsiveness), and support (acceptability) for both clinicians and clients.[12] The instruments were, based on the mentioned criteria, selected by consensus in the project group.

In addition to the toolkits, we developed an educational program to enhance the use of outcome measures in general, and of those included in the toolkits specifically. The program was tailored based on the questionnaire completed by participants at first measurement, which addressed three factors: (1) readiness to change; (2) policy regarding (use of) measuring in practice; and (3) use of instruments.[7] The program's purpose was to minimize barriers at the level of the physiotherapist (i.e., those relating to their competence or their attitude).

The program consisted of four interactive half-day training sessions spread over 4–5 months. Between sessions, participants were instructed to use the measurement instruments in the toolkit with patients in their clinical practice; coaching and feedback were provided during the four training sessions. In each session, participants discussed the instruments in the toolkit; their use in daily practice for diagnostic, prognostic, or evaluative purposes; and the interpretation of test results in relation to their own patients and in the process of clinical reasoning. In addition, physiotherapists were taught how to overcome organizational barriers within their own practice settings (e.g., by sending out questionnaires in advance or using special software).

Program instructors were drawn from all physiotherapy educational programs in the Netherlands and were trained as part of their ongoing professional development to teach the modules within their local networks. These instructors were mandatory trained during two days by the project group. Every university participated and taught the program in its catchment area, ensuring good geographical coverage within the Netherlands.

Procedure and evaluation

Data were collected via online surveys. The surveys were managed by the Institute for Applied Sciences (ITS) and the Strategy and Development unit of the KNGF. All physiotherapists received a reminder to complete the survey one week after the link for the pre-measurement survey was sent; the deadline for submitting a completed questionnaire was three weeks after receiving the link to the survey. Participants in the intervention group received an invitation to complete the post-measurement survey immediately after finishing the course, and a reminder 2 weeks after finishing the educational program. Follow-up time for the intervention group was 8 months after finishing the course (third survey). Participants in the control group were invited to complete the post-measurement within a period of 16 days after enrolling in the study and were sent a reminder on day 9. Follow-up time for the control group was 8–9 months after enrollment (third survey). See figure 2.1.

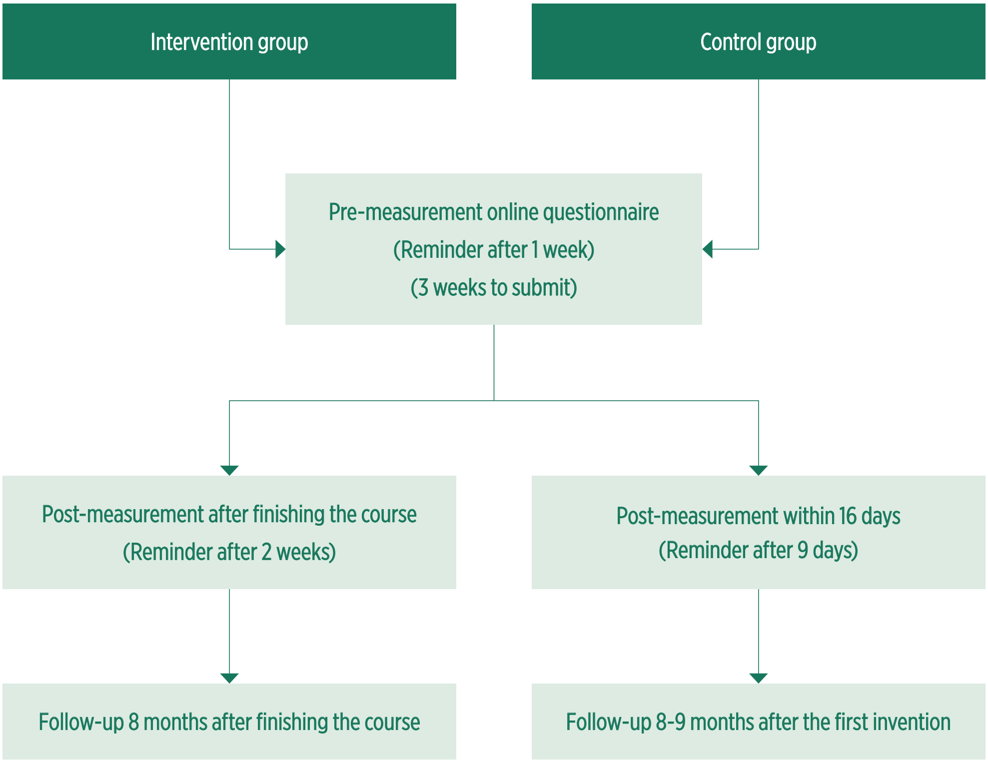

Figure 2.1 | Timelines for data collection and reminders for both groups.

Outcome measures

Outcome variables were collected via online surveys. The first two outcome variables for the study – (1) physical therapists' general attitude towards measurement instruments and (2) their ability to choose measurement instruments – were measured using a five-point Likert-scale (1 = strongly agree, indicating positive attitude and knowledge; 5 = strongly disagree, indicating negative attitude and lack of knowledge). Outcome (3), participants' use of measurement instruments, was determined by asking participants to estimate with what percentage of their clients they used measurement instruments (0 of every 5 patients (0%), 1 of every 5 patients (20%), 2 of every 5 patients (40%), 3 of every 5 patients (60%), 4 of every 5 patients (80%) or 5 of every 5 patients (100%)). Participants in the intervention group were asked about outcomes (4), the applicability of the tailored educational program, and (5), changes achieved in physical therapy practice; the data were quantified in terms of the percentage of respondents who agreed and disagreed with survey items relating to these outcomes.

Statistical analysis

Data were analyzed by the ITS institute and the KNGF's Strategy and Development unit, using SPSS version 18.0 (SPSS Inc. Released 2009. PASW Statistics for Windows, Version 18.0. Chicago: SPSS Inc.). The characteristics of the intervention and control groups were documented using descriptive statistics. Descriptive statistics and paired *t*-tests were used to test within-group differences between pre-measurement and post-measurement; to test differences between intervention and control groups at baseline, we used Fisher's Exact test for categorical variables and independent-samples *t*-tests for the other variables. We also used univariate analysis of covariance (ANCOVA) to test pre–post differences between intervention and control groups (between-group analysis), controlling for the possible effect of certain covariates on the variables of interest between pre-measurement and post-measurement. To evaluate the possibility of selective non-response at post-testing, we used unpaired *t*-tests to compare the pre- and post-measurement groups in terms of gender, age, work setting, working hours, work experience, attitude towards outcome measures, and readiness to change behaviour. For all applied statistical tests, a *p*-value of 0.05 was used as a cut-off point for the 95% confidence interval.

Ethics approval was not required for this study because no patients were involved.

2.3

Results

Development of the toolkits resulted in a toolkit for private practitioners consisting of 19 measurement instruments and a toolkit for nursing homes containing 14 instruments (see Appendix 2.1).
In the intervention group (*N*=366) response rates were 72,4% (265/366) at pre-measurement and 67% (247/366) at post- measurement; 175 participants (48%) completed both measurements. For the control group, response rates were 28% (279/1000) at pre- measurement and 19% (190/1000) at post- measurement; 86 (9%) completed both measurements. Reasons for non-response are not known.
After removing from the analysis 13 respondents in the intervention group and 44 in the control group who provided no information relevant to any of our research questions, we were left with a sample size of 252 in the intervention group and 235 in the control group at pre- measurement. An additional 18 respondents in the intervention group and 36 in the control group did not answer the questions pertaining to gender, setting, age, working week, work experience, and attitude towards outcome measures.

Table 2.1 summarizes the baseline characteristics of respondents in the intervention and control groups. The intervention group was older and worked more hours per week than the control group.

Table 2.1 | **Pre-measurement characteristics of participants**

	No. (%) of respondents*		
Characteristic	Intervention group (*N*=234)*	Control group (*N*=199)*	*p*-value†
Sex			0.21
Male	116 (49.6)	87 (43.7)	
Female	118 (50.4)	113 (56.3)	
Employment setting			0.64
Primary care	186 (79.5)	154 (77.4)	
Nursing home	48 (20.5)	45 (22.6)	
Age, y			<0.001
<30	35 (15.0)	47 (23.6)	
30–50	98 (41.9)	107 (53.8)	
≥50	101 (43.1)	46 (22.6)	
Working week, h/wk			0.008
<25	48 (20.5)	66 (33.2)	
25–33	72 (30.8)	45 (22.6)	
≥33	114 (48.7)	88 (44.2)	
Work experience, y			0.002
0–10	42 (17.9)	64 (32.2)	
11–20	40 (17.1)	38 (19.1)	
21–30	88 (37.6)	60 (30.1)	
≥30	64 (27.3)	37 (18.6)	

▶

Table 2.1 continued

Characteristic	No. (%) of respondents* Intervention group (*N*=234)*	Control group (*N*=199)*	*p*-value†
Attitudes and behaviours (intervention *N*=252; control *N*=235)			
Positive attitude towards outcome measures			0.79
Agree	221 (87.7)	202 (86.0)	
Neutral	24 (9.5)	24 (10.2)	
Disagree	7 (2.8)	9 (3.8)	
Difficulty in changing behaviour			0.036
Agree	134 (53.2)	98 (41.7)	
Neutral	51 (20.2)	55 (23.4)	
Disagree	67 (26.6)	82 (34.9)	
Use of measurement instruments, in % of clients			
Consistently use	26	41	<0.001
Occasionally use	25	25	0.95
Consistently do not use	48	34	<0.001
Difficulty in choosing among the many available measurement instruments‡	3.5	3.1	<0.001

* Unless otherwise indicated.

† *p*-values for testing differences between intervention and control groups. For categorical variables, Fisher's Exact test was used; for the last four variables, independent-samples *t*-test was used.

‡ Mean score on a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree).

The majority of respondents in both groups reported a positive attitude towards outcome measures; the proportion was higher in the intervention group, but the difference was not statistically significant. The intervention group reported significantly greater difficulty in changing behaviour and more difficulty in choosing the appropriate measurement instrument. The intervention group also reported that they were less likely to use outcome measures consistently and were more likely to consistently not use them (see Table 2.1).

Comparing the pre- and post-measurement groups in terms of gender, age, work setting, working hours, working experience, attitude towards outcome measures, and difficulty in changing behaviour indicated that there was no selective non-response between pre- and post-measurement.

After completing the educational program, the intervention group scored significantly more positive on all aspects of the post-measurement survey, while the control group showed no change. ANCOVA found no significant effect of age, gender, or work experience on the use of measurement instruments (test of between subjects effect for work experience F=2.312; *p*=0.11).

Table 2.2 reports pre- and post-measurement results for both intervention and control groups on the use of outcome measures and the ability to choose the right outcome measures for clients. These within-group results are based on paired *t*-tests; we also analyzed the effects of work experience, gender and age as covariates in the between-group ANCOVA, which found no significant influence of work experience, gender, or age on the results.

Table 2.2 | Use of and ability to choose outcome measures

	Intervention group (*N*=175)				Control group (*N*=86)			
Outcome	Pre	Post	95% CI for difference*	*p*-value	Pre	Post	95% CI for difference*	*p*-value
Consistent use of measurement instruments, in % of clients	26	41	11, 20	0.001†	45	44	-3, 8	0.40
Consistent non-use of measurement instruments, in % of clients	50	31	-24, -13	0.001†	30	28	-7, 4	0.59
Difficulty in choosing one of many possible measurement instruments‡	3.48	2.71	-0.93, -0.61	0.001†	2.93	2.87	-0.28, 0.14	0.53

* Calculated as post-test – pre-test.

† Significant at $p<0.05$.

‡ Mean score on a 5-point Likert-type scale (1 = strongly disagree, 5 = strongly agree).

Table 2.3 summarizes responses from the intervention group to questions about the applicability of the tailored educational program, which were designed to evaluate the usefulness of the program and the way in which it did or did not change their physiotherapy practice.

Table 2.3 | Applicability of the educational program and changes in physiotherapy practice

Question	No. (%) of respondents
Was the content of the educational program useful?	
Yes	164 (91)
No	17 (9)
Did you change your physiotherapy management?	
Yes	149 (82)
No, because I already work according to the methods presented	18 (10)
No, because I have no patients to whom I could apply an outcome measure	4 (2)
No, because I obtain good results without using outcome measures	10 (6)

2.4
Discussion

Our aim in this study was to describe the development of a tailored educational program and two toolkits of feasible outcome measures and to evaluate their effects on the overall implementation of outcome measures in the daily practice of physiotherapists.

The educational program and the toolkits were developed based on a systematic analysis of barriers to and facilitators of the use of measurement instruments in daily practice,[14] and were pre-measured in practice with physiotherapists working in private practice (78%) and in nursing homes (22%). This is somewhat different from the distribution in the Netherlands with 13,355 physiotherapists work in private practice and fewer than 1,000 work in 962 nursing homes. It is, however, possible that those who responded were physiotherapists more interested in outcome measures than those who did not respond.

Our study found facilitators and barriers similar to those reported in other studies:[3,12,14,15] in general, participants had a positive attitude towards outcome measures (a facilitator), but the majority admitted to difficulties in changing their behaviour (a barrier). At baseline, there were significant differences in work experience and age between the intervention group and the control group; these two variables are obviously related to each other, but neither influenced the increased use of measurement instruments after the intervention. The control group rated themselves as better able to choose measures and as using the measures more often; our control respondents may represent a group of early adopters who already feel confident in the use of measurement instruments, while the intervention group may have felt a greater need for additional education on the use of measurement instruments. Although the intervention group rated themselves as less able to choose measures and as using the measures less often than the control group at baseline, the educational program succeeded in bringing them up to a significantly higher level. In fact, one may call both the intervention and the control group early adapters regarding the attitude towards measurement instruments. However, the intervention group, possibly recognizing their lack of knowledge, were more eager to learn. Whereas the control group indicated to be already familiar with (the use of) measurement instruments.

One of our strategies was to focus on developing toolkits of short and easily applicable instruments and user descriptions. We anticipated that it would be feasible to develop these toolkits and provide therapists with ready-to-use instruments that were easy to incorporate into their clinical reasoning process. We realize that the toolkits are not fixed sets, and the choice of instruments remains open to discussion. However, because therapists find it almost impossible to choose from the overwhelming number of instruments available to them – for example, the KNGF's 18 published guidelines recommend a total of 127 measurement instruments – there was a need to provide guidance in the selection and application of these instruments.

Overall, the observed effect of the intervention was a significant increase in the consistent use of outcome measures (from 26% at baseline to 41% at follow-up; p=0.001) and a substantial decrease in the consistent non-use of measurement instruments (from 50% at baseline to 31% at follow-up; p=0.001). Neither variable changed significantly in the control group. Similarly, we found a substantial decrease in mean reported difficulty in choosing a measurement instrument among the intervention group (from 3.5/5 at baseline to 2.7/5 at follow-up), while the control group showed no significant change. However, the control group scored higher on these outcomes.

After completing the educational program, 91% of respondents in the intervention group reported finding its content useful during their daily work as physiotherapists, and 82% reported having changed their physiotherapy practice with respect to outcome measurement. Only 9% of respondents who attended the program and had not previously applied outcome measures did not change their physiotherapy practice after completing the program. Thus, it is clear that participants experienced the toolkit and educational program as useful and that the great majority changed their attitude toward using measurement instruments in daily practice.

Nevertheless, this study has significant limitations. First, the study used a non-randomised sample, and therefore the data may be subject to selection bias, since the intervention group consisted of physiotherapists who voluntarily participated in the tailored educational program and were eager to learn, while the control group likely consisted of early adopters confident enough in their use of measurement instruments to voluntarily complete the online questionnaire. The intervention group also received information about the educational program in advance, which may have influenced them to subscribe to the program; on the other hand, the perception of the study participants to be less informed on outcome measures, as evidenced by their having more difficulty in choosing the appropriate measurement instruments and greater non-use of outcome measures, may have led them to enrol in the course. We expected the control group to be poorly informed about measurement instruments because they got no information at all regarding the content of the educational program. However, this expectation was not met by the baseline measurement. At follow-up, these between-group differences disappeared, suggesting an effect of intervention. A delayed-start control group (consisting of half of the therapists who volunteer for the intervention, who are first measured over a period of no intervention in order to serve as a control) might have been useful in determining the effects of the intervention.

Second, although using an online questionnaire allowed us to survey a large group of physiotherapists, we were not able to ask more in-depth questions. Furthermore, the questionnaire's reliability (reproducibility) was not investigated before the study, and therefore we cannot rule out detection or measurement bias, although both groups were measured in an identical way.

Third, response rates for both intervention and control groups were low; the possible influence of the low response rates is not known, but could seriously jeopardize the validity of this study.
Finally, our study did not include a long-term follow-up component, and therefore we do not know to what degree physiotherapists who attended the tailored educational program continued their change in physiotherapy practice. More studies are needed to determine the long-term outcomes of this intervention.

2.5

Conclusion

Developing toolkits and a tailored educational pro-gramme based on a thorough problem analysis proved feasible and showed a positive effect on physiotherapists' ability to choose one of many possible outcome measures and on their use of outcome measures in daily physiotherapy practice.

On the basis of our findings, we recommend that physiotherapy associations invest in developing toolkits and tailored educational programs to facilitate the implementation of their clinical practice guidelines. Further research is needed to confirm the results of this study in other groups and in a randomized con-trolled trial.

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2.6

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Appendix 2.1

Toolkit's measurement instruments for physiotherapists in private practices

Patient's demands		Patient Specific Complaints Questionnaire
Impairments	Pain	Visual Analogue Scale (VAS)/Numeric Rating Scale (NRS)
	Range of Motion	Goniometer
	Muscle force	Hand-held Dynamometer
Activities of Daily Living	Shoulder/arm/hand	Disability of Arm-Shoulder-Hand (DASH)
	Shoulder	Shoulder Pain & Disability Index (SPADI)
	Cervical	Neck Disability Index (NDI)
	Lumbar	Quebec Back Pain Disability Questionnaire (QBPDQ)
	Hip	Algofunctional Index
	Knee	• Algofunctional Index (degenerative disorders) • Lysholm-score (traumatic patients) combined with Tegner-score
	Ankle	Function-score Ottawa Ankle Rules
Walking		6-Minutes Walking Test
Personal factors		• Four Dimensional Symptom Questionnaire (4DSQ) • Tampa-scale Kinesiofobia • Self Efficacy Scale
General perceived effect		Global Perceived Effect (7-point-scale)

Toolkit's measurement instruments for physiotherapist in nursing homes

Patient's demands		Patient Specific Complaints Questionnaire
Immobility/sitting		Trunk Control Test (TCT)
	Staying	Berg Balance Scale (BBS)
	Transfers	Timed Up-and-Go (TUG)
Mobility	Walking	• Elderly Mobility Scale (EMS) • Functional Ambulation Categories (FAC) • 10-Meter Walking Test • 6-Minutes Walking Test
Risk-to-fall-analysis		STRATIFY risk assessment tool
Arm/hand function		• Frenchay Arm Test (FAT) • Disability of Arm-Shoulder-Hand (DASH) • Handheld dynamometer
Activities of daily living		Barthel-index
Pain		Numeric Rating Scale (NRS)

Chapter 3

Development and evaluation of an implementation strategy for collecting data in a national registry and the use of Patient Reported Outcome Measures (PROMs) in physical therapy practice; a quality improvement study

Guus A. Meerhoff
Simone A. van Dulmen
Marjo J.M. Maas
Karin Heijblom
Maria W.G. Nijhuis-van der Sanden
Philip J. van der Wees

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Abstract

Background | In 2013, the Royal Dutch Society for Physical Therapy launched the program "Quality in Motion." This program aims to collect data from electronic health record systems in a registry that is fed back to physical therapists, facilitating quality improvement.

Purpose | The purpose of this study was to describe the development of an implementation strategy for the program and to evaluate the feasibility of building a registry and implementing patient-reported outcome measures (PROMs) in physical therapist practices.

Methods | A stepwise approach using mixed methods was established in 3 consecutive pilots with 355 physical therapists from 66 practices. Interim results were evaluated using quantitative data from a self-assessment questionnaire and the registry and qualitative data from 21 semistructured interviews with physical therapists. Descriptive statistics and McNemar's symmetry chi-squared test were used to summarize the feasibility of implementing PROMs.

Results | PROMs were selected for the 5 most prevalent musculoskeletal conditions in Dutch physical therapist practices. A core component of the implementation strategy was the introduction of knowledge brokers to support physical therapists in establishing the routine use of PROMs in clinical practice and to assist in executing peer assessment workshops. In February 2013, 30.3% of the physical therapist practices delivered 4.4 completed treatment episodes per physical therapist to the registry; this increased to 92.4% in November 2014, delivering 54.1 completed patient episodes per physical therapist. Pre- and posttreatment PROM use increased from 12.2% to 39.5%.

Limitations | It is unclear if the participating physical therapists reflect a representative sample of Dutch therapists.

Conclusion | Building a registry and implementing PROMs in physical therapist practices are feasible. The routine use of PROMs needs to increase to ensure valid feedback of outcomes. Using knowledge brokers is promising for implementing the program via peer assessment workshops.

3.1
Introduction

The primary aim of modern healthcare systems is to realize optimal health outcomes for patients and populations and to deliver services that are of the highest possible quality. High-quality healthcare has been defined as care that is safe, timely, equitable, effective, efficient, and patient-centered.[1] To upgrade the national policy on quality in The Netherlands, in 2013 the Royal Dutch Society for Physical Therapy (KNGF) initiated several pilot studies to develop and implement an innovative quality program, “Quality in Motion.” The rationale for this program is to improve patient-centeredness and the effectiveness of care by implementing patient-reported outcome measures (PROMs) in clinical physical therapy (PT) practice.

For this innovative policy on quality, a registry was established to collect data on patient characteristics, structure, processes and PROMs at the level of physical therapists from the Electronic Health Record (EHR) systems of physical therapist practices. PROMs are questionnaires or single-item scales measuring outcomes that can be generic (eg, measuring pain) or condition-specific aspects of patient functioning.[2] PROMs are considered important for shared decision making, goal setting and the monitoring of outcomes in the clinical process, as well as to increase the transparency of treatment outcomes when PROMs data are aggregated across patients.[3,4] Such aggregated outcomes provide information for the improvement of quality and can be used by patients to choose healthcare providers.[2,5]

All data collected in the registry are used to provide continuous provide feedback on PROMs to the physical therapists via a web portal. Continuous feedback of the data supports a learning environment, and can be an effective tool to enhance quality improvement and the accountability of care.[6] In addition, effective implementation strategies, such as the use of opinion leaders, audit and feedback, educational outreach, educational meetings, and workshops can support such a learning environment.[7-10] In summary, the use of PROMs in clinical practice and the feedback of data via the web portal were expected to support physical therapists and patients in shared decision making, goal setting and the monitoring of outcomes in the clinical process, thus enhancing patient-centered care; support physical therapists in quality improvement activities; allow physical therapists to provide transparency of treatment outcomes using aggregated PROMs data.

Despite the current interest in PROMs, their use at the level of clinical practice has been shown to be suboptimal.[11-15] Moreover, the implementation of PROMs at the aggregated level for quality improvement and transparency is in its early stages of development. Several initiatives have illustrated the possibility of using PROMs at the aggregated level,[16-18] but these efforts have not yet demonstrated the feasibility of integrating this use of PROMs on a wide scale.[2] To enhance the routine use of PROMs at these levels, it is essential to integrate the collection of PROMs data for multiple purposes.[2]

An assessment of the feasibility of implementing PROMs for different purposes is important in determining whether the innovative policy on quality requires adaptation and is appropriate for further testing.[19] Therefore the aims of this article are to describe the process of the development and adaptation of the implementation strategy of the innovative quality policy, and to evaluate the feasibility of 2 key elements the implementation of PROMs measurements in physical therapist practices and the delivery of data by physical therapist practices to the registry.

3.2
Methods

Study design and setting

The program was designed to allow a gradual evidence-informed development of the implementation strategy based on continuous evaluation of pilot studies over a four-year period between 2013 and 2016. The goal was to conduct six pilots with existing regional networks of primary care PT practices. During these pilots, the feasibility was evaluated with a focus on the areas of acceptability, practicality, and implementation.[20] A mixed methods design was applied, using quantitative data collected from the patient records of the participating Physical therapists via the EHR systems of the PT practices and a questionnaire, and using qualitative data collected with semi-structured interviews in individual Physical therapists. All data were collected in a sample of Physical therapists working in Dutch primary healthcare practice.

This paper describes the interim results based on the first three pilots supervised by the project team, consisting of the author group [GM, SD, MM, RN, PW], all Physical therapists, and researchers at the Radboud University Medical Center, and leaders from the participating networks [RH, JD, HE], who were all Physical therapists in clinical practice and board members of the participating networks. The three pilots were conducted from February 2013 to November 2014.

To achieve the aims of this paper, a stepwise cyclical process of development, implementation, and adaptation was established in the first three consecutive pilots, applying action research by using the seven steps of the Grol and Wensing implementation of change model (see Figure 3.1).[21,22] This implementation of change model and action research followed an evidence-based approach, combining scientific evidence, on-going data collection, and information obtained from the participation of the Physical therapists in the pilots as well as other stakeholders (i.e., KNGF, health insurance companies, patient representatives, and EHR software vendors).[22-24] Early experiences in the first pilot were used to redesign the second pilot, and these experiences were then again used to redesign the third pilot. Prior to the start of each pilot, input was obtained from the leaders of the participating networks during different meetings. This was deemed important because such opinion leaders can successfully promote evidence-based practice.[25] For data collection, a third trusted party – an independent entity overseeing the integrity of the database and the transaction of the data – that built the registry was contracted.

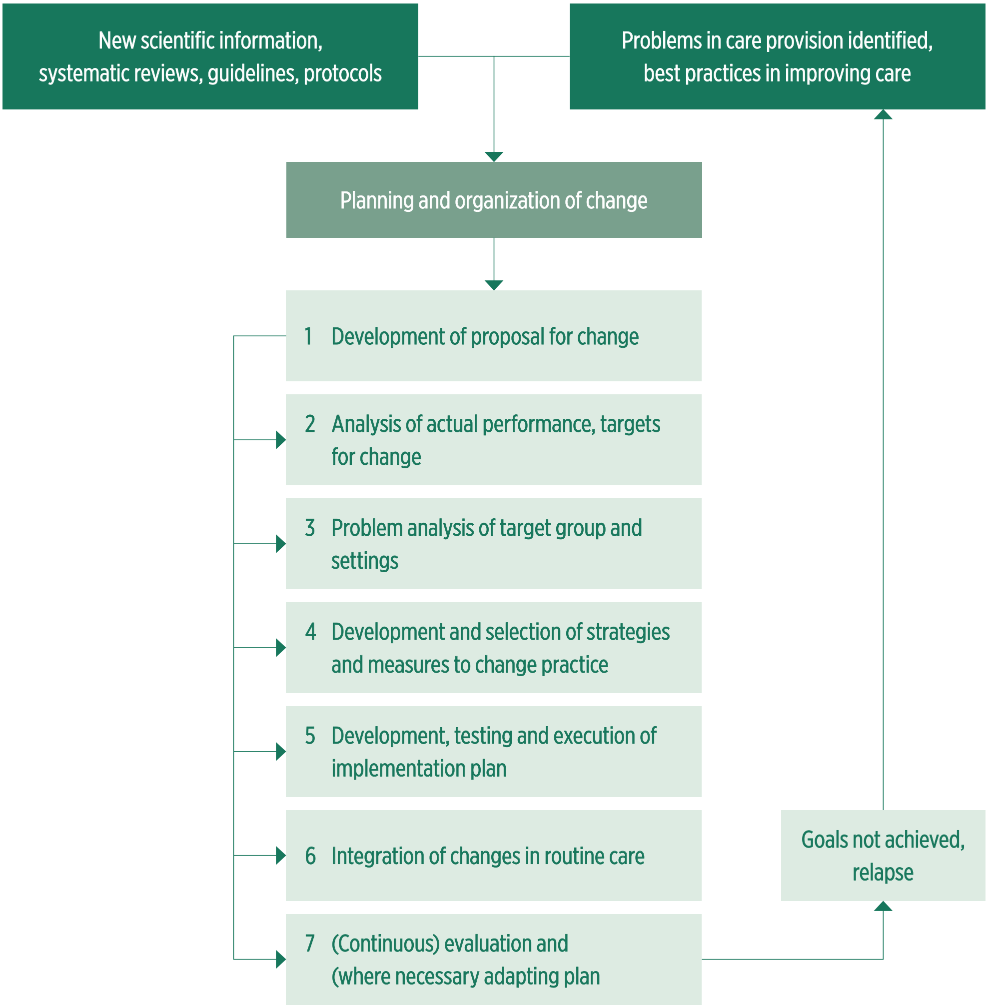

Figure 3.1 | The implementation model of Grol and Wensing.[22]

The cyclical process of development, adaptation and implementation

The process of the development, adaptation, and implementation followed seven steps, based on Grol and Wensing's implementation for change model (see Figure 3.1), as set out below.

Step 1 | Selecting the variables of interest for the implementation strategy

The first step entailed deciding which variables in terms of health conditions, patient characteristics, structure, and process variables, and PROMs would be selected for data collection in the registry. The selection of health conditions was based on the prevalence of health conditions in Dutch primary care PT practice.[26] The patient characteristics and process variables were selected based on the Dutch national clinical practice guidelines (CPGs) for record keeping in PT practice.[27] The structure variables were identified by the author group. Patient characteristics, process, and structure variables were included to enable case-mix correction, and to link processes to outcomes of care for quality improvement purposes in a later phase of the Quality in Motion program, when routine in data delivery and a registry with sufficient volume were achieved. The selection of PROMs was informed by recommendations in the Dutch national PT CPGs for different health conditions.[28-31] After the initial selection of potentially eligible PROMs, a final selection was made during a consensus procedure with a panel of experts [RO, SB, RS, PW, SD, GM], all Physical therapists, and expert researchers in outcomes measurement.

To allow the transfer of all data from the EHR-systems to the registry, all (approximately 10) different EHR systems were asked to deliver the data to the registry based on technical specifications. All data were collected monthly via the third trusted party based on a data protocol that complied with regulations for privacy and data transfer. All patients were asked for permission for the use of their data.

The study was approved by the Medical Ethical Committee of the Radboud University Medical Center (registration #2014/260).

Step 2 | Analysis of actual performance

The web-based "*PROM use self-assessment questionnaire*" (see Appendix 2), evaluating self-reported PROM use in PT practices, was sent to participating Physical therapists via e-mail at the start and on completion of each pilot. This questionnaire was based on an existing questionnaire developed to assess knowledge and attitudes toward the use of measurement instruments in PT practice.[32] This unvalidated questionnaire was adapted in collaboration with the initial developers [AS, SB, RP]. Three items were deleted as these questions presumed Physical therapists did not have EHR systems, which all participants of the pilot studies were obliged to have. Three items were added inquiring how PROMs were used. Based on consensus among the author group, it was decided that Parts 1 and 2, consisting of 18 and 10 items respectively, would be included as outcome variables in the study. These parts measure the areas addressing the acceptability, practicality, and implementation of using PROMs in PT practices, consisting of 15, 4, and 9 variables, respectively. In total 27 variables were scored using a 5-point Likert scale assessing the level of agreement, and one variable scored the percentage of PROM use with a 6-category response option. The variable "*I use PROMs for the majority (>50%) of my patients*" was defined as the primary outcome as the implementation of PROMs was one of the key elements for evaluating the program.

Step 3 | Barrier and facilitator analysis of the target group and setting

Semi-structured interviews were administered to Physical therapists who were involved in one of the three pilots and voluntarily participated. The Physical therapists were selected based on their different roles, such as practice owner, employee, working as an educator or as a policy advisor. The goal of these interviews was to identify barriers and facilitators for the acceptability, practicality, and implementation of PROMs in clinical practice, and to collect data from PT practices in the registry. This information was used to adapt the implementation strategy (see step 5). In this paper, a summary of the general findings of the interviews is presented. The in-depth results will be published elsewhere.

Step 4 | Development of a general implementation strategy

To inform the development of a general implementation strategy, recommendations from reviews of strategies for changing professional behavior were used, and included the use of opinion leaders, audit and feedback, educational outreach, educational meetings, and workshops.[7-10] Peer assessment, which has been proven to be an effective method to improve guideline-consistent clinical performance in physical therapy,[33,34] was used as a specific method for audit and feedback. In peer assessment, professionals are evaluated by their peers, and provide each other with performance feedback that triggers reflection and uncovers areas of clinical performance that need improvement.[35]

Step 5 | Tailoring the implementation strategy to the participating pilot groups

The implementation strategy was optimized using the action research approach, namely: "the systematic collection of information that is designed to bring about social change."[22] Based on the initial self-reported performance of participants in using PROMs (step 2), the analysis of barriers and facilitators (step 3), input from the leaders of the participating networks, and knowledge and experience acquired during the previous pilots, necessary adaptations were made to optimize the strategy during each consecutive pilot. This tailoring process was necessary because research results cannot be used as a "can opener".[24] "Generic knowledge can only seldom be taken directly off the shelf and applied without some sort of vetting or tailoring to the local context."[36]

Step 6 | Integration of changes in routine care

During the first pilot the concept of knowledge brokers (KBs) was introduced to facilitate further integration of the use of PROMs in routine care. The KBs were volunteer Physical therapists who provided a link between the researchers and their PT colleagues by translating research evidence into local policy and practice in a two-way process.[37,38] In each pilot, 6–8 KBs were selected from the participating group of Physical therapists.

Step 7 | Evaluating the self-reported and actual use of PROMs, and data collection in the registry

To evaluate the effect of the implementation strategy on self-reported PROM use, differences in the responses to the self-assessment questionnaire at baseline and follow-up were analyzed. Changes in actual PROM use was assessed by summarizing the percentage of PROM use pre- and post-treatment, and comparing these percentages before and after the pilot.

The effect of the implementation strategy on collecting data from PT practices in the registry was evaluated by analyzing: 1) the percentage of participating practices that successfully delivered data, and 2) the volume of treatment episodes collected via the EHR systems.

Data analysis

Quantitative data analysis

The differences in the proportion of participants who provided responses in agreement concerning the variables included in the self-assessment questionnaire between the baseline and follow-up measurements were analyzed using McNemar's symmetry chi-squared test to calculating the *p*-value. The initial response options "I completely agree," "I agree," "I am in doubt," "I disagree" and "I completely disagree" were dichotomized into "agree" and "disagree" combining the first two and the last three response options respectively. The baseline and follow-up measurements were paired at the level of the individual PT by using an anonymous unique identifier.
The data collected in the registry were used to calculate the increase in: 1) the percentage of practices that delivered data; 2) the volume of the total treatment episodes; 3) the actual pre- and post-treatment uses of PROMs in each pilot. All data were analyzed using SPSS version 20.

Qualitative data analysis

The semi-structured interviews were transcribed verbatim and entered into Atlas.ti software for qualitative analysis. All interviews were analyzed by two researchers using Template analysis.[39] The qualitative analysis identified the barriers and facilitators of the two key elements of the program (evaluating the different areas of feasibility in implementing PROMs measurements in

PT practice, and the delivery of data by PT practices to the registry), and divided these over four levels: healthcare professional (PT), healthcare organization (PT practice), the innovation (PROM measurement), and the socio-political context (e.g., financial arrangements). These levels were derived a priori based on descriptions in the existing literature.[40] A framework of codes was developed and applied to all interviews. Coding discrepancies were reconciled in a team meeting involving the authors. In addition, input from the leaders of the participating networks was collected during different meetings. Both sources of information were used to adapt the implementation strategy, and to optimize the feasibility of the implementation of PROMs and the collection of data in the registry.

3.3
Results

Step 1 | Selecting the variables of interest for the implementation strategy

The selected health conditions were as follows: low back, neck, shoulder, hip and knee problems.[26] For each health condition, one or two condition-specific PROMs and four generic PROMs were selected (see Table 3.1). The variables selected to collect patient characteristics, and the structure and process of PT care are summarized in Appendix 3.1.

Table 3.1 | Patient Reported Outcome Measures used in pilots

	During pilots	Adaptations after the pilots: inclusion of additional PROMs
General	• NPRS: Numeric Pain Rating Scale • VAS: Visual Analog Scale • PSFS: Patient Specific Functioning Scale • GPE: Global Perceived Effect	
Low Back	QBPDS: Quebec Back Pain Disability Scale	
Neck	NDI: Neck Disability Index	
Shoulder	DASH: Disability of Arm, Shoulder & Hand	Quick DASH
Hip	HOOS: Hip Disability & Osteoarthritis Outcome Scale	HOOS-PS
	AIH: Algofunctional Index Hip	(HOOS short form)
Knee	KOOS: Knee Injury & Osteoarthritis Outcome Scale	KOOS-PS
	AIK: Algofunctional Index Knee	(KOOS short form)

Step 2 | Analysis of actual performance

The characteristics of the participating Physical therapists are presented in Table 3.2. The self-assessment questionnaire was completed by 76.6% of the Physical therapists (*N*=272) at baseline and follow-up. In the three pilots, these percentages were 72.2%, 82.7%, and 80% respectively. Table 3.3 shows the results of the three pilots. At baseline, the five variables attaining the lowest implementation scores among the responding Physical therapists were: 1) arrangements made concerning how to use PROMs (30.1%); 2) it was discussed how to implement PROMs (34.6%); 3) PROMs being sent electronically to patients when possible (40.1%); 4) PROMs being administered by the patients themselves (43.0%); 5) PROMs being used with the majority (>50%) of patients (43.2%). These results showed room for improvement, emphasizing the need for the active implementation of PROMs.

Table 3.2 | Characteristics of participants in the three pilot studies

Cohort	Practices	Physical therapists	Mean physical therapists per practice (SD)	Mean age (SD)	Gender (% male)
Pilot 1	33	180	5.6 (3.8)	43.4 (11.8)	43.6
Pilot 2	23	75	4.2 (3.4)	48.8 (12.0)	44.0
Pilot 3	10	100	9.1 (3.4)	42.6 (12.0)	34.7
Total	66	355	7.3 (5.9)	44.6 (12.7)	37.3

SD = Standard deviation.

Table 3.3 | Results of the self-assessment questionnaire[†]

	Baseline (% agreeing)	Follow-up (% agreeing)	*p*-value
Practicality			
I know where to find PROMs (*N*=272)	79.0	95.2	0.000**
PROMs are available (*N*=272)	83.5	97.1	0.000**
I think my patients do think using PROMs takes too much time (*N*=272)	83.5	88.6	0.077
Patients are cooperative in using PROMs (*N*=272)	64.0	69.9	0.110
Implementation			
I use PROMs in the majority (>50%) of my patients (*N*=271)	43.2	53.9	0.004*
My supervisor(s) support the use of PROMs (*N*=272)	60.7	80.9	0.000**
My supervisor(s) use PROMs in clinical practice themselves (*N*=272)	57.4	76.8	0.000**
I use PROMs in daily practice (*N*=272)	70.2	81.3	0.000**
My supervisor(s) require PROMs are reported in our electronic health records (*N*=272)	51.5	71.0	0.000**
My colleagues also use PROMs in clinical practice (*N*=272)	63.2	83.5	0.000**
In our practice we discuss how to implement PROMs (*N*=272)	34.6	57.0	0.000**
When possible we send the PROMs to our patients electronically (*N*=142)[‡]	40.1	51.4	0.010*
PROMs are administered by the patients themselves (*N*=142)[‡]	43.0	59.9	0.000**
Acceptability			
I am able to implement PROMs together with my patients (*N*=272)	83.5	93.8	0.000**
I am able to interpret PROMs results (*N*=272)	61.0	79.8	0.000**
Using PROMs does not affect my professional authority to make my own decisions (*N*=272)	66.2	84.9	0.000**

▶

Table 3.3 continued

	Baseline (% agreeing)	Follow-up (% agreeing)	*p*-value
Using PROMs helps me to formulate a PT diagnosis (*N*=272)	54.4	58.8	0.262
PROMs are useful in the evaluation of a treatment (*N*=272)	89.0	92.3	0.188
I am able to use PROMs within my clinical reasoning process (*N*=272)	68.4	91.2	0.000**
PROMs have a positive influence on the quality of PT healthcare (*N*=272)	61.8	69.1	0.027*
It is important to register patient opinions objectively with PROMs (*N*=272)	75.4	77.9	0.401
Using PROMs in clinical practice takes too much time (*N*=272)	81.2	83.5	0.544
When using PROMs I am able to include the wishes of my patients (*N*=272)	56.6	66.9	0.008*
I would like to use PROMs more often (*N*=272)	64.7	68.0	0.386
I have experienced the added value of PROMs (*N*=272)	55.5	67.3	0.000**
Using PROMs is a standard part of my clinical reasoning (*N*=272)	44.9	61.0	0.000**
Within our practice we have made arrangements for using PROMs (*N*=272)	30.1	64.0	0.000**
The use of PROMs fits in our work routines (*N*=272)	62.5	69.9	0.021*

† The results of responses from the three pilots for those who completed both the baseline and follow-up self-assessment questionnaires.
‡ This question was only included in the questionnaires in pilot 2 and 3 and was therefore completed by 142 participants.
* Significant at ≤0.001.
** Significant at <0.05.

Step 3 | Barrier and facilitator analysis of the target group and setting

Semi-structured interviews were conducted with 21 Physical therapists aged 27–64 years (mean: 52.9); 14 participants were male, 14 were owners of a clinic, 2 were employees, 3 worked in education, and 2 were policy advisors. All Physical therapists were selected by the KNGF and invited to participate. In summary, the results show that the main barriers to the use of PROMs in clinical practice are in the areas of acceptability and practicality. Barriers at the level of the healthcare professionals are related to the area acceptability, e.g., lack of competence of Physical therapists in routine PRO measurement, and resistance to changing behavior. At the level of the healthcare organization, these barriers were related to the practicality, e.g., insufficient time to implement the innovation, and lack of availability of PROMs. At the level of the innovation itself, these barriers were related to the area acceptability, e.g., the PROMs lacking applicability (difficulty and length). At the level of the socio-political context, barriers were related to the area practicality, e.g., the lack of user-friendly EHR systems (systems without a patient portal for online data collection), and the lack of integration of PROMs in the EHR (systems presenting PROMs separately from the patient record). Reported facilitators were related to practicality, i.e., the availability of a core set of PROMs, the active involvement of Physical therapists in developing the implementation strategy, and the fact that the Physical therapists felt enabled to be more transparent about the results of their care. The role of health insurance companies as a stakeholder was perceived as both a facilitator and a barrier.

Step 4 | Development of the general implementation strategy

The implementation strategy comprised a multifaceted program with five interactive educational workshops in each pilot provided by local opinion leaders. The first workshop included an introduction to the pilot and instructions for the use of PROMs. Peer assessment activities were used during the 2nd, 3rd, and 4th workshops. Two peer assessment workshops aimed to facilitate the **use** of PROMs in clinical practice. Peer assessment was based on a simulated setting using patient vignettes, including PROMs data, in which peers provided each other with feedback on performing the role of PT. One peer assessment workshop aimed to provide performance feedback based on the pre- and post-treatment PROM scores of groups of patients. At the end of each pilot, a fifth workshop was organized in which the overall results derived from the process and outcomes data of the regional network and PT practices were presented and discussed.

Step 5 | Tailoring the general implementation strategy to the participating pilot groups

In Table 3.4, the specific focus of the pilots, formulated together with the Physical therapists, is set out. Five main adaptations were applied to the implementation strategy during the consecutive pilots to increase the practicality of data delivery and the use of PROMs in clinical practice. The five adaptations were: (i) the inclusion of an introduction workshop with all participating Physical therapists, (ii) the introduction of KBs, (iii) intensifying the communication with the EHR vendors, (iv) intensifying the support of the participating Physical therapists for the manual delivery of data to the registry, and (v) the inclusion of the short-forms of selected PROMs (see Table 3.4).

Table 3.4 | Focus of the pilot studies and adaptations to the implementation strategy

Pilot	Focus of the pilot	Barriers experienced in the implementation strategy	Adaptation of the implementation strategy
1	Build infrastructure to extract data from EHR to the registry Establish routine in data collection. Analysis of data based on pre- and post-treatment PROMs measurement. First experience with peer assessment to facilitate the use of PROMs in clinical practice	Based on the results of the self-assessment questionnaire, a competence gap was identified, leading to resistance to change. The participating network needed more assistance to achieve successful implementation.	Before the start of the pilot, an extra workshop with all Physical therapists was introduced to increase competencies and decrease the resistance to change of the Physical therapists by discus-sing the added value of PROMs in the process of care. During the pilot, KBs were introduced to further integrate the use of PROMs in routine care upon completion of the pilot.
2	KBs were trained in stimulating routine PROMs use by their colleagues, and to provide support during the peer assessment workshops. A strong focus was still put on building the data infrastructure for extracting data from EHRs to the registry.	Physical therapists experienced difficulties in manually uploading their data from their EHR to the registry.	The communication with the EHR vendors was intensified to emphasize the need to innovate their systems in order to facilitate the use of PROMs. This resulted in improvements in data extraction from the EHR to the registry, which became much easier and less time consuming. Support for the participating PT practices in delivering their data to the registry on a monthly basis was intensified to increase data delivery. This support consisted of reminders sent before the deadline for each delivery. In addition, a helpdesk was installed to address questions the Physical therapists had concerning the delivery of data.
3	KBs were trained to become independent lecturers in educating their colleagues in peer assessment activities to implement the quality program.	The length of some of the selected PROMs was experienced as a barrier.	After the third pilot, the short forms of selected PROMs (Quick DASH, HOOS-PS, and KOOS-PS) were implemented to increase the feasibility of implementing PROMs in clinical practice (see Table 3.2).

PROMs = Patient-Reported Outcome Measures; HER = Electronic Health Records; KBs = Knowledge Brokers.

The first pilot started in spring 2013, and the second and third pilots started at intervals of approximately 6 months. Initially, each pilot was scheduled for a duration of 12 months. However, addressing technical barriers in extracting the data from the EHR systems to the registry took longer than expected; therefore, the durations of the first and second pilots were extended to six and three months respectively.

Step 6 | Integration of changes in routine care

In the first pilot, the project team provided educational staff for all five workshops. The idea of using KBs arose at the end of the first pilot to allow the continuation of support for Physical therapists in routine data collection after completion of the pilot.

In the second pilot, the KBs were appointed at the start and they were included in the decision-making process in tailoring the implementation strategy. They were part of the implementation strategy and provided support in the peer assessment workshops, with an increasing role in integrating the use of PROMs in PT care. The project team provided training and supervision of the KBs throughout the pilot. Learning from the experience in the second pilot, the role of the KBs was further increased in the third pilot by giving them more responsibilities during the peer-assessment workshops. As a result, the KBs were able to play a major role during the third pilot, a role that they continued to perform after the pilot ended.

In addition to the increasing role of the KBs, the leaders of the participating networks developed their leadership roles during the pilot projects in establishing policy for continuous quality improvement within their networks of Physical therapists, as well as in collaborating with stakeholders.

Step 7 | Evaluating the self-reported and actual use of PROMs, and data collection in the registry

At follow-up, the self-assessment questionnaire showed significant improvements for variables related to the three feasibility areas acceptability, practicality, and implementation (Table 3.3). The proportion of Physical therapists who reported using PROMs with the majority of their patients increased significantly at 10.7% (95% CI 3.8–17.6; *p*-value ≤0.001). Actual PROM use pre-treatment increased from 25.5% to 71.2%, and the overall pre- and post-treatment PROM use increased from 12.2% to 39.5%. Analyzing the pilots separately, similar results were found, showing the greatest increase for the outcomes in the third pilot (Table 3.5).

In July 2014, 65.2% of the participating practices delivered data to the registry; this percentage increased to 92.4% in December 2014. Each pilot showed a clear increase in percentage terms, with the biggest increase in the third pilot (Table 3.5). A similar increase was found in the volume of patient records with completed treatment episodes. In July 2014, the registry contained an average of 12.9 completed patient episodes per PT; this increased to 54.1 completed episodes in December 2014. The third pilot showed the greatest increase (Table 3.5).

Table 3.5 | Specifications of the registry

	Pilot 1		Pilot 2		Pilot 3		Pilots 1–3	
	02/13†	02/14‡	12/13†	07/14‡	04/14†	11/14‡	02/13†	11/14‡
PROM use pre-treatment (%)§	25.5	41.6	59.5	83.3	56.0	84.6	25.5	71.2
PROM use pre- and post-treatment (%)§	12.2	24.1	39.7	45.4	22.4	46.4	12.2	39.5
Practices connected with the registry (%)	30.3	69.7	33.3	91.3	30.0	100.0	30.3	92.4
Patient episodes in the registry per PT with completed treatment episodes (N)§	4.4	39.6	0.5	39.0	8.9	59.3	4.4#	54.1#

† Measured before the start of the pilot.

‡ Measured at the end of the pilot.

§ Data specified for the selected five main musculoskeletal health conditions.

Overall, the registry contained 789 and 19,222 completed patient episodes respectively in February 2013 and November 2014.

3.4
Discussion

This study shows that the implementation of PROMs in PT practice and collecting data in a registry are feasible. The implementation strategy resulted in an increase in the percentage of self-reported and actual PROM use, an increase in the percentage of practices that delivered data to the registry, and an increase in the number of patient episodes collected in the registry. The iterative process of developing and adapting the implementation strategy, together with the participating networks, enhanced the joint responsibility. Important adaptations to the implementation strategy applied within the consecutive pilots were as follows: 1) organizing an introduction workshop; 2) introducing KBs; 3) intensifying the communication with the EHR vendors; 4) intensifying the support of the participating Physical therapists in their manual delivery of data to the registry; 5) the inclusion of the short forms for selected PROMs.

Although a systematic approach to implementing PROMs was employed, the innovative nature of the study did not allow for a clear schedule in terms of content and timeline. The first two pilots took longer than anticipated, mainly due to technical issues with data extraction to the registry. Notwithstanding these difficulties significant improvements were obtained for most of the **variables** in the self-assessment questionnaire, such as the primary outcome variable measuring self-reported PROM use. Nevertheless, a negative score was obtained for the administrative burden of PROMs on Physical therapists and the burden for the patient as perceived by the Physical therapists. These two results underpin the importance of the introduction of short forms of the PROMs. In addition, the baseline results of the questionnaire contradict the results of the interviews concerning the *availability of PROMs and competences in using PROMs*. These contradictions may be explained by the fact that the opinions of the interviewees differed from the opinions of the majority of the Physical therapists who responded to the self-assessment questionnaire.

Actual PROM use also showed an increase in measurements pre- and post-treatment. This increase was found within each pilot, showing the greatest increase in the third pilot. However, the data in the registry revealed that pre- and post-treatment PROMs measurement was still limited. This shows that the implementation of PROMs in PT practice has room for improvement, as previously identified.[12,13] Although no specific pre-defined target was set for PROM use, a higher percentage of pre- and post-treatment measurements was expected. The main gap in data collection was caused by a lack of post-treatment measurements. During the interviews Physical therapists reported having difficulties in changing their behavior to administer the post-treatment measurements. Moreover, they reported that administering PROMs was difficult when EHR systems did not provide patient portals that enabled collection of PROMs data via e-mail. Finally, the delivery of data to the registry did increase with each pilot, with the greatest increases in the second and third pilots.

During the consecutive pilots several adaptations were made to the initial implementation strategy. An extra workshop was scheduled to increase competencies in using PROMs in clinical practice and to lower the resistance to change. KBs were introduced to facilitate the further integration of the use of PROMs in routine care. Their role became more prominent over the course of the different pilots. The use of KBs is promising for the further implementation of the program via peer assessment strategies. However, voluntary commitment may not be sustainable. In Canada professionally trained and fully employed KBs have been introduced to oversee multiple projects and professionals.[41] To develop the position of KBs, studies are needed to evaluate their competences and roles in greater depth. Moreover, to ensure the sustainable use of KBs, some sort of compensation should be established.

In addition, after intensifying the communication with EHR vendors, they improved their systems, facilitating the registration and extraction of data to the registry; moreover Physical therapists received greater support when having difficulties uploading data. The final adaptation, after the third pilot, was the introduction of the short forms of the PROMs, minimizing the administrative burden.

Strengths and limitations

A specific strength of this study is the innovative means of data collection, using technological possibilities to collect a large sample of “real world” data in a large cohort of Physical therapists. This “real world” data made it the possible to pioneer with outcome measurements in stimulating patient-centered care and improving quality in clinical practice.

Several aspects may have limited the generalizability of our study. First, we do not know if our sample of participating Physical therapists reflects a representative sample of subgroups, such as those identified by Rogers: innovators, early adaptors, early majority, late majority and laggards.[42] Although it seems plausible that Physical therapists from all subgroups have been included as the practices and not the Physical therapists themselves decided to participate, the presence of all subgroups cannot be guaranteed. Second, only a restricted number of health conditions and a relatively small number of PROMs were selected. Third, the study was conducted in the context of Dutch healthcare. Similar pilots should be executed in different (international) settings to test the generalizability of the results. The fourth limitation relates to the use of an unvalidated questionnaire to evaluate self-reported PROM use, and knowledge of and attitudes towards PROMs. Finally, all reported outcomes might be influenced by the Hawthorne effect, triggering a social desirability bias concerning the outcomes measured simply by participating in the pilot.[43]

Implications for further development and policy

The program “Quality in Motion” is halfway through its four-year development period and is still in the process of increasing the routine for data collection. Several steps are being explored within the next phase. First, the current networks need further support to maintain and expand their routine in data collection. Second, new pilots will start to further develop the emerging implementation strategy, in which KBs play a vital role, as well as addressing barriers to implementation, such as the lack of online portals in the EHR systems. Third, benchmarking tools based on the PROMs results will be developed, providing continuous feedback to facilitate quality improvement activities. For the development of these tools, the use of patient characteristics, process variables, and structure variables will be essential to apply the necessary case mix adjustment, and to stimulate quality improvement by linking processes to the outcomes of care.

Fourth, the experiences of peer assessment strategies and quality improvement based on health outcomes measurement will be used to inform the development of an audit system. This system is expected to become another key element of the quality program.

There have been several other initiatives establishing outcome registries in PT, providing excellent opportunities for sharing knowledge and collaboration. One example is the American Physical Therapy Association (APTA), which has initiated the Physical Therapy Outcomes Registry at the national level.[44] The further development of such outcome registries should integrate the technical development of the registries themselves with a robust implementation strategy, facilitating meaningful use of PROMs data in clinical practice, quality improvement, and performance measurement for external accountability purposes.[2]

3.5
Conclusions

This study shows that collecting data in a registry and implementing PROMs in PT practice is feasible, although the use of PROMs still shows room for improvement. The iterative process in developing and conducting the pilots, in collaboration with the participating networks, has enhanced joint responsibility for the initiative, and the use of KBs is promising. Despite these results, several barriers, such as the support of EHR systems in the implementation of PROMs, need to be overcome to improve the overall results. Data in the registry can be used for quality improvement purposes in a safe setting, but the system is not yet sufficiently robust for performance measurement for external accountability purposes.

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3.6
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Chapter 4

Which factors influence the use of Patient Reported Outcome Measures in Dutch physiotherapy practice: a cross-sectional study

Guus A. Meerhoff
Simone A. van Dulmen
Juliette K. Cruijsberg
Maria W.G. Nijhuis-van der Sanden
Philip J. van der Wees

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Abstract

Purpose | Patient-reported outcome measures (PROMs) have the potential to enhance the quality of healthcare, but due to suboptimal implementation it is unclear whether they fulfil this role in physiotherapy practice. This cross-sectional study aimed to identify the factors influencing PROM use in Dutch private physiotherapy practices.

Method | A total of 444 physiotherapists completed a self-assessment questionnaire and uploaded the data from their electronic health record (EHR) systems to the national registry of outcome data. Univariate and multivariate ordinal logistic and linear regression analysis were used to identify the factors associated with self-reported PROM use and PROM use registered in the EHR-systems, derived from the self-assessment questionnaire, and from the data in the national registry, respectively. Five categories with nine independent variables were selected as potential factors for regression analysis. The similarity between self-reported and registered PROM use was verified.

Results | We found that 21.6% and 29.8% of the participants used PROMs in >80% of their patients, based on self-report and EHR report, respectively, and we identified the factors associated with PROM use.

Conclusion | These factors were EHR-systems that support PROM use, and more knowledge about PROM use. These findings can guide future strategies to enhance the use of PROMs in physiotherapy practice.

4.1
Introduction

The health care system can be made more patient-centered by using relevant outcome measures for patients, such as patient-reported outcome measures (PROMs).[1] PROM data can provide an effective and efficient way to improve and evaluate the process and outcomes of care, thereby contributing to the overall quality of health care.[2] To encourage the use of PROMs in clinical practice, it is important to understand the factors that influence their use.

In the clinical process, PROM data can be used to screen patients, set goals,[3-7] improve patient-provider communication[3], make shared decisions,[3-7] and monitor outcomes,[3,4,6,7] all of which contribute to a physiotherapist's clinical reasoning. In addition, PROM data can be aggregated across patients to provide information about the self-reported health status of patients being treated by a physiotherapist, in the physiotherapist's practice, and at the regional or national level. This aggregated data then establishes a benchmark against which the physiotherapist or the practice can compare the average increase in functioning or reduction of symptoms of a specific patient group, then use this information for quality improvement purposes – for example, by using plan-do-check-act cycles. This benchmark enables physiotherapists and physiotherapy practices to compare the outcomes they obtain against the care they provide and determine whether they need to improve their knowledge, skills, or their care process to obtain better outcomes.

Additionally, when such data is collected aggregated PROM data can be used for public reporting of the overall treatment results. Public reporting enables patients to choose a healthcare provider based on these outcomes, and it enables payers to introduce a pay for performance structure for health care practices based on the PROM results.[6,8-10]
Although PROMs have great potential and are included in the clinical practice guidelines of the Royal Dutch Society for Physiotherapy (KNGF), research has shown that they have not yet been widely adopted by physiotherapists.[11-16] In a national quality program, the KNGF developed a new system[17] that extracts the PROMs from all the electronic health record (EHR)-systems in the country and collects them in a national registry of processes and outcomes of physiotherapy care. To do this, an extensive implementation strategy was developed for physiotherapists in primary care physiotherapy practice. In the Netherlands, 20,696 physiotherapists work in primary care across 11,415 private practices.[18] Dutch primary care physiotherapy is easily accessible for patients and is reimbursed partly through mandatory health insurance and partly through additional voluntary insurance coverage.

The five most common musculoskeletal health problems in Dutch primary care physiotherapy practice were selected for data collection: low back, neck, shoulder, hip and knee problems.[19] Based on the KNGF's clinical practice guidelines, the following PROMs were included for these problem categories:[20-23] the Quebec Back Pain Disability Scale, Neck Disability Index, (Quick) Disabilities of Arm Shoulder and Hand, Hip Osteoarthritis Outcome Scale, Algofunctional Index for the hip, Knee injury and Osteoarthritis Outcome Scale and Algofunctional Index for the knee.

One goal of the national quality program was to increase the use of PROMs, and it provided mandatory training for all participants including five educational workshops. During these workshops the specific PROMs for the program were introduced, their use in clinical practice was discussed (e.g. how to administer a PROM, how to interpret and discuss the results with patients, how to use PROMs for goal setting and monitoring etc.), and their psychometric properties and interpretation of scores were taught.

The baseline measures of the program showed poor PROM use. In 25.5% of all patients' records a PROM was used at intake, and in 12.2% a PROM was used both at intake and at follow-up.[17] Although PROM use increased substantially with the implementation strategy – to 71.2% at intake and 39.5% at both intake and follow-up – higher rates of implementation had been expected.[17] Especially the implementation at intake and follow-up were expected to be higher after finishing the implementation strategy, to be able to obtain a dataset that provided a valid representation of the patient population of a physiotherapist. For that reason, although the increase in PROM implementation was substantial, we still think the implementation is suboptimal. Due to this suboptimal implementation it remains unclear whether PROMs can fulfil their potential in physiotherapy practice.

It is well known that the knowledge and attitudes of professionals, and organizational context can influence the success of implementation.[24,25] Based on earlier studies we hypothesized that the demographic characteristics of physiotherapists and the characteristics of their practices influenced the use of PROMs.[26-30] Thus, the aim of this study was to identify the factors that influence the use of PROMs in Dutch primary care physiotherapy practice.

4.2

Methods

Design and setting

This was a cross-sectional study of Dutch primary care private physiotherapy practices.

Participants

We recruited 444 physiotherapists from 113 primary care practices in four **regional** networks to participate in pilot studies for implementing the quality program.[17]

Pilot studies

Between April 2013 and April 2015, we carried out an initial, 1-year implementation strategy using a different pilot study for each network. This strategy was developed on the basis of the scientific literature and adapted to the local context of each network using input obtained from the physiotherapists and stakeholders involved (KNGF, health insurance companies, patient representatives, and EHR software vendors). The implementation process in the **four** consecutive pilot studies applied action research[31] in a cyclical process according to the framework for implementing innovations in healthcare developed by Grol and Wensing.[32] After each pilot study, the implementation strategy was adapted using the lessons learned from that pilot.[17]
The pilot studies were approved by the Medical Ethical Committee of Radboud University Medical Center (registration #2014/260).

Data sources

We used two data sources to identify the factors associated with PROM use. For both sources, we retrieved the data at the follow-up measurement of the pilot studies, immediately after the implementation strategy was finished, but at different points since the pilots ended at different times. The data in the two data sources were linked using a unique participant identifier, which was registered in both the self-assessment questionnaire and the registry. This identifier did not reveal the identity of the physiotherapist participants.

Self-assessment questionnaire

The first data source contained the responses to a self-assessment questionnaire (see online Appendix 4.1). Using online survey software, we sent out this questionnaire to all the participants after the pilot studies ended. The questionnaire was based on an existing questionnaire and adapted for our study in collaboration with the initial developers (AS, SB, RP). Three questions in the original questionnaire were deleted because they presumed that physiotherapists did not have EHR-systems – but they do because having them was obligatory for participating in a pilot – and three items were added to obtain information about how the PROMs were used.

National registry

The second data source was the national registry of KNGF's national quality program, which contains data describing the process and outcomes of physiotherapy care. Each month, the participants uploaded these data (see online Appendix 4.2) from their EHR-system to the registry. We used the data for completed treatment episodes, collected as follow-up data over 5 months after the implementation strategy of each pilot was finished.

The national registry is hosted by an independent entity – a trusted third party (TTP) – which oversees the integrity of the database and the data transactions. Based on a data protocol that complies with regulations for privacy and data transfer, and registered with the Dutch Data Protection Authority, this TTP manages the delivery of data from the EHR-systems to the national registry and from the national registry to our research institute.

Outcome measures (dependent variables)

The two data sources reflected two (dependent) outcome measures: (1) the self-reported use of PROMs was determined using the data retrieved from the self-assessment questionnaire (see online Appendix 4.1);[25] and (2) the PROM use registered in the EHR-systems was determined using the data collected in the national registry (see online Appendix 4.2).

The question about self-reported PROM use on the questionnaire that we adapted had consisted of six response categories. To obtain categories that would be comparable in size, self-reported PROM use was included as an outcome variable with four ordinal categories (0–20%; 21–50%; 51–80%; 81–100%) in the first analysis. The PROM use registered in the EHR-systems was included in the second analysis as a continuous outcome variable (0–100%).

We used two outcome variables because both types of PROM use might have been biased. The literature has shown that misperceptions between self-reported and actual use of instruments, such as guidelines and measurement instruments (such as PROMs) are quite common.[33] In addition, the data collected in the national registry was potentially incomplete.[34] This is because during the initial pilot, the registry and its infrastructure were still being developed and improved. Data collected routinely in a clinical registry are prone to have missing data due to the uncontrolled setting.[35,36] Therefore the completeness of all the records could not be guaranteed.

Factors (independent variables)

To identify the factors that influenced the use of PROMs, several items on the self-assessment questionnaire were included as independent variables. This resulted in nine independent variables divided into five categories: demographic characteristics; characteristics of physiotherapy practices; physiotherapists' knowledge; physiotherapists' attitudes; and contextual factors related to PROM use.

Based on consensus we have reached, three variables – gender (male / female), age (continuous variable) and work experience (continuous variable) – were included in the category *demographic characteristics*. Gender was included to determine whether there were differences between men and women as proposed by the SAGER guidelines.[28] Age and work experience were included because we hypothesized that both older and more experienced physiotherapists would be less inclined to implement changes, such as using PROMs.[29, 30]

The category *characteristics of physiotherapy practices* included four variables: number of full-time equivalent (FTE) physiotherapists in a practice (≤4.5 to >4.5 FTE), whether a practice was certified, whether innovative primary care practices with accreditation for high quality standards of care were provided (yes / no), and the type of EHR-system used (supportive / non-supportive of using PROMs). We hypothesized that practices with more FTEs would achieve a better use of PROMs, since larger practices tend to have higher profit margins, and this enables them to invest more heavily in quality improvement – for example, by appointing a team member who assists in optimizing the use of PROMs. The presence of such a team member has been shown to be a factor in implementing quality-enhancing initiatives.[30] We also hypothesized that a physiotherapy practice that was certified would make better use of PROMs since participating in a network that has similar goals – such as having high quality standards – appears to be a driver for implementing new or improved procedures.[30]

The type of EHR-system used was characterized as being either supportive or non-supportive of using PROMs. A supportive EHR system was defined as a system that: (1) included an online portal where patients could complete PROMs, (2) programmed the correct version of each PROM, and (3) listed the PROMs in an easy to find location on its website. Supportive EHR-systems were hypothesized to facilitate a high level of PROM use.[37] In our study, only one EHR-system fulfilled all three criteria and was categorized as supportive; the other three were categorized as non-supportive.

The third, fourth and fifth categories of independent variables represented items on the self-assessment questionnaire that were clustered as continuous variables into three factors: physiotherapists' knowledge, physiotherapists' attitude and the contextual influence on physiotherapists of the concept of PROMs and their use in clinical practice. Higher scores on these variables reflected greater knowledge, a more positive attitude, and a more facilitating environment for using PROMs in clinical practice, respectively. These factors are known to influence the implementation of an innovation.[24,25] Clustering the items into the three factors was based on consensus we have reached as authors (SD, RN, PW & GM) and was verified by a confirmatory factor analysis (see online Appendix 4.3). The independent variables are shown in Table 4.1, and the questionnaire is reproduced in online Appendix 4.1.

Table 4.1 | Independent variables included in our analysis

Variable	Continuous?
Demographic characteristics of participants	
Gender (male/female)	No
Age, y	Yes
Work experience, y	Yes
Characteristics of practice	
Certified-practice (yes/no)	No
Number of FTEs (≤4.5 to >4.5)	No
EHR system (provider supportive-/non-supportive of using PROMs)	No

▶

Table 4.1 continued

Variable	Continuous?
Factor	
Knowledge of physiotherapist	Yes
Attitude of physiotherapist	Yes
Context of physiotherapist	Yes

FTE = full-time equivalent; EHR = electronic health record; PROM = patient-reported outcome measure.

Data analysis

To test whether the participants resembled the national reference data on the descriptive variables of age and gender, one sample *t*-test was executed.

We used two distinct regression models to identify factors associated with PROM use. In the first model, regression analysis using the self-reported use of PROMs as the ordinal dependent variable was conducted. Univariate ordinal logistic regression analysis was used to test whether the selected independent variables were associated with the dependent variable. Variables with a *p*-value of <0.2 in the univariate analysis were included in a backward multivariate ordinal logistic regression analysis. Using backward techniques, the initial multivariate analysis included all variables that had a *p*-value of <0.2 in the univariate analysis. The final multivariate model included only those independent variables that showed a significant association (*p*-value of <0.05) with the dependent variable.

The second regression model used PROMs registered in the EHR-systems as a continuous dependent variable. First, a univariate linear regression analysis was performed to decide whether the selected independent variables were associated (*p*-value of <0.2) with the dependent variable. Second, a multivariate linear regression analysis was performed, in which the variables with a *p*-value of <0.2 in the univariate analysis were included. This regression model analysed which independent variables were significantly associated (*p*-value of <0.05) with the dependent variable.

All assumptions required for the analysis were met. IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, NY) was used for all analyses.

4.3
Results

Participants and their use of PROMs

The self-assessment questionnaire was returned by 431 physiotherapists (response rate of 97%). They did not always answer all the questions, which resulted in different response rates per item. Their demographic characteristics represented a significantly different sample compared to the national reference data.[38] Data from the self-reported PROM use and the PROM use registered in the EHR-systems showed that 21.6% and 29.8% of the participants, respectively, used PROMs for >80% of their patients (see Table 4.2).

Table 4.2 | Descriptive Statistics of Participants' Characteristics

Variable	Study data (%)	Reference data, % (*N*=26.339)
Age, y (*N*=347)		
<25	2.0	5.4*
25–39	36.0	42.5**
40–59	53.9	43.1**
60–67	8.1	8.7**
≥68	0.0	0.3 N/A
Gender (*N*=431)		
Male	44.3	39.8**
Female	55.7	60.2**
Work experience, y (*N*=244)		
0–10	33.6	N/A
11–20	20.1	N/A
>20	46.3	N/A

▶

Table 4.2 continued

Variable	Study data (%)	Reference data, % (*N*=26.339)
Self-reported PROM use, in % of patients (*N*=365)		
0–20	19.2	N/A
21–50	25.6	N/A
51–80	33.6	N/A
81–100	21.6	N/A
PROM use registered in EHR-systems, in % of patients (*N*=322)		
0–20	23.9	N/A
21–50	23.9	N/A
51–80	22.4	N/A
81–100	29.8	N/A

* $p \leq 0.05$
** $p \leq 0.001$
PROM = patient-reported outcome measure; EHR = electronic health record.

Factors associated with self-reported PROM use

Univariate ordinal logistic regression analysis showed that the factors age, certified-practice, EHR-system, knowledge, attitude and context were associated (*p*-value of <0.2) with the dependent variable self-reported use of PROMs. The outcome of the multivariate analysis showed that the self-reported use of PROMs was associated with the factors EHR-systems supporting PROM use, and greater knowledge of PROMs. Both sets of results are shown in Table 4.3.

Factors associated with PROM use registered in the EHR-systems

Univariate linear regression analysis for PROM use registered in the EHR-systems showed an association (*p*-value of <0.2) with the factors certified-practice, EHR-system, knowledge, attitude and context. The outcome of the multivariate linear analysis showed that the PROM use registered in the EHR-systems, was associated with the use of EHR-systems supporting PROM use, and more knowledge of PROMs of physiotherapists. Both sets of results are shown in Table 4.4.

Table 4.3 | Univariate and multivariate ordinal logistic regression analyses using 'self-reported use of PROMs' as the dependent variable

Predictor variable	Univariate analysis: Odds ratio (95% CI)	Univariate analysis: Significance (*p*-value)	Multivariate analysis (*N*=331): Odds ratio (95% CI)	Multivariate analysis (*N*=331): Significance (*p*-value)
Demographic characteristics of physiotherapists				
Gender, female	1.26 (0.87, 1.83)	0.22	N/A	N/A
Age, y	0.99 (0.97, 1.00)	0.11*	N/A	N/A
Work experience, y	1.00 (0.98, 1.02)	0.78	N/A	N/A
Characteristics of physiotherapy-practices				
Certified-practice (yes)	7.75 (4.30, 13.96)	≤0.001*	N/A	N/A†
Number of FTEs, >4.5	1.23 (0.82, 1.86)	0.32	N/A	N/A
Supportive of EHR system	3.92 (2.47, 6.20)	≤0.001*	2.47 (1.52, 4.01)	≤0.001*
Other				
Knowledge	15.33 (9.3, 26.21)	≤0.001*	12.68 (7.32, 21.98)	≤0.001*
Attitude	4.30 (2.93, 6.30)	≤0.001*	N/A	N/A
Context	3.52 (2.57, 4.82)	≤0.001*	N/A	N/A

* Independent variable significantly influencing self-reported use of PROMs; $p<0.05$.
† Excluded due to high correlations with EHR-system.
PROM = patient-reported outcome measure; FTE = full-time equivalent; EHR = electronic health record.

Table 4.4 | **Univariate and multivariate linear regression analyses using 'PROM use as registered in the EHR systems' as the dependent variable**

Predictor variable	Univariate analysis		Multivariate analysis (*N*=228)	
	Unstandardized^ß (95% CI)	Significance (*p*-value)	Unstandardized^ß (95% CI)	Significance (*p*-value)
Demographic characteristics of physiotherapists				
Gender (female)	1.60 (−6.26, 9.45)	0.69	N/A	N/A
Age, y	0.06 (−0.31, 0.43)	0.75	N/A	N/A
Work experience, y	0.06 (−0.32, 0.44)	0.76	N/A	N/A
Characteristics of physiotherapy-practices				
Certified-practice, yes	37.78 (27.37, 48.18)	≤0.001*	N/A	N/A†
Number of FTEs, >4.5	−0.19 (−8.50, 8.13)	0.97	N/A	N/A
Supportive of EHR system	29.30 (21.16, 37.43)	≤0.001*	22.61 (8.55, 36.67)	0.002*
Other				
Knowledge	26.43 (18.51, 34.35)	≤0.001*	13.78 (4.99, 22.56)	0.002*
Attitude	14.92 (6.71, 23.13)	≤0.001*	2.79 (−5.60, 11.19)	0.51
Context	11.51 (4.80, 18.21)	≤0.001*	−2.80 (−9.63, 4.03)	0.42

* Independent variable significantly influencing self-reported use of PROMs; p<0.05.
† Excluded due to high correlations with EHR-system.
PROM = patient-reported outcome measure; EHR = electronic health record; FTE = full-time equivalent.

4.4
Discussion

This study showed that the use of PROMs in primary care physiotherapy practice is limited. Two factors, EHR-systems supporting PROM use and more knowledge about PROMs, were associated with greater self-reported PROM use, and with PROM use registered in the EHR-systems. Outcomes were comparable between the two methods of measurement.

The fact that the EHR-system used by a practice influences its use of PROMs has been reported for other professions in other countries; those results support our findings. For example, Sorondo and colleagues evaluated the use of a patient portal connected to the EHR-system to collect self-reported health information, including PROMs, used by primary care physicians in the United States; they found that technological difficulties limited the adoption of PROMs.[39] In addition, a review by Irizarry and colleagues showed that the success of implementing portals to collect patient-reported health information depended on their usability.[40]

The influence of knowledge on the use of outcome measures has been reported before.[11,25,41] Our study supports those findings for the specific use of PROMs, showing that higher levels of knowledge result in greater PROM use.

Both dependent variables showed that a relatively high percentage of the participants used PROMs in <50% of their patients, a finding that is comparable to other studies reporting on the use of measurement instruments including PROMs.[11-16] The factors identified in our study can play an important role in encouraging the implementation of PROMs in physiotherapy practice.
The strength of this study is that the factors influencing the use of PROMs in physiotherapy practice were identified on the basis of not only self-reported information but also real-world data obtained from a large cohort of physiotherapists.

Nevertheless, our study had some limitations. First, the participants significantly differed from the national reference data, which may limit the generalizability of the results. Second, although we used two sources of data about PROM use, both might be subject to bias. However, the data did not differ substantially and, using these two sources, similar factors associated with PROM use were identified. Finally, the questionnaire we used to determine self-reported PROM use has not been validated in physiotherapy practice.

4.5
Conclusion

This study shows that there is room for improvement in the routine use of PROMs in Dutch primary care physiotherapy practice. It contributes to the body of knowledge about the factors influencing PROM use and provides information that is: valuable for encouraging the use of PROMs and that can be readily used in physiotherapy practice. Key factors associated with greater PROM use are more supportive EHR-systems, and MORE KNOWLEDGE ABOUT PROMs on the part of physiotherapists.

To improve the use of proms in clinical practice, both the knowledge of physiotherapists and the level of support of ehr-systems need to be improved. Achieving the optimal use of proms is very important to be able to utilize their full potential, both within the clinical process and at the aggregated level. This optimal use could be achieved by organising active implementation strategies in which knowledge brokers play a crucial role. Using knowledge brokers is an emerging strategy that facilitates knowledge translation and exchange through interaction between researchers and end users.[42] for example, knowledge brokers stimulate active learning about how to achieve an optimal prom implementation. Active learning is based on social cognitive theory and has been shown to be effective in increasing knowledge.[43,44]

Another strategy for increasing the use of proms is to inform the suppliers of ehr-systems about their potential for stimulating prom use. Ehr-system suppliers should be encouraged to develop online portals where patients can complete their proms.

Future research should examine (1) whether increasing the usability of proms in ehr-systems also facilitates the routine use of proms in registering outcome data in the national registry and (2) what types of strategies have been successful at encouraging physiotherapists to implement proms both within the clinical process and at the aggregated level.

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4.6
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Appendix 4.1
The “PROM use self-assessment questionnaire”

The “PROM use self-assessment questionnaire”

Meerhoff[1,2], Stevens[3], Beurskens[3], van Peppen[4], van Dulmen[1] and van der Wees[1]

1 Radboud university medical center, Radboud Institute for Health Sciences, IQ healthcare, PO Box 9101, 6500 HB, Nijmegen, the Netherlands.
2 Royal Dutch Society for Physical Therapy (KNGF), Stadsring 159B, Amersfoort, the Netherlands
3 Zuyd University of Applied Sciences, Nieuw Eyckholt 300, Heerlen, the Netherlands
4 Utrecht University of Applied Sciences, Oudenoord 340, Utrecht, the Netherlands

The Royal Dutch Society for Physical Therapy supports the use of Patient Reported Outcome Measures (PROMS) and therefore recommends them in their guidelines. In clinical practice the actual use of these instruments is nonetheless suboptimal. To be able to develop more specific implementation strategy for the PROMs the following questionnaire has been developed.

Administering the questionnaire takes approximately 10–15 minutes

Name: ……………………………………………………………………………………………

Date: ……………………………………………………………………………………………

Part 1 | Questions about your PROM use

		I completely disagree	I disagree	I am in doubt	I agree	I completely agree	Measuring the area:
1	I know where to find PROMs.*	○	○	○	○	○	Practicality
2	I am able to implement PROMs together with my patients.*	○	○	○	○	○	Acceptability
3	I am able to interpret PROM results.*	○	○	○	○	○	Acceptability
4	Using PROMs does not affect my professional authority to make my own decisions.*	○	○	○	○	○	Acceptability
5	Using PROMs helps me to formulate a PT diagnosis.*	○	○	○	○	○	Acceptability
6	PROMs are useful in the evaluation of a treatment.*	○	○	○	○	○	Acceptability
7	I am able to use PROMs within my clinical reasoning process.*	○	○	○	○	○	Acceptability
8	PROMs have a positive influence on the quality of PT healthcare.*	○	○	○	○	○	Acceptability
9	It is important to register patient opinions objectively with PROMs.*	○	○	○	○	○	Acceptability
10	Using PROMs in clinical practice takes too much time.*	○	○	○	○	○	Acceptability

▶

Part 1 continued

		I completely disagree	I disagree	I am in doubt	I agree	I completely agree	Measuring the area:
11	I think my patients do think that using PROMs takes to much time.*	○	○	○	○	○	Practicality
12	When using PROMs I am able to include the wishes of my patients.*	○	○	○	○	○	Acceptability
13	I would like to use PROMs more often.*	○	○	○	○	○	Acceptability
14	I use PROMs in daily practice.*	○	○	○	○	○	Implementation
15	I have experienced the added value of PROMs.*	○	○	○	○	○	Acceptability
16	Patients are cooperative in using PROMs.*	○	○	○	○	○	Practicality
17	Using PROMs is a standard part of my clinical reasoning.*	○	○	○	○	○	Acceptability
18	I use PROMs with ... % of my patients.*	○ 0% ○ 1–10% ○ 11–20%	○	○	○	○ 21–50% ○ 51–80% ○ 81–100%	Implementation

Part 2 | Questions about the policy within your practice

	I completely disagree	I disagree	I am in doubt	I agree	I completely agree	Measuring the area:
19 PROMs are available.*	○	○	○	○	○	Practicality
20 Within our practice we have made arrangements on how to use PROMs.*	○	○	○	○	○	Acceptability
21 My superior(s) support the use of PROMs.*	○	○	○	○	○	Implementation
22 My supervisor(s) use PROMs in clinical practice themselves.*	○	○	○	○	○	Implementation
23 My supervisor(s) require PROMs are reported in our electronic health records*	○	○	○	○	○	Implementation
24 My colleagues also use PROMs in clinical practice.*	○	○	○	○	○	Implementation
25 In our practice we discuss how to implement PROMs.*	○	○	○	○	○	Implementation
26 The use of PROMs fits our work routine.*	○	○	○	○	○	Acceptability
27 When possible we send the PROMs to our patients electronically.*	○	○	○	○	○	Implementation
28 PROMs are administered by the patients themselves.*	○	○	○	○	○	Implementation

Part 3 | Personal information

29	Personal health provider code (for renumeration purposes):			N/A
30	Membership number KNGF:			N/A
31	Name:			N/A
32	Surname:			N/A
33	Address:			N/A
34	Postal code:			N/A
35	Residence:			N/A
36	Date of birth:			N/A
37	Gender:	○ Male	○ Female	N/A
38	Work experience as physical therapist (in years):			N/A
39	Do you work in more than one practice?	○ Yes	○ No	N/A
40	How many hours a week do you work as a physical therapist?			N/A
41	Specialty degrees as physical therapist:	○ Pediatric ○ Manual ○ Pelvic ○ Eudema	○ Geriatric ○ Psychosomatic ○ Sports ○ Orofacial	N/A
42	What type of employment (contract) do you have?	○ Employee	○ Owner	N/A
43	What are your personal goals for this pilot?			N/A

Part 4 | Practice information

44	Name practice owner:			N/A
45	Address of your practice:			N/A
46	Postal code of your practice:			N/A
47	City/town where your practice is situated:			N/A
48	Does your practice have more than one location:	○ Yes	○ No	N/A
49	Has your practice more than one practice code (for renumeration purposeses):	○ Yes	○ No	N/A
50	Practice code 1:			N/A
51	Practice code 2 (if applicable):			N/A
52	Practice code 3 (if applicable):			N/A
53	Total number of physical therapists working in your practice (all locations together)			N/A
54	Total number of full-time equivalent (FTE) staff working in your practice (all practice locations together)			N/A
55	Is (are) a secretary(s)/administrative staff working in the practice (all locations combined)?	○ Yes	○ No	N/A
56	If yes, how many hours per week?			N/A
57	Who is your EHR system provider			N/A
58	Is your clinic a so-called HKZ practice?	○ Yes	○ No	N/A
59	Is your clinic a so-called top practice?	○ Yes	○ No	N/A
60	Has your practice received a management audit by the insurance company?	○ Yes	○ No	N/A
61	I hereby declare I am sufficiently informed about the transfer of all our data from our Electronic Health Record system to the national registry of the KNGF and declare my willingness to participate in the project.	○ Yes		N/A

* Items selected as (outcome) variables for analysis.

Appendix 4.2

Technical specifications for Electronic Health Record suppliers

Patient characteristics	• Patient ID • Patient year of birth • Patient gender • Patient postal code
Structure variables	• Physical therapist ID • Practice ID • Number at Chamber of Commerce • Physical therapy license • Postal code of physical therapy practice • Address of physical therapy practice • Electronic Health Record system • Version number of the Electronic Health Record system
Process variables	• Referring clinician/specialist registered • Date of consultation • Performance code, indicating the type of intervention • Date of final evaluation • Reason for consultation • Location/pathology code • Duration of health conditions • Course of experienced health conditions • PT diagnosis registered • Current health issue a relapse • Co-morbidities registered • Expected recovery • Main treatment goal • Treatment episode duration • Achievement of treatment result • Reason end of treatment
Outcome variables	• Measurement instrument code, PROMs code • Measurement instrument, date • Measurement instrument, version number • Item scores on assessed measurement instrument • Sum score on assessed measurement instrument

Appendix 4.3

Factor loadings of the self-assessment questionnaire

	PCA loadings in category			
Question from self-assessment questionnaire	Context†	Attitude†	Knowledge†	
I know where to find PROMs.	0.225	0.189	0.659‡	Knowledge
I am able to implement PROMs together with my patients.	0.155	0.197	0.781‡	Knowledge
I am able to interpret PROM results.	0.152	0.216	0.750‡	Knowledge
Using PROMs does not affect my professional authority to make my own decisions.	0.252	0.209	0.737‡	Knowledge
Using PROMs helps me to formulate a physiotherapy diagnosis.	0.087	0.656‡	0.086	Attitude
PROMs are useful in the evaluation of a treatment.	0.114	0.633‡	0.306	Attitude
I am able to use PROMs within my clinical reasoning process.	0.456	0.081	0.674‡	Knowledge
PROMs have a positive influence on the quality of physiotherapy healthcare.	0.111	0.800‡	0.099	Attitude
It is important to register patient opinions objectively with PROMs.	0.139	0.742‡	0.228	Attitude
Using PROMs in clinical practice takes too much time.	-0.037	0.662‡	0.115	Attitude
When using PROMs I am able to include the wishes of my patients.	0.446	0.110	0.680‡	Knowledge
I would like to use PROMs more often.	-0.043	0.730†	−0.111	Attitude
I use PROMs in daily practice.	0.419	0.118	0.726†	Knowledge
I have experienced the added value of PROMs.	0.311	0.533†	0.458	Attitude
Using PROMs is a standard part of my clinical reasoning.	0.197	0.748†	0.209	Attitude

Appendix 4.3 continued

	PCA loadings in category			
Question from self-assessment questionnaire	Context†	Attitude†	Knowledge†	
PROMs are available.	0.543†	0.052	0.344	Context
Within our practice we have made arrangements for how to use PROMs.	0.749†	0.103	0.079	Context
My superior(s) support the use of PROMs.	0.750†	0.145	0.202	Context
My supervisor(s) use PROMs in clinical practice themselves.	0.766†	0.074	0.263	Context
My supervisor(s) require that PROMs be reported in our electronic health records.	0.792†	0.062	0.213	Context
My colleagues also use PROMs in clinical practice.	0.706†	0.099	0.366	Context
In our practice we discuss how to implement PROMs.	0.738†	0.091	0.133	Context
The use of PROMs fits our work routine.	0.618†	0.400	0.252	Context

† The items included on the identified factors showed an internal consistency of 0.93, 0.88 and 0.90 on Context, Attitude and Knowledge, respectively.

‡ Only factors with a factor loading of >0.5 were included.

PCA = principal component analysis.

Chapter 5

Exploring the perspective of patients with musculoskeletal health problems in primary care on the use of Patient Reported Outcome Measures to stimulate quality improvement in physiotherapist practice; a qualitative study

Guus A. Meerhoff
Simone A. van Dulmen
Marjo J.M. Maas
Annick Bakker-Jacobs
Maria W.G. Nijhuis-van der Sanden
Philip J. van der Wees

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Abstract

Background | Patient-reported outcome measures (PROMs) in clinical practice might enhance patient-centeredness and effectiveness of physiotherapy practice. Although patients have a crucial role in using PROMs, little is known about their perspective on its usefulness.

Purpose | Explore the perspective of patients with musculoskeletal health problems on using PROMs for quality improvement in primary care physiotherapy practice, and determine what barriers and facilitators patients perceive.

Methods | Semi-structured interviews were performed in 21 patients recruited from primary care physiotherapy practice and analysed using theoretical thematic analysis. Barriers and facilitators on PROMs implementation were categorised into four predefined domains conform Fleuren et al.

Results | Across all domains, three major themes were identified: Practicality, Interaction with the physiotherapist for decision-making, and Sharing information outside the clinical context. Generally, PROMs were perceived practically applicable instruments with added value to the interaction with the physiotherapist for shared decision-making and for stimulating quality improvement. The perceived barriers were: difficulties in administering PROMs for patients with poor computer skills, suboptimal efficiency when PROMs were administered at the expense of the consultation, the insufficient added value of PROMs for patients with recurrent health problems, and reluctance about sharing aggregated data for accountability purposes.

Limitations | The dependence on the participating physiotherapists in patient recruitment might have resulted in selection bias.

Conclusion | Patients perceive that using PROMs has an added value in primary care physiotherapy practice. Optimising implementation using tailored implementation strategies related to the identified barriers in all four domains might further improve the use of PROMs in clinical practice.

5.1
Introduction

As defined by the Institute of Medicine (IOM), high-quality healthcare is *safe*, *timely*, *equitable*, *effective*, *efficient*, and *patient-centred*.[1] To better align the quality policy of the Royal Dutch Society for Physiotherapy (KNGF) with IOM's quality definition, in 2013 KNGF decided to broaden the scope of its quality policy, for primary care physiotherapy practice. Besides focusing on process-related aspects of clinical reasoning in the physiotherapy care process, such as the administration of history taking, the implementation of clinical practice guidelines (CPGs), and requirements on continuous professional development, KNGF added outcome-related elements to their national quality policy by focusing on patient-reported outcome measures (PROMs). The focus on PROMs was aimed at stimulating the quality of physiotherapy care on IOM's aspects of patient-centeredness and effectiveness.

PROMs are questionnaires or single-item scales measuring outcomes that may focus on a generic domain, for example, pain; or are condition-specific, and focus for example on components of patients' functioning related to a specific disease or condition.[2] In the clinical process, PROMs are considered important for aspects that stimulate patient-centeredness such as shared decision-making, goal setting and monitoring of outcomes.[3-13] Additionally, when aggregated across patients, PROMs data can be used for monitoring and quality improvement, and for public reporting of outcomes for accountability purposes to external stakeholders, such as insurance companies and policy makers.[8,9,3-17]

Notwithstanding the potential benefits of PROMs, and the fact that PROMs are recommended in clinical practice guidelines,[18–22] their implementation in clinical practice is suboptimal (12–69%).[23-28] Reasons for this suboptimal implementation are a lack of knowledge about the use of PROMs and interpretation of PROM scores, difficulty in changing professional behaviour to start using PROMs, and limited organizational support to use PROMs (such as the lack of available time and lack of support to integrate PROMs into the electronic health record systems).[23,26,27,29-31]

To determine if the implementation percentage of PROMs in primary care practice could be increased, and thus, if PROMs could assist physiotherapists in increasing patient-centeredness and effectiveness of their interventions, KNGF included the implementation of PROMs as part of a national quality program titled 'Quality in Motion'(QIM). Within the QIM program, peer assessment and feedback was used in primary care physiotherapy as an implementation strategy to enhance the patient-centeredness and effectiveness of physiotherapy practice.[32] Physiotherapists were stimulated to use PROMs as a tool to clarify the patient problem, to set goals in dialogue with the patient, to monitor the treatment process, and to evaluate the treatment effect. Moreover, aggregated PROM data were used to provide feedback on practice outcomes.

An evaluative study, that followed 355 physiotherapists in primary care practice during the one-year implementation strategy, showed that the routine use of PROMs increased in clinical practice; nevertheless, it did not reach the expected level.[32]

Since patients have a crucial role in the implementation of PROMs, it is relevant to get insight into their perspective on its use. Despite the availability of studies on the use of PROMs,[23–25,27,28,33] and their barriers and facilitators,[23,26,27,29-31] only a few publications have evaluated the patient's perspective on PROMs in physiotherapy practice.[34,35] These studies identified that PROMs assisted in goal-setting, by physiotherapists and their patients, and in the reflection on the results. The small number of studies made it relevant to obtain a more in-depth understanding of the patient‘s perspective on the use of PROMs.

The purpose of this study was to explore the perspective of patients with musculoskeletal health problems on using PROMs to stimulate patient-centeredness as one of the components of health-care quality in primary care physiotherapy practice and to determine which factors patients perceive as barriers or facilitators for using PROMs.

5.2

Methods

Study design and setting

This qualitative study was conducted in Dutch primary care physiotherapy practice, embedded in the QIM program. To identify the perspective of patients with musculoskeletal health problems in primary care practice on using PROMs and to identify the factors they perceive to be barriers and facilitators, we used theoretical thematic analysis techniques (Braun et al., 2006) based on the framework of Fleuren et al.[37] This framework identifies generic determinants that influence the implementation of innovation in healthcare divided over the following four domains: 1) characteristics of the *socio-political context*, e.g., rules, legislation, and patient characteristics; 2) characteristics of the *organization*, e.g., staff turnover or decision-making processes in the organization; 3) characteristics of the *user* of the innovation, e.g., knowledge, skills, and perceived support from colleagues; and 4) characteristics of the *innovation*, e.g., complexity or relative advantage.[37] These domains were used to identify more specific factors that the selected patients perceived to influence the implementation of PROMs in the Dutch primary care physiotherapy practice.

The COREQ-32 criteria for reporting qualitative research was used to design and report the current study.[38]

Participants

A convenience sample of 15 physiotherapists from two regional networks participated in our study. They were involved in the one-year QIM program and voluntarily asked to invite one to five patients each. Patients could be included when the treatment episode of the selected patients was started during or after the physiotherapists followed the QIM-program. An additional inclusion criterion was that patients were treated for musculoskeletal problems.

During the one-year QIM program, physiotherapists were instructed on how to use PROMs in the diagnostic and treatment process and as feedback on the practice outcomes. All physiotherapists agreed to participate and were provided with training on how to involve their patients in the reasoning and shared decision-making process. Additionally, after a verbal introduction was given, the patients received a printed invitational letter. If patients were willing to participate, their name and telephone number were provided to the researcher (GM). The secretarial staff of the research team then contacted these participants to schedule an appointment for the interview. All participants provided their informed consent prior to the interview.

Data collection

After the retrieval of an informed consent form, one researcher (GM) conducted all interviews by telephone between January and March 2017. Each interview was audiotaped and took between 25 to 35 minutes. Before the start of the interview, the researcher (GM) introduced himself as a physiotherapist doing a PhD, no further information was provided. Apart from the telephone interviews, there was no contact between the research team and the participants. The interviews were semi-structured and based on an interview guide developed by the research team (GM, SD, MM, PW, RN). The relevant characteristics of the complete research team are provided in Appendix 5.I.

In search of generic and more specific factors influencing the implementation of PROMs, this interview guide covered all domains from Fleuren et al.[37] The first part of the interview contained open questions on the use of PROMs in clinical practice. In the second part, the patients were informed about the possibility to use PROMs results on an aggregated level as management information to monitor the performance of physiotherapists or their practice. Thereafter their perspective on such use was explored. Examples of questions were: ‘Please explain what are the pros and the cons of completing such questionnaires?’; ‘What is the effect of (not) discussing the PROMs results with you?’; ‘What is your opinion on using the bundled PROMs results between colleagues in trying to improve their clinical work?’

During the process of interviewing, the guide was refined using the field notes that were taken based on the responses of the participants (see Appendix II for the complete interview guide). Data collection proceeded until saturation was reached. Saturation is defined as the degree to which new data repeated what was expressed in the previous data and redundancy is achieved.[39]

Data analysis

We used a theory-driven approach to thematic analysis[36] to structure and analyse the interview data. The framework of Fleuren et al.[37] served as our theoretical scope to identify generic and more specific factors affecting implementation.

We conducted the analysis in six steps. First, the semi-structured interviews were transcribed verbatim, the transcripts were then sent to the participants for approval, and after the approval was received, they were entered into Atlas.ti. Atlas.ti is a software solution for qualitative analysis that enables researchers to store data, assign codes, merge codes into higher order codes, and link codes. Second, two researchers (GM & AB) independently coded the first three transcripts. Third, after this initial coding, both researchers discussed the codes in order to reach consensus. If no consensus was reached, a third researcher (PW) was consulted. This process resulted in an initial code-book. Fourth, the remaining transcripts were analysed by GM and AB. When necessary, new codes were added during the analysis of the remaining transcripts. Fifth, the coding results were discussed during a consensus meeting similar to phase 3. In the sixth phase, during three face-to-face discussion rounds, the research team (RN, SD, AB, MM, PW, GM) identified subthemes and themes by the constant comparison of codes, representing the actual factors that were perceived to have an impact on the implementation. Subsequently, the identified factors were linked to the domains of the framework of Fleuren et al.[37]

5.3

Results

Twelve of the 15 participating physiotherapists successfully invited 23 patients (1 to 5 patients per physiotherapist) who were treated within the Dutch primary care physiotherapy practices and for which the treatment costs were reimbursed by the insurance companies. Two patients were not able to participate in the interview due to personal circumstances. The analysis of interviews 19–21 revealed no new information so saturation was assumed, and practices were asked to stop inviting new patients.

The mean age of the participating patients was 56.3 years (range 24–76 years). The participants were comprised of males (*N*=6) and females (*N*=15), younger (18–35 years) (*N*=2), middle-aged (36–55 years) (*N*=7), and older patients (56–80 years) (*N*=12), patients with Dutch (*N*=19) and foreign origin (*N*=2), patients with acute health problems (*N*=14) and chronic health problems (*N*=7), and patients who visited the physiotherapist with a new health problem (*N*=15), as well as patients who had a recurrent health problem within two years, as registered in the electronic health record of the patient (*N*=6). All participants were fluent in Dutch. The participants underwent short (1–4 treatments) (*N*=2), average (4–12 treatments) (*N*=11) and long (>12 treatments) episodes (*N*=8) of treatment.

The patients that were included in this study presented health problems related to the musculoskeletal domain in the neck, shoulder, low back, hip, knee, and foot. The Dutch versions of the Numeric Pain Rating Scale (NPRS), the Visual Analogue Scale (VAS), the Hip Osteoarthritis Outcome Scale (HOOS), the Knee Osteoarthritis Outcome Scale (KOOS), the Neck Disability Index (NDI), the Quebec Back Pain Disability Scale (QBPDS), and the Patient-Specific Complaints (PSC) were the PROMs that were filled out by the interviewed patients. Depending on the infrastructure of the clinic and the preferences of the physiotherapist, the PROMs were filled out using paper and pencil or online completion methods. Preferably the PROMs were filled out at the start and the end of a treatment episode.

Three major themes were identified in the data analysis: *Practicality*, *Interaction with the physiotherapist for decision-making*, and *Sharing information* outside the clinical context. In Table 5.1, the themes and subthemes are described, linked to the domains of Fleuren et al.[37]

Table 5.1 | The domains, themes, and subthemes on the patient's perspective using PROMs in clinical practice

Fleuren's domains	Theme	Subtheme
Organization Innovation	Practicality	• Applicability • Administering PROMs • Efficiency • Required time investment
User Innovation	Interaction with the PT for decision-making	• Communication • Diagnostics and evaluation • Patient-centeredness • Self-awareness • Reflection on results
Socio-political context Innovation	Sharing information outside the clinical context	• Using data for quality improvement • Sharing data with insurance companies

Practicality

The practicality theme defines the issues patients perceived by completing PROMs and is divided into four subthemes: *applicability*, *administering PROMs*, *efficiency*, and *required time investment*. The relevant quotes for these subthemes are described in Table 5.2. Within the framework of Fleuren et al.,[37] practicality and its subthemes relate to the domains of *Organization and Innovation*.

Table 5.2 | Quotes related to the theme 'practicality'

Subthemes	Quotes
Applicability	"Yes, the patient reported outcome measures (PROMs) are applicable to my health problem, and therefore, it's relevant to answer such questions." "The disadvantage of such questionnaires is that they measure a specific moment in time. That is difficult since my health problems differ each day. Every once in a while when I fill in the questionnaire on a relatively good day I wonder if my physiotherapist gets a representative picture"
Administering PROMs	"Well, we are asked to complete the questionnaire using a computer and that is a little difficult for me because I am a little older and… well, it is only recently that we have had a computer".
Efficiency	"I think it is more convenient to fill in the questionnaire when you are at home, at a time that it suits yourself. At least then it will not go at the expense of your consultation time… or it prevents that you will have to stay at the practice to fill in the questionnaire after the treatment…"
Required time investment	"So, doing the follow-up and building up a patient-file, will take up more time… However, I think that the advantages of building up such a file outweigh the disadvantages."

In general, patients judged the PROMs to be *applicable*. Not all items are relevant for each patient, but the patients understood that this was inevitable when using such generally applicable questionnaires. Some patients had difficulties deciding how to score the items of the PROMs, especially when health problems fluctuated.

The preferences of patients on how to *administer PROMs* differed. When patients have little affinity with computers they preferred the paper version. Others preferred to fill out the PROMs online because it provided the patients with the opportunity to carefully read and complete the PROMs at a self-chosen moment without losing their consultation time, which increased the efficiency.

Although using PROMs was seen as important, it bothered patients when filling out the PROMs at the expense of their consultation time. Other patients had the perception that using PROMs stimulated *efficiency* since physiotherapists were better able to prepare themselves for the consultation.

Patients stated that the *required investment of time* to fill out the PROMs, which was 10–15 minutes on average, was an investment that everyone was willing to make. Patients perceived that the benefits of administering the PROMs, which helped to build-up a patient-file, outweighed the disadvantages.

Interaction with the physiotherapist for decision-making

Patients perceived that the PROMs were being used by the physiotherapist in clinical practice to support their decision-making. Within this theme, five subthemes were identified: *communication*, *diagnostics and evaluation*, *patient-centeredness*, *reflection on results*, and *self-awareness*. The relevant quotes for these subthemes are described in Table 5.3. Using the framework of Fleuren et al.,[37] this theme and its subthemes mainly related to the User and Innovation domains.

Table 5.3 | Quotes related to the theme 'interaction with the PT for decision-making'

Subthemes	Quote
Communication	"PROMs are probably useful for patients who visit their PT for the first time. For me, they are not useful anymore. I have visited my PT before with these health problems. Therefore, I know why I visit my PT, I know my PT treats me well, and I know that 'the' treatment is effective. Therefore, I wonder: why should I keep on completing these questionnaires, even though we already know what 'the' treatment looks like."
Diagnostics and evaluation	"Obviously the benefit of using PROMs is that PTs can prepare themselves for my visit. Using the PROM-results, your PT can analyse what might trigger the health problem and think about the intervention they might use. At a later phase, when the PROMs are completed again, they could analyse the progression did the pain decrease or is it completely resolved?"
Patient-centeredness	"By administering questionnaires, the PT can optimally adjust his treatment plan, with the advantage, I presume, for the patient that a sort of a custom-fit plan arises. You'll get more personal advice, and therefore, a more personal trajectory."
Reflection on results	"I must say that this reflection upon the results really has an added value. It unravels the underlying thoughts, which might explain differences between the answers on the questionnaire and the things that have been said during the intake."

▶

Table 5.3 continued

Subthemes	Quote
Self-awareness	"I think that the questionnaires have helped me clarify my health problems, as completing the questionnaire provides me with a clearer picture of my health problems. ... And when I am at the PT practice and am asked about my health problems, then I only start to think about it at that time... then you wonder at what moments during the week is the pain actually present. ...the benefit of using the questionnaires is that you've already written that down. Indeed I must say that that is a real big benefit."

New patients felt that using PROMs stimulated *communication* with their physiotherapist. Patients that visited their physiotherapist with recurrent health problems identified the added value of PROMs in clarifying their problems and creating self-awareness, but they did not perceive the benefits in *communication*. They were familiar with their therapist and rather preferred talking directly to their physiotherapist.

Most of the interviewed patients thought that using the results of the PROMs assisted in the process of *diagnostics and evaluation*. Nevertheless, some patients with recurrent health problems, stated that the added value of PROMs was less apparent since their physiotherapist was already familiar with their problem. In addition, according to most patients, PROMs contributed to the *patient-centeredness* of physiotherapy care. It helped patients formulate problems and it enabled physiotherapists to make a treatment plan tailored to the specific problems of their patients. Some patients who visited their physiotherapist with a recurrent health problem perceived that PROMs did not increase patient-centeredness. They did not recognise the added value of discussing the PROM-results for deciding the best treatment options. They reasoned that using PROMs merely stimulated talking about health issues, but stated that valuable treatment-time was wasted to resolve their health issues.

Overall, patients experienced that their physiotherapist *reflected on the results* of the PROMs scores in the clinical consultation. This was appreciated by the patients since it gave meaning to the effort they made to fill out the PROMs, and it provided valuable additional information that could be used by the physiotherapist. Finally, almost all patients reported that completing the PROMs increased *self-awareness* of their health problem and helped them formulate the (severity of the) health problem.

Sharing information outside the clinical context

This third theme identified the patient's perspective on sharing the collected information. This theme was divided into two subthemes: *sharing data with insurance companies* and *using data for quality improvement*. The relevant quotes for these subthemes are described in Table 5.4. Within the framework of Fleuren et al.;[37] sharing information outside the clinical context was mainly related to the domains *Innovation* and *Socio-political context*.

Table 5.4 | Quotes related to the theme 'sharing information outside the clinical context'

Subtheme	Quote
using data for quality improvement	"It might trigger PTs to learn from each other when results are compared."
sharing data with insurance companies	"Well, as soon as the collected data become publicly available and end up in the commercial circuit... then you are absolutely not sure that it will trigger the positive effect that is pursued. Therefore, I think that is a disadvantage of using the data towards insurance companies, to obtain external transparency... because insurance companies are commercial entities, for whom obtaining profit is a central theme. Also, I doubt in what way the data will be used....".

Patients uniformly supported the use of the results of the PROMS on an aggregated level to stimulate quality improvement by enabling healthcare professionals to learn from each other. The majority of the patients were reluctant about sharing data with insurance companies to achieve external transparency for accountability purposes, predominantly due to the uncertainty about how these commercial organizations would use these data. Patients feared that external transparency would give insurance companies too much influence, which is merely used to obtain commercial profits. This was perceived as threatening.

Nevertheless, some favoured the external transparency to insurance companies for accountability purposes since this enabled insurers to fulfil their societal responsibility in increasing quality and maintaining affordable healthcare. Others agreed that transparency to external stakeholders for accountability purposes was important but they doubted if insurance companies, due to their commercial role, were the best stakeholders for this role. One patient suggested that an independent party should guide the use of aggregate data as an accountability instrument, as such parties would not have the commercial interest of that of insurance companies.

In summary, the results show that most of the identified subthemes were perceived to be both barriers and facilitators for the use of PROMs. In Table 5.5 a summary of the main findings is presented.

Table 5.5 | A summary of the identified barriers and facilitators per subtheme

Subtheme	Barrier and facilitator
Theme 1: Interaction with the PT for decision-making	
Applicability	In general, patients identified the applicability as sufficient, which facilitated the use of PROMs. In patients with fluctuating health problems deciding how to score the items of the PROM was difficult and perceived to be a barrier.
Administering PROMs	Only in patients with fewer computer skills, the digital administration of PROMs was seen as a barrier. All other patients perceived it as a facilitator.
Efficiency	Patients who were able to fill in the PROMs before their consult perceived the PROMs to be a facilitator, since their physiotherapist was able to better prepare himself. Patients who needed to fill in the PROMs at the consult perceived a lower efficiency and identified it as a barrier since their time to be treated was less.
Required time investment	None of the patients perceived the required time investment to be a barrier.
Theme 2: Practicality	
Communication, Diagnostics and evaluation, Patient-centeredness, Self-awareness, Reflection on results	• Patients that visited their PT with a new health problem thought PROMs to be facilitators, and patients that visited their PT with recurrent health problems identified them as barriers. • PROMs are identified as facilitators, stimulating self-awareness of patients and the reflection upon the results between patients and physiotherapists.
Theme 3: Sharing information outside the clinical context	
Sharing data with insurance companies	Some patients perceived this to be a facilitator, to enable the insurance companies to fulfil their societal role to increase healthcare quality and maintain affordability. Others perceived this as a barrier since they were suspicious about the way the data would be used by these commercial organisations.
Using data for quality improvement	All patients perceived this to be a facilitator.

5.4
Discussion

This study showed that patients perceived that the use of PROMs had an added value in primary care physiotherapy practice. Among patients with musculoskeletal health problems in primary care, this study identified three themes representing their perspective on the use of PROMs to stimulate quality improvement: 1) practicality; 2) interaction with physiotherapist for decision-making; and 3) sharing information outside the clinical context. The subthemes of these three themes were identified as both barriers and facilitators for using PROMs in physiotherapy practice. Overall, barriers and facilitators were found in all the domains of Fleuren et al.[37] socio-political context, organization, user, and innovation, confirming the relevance of the domains identified by Fleuren et al.

Basch et al. (2017) stated that some patients might be particularly unlikely to respond when collecting PROMs because of factors such as health literacy, language barriers, or functional or cognitive limitations.[40] They stated that "collecting PROMs data from these patients was challenging, but can be enhanced by using well-designed PROMs collection systems, appropriate technology-assisted options, or supportive processes".[40] Such non-responders, as Basch et al. (2017) described, might trigger the discrepancies in participation rates among certain patient populations and could lessen the value and generalisability of outcomes measurement.[41] To prevent the occurrence of this loss in generalisability, it is probably most effective to invest in optimal supportive processes. Besides using e-mail, an example of such support could be having a tablet in the waiting room and a secretarial person who could assist if necessary, a solution that has shown to be effective in patients with renal disease.[42] In addition, the format of the presentation could also be changed from written questions to a more visual or verbal presentation, which, as shown in Dutch primary physiotherapy care,[43] potentially facilitates the administration of PROMs.

Increasing the implementation of the online administration of PROMs also avoids that the administration of the PROM is done at the expense of the consultation time, which increases efficiency.

Multiple papers underpin the added value of PROMs on communication and diagnostics and the evaluation of the treatment.[3-13,44] Nevertheless, not every patient benefits from PROMs Greenhalgh et al. (2017) state that "patients valued both standardised and individualised PROMs as a tool to raise issues, but thought is required as to which patients may benefit and which may not".[9] In addition, Lohr et al. (2009) explained that PROMs could help patients communicate their needs and concerns if the PROMs collected information that had a high priority for them.[45]

The added value of patient-centred care (e.g., by stimulating shared decision-making) and increasing self-management, which could both be achieved by the use of PROMs,[9,13,15] is shown in patients with long-term conditions, such as chronic pain.[46] Nevertheless, in our study patients suffering from recurrent musculoskeletal health problems did not feel that their needs were being met using PROMs. We hypothesised that these patients might not feel the benefits of PROMs since this patient category may typically visit their physiotherapist on an intermittent basis, only when their complaints recur. During such intermittent visits, comparable treatment modalities may be provided with similar perceived effectiveness. Therefore, this patient group may already have experiences and expectations about the treatment that would be provided, and a strong belief that the treatment would help them. They might not be aware of the possible other treatment options which could be decided upon completion of a PROM. Therefore, patients may not feel their needs are being met using PROMs.

One could imagine that when a similar study was executed in long-term rehabilitation patients with neurological conditions, this might have resulted in more positive findings towards PROMs. This latter patient category often visits their physiotherapist for a prolonged period of time, during which PROMs are used as a monitoring tool to evaluate progress and to stimulate self-management.

Besides the possible influence of the patient population on the perceived usefulness of PROMs regarding decision-making, we hypothesise that in the end, the physiotherapist has a crucial role in how PROMs are experienced. Daykin et al. (2004) already identified that the health beliefs of physiotherapists were predominantly biomedical rather than bio-psychosocially focussed.[47] To be able to perceive the added value of PROMs in clinical decision-making, a further shift to the bio-psychosocial model regarding the health beliefs of physiotherapists is needed, since PROMs are instruments focussed on this bio-psychosocial domain. In addition, physiotherapists need to be trained on how to implement PROMs in clinical practice (e.g., being able to explain to patients the relevance of collecting information using the PROMs). Swinkels et al. (2011) have already shown that knowledge and skills were lacking in the implementation of PROMs.[26] Additionally, Stevens et al. (2017) showed that proper implementation of PROMs, by training physiotherapists, increased the experienced shared-decision making and goal-setting.[48] Another way to explain the importance of PROMs to inform shared decision-making is by developing an instructional video that is integrated into the PROM, which can be shown during or before administration.

The reluctance of patients towards using their data for accountability purposes, defined by Braithwaite et al. (2011) as performance management, had already been identified.[49] Braithwaite et al. (2011) stated that such performance management systems might have a little meaningful impact on the performance when the targets of the defined indicators have perverse effects,[49] which might lead to gaming as defined by Bevan and Hood.[50] This gaming negatively influences the validity of the data and might severely limit the potential positive benefits that PROM use has.[6] Wolpert already identified such perverse effect, when funders of the service mandated the use of PROMs, setting targets for completion rates but paying little attention to its integration within the clinical conversation or clinical care.[6] As a consequence, the use of PROMs as a means became an end in itself. Based on the merely economic interest of the commercial insurance companies, the reluctance that interviewees expressed towards sharing information outside the clinical context was possibly triggered by such anticipated perverse effects. The reluctance of sharing information with insurance companies functions as an implementation barrier and might diminish when the uncertainty of the consequences of completing the PROMs has been resolved. This can possibly be achieved when all stakeholders involved, define acceptable arrangements in how to use the shared information, which assists in building the trust among stakeholders that the data will not be misused.[17]

Strengths and limitations

The strength of this paper was that the authors conducted a general exploration of the use of PROMs in patients with different musculoskeletal health problems in primary care physiotherapy, and they did not solely evaluate the perspective of patients on a specific questionnaire. This enabled the researchers and policy-makers to take this general perspective into account in their future work on the implementation of PROMs in clinical physiotherapy practice.

Nevertheless the study is subject to several limitations. First, the dependence on the participating physiotherapists for including patients, which might have resulted in a selection bias of our participating patients, for example, illiterate patients were not included although being literate was not an inclusion criterion. However, the total sample of patients did include males, females, younger, middle-aged, and older patients, patients with Dutch and foreign origin, patients with acute and chronic health problems, and patients who visited the PT with a new health problem, as well as patients with a recurrent health problem. Second, the study was very specific in only focussing on patients with musculoskeletal health problems who received treatment in primary care physiotherapy practice, which is a very specific area of practice. Therefore, the findings cannot be extrapolated to other contexts of physiotherapy care. Third, for this study, the authors only focussed on the external transparency towards the insurance companies; participants were not asked on their view in using the PROMs data for external transparency purposes to inform the patient’s choice.

Implications for practice and policy

As explained by Achterberg et al. (2008), numerous determinants for a successful implementation are identified.[51] However, such determinants provide headings rather than specific factors for implementation.[51] In this study, these determinants were based on the generic domains of Fleuren,[37] and an analysis was performed to determine the specific factors related to the context of this study. This contextualisation is crucial to obtain optimal implementation results.[52] Based on the identified factors, several implications that could address the barriers for the implementation have been defined in the discussion. In Table 5.6, a summary of these implications connected to the subthemes, themes, and the domains of Fleuren is given.[37] The identified factors could contribute to the development of a tailored implementation strategy for the use of PROMs in clinical practice. Future research should focus on two areas: 1) the investigation of whether similar results would be found in other contexts of physiotherapy practice; and 2) the development, implementation and evaluation of the effect of tailored implementation strategies.

Table 5.6 | **Implications for practice and policy**

Implication	Subtheme(s)	Theme(s)	Domain(s) of Fleuren
Administer the PROMs outside the consultation to increase efficiency. This can be done by e-mailing the PROM in advance or, when computer skills are lacking, help the patient use a tablet in the waiting room	• Administering PROMs • Efficiency	• Practicality	• Organisation • Innovation
Create a visual/verbal presentation form explaining why PROMs are being administered (for clinical and aggregated purposes) minimising the necessity to give an explanation at the cost of valuable consultation time, especially for patients with recurrent health problems; it increases the understanding and acceptance of patients.	• Efficiency	• Practicality	• Organisation • Innovation
	• Communication • Diagnostics and evaluation • Patient-centeredness	• Interaction with PT for decision-making	• Innovation • User
If needed, provide training for professionals to enable them to give a verbal explanation to patients on why PROMs are being administered (for clinical and aggregated purposes).	• Communication • Diagnostics and evaluation • Patient-centeredness	• Interaction with PT for decision-making	• Innovation • User

▶

Table 5.6 continued

Implication	Subtheme(s)	Theme(s)	Domain(s) of Fleuren
Select the appropriate PROM, outweighing the balance between the essential questions and the length of the questionnaire.	• Communication • Diagnostics and evaluation • Patient-centeredness	• Interaction with PT for decision-making	• Innovation • User
To overcome the reluctance towards sharing information with insurance companies there is a need to make contractual agreements, ensuring that the data is only used in a pre-defined way that has been approved by all stakeholders.	• Sharing data with insurance companies	• Sharing information outside the clinical context	• Socio-political context • Innovation

5.5
Conclusion

In general, patients with musculoskeletal health problems treated in primary care physiotherapy practice perceived PROMs as practical instruments that were useful in the interaction with the physiotherapist for decision-making and sharing information for quality-improvement purposes. This study revealed different barriers to using PROMs on different subthemes. The specific context of the identified barriers in our study may guide implementation strategies within physiotherapy practice to further improve the use of PROMs in clinical practice.

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5.6
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Appendix 5.1
Characteristics of the research team

Name	Gender	Credentials	Occupation	Experience
Guus Meerhoff	Male	MSc.	PT, Junior Researcher, Senior policy advisor	Qualitative research methods in health care introduction, Radboudumc Nijmegen.
Simone van Dulmen	Female	Dr.	PT, Senior researcher	Implementation research, qualitative and quantitative studies.
Marjo Maas	Female	Dr.	PT, Senior Researcher, Senior Lecturer	Implementation research, Qualitative research. Teaches qualitative research module in PhD pogram.
Annick Bakker-Jacobs	Female	BSc.	Research assistant	Data analysis in qualitative and quantitative research methods.
Ria Nijhuis-van der Sanden	Female	Prof. Dr.	PT, Professor of Allied Health	Quantitative and qualitative methods. Multiple studies with quantitative, qualitative, and mixed methods studies in health sciences.
Philip van der Wees	Male	Prof. Dr.	PT, Professor of Allied Health Sciences	Implementation science, quantitative and qualitative methods. Teaches qualitative research module in PhD program. Multiple quantitative, qualitative and mixed methods studies.

PT = Physiotherapist.

Appendix 5.2
Interview guide

1 Did your physiotherapist ask you to complete one or more questionnaires during your treatment?*

* If ‘Yes’ proceed and ask question 2–8 and 12 & 13. If the interviewee did not complete one single questionnaire give, explain the questionnaires by quoting some examples from a questionnaire regarding their health problems. In case of low back pain, cite some of the questions from the Quebec Back Pain Disability Scale (QBPDS). After this introduction, please proceed to question 8 and further.

2 If so, do you know what questionnaires these were?

3 When (during your different treatments) were you asked to complete these questionnaires?

4 Questions on the experiences in using these questionnaires?

a Please explain, what are the pros and cons of completing such questionnaires?

b Did your physiotherapist give a clear explanation on how to complete these questionnaires?

c Did your physiotherapist give a clear explanation on why to complete these questionnaires?

d Did your physiotherapist discuss the results of the questionnaire together with you? (how did he do so and did you understand the results?)

e What was the effect of (not) discussing the results with you?

f How did you complete the questionnaire (at home, at the practice of your physiotherapist, digital or on paper, all by yourself or with the assistance of your physiotherapist)?

g What way would you prefer to complete such a questionnaire?

h How much time did it take to complete the questionnaire? Was this too long/short/OK? What would be the ideal length of a questionnaire (in mins)?

i What do you think of the content of the questionnaire? (Were the items closely related to the health problems for which you visited your physiotherapist? Where the clearly formulated?)

5 What’s in it for you personally?

a Did the questionnaires facilitate the communication and the clarification of your problem? (please explain?)

b Are such questionnaires of added value to identify the problems for which you visit your physiotherapist? Or to monitor the progress that is made over the course of the different treatments? (please explain?)

Appendix 5.2 continued

6 Can you explain your personal opinion about the use of such questionnaires by your physiotherapist, in the effort of making healthcare more patient-centred?

7 Can you please explain if you are prepared to complete such questionnaire at the start and the end of a series of treatment?

8 Are you prepared to complete such a questionnaire?

9 How much time are you willing to invest in completing such a questionnaire?

10 Do you think such questionnaires could have a positive contribution to your treatment? For example, because the answers you will provide will give your physiotherapist a better insight into your complaints, which possibly will facilitate the communication an enabled your physiotherapist to define a more specific (goal-directed) treatment?

11 Can such questionnaires contribute to the objective evaluation of the given treatment, when completed again after a certain period?

In trying to stimulate healthcare quality, the bundled results of all questionnaires could be used by: 1) professionals in benchmarking their results to their colleagues. Such results can be used to evoke discussions about their clinical work (e.g. what treatment is given to a certain patient category), and 2) insurers in creating pay for performance structure.

12 What is your opinion in using the bundled results between colleagues in trying to improve their clinical work?

13 What is your opinion in sharing the bundled results with the insurance companies in trying to influence the care provided by developing pay for performance structure?

Chapter 6

Reliability, validity and discriminability of Patient Reported Outcomes for non-specific low back pain in a nationwide physical therapy registry: a retrospective observational cohort study

Guus A. Meerhoff
Arie C. Verburg
Renske M. Schapendonk
Juliette Cruijsberg
Maria W.G. Nijhuis-van der Sanden
Simone A. van Dulmen
Philip J. van der Wees

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Abstract

Background | A national clinical registry was established in the Netherlands containing data directly sampled from electronic health record systems of physical therapists (PTs). This registry aims to evaluate the potential of patient reported outcome measures (PROMs) to develop quality indicators (QIs) in physical therapy care.

Purpose | To test to what extent the collected PROM data are reliable, valid and discriminatory between practices in measuring outcomes of patients with non-specific low back pain (NSLBP).

Methods | In this retrospective cohort study 865 PT practices with 6,560 PTs voluntarily collected PROM data of patients with NSLBP, using the Quebec Back Pain Disability Scale (QBPDS), the Numeric Pain Rating Scale (NPRS) and the Patient Specific Functioning Scale (PSFS).

Reliability was determined by analysing the completeness of the dataset, the comparability by using national reference data, and through checking selection bias in the included patients. Validity was tested using the known-groups contrast between patients with (sub)acute vs. chronic NSLBP. To determine discriminative ability of outcomes between PT practices, case-mix corrected hierarchical multilevel analyses were performed.

Results | Reliability was sufficient by confirming fifteen of the sixteen hypotheses: 59% of all patients opted in for data analysis, 42% of these included patients showed repeated measurement, comparing with reference data and potential selection bias showed <5% between group differences, while differences between (sub)acute and chronic NSLB-groups were significantly larger than 5% (less treatment sessions, lager differences in outcomes in (sub)acute NSLB patients). In addition, all nine adjusted hierarchical multilevel models confirm that the collected dataset on outcomes in PT care is able to discriminate between practices using PROM results of patients with NSLBP (ICC-scores range 0.11–0.21).

Limitations | Although we have shown the reliability, validity and discriminative ability of the dataset in the quest to develop QIs, we are aware that reducing missing values in patient records and the selective participation of PTs that belong to the innovators needs attention in the next stages of implementation to avoid bias in the results.

Conclusion | PROMs of patients with NSLBP collected in the national clinical registry of KNGF are reliable, valid and able to discriminate between primary care PT practices.

6.1

Introduction

Within healthcare, the use of health outcomes as quality indicators (QIs) to enable transparency of the service delivery is gaining momentum.[1-5] Although seemingly promising, there is still limited experience with the development and implementation of QIs based on health outcomes.[6,7] Presumably, data collected in clinical registries can be used in developing such QIs, ultimately assisting in achieving more transparency of service delivery.[8-10]

QIs are "measurement tools, screens, or flags that are used as guides to monitor, evaluate, and improve the quality of patient care, clinical support services, and organizational functions that affect patient outcomes".[11] (p.524) QIs consist of explicitly defined and measurable items referring to the structures, processes or outcomes of care,[12-14] and have the potential to be used to support quality improvement, accountability and to provide transparency of service delivery in healthcare.[15] A prerequisite of QIs to be of added value, is that they are defined using data, for example from KNGF's clinical registry, that are valid, reliable and able to discriminate between groups of interest.[2]

The Royal Dutch Society for Physical Therapy (KNGF) aims to develop and implement QIs using data from a clinical registry. To do so they initiated a quality program called Quality in Motion.[16] In this program a national clinical registry has been developed that enables the anonymous collection of data on: patient characteristics, structure, processes and (patient reported) health outcomes. Data are only collected after a one-off informed consent was provided by the patient and their therapist and recorded in the patient file. The data is collected directly from the electronic health record (EHR) systems used in primary care physical therapy (PT) practices.[16]

Clinical practice guidelines (CPGs) often include recommendations on healthcare delivery and outcomes that can be transformed into QIs.[12,17-20] An example of such a recommendation is the use of (patient reported) outcomes that measure health-related aspects such as physical functioning or perceived pain and can be used to evaluate treatment.[21-26] Since the KNGF has a long history in developing high quality CPGs,[22,27] they decided to use the recommendations in their CPGs for the selection of patient reported outcome measures (PROMs) as a basis for developing QIs. PROMs were chosen for the development of QIs, since they enable the measurement of health outcomes based on the direct perception of patients and these instruments are recommended in the high quality CPGs of KNGF.

The purpose of this study was to test to what extent health outcomes collected with PROMs in the clinical registry of KNGF are reliable, valid and able to discriminate between PT practices. These psychometric properties have been tested on data collected in patients with non-specific low back pain (NSLBP), a patient category with a large prevalence in physical therapy care. The following research questions were formulated:

1. What is the reliability and validity of health outcomes in the clinical registry measured with PROMs?
2. To what extent do health outcomes of physical therapy care collected in the clinical registry discriminate between practices using PROM results of patients with NSLBP?

6.2
Materials and methods

Study design and setting

This is a retrospective observational cohort study based on data collected in KNGF's clinical registry by PT practices in Dutch primary care physical therapy. All data collected between 01-01-2013 until 28-11-2018 were used.

Participants

A total of 865 PT practices with 6,560 physical therapists (PTs) voluntarily collected data of patients with NSLBP.

Data Collection

Data on all patient categories that visited the PT were collected in the registry. This was done by uploading anonymous data from patient records in the clinically used EHR-systems to KNGF's clinical registry. To ensure uniformity of the data collection,[28] all data in the registry are collected based on predefined technical specifications.[16] This procedure of data collection has shown to be feasible.[16]

Data were only uploaded to the clinical registry from the EHR-systems if: 1) the patient provided their informed consent for anonymous use of the clinical data from their patient record, and 2) the therapist provided their informed consent on the use of all patient records for which they received an informed consent of the patient. For the initial reliability analysis that focussed on the completeness and comparability, all data from the clinical registry were used. For the other analyses, that specifically aimed on patients with NSLBP a selection was made and data of patients were only included if: patients visited their PT due to NSLBP, the treatment episode was finished, patients were 18 years or older, if gender and the level of chronicity of their complaints was recorded (i.e. (sub)acute vs. chronic, with (sub)acute being 0–12 weeks since onset, and chronic >12 weeks[29]), and if a PT practice had collected data from at least 30 patients with NSLBP.

Selected outcome measures

We used the PROMs that were recommended in KNGF's clinical practice guideline (CPG) for low back pain.[25] These PROMs are: the Quebec Back Pain Disability Scale (QBPDS), the Numeric Pain Rating Scale (NPRS) and the Patient Specific Functioning Scale (PSFS).

The QBPDS is a 20-item PROM which measures the domain physical functioning using a 6-point Likert scale, ranging from 0 "not difficult at all" to 5 "unable to do". The overall score on the QBPDS is the sum score of the 20 items. A minimum score (0) represents "not being disabled at all" and the maximum score (100) represents "being maximally disabled".[30,31] The QBPDS is a feasible PROM which takes patients approximately 10 minutes to administer. The QBPDS scores limited to moderate evidence for good reliability, validity and usability.[32] In addition, it has been identified as a responsive PROM with a minimal important change (MIC) of 20 points.[32,33]

The NPRS is an instrument that assesses the domain perceived pain intensity.[34] It is a 1-item questionnaire with an 11-point scale ranging from 0 "no pain" to 10 "extreme pain".[35,36] The NPRS is identified to be feasible and easy to administer.[35,36] The NPRS scores moderate to high on the psychometric properties reliability and validity[34,37] and is responsive with a MIC of 2 points.[37,38]

The PSFS, which is equivalent to the Patient Specific Complaints (PSC) instrument[39], measures the domain physical functioning and "involves four steps, in which the patient's main activity problems are identified, prioritized, scored and evaluated."[40 (p.2)] Each activity is scored on a 11-point scale ranging from 0 "Able to perform activity at pre-injury level" to 10 "Unable to perform activity".[41] The PSFS is a feasible instrument with good to excellent measurement properties (reliability, validity and sensitivity to change).[38,41] The MIC for the PSFS was set at 2 points.[42]

Sample size

In deciding if the selected data exceeds the sample size threshold, a general rule of thumb concerning the ability to discriminate outcomes between practices states that a minimum of 30 PT practices are required which should include a minimum of 30 patients each equalling 900 patients.[28,43] The included PROMs in this study measure the domains physical functioning, and pain intensity. Perreault et al. (2005) estimated the agreement between patients and PTs on the domain physical functioning (ICC=0.56) and pain intensity (ICC=0.55).[44] This enabled us to calculate a more specific sample size, using the equation of Twisk et al. (2013), presented in S1 Appendix.[45] For this study this resulted in a minimum sample size of 1963 patients, treated in 66 PT practices.

Data analysis

Reliability of the data

The reliability of the included data was determined in four ways. First, by determining the completeness of the complete dataset of the clinical registry. This was done using the mean percentage of patients that were included (opted-in) in the database from the EHR-systems. Since data collection in the clinical registry is innovative and involves the anonymous processing of personal data on health status, we assumed that not all patients were willing or invited by their therapist to cooperate, which may result in selection bias if the number of patients that did not opt-in is too high. Given the early stage of implementation of the registry, we hypothesized it to be realistic to aim for a percentage of opted-in patients that lies above 50%. In addition, using the same dataset, completeness was determined by calculating the mean percentage of the (opted-in) patient records where a repeated pre- and post-treatment measurement with one of the selected PROMs was executed. Based on previous studies in the Netherlands and Israel, we hypothesized it to be realistic to set this percentage at a minimum of 40%.[16,46]

The second evaluation of reliability was estimating comparability of patient characteristics in the opted-in population in the complete clinical registry with national reference data. We compared the characteristics age and *gender* of all patient records of the clinical registry with a dataset that is considered to be the national reference data.[47] This analysis enabled us to check if the data in the registry is comparable to a dataset which is seen as a national benchmark. The age categories chosen for this study were aligned with those used in the national reference dataset.

The third evaluation estimated the potential selection bias in the dataset of patients with NSLBP selected from the clinical registry based on inclusion rates per practice. This analysis was executed by dividing the records of patients with NSLBP in the clinical registry into two groups: practices with low vs. practices with high inclusion rates. The two groups were created using the median percentage of patients per PT practice that are included (opted-in) in the registry, based on the patient's informed-consent. The group with low inclusion rates was compared to the group with high inclusion rates on the characteristics *age*, *gender* and *number of treatment* sessions. This analysis enabled us to test again if 'the percentage of opted-in patients' created selection bias in the included population, which in turn would decrease reliability.

For the fourth reliability analysis, we further estimated potential selection bias in the dataset on patients with NSLBP through a different approach. The presence or absence of a repeated measurement with one of the selected PROMs (QBPDS, NPRS or PSFS) was used to create two groups. The group with a repeated measurement was compared to the group without a repeated measurement on the characteristics age, gender and *number of treatment sessions*. This enabled us to check if ‘the presence/absence of a repeated PROM measurement’ created selection bias in the included population, which in turn would decrease reliability.

Due to the large sample sizes it was expected that, using a *t*-test, the differences between the groups for the second, third and fourth reliability analyses would be statistically significant on all items. Nevertheless, we hypothesized that the analyses would not result in relevant differences between the created groups. We set an a priori threshold of >5% difference as relevant, i.e. groups were considered equal if the differences were ≤5%. Differences between the created categories were established by calculating the relative differences on the outcomes of the created groups.

Validity of the data

Regarding the validity of the collected data on patients with NSLBP the known-groups validity was determined, which is a component of construct validity frequently used to determine psychometric properties of measurement instruments.[48] With known-groups validity, the ability to distinguish or discriminate among distinct groups is defined.[49] We expected that distinct groups in the clinical registry would be present, and we defined the known-groups to be patients with chronic NSLBP versus those with (sub)acute NSLBP. Based on the findings of Costa et al. (2012) we hypothesized that patients with chronic NSLBP would need a higher number of *treatment sessions* and would achieve a lower *change score on the three PROMs of interest* (QBPDS, NPRS and PSFS).[29] Due to the large sample sizes it was expected that, using a *t*-test, the differences between the groups would be statistically significant on all items, therefore we set an a priori threshold of >5% difference between the groups as being relevant. Differences between the created categories were established by calculating the relative differences on the outcomes of the created groups. For this analysis only the records of patients with NSLBP were included in which data of at least one of the selected PROMs was available at baseline (T_0) and endpoint (T_{end}) of treatment.

The ability to discriminate between practices

To determine the ability of the collected dataset on patients with NSLBP in the clinical registry to discriminate outcomes between PT practices using the PROM results, several hierarchical multilevel analyses were performed. Initially, for each of the outcome measures -QBPDS, NPRS and PSFS- three intercept-only hierarchical multilevel models were estimated. Each model resulted in an intraclass correlation coefficient (ICC), representing the ability of the collected data to discriminate outcomes between PT practices. If an ICC is >0.10 it can be interpreted as adequate, indicating that the model is able to discriminate outcomes between PT practices.[50] The ICC values in discriminating outcomes of healthcare typically range between 0.05 and 0.20.[51] The three different models were estimated since they represent the possible outcomes of the collected PROMs. The first model estimated the mean pre-posttreatment (T_0 - T_{end}) change scores with 95% confidence intervals (CI) of individual practices. The second model estimated the mean percentage and 95% CI of patients in which the MIC was achieved of individual practices. The third model estimated the mean post-treatment score (Tend) with 95% CI on the selected PROMs of individual practices. For each of the three models overall mean scores for all practices combined were also estimated.

Next, it was tested if stronger models were created when adjusted models were estimated, applying case-mix correction for the independent variables: *age*, *gender*, *chronicity of the complaints* (i.e. (sub)acute vs. chronic, with (sub)acute being 0–12 weeks since onset and chronic >12 weeks) and *severity of complaints at the start of the treatment* (using the results on the PROMs). These independent variables were seen as contextual variables that may influence the results on the outcome measures. As defined by Twisk et al. (2019)[51], all such varia bles can be included in the model at once.[51] The ICC presents “a good gauge of whether a contextual variable has a significant effect on the outcome”.[52 (p.818)] The model with the highest ICC value represents the strongest model and was selected to estimate the ability of the collected data in the clinical registry to discriminate outcomes between PT practices.

Differences between groups for reliability analyses were statistically tested using independent-sampled *t*-tests or Fisher’s Exact test if the assumption on normality was met. IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, NY) was used for all analyses.

6.3
Results

Overall the clinical registry contained 213,245 records of patients with NSLBP, collected from 865 PT practices, see S2 Figure for a flowchart of the patient inclusion. The mean age of the patients was 52.4 years (SD=17.2), 55.0% of the patients was female and 77.5% of the patients had (sub)acute complaints. The registry contained 21,758, 54,904 and 73,554 patient episodes with repeated measurements of the QBPDS, NPRS and PSFS, respectively (See Table 6.1). See Table 6.2 for a summary on all executed analyses on the different psychometric properties which are explained below.

Table 6.1 | Descriptive statistics of mean PROM-score

	QBPDS (score range: 0–100)	NPRS (score range: 0–100)	PSFS (score range: 0–100)
PT practices (N)	204	405	500
Patients (N)	21,758	54,904	73,554
Mean baseline score (SD)	40.0 (18.4)	6.3 (1.8)	6.9 (1.9)
Mean end score (SD)	13.1 (15.9)	2.2 (2.1)	1.9 (2.4)
Mean change T_0-T_{end} (SD)	-27.0 (19.8)	-4.2 (2.5)	-5.0 (2.7)

QBPDS = Quebec Back Pain Disability Scale; NPRS = Numeric Pain Rating Scale; PSFS = Patient Specific Functioning Scale

Table 6.2 | A summary on all executed analyses on the different psychometric properties

Psychometric property	Aspect of interest	Determined by:
Validity	Known-groups validity	Determined by analysing the differences on the variables number of treatment sessions and achieved change score on the used PROMs. It was hypothesized that patients with chronic NSLBP would need a higher number of treatment sessions and would achieve a lower change score on the three PROMs of interest (QBPDS, NPRS and PSFS).
Discriminant ability	Intraclass Correlation Coefficients	Executing several hierarchical multilevel analyses, both intercept-only and adjusted models. If an ICC is >0.10 it can be interpreted as adequate, indicating that the model is able to discriminate outcomes between PT practices.

Reliability of the collected data

The analysis on the completeness, using the complete dataset of the clinical registry, showed that 59.2% of the patients provided permission for the use of their data, thus are opted-in. In total 41.7% of the complete dataset of the clinical registry has executed a repeated measurement with one of the selected PROMs. Both percentages exceed the benchmark that we have defined, confirming our hypotheses on completeness.

Comparing data from the complete dataset of the clinical registry with the national reference data showed a statistically non-significant difference in gender of 0.2%, and significant differences in all age groups with percentages between -2.3% and 2.5% (see Table 6.3). None of the comparisons exceeded the a priori defined threshold of 5% for being relevant differences, confirming our hypothesis on comparability.

Table 6.3 | Reliability analysis on comparability

	Total clinical registry	National reference data[47]	Difference (%)[*]
Age distribution			
PT practices (*N*)	1,812	N/A	N/A
Patients (*N*)	1,377,215	29,326	N/A
Patients aged 0–4 (*N* (%))	9,522 (0.7)	59 (0.2)	0.5[†]
Patients aged 5–17 (*N* (%))	87,125 (6.3)	1,438 (4.9)	1.4[†]
Patients aged 18–44 (*N* (%))	404,583 (29.4)	7,8892 (6.9)	2.5[†]
Patients aged 45–64 (*N* (%))	499,483 (36.3)	10,3813 (5.4)	0.9[†]
Patients aged 65–74 (*N* (%))	210,511 (15.3)	4,8091 (6.4)	1.1[†]
Patients aged 75–84 (*N* (%))	126,351 (9.2)	3,372 (11.5)	-2.3[†]
Patients aged ≥85 (*N* (%))	39,640 (2.9)	1,378 (4.7)	1.8[†]
Gender distribution			
PT practices (*N*)	1,812	N/A	N/A
Patients (*N*)	1,399,926	29,326	N/A
Male patients (*N* (%))	562,632 (40.2)	11,730 (40.0)	0.2
Female patients (*N* (%))	837,294 (59.8)	17,596 (60.0)	-0.2

All data of the KNGF's clinical registry compared to the national reference data[47].

[*] Percentual differences are calculated by subtracting the percentages of the National reference data from the Total clinical registry data.

[†] $p \leq 0.001$ (*t*-test).

N/A = Not applicable.

Estimating the potential selection bias in the included patients with NSLBP, the analysis comparing practices with high versus low inclusion rates of patients, resulted in non-significant differences of -0.2%, 1.1% and -2.8% on age, gender and number of treatment sessions, respectively (see Table 6.4). The analysis comparing presence or absence of a repeated measurement with one of the selected PROMs, using the same dataset, resulted in statistically significant differences, of 2.7%, -0.2% and 35.0% on age, gender and number of treatment sessions, respectively (see Table 6.5). Five of the six analyses confirmed our hypotheses on selection bias since they did not exceed the a priori defined threshold of 5%.

Table 6.4 | **Reliability analysis on selection bias using the NSLBP sample (*N*=213,245 patients from 865 PT practices) of the total clinical registry: a within groups comparison on descriptive statistics using the median opt-in to divide the NSLBP sample into two groups.**

	NSLBP-sample of the total clinical registry scoring below median* opt-in	NSLBP-sample of the total clinical registry scoring above median* opt-in	Difference (%)†
Mean age patients (SD)	52.6 (4.6)	52.7 (4.9)	-0.2
Percentage of female patients (SD)	55.5 (8.1)	54.9 (7.7)	1.1
Mean number of treatment sessions (SD)	6.9 (2.8)	7.1 (2.6)	-2.8

* median % patients included = 68.3.

† Percentual differences are calculated using the following formula: Difference (%) = ((NSLBP-sample of the total clinical registry scoring below median^ opt-in / NSLBP-sample of total clinical registry scoring above median* opt-in) x 100) – 100.

Table 6.5 | **Reliability analysis on selection bias using the NSLBP sample of the total clinical registry: a within groups comparison using the availability of a repeated measurement with a PROM (NPRS/ QBPDS/ PSFS) to divide the NSLBP sample in two groups.**

	With pre- and post-test PROM use	Without pre- and post-test PROM use	Difference (%)*
PT practices (*N*)	775	865	N/A
Patients (*N*)	88,852	124,393	N/A
Mean age patients (SD)	53.2 (17.1)	51.8 (17.2)	2.7†
Percentage of female patients (SD)	55.6 (5.7)	55.7 (6.1)	-0.2†
Mean number of treatment sessions (SD)	8.1 (8.9)	6.0 (8.3)	35.0†

* Percentual differences are calculated using the following formula: Difference (%) = ((With pre- and post-test PROM use / Without pre- and post-test PROM use) x 100) – 100.

† $p \leq 0.001$ (*t*-test).

N/A = not applicable.

Known-groups validity of the collected data

Patients with (sub)acute NSLBP needed 25.7% less treatment sessions than patients with chronic NSLBP. The three other analyses showed that patients with (sub)acute NSLBP compared to patients with chronic NSLBP achieved a 40.1%, 29.4% and 23.8% higher change score on the QBPDS, NPRS and the PSFS, respectively. The results of these four analyses for the known-groups validity all exceeded the set threshold of 5%, confirming our hypothesis on the known-groups validity of the data (see Table 6.6).

The ability to discriminate between practices based on the collected data

Seven of the nine ICC-scores obtained from the intercept-only hierarchical multilevel analyses exceed the a priori formulated threshold of 0.10 (see Table 6.7). In the adjusted-models all nine ICC-scores exceeded this threshold with scores ranging from 0.11-0.21. These results indicate that the adjusted-models are able to discriminate outcomes between PT practices, confirming the discriminative ability of the data.[50]

Table 6.6 | Validity analysis on the NSLBP sample of the total clinical registry, using the known-groups validity to divide the NSLBP-sample in two groups.

	Patients with (sub)acute NSLBP			Patients with chronic NSLBP			Difference (%)[*]
	Mean (SD)	PT practices (*N*)	Patients (*N*)	Mean (SD)	PT practices (*N*)	Patients (*N*)	
Number of treatment sessions							
	7.5 (7.7)	526	65,284	10.1 (11.3)	472	18,658	-25.7[†]
Change score PROM T_0 versus T_{end}							
QBPDS	-28.6 (19.7)	204	17,399	-20.3 (19.0)	186	4,359	40,1[†]
NPRS	-4.4 (2.5)	405	43,467	-3.4 (2.6)	350	11,447	29.4[†]
PSFS	-5.2 (2.7)	500	57,284	-4.2 (2.9)	439	16,270	23.8[†]

[*] Percentual differences are calculated using the following formula: Difference (%) = ((Patients with (sub)acute NSLBP Mean (SD) / Patients with chronic NSLBP Mean (SD)) x 100) – 100.

[†] $p \leq 0.001$ (*t*-test).

NPRS = Numeric Pain Rating Scale; PSFS = Patient Specific Functioning Scale; QBPDS = Quebec Back Pain Disability Scale.

Table 6.7 | The intraclass Correlation Coefficients for the intercept-only model and adjusted model on the mean change-score, the mean percentage of MIC achieved-score and the mean end score of all selected PROMs.

	ICC intercept-only model	ICC adjusted-model
Mean change score		
NPRS	0.10	0.16
QBPDS	0.12	0.21
PSFS	0.11	0.17
Mean percentage MIC achieved score		
NPRS	0.11	0.14
QBPDS	0.12	0.19
PSFS	0.12	0.14

▶

Table 6.7 continued

	ICC intercept-only model	ICC adjusted-model
Mean end score		
NPRS	0.12	0.13
QBPDS	0.10	0.11
PSFS	0.12	0.14

ICC = Intraclass Correlation Coefficients; NPRS = Numeric Pain Rating Scale; PSFS = Patient Specific Functioning Scale;
QBPDS = Quebec Back Pain Disability Scale.

6.4
Discussion

Overall the results of this study show that the analyses regarding the reliability of the data in the clinical registry were in line with our a priori formulated hypotheses: the data was sufficiently complete, comparable and we did not identify selection bias in the patients that were included in the registry. All analyses on the known-groups validity met the a priori formulated hypotheses. Based on these results it can be concluded that both reliability and known-groups validity are confirmed. In addition, the hierarchical multilevel analyses confirm that the collected dataset on outcomes in PT care is able to discriminate between practices using PROM results of patients with NSLBP.

Only one of the six analyses aiming to check for selection bias in the included patients, as part of the reliability analyses, did not meet the a priori formulated hypothesis. This analysis represented the number of treatment sessions required in patients with a repeated PROM measurement versus those without. The results showed that patients who required fewer treatments more often did not complete a repeated PROM measurement. This might be explained by the fact that PT's and/or patient's belief that the completions of a repeated PROM measurement have no added value for this patient category with a short treatment period and fast recovery.

To the best of our knowledge, within the field of physical therapy similar studies, which execute a so-called practice test, aiming to investigate the reliability, validity and discriminative ability of the collected data in a clinical registry, have not been published. In several countries and healthcare settings similar initiatives started the collection of PROMs scores in clinical registries, as a prerequisite for the development of QIs based on clinical data. A first example of such registry is initiated by the National Health Service in the United Kingdom, which introduced their national PROMs programme in 2009. A second example is initiated in 2010 by the Dutch Institute for Clinical Auditing (DICA). DICA manages 22 clinical registries, belonging to different scientific associations of medical specialists (e.g. neurologists & oncologists).[53] Despite this experience in building clinical registries, several publications suggest that the integrated implementation of PROMs, using them to stimulate shared decision-making on clinical level and as performance information on managerial level has not yet been successfully achieved. [8,54]

In the quest for developing QIs using data from clinical registries, the execution of a practice test to evaluate the psychometric properties of the collected data is crucial. There are a limited number of studies in other fields than PT that have conducted such a practice test. Examples of such studies are analysed in the review on the validity of QI's on the readmission rate of Fischer et al. (2012). This study showed that only a small proportion 21 of the 486 included papers test the actual validity of the data in some sort of practice test.[55] In addition, a systematic review of Langendam et al. (2020) showed that performing a practice test to validate the formulated QI which are based on recommendations of CPGs is relatively rare.[20]

There are some publications providing a framework on the development of QIs.[18,56] These frameworks also emphasize the importance of the execution of a practice test, since it enables formulating a benchmark for a QI that meets all psychometric criteria.[2,28,56] Unfortunately, several studies state that there is no standard definition of what a practice test has to contain.[18,20] Often only the Delphi methodology is used to reach consensus in formulating QIs and practice tests are not executed.[17,19,42,57]

In short, there is no guidance available for applying a practice test as we have done in this study. The results of this study are therefore a good starting point for the development of standards for a practice test to be carried out in the development of benchmarks for QIs based on data from a clinical registry that meet all relevant psychometric properties.

Strengths and Limitations

The strength of this paper is the large number of PTs that voluntarily participated and collected data on a very large number of participating patients.

Nevertheless, this paper is subject to several limitations. Despite the fact that the infrastructure of the clinical registry has been successfully built up, we identified that input fields from the patient files in the EHR-systems are still registered as missing values, and thus could not be included in this study. These missing values sometimes occurred due to technical omissions (e.g. there are several QBPDS questionnaires defined in the EHR-software but only one of the questionnaires is eligible for extraction to the registry), but also due the submission of incompletely registered patient files from the EHR-system to the national registry. In the further implementation of the clinical registry, we make a continuous effort in trying to decrease the number of missing values. A specific challenge is the large number of different EHR-suppliers that is involved. We have improved the collaboration with the different EHR-system suppliers, which assists in overcoming the technical omissions. In addition, we have executed different projects trying to influence the behaviour of PTs in completing all fields of a patient file before uploading. Examples of such projects are: the organization of several regional symposia to teach PTs on how to use the registry and the development of an online (free for use) feedback dashboard. Such implementation activities are important in the further exploitation of a clinical registry. After all, having a registry with complete patient files is crucial in the development of valid benchmarks for QIs. A second limitation is the chance of selection bias based on the PT practices that participate in the data collection. This is likely to have happened since -in this early stage of implementation- the current users of the clinical registry, the PTs who voluntarily provided all data, are mainly the innovators, early adopters and early majority.[58] These participants are probably PTs who favour the use of PROMs. A third limitation might be the fact that we have used somewhat older data from the registry. Despite this, we assume that the data are still relevant as a good representation of the clinical practice and that they shed light on the potential that a clinical registry has in formulating QIs and their benchmarks. Moreover, the outcomes can be used as baseline measurement to evaluate changes over time.

Implications for future research and clinical practice

Future research should focus on several topics. First, the further development of a standardised practice test, which is an important step before defining QIs and their benchmarks. Such a test should finally include all psychometric properties that need to be tested in defining QIs. These aspects are: reliability, validity, discriminative ability, responsiveness to change, feasibility and usability.[2,28] The development of such a practice test will likely help with the implementation of QIs in clinical practice and will minimize the resistance in the use of QI and their benchmark. Second, research should focus on the development of actual benchmark based on the collected data thus far. This means that an extensive developmental process must be completed before a QI, including a psychometrically sound benchmark is finished. Given the investment needed it does not seem feasible to develop QIs for all conditions in the field of PT. Therefore it is relevant to investigate what solution can be found for this problem. A possible solution might be the development of several generic QIs for the field of PT and only develop specific QIs for conditions that are seen on a very regular basis by all PTs, as is the case in patients with NSLBP.

In addition, from a clinical practice perspective, efforts should be made to assist PTs in completing their patient files (e.g. by using modern technology such as applications for mobile devices which enable patients to fill in PROMs on their mobile phones) and to increase the number of PTs who will provide their data to the clinical registry. Finally, continuous investments must be made in improving the infrastructure of the clinical registry, on the one hand to detect errors (e.g. missing values) and on the other to improve efficiency and ease of use.

6.5
Conclusions

This study showed that the health outcomes of patients with NSLBP collected with PROMs in the national clinical registry of KNGF are reliable, valid and are able to discriminate between primary care PT practices.

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Ethical approval | 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 regional Medical Ethical Committee of Radboud university medical center (registration #2014/260).

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6.6

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Chapter 7

Summary and Discussion

7.1

Introduction

The overall aim of this dissertation was to improve the quality system for Dutch physiotherapists, by facilitating them to become more transparent on their service delivery using a national clinical registry. For this dissertation, the following specific objectives were formulated:

- To develop core sets of short and easily applicable measurement instruments for physiotherapists, to develop an educational programme for the implementation of these core sets; and to evaluate the effects of the implemented educational programme on the attitude of physiotherapists towards the core sets and their actual use.
- To describe an evidence-informed process of development and adaptation of the implementation strategy focussing on the use of PROMs and data delivery to the national registry in daily clinical physiotherapy practice.
- To identify influencing factors that stimulate or hinder the use of PROMs in Dutch primary care physiotherapy practice.
- To uncover the perspectives of patients visiting physiotherapists with musculoskeletal health problems on using PROMs to stimulate patient-centeredness.
- To test the reliability, validity and discriminative ability of the data collected in the national clinical registry.

This chapter first summarizes the main findings of this dissertation. Then the lessons learned are described by reflecting on the following themes: (I) investing in knowledge of physiotherapists and patients, (II) influencing behaviour via (informal) leaders, and (III) establishing a well-functioning system with optimal support for its end-users. This is followed by the recommendations for future developments, and a general conclusion.

7.2

Summary

Chapter two, a cohort study with a controlled pre-post design, identified that the implementation of an educational programme that focussed on the use of core sets of outcome measures (including PROMs) for physiotherapists working in primary care and nursing homes was successful. The educational outreach programme consisted of four interactive half-day training sessions spread over 4–5 months. The intervention group showed significant improvements on the self-reported use of outcome measures and the ability to choose a relevant outcome measure compared to the control group which did not show significant differences in pre-post measurement on the outcomes of interest.

Based on these results we concluded that the development of core sets of relevant outcome measures and active educational outreach are important aspects to improve the implementation of outcome measures in clinical practice. The availability of such an educational programme is a prerequisite for implementing the national clinical registry, that was later developed as part of the Quality In Motion (QIM) program of the KNGF. This QIM program aimed to contribute to the further development of the quality of service delivery of physiotherapists within the Dutch healthcare system using outcome measures.

Chapter three, a quality improvement study, presents the findings of a step-wise implementation strategy evaluated with mixed methods. The implementation strategy was applied in three pilot regions with 355 participating physiotherapists. It existed of an educational programme with 4–meetings in which physiotherapists were supported in establishing the routine use of PROMs in clinical practice and the delivery of data to the national clinical registry. Besides several lectures, peer learning was a key component of the implementation strategy.

Knowledge brokers were introduced to facilitate the implementation process. The knowledge brokers were peers in the pilot groups of participating physiotherapists with specific expertise on the topic of interest.

At baseline, the self-reported use of PROMs showed room for improvement, emphasizing the need for more knowledge and instructions. In addition, interviews with physiotherapists identified several barriers on the use of PROMs, including insufficient time to implement the use of PROMs, PROMs used are too difficult or too long, and the lack of a user-friendly electronic health record (EHR) system. Facilitators were the availability of a core set of PROMs, active involvement of physiotherapists in the process of developing and adapting the implementation strategy, and the fact that physiotherapists felt enabled to become more transparent about their treatment outcomes. The implementation strategy resulted in an increase in self-reported and actual PROM use, an increase in practices that delivered data to the registry, and an increase in the number of patient episodes collected in the registry.

Based on these results we concluded that the implementation of PROMs in physiotherapist practice and the collection of data in a clinical registry are feasible. The iterative process of developing and adapting the implementation strategy, together with the participating physiotherapists, enhanced the joint responsibility for the implementation. Nevertheless, several aspects were identified that could support further implementation. First, it is important to use short forms of the PROMs when available, minimizing the perceived registration burden. Second, the use of knowledge brokers can be further extended to facilitate the use of PROMs and data collection in the registry. Third, we concluded that using patient portals for completing the PROMs, and programming the correct version of each PROM with easy accessibility in the EHR may support further implementation. Altogether these results were promising in our attempt to create a national clinical registry that enables physiotherapists to become more transparent on their service delivery.

Chapter four describes a retrospective cross-sectional study that analysed the use of PROMs in Dutch primary care physiotherapy practice, and explored the factors associated with self-reported PROM use and PROM use as registered in the EHR systems. The results showed that less than one third of the physiotherapists used PROMs in more than 80% of their patients. Higher self-reported and actual use of PROMs were related to more supportive EHR-systems and more knowledge of physiotherapists about PROMs.

We concluded that the implementation of PROMs in Dutch primary care physiotherapy practice was suboptimal, and that the identified factors can be used in further optimalization of the implementation strategies. Efforts need to be made to achieve higher percentages of PROM-use in clinical practice. These efforts are most likely to make impact if they focus on: 1) the level of support EHR systems offer, for example by developing patient portals that enable the patients to complete the PROMs themselves, on a self-chosen moment in time, and 2) increasing the knowledge of physiotherapists regarding the use of PROMs in a clinical setting, for example by organizing active implementation strategies in which knowledge brokers play a crucial role.

Chapter five, a qualitative study, provided insight in the perspectives of patients visiting physiotherapists with musculoskeletal health problems on using PROMs, and determined which factors patients perceived as barriers or facilitators for using PROMs. The results identified three themes: (1) *practicality of using PROMs*, (2) *interaction with the physiotherapist for decision-making* and (3) *sharing information outside the clinical context*. Within these themes several subthemes were identified with barriers and facilitators for using PROMs in physiotherapist practice.

Overall we concluded that patients with musculoskeletal health problems perceived that the use of PROMs had an added value in primary care physiotherapy practice. Nevertheless the identified barriers need to be addressed in the further implementation of the national clinical registry.

In the quest for ultimately developing relevant feedback information using data from the national clinical registry, **chapter six**, a retrospective observational cohort study, presents the findings of a practice test investigating the quality of the data in the national clinical registry of patients with non-specific low back pain (NSLBP). This practice test consisted of multiple analyses to evaluate reliability, (known-groups) validity and discriminative ability of patient reported outcomes for NSLBP. Reliability and known groups validity was based on hypothesis testing. Discriminative ability was determined by executing hierarchical multilevel analyses. Reliability was confirmed in 15 of the 16 analyses. The known-groups validity was confirmed in all 4 executed analyses. Finally the discriminative ability was confirmed in all 9 executed analyses.

We concluded that the health outcomes of patients with NSLBP collected with PROMs in the national clinical registry of KNGF are reliable, valid and are able to discriminate outcomes of service delivery between primary care physiotherapy practices. In addition, the results of this study provide a good starting point for the development of standards for a practice test to be carried out in the development of quality indicators based on data from a clinical registry.

7.3
Lessons learned

The implementation of the clinical registry in the pilot regions started after several meetings that were held to inform the pilot groups about the ambitions of KNGF with the clinical registry. During these meetings it became clear that delivering high quality care was the general ambition of the participating physiotherapists. They were interested in creating a learning environment, and transparency was accepted if this would be used as resource to improve the quality of clinical practice. Also, PROMs were perceived as relevant outcome data.

From the studies in this dissertation we have learned that the collection of clinical data of Dutch primary care physiotherapists in a national registry and their transparent use to improve quality is feasible. These findings are in line with other initiatives in the Netherlands, the US, the UK, Sweden, Denmark and Norway, where clinical registries have been developed and implemented with success.[1–5] Nevertheless, it requires a continuous effort, aimed at further development and implementation, to increase the data collection (e.g. by decreasing the effort it takes and by increasing the number of participating physiotherapists) and to further expand use of the clinical registry for quality improvement purposes.

To successfully implement such a clinical registry, achieving a persistent change in the behaviour of the primary users (patients and physiotherapists) is conditional. As identified in other literature on the systematic collection of PROMs in clinical practice[6–8], we have shown that, to facilitate behavioural change, it is important to invest in:

1 increasing the knowledge of participating physiotherapists regarding the potential of routine collection of clinical data for improving the quality of care,
2 the support of the formal and informal leaders of the regions and,
3 the development of a well-functioning system with optimal support for its end-users.

These three aspects correspond with the three fundamental constructs of Ajzen's Theory of Planned Behaviour (TPB), a leading theoretical model on behaviour change. This model states that an individual's intention to perform behaviour can be explained based on attitudes towards their behaviour, their perceived social norm, and their perceived behavioural control.[9] In the executed pilot studies, we influenced the attitudes of participating physiotherapists by increasing knowledge through the educational programme (focussing on the practical use of PROMs in the context of the clinical registry and on the perceived benefits of using PROMs for physiotherapists and patients). The social norm was influenced via the formal and informal leaders of the pilot regions who stimulated and advocated the routine collection of clinical data. The behavioural control was

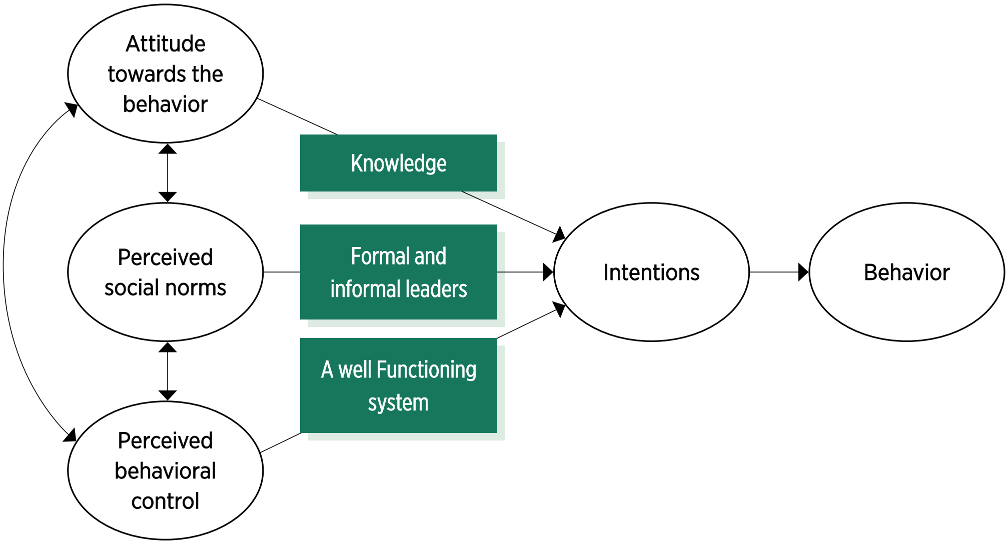

Figure 7.1 | The three fundamental constructs of Ajzen's Theory of Planned Behaviour (TPB) linked to the aspects we have invested in during the pilot studies to facilitate behavioural change.[9]

influenced by the development of a well-functioning system with optimal support for data collection and quality improvement cycles for its end-users. Inducing these positive influences on the three fundamental pillars of the TBP-model we showed that the use of the data in the national clinical registry for quality improvement increased and the volume of the collected data has grown.

Figure 7.1 provides a schematic representation of the model linked to the aspects we have invested in during the pilot studies. Below we elaborate and reflect on the three aspects related to relevant scientific literature.[9]

Investing in the knowledge of physiotherapists and patients

Knowledge transfer to end-users and stakeholders has been identified as one of the important determinants that influence the implementation of innovations in healthcare.[10] This is supported by several publications that identified the importance of knowledge about PROMs when implementing them in clinical practice.[6–8] Because the implementation of the clinical registration requires knowledge transfer at various levels (physiotherapist, patient and practice), we have developed a multifaceted implementation strategy.[11,12] We used a bottom-up approach because it is expected to be more effective than top-down approaches.[13–17]

Our multifaceted implementation strategy for knowledge transfer focussed on: (a) an educational programme about the use of PROMs for improving quality of care, (b) the use of knowledge brokers and (c) peer assessment as method for quality improvement. This focus was chosen using evidence from several reviews of the Cochrane Effective Practice and Organization of Care (EPOC) Group, which conclude that professional practice and healthcare outcomes can be improved by focussing on knowledge transfer via: 1) educational outreach such as lectures, webinars and conferences[18,19]; 2) local opinion leaders[20], such as knowledge brokers; and 3) audit and feedback[21], which includes peer learning. We used the current evidence base to design the implementation strategy, tailored to the specific context of Dutch physiotherapists in primary care practice.[11]

The results of our studies indicate that the knowledge of physiotherapists for using PROMs increased. Nevertheless, regarding the knowledge transfer to physiotherapists, we think that only providing a set number of implementation activities with a project-based educational programme is not sufficient on the long run. Instead, this should be a continuous learning activity, that needs to be incorporated in the working routine of physiotherapists.[22–24]

In addition, it should be noted that our findings about the perspectives for knowledge transfer to patients are only based on the interviews with physiotherapists as described in chapter 5. Within the executed pilots we have only made a limited effort to transfer knowledge to the patient, through patient information made available via the participating physiotherapists. Therefore, a more extensive strategy should be developed that focuses on knowledge transfer to the patient. The importance of patient involvement in the development of clinical registries using routine data collection has also been identified by Nelson et al. (2016).[5] Based on their study findings, they state that patients were insufficiently involved in identifying their priorities on the data that should be collected, and that patients were not able to access the data that is collected. They suggested that patient-involvement, including knowledge transfer, should be increased to obtain the full potential of clinical registries.[5]

Influencing behaviour change via (informal) leaders

As described in Chapter 3, we have used both formal and informal leaders to stimulate behavioural change. The formal leaders were the board members and policy makers of the professional association, the academic leaders (e.g. professor, principal investigator and PhDs) in the field of implementation science, and regional board members of cooperatives of collaborating physiotherapists that participated in the pilots. In the phase prior to the pilot studies, these formal leaders were used as lobbyists towards physiotherapists and insurance companies to make a start with the implementation of the clinical registry. During the pilots they were responsible for the actual roll-out of the educational program and the continuous (technical) development of the clinical registry. The influence of this formal leadership in stimulating behavioural change to optimize healthcare quality is broadly recognized.[10,12,25]

The informal leaders that stimulated behavioural change were the 'opinion leaders' as defined by Flodgren et al.[20] These informal opinion leaders were defined using the Social Learning Theory hypothesis, which describes that informal individuals who are perceived as 'credible', 'likable' and 'trustworthy' have the ability to function as influencers in stimulating behavioural change.[26] Flodgren et al. concluded that these informal opinion leaders can be effective in improving healthcare professionals' compliance with evidence-based practice and patient outcomes.[20] The informal leaders in our studies also had a role prior to the start of the pilot studies, in lobbying together with the formal leaders to get the physiotherapists involved in the implementation of the clinical registry. These informal leaders were successfully selected via the informant method, meaning that these leaders were identified by asking the board members of the regional cooperatives to identify individuals who could act as principal source of influence.[27] In addition, during the pilot studies, knowledge brokers have been deployed as informal leaders. These knowledge brokers were volunteer physiotherapists from the participating pilot regions who assisted with the implementation and further development of the clinical registry during the pilots. The knowledge brokers were also selected via the informant method.[27] The potential of knowledge brokers as informal leaders has been identified in several publications.[28-38]

For further implementation, the influential power of the formal leaders can be increased by being more visible. This visibility should be aimed at encouraging participation in the clinical registry and its continuous improvement. Information meetings during which the formal leaders explain the potential and importance of the clinical registry may boost the number of participants. In addition, the organization of discussion meetings between the formal leaders and participating physiotherapists may stimulate the necessary continuous (technical) further development of the data collection and the presentation of the information obtained. We also assume that the structural embedding of knowledge brokers as informal leaders in the continuous learning cycle, focusing on knowledge translation and implementation, stimulates a sustainable and future-proof implementation of the clinical registry.

Establishing a well-functioning system with optimal support for its end-users

A national clinical registry in which patients and physiotherapists voluntarily collect clinical data can only exist by virtue of the support of its primary users; patients and physiotherapists. Establishing a well-functioning system with optimal support for its end-users is a vital aspect in creating this support.[5] As we have learned from the studies in this dissertation, such a well-functioning system needs to be *user-friendly*, contain *data with good quality*, and necessarily define *strict conditions for transparency*.

User-friendliness

As defined by the United Nations, currently we live in the digital age in which data play a pivotal role[39], it is viewed as “the new oil”.[40] Data is “nearly omnipresent with the emergence of ‘smart infrastructure’ and digital platforms”.[39] This enabled the development of numerous clinical registrations all over the world.[1-5] These registrations typically rely on patient-data that is acquired from EHR-systems.[5,41]

An important condition for data collection in clinical registrations is the user-friendliness of the systems used.[42] From chapter 3, 4 and 5 we have learned that the user-friendliness of our clinical registration was influenced by two main categories: the level of support EHR-systems provided in the collection of data (e.g. by providing an online patient portal), and by the perceived practicality in completing the PROMs (e.g. the required time investment). Monkman and Kushniruk also identified the importance of patient portals and their user friendliness.[43] The integration of EHR data in clinical registries is challenging and it requires continuous efforts to improve the user friendliness of the data collection process.[44] Several publications have shown that the time that is required to administer PROMs reduces practicality.[45-47]

All efforts made in the context of this dissertation have led to a functioning infrastructure that has been used by an increasing number of physiotherapists. These physiotherapists collected data of an increasing number of patients during the different pilots that were executed. Emphasis has been put on the user-friendliness of the infrastructure by including short forms of the included PROMs and by improving the software of the different EHR-systems.

Nevertheless, the user-friendliness can be further improved when emphasis is put on several aspects: First, an even stricter selection of the outcomes of interest collected in the clinical registry should be applied. This is necessary to ensure that these outcomes of interest reflect the right balance between clinically interesting information ('the content') and the overall administrative burden, that is perceived to be a problem in healthcare in the Netherlands.[48] Until now the selection of the outcomes of interest is done by the involved researchers and initiators from the participating physiotherapy practices. By placing the emphasis on 'the content', this group of innovators, according to Rogers's innovation diffusion theory,[49] inadvertently tended to be overcomplete in the selection of the outcomes of interest. In order to avoid excessive administrative burden, the future selection of the outcomes of interest should be done more explicitly with the aforementioned balance in mind. Additionally, we advise to include other relevant outcomes such as physical performance measures that can be self-monitored by patients (e.g. pedometry). It is essential to actively involve the primary users in the selection of the outcomes of interest. This concerns both a representative group of physiotherapists and patients. We have not actively involved the latter so far.

A second mechanism for increasing user-friendliness of the clinical registration is selecting short forms of PROMs as default, which will result in reducing the burden for patients in completing the PROMs. In addition, it should be explored how we can facilitate the implementation of computer adaptive testing (CAT)[50], as applied in the PROMIS questionnaires[51], which might even further increase user-friendliness.

A third mechanism stimulating user-friendliness is the collection of all variables of interest (process, structure and outcome) by the primary source (e.g. patients who registers relevant information themselves), with the aim of single registration and reuse of data.[52] This so-called source registration is expected to improve the user-friendliness since it reduces the administrative burden.[53] Source registration is already the default method with some demographic data (e.g. date of birth, address, type of insurance).[54] Source registration should also be better organized for medical data (e.g. referral data from a general practitioner or medical specialist).[55] To achieve source registration, it is essential to increase the standardization of nomenclature and technical specification in the collection of data. Since this prevents the inclusion of open text fields in EHR-systems and instead allows for the inclusion of standardized categories, which can be registered once by the primary source and be reused. The lack of standardized technical specifications is an important obstacle in the implementation of clinical registries in general.[56] This obstacle exists despite the presence of a clinical practice guideline for record keeping[57] and (inter) national communication standards for the design of technology, such as HL7 FHIR[58]. To increase user-friendliness, it is essential to increase source registration, so that multiple use of clinical data from EHRs (for example in clinical registries) is facilitated.

A fourth strategy for increasing user-friendliness is the development of a patient portal (e.g. a mobile application). Such portal should stimulate that data which cannot be reused from other sources (e.g. history taking for the physiotherapy context or PROM data) are directly collected from the patient as primary source. It is expected to increase user-friendliness by preventing the loss of valuable time during the consultation, as stipulated in chapter 5. And, such portal provides the opportunity to feed relevant information back to the patient (and physiotherapist) via a dashboard. It is essential that such a portal is usable for patients e.g. with a lower social-economic status, of foreign origin, with a visual impairment or otherwise relevant impediment (such as reduced computer skills as described in chapter 5).

The fifth aspect of user-friendliness zooms in on the information that is fed back to patients and physiotherapists. Feedback is viewed as one of the most powerful mechanisms to stimulate learning.[59] In the executed pilots within the context of this dissertation, the feedback information that was created using the collected data was only provided to the participating physiotherapists via written reports and physical (face to face) meetings. As in other branches, ideally this information is created automatically and provided via -easy to interpret- digital dashboards.[60] A relevant example of such a dashboard is the Codman tool,[61] developed for the quality registration of medical specialists in the Netherlands, DICA. To achieve automated and digitally feedback, dashboards need to be developed that preferably convert data real-time into feedback information, which can be used for different purposes (e.g. a decision tool, patient information, training material, practice-management information and lobby).[62–64] Recently, the KNGF has made a big step in developing such a feedback dashboard for physiotherapists. Their dashboard provides almost real-time information (i.e. information is updated every midnight).[65] Nevertheless, so far this feedback is still only quite descriptive and not specifically intended for patients. For the future development of the feedback dashboard it is relevant to provide an easy to interpret feedback report on the data deliveries that a physiotherapist has done to the clinical registry. For example by giving insight if the patient episodes were accepted or bounced, the percentage of patients that were opted-in, and the completeness of the registration of the accepted episodes based on the required data-units from the technical specifications. In addition the future development of the feedback dashboard should focus on the presentation of information that stimulates shared decision-making within the clinical process (which also requires a focus on patients as end-users). In the Netherlands, this presentation of information that stimulated shared decision-making has been common practice in birth care for years.[66] Other examples are ‘patients like me’ from the US[67,68] and a comparable initiative from Chronisch Zorgnet (CZN) in the Netherlands for patients with intermittent claudication.[69] Finally the future presentation of the feedback dashboard should focus on the presentation of information which enables physiotherapy practices to monitor their quality assurance obligations (e.g. contractual conditions for reimbursement from insurance companies). A feedback dashboard with relevant and real time information will increase the user friendliness of the clinical registry, since it converts the merely abstract data of the database into easily applicable information.

Quality of the data

In establishing a well-functioning system that collects data and feeds back information, evaluating the quality of the collected data is crucial. Certainty about the quality of the collected data is conditional before the data can be converted into meaningful information. We evaluated the quality of the data by measuring the feasibility of collecting the data, as well as the relevance, validity, reliability, usability and responsiveness of the collected data; see box 1 for the definitions of these constructs.[70-74]

Definitions of constructs to establish the quality of the collected data

Feasibility	The data should be feasible to obtain.[72,75]
Relevance	The outcome of interest, collected with the selected data, should occur frequently or should represent an improvement opportunity.[75]
Validity	The data measures what it is intended to measure.[70,75]
Reliability	The data gives the same result on repeated measures.[70,75]
Usability	The data that is collected must be understood by the intended audiences (eg, consumers, healthcare providers, and payers). Data that are difficult to understand will not be translated into meaningful improvement.[70,72,75]
Responsiveness	The ability of data to detect change over time in the construct to be measured.[76]

We have used four different approaches in our attempt to optimize the quality of the collected data in the national registry. First, regarding feasibility, usability and relevance, as explained in chapter 3, we determined which data to collect in close cooperation with the participating physiotherapists. This approach fits well with the principles of a user-centered design (UCD). This is a formal approach aims to ensure that applications such as our clinical registry incorporate the needs, wants, skills, and preferences of the intended user throughout the application's development.[77] Second, as described in chapter 3, the validity and reliability of the data collection was tested. This was achieved by standardizing the entire 'pipeline' from collecting the data via the EHR-system to transferring the data into the registry, by defining extensive technical specifications on all data units that needed to be collected. All efforts that have been made to test the validity and reliability of the data collection were focussed on increasing the interoperability between the different EHR-systems and the registry. Interoperability has been defined as the ability of a system to exchange electronic health information with, and use of electronic health information from other systems without special effort on the part of the user.[78] For increasing the interoperability of data, so-called common data models (CDMs) have been developed since the 1990s. These are models in which data is organized into a standard structure and make it easier to share data between different systems.[79] The technical specifications that we have developed for our registry are such a common data model. Proper implementation of a common data model is conditional to optimize data quality. This can be achieved by implementing an end-to-end test procedure, in which is tested what data units are entered in the system and if the designated data units are transmitted properly.[80]

Third, as described in chapter 3, we tested the feasibility, validity and reliability of the collected data. This was done by reporting to the participating practices if the data were delivered successfully and which data had bounced after each time they uploaded their data to the registry. Such feedback-information is crucial for the successful implementation of clinical registries aimed at optimizing quality assurance.[81]

Fourth, as described in chapter 6, we tested the validity, reliability and responsiveness of the collected data. This was tested on the subset of patients with non-specific low back pain (NSLBP) by the execution of a so-called practice test. The importance of such a practice test, indicating the quality of the collected data, is emphasized in other publications.[75,82,83] Unfortunately, there is no standard definition of what a practice test has to contain.[84-86] There are only a limited number of studies in healthcare that have formulated a best-practice procedure on how to conduct a practice test.[74,87]

The four approaches used to optimize the data quality have been a first step towards developing a clinical registry containing data of good quality. We determined which data to collect in cooperation with the participating physiotherapists, we offered the vendors of EHR-systems clear instructions on how the data needed to be collected, we provided physiotherapists insight in their data deliveries, and we made a first successful effort in the execution of a practice test, testing the quality of the data that was collected.

Nevertheless, as discussed earlier, we acknowledge that patients were insufficiently involved in the design of our study. Patients should better be involved in identifying their priorities on the data that should be collected, deciding on how the data actually is collected, and in providing patients access to the information based on the data collected.[5] The limited patient participation in the studies of this thesis potentially limits the relevance of the collected data, and may limit the use of data for e.g. self-management and shared-decision making purposes.[5]

In our attempt to optimize the data quality, in addition to the aspects of user-friendliness that have been described above, we strongly recommend the development and annual obligatory implementation of a pipeline check. Such 'pipeline-check' is very labour-intensive due to the large number of EHR-system suppliers (*N*>20) in Dutch primary care physiotherapy practice. As a result, thus far we were unable to implement a full pipeline check for the assurance of validity and reliability of the data, as we had liked to do. For each EHR-system, we checked whether the designated data units were sent to the registry, but not whether those data units were formulated exactly as described in the technical specifications. In concrete terms this means, for example, that it has been checked whether EHR-system 'X' can successfully deliver a certain PROM to the registry, but it has not been checked in detail whether the items of that PROM have been formulated exactly as prescribed. The future development of such an obligatory pipeline check should strive to improve the standardization of language and technology, as also described above under the heading 'user-friendliness'. Such a test should not only check if certain 'data-units' from the system are sent to the national registry, but should also verify whether the information collected in that field is in accordance with the prescribed technical specifications. This pipeline-check should validate the data flow from all EHR-systems to the clinical registry and the way in which the data is stored and converted into information within the clinical registry. This pipeline check should preferably be performed by an independent external entity certified by a recognized institute.[84] Such external entities could be the 'Nederlandse Norm' (NEN)[88] and/or the International Organization for Standardization (ISO)[89].

We also learned that the reporting to participating practices with feedback information about data delivery – as part of the pipeline check – was too technical. This made that most physiotherapists did not use them to check if the data delivery was successful. Although the intention of this reporting was good, it needs to be redeveloped in such a way that it is easy to use by the participating practices.

In addition to the pipeline check, future research should develop a broadly accepted standard procedure for the execution of a practice test. Such a test is crucial in verifying the quality of the collected data and the information that is derived from it. In addition it should stimulate the increase of the quality of the data and information by suggesting improvement actions. Although there is no clear guidance on how to apply a practice test[85,86], a practice test should preferably measure the following important data-quality aspects: relevance, reliability, feasibility, achievability and usability.[70–74] Only when both the pipeline check and the practice test provide sufficient certainty that the properties of the data are adequate, it is possible to provide adequate feedback information, that does not fall prey to the 'garbage in is garbage out' argument.[90]

A well-described example of such feedback information are quality indicators (QIs).[91] QIs are "measurement tools, screens, or flags that are used as guides to monitor, evaluate, and improve the quality of patient care, clinical support services, and organizational functions that affect patient outcomes"[92]. QIs consist of explicitly defined and measurable items referring to the structures, processes or outcomes of care.[93–95]

There are several frameworks for the development of QIs.[74,83,85,96] These frameworks also emphasize the importance of the execution of a practice test, since it enables formulating a benchmark for a QI that meets all the quality aspects.[75,82,83] So far, research shows that often only the Delphi methodology is used to reach consensus in formulating QIs, and practice tests are not commonly executed.[97-100]

Formulating strict conditions for transparency

The clinical registry of the KNGF was initiated with the aim to improve the quality system for Dutch physiotherapists by facilitating them to become more transparent on their service delivery. Transparency can be both internally and externally oriented. This is about 'to whom' the transparency is provided. Internally, it focuses on transparency between physiotherapists themselves. When transparency is externally oriented, it is often intended for patients, health insurers and government.

In chapter 3 and 5 we have explored the views on transparency of the collected data of physiotherapists and patients, respectively. From chapter 5 we have learned that patients are willing to share their data to stimulate quality improvement in a safe learning environment. This can be achieved through internal transparency, using the feedback-information from the clinical registry to stimulate healthcare professionals to learn from each other and to improve their quality of service-delivery. Internal transparency can be achieved, for example, through audit and feedback activities, such as peer learning and case-based discussions.[12,21,101,102] The relevance of such a safe learning environment is underpinned by Steenbruggen et al. They state that a safe learning environment among peers is essential to be able to stimulate learning.[103] The authors conclude that a safe environment should offer "a sense of freedom, without external guidance, with internal observers and feedback offered privately, in a mutually supportive relationship, acknowledging the vulnerability of participants".[103]

Additionally, from chapter 3 and 5 we have learned that caution is required with external transparency towards health insurers. In providing external transparency the information is often used to monitor performance. Physiotherapists and patients have little confidence in the way health insurers will use the obtained information. The reluctance towards external transparency of the obtained information for performance management has also been identified by Braithwaite and Mannion.[104] They warn that such performance management systems might have a little meaningful impact on the performance when the targets of the defined indicators have perverse effects[104], which may lead to gaming.[105] Gaming negatively influences the validity of the data, and may severely limit the potential positive benefits that PROM use has.[106] Wolpert identified such perverse effects, when funders of the service mandated the use of PROMs, setting targets for completion rates but paying little attention to its integration within the clinical conversation or clinical care.[106] As a consequence, the use of PROMs as a means became an end in itself.

Our studies showed that use of the collected data for internal transparency purposes is accepted by physiotherapists and patients as primary end-users. On the other hand, caution is required with external transparency. In the further development and implementation of the clinical registry, it is essential to formulate strict conditions that should apply on the (internal and/or external) use of the data. Obviously these conditions must fit in the framework of current legislation and regulation, that apply to the use of the data and/or information from the clinical registry. Such strict conditions may prevent that physiotherapists and patients do not start, or even stop participating in the data collection, which potentially harm the data quality of the clinical registry and ultimately even its existence. In order to formulate these strict agreements, it is conditional that the registry has a suitable and formalized governance structure which is made responsible for the formulation of these conditions and its compliance. The conditions, for example, define how relevant feedback information, such as the QI's mentioned above, should be developed before they can be used (for internal and/or external transparency purposes). This governance structure must lead to an appropriate balance of powers between the interests of patients and physiotherapists as primary end users. Over time it might be possible that more secondary users, such as the government and insurance companies get a role in the governance structure.

As explained in the paragraph on the quality of the data, there is no standardized practice test to validate the relevant quality aspects. Given this absence, it is sensible to be cautious about the use of QIs for external transparency, as also stated in a report by Verburg et al.[107] If the step towards external transparency is made too soon, it can be expected that the perverse effects will hinder the valuable application of QIs.[104]

7.4
Recommendations for research and policy & practice

1 Investing in the knowledge of physiotherapists and patients

Future *research* should explore:

- How physiotherapists can be encouraged to participate in a continuous learning activity to stimulate knowledge transfer and long-term implementation of the clinical registry. Peer learning meetings could be such a learning activity.
- What would be the best way to ensure sufficient knowledge of patients about the objective, the importance and actual implementation of the clinical registry.

From a *policy and practice* perspective:

- A cyclical financial investment is needed to sustainably invest in the necessary knowledge translation towards patients and physiotherapists, enabling further development and implementation of the clinical registry.
- In order to achieve optimal implementation of a clinical registration, investments in knowledge transfer should already be made in the curriculum of the bachelor's degree programme.

2 Influencing behaviour change via (informal) leaders

- Future *research* should focus on how formal and informal leaders can exert an even more effective influence on achieving the aspirations for using the clinical registry within the quality system.
- From a *policy and practice* perspective, we recommend that the formal leaders, taking into account the ambitions of the physiotherapists and patients and other stakeholders, develop a multi-year agenda aimed at achieving the objectives with regard to the further development and implementation of the clinical registry.

3 Establishing a well-functioning system with optimal support for its end-users

Future *research* should explore how to develop:

- A set of relevant performance measures that can be self-monitored by patients, which can be used in addition to the selected PROMs.
- A patient portal that stimulates that patient reported data are collected directly by the patient into the registry.
- An annual obligatory implementation of a pipeline check of the system of the clinical registry as a whole. This pipeline-check should validate the data flow from the various EHR-systems to the clinical registry and the way in which the data is stored and converted into information in the clinical registry.
- A broadly accepted standard procedure for the execution of a practice test.
- An even more innovative dashboard focussing on the following three aspects: 1) how provide an easy to interpret feedback report on the data deliveries; 2) how to use the produced information to stimulate shared decision-making within the clinical process and; 3) how to present the data that enables physiotherapy practices to monitor their quality assurance obligations.

From a *policy and practice* perspective:

- Increase patient participation in the development and implementation of the clinical registry.
- Apply stricter selection criteria on the outcomes measured that meet the interests of patients and physiotherapists, and decrease the administrative burden.
- Stimulate collection of all data-units directly from the primary source.
- Increase the standardization of nomenclature and technical specifications of the data collection.
- Formulate strict conditions that should apply on the (internal and/or external) use of the data.
- Ensure that the registry has a suitable and formalized governance structure leading to an appropriate balance of powers between the interests of all end users.

7.5

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Addendum

Nederlandse samenvatting

Introductie

Dit proefschrift is tot stand gekomen als resultaat van een kwaliteitsprogramma geïnitieerd door het Koninklijk Nederlands Genootschap voor Fysiotherapie (KNGF), getiteld Kwaliteit in Beweging (KiB). Het doel van het KiB-programma was om te verkennen op welke wijze het geldende kwaliteitssysteem voor fysiotherapeuten vernieuwd kon worden.

In mijn dagelijkse aanstelling bij het KNGF ben ik betrokken bij de ontwikkeling en implementatie van beleid dat bijdraagt aan de kwaliteit van zorg van fysiotherapeuten. Als vereniging stellen we ons als doel dit beleid te ontwikkelen en implementeren in nauwe samenwerking met onze leden.

In het introductiehoofdstuk lichten we achtereenvolgens toe wat de gehanteerde definitie van kwaliteit van zorg is, hoe het huidige kwaliteitssysteem voor fysiotherapeuten in Nederland is opgezet en wat de stimulerende factoren voor innovatie van dit kwaliteitssysteem zijn. Vervolgens zoomen we in op één van de veelbelovende stimulerende factoren voor innovatie: transparantie van zorg. Tot slot beschrijven we het hoofd en de subdoelen van mijn proefschrift.

Definitie van kwaliteit

Kwaliteit van zorg laat zich niet makkelijk vangen in een definitie, het is complex en veelomvattend. In dit proefschrift hebben we de definitie van het Institute of Medicine (IOM) gehanteerd om kwaliteit van zorg te definiëren. Zij beschrijven kwaliteit van zorg als “de mate waarin zorgverlening voor individuen en populaties de kans op gewenste gezondheidsresultaten vergroten en in overeenstemming zijn met de huidige professionele kennis”. Deze definitie identificeert zes domeinen om kwaliteit van zorg te definiëren, deze zijn: veiligheid, effectiviteit, patiëntgerichtheid, tijdigheid, efficiency en gelijkwaardigheid. In de ambitie om kwaliteit van zorg te stimuleren binnen het KiB-programma is gebaseerd op de maatschappelijke en politieke situatie gekozen om te focussen op de domeinen *effectiviteit*, *patiëntgerichtheid* en *efficiëntie* van de kwaliteitsdefinitie van het IOM.

Huidige kwaliteitssysteem

Om de kwaliteit van de fysiotherapeutische zorg in Nederland te borgen is een kwaliteitssysteem ingericht. Enerzijds zijn de vereisten in dit systeem gebaseerd op de wet BIG (Beroepen In de Gezondheidszorg), die sinds 1993 geldt. Daarin wordt je als fysiotherapeut verplicht om te voldoen aan een minimale werkureneis van 2.080 uur per 5 jaar. Anderzijds heeft het KNGF sinds 1997 een aanvullende vereisten gesteld. Deze worden geborgd in een privaatrechtelijk register van het

KNGF. Tegenwoordig heet dat register het Kwaliteitshuis Fysiotherapie. De aanvullende vereisten van dit register zijn dat fysiotherapeuten deel moeten nemen aan de klachtenregeling conform de WKKGZ (Wet Kwaliteit, Klachten en Geschillen Zorg), dat ze per registratieperiode accreditatiepunten moeten behalen bijvoorbeeld door het volgen van scholing en ze committeren zich aan de professionele standaard en vakinhoudelijke behandelrichtlijnen.

Stimulerende factoren voor innovatie van een kwaliteitssysteem

Innovaties worden gedreven door interne en externe factoren. Een goed voorbeeld van een interne factor voor innovatie in de fysiotherapie is de toewijding van deze zorgverleners om de best mogelijke zorg te leveren, iedere dag weer. Tegelijkertijd is alom bekend dat het helaas jaren duurt voordat wetenschappelijke kennis haar weg vindt naar de klinische praktijk. Daarom is het belangrijk om een kwaliteitssysteem zodanig te innoveren dat het de gemotiveerde en betrokken fysiotherapeuten optimaal ondersteunt in de toepassing van de beste zorg, gebaseerd op recente wetenschappelijke kennis. Een prominent aanwezige externe factor voor innovatie in de fysiotherapie en de zorg zijn de stijgende zorgkosten. In 2006 werd ‘de marktwerking’ in de zorg geïntroduceerd, met als doel om meer grip te krijgen op de zorgkosten. Dat is helaas nog niet gelukt. De huidige groei in zorgkosten vormt een bedreiging voor het solidaire Nederlandse zorgstelsel. Deze externe factor vraagt om innovaties in het kwaliteitssysteem, waardoor het beter mogelijk wordt om zorg in te kunnen kopen gebaseerd op de prijs-kwaliteit verhouding. Dat is op dit moment nog niet goed mogelijk omdat er onvoldoende zicht is op een afgebakende en breed geaccepteerde definitie van de kwaliteit van zorg. Hierdoor wordt zorg op dit moment hoofdzakelijk ingekocht gebaseerd op de prijs.

Transparantie van zorg

Het vergroten van de transparantie van de geleverde zorg én het resultaat ervan wordt gezien als een veelbelovende innovatie, die aansluit bij zowel de interne als externe factoren. Transparantie maakt het in theorie immers mogelijk om te monitoren in hoeverre de beschikbare wetenschappelijke kennis wordt toegepast in de praktijk en de kosten. Daardoor ontstaat inzicht in de prijs-kwaliteitverhouding.

In landen als het Verenigd Koninkrijk, Canada, Australië en de Verenigde Staten wordt transparantie van zorg al toegepast om bovengenoemde prestaties van zorg te monitoren. Ook in Nederland wordt in bepaalde mate transparantie van zorg gevraagd, bijvoorbeeld door verzekeraars.

Transparantie van de dienstverlening kan worden bereikt door data te verzamelen over de geleverde zorg en de uitkomsten. Gebruikmakend van het Donabediaanse model zijn er drie soorten data die kunnen worden gebruikt om deze transparantie over de kwaliteit van zorg te geven.

Dit zijn: data over de *structuur*, het *proces* en de *uitkomst* van de zorg. De *structuur*, vertegenwoordigt alle aspecten die van invloed zijn op de context waarin zorg wordt verleend, bijvoorbeeld de fysieke faciliteit, apparatuur en personeel. Het *proces* beslaat alle activiteiten die binnen de gezondheidszorg worden ondernomen, zoals diagnose, behandeling, preventieve zorg en voorlichting aan patiënten. En de *uitkomst* betreft alle bereikte resultaten van de verleende zorg, zowel voor patiënten als voor/of bevolkingsgroepen. Bijvoorbeeld veranderingen in de gezondheidstoestand, het gedrag, de kennis, de tevredenheid van de patiënt en de gezondheidsgerelateerde kwaliteit van leven.

Data over de structuur, het proces en de uitkomst van de zorg worden al jarenlang verzameld in de elektronisch patiëntendossiers die aanwezig zijn in vrijwel alle fysiotherapiepraktijken in Nederland. Vanuit deze elektronische patiëntendossiers kan de relevante data worden geüpload naar een externe opslag, waardoor het verzamelen van klinische gegevens over structuur, proces en uitkomst van de zorg relatief eenvoudig op grote schaal te realiseren is. Het verzamelen van gegevens in dergelijke opslag biedt de mogelijkheid om een landelijk klinisch register te ontwikkelen, waarmee transparantie kan worden gestimuleerd.

Het KNGF heeft als onderdeel van het KiB-programma besloten om in 2013 een dergelijk landelijk klinisch register te ontwikkelen en te implementeren. Dit landelijk klinisch register kreeg de naam Landelijke Database Fysiotherapie (LDF). Het doel was om te verkennen of het kwaliteitssysteem voor Nederlandse fysiotherapeuten op de domeinen effectiviteit, patiëntgerichtheid en efficiëntie van de kwaliteitsdefinitie van het IOM kan worden verbeterd met de introductie van transparantie.

Binnen de LDF lag de nadruk vooral op het verzamelen van uitkomst data in de vorm van vragenlijsten die de (ziekte)perceptie van de patiënt vastleggen, de zogenaamde 'patient reported outcome measures' (PROMs). De gekozen PROMs worden allen aanbevolen in de vakinhoudelijke behandelrichtlijnen van het KNGF. PROMs meten uitkomsten gericht op een generiek domein (bijvoorbeeld pijn), of aandoeningspecifiek domein, waarbij ze zich richten bijvoorbeeld op onderdelen van het functioneren van de patiënt die verband houden met een specifieke ziekte of aandoening (bijvoorbeeld schouderklachten). In het klinische proces worden PROM's belangrijk geacht voor aspecten die patiëntgerichtheid stimuleren, zoals gedeelde besluitvorming, het stellen van doelen en monitoring van uitkomsten. Daarnaast kunnen PROMs-gegevens, indien geaggregeerd over patiënten, worden gebruikt voor monitoring en kwaliteitsverbetering, en voor openbare rapportage van uitkomsten voor verantwoordingsdoeleinden aan externe belanghebbenden, zoals beleidsmakers en verzekeringsmaatschappijen. Naast de uitkomstdata worden in de registratie ook structuur- en procesdata met betrekking tot de dienstverlening verzameld. Deze gegevens zijn geselecteerd op basis van de richtlijn Dossiervoering van het KNGF. Het verzamelen van structuur- en procesdata is belangrijk omdat deze van cruciaal belang zijn voor de interpretatie van de uitkomstdata. Wanneer bijvoorbeeld uitkomstdata van een PROM worden gebruikt om het effect van een reeks bezoeken aan een fysiotherapeut te objectiveren, is voor een juiste interpretatie van de prijs-kwaliteitverhouding kennis van de procesvariabele aantal behandelingen cruciaal. Als er veel data wordt verzameld, kan inzicht in de relatie tussen uitkomst en kosten en de invloed van patiëntvariabelen als leidraad worden gebruikt: men zou bijvoorbeeld kunnen verwachten dat de optimale PROM-uitkomst een bepaald gemiddeld aantal behandelsessies vergt, meer sessies zullen niet tot een beter resultaat leiden, terwijl minder sessies het resultaat zullen verminderen. In bepaalde subgroepen van patiënten (bijv. ouderen of de aanwezigheid van multimorbiditeit of een lage sociaaleconomische status) kan het echter nodig zijn om een groter aantal behandelingen te geven om het optimale PROM-resultaat te bereiken. Zo stimuleert transparantie beide: zorg op maat én een optimale kosten-kwaliteitverhouding.

Hoofd- en subdoelstellingen

Het hoofddoel van dit proefschrift was om het kwaliteitssysteem voor Nederlandse fysiotherapeuten te verbeteren door hen te helpen transparanter te worden over hun dienstverlening met behulp van een landelijk klinisch register, de LDF.

We besloten ons te concentreren op het verzamelen van door de patiënt gerapporteerde uitkomsten (PRO) met door de patiënt gerapporteerde uitkomstmaten (PROMs). De verzamelde gegevens in het LDF moeten worden omgezet in relevante feedbackinformatie voor de deelnemende fysiotherapeuten, zodat zij het inzicht in de kwaliteit van hun dienstverlening kunnen verbeteren door hun eigen gegevens te vergelijken met die van anderen. Onze hypothese was dat de ontwikkeling van zo'n landelijk klinisch register met een actieve implementatiestrategie, inclusief opleiding van fysiotherapeuten die hen helpen om de noodzakelijke gedragsverandering te bewerkstelligen, het kwaliteitssysteem zou verbeteren en kwaliteitsverbetering zou stimuleren. De opleiding was gericht op: 1) het formuleren van verbeterdoelen door gebruik te maken van de verzamelde uitkomsten en 2) het evalueren van deze verbeterdoelen in plan-do-check-act cycli door te reflecteren op de verkregen uitkomsten in relatie tot de geboden behandeling. Continue dataverzameling in de LDF biedt de mogelijkheid om de impact van de plan-do-check-act cycli te monitoren en zo de kwaliteit van de zorg op cyclische wijze te verbeteren.

Voor dit proefschrift werden de volgende subdoelstellingen geformuleerd:

- Kernsets ontwikkelen van korte en eenvoudig toepasbare meetinstrumenten voor fysiotherapeuten, een cursus ontwikkelen voor de implementatie van deze kernsets; en om de effecten van het geïmplementeerde cursus op de houding van fysiotherapeuten ten opzichte van de kernsets en het daadwerkelijke gebruik ervan te evalueren.
- Beschrijven van een evidence-informed proces van ontwikkeling en aanpassing van de implementatiestrategie gericht op het gebruik van PROMs en gegevenslevering aan de LDF in de dagelijkse fysiotherapeutische praktijk.
- Het identificeren van beïnvloedende factoren die het gebruik van PROMs in de Nederlandse eerstelijns fysiotherapiepraktijk stimuleren of belemmeren.
- Het vaststellen van opvattingen van patiënten over het gebruik van PROMs om patiëntgerichtheid te stimuleren.
- Testen van de betrouwbaarheid, validiteit en onderscheidend vermogen van de gegevens die zijn verzameld in het landelijk klinisch register.

Deze subdoelstellingen leggen verschillende aspecten bloot die van invloed zijn op het succes van de implementatie van transparantie in de fysiotherapie, met behulp van de LDF. Deze kennis kan worden gebruikt om de verdere implementatie van transparantie als innovatie in het kwaliteitssysteem voor Nederlandse fysiotherapeuten, maar levert ook kennis op die kan worden gebruikt voor de implementatie van soortgelijke initiatieven in andere landen of voor andere zorgprofessionals.

In **hoofdstuk 2** beschrijven we de ontwikkeling en implementatie van een cursus gericht op de toepassing van kernsets van meetinstrumenten voor de diagnostiek en evaluatie van de zorg. De cursus bestond uit vier interactieve trainingssessies van een halve dag, verspreid over 4-5 maanden. Uit de voor- en nametingen blijkt dat de cursus het vermogen om een relevante meetinstrument te kiezen en het zelf gerapporteerde gebruik van de meetinstrumenten significant heeft verbeterd bij de interventiegroep. De controlegroep toonde geen significante verschillen op bovengenoemde uitkomsten.

We concluderen dat de ontwikkeling van kernsets van meetinstrumenten en actieve implementatie via een cursus belangrijke aspecten zijn om de toepassing van meetinstrumenten in de praktijk te verbeteren. De beschikbaarheid van een dergelijk cursus is een voorwaarde voor de implementatie van de LDF. De LDF werd gedurende de volgende studies ontwikkeld en geïmplementeerd, als onderdeel van het KiB-programma van het KNGF. In dit programma hebben meetinstrumenten en transparantie een belangrijke rol in de verdere ontwikkeling van de kwaliteit van de dienstverlening van fysiotherapeuten binnen de Nederlandse gezondheidszorg.

In **hoofdstuk 3** beschrijven we de initiële ontwikkeling en implementatie van de LDF. De verzamelde data in de LDF worden omgezet in relevante informatie die wordt teruggekoppeld aan fysiotherapeuten. Deze informatie kan worden toegepast om kwaliteitsverbetering te stimuleren.

De implementatiestrategie is toegepast in drie pilotregio's met 355 deelnemende fysiotherapeuten en wordt geëvalueerd met kwalitatieve en kwantitatieve methoden. De focus lag op het gebruik van meetinstrumenten die de (ziekte)perceptie van de patiënt vastleggen, de zogenaamde 'patient reported outcome measures' (PROMs). De implementatie bestond uit een cursus van 4 bijeenkomsten waarin fysiotherapeuten werden ondersteund bij het verbeteren van het routinematige gebruik van PROMs en het aanleveren van data aan de LDF. Naast verschillende lezingen was gezamenlijk leren een belangrijk onderdeel van de implementatiestrategie. Gezamenlijk leren is een vorm van leren waarbij fysiotherapeuten met - én van elkaar leren door reflectie op de verzamelde data. Aanvullend hebben we 'kennismakelaars' geïntroduceerd om het implementatieproces te vergemakkelijken. De kennismakelaars waren collega fysiotherapeuten met uitgebreidere expertise over de toepassing van PROMs. Zij functioneerden als laagdrempelige vraagbaak bij de implementatie van de LDF. In samenspraak met de deelnemende fysiotherapeuten werd gebaseerd op de opgedane ervaringen tijdens de pilots de implementatiestrategie aangepast.

Bij voormeting bleek het zelf gerapporteerde gebruik van PROMs suboptimaal. Daarnaast kwamen uit de interviews met fysiotherapeuten de volgende belemmeringen voor het gebruik van PROMs naar voren: onvoldoende tijd om het gebruik van PROMs te implementeren, de PROMs zijn te moeilijk of te lang en het elektronisch patiëntendossier (EPD) is onvoldoende gebruiksvriendelijk. Faciliterende factoren bij de implementatie waren: de beschikbaarheid van een kernset van PROMs, actieve betrokkenheid van fysiotherapeuten bij het proces van het ontwikkelen en aanpassen van de implementatiestrategie, en het feit dat fysiotherapeuten zich in staat voelden om transparanter te worden over hun behandelresultaten. De nameting resulteerde in een toename van zelf gerapporteerd en feitelijk PROM-gebruik, een toename van praktijken die gegevens aanleverden aan het landelijk klinisch register en een toename van het aantal patiëntepisodes dat in het landelijk klinisch register werd verzameld.

Op basis van deze resultaten concludeerden we dat de implementatie van PROMs en het verzamelen van gegevens in de LDF haalbaar is. Het iteratieve proces van het ontwikkelen en aanpassen van de implementatiestrategie, samen met de deelnemende fysiotherapeuten, versterkte de gezamenlijke verantwoordelijkheid voor de implementatie. Desalniettemin werden verschillende aspecten geïdentificeerd die voor verdere implementatie relevant zijn. Ten eerste is het belangrijk om, indien beschikbaar, de korte versies (short forms) van de PROMs te gebruiken om de ervaren registratielast tot een minimum te beperken. Ten tweede kan de inzet van kennismakelaars verder worden uitgebreid om het gebruik van PROMs en dataverzameling in de LDF te vergemakkelijken. Ten derde concludeerden we dat het gebruik van patiënt portalen voor het (digitaal en online) invullen van de PROMs en het verbeteren van de gebruiksvriendelijkheid van het EPD de verdere implementatie kan ondersteunen.

In **hoofdstuk 4** werd het gebruik van PROMs in de Nederlandse eerstelijns fysiotherapiepraktijk onderzocht. Aanvullend werd geanalyseerd welke factoren van invloed zijn op de zelf gerapporteerde en daadwerkelijke toepassing van PROMs. Hiervoor is gebruik gemaakt van vragenlijsten en de data die is verzameld in de LDF. De resultaten tonen aan dat minder dan een derde van de fysiotherapeuten PROMs gebruikte bij meer dan 80% van hun patiënten. Hoger zelf gerapporteerd en daadwerkelijk gebruik van PROMs waren gerelateerd aan meer ondersteunende EPD-systemen en meer kennis van fysiotherapeuten over PROMs.

We concludeerden dat de implementatie van PROMs in de Nederlandse eerstelijns fysiotherapie suboptimaal was en dat de geïdentificeerde factoren gebruikt kunnen worden voor de verdere implementatie. Het vergroten van het PROM-gebruik in de praktijk te vraagt om verdere implementatie inspanningen. Deze inspanningen hebben de meeste kans van slagen als ze zich richten op: 1) de mate van ondersteuning die EPD-systemen bieden, bijvoorbeeld door patiëntenportalen te ontwikkelen waarmee de patiënt de PROMs zelf (digitaal en online) kan invullen, op een zelfgekozen moment, en 2) vergroten van de kennis van fysiotherapeuten over het gebruik van PROMs in een klinische setting.

In **hoofdstuk 5** worden de belemmerende en bevorderende factoren beschreven die patiënten ervaren bij het gebruik van PROMs. Deze factoren zijn uitgevraagd in interviews die zijn gehouden met 23 patiënten. De resultaten zijn onderverdeeld in de volgende drie thema's van belemmerende en bevorderende factoren: (1) de praktische toepasbaarheid van PROMs, (2) interactie met de fysiotherapeut voor besluitvorming en (3) het delen van informatie buiten de klinische context. Binnen deze thema's zijn verschillende sub thema's geïdentificeerd met belemmerende en bevorderende factoren voor het gebruik van PROMs in de fysiotherapeutische praktijk.

Over het algemeen concludeerden we dat patiënten het gebruik van PROMs een meerwaarde vonden in de eerstelijns fysiotherapiepraktijk. Desalniettemin moeten de geïdentificeerde belemmeringen worden aangepakt bij de verdere implementatie van de LDF.

In **hoofdstuk 6** beschrijven we de bevindingen van een praktijktest waarin de kwaliteit van de data van patiënten met aspecifieke lage rugpijn in de LDF toetsen. Deze praktijktest hebben we uitgevoerd in de zoektocht naar het uiteindelijk ontwikkelen van relevante feedbackinformatie met behulp van gegevens uit de LDF. Deze praktijktest bestond uit meerdere analyses om de betrouwbaarheid, validiteit en het onderscheidend vermogen van PROMs-data voor aspecifieke lage rugpijn te evalueren. De betrouwbaarheid en validiteit zijn bepaald door het toetsen van diverse hypothesen. Het onderscheidend vermogen werd bepaald door hiërarchische multilevel-analyses uit te voeren. De betrouwbaarheid werd als voldoende beoordeeld doordat in 15 van de 16 analyses de gestelde hypothese werd bevestigd. De validiteit werd bevestigd in alle 4 de uitgevoerde analyses. Tot slot werd ook het onderscheidend vermogen bevestigd in alle 9 uitgevoerde analyses.

We concludeerden dat de gezondheidsuitkomsten van patiënten met aspecifieke lage rugpijn, verzameld met PROMs in de LDF van het KNGF, betrouwbaar en valide zijn en in staat zijn om de resultaten van de dienstverlening tussen eerstelijns fysiotherapeutische praktijken te onderscheiden. Daarnaast bieden de resultaten van dit onderzoek een goed uitgangspunt voor het ontwikkelen van standaarden voor een uit te voeren praktijktest bij het ontwikkelen van kwaliteitsindicatoren op basis van gegevens uit een klinische registratie.

Tot slot beschrijven we in **hoofdstuk 7** de algemene discussie aan de hand van een drietal thema's en geven we diverse aanbevelingen voor wetenschappelijk onderzoek, beleidsontwikkeling en de klinische praktijk. Terugblikkend op de diverse hoofdstukken beschrijven we in de discussie dat de implementatie van de LDF in de pilotregio's is met bijeenkomsten waarin de pilotgroepen zijn geïnformeerd over de ambities van het KNGF met de LDF. Tijdens deze bijeenkomsten werd duidelijk dat het leveren van hoogwaardige zorg de algemene ambitie was van de deelnemende fysiotherapeuten. Ze waren geïnteresseerd in het creëren van een leeromgeving en transparantie werd geaccepteerd als dit zou worden gebruikt als hulpmiddel om de kwaliteit van de klinische praktijk te verbeteren. Ook werden PROMs gezien als relevante uitkomstgegevens.

Uit de afzonderlijke hoofdstukken in dit proefschrift hebben we geleerd dat het haalbaar is om klinische data van Nederlandse fysiotherapeuten in de eerstelijn te verzamelen in de LDF en om deze data transparant te gebruiken om de kwaliteit zorg te verbeteren. Deze bevindingen sluiten aan bij andere initiatieven in Nederland, de Verenigde Staten, het Verenigd Koninkrijk, Zweden, Denemarken en Noorwegen, waar dergelijke registraties met succes zijn ontwikkeld en geïmplementeerd. Het vereist echter een continue inspanning, gericht op verdere ontwikkeling en implementatie, om de dataverzameling te vergroten (bijvoorbeeld door de inspanning te verminderen en het aantal deelnemende fysiotherapeuten te vergroten) en om het gebruik van de klinische registratie voor kwaliteitsverbetering verder uit te breiden.

Om een dergelijke klinische registratie succesvol te implementeren, is het bereiken van een blijvende verandering in het gedrag van de primaire gebruikers (patiënten en fysiotherapeuten) voorwaardelijk. In lijn met andere literatuur over de systematische verzameling van PROMs in de klinische praktijk, hebben we aangetoond dat het belangrijk is om te investeren in:

- het vergroten van de kennis van deelnemende fysiotherapeuten over het potentieel van routinematige verzameling van klinische data voor het verbeteren van de kwaliteit van zorg,
- de ondersteuning door de formele en informele leiders bij de implementatie van de LDF en,
- de ontwikkeling van een goed werkend systeem met optimale ondersteuning voor haar eindgebruikers. Waarbij onderwerpen als gebruiksvriendelijkheid, kwaliteit van data en de formulering van strikte afspraken over het verschaffen van transparantie essentieel zijn.

Gekoppeld aan deze thema's benoemen we de volgende aanbevelingen voor wetenschappelijk onderzoek, beleidsontwikkeling en de klinische praktijk:

1 Investeren in de kennis van fysiotherapeuten en patiënten

Toekomstig *onderzoek* zou zich moeten richten op de vraag:

- Hoe fysiotherapeuten kunnen worden aangemoedigd om deel te nemen aan een doorlopende leeractiviteit om kennisoverdracht en langdurige implementatie van het LDF te stimuleren. Gezamenlijk leren zou zo'n leeractiviteit kunnen zijn.
- Wat de beste manier is om te zorgen voor voldoende kennis bij patiënten over het doel, het belang en de daadwerkelijke implementatie de LDF.

Vanuit het *beleids- en praktijkperspectief* bevelen we aan:

- Dat er een duurzame financiële investering komt om te kunnen investeren in de noodzakelijke kennisvertaling richting patiënten en fysiotherapeuten en waardoor verdere ontwikkeling en implementatie van de LDF mogelijk wordt.
- Dient reeds in het curriculum van de bacheloropleiding geïnvesteerd te worden in kennisoverdracht, om zodoende tot een optimale implementatie van de LDF te komen.

2 Beïnvloeden van gedragsverandering via (informele) leiders

- Toekomstig *onderzoek* moet zich richten op hoe formele en informele leiders nog effectiever invloed kunnen uitoefenen op het realiseren van de ambities voor het gebruik van de LDF binnen het kwaliteitssysteem.
- Vanuit *beleids- en praktijkperspectief* bevelen wij aan dat de formele leiders, rekening houdend met de ambities van de fysiotherapeuten en patiënten en andere stakeholders, een meerjarenagenda ontwikkelen gericht op het behalen van de doelstellingen gericht op de verdere ontwikkeling en implementatie van de LDF.

3 Opzetten van een goed werkend systeem met optimale ondersteuning voor de eindgebruikers

Toekomstig *onderzoek* zou zich moeten richten op de selectie/ontwikkeling van:

- Een reeks relevante uitkomstmaten die een patiënt zelf kan monitoren (bijvoorbeeld aantal stappen per dag) en die kunnen worden gebruikt naast de geselecteerde PROMs.
- Een patiëntenportaal dat stimuleert dat door de patiënt gerapporteerde gegevens direct door de patiënt worden verzameld in het register.
- Een jaarlijkse verplichte implementatie van een pijplijncheck van het systeem van de LDF als geheel. Deze pijplijncheck moet de datastroom van de verschillende EPD-systemen naar de LDF en de manier waarop de gegevens worden opgeslagen en omgezet in informatie in de LDF valideren.
- Een breed geaccepteerde standaardprocedure voor het uitvoeren van een praktijktest, zoals beschreven in hoofdstuk 6.
- Een continue doorontwikkeling van het LDF-dashboard waarin de verzamelde data wordt teruggekoppeld in bruikbare informatie. Deze doorontwikkeling moet zich richten op de volgende drie aspecten: 1) hoe zorgen voor een eenvoudig te interpreteren feedbackrapport over de dataleveringen, waaruit af te lezen valt in hoeverre het leveren van de data geslaagd is; 2) hoe de geproduceerde informatie te gebruiken om gedeelde besluitvorming binnen het klinische proces te stimuleren en; 3) hoe de gegevens te presenteren die fysiotherapeutische praktijken in staat stellen hun kwaliteitsborgingsverplichtingen vanuit bijvoorbeeld zorgverzekeraars te bewaken.

Vanuit *beleids- en praktijkperspectief* bevelen we aan om:

- De patiëntenparticipatie te vergroten bij de ontwikkeling en implementatie van de LDF.
- Strengere selectiecriteria toe te passen op de inclusie van de PROMs, waarmee beter tegemoetgekomen wordt aan het belang van patiënten en fysiotherapeuten en de administratieve lasten verminderen.
- Het verzamelen van alle data rechtstreeks uit de primaire bron te stimuleren (bijvoorbeeld de geboortedatum en adres op te halen vanuit VECOZO), hierdoor verminderen we de administratieve lasten.
- De standaardisatie van nomenclatuur en technische specificaties van de gegevensverzameling te vergroten.
- Strikte voorwaarden te formuleren die voor het (intern en/of extern) gebruik van de data.
- De LDF een geschikte en geformaliseerde bestuursstructuur te geven, die leidt tot een passend machtsevenwicht tussen de belangen van alle eindgebruikers.

Data Management

All data that is collected for this dissertation are stored at the server of the Radboudumc, department IQ healthcare, secured folder: "H:\PL Philip van der Wees". Only the project team has access to this secured environment. In this dissertation, all data on patients and physiotherapists have been pseudonymized. For patients information obtained from the registry, this pseudonymization is provided by the national registry, which is hosted by a third trusted party taking into account the current legislation, under auspices of the Royal Dutch Society for Physical Therapy (KNGF). Personal details of patients and physiotherapists that participated in the interviews were stored in a separate secured folder: "H:\PL Philip van der Wees".

All studies in this dissertation were conducted with the principles of Good Clinical Practice, The Netherlands Code of Conduct for Research integrity and according to the Declaration of Helsinki. For each study we followed the international committee for Research Involving Human Subjects (ICMJE) criteria for authorship. The Medical Ethical Committee of the Radboudumc approved the study protocols for chapter 3, 4, 5 and 6 (registration # 2014/260).
Data were analysed using SPSS and Atlas.ti. Informed consent was obtained from all individual participants included in the studies. According to international standards, data will be stored for 15 years. Data of the studies in this dissertation can be reused after a reasonable request upon the PhD candidate.

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Guus A. Meerhoff | Welke vragenlijst gebruiken bij nekklachten? | Physios, 2013

Raymond A.H.M. Swinkels, Guus A. Meerhoff, Emmylou Beekman, Sandra J.H.M. Beurskens | Raamwerk Klinimetrie voor evidence based products | KNGF, 2016

Jasper D. Bier, Wendy G.M. Scholten-Peeters, Bart J. Staal, Jan Pool, Maurits W. van Tulder, Emmylou Beekman, Guus A. Meerhoff, Jesper Knoop, Arianne P. Verhagen | KNGF-richtlijn Nekpijn, 2016

Marlies van Nimwegen, Maarten Nijkrake, Marten Munneke, Dinja de Groot, Karin G. Heijblom, Guus A. Meerhoff | KNGF-richtlijn ziekte van Parkinson | KNGF & Parkinsonnet, 2017

Simone van Dulmen, Philip van der Wees, Guus A. Meerhoff, Marjo Maas, Femke Driehuis, Annick Bakker-Jacobs, Juliette Cruijsberg, Janine Liefers, Ria Nijhuis-van der Sanden | Eindrapport onderzoeksprogramma Masterplan Kwaliteit in Beweging (MKIB) | Radboudumc - IQ healthcare, 2017

Emalie J. Hurkmans, Wilfred F.H. Peter, Nynke M. Swart, Guus A. Meerhoff, Thea P.M. Vliet-Vlieland | KNGF-richtlijn Reumatoïde artritis | KNGF & VvOCM, 2018

Nynke M. Swart, Emalie J. Hurkmans, Guus A. Meerhoff | Evidence-based handvatten voor diagnostiek en behandeling – Nieuwe richtlijn Reumatoide artritis KNGF/VvOCM | Fysiopraxis, 2018

Caroline S. Kampshof, Wilfred F.H. Peter, Mitchell C.M. van Doormaal, Jesper Knoop, Guus A. Meerhoff, Thea P.M. Vliet Vlieland | KNGF-richtlijn Artrose heup-knie | KNGF & VvOCM, 2018

Wilfred F.H. Peter, Caroline S. Kampshof, Jesper Knoop, Mitchell C.M. van Doormaal, Guus A. Meerhoff, Thea P.M. Vliet Vlieland | De KNGF-richtlijn Artrose heup-knie 2018 | Physios, 2018

Femke Driehuis, Irma Woudenberg-Hulleman, Ingrid M. Verhof-van Westing, Harry Geurkink,Bert Hartstra, Michiel Trouw, Ron van Heerde, Mario van Til, Guus A. Meerhoff | KNGF-richtlijn fysiotherapeutische dossiervoering, 2019

Wilfred F.H. Peter, Nynke M. Swart, Guus A. Meerhoff, Thea P.M. Vliet-Vlieland | Herziene KNGF-richtlijn Reumatoïde artritis 2018 | Physios, 2019

Guus A. Meerhoff | KNGF-richtlijnen, zo ziet het ontwikkelproces eruit | Physios, 2019

Frank van de Laar, Martin T. Moons, Guus A. Meerhoff | Begrijpen van systematische literatuurreviews, een praktische introductie | Physios, 2019

Alex van't Hul, Hilde Vreeken, Guus Meerhoff, Rik Gosselink, Daniel Langer, Jean Muris, Emmylou Beekman, Martijn Spruit | Fysiotherapie bij COPD helpt, maar blijft vaak onbenut | Huisarts en Wetenschap, 2019

Hilde L. Vreeken, Emmylou Beekman, Mitchell C.M. van Doormaal, Marleen H.T. Post, Guus A. Meerhoff, Martijn A. Spruit | KNGF-richtlijn COPD | KNGF &VvOcm, 2020

Emmylou Beekman, Mitchell C.M. van Doormaal, Marleen H.T. Post, Alex J. Van 't Hul, Guus A. Meerhoff, Hilde L. Vreeken | Fysiotherapie bij chronisch obstructief longlijden (VI) De herziene KNGF-richtlijn COPD | Physios, 2020

Femke Driehuis, Guus A. Meerhoff | KNGF-leidraad externe richtlijnen 2020 Ontwikkeling en implementatie van externe richtlijnen | KNGF, 2020

Carmen Bergstrom, Lucelle van de Ven, Dorethé Wassink, Jan van der Wel, Guus A. Meerhoff, Stefan Visscher, Joppe van der Reijden, Johan Snijders, Carinke Buiting-van der Zon, Maret Zonneveld,Wineke Remijse, Lilian Dekkers, Judith van der Vloed, Jeanine Brink, Danielle Conijn, Debby de Ridder, Marleen Post | Richtlijn Informatie-uitwisseling tussen arts en paramedicus (Richtlijn HASP-paramadicus) | NHG, LHV, KNGF, EN, NVD, NVLF & VvOCM, 2020

Nynke M. Swart, Adri T. Apeldoorn, Danielle Conijn, Guus A. Meerhoff, Raymond W.J.G. Ostelo | KNFG-richtlijn Lage rugpijn en lumbosacraal radiculair syndroom | KNGF & VvOCM, 2021

Hilde Vreeken, Mitchell van Doormaal, Daniëlle Conijn, Guus Meerhoff, Nynke Swart | KNGF-richtlijnenmethodiek 2022, Ontwikkeling en implementatie van KNGF-richtlijnen | KNGF, 2023

About the author

Guus Meerhoff was born on March 4th, 1985 in Stadskanaal, the Netherlands. He completed secondary school in 2002 at the Ubbo Emmius College in Stadskanaal. In 2006, he finished his bachelors degree physiotherapy at the Hanzehogeschool University of Applied Sciences in Groningen and thereafter he finished his masters degree Human Movement Sciences at the Rijksuniversity of Groningen.

He worked as physiotherapist in clinical practice for 7 years, thereafter he started as a policy advisor at the association for physiotherapists in the Netherlands, the Royal Dutch Society for Physical Therapy (KNGF). Guus is currently still appointed at KNGF. After being a policy advisor and program manager, currently he is appointed a general manager of the Quality department within KNGF. Together with his team of 30 professionals and many other stakeholders he holds the responsibility to develop and implement the quality policy for Dutch physiotherapists. Examples of projects are; the development and implementation of the professional standard for physiotherapists, clinical (treatment) guidelines, the national research agenda, education standards and a clinical registry (the LDF, which is initially developed and implemented within the scope of this dissertation).

During his earlier years at KNGF he got offered a position at IQ healthcare, on the development and implementation of a clinical registry, with the aim to improve the quality system for Dutch physiotherapists. This clinical registry is the LDF. He combined this research position with his position as a policy advisor at KNGF.

Besides his work for KNGF and Radboudumc, Guus works as an editor for Physios. Physios is a Dutch journal about innovations and developments within physiotherapy. Physios is accredited by KNGF and is issued 4 times a year, online and in print. Physios has approximately 2000 subscribers.

PhD portfolio

Name PhD Candidate: G.A. (Guus) Meerhoff	**PhD period:** 1-8-2013 to 19-01-2024
Department: Scientific Centre for Quality of Healthcare	**Promotor:** Prof. dr. P.J. (Philip) van der Wees Prof. dr. M.W.G. (Ria) Nijhuis – van der Sanden
Graduate School: Radboudum Research insitute for Medical Innovation	**Co-promotor:** Dr. S.A. (Simone) van Dulmen

	Year(s)	Uren
COURSES & WORKSHOPS		
Qualitative Research Methods and Analysis	2013	84
GRADE	2014	48
Academic writing	2014	40
RIHS Introduction course	2014	22
Biometrics PAO Heyendaal	2016	81
Projectmanagement TwijnstraGudde	2016	28
BROK	2017	28
Programmamanagement TwijnstraGudde	2017	63
De Baak (Talent Ontwikkel Programma)	2019	210
Situationeel leiderschap Bureau Zuidema	2021	26
CONGRESSES		
Oral presentations		
Liverpool | ER-WCPT Congres	2014	28
Maarssen | National congres of KNGF	2014	28
Melbourne | G-I-N Congres	2015	28
Ljubljana | National congres of the Slovanian Association of Physiotherapists	2015	28

	Year(s)	Uren
Singapore | WCPT Congres (Panel discussion)	2015	28
Zwolle | National congres of the NVFK	2015	28
Amsterdam | G-I-N Congres	2015	28
Philadelphia | G-I-N Congres	2016	28
Cape Town | WCPT Congres	2017	28
Cape Town | IPPTA Congres	2017	28
Dublin | ER-WCPT Congres	2017	28
Colorado Springs | IPPTA Congres	2018	28
Cape Town | G-I-N Congres	2018	28
Manchester | G-I-N Congres	2019	28
Geneve | WCPT Congres	2019	28
Riga | National congres of the Lavijas Fizioterapeitu Asociacija	2019	28
Beirut | National congres of the Lebanese Order of Physiotherapists	2019	28
ONLINE | COVID webinar ER-WPT	2021	14
Prague | General Meeting of the ER-WPT	2022	28
Poster presentations		
Singapore | WCPT Congres	2015	28
Organizing Commitees		
Amsterdam | 12th G-I-N Conference	2015	40
Den Bosch | 4th Conference on Clinical Guidelines of the ER-WPT	2018	40
OTHER		
Working Groups		
Member of the Allied Health Working Group of G-I-N	2015-2018	N/A
Member of the Professional Issues Working Group of ER-WPT	2016-current	N/A
Editor		
Editor at Physios	2013-current	N/A
TOTAL		**1.280**

Koninklijk Nederlands
Genootschap voor Fysiotherapie

Royal Dutch Society for Physical Therapy

Radboudumc
university medical center

Radboud University