

**Management of patients  
with shoulder pain in  
primary care**

A pause for reflection



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Management of patients with shoulder pain in primary care – a pause for reflection  
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*Begeleiding van patiënten met schouderpijn  
in de eerstelijns gezondheidszorg – een denkpauze  
(met een samenvatting in het Nederlands)*

**Proefschrift**

ter verkrijging van de graad van doctor aan de  
Universiteit Utrecht  
op gezag van de  
rector magnificus, prof.dr. H.R.B.M. Kummeling,  
ingevolge het besluit van het college voor promoties  
in het openbaar te verdedigen op

donderdag 18 maart 2021 des ochtends te 10.30 uur

door

**Margit Kirsten Kooijman**

geboren op 14 januari 1982  
te Utrecht

**Promotoren:**

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## Voorwoord

*‘Maar wat als je nu, als zwaan, net moest doen alsof je een muis was? Als je moest doen alsof je grijs en harig en klein was? Als je geen lange slingerstaart had om op staartendag recht omhoog te dragen? Als je waggelde, telkens wanneer je probeerde als een muis te lopen? Als je iedere keer snaterde, wanneer je als een muis probeerde te praten? Zou je dan niet het ongelukkigste schepsel ter wereld zijn?’*

Een vlammend voorwoord moest het worden.

Het enige stuk waar niemand feedback op mocht geven, wat vrij was.

Zoveel felheid...

De jonge vrouw van toen wil gezien worden; omringd door lieve mensen, zeker, en toch, op de verkeerde plek. Hardheid. Twijfel. Pijn.

Door de ogen van de liefde zie ik haar nu; ze wist het niet, ze wist het gewoon niet.

*‘Ik zeg er onmiddellijk bij dat de deuren naar de wereld van het wilde Zelf niet talrijk, maar wel heel waardevol zijn. Als je een diep litteken hebt, dan is dat een deur, als je een oud, oud verhaal hebt, dan is dat een deur. Als je zo veel van de lucht en het water houdt dat het bijna onverdraaglijk is, dan is dat een deur. Als je naar een intenser leven, vol leven, gezond leven verlangt, dan is dat een deur.’*

Mijn proefschrift was een deur. Niet iedereen krijgt die kans. En niet iedereen gebruikt de mogelijkheid. Gedurende de reis veranderde de grond, het gezelschap en het doel. Ik scherpte al mijn zintuigen, leerde mijn eigen kompas te gebruiken en... kwam thuis (zelfs met een boekje).

*‘Rituelen vormen één van de manieren waarop mensen hun leven in een bepaalde context plaatsen. Rituelen brengen de schimmen en geesten van een mensenleven bijeen, rangschikken ze en leggen ze te ruste. Een ieder richt een ofrenda op haar eigen manier in, vertellen wel of niet het verhaal dat erbij hoort, en laten het dan staan zo lang ze willen.’*

Al sparrende over waarom dit voorwoord toch zo moeilijk te schrijven was, besefte ik dat er nog iets niet klaar was. Was het bangheid? Nee! ... Ja! Dat er iemand om het hoekje komt en zegt: ‘nee nee, niet goed’. En ik wist. Na de dag, de laatste dag, zal ik één exemplaar verbranden. Gewoon zodat ik weet, echt weet, het is klaar.

*‘En nu komt het belangrijkste gedeelte van het verhaal: het wordt lente, er komt nieuw leven, er komt een nieuwe tijd, een nieuwe kans. Het belangrijkste is vol te houden, stand te houden, want de belofte van de wilde natuur is deze: na de winter wordt het altijd lente. (...) Bloeien is ons geboorterecht.’*

Toch nog vlammen in dit voorwoord.

De eigen groep gevonden.

Proefschrift af.

Lente.

Culemborg, 24 januari 2021



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# 1

## **General introduction**



*A 42-year-old man presents with shoulder complaints in the local physiotherapy practice. He was referred by the general practitioner for recurrent complaints; a corticosteroid injection had had no effect. He has been having complaints for about six months but cannot remember a clear cause. The pain intensity varies; sometimes it is almost gone and other times it keeps him from sleeping properly. He also noticed that his posture is slightly bent. Many times he has been on the point of visiting a general practitioner or a physiotherapist but as many times he didn't think his pain and limitations in function severe enough. Recently though, the pain increased and prevents him not only from sleeping but also from playing tennis. In addition, dressing himself and doing groceries is becoming problematic. Now, he is worried that it will deteriorate so he seeks advice if it is maybe best to wear a sling for a while or that he should ignore the pain and keep on going?*

It is becoming increasingly clear that pain is one of our most common and expensive public health problems and the leading cause of disability worldwide<sup>12,3</sup>.

In a population-based survey, nearly three-quarter of the Dutch population reported the presence of musculoskeletal pain during the past 12 months<sup>4</sup>. Around half of them had contacted a health professional because of it; meaning that on a yearly basis, 28% of the general population consulted a health care professional because of musculoskeletal pain. These professionals mainly involve general practitioners, physiotherapists and medical specialists such as orthopaedic surgeons.

This survey as well as recent figures from the global burden of disease study revealed that musculoskeletal pain was very prevalent in younger age groups and not an aging problem as such<sup>3,4</sup>. Yet, besides being a burden for the individual, musculoskeletal pain represents a burden on the society that is expected to increase because people tend to live longer<sup>2</sup>.

Shoulder pain is amongst the most frequently reported pain sites<sup>5,6</sup>.

## **Prevalence and burden of shoulder pain**

In 2006, a systematic review of the literature revealed that the point prevalence for upper extremity musculoskeletal disorders differed from 2-53% and the 12-month prevalence from 2-41%, depending on the setting and definition used<sup>7</sup>. In the Netherlands, the 12-month prevalence of (non-traumatic and non-systemic) complaints of the arm, neck and/or shoulder (CANS) in the open population was 37% and the point prevalence was 26%<sup>8</sup>. The prevalence figures for shoulder pain specifically ranged from 7-26% for point prevalence and 5-47% for the 12-month prevalence<sup>9</sup>. In Norway, the one-year prevalence of shoulder pain in the general population was reported to be as high as 55%<sup>10</sup>.

Besides upper extremity musculoskeletal disorders can adversely affect daily living, they are associated with a high economic and social burden. They are responsible for substantial health care resource expenditure, work absenteeism and disability. In the

Netherlands, in 2012, 11% of the registered sick leave days were due to CANS<sup>11</sup>. Yearly costs of CANS are estimated at 2.1 billion Euros of which most costs are due to sick leave and 150 million due to health care usage<sup>12</sup>. As far as the author is aware, no estimates of costs of shoulder pain specifically are known.

## **Shoulder pain: (lack of) terminology**

The main reason that the estimates of the occurrence of shoulder pain are so diverse is that there is no consensus on the terminology of this musculoskeletal condition<sup>13</sup>. A review by Van Eerd et al. (2003) revealed 27 different classification systems for upper extremity musculoskeletal disorders for the working population alone<sup>14</sup>. These systems varied in the criteria to describe the disorder, the labels used to identify them and in the disorders that were included.

Lack of uniformity in diagnostic labeling is complicated by the weak correlation between structural factors and the clinical presentation of shoulder pain<sup>15,16</sup>. This phenomenon is being acknowledged throughout the spectrum of musculoskeletal disorders<sup>17</sup>. As the categorizations of these pathological processes are poorly understood, the cataloging of pain and dysfunction stemming from the musculoskeletal system cannot be but prone to variable interpretations<sup>18</sup>. Receiving different diagnostic labels from different clinicians is at least confusing and at worst detrimental for patients as these diagnostic terms have implications on their perception<sup>19</sup>.

For shoulder pain in particular, clear definitions are also hindered by the limited diagnostic value of physical examination tests. These are meant to aid clinicians in diagnosing patients presenting with shoulder pain<sup>20</sup>. However, a Cochrane analysis of the literature identified the existence of more than 170 different tests<sup>21</sup>. Moreover, some tests are known by different names or are used for several different shoulder diagnoses. This myriad of information would challenge any clinician to make any choice. A blessing in disguise, is that all meta-analyses on this subject contend that no single test was pathognomonic for any specific diagnosis<sup>20-24</sup>. Still, it is almost tangible that this is frustrating for patients and clinicians alike.

## **Prognosis**

The increase in the prevalence of musculoskeletal diseases combined with an absence of clear underlying etiological mechanisms implies that its management is becoming increasingly reliant on information on the prognosis<sup>2</sup>. This trend can also be observed in studies focusing on patients with shoulder pain<sup>19,25</sup>.

The prognosis for patients with shoulder pain is moderately favourable, as about 40-60% have recovered within six months to two years<sup>26,27</sup>. At six months, among Danish musculoskeletal physiotherapy patients, only one in two perceived their



symptoms as acceptable notwithstanding the average improvement being above the threshold for clinically important change<sup>28</sup>.

To help inform patients and clinicians on the likelihood of future outcomes, research into prognostic factors aims to detect factors associated with clinical outcomes to aid therapeutic management and identify targets for new interventions to improve the course of the health condition<sup>29</sup>. In 2004, a systematic review of prognostic studies on shoulder pain found that there was disappointingly little evidence for most factors that commonly were suggested to be of prognostic importance<sup>30</sup>. They found consistent evidence only for high pain intensity at baseline to be a strong predictor for a poor prognosis. As was to be expected, many studies were published on this topic since, especially in primary care settings. Hence, at the moment it is unclear if more studies are required or if there already is consensus on important prognostic factors.

## Organization of care

Today, in the Netherlands, a high number of patients with shoulder pain visit a general practitioner or physiotherapist<sup>31</sup>. The annual consulting incidence in general practice for shoulder symptoms is estimated at 36 per 1000 person years<sup>32</sup>. General practitioners only refer more patients to the physiotherapist for back and neck pain<sup>32</sup>. In physiotherapy practice, about 10% of patients have shoulder complaints, which makes it the most common complaint after back and neck complaints<sup>33</sup>.

The current Dutch guideline for general practitioners in the management of shoulder pain suggests a stepwise approach consisting of advice, watchful waiting, analgesia and referral for physiotherapy when these steps fail to reduce complaints sufficiently<sup>34</sup>. Referral to secondary care for non-traumatic shoulder pain is only indicated in case of atypical signs or when usual care leads to unsatisfactory results. There also is a short guideline available for physiotherapists<sup>35</sup>. It is based partly on scientific evidence and partly on best practice because the content of physiotherapy treatment is still under discussion. In both guidelines, attention is paid to diagnosis and treatment but there is only brief information on collaboration and whether or when to refer a patient or not<sup>36</sup>. This deficiency leads to the question what this presently looks like in practice?

Sound patient care rests firmly on precise choice of providers and smooth transitions from one clinician to the other<sup>18</sup>. General practitioners and physiotherapists trained and equipped to perform musculoskeletal ultrasound in patients with musculoskeletal disorders is one example of the transition of musculoskeletal services from secondary to primary care in recent years. It appears like musculoskeletal ultrasound is being used increasingly with the intention to improve their diagnostics and assist them in selecting the most appropriate intervention<sup>37,38</sup>. Nevertheless, clear data on the uptake is unknown as are any considerations by practice owners and trained physiotherapists for providing and using musculoskeletal ultrasound.

As another opportunity to choose the best available health care provider, patient self-referral to physiotherapy was introduced in the Netherlands in 2006. Before that date, a referral from the general practitioner was necessary. The proportion of self-referrers has been rising since, up to more than 56% in 2018<sup>39</sup>. However, it is still unclear whether patients are able to choose the qualitatively best available care provider<sup>40</sup>. Well-timed referrals by patients themselves and clinicians are essential as treatment is most beneficial when provided at the right place and at the right time<sup>18</sup>. To assess if or to what extent support herein is desirable, information on the current care processes for different modes of access is required but lacking at the same time.

## **Interventions**

In recent years, a vast number of meta-analyses have been published on the effectiveness of conservative interventions for patients with shoulder pain<sup>41-49</sup>. They generally reveal that although some interventions have more effect than no treatment on the short term, in the long term no robust, high quality evidence is available that any intervention or combinations of interventions leads to statistically significant or clinically relevant benefits over one another, placebo or other treatments such as medication or surgery. Consequently, before investing in more research on interventions in itself, information is required on current use and whether management decisions on interventions by the main clinicians actually match each other.

## **Context factors**

Besides the intervention(s) applied, lately more research explores the role of so-called contextual factors<sup>50,51</sup>. These are general or non-specific factors influencing - the effectiveness of - treatment such as those related to the patient, practitioner or setting<sup>52</sup>. Although acknowledged within the field of psychotherapy, in primary care settings contextual factors are much less known and investigated. A study on management decisions in non-traumatic complaints of arm, neck and shoulder in general practice, found that absence of convincing evidence in favour of the treatment options investigated, may leave more room for personal preferences of both general practitioner and patient<sup>53</sup>. Knowing this, the question arises how these contextual factors influence the effectiveness of treatment in patients with shoulder pain?

## **Aim and scope**

In this thesis, we opt for a pause for reflection on the current management of shoulder pain in primary care in order to enable ourselves to decide wisely on the way forward. By asking the question ‘where are we now?’ we will explore some leads to improve care for patients with shoulder pain by physiotherapists and general practitioners.

Three parts are considered:

### **I Process and content of care**

- What are the characteristics of the patient population and care process in patients with shoulder syndromes in general and in physiotherapy practice? (*Chapter 2*)
- Does the population and care process differ between patients treated solely by their GP, those referred for physiotherapy and self-referrals? (*Chapter 2*)
- Do general practitioners and physiotherapists agree on the best management for four common shoulder complaints? (*Chapter 3*)

### **II Diagnosis and prognosis**

- What is the diffusion of musculoskeletal ultrasound in Dutch physiotherapy practices? (*Chapter 4*)
- What are the experiences of physiotherapist with MSU in a primary care setting in patients with shoulder complaints? (*Chapter 4*)
- Which factors have prognostic value on (un)favourable outcome in patients with shoulder complaints in primary care, secondary care and occupational settings? (*Chapter 5*)

### **III Context factors**

- Is there a therapist effect in physiotherapists treating patients with shoulder pain? (*Chapter 6*)
- Do personality traits of the physiotherapist influence patient outcome? (*Chapter 6*)

*Chapter 7* comprises a general discussion on the findings of this thesis.

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# 2

## **Patients with shoulder syndromes in general and physiotherapy practice: an observational study**

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## Abstract

**Background** Shoulder complaints are commonly seen in general practice and physiotherapy practice. The only complaints for which general practitioners (GPs) refer more patients to the physiotherapist are back and neck pain. However, a substantial group have persistent symptoms. The first goal of this study is to document current health care use and the treatment process for patients with shoulder syndromes in both general practice and physiotherapy practice. The second goal is to detect whether there are differences between patients with shoulder syndromes who are treated by their GP, those who are treated by both GP and physiotherapist and those who access physiotherapy directly.

**Methods** Observational study using data from the Netherlands Information Network of General Practice and the National Information Service for Allied Health Care. These registration networks collect healthcare-related information on patient contacts including diagnoses, prescriptions, referrals, treatment and evaluation on an ongoing basis.

**Results** Many patients develop symptoms gradually and 35% of patients with shoulder syndromes waited more than three months before visiting a physiotherapist. In 64% of all patients, treatment goals are fully reached at the end of physiotherapy treatment. In general practice, around one third of the patients return after the referral for physiotherapy. Patients with shoulder syndromes who are referred for physiotherapy have more consultations with their GP and are prescribed less medication than patients without a referral. Often, this referral is made at the first consultation. In physiotherapy practice, referred patients differ from self-referrals. Self-referrals are younger, they more often have recurrent complaints and their complaints are more often related to sports and leisure activities.

**Conclusions** There is a fairly large group of patients with persistent symptoms. Early referral by a GP is not advised under current guidelines. However, in many patients, symptoms develop gradually and a wait-and-see policy means more valuable time may pass before physiotherapy intervention takes place. Meanwhile a long duration of complaints is a predictor for poor outcome. Therefore, future research into early referral is required. As physiotherapists, we should develop a way of educating patients to avoid lengthy waiting periods before seeking help. To prevent high costs, physiotherapists could consider a classification of pain and limitations and wait-and-see policy as used by GPs. With early detection, a once-off consultation might be sufficient.

## Background

Shoulder complaints are the most common complaints of the extremities in an average physiotherapy practice; 9.8% of all patients present with this type of problem<sup>1</sup>. Low back pain and neck pain are the only complaints for which a general practitioner (GP) refers more patients to the physiotherapist; 7.3% of all referrals to a physiotherapist are made for shoulder complaints<sup>2</sup>. Studies report unfavourable outcomes in many patients<sup>3-6</sup>, high costs in terms of secondary care and sick leave<sup>7</sup> and frequent occurrence in the workplace<sup>8</sup>. Therefore, shoulder conditions involve a considerable burden for the individual and the society.

Shoulder complaints can be roughly divided into problems with the glenohumeral joint (frozen shoulder, osteoarthritis) shoulder instability, acromioclavicular or sternoclavicular complaints, cervical or cervicothoracic dysfunction and problems with structures in the subacromial space. It has been estimated that approximately 44-80% of all shoulder complaints originate from these anomalies of structures in the subacromial space<sup>9,10</sup>. This space contains the tendons of the rotator cuff muscles and two bursae. Entrapment or inflammation of these structures leads to a restricted range of motion and pain. Although these complaints are described as shoulder syndromes, there is lack of consensus on the diagnostic criteria and on the best approach to management<sup>11-14</sup>. Incidence and prevalence of shoulder conditions have been identified but there are no such estimates for shoulder syndromes<sup>14</sup>. In addition, a recent systematic review of the literature indicates that many studies on the management of impingement syndrome are deficient in detailed demographic information, as well as information on previous medical treatment such as corticosteroid injections or (non-) steroidal anti-inflammatory drugs, previous physiotherapy and even the duration of the symptoms at the start of treatment<sup>14</sup>. The current study provides this information for a large group of patients who consulted their general practitioner (GP) or physiotherapist for these complaints.

As referred to above, there is debate on the best treatment methods for patients with shoulder syndromes. Dorrestijn et al.<sup>11</sup> and Kromer et al.<sup>15</sup> showed that so far, there is no evidence indicating whether surgical treatment or conservative treatment has a better outcome for patients with shoulder syndromes. Therefore, it is suggested that patients should be treated conservatively before surgical intervention is considered<sup>15</sup>. There is a Dutch guideline for (general) shoulder complaints for GPs that suggests a stepwise approach of advice, analgesia and referral for physiotherapy<sup>9</sup>. There also is a short guideline available for physiotherapists. This is based partly on scientific evidence and partly on best practice because the content of physiotherapy treatment, as part of conservative treatment, is still under discussion<sup>16</sup>. This results in a variable number of patients (20 -79%) that respond well to physiotherapy<sup>10</sup>. In order to improve treatment, knowledge of current treatment methods is indispensable but as yet, it is not adequately available.

Using data from registration networks, the present study describes patient characteristics and the treatment process for patients treated by a representative group of GPs or physiotherapists who were unaware of the specific purpose of this study. In the Netherlands, patients can access physiotherapy professionals directly (known as direct access or self-referral) and it is known that use, treatment and outcome may differ depending on the mode of access<sup>17</sup>. However, it is not known whether this is also true for patients with shoulder syndromes specifically. By separating patients who were referred for physiotherapy from those who were not, an attempt was made to describe the care of the two groups and to determine if they were materially different. In brief, the present study addresses two research questions. First, what are the characteristics of the patient population and the care process in patients with shoulder syndromes in general and in physiotherapy practice in particular? Second, does the population and care process differ between patients treated solely by their GP, those referred for physiotherapy and self-referrals?

## Methods

### Registration

To describe patient characteristics and the process of care for patients with shoulder syndromes, data were used from the Netherlands Information Network of General Practice (LINH)<sup>2</sup> and the National Information Service for Allied Health Care (LIPZ)<sup>1</sup>. At the start of LINH, a random sample was drawn from the human resources register of GPs. Participating GPs record data on all patient contacts, including diagnoses, referrals and prescriptions. LIPZ is a registration network of physiotherapy practices that collects healthcare-related information on patient characteristics, mode of access, health problems and treatment plans on an ongoing basis. At the start of LIPZ, a random sample was drawn from the human resources register of physiotherapists.

According to Dutch legislation entitled 'Regulations on medical research involving human subjects', ethical approval is required for medical research in which persons are subjected to treatment or are required to behave in a certain manner. As this was not the case for the present study, ethical approval was not necessary. Nevertheless, the Dutch Data Protection Authority was notified of the research. In addition, pursuant to the Personal Data Protection Act, data were collected anonymously, patients were informed about the research by posters and leaflets in practice waiting rooms and patients had the opportunity to refuse participation. The research was carried out in accordance with the Helsinki Declaration.

### Participants

From the LINH database, all patients with shoulder syndromes, ICPC L92 (International Classification of Primary Care<sup>18</sup> who visited the GP in 2008 (n = 2428) were selected.

Eighty-five LINH practices were included, providing a representative sample of Dutch general practices with regard to practice type (solo, dual, group or health centre), degree of urbanisation and region. Patients with ICPC L92 were also selected from the LIPZ database. Because this database is smaller, all patients who visited the physiotherapist between 2006 and 2010 ( $n = 1182$ ) were selected. Forty-nine LIPZ practices were included and 116 physiotherapists delivered data, providing a representative sample of Dutch physiotherapy practices with regard to practice type (solo, dual, group), degree of urbanisation and region. This is also true for the selection of physiotherapists with regard to age and year of graduation but there are more male therapists ( $p = 0.01$ ) that register for LIPZ and the number of direct patient-related working hours is higher ( $p = 0.05$ ).

### **Data collection**

In LINH, for every patient, a care episode was defined as the time between the first and last visit for L92 in 2008. Care episodes were constructed on the basis of EPICON, which is an algorithm that groups ICPC-coded contact records from electronic medical records in general practice into care episodes. This algorithm calculates care episodes for each year separately (Biermans et al., 2008). Prescriptions were registered in accordance with the Anatomical Therapeutic Chemical (ATC) classification system. Because not all prescriptions were linked to a diagnosis, a list was made of the most common prescriptions based on a group of patients with a known diagnosis of L92. For each of these prescriptions, the number of times they were prescribed during a shoulder-syndrome care episode was determined. Interventions were registered using CTG codes, which are standardised codes set by the Dutch healthcare authority for health care claims to health insurers. For the most common codes with a diagnosis of L92, the number of times they occurred during a care episode of shoulder syndrome was determined. Referrals were also registered and for the most common referrals with a diagnosis of L92, the number of times they occurred during a care episode of shoulder syndromes was established. Based on the information in the referral module, the total group of patients was split in two: patients referred for physiotherapy during the care episode versus patients who were not referred for physiotherapy.

In LIPZ, a series of consecutive treatment sessions for shoulder syndromes was considered to be a care episode. For each care episode, the gender and age of the patient was registered. Also recorded were the duration of the complaint at intake, whether it was a recurrent complaint (when the complaint appeared after a symptom-free period of at least four weeks and at most two years) and the treatment goal(s). At the end of the treatment, therapists registered a maximum of three interventions that were applied in at least 50% of the treatment sessions. Besides these features of the treatment plan, the outcome was also registered (indication of the extent to which the treatment goals were met, according to the physiotherapist). Based on the mode of access, the total group of patients was split in two: patients referred by their GP versus patients who accessed physiotherapy directly.

## Data analysis

Descriptive statistics were calculated for all variables using Stata 11. Chi-square tests ( $\alpha = 0.05$ ) were used to test differences in categorical data between patients with shoulder syndromes with and without a referral; two-sample t-tests were used for continuous data.

## Results

Incidence of shoulder syndromes in general practice in 2008 was 8.5 patients per 1000 patients, or 38% of all shoulder complaints. Prevalence was 14.2/1000 patients/year, or 42% of all shoulder complaints. GPs treated 82% ( $n = 1983$ ) of patients themselves and referred 18% ( $n = 445$ ) to one or more other clinicians, mainly to a physiotherapist (13%,  $n = 306$ ) or a medical specialist (7%,  $n = 165$ ) (total is more than 18% because there may have been more than one referral per patient). In two-thirds of the referred patients ( $n = 199$ ), the referral for physiotherapy was given during the first GP consultation without further treatment by the GP, seven percent ( $n = 20$ ) were referred within two weeks and a further seven percent ( $n = 22$ ) within one month. In general practice, there was no difference in terms of age or gender between patients who were referred for physiotherapy and those who were not (Table 1); 42% ( $n = 1016$ ) of the patients with shoulder syndromes were male and the mean age was 55 years (SD 15).

**TABLE 1.** Patient characteristics in general practice and physiotherapy practice

	General practice (GP)		Physiotherapy practice (PT)	
	Only GP ( $n = 2134$ )	GP -> PT ( $n = 294$ )	GP -> PT ( $n = 895$ )	Only PT ( $n = 148$ )
Mean age (years $\pm$ SD)*	55 (15)	55 (14)	57 (16)	53 (16)
Gender (% male)*	42	44	41	54

\* Significant difference between 'only PT patients' in PT and 'GP -> PT patients' in PT

Table 2 shows that treatment in general practice was different for patients who were referred for physiotherapy. They consulted their GP more often but received less medication; in particular, fewer patients were prescribed NSAIDs. Of the patients referred for physiotherapy, 37% ( $n = 109$ ) consulted their GP again after the visit during which the referral was made.

**TABLE 2.** Treatment characteristics in general practice

	General practice (GP)	
	Only GP (n = 2134)	GP -> PT (n = 294)
Prescriptions (%)*	69	50
Paracetamol	4	8
NSAID*	50	38
Corticosteroids	24	19
Local anaesthetic	11	9
Opioids	7	7
Interventions		
Consultation (mean number ± SD)*	1.5 (1.4)	2.0 (1.6)
Duration of care episode (in days)	46	60
Cyriax injection (%)*	29	21

\* Significant difference between 'only GP patients' and 'GP => PT patients'

In physiotherapy practice, 2.6% (n = 1182) of all patients presented with shoulder syndromes, accounting for 27% (n = 1182) of all shoulder complaints. Of these, 76% (n = 895) were referred by a GP, 12% (n = 139) by a medical specialist and 12% (n = 148) accessed the service directly. Self-referrals differed from referred patients; they were younger and more often male (Table 1). Furthermore, they more often had recurrent problems and these were more frequently related to sports and leisure activities and less often to work (Table 3). The treatment also differed; in self-referrals, treatment goals were more often aimed at muscle function.

There were no differences between referred patients and self-referrals in terms of the duration of the complaint at the start of treatment, previous physiotherapy, severity of the complaint or the onset. Of patients with shoulder syndromes, 35% (n = 365) waited more than three months before visiting a physiotherapist, 45% (n = 469) had already had physiotherapy previously, severity of the complaint (between 0 and 10) was rated 7 and in 75% (n = 224) of the patients the symptoms had developed gradually. Common combinations of interventions were exercises aimed at functions and mobilisation or massage. At the end of treatment, the results did not differ between referred patients and self-referrals: in 64% (n = 668) of all patients with shoulder syndromes the treatment goals were fully reached.



**TABLE 3.** Complaints and treatment characteristics in physiotherapy practice

	Physiotherapy practice (PT)	
	GP -> PT (n = 895)	Only PT (n = 148)
Recurrent complaint (% yes)*	22	31
Duration of complaints (%)		
< 1 month	30	33
1 -3 months	34	36
> 3 months	36	31
Previous physiotherapy (% yes)	44	47
Pain severity (NRS 0 – 10) (mean ± SD) (n = 210/57)**	7 (1.7)	7 (1.1)
Onset (%) (n = 238/62)**		
Gradual	76	71
Sudden	24	29
Cause (%) (n = 158/44)**		
Sport	13	41
Work	33	27
Leisure activities	13	18
Other	41	14
Treatment sessions (mean ± SD)	15 (18)	15 (19)
Duration of treatment (mean ± SD, in weeks)	13 (15)	12 (15)
Treatment goals (%)*		
Mobility	47	33
Muscle function	11	20
Pain	11	13
Other	31	34
Interventions (% used in ≥ 50% of the treatment sessions)		
Mobilisation	45	39
Massage	39	45
Physical agent modalities	12	13
Exercise therapy - functions*	70	55
Exercise therapy - skills	24	32
Information & advice	33	33
Treatment goals fully reached (%)	63	69

\* Significant difference between 'only PT patients' and 'GP => PT patients'. \*\* Registration since 2009.

## Discussion

The present study sought to determine the characteristics of the patient population and the types of treatment for patients with shoulder syndromes in both general practice and in physiotherapy practice and secondly, whether there are differences between patients who are treated by their GP, those who are referred for physiotherapy and those who access physiotherapy directly. The results show that there are differences between these populations both in terms of the characteristics of the patient and the treatment they receive.

Eight out of ten patients with shoulder syndromes that visit a GP are treated solely by the GP and not referred to another clinician. In these patients, treatment was aimed at reducing pain and inflammation. The number of patients referred for physiotherapy in the present study was comparable to that of Kuijpers et al.<sup>19</sup>. Most patients who received a referral for physiotherapy were referred early on and were

prescribed less medication. The guideline for shoulder complaints from the Dutch College of General Practitioners recommend a stepwise approach in which the patient is referred for physiotherapy when there is no improvement with rest and advice ('wait and see') and pain medication for one or two weeks (preferably paracetamol)<sup>9</sup>. When pain is the main problem, extended treatment with analgesia is indicated. Physiotherapy is mainly indicated in the presence of a limited range of motion or other functional limitations. Although the duration of the complaints does not appear on GP records, the high number of first visit referrals indicates a discrepancy between the guideline and practice regarding the time frame for referral to physiotherapy. Further experimental research into the long-term effectiveness of early versus later referral is required to determine the preferred procedure. Duration of the complaints, level of pain, presence of functional limitations and concomitant cervical or cervicothoracic dysfunction will need to be taken into account.

In previous research, it was demonstrated that patients with shoulder complaints make as much use of direct access as the general patient population when attending the physiotherapist<sup>17</sup>. However, the results of this study show that patients with *shoulder syndromes* make less use of direct access; only 13% came through direct access compared with 22-44% of the entire patient population attending the physiotherapist from 2006 to 2010. It is known that self-referral decreases with age. The average age of patients with shoulder syndromes was 56 and therefore, the number of self-referrals can be expected to be lower in comparison with the general patient population in physiotherapy practice. Pain severity might also explain the limited number of self-referrals among patients with shoulder syndromes. Pain is common in shoulder syndromes and the average score on the numeric rating scale for pain severity was seven for both referred patients and self-referrals. Kennedy et al. found a comparable level of pain severity in patients with soft tissue disorders<sup>8</sup>. Given the type of treatment offered in general practice, patients with severe pain might turn to a GP first. The difference might also be related to the onset of pain. Self-referrals more often involve complaints of a short duration<sup>17</sup>. In three quarters of the patients with shoulder syndromes, the symptoms developed gradually; a much higher proportion than seen in the general patient population (60%)<sup>1</sup>. Van der Windt et al.<sup>20</sup> showed that a relatively large proportion of patients with shoulder syndromes considered strain or overuse in usual activities to be the precipitating cause of their problems. This study also shows that many patients wait a long time before they visit a physiotherapist. Kennedy et al. also found that almost half of patients with soft tissue disorders of the shoulder wait more than three months before contacting a physiotherapist<sup>8</sup>. It seems worthwhile to bring this information to the attention of patients since both a gradual onset and long-lasting complaints might contribute to an unfavourable prognosis<sup>21</sup>. However, earlier physiotherapy intervention for more patients is more expensive. It is the responsibility of the profession to act on this. The new guideline on shoulder syndromes advises physiotherapists to use the classification of pain and functional limitations, as practiced by GPs. Given the limited value of clinical shoulder tests, even when combined<sup>22</sup>, this

could be a helpful approach. Perhaps with early detection, a once-off consultation during which advice is given will be sufficient. Regarding the use of such a wait-and-see policy by physiotherapists, the profession will need to determine the conditions under which this is possible as well as its impact on prognosis and cost-effectiveness.

With regard to the physiotherapy treatment itself, the results of the present study show that in patients with shoulder syndromes, exercises aimed at functions, mobilisation and massage are the main types of intervention, which is partly in line with what is known about the treatment of shoulder injuries. Literature reviews by Green et al.<sup>12</sup> and Kromer et al.<sup>15</sup> on physiotherapy interventions for shoulder pain did not mention massage, whereas other research on the effectiveness of massage for shoulder pain provided moderate evidence for analgesic effects.

Physiotherapy treatment results in a positive outcome in 64% of patients with shoulder syndromes, regardless of the mode of access. In the general patient population in physiotherapy practice, 68% fully reach the treatment goals<sup>1</sup>. Of the patients referred for physiotherapy, 37% go back to their GP. This is in line with previous studies indicating an unfavourable outcome in many patients resulting in high costs<sup>3,23</sup>. On the other hand, Kuijpers et al. found that the total costs in the six months after first consultation for shoulder pain in primary care were not alarmingly high. In that study, the cost of physiotherapy accounted for only 14% of the total costs, as few patients were referred for therapy. However, the authors concluded that higher health care costs and productivity losses may be expected when follow-up times are longer due to a poor prognosis<sup>24</sup>.

Registration networks cover a large number of patients, providing a rich source of data. However, there are some limitations to this method of data collection. In LIPZ, information is collected on all diagnoses. This means detailed information specific to shoulder syndromes is not available; e.g. the existence of neck or back problems or repetitive or provocative movements in work or sport. Furthermore, diagnoses are based on referral letters, which can be ambiguous or imprecise. For example, terms such as 'shoulder complaints' are used, without giving further information. The procedure for diagnosing specific shoulder disorders is further complicated by a lack of consensus on the diagnostic criteria. Where diagnosis is difficult, complaints may be described as general shoulder complaints in the first instance, perhaps more so by less experienced clinicians. In this study, these general shoulder complaints are not included as shoulder syndromes in order to prevent heterogeneity as much as possible. Therefore, the results are based on a more homogeneous group of patients, but this may have led to an underestimation of the number of people attending the physiotherapist with shoulder syndromes. To measure the outcome of physiotherapy treatment, an indication of the extent to which the treatment goals were met is registered in LIPZ by the physiotherapist. This is a subjective outcome measure. In 2010, an indication of symptom severity at the beginning of the care episode and at the end was introduced. When patients do not come back, this information, which has to be obtained from the patient, remains unknown. As a result, this outcome measure is only

known for a subgroup of patients, which is insufficient for a reliable investigation. Therefore, physiotherapists give an indication of the result, so that an outcome measure is known for every patient. In the present study, referred patients and self-referrals achieved the treatment goals to the same extent. Since the outcome is measured in the same subjective manner, it is not expected that the results would be different. Nevertheless, ideally, patient-reported outcome measures should also be studied.

In LINH, a diagnosis was not registered for every consultation. Prescriptions, referrals and interventions are calculated for the total care episode of shoulder syndromes and might therefore have been overestimated. However, this calculation only concerned a selection of frequently used prescriptions, referrals and interventions which prevents the inclusion of those actually relating to a diagnosis other than shoulder syndromes.

Finally, data is based on two different patient populations. The physiotherapy database is much smaller and, therefore, a longer time period was selected. However, there were no policy changes in the area or indications that the group of patients consulting their GP changed over the period of the study. Nevertheless, it would be interesting to investigate the care process in a multidisciplinary network incorporating the activities of various health care professionals.

## Conclusions

In summary, there are differences in general practice between patients who are referred for physiotherapy and those who are not. Patients who are referred are prescribed less medication and are often referred at the first consultation with their GP. This goes against current guideline for GPs and could result in unnecessary or higher costs. On the other hand, possibly due to the gradual onset of complaints and a wait-and-see policy, for many patients, it takes quite a while before they see a physiotherapist, even though it is suggested that a long duration of complaints could be a predictor for poorer outcomes. When a restricted range of motion is the main problem, it is arguable that patients receive less medication but a quick referral to a physiotherapist. Future research into the long-term cost-effectiveness of an early referral could demonstrate whether this leads to better outcomes and should therefore be the preferred treatment.

As clinicians, we should also develop a way of educating patients about shoulder syndromes to prevent them waiting too long before they seek help. However, this can only be cost-effective when the profession sets clear guidelines on indications for physiotherapy, especially since there is debate on the value of clinical diagnostic tests. The classification of pain and functional limitations and adoption of the wait and see policy as used by GPs could be an example or starting point. Perhaps with early detection, a once-off consultation in which advice is given will be sufficient, especially when pain is severe. The consequences of such initiatives for the prognosis of the individual patient as well as cost-effectiveness should be investigated first.

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# 3

## **Physiotherapist management of patients with shoulder pain in comparison with general practitioner care – a vignette study**

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## Abstract

**Introduction** Patients with shoulder complaints are commonly seen in primary care general and physiotherapy practice. Despite increasing literature, clinicians still face many uncertainties in treating these complaints, resulting in unfavourable prognosis for many patients. By comparing general practitioners and physiotherapists' management to each other, leads are established to improve treatment of patients with shoulder pain in primary care.

**Methods** A questionnaire was sent to a random sample of 500 general practitioners and 500 physiotherapists, recruited from the national register databases for general practitioners and physiotherapists of the Netherlands Institute for Health Services Research. Each questionnaire consisted of four vignettes representing four common shoulder problems: rotator cuff tendinopathy, acute rotator cuff tear and early and late presentation of adhesive capsulitis. Clinicians were asked to indicate what management options they would routinely advocate.

**Results** The net response rate of general practitioners was 16.9% and of physiotherapists 24.0%. The degree to which general practitioner and physiotherapist management correspond with each other seems to depend on the type of shoulder pain involved. With subacromial complaints or an acute rotator cuff tear, the majority of both groups of clinicians generally agree on the preferred treatment. The scenario of the patient with capsulitis, especially the late presentation, caused much more variation in responses both between and within groups.

**Conclusion** Further research on adequate keep/refer decision making as well as more attention for psychosocial issues could be important topics in order to improve treatment.

## Introduction

Musculoskeletal conditions are highly prevalent in society and are known to have a substantial impact on health related quality of life. Shoulder complaints such as tendinitis or capsulitis are among the most commonly reported of these conditions<sup>1</sup>. The annual consulting incidence in general practice for shoulder symptoms is estimated at 36 per 1000 person years and general practitioners only refer more patients to the physiotherapist for back and neck pain<sup>2</sup>. In physiotherapy practice, about 10% of patients have shoulder complaints, which makes it the most common complaint of the extremities<sup>3</sup>.

The majority of shoulder complaints arise gradually and various studies show that many patients already have complaints of long duration when they first present themselves with a clinician<sup>4-6</sup>. Since this is a risk factor for poor treatment results, it is not surprising that unfavourable outcome is reported often<sup>5,6</sup>. In recent years, there has been an increase in research on other prognostic factors but despite the effort, besides longer duration only scores on pain-intensity and function have been consistently linked to outcome<sup>6,7</sup>.

Adequate decision-making on treatment is further hampered since physical examination is characterised by the limited validity of the clinical tests to diagnose the origin of symptoms<sup>8,9</sup>. In addition, though the overall evidence is conflicting, numerous psychological factors keep emerging as possible factors contributing to the prognosis of the shoulder complaints. All in all, this shows that delivering adequate treatment is a highly challenging task for physiotherapists and general practitioners as the main caregivers in primary care.

To carry out this task well, the Dutch taskforce 'right care at the right place' emphasizes the importance of collaboration and integration<sup>10</sup>. The Dutch guideline for general practitioners on the management of shoulder complaints provides some information on this. It suggests referral for physiotherapy in case a wait-and-see policy in combination with use of analgesics fails to reduce complaints sufficiently<sup>11</sup>. In contrast with this advice, previous research shows that the majority of patients was referred during the first consultation with the general practitioner<sup>4</sup>. The World Confederation of Physical Therapists regards the ability to independently determine whether a patient's condition is suitable for physiotherapy management a core element in their guideline for standards of physiotherapy practice<sup>12</sup>. However, most national guidelines for physiotherapists do not contain statements on keep/refer decision-making, which is true for the situation in the Netherlands as well<sup>13</sup>. The short guideline on subacromial complaints only recommends referring a patient (back) to the GP when treatment fails<sup>14</sup>. Recent research shows that most physiotherapists comply with this guideline except

that a large proportion of patients still received treatment when no improvement was observed<sup>5</sup>.

So, there is the already complex task of treating patients with shoulder patients combined with a potential evidence-practice gap in both general practitioner and physiotherapist care. Collaboration and integration are important but it may be expected that this only yields positive results when there is interdisciplinary consensus on the best management strategies. This was reason for us to investigate the current management for four common shoulder problems. By comparing general practitioner and physiotherapist care to each other, potential leads are established to improve management of patients with shoulder pain in primary care.

## **Methods**

### **Design and participants**

A random sample of 500 GPs and 500 physiotherapists, recruited from the national register databases for general practitioners and physiotherapists of NIVEL (Netherlands Institute for Health Services Research), were sent a questionnaire to investigate the management of patients with shoulder pain in primary care practices in the Netherlands. The invitation to participate described that these complaints are common but known to have an unfavourable outcome in many patients and that the purpose of this study was to assess current management amongst the two main caregivers in primary care in an attempt to identify leads for improvement of care. Participating clinicians approved of the study by filling out the questionnaire, their participation did not influence treatment. According to the Dutch Medical Research Involving Human Subjects Act, this study did not require ethics approval. The study did follow the Declaration of Helsinki.

### **Data collection**

The questionnaire consisted of four vignettes, adopted from the study of Buchbinder et al. (2013) on determining the pattern of care for shoulder pain in Australian general practice<sup>15</sup>. The vignettes presented a 77 year-old female with a six-week history of shoulder pain consistent with rotator cuff tendinopathy; a 45 year-old laborer with clinical features consistent with an acute rotator cuff tear; a 50 year-old female with a three week history compatible with adhesive capsulitis; and the same patient presenting three months later with persistent symptoms (appendix 1). Also following Buchbinder et al. (2013), response options were categorized into investigations, treatment and referrals, and general practitioners were asked to select the options they would normally apply. For physiotherapists, response options were modified according to their treatment possibilities. In addition, both general practitioners and physiotherapists were

asked to specify the reason for referring, if any. This way, thoughts on appropriate treatment between general practitioners and physiotherapists could be compared in more detail. Both groups of clinicians were requested to indicate the likelihood (very likely to very unlikely) of recovery taking place within two weeks, six weeks, one to two years or whether the patient would have a recurrence within two years, have permanent difficulties with activities of daily life or would require surgery. Finally, information was gathered on demographic details, years of experience, specific training on musculoskeletal or shoulder complaints, type of practice and if the practice had musculoskeletal ultrasound at their disposal. A letter with online login to the questionnaire was sent to all participants by post. After two weeks, as a reminder all non-responders received the questionnaire by post.

### **Data analysis**

Descriptive statistics were used to summarize characteristics of general practitioners and physiotherapists. Non-response analyses were performed using t-tests and chi-square tests ( $\alpha = 0.05$ ). For each vignette and for both groups of clinicians, the proportion of responses was calculated. The response options 'likely' and 'very likely' were added together for each prognosis item. Whenever the same treatment option was available to both groups of clinicians, Chi-square tests were used to test differences in categorical data between them. All analyses were performed using Stata 15.0.

### **Results**

Of the 500 questionnaires distributed to general practitioners, 29 were returned by post, 55 digitally and four were returned because of incorrect addressing. The net response rate was 16.9%. Of the 500 questionnaires distributed to physiotherapists, 55 were returned by post, 55 digitally and 42 were returned because of incorrect addressing. The net response rate was 24.0%. Non-response analysis showed that groups were comparable for age and gender except that responding general practitioners were somewhat younger (mean 46 years) than non-responding ones (mean 48 years,  $p = 0.0325$ ). Table 1 presents demographic details of the responding clinicians.

**TABLE 1.** Demographic details of responding general practitioners and physiotherapists

	<b>General practitioners (n = 80)* n (%)</b>	<b>Physiotherapists (n = 110) n (%)</b>
Age, mean (sd)	46 (10)	46 (13)
Gender (male)	46 (55)	56 (51)
Years of clinical experience, mean (sd)	17 (11)	22 (13)
Formal advanced education in musculoskeletal diseases (yes) (GP only)	1 (1)	-
Member of a shoulder network (PT only)	-	26 (24)
Number of patients per week, mean (sd)	103 (30)	52 (13)
Number of patients with shoulder complaints per week, mean (sd)	5 (3)	13 (11)
Ultrasound at your disposal (yes)	3 (4)	41 (38)
Type of practice		
Solo	12 (15)	12 (11)
Duo	27 (34)	4 (4)
Group	23 (29)	58 (54)
Multidisciplinary (GP + PT)	18 (22)	33 (31)

\* Four general practitioners did not fill in any of the demographic details

### **Vignette 1: rotator cuff tendinopathy**

The majority of general practitioners and physiotherapists indicated that no additional investigations were necessary but almost one third of the physiotherapists would opt for referral to a colleague physiotherapist for ultrasound (table 2). Around three quarters of the physiotherapists would advise on home exercises and activity or work modification and half on the general practitioners would do so. Further analysis showed that another 12% of general practitioners would refer the patient to a physiotherapist for this reason. In total, 74% of general practitioners would refer to a physiotherapist for some type of treatment. In both groups of clinicians, only a small number would perform a psychosocial evaluation.

**TABLE 2.** Management of rotator cuff tendinopathy\*

V1	General practitioners (n = 84) N (%)	Physiotherapists (n = 110) N (%)	P-value
<b>Investigations</b>			
Would not order any tests	69 (82)	na	
X-ray	10 (12)	na	
Ultrasound primary care	7 (8)	na	
Ultrasound secondary care	4 (5)	na	
CT scan	0 (0)	na	
MRI scan	0 (0)	na	
Blood tests (e.g. FBE, ESR)	4 (5)	na	
<b>Consultation management/ advice</b>			
Expectant observation only	9 (11)	1 (1)	0.002**
Advice on home exercise	46 (55)	94 (85)	<0.001**
Activity/work modification	35 (42)	80 (73)	< 0.001**
Psychosocial evaluation	3 (4)	12 (11)	0.058
Mobilisation	na	47 (43)	
Massage	na	37 (34)	
Exercise therapy	na	86 (78)	
<b>Prescribe medication:</b>			
Over-the-counter- analgesics	21 (25)	na	
Prescription analgesics	8 (10)	na	
Prescription NSAIDs	19 (23)	na	
Administer a glucocorticoid injection:	49 (58)	na	
<b>Referral</b>			
Would not refer	27 (32)	76 (69)	
Orthopaedic surgeon	5 (6)	na	
Physiotherapy – exercise therapy	41 (49)	na	
Physiotherapy – mobilisation/massage	5 (6)	na	
Physiotherapy – advice on activities of daily living, work, home exercises	23 (27)	na	
Physiotherapy – not specified	11 (13)	na	
Colleague physiotherapist for ultrasound	na	33 (30)	
GP – not specified	na	0 (0)	
GP for pain medication	na	7 (6)	
GP for investigations (e.g. MRI)	na	12 (11)	
GP for referral to orthopaedic surgeon	na	5 (5)	
<b>Prognosis – likely or very likely to:</b>			
Recover within 2 weeks	6 (7)	8 (7)	0.972
Recover within 6 weeks	51 (61)	76 (69)	0.224
Recover within 1-2 years	69 (82)	94 (85)	0.533
Have a recurrence within 2 years	28 (33)	17 (15)	0.003**
Have permanent difficulties with activities of daily life	7 (8)	9 (8)	0.970
Require surgery	0 (0)	1 (1)	0.381

\* multiple responses possible; \*\* significant at  $p < 0.05$  level; na = not applicable

## Vignette 2: Acute rotator cuff tear

Most general practitioners indicated further investigation by means of ultrasound in primary or secondary care and/or referral to an orthopaedic surgeon was necessary (table 3). Likewise, many physiotherapists indicated they would refer the patient to their general practitioner for these reasons and/or for ultrasound with a colleague. Although impaired movement and not pain is the main complaint, in

total 82% of general practitioners would advise or prescribe some kind of pain medication, mostly NSAIDs, whereas only very few physiotherapists indicated they would refer the patient to the general practitioner for medication. In total, 41% of general practitioners would refer for some type of physiotherapy and the majority of physiotherapists indeed indicated they would start treatment, which would consist of exercise therapy and mobilisation mainly.

**TABLE 3.** Management of rotator cuff tear\*

<b>V2</b>	<b>General practitioners (n = 84) N (%)</b>	<b>Physiotherapists (n = 110) N (%)</b>	<b>P-value</b>
<b>Investigations</b>			
Would not order any tests	8 (10)	na	
X-ray	6 (7)	na	
Ultrasound primary care	35 (42)	na	
Ultrasound secondary care	43 (52)	na	
CT scan	1 (1)	na	
MRI scan	7 (8)	na	
Blood tests (e.g. FBE, ESR)	0 (0)	na	
<b>Consultation management/advice</b>			
Expectant observation only	5 (6)	12 (11)	0.207
Advice on home exercise	21 (25)	69 (65)	< 0.001**
Activity/work modification	35 (42)	83 (78)	< 0.001**
Psychosocial evaluation	3 (4)	5 (5)	0.709
Mobilisation	na	41 (39)	
Massage	na	17 (16)	
Exercise therapy	na	61 (58)	
<b>Prescribe medication:</b>			
Over-the-counter- analgesics	19 (23)	na	
Prescription analgesics	15 (18)	na	
Prescription NSAIDs	46 (55)	na	
Administer a glucocorticoid injection:	5 (6)	na	
<b>Referral</b>			
Would not refer	10 (12)	18 (17)	
Orthopaedic surgeon	57 (69)	na	
Physiotherapy – exercise therapy	21 (25)	na	
Physiotherapy – mobilisation/massage	3 (4)	na	
Physiotherapy – advice on activities of daily living, work, home exercises	11 (13)	na	
Physiotherapy – not specified	8 (10)	na	
Colleague physiotherapist for ultrasound	na	47 (44)	
GP – not specified	na	9 (8)	
GP for pain medication	na	2 (2)	
GP for investigations (e.g. MRI)	na	62 (58)	
GP for referral to orthopaedic surgeon	na	28 (26)	
<b>Prognosis – likely or very likely to:</b>			
Recover within 2 weeks	3 (4)	2 (2)	0.445
Recover within 6 weeks	22 (26)	27 (25)	0.794
Recover within 1-2 years	60 (71)	82 (75)	0.627
Have a recurrence within 2 years	6 (7)	7 (6)	0.830
Have permanent difficulties with activities of daily life	15 (18)	12 (11)	0.166
Require surgery	35 (42)	32 (29)	0.068

\* multiple responses possible; \*\* significant at  $p < 0.05$  level; na = not applicable

### Vignette 3: Early presentation of adhesive capsulitis

Around 80% of general practitioners would prescribe the patient NSAIDs or administer a glucocorticoid injection (table 4). Also a large group of physiotherapists (47%) would refer the patient to their general practitioner for pain medication. Many general practitioners (61%), next to taking care of pain relief would refer the patient for some type of physiotherapy treatment, mainly with the intention of exercise therapy. Most physiotherapists would start treatment and considered exercise therapy and mobilization of equal importance. Significantly more physiotherapists than general practitioners indicated they would give advice on home exercises and activity or work modification. Also significantly more physiotherapists than general practitioners chose to perform a psychosocial evaluation, but in both groups it involved only a small percentage of patients. Contrary to the other vignettes, they differed significantly on their prognosis; more general practitioners expected a recovery within two or six weeks.

**TABLE 4.** Management of early presentation of adhesive capsulitis\*

<b>V3</b>	<b>General practitioners (n = 84) N (%)</b>	<b>Physiotherapists (n = 110) N (%)</b>	<b>P-value</b>
<b>Investigations</b>			
Would not order any tests	62 (76)	na	
X-ray	12 (15)	na	
Ultrasound primary care	10 (12)	na	
Ultrasound secondary care	2 (2)	na	
CT scan	0 (0)	na	
MRI scan	0 (0)	na	
Blood tests (e.g. FBE, ESR)	7 (9)	na	
<b>Consultation management/advice</b>			
Expectant observation only	4 (5)	9 (8)	0.333
Advice on home exercise	37 (45)	80 (75)	< 0.001**
Activity/work modification	26 (32)	74 (70)	< 0.001**
Psychosocial evaluation	3 (4)	26 (25)	< 0.001**
Mobilisation	na	68 (64)	
Massage	na	23 (22)	
Exercise therapy	na	67 (63)	
<b>Prescribe medication:</b>			
Over-the-counter- analgesics	11 (13)	na	
Prescription analgesics	15 (18)	na	
Prescription NSAIDs	61 (74)	na	
Administer a glucocorticoid injection:	49 (58)	na	



**TABLE 4.** Management of early presentation of adhesive capsulitis<sup>†</sup> (continued)

V3	General practitioners (n = 84) N (%)	Physiotherapists (n = 110) N (%)	P-value
<b>Referral</b>			
Would not refer	31 (38)	28 (26)	
Orthopaedic surgeon	8 (10)	na	
Physiotherapy – exercise therapy	29 (35)	na	
Physiotherapy – mobilisation/massage	16 (20)	na	
Physiotherapy – advice on activities of daily living, work, home exercises	13 (16)	na	
Physiotherapy – not specified	9 (11)		
Colleague physiotherapist for ultrasound	na	10 (9)	
GP – not specified	na	13 (12)	
GP for pain medication	na	50 (47)	
GP for investigations (e.g. MRI)	na	17 (16)	
GP for referral to orthopaedic surgeon	na	9 (8)	
<b>Prognosis – likely or very likely to:</b>			
Recover within 2 weeks	15 (18)	0 (0)	< 0.001**
Recover within 6 weeks	43 (51)	15 (14)	< 0.001**
Recover within 1-2 years	71 (85)	97 (88)	0.459
Have a recurrence within 2 years	8 (10)	6 (5)	0.278
Have permanent difficulties with activities of daily life	7 (8)	3 (3)	0.080
Require surgery	2 (2)	2 (2)	0.785

<sup>†</sup> multiple responses possible; \*\* significant at  $p < 0.05$  level; na = not applicable

#### **Vignette 4: Late presentation of adhesive capsulitis**

A large proportion of general practitioners indicated that further imaging and/or referral to an orthopaedic surgeon was necessary (table 5). Despite stiffness rather than pain was the main complaint in this chronic phase, more than half of them would administer a glucocorticoid injection or refer for one. About one third of physiotherapists indicated they would refer the patient to their general practitioner for one of these reasons. In total, 57% of general practitioners would refer for some type of physiotherapy and a minority indicated they would advise on home exercises or activity/work modification. Contrary, many physiotherapists considered this an important part of their treatment, next to mobilization techniques and exercise therapy. Both groups do not pay much attention to the psychosocial aspect of the complaints. Whilst most physiotherapists believed that recovery would take place within one to two years, general practitioners were divided on the prognosis.

**TABLE 5.** Management of late presentation of adhesive capsulitis\*

<b>V4</b>	<b>General practitioners (n = 84) N (%)</b>	<b>Physiotherapists (n = 110) N (%)</b>	<b>P-value</b>
<b>Investigations</b>			
Would not order any tests	31 (38)	na	
X-ray	27 (33)	na	
Ultrasound primary care	18 (22)	na	
Ultrasound secondary care	21 (26)	na	
CT scan	0 (0)	na	
MRI scan	3 (4)	na	
Blood tests (e.g. FBE, ESR)	3 (4)	na	
<b>Consultation management/advice</b>			
Expectant observation only	2 (3)	7 (7)	0.201
Advice on home exercise	20 (25)	81 (76)	< 0.001**
Activity/work modification	16 (20)	51 (48)	< 0.001**
Psychosocial evaluation	5 (6)	19 (18)	0.020**
Mobilisation	na	89 (83)	
Massage	na	20 (19)	
Exercise therapy	na	76 (71)	
<b>Prescribe medication:</b>			
Over-the-counter- analgesics	8 (10)	na	
Prescription analgesics	4 (5)	na	
Prescription NSAIDs	19 (24)	na	
Administer a glucocorticoid injection:	37 (44)	na	
<b>Referral</b>			
Would not refer	5 (6)	72 (68)	
Orthopaedic surgeon	41 (51)	na	
Physiotherapy – exercise therapy	29 (36)	na	
Physiotherapy – mobilisation/massage	11 (14)	na	
Physiotherapy – advice on activities of daily living, work, home exercises	15 (19)	na	
Physiotherapy – not specified	6 (8)	na	
Colleague physiotherapist for ultrasound	na	4 (4)	
GP – not specified	na	5 (5)	
GP for pain medication	na	11 (10)	
GP for investigations (e.g. MRI)	na	15 (14)	
GP for referral to orthopaedic surgeon	na	13 (12)	
<b>Prognosis – likely or very likely to:</b>			
Recover within 2 weeks	1 (1)	0 (0)	0.251
Recover within 6 weeks	9 (11)	1 (1)	0.002**
Recover within 1-2 years	61 (73)	97 (88)	0.006**
Have a recurrence within 2 years	15 (18)	2 (2)	< 0.001**
Have permanent difficulties with activities of daily life	19 (23)	13 (12)	0.045**
Require surgery	9 (11)	1 (1)	0.002**

\* multiple responses possible; \*\* significant at  $p < 0.05$  level; na = not applicable

## Discussion

This vignette study which aims to find potential leads to improve treatment of patients with shoulder pain in primary care shows that the degree to which general practitioner and physiotherapist management correspond with each other seems to depend on the type of shoulder pain involved. Regarding subacromial complaints (vignette 1) or an acute rotator cuff tear (vignette 2), the majority of both clinicians generally agreed on preferred treatment. The scenarios of the patient with capsulitis (vignette 3 and 4), especially the late presentation, showed more variation in responses both between- and within groups.

Compared to earlier research on Australian general practitioner and rheumatologist care of the same patients with shoulder pain presented in current study, Dutch general practitioners and physiotherapists adhere to their guidelines to a much larger degree<sup>15</sup>. Except in the case of the late presentation of capsulitis, there was less reliance on unnecessary imaging and referral to secondary care and more agreement on the preferred treatment. Nevertheless, a recent study in physiotherapy practices in the Netherlands confirmed existing estimations that around 60% of patients recover in six months and although this is a bit higher than the 21-51% reported in general practice, it still leaves a large group of patients with ongoing shoulder problems<sup>5</sup>.

It is interesting to look into the aspects of treatment in which clinicians diverge from each other and best available evidence. First, despite relatively low reliance on imaging and referrals to specialists, general practitioners and physiotherapists choose a high rate of interventions. For example, in all scenarios except the early presentation of capsulitis, general practitioners tend to prescribe or advise analgesics although impairment and not pain is the main complaint. In the second scenario of acute rotator cuff tear referrals for imaging and/or specialist care suggest a correctly made diagnosis, however many also refer for physiotherapy. Likewise, physiotherapists indicate additional investigations are necessary but at the same time start treatment themselves, often targeted at mobilization which is contradictory to their appropriate recognition of possible tissue damage. This becomes clearer in the scenario of the late presentation of capsulitis in which general practitioners initiate all types of different treatment and thus diverge from each other. Additionally, evidence suggests that these complaints usually are self-limiting and that in the long run no type of treatment is favourable above another, including placebo<sup>16,17</sup>. Although physiotherapists seem to be more aware of the problem at hand as they more often indicate the correct prognosis and opt for fewer referrals to general practice, they too report to intervene. A high rate of referrals back and forth could indicate willingness to collaborate in the patient's best interest, as it appears to do in the scenarios of subacromial complaints and acute rotator cuff tear. High intervention rates could also suggest insecurity on the right management including keep/refer decision-making.

This leads to the second aspect where general practitioners and physiotherapists appear to diverge from mainstream evidence which, opposite to the above, draws attention since it is as good as absent from their treatment, namely giving attention to the psychosocial aspect of the complaint. In addition, general practitioners do not seem to advise all their patients on home exercises and/or activity modification or refer to a physiotherapist for this reason. All in all, it seems that clinicians feel an urge to *do* something about their patients' suffering and less talk about it, especially when pain is prominent or with persistent complaints. This is interesting since current guidelines emphasize discussing the importance of staying active, the often lengthy and capricious course and the influence of psychological factors<sup>11,14</sup>. A very plausible explanation could be the patient's expectation for the general practitioner or physiotherapist to solve their problem. And although it is only natural that this appeals to the caregiver, without awareness on these sometimes unspoken demands, it easily leads to an increase of all kinds of interventions. While giving more advice will almost inevitably lead to a higher demand on the already pressurized time patient and clinician have together nowadays, in the long run it may save time and costly interventions. And last but not least, may lead to more effective recovery.

The main concern in the interpretation of current study results is that stated rather than actual practice was measured. In their systematic review, Hrisos et al. (2009) found overall inconclusive evidence for the validity of clinicians self-report, but several vignette studies suggested that estimates of clinical behaviour were close to actual practice<sup>18</sup>. However, with close-ended lists of response options there is a risk of overestimation of performance since they provide an extensive number of possible actions. By using the same list of response options for every vignette we did an attempt to at least standardize this error. In addition, as is often wise with proxy measures, we focused on the big picture; on global differences between general practitioners and physiotherapists and between patterns of care amongst scenarios.

Nevertheless, by its nature vignettes are brief and static and lack the possibility of detecting any non-verbal information, which can influence decision-making.

Another disadvantage of this type of research is that it only captures one moment in time, which complicates assessment of appropriate referring. Referrals are an important aspect of treatment and to be able to compare clinician's thoughts and ideas on this topic more precisely, we specified the reasons for referral from general practitioner to physiotherapist and vice versa. While this works well to measure if and why they refer to the most designated caregiver, it is far more difficult to value their capability of doing so at the right time. It could well be that clinicians chose to indicate that immediate referral was appropriate next to their own treatment whilst in actual practice they would await the effects of their interventions before potentially doing so. Despite this possible overestimation, our results show clear differences between scenarios. So, more detailed investigations into the effects of earlier versus later referral and the capability of primary care clinicians to do so timely is

highly recommended so that more specific recommendations can be created on adequate keep/refer decision making.

A last aspect to take into consideration is the relatively low response rate, which could impair generalisability. Non-response analysis showed only minor differences in gender but other characteristics such as years of clinical experience or education were not available for comparison. The absolute number of participants, i.e. 84 GPs and 110 physiotherapists give some assurance that the global approach of both disciplines has been adequately measured. The response rates were also in the same range as the previous study by Buchbinder et al. (2013)<sup>15</sup>. As well, they found no differences in management between general practitioners with and without education on musculoskeletal complaints.

In summary, the degree to which general practitioner and physiotherapist management correspond with each other seems to depend on the type of shoulder pain involved. With subacromial complaints or an acute rotator cuff tear, the majority of clinicians generally agreed on the preferred treatment. The scenario of the patient with capsulitis, especially the late presentation, caused much more variation in responses both between and within groups. Given the unfavourable outcome in many patients, especially in patients with high and/or persisting pain, further research on adequate keep/refer decision making as well as more attention for psychosocial issues could be important topics in order to improve treatment.

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## **Appendix A. Vignettes**

### **Vignette 1**

A 77-year-old woman, a retired bookkeeper living with her husband, presents with a 6-week history of discomfort in her right shoulder/deltoid region while sleeping, and difficulty doing her hair, putting on her coat, doing up her bra and reaching up to high shelves. On examination there is tenderness over the lateral aspect of the shoulder and pain on shoulder abduction in the mid-range but a normal range of movement. The remainder of the findings on physical examination are normal. There is no history of trauma. She has been previously well with no history of serious illness. A previous GP prescribed a 2-week course of NSAID, which didn't provide any relief.

### **Vignette 2**

A 45 year-old labourer sustained a work-related injury to his non-dominant left shoulder two weeks ago. A 100kg door he was carrying slipped from his grip and he felt a sharp pain in his shoulder as he attempted to stop the door from falling. His foreman made him go to the hospital where x-rays of his shoulder were normal. Since then he reports that his pain is still present, but has improved. However, he has been unable to return to work because he cannot raise his arm above his chest height.

### **Vignette 3**

A 50 year old, right-hand-dominant female executive presents with a 3-week history of pain and progressive loss of motion of her left shoulder without history of trauma. The pain has been severe and interfering with sleep. On physical exam, a global loss of active and passive range of motion is noted with forward elevation to 45 degrees, internal rotation to the sacrum and external rotation to 10 degrees.

### **Vignette 4**

You review the woman from the previous scenario two months later. Her pain is somewhat improved but she still has a very stiff shoulder and on physical examination there is still a 50% global loss of active and passive range of motion in all directions.



# 4

## **One in six physiotherapy practices in primary care offer musculoskeletal ultrasound – an explorative survey**

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## Abstract

**Background** The first aim of this research was to investigate the current prevalence of musculoskeletal ultrasound in Dutch physiotherapy practices. The second aim was to explore experiences of physiotherapists with musculoskeletal ultrasound in a primary care setting with patients presenting with shoulder complaints.

**Methods** A random sample of 1,000 owners of primary care physiotherapy practices was sent a questionnaire to investigate the prevalence of musculoskeletal ultrasound. A second questionnaire was sent to physiotherapists using musculoskeletal ultrasound to explore experiences with it in patients with shoulder complaints.

**Results** The net response rate of the first questionnaire was 57.7%. In 18% of the physiotherapy practices musculoskeletal ultrasound was offered. Sixty-nine physiotherapists returned the second questionnaire. Physiotherapists indicated they most often used musculoskeletal ultrasound in patients with shoulder complaints, mainly for suspected tissue damage (83.7%), followed by making a diagnosis (63.3%) and for determining the choice of treatment (36.7%). Physiotherapists reported the biggest advantage was that they were better able to diagnose presenting shoulder complaints. The most frequently mentioned disadvantage of the use of musculoskeletal ultrasound was that assessment is difficult and that there is a risk that findings may not be sufficiently linked to history and physical examination.

**Conclusion** One in six physiotherapy practices in the Netherlands offer musculoskeletal ultrasound. It is mainly used for patients with shoulder complaints, with an emphasis on detecting tissue damage and as an aid for diagnosis. Physiotherapists trained to work with musculoskeletal ultrasound seem enthusiastic and are at the same time aware of its disadvantages.

## Background

Musculoskeletal ultrasound (MSU) in secondary care has become a patient friendly, accurate and cost-effective method for diagnosing shoulder complaints<sup>1</sup>. In recent years, it also gained popularity amongst GPs and physiotherapists. However, basic data on MSU in primary care is scarce. For example, the uptake, the targeted patient population and reimbursement is largely unknown<sup>2-4</sup>. For patients, the possibility of accurate additional imagery in combination with physical examination at one place close to their homes is attractive. For policy makers, it is of importance in the discussion of substitution from secondary to primary care. Scholten-Peeters (2014) investigated the opinions and experiences of Dutch radiologists and orthopedic surgeons about the use of MSU in primary care<sup>3</sup>. It shows that they had little confidence in its use in primary care and believed that diagnostic MSU belongs in secondary care. The discussion on the desirability of MSU in primary care, calls for a further investigation on actual prevalence and experiences of MSU physiotherapists.

It is suspected by the authors that for a large part, MSU is used to diagnose shoulder complaints. Therefore, this paper focuses mainly on patients with shoulder problems. Except for back and neck problems, shoulder pain is the most frequent complaint in physiotherapy practice<sup>5</sup>. Despite its frequent occurrence, studies report unfavourable outcome in many patients. In physiotherapy practice, the percentage of patients recovering after treatment varies from 20% to 79% and it is known that the treatment duration is relatively long<sup>6</sup>. This is frustrating for patients and clinicians and leads to high costs both for secondary care and sick leave<sup>7-9</sup>.

Since long-lasting complaints contribute to an unfavourable prognosis, an adequate and quick diagnosis is important<sup>10,11</sup>. This is the starting point for choosing the right treatment with the appropriate clinician, most frequently the GP or physiotherapist. However, the shoulder is one of the most complex joints to diagnose complaints correctly. In clinical practice and in research, history and physical tests are relied on for this purpose. Yet, many studies show that these physical tests, even when combined, have limited diagnostic value<sup>12</sup>. In search for an alternative, MSU as a diagnostic aid is on the rise in primary care<sup>13</sup>. The important question being how physical tests and MSU relate to one another and whether MSU is considered valuable by clinicians in improving the management of shoulder conditions. As a starting point, the current study explores the use of MSU in the clinical practice of the physical therapist. As such, it addresses two research questions. Firstly, what is the current prevalence of MSU in Dutch physiotherapy practices? Secondly, what are the experiences of MSU physiotherapists with MSU in a primary care setting in patients with shoulder complaints?

## Methods

We performed an explorative survey of a sample of owners of physiotherapy practices and MSU physiotherapists in the Netherlands.

### Design and participants

#### Practice owners

A random sample of 1000 owners of physiotherapy practices in the Netherlands, representative of age, gender, type of practice and degree of urbanicity were invited to participate to investigate the diffusion of MSU in physiotherapy practices by means of a questionnaire. They were recruited from the national register database for physical therapists of the Dutch Institute for Health Services Research (NIVEL). At the end of the questionnaire, they were asked to state the names and email addresses of MSU physiotherapists working in their practice, if any.

#### MSU physiotherapists

In a second questionnaire, these MSU physiotherapists were questioned on their opinion and experience with MSU. Since MSU is relatively new in physiotherapy settings, a random sample to recruit more participants did not seem appropriate. It was therefore decided to recruit additional MSU physiotherapists through snowball-sampling in the authors professional network and through requests on social media. According to the Dutch Medical Research Involving Human Subjects Act, this study did not require ethics approval. The study did follow the Declaration of Helsinki research ethics<sup>14</sup>.

### Data collection

#### Practice owners

The questionnaire for practice owners included questions on the characteristics of the practice and on reasons for offering or non-offering MSU. A group of researchers, pioneers in the field of MSU education and from research institute NIVEL, and MSU physiotherapists (n = 12) was asked to provide feedback on the scope and completeness of the questionnaire. Modifications were made and the final version was tested in another group (n = 4) to evaluate feasibility. The final digital questionnaire consisted of 18 open and close-ended questions and took approximately seven minutes to complete. A letter with online login to the questionnaire was sent to all participants by letter post. After two weeks, all non-responders received the questionnaire by post. After four weeks, all non-responders received a reminder by post.

### **MSU physiotherapists**

The digital questionnaire for MSU physiotherapists comprised of four sections: general information on the respondents, opinions and experiences with MSU in physiotherapy practice for the general patient population and for patients with shoulder complaints specifically, advantages and disadvantages and several propositions. It consisted of 33 open and close-ended questions and 13 propositions and took approximately 10 minutes to complete. The same check on scope, completeness and feasibility was carried out before it was sent to all respondents by email. Reminders (by email) were sent after one and three weeks.

### **Data analysis**

Open-ended questions were read first, then summarized by topic by the first author. This grouping was discussed with two co-authors until consensus was reached. As for the practice owner questionnaire, non-response analyses were performed using t-tests and Chi-square tests ( $\alpha = 0.05$ ). To test differences between practices with and without MSU, Chi-square tests were used for categorical data and two-sample t-tests were used for continuous data. Data was checked for normal distribution.

## **Results**

### **Practice owners**

#### **Respondents**

Of the 1000 questionnaires distributed, 30 were returned because of incorrect addressing. In total, 560 responders completed the questionnaire of which 197 digitally and 363 by letter post. The net response rate was 58%. Table 1 presents the characteristics of responding and non-responding practice owners. It shows that respondents were statistically older in age than non-respondents, otherwise groups were comparable.

**TABLE 1.** Characteristics of invited physiotherapy practice owners and results of non-response analysis

	<b>Respondents (n = 560) (%)</b>	<b>Non-respondents (n = 410) (%)</b>	<b>P value non-response analysis</b>
Gender (% male)	65.8	64.4	0.645
Age (mean, sd)	54.9 (7.8)	53.2 (8.7)	0.001
Type of practice:			0.182
Solo	32.6	37.1	
Duo	13.8	15.3	
Group	53.7	47.7	
Degree of urbanicity:			0.705
Urban	46.0	46.5	
Suburban	21.5	19.4	
Rural	32.6	34.1	
Region:			0.245
North	8.8	12.4	
East	19.5	18.6	
West	45.6	46.3	
South	26.1	22.8	

MSU was offered in 18% (n = 99) of the practices. These practices were bigger in number of full-time equivalent (FTE) and in number of physiotherapists with a specialty in pelvic, manual, sports or occupational physiotherapy than in practices not offering MSU (table 2). On average, there were 2.0 (SD 1.0) MSU physiotherapists working in a practice offering MSU.

**TABLE 2.** Characteristics of participating practices

	<b>Total</b>	<b>Practice with MSU (n = 99) (%)</b>	<b>Practice without MSU (n = 461) (%)</b>	<b>P value</b>
Number of fte (mean, sd)	3.6 (3.4)	6.0 (4.0)	3.1 (3.0)	< 0.001
Specialty:				
Pelvic	19.8	31.3	17.2	0.001
Geriatrics	8.9	13.1	8.0	0.100
Pediatrics	21.4	28.3	19.9	0.064
Manual	61.1	85.9	55.6	< 0.001
Orofascial	7.1	11.1	6.2	0.083
Psychosomatic	15.9	20.2	15.0	0.201
Sports	26.6	53.5	20.8	< 0.001
Edema	31.0	40.4	28.9	0.025
Occupational	10.3	25.3	7.1	< 0.001
MSU PT				< 0.001
yes	18.5	92.8	2.5	
no	81.5	7.2	97.5	

### Reasons for (non)offering MSU

Of the practice owners who offer MSU, 92% indicated that they would purchase MSU equipment when given the choice again. On the open-ended question 'what is/are the main reason(s) for purchasing MSU equipment', most answers could be attributed to the improvement of diagnosis. High costs for purchase/ no reimbursement and not using it at all were mentioned by those who would not choose for MSU again. Of the practices without MSU, 34% did not have a specific reason, 7% did not have MSU equipment yet

but thought of purchasing it and 59% had specific reasons for not offering MSU. These included high costs and no reimbursement; not suitable for the practice' patient population; doubts on the scientific evidence or benefit for daily practice; MSU does not fit in the professional profile of the physiotherapist; no need because of co-operation with another MSU practice or resistance of GPs (open-ended question: 'Is/are there specific reason(s) for not offering MSU in your practice (yet)?').

## MSU physiotherapists

### Respondents

In total, 69 MSU physiotherapists reacted on our request to fill out a questionnaire on the use of MSU. Table 3 presents the characteristics of participating physiotherapists.

<b>TABLE 3. Characteristics of MSU physiotherapists (n = 69)</b>	<b>(%)</b>
Gender (male)	84.1
Age, mean (sd)	45.3 (11.4)
Experience as physiotherapist, mean years (sd)	21.7 (11.0)
Specialty:	
Pelvic	1.5
Geriatrics	0.0
Pediatrics	0.0
Manual	50.0
Orofascial	1.5
Psychosomatic	0.0
Sports	16.2
Edema	4.4
Occupational	7.4
Year MSU education completed:	
<= 2006	20.0
2007-2010	33.9
>=2011	46.1
Masterclass on shoulder disorders (yes)	53.5
Experience with MSU, mean years (sd)	4.4 (3.2)

On the question how reimbursement was arranged, 63% of the respondents indicated MSU was claimed as a regular physiotherapy treatment, 37% did not claim (additional) costs at all because they considered it part of treatment and nine respondents did not answer the question. Almost all MSU physiotherapists agreed that treatment has become more efficient because of MSU and 76% thinks it has reduced costs. On the open-ended question: 'for which part of the body do you use MSU most frequently?' 71% of the MSU physiotherapists indicated they focused on patients with shoulder problems, another 20% focused on shoulder and lower extremity. Almost 62% of the MSU physiotherapists thought that patients specifically chose to visit their practice because of the possibility of MSU treatment and 80% agreed with the proposition that patients were more satisfied because of it.



### Opinion and experience with MSU

Of the respondents, 89% (n = 58) used MSU in daily practice. These respondents were asked several questions on their use of MSU in physiotherapy practice for the general patient population and for patients with shoulder complaints specifically.

In 37% of the new patients with shoulder complaints and in 4% of new patients in general, MSU is often (in > 75% of the patients) or always used (table 4). Almost 77% of the MSU physiotherapists agree with the proposition that ideally MSU should be used in all patients with shoulder complaints.

**TABLE 4.** Opinions and experiences of MSU physiotherapists (%) (n = 58)

	Never*	Sometimes	Regularly	Usually	Often	Always
How many times do you perform an echo in new patients with shoulder complaints?	4.1	8.2	20.4	30.6	26.5	10.2
How many times do you perform an echo in the general patient population?	0.0	44.9	40.8	10.2	4.1	0.0
How often does your initial diagnosis change in patients with shoulder complaints?	4.3	48.9	38.3	4.3	4.3	0.0
How often does your initial diagnosis change in the general patient population?	0.0	56.3	43.7	0.0	0.0	0.0
How often do you receive requests for MSU from colleagues for patients with shoulder complaints?	4.2	20.8	52.1	14.6	8.3	0.0
How often do you receive requests for MSU from colleagues for the general patient population?	2.1	41.7	43.7	4.2	8.3	0.0

\*never: in 0% of patients, sometimes: 1-25%, regularly: 26-50%, usually: 51-75%, often: 76-99%, always: 100%

In patients with shoulder complaints, MSU is mainly used for suspected tissue damage (84%) (table 5). About half of the respondents indicated that the results of the MSU scan regularly changed their initial diagnosis among patients with shoulder complaints (table 4). These results are much the same in the general patient population. Over 90% of the MSU physiotherapists indicated that they feel more confident in their choice of treatment because of MSU and 65% considered their treatment improved because of it.

**TABLE 5.** Main purposes of MSU

	Patients with shoulder complaints (%)	General patient population (%)
I use MSU mainly for:		
Reassurance of the patient	16.3	24.5
Choice of treatment	36.7	36.7
Adjustment of treatment	8.2	12.2
Evaluation of treatment	28.6	24.5
Doubts of diagnosis	28.6	18.4
Making a diagnosis	63.3	75.5
Suspicion on tissue damage	83.7	75.5
Indication for physiotherapy	12.2	12.2

More than 50% of the respondents receive regular requests for MSU from colleagues in patients with shoulder complaints (table 4). Another 23% receive these requests often to always. In the general patient population around 44% of the MSU physiotherapists never or sometimes receive these requests. For both populations, it mainly concerns requests from general practitioners and colleagues from their own physiotherapy practice and in both populations 25% use history and clinical information provided by the applicant without examining the patient themselves.

### **Advantages and disadvantages**

Regarding the open-ended question as to the biggest advantage of MSU, physiotherapists most frequently indicated its role in better diagnosing shoulder complaints, which helps them with prognosis and treatment. Almost 90% agreed with the proposition that dynamic examination is the most important advantage compared to other diagnostic imaging. The most frequently mentioned disadvantage was that assessment is difficult and that there is a risk that findings may not be sufficiently linked to history and physical examination. Because physiotherapists' central starting point is the patient with his complaints, many MSU physiotherapists (85%) first performed history and physical examination and used MSU additionally. However, more than 65% disagreed that history and physical examination are more important than MSU findings. When clinical findings contradict results of MSU, 21% trusted MSU, 32% discussed it with a colleague or GP, 14% trusted the clinical findings, 6% directly referred to the GP and 27% indicated their strategy depended on the particular findings. Of the MSU physiotherapists, 66% advised patients to contact their GP more quickly and 95% indicated they directed patients to the GP more specifically.

## **Discussion**

The purpose of current study was to investigate the current prevalence of MSU in Dutch physiotherapy practices and to explore experiences of MSU physiotherapists with MSU in a primary care setting in patients with shoulder complaints. It shows that in 18%

of the practices MSU was offered, mainly with the intention to improve diagnosis. Most practice owners seem content with their decision since nine out of ten would make the choice for MSU again. Data on this topic is scarce but research in Australia shows that requests by GPs for diagnostic shoulder ultrasonography are on the rise<sup>15,16</sup>.

The participating MSU physiotherapists in the second part of the study indicate that by far, MSU is most frequently used in patients with shoulder complaints. The most frequently mentioned perceived advantage is that MSU helps them to make a better diagnosis. In new patients with shoulder complaints, MSU is more often used than in general patient population and ideally, many responding MSU physiotherapists think it should be used in all new shoulder patients. This finding supports our observation that in this specific group of patients, responding physiotherapists often seek assurance to improve their diagnosis and/or treatment by using MSU. Apparently, this applies to other clinicians as well since MSU physiotherapists receive relatively many requests from colleagues and GPs for these patients. A quarter of MSU physiotherapists did not examine these referred patients themselves by means of history and physical examination. It is not known to us what pre-existing information the responding MSU physiotherapists would have possessed among their patients, although research amongst Australian GPs indicates that around a third of the MSU requests did not contain any additional information for the radiologist<sup>17</sup>. Since supposed pathology in MSU findings may be asymptomatic, especially in patients over 60 years old, this lack of information could undermine the security that is looked for<sup>18</sup>. Even more so because it has been suggested that MSU is most effective when linked to history and clinical examination by the same clinician<sup>15</sup>. Radiologists do not examine patients themselves but MSU physiotherapists can, hence the profession could actually change this 'problem' to their advantage.

Responding MSU physiotherapists themselves stated that dealing with inconsistent findings from MSU and physical examination is difficult. It is the biggest disadvantage from their point of view. This also shows in the diverse strategies they indicate they practice when it happens; some trust the results from MSU, others rely on clinical examination or discuss it with a colleague or GP. This might also explain why MSU physiotherapists more often and more specifically refer patients back to their GP. Whether this eventually leads to an increase or decrease in requests for care and associated costs is a legitimate question for further research.

It is known that MSU is a valid and reliable method to identify full- and partial thickness tears of the tendon if performed by radiologists and/or orthopaedic surgeons, there is only limited evidence for tendinopathy, calcification and bursitis<sup>1,19,20</sup>. The first, small sample reliability study amongst physiotherapists in primary care indicates that there is slight to moderate agreement between MSU physiotherapists and radiologists and moderate to substantial agreement between MSU physiotherapists mutually, although both vary depending on pathology and experience<sup>21</sup>. It was also concluded that this was relatively low compared to reliability between radiologists. In their study on opinions on use of MSU in primary care, Scholten-Peeters et al. (2013) found that

participating radiologists and orthopaedic surgeons found more disadvantages than advantages including false negative and positive results, lack of experience and not able to relate MSU to other additional imaging and insufficient education<sup>3</sup>. It has been shown that clinicians other than radiologists such as rheumatologists and orthopaedic surgeons are able to achieve comparable levels of diagnostic accuracy<sup>22</sup>. However, additional studies are required to confirm or refute these arguments.

As with direct access physiotherapy, which was another shift in health services and possible substitution from GP care to physiotherapy care and also feared and criticised mainly by other health care professionals, reservations should be taken seriously<sup>23</sup>. The uptake of direct access was on the rise even before it was arranged officially and before (pilot) research was conducted on possible successes and failures. The utility of direct-access physiotherapy was supported by the high percentage of patients accessing this form of healthcare provision<sup>23</sup>. It appears that the profession anticipated and responded well on this changed demand. A similar situation now arises with MSU by physiotherapists; the uptake is on the rise, other health care professionals are sceptical and research is scarce<sup>3</sup>. At the same time, responding MSU physiotherapists appear enthusiastic at offering MSU; they think patients choose their practice specifically and are more satisfied. In addition, they think their treatment is more efficient and they are better able to cure patients. With direct access, new policy was made on education, reimbursement and interdisciplinary communication. The same is desired and required for MSU, also because of the large group of patients that comes via direct access. Objections and difficulties such as conflicting findings should be appointed so that they can be discussed and addressed as important training issues. Furthermore, more research is necessary. First on reliability, which would include intra- and interrater agreement between MSU physiotherapists mutually and between MSU physiotherapists and radiologists. Second, the effectiveness of additional MSU compared to the current situation should be investigated. This includes the desirability of MSU by the profession itself since a substantial group of practice owners indicated that they do not offer MSU, some for a very specific reason such as high costs whilst others mentioned no reason as to why they did not offer it. All in all, the professional need for an alternative for diagnosing patients with shoulder complaints and the possibilities that MSU offer for physiotherapists and their patients and eventually policy makers, should be explored more fully.

### **Study limitations**

One of the purposes of current study was to explore the experiences of MSU physiotherapists with MSU within Dutch primary care settings in patients with shoulder complaints. Because little is known on MSU in primary care and in a physiotherapy setting particularly, questions were asked about the use of MSU in the general patient population (non shoulder). This was done not with the intention to compare both groups but to outline a framework to better understand the role of MSU in patients with shoulder complaints. However, since results show that MSU is used mainly for

shoulder complaints, the differences found between both populations might exist but may be of slight importance in daily practice and are probably based on a small number of patients.

A second limitation of current study is that we measured stated rather than actual practice. Meaning responding MSU physiotherapists might have given socially acceptable answers, for example on delicate matters such as reimbursement. However, a substantial group indicated not doing their own physical examination when another clinician requests MSU, which is not in line with protocol. It also means that they were required to give estimates, for example on the number of patients they see, use MSU or in which they switch diagnosis. Despite this subjectivity, the results indicate an overall trend towards a positive opinion on the use of MSU. At the same time they show that MSU physiotherapists are aware of disadvantages such as the issue of what to do with conflicting results.

## **Conclusion**

The results from our questionnaires show that 18% of the physiotherapy practices use MSU, mainly for patients with shoulder complaints and with an emphasis on detecting tissue damage and as an aid for diagnosis. MSU physiotherapists seem enthusiastic and are at the same time aware of its disadvantages.

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# 5

## **Pain intensity, neck pain and longer duration of complaints predict poorer outcome in patients with shoulder pain – systematic review**

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## Abstract

**Background** Shoulder complaints are common and have an unfavourable prognosis in many patients. Prognostic information is helpful for both patients and clinicians in managing the complaints. The research question was which factors have prognostic value on (un)favourable outcome in patients with shoulder complaints in primary care, secondary care and occupational settings.

**Methods** Update of a systematic review in primary care, secondary care and occupational settings.

**Results** Nine articles were published since the original review in 2004. Six were of high quality covering a wide variety of prognostic factors and outcome measures. Four studies were conducted in primary care settings. A best evidence synthesis, including the results of the previous systematic review on this topic shows that there is strong evidence that higher shoulder pain intensity, concomitant neck pain and a longer duration of symptoms predict poorer outcome in primary care settings. In secondary care populations, strong evidence was found for the association between greater disability and poorer outcome and between the existence of previous shoulder pain and poorer outcome.

**Conclusion** Clinicians may take these factors into account in the management of their patients. Those with a worse prognosis may be monitored more frequently and the treatment plan modified if complaints persist.

## Background

Shoulder complaints are common in the general population. A systematic review by Luime et al. (2004) indicates that prevalence figures range from 7 to 26 % for point prevalence, up to 67 % for lifetime prevalence<sup>1</sup>. In the Netherlands, the annual consulting incidence in general practice for shoulder symptoms is estimated at 29 per 1000 person years<sup>2</sup>. In physiotherapy practice, 9.8 % of patients present themselves with shoulder complaints which makes it the most common complaint of the extremities<sup>3</sup>.

From previous studies, it is known that there is an unfavourable long-term outcome in many patients with shoulder complaints<sup>4,5</sup>. This is troublesome for patients as well as clinicians and in time for employers and insurance. Although treatment of patients with shoulder problems is mainly an issue for primary care<sup>6</sup>. previous research shows that a relatively small group of patients is responsible for high costs for secondary care and sick leave, which accounts for a large part of total costs of shoulder pain<sup>7</sup>. To optimize the treatment of shoulders complaints, it is helpful to obtain insight into prognostic factors related to shoulder complaints. Prognostic information is important for clinicians to identify patients with a higher risk for developing chronic pain or disability. When shown robust and modifiable, this information can facilitate clinical decision-making and if necessary, timely and specific consultation with or referral to other health care providers. For patients, it can provide adequate knowledge about the expected course of their shoulder problems and facilitate adequate coping with them.

In 2004, a systematic review was published on prognostic studies on shoulder disorders<sup>8</sup>. It included six high quality and ten low quality studies, mostly performed in a secondary care setting. The review reported strong evidence that high pain intensity predicts a poorer outcome in primary care populations and that middle age predicts poorer outcome in occupational populations. Moderate evidence was found for long duration of complaints and high disability at baseline as predictors of poorer outcome in primary care. Because the results were based on a small number of studies and the majority was conducted in secondary care, they need to be interpreted with caution. Because new studies, especially in the primary care setting, have been published on predictors of outcome we decided to update the evidence on prognostic factors on the outcome of shoulder disorders. The research question was which factors have prognostic value on (un)favourable outcome in patients with shoulder complaints in primary care, secondary care and occupational setting.

## Methods

### Search strategy

This review updates previous work by Kuijpers et al. (2004)<sup>8</sup>. Therefore, a computerized literature search was performed in PubMed and Embase using the same search strategy

with the exception that the search was confined to the dates February 2003 through February 2014. Some key words and/or medical subject headings changed hence the following search terms were used: shoulder/abnormalities, shoulder/injuries, shoulder/pathology, shoulder/physiopathology, shoulder pain, shoulder joint, shoulder impingement syndrome, clinical study, longitudinal study, intervention study, cohort studies, pro- spective study, retrospective study, incidence, mortality, prognos\*, predict\*, course. Selection criteria were adopted from Kuijpers et al. (2004)<sup>8</sup>:

- The study focussed on patients suffering from shoulder complaints
- The association of at least one prognostic factor with the outcome of shoulder pain had to be presented
- The design had to be a cohort study
- The article was published in English
- Results were published as a full report before February 2014
- Studies that focused on shoulder pain due to luxation, cancer or systematic diseases such as rheumatoid arthritis or osteoporosis were excluded. Also studies that focused on the results of surgery were excluded.

Additionally, a manual search was conducted to retrieve relevant publications from the reference lists of all selected publications. Two authors (MK and DB) read titles, abstracts and full-text articles. Studies were excluded if the content did not meet the inclusion criteria. Disagreements regarding article inclusion were resolved by discussion between the two reviewers. If consensus could not be reached, a third reviewer (IS) was consulted and had the final vote.

### **Quality assessment**

Three reviewers (MK, IS, CV) independently assessed the methodological quality of each article using the checklist designed and used by Kuijpers et al. (2004) (Table I)<sup>8</sup>. The checklist covers aspects of internal validity (criteria A, D, E, F, G, H, I, J, K, L, M, P, Q), generalisability (criteria B, C, N, O) and precision (criterion R) (Appendix A). It contains seven categories: study population, response rate, follow-up, treatment, outcome, prognostic factors and data presentation. The list contains 18 criteria that can be scored positive ('+'), negative ('-') or unclear ('?'). The total score is the sum of all the criteria that are scored positive. The cut-off point used by Kuijpers et al. (2004) which was shown to be robust, was adopted; studies with scores > 8 points (>60 % of the maximum attainable score) were considered to be of high quality, studies that scored ≤ 8 points of low quality<sup>8</sup>. Disagreements between reviewers on study quality were resolved by discussion between the three reviewers.

**TABLE 1.** Criteria list for assessing the methodological quality of prognostic cohort studies on shoulder disorders

<b>Criteria</b>		<b>Score</b>
<b>Study population</b>		
A.	Inception cohort (defined in relationship to onset of symptoms)	+/-/?
B.	Description of inclusion and exclusion	+/?
C.	Description of study population	+/?
<b>Response</b>		
D.	Response >75%	+/-/?
E.	Information about non-responders versus responders	+/-/?
<b>Follow-up (extent and length)</b>		
F.	Prospective data collection	+/-/?
G.	Follow-up of at least 6 months	+/-/?
H.	Drop-outs/loss to follow-up < 20%	+/-/?
I.	Information completers versus loss to follow-up/drop-outs	+/-/?
<b>Treatment</b>		
J.	Treatment in cohort is fully described/standardised	+/-/?
<b>Outcome</b>		
K.	Standardised assessment of relevant outcome criteria	+/?
<b>Prognostic factors</b>		
L.	Standardised assessment of patient characteristics and potential clinical prognostic factor(s)	+/?
M.	Standardised assessment of potential psychosocial prognostic factor(s)	+/?
<b>Data presentation</b>		
N.	Frequencies of most important outcome measures	+/-
O.	Frequencies of most important prognostic factors	+/-
P.	Appropriate analysis techniques	+/-/?
Q.	Prognostic model is presented	+/-/?
R.	Sufficient numbers	+/-/?

## Analysis

Data were extracted by using a predefined data extraction form regarding study population, design, setting, outcome measures, prognostic factors and strength of association. To facilitate interpretation and comparison of the results the studies were categorized per setting (primary care, secondary care and occupational setting). Statistically significant multivariate associations or if not available, univariate associations were presented. Non-significant associations were summarised. Prognostic factors examined only once were described separately from those occurring twice or more. Classification of prognostic factors was performed independently by two reviewers (MK and DB), if necessary, a third (IS) and fourth (CV) reviewer were consulted until consensus was reached. Outcome measures were so diverse that we chose to organize them in either 'better' or 'poorer' outcome. For example, less pain, better function, being able to work and no recurrent complaints were considered 'better' and more pain, more disability and worse (perception of) outcome as 'poorer'. Due to heterogeneity in study population, setting, prognostic factors and outcome measures, statistical pooling of results (meta-analysis) was considered inappropriate. Instead, a best evidence synthesis was performed. In this qualitative analysis, conclusions are based on

the number of studies evaluating this factor, consistency of results and methodological quality (Table 2). Results were considered consistent if > 75 % of the studies reported results in the same direction<sup>9,10</sup>.

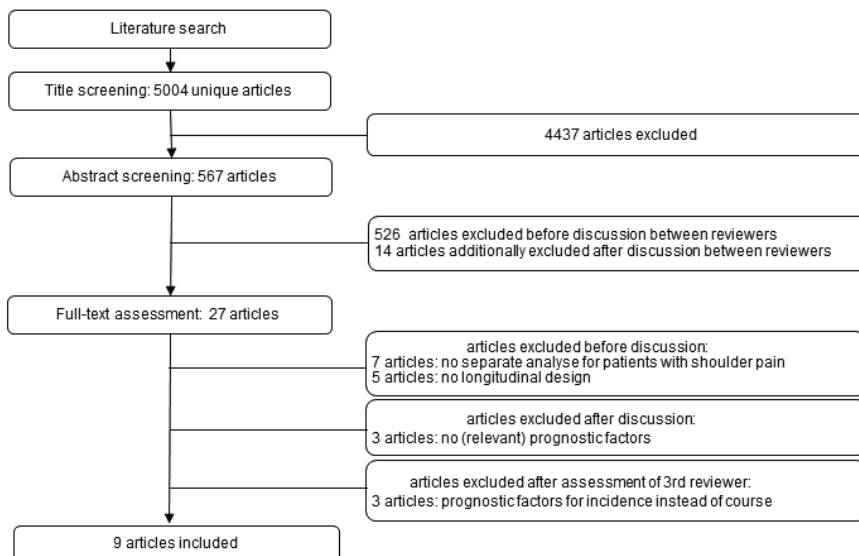
**TABLE 2.** Levels of evidence for prognostic factors on shoulder disorders

Level of evidence	
Strong	Consistent findings (>75%) in at least two high quality cohorts
Moderate	Consistent findings (>75%) in one high quality cohort and at least one low quality cohort
Weak	Findings of one high quality cohort or consistent findings (>75%) in at least three or more low quality cohorts
Inconclusive	Inconsistent findings irrespective of study quality, or less than three low quality cohorts available
No evidence	No data presented

## Results

### Selection of studies

The literature search yielded 5,004 citations. After completion of the selection procedure, 4,995 publications were eliminated based on title, abstract and full-text, leaving nine studies of which the methodological quality was assessed<sup>11-19</sup>. Figure 1 (flowchart) shows an overview of the study selection procedure.



**FIGURE 1.** Overview of the selection procedure

## Methodological quality

There was disagreement between reviewers on seven of 162 (9 × 18) items (4 %), which was solved by discussion. Six studies were classified as high quality studies and three as low quality, there was a range in scores between 9 and 16 points. Table 3 presents the methodological quality of all studies, including those of the original re- view. In most studies, items ‘description of study population’ (C), ‘prospective data collection’ (F), ‘assessment of outcome criteria’ (K), ‘assessment of patient characteristic and prognostic factors’ (L), ‘frequencies of outcome measures’ (N) and ‘frequencies of prognostic factors’ (O) of the criteria list were well described. In five studies, follow-up was shorter than six months (G). Both items on response were poorly described; in eight studies the response rate was higher than 75 % (D) and in three studies information was given about responders/non responders (E). In addition, the minority of studies included information on dropouts or those lost to follow up.

**TABLE 3.** Results of the methodological assessment of prognostic cohort studies on soulder disorders

First author	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	Quality score	Score (%)	
Bartolozzi	1994	-	+	-	?	?	+	+	-	?	+	+	+	?	+	+	+	-	+	10	56
Binder	1984	-	+	-	?	?	+	+	+	?	+	+	+	?	+	+	-	-	-	9	50
Brox	1996	-	+	+	+	-	?	+	+	+	?	+	+	+	+	+	+	+	+	14	78
Cassou	2002	+	+	+	+	?	+	+	+	?	?	+	+	+	+	+	+	+	+	15	83
Chard	1988	+	?	+	?	?	+	+	+	?	?	+	+	?	+	+	+	?	+	11	61
Croft	1996	+	?	+	?	?	+	+	-	+	?	+	?	?	+	-	+	?	+	9	50
Engebretsen	2010	-	+	+	+	?	+	+	+	+	+	+	+	+	+	+	+	+	-	15	83
Gill	2013	-	?	+	?	?	+	+	?	?	?	+	+	-	+	+	-	+	+	9	50
Herin	2012	-	?	+	?	?	+	+	?	?	?	+	+	+	+	+	-	+	+	10	56
Kaergaard	2000	?	?	+	+	?	+	+	-	-	?	+	?	+	-	-	?	?	-	6	33
Kennedy	2006	+	+	+	+	+	+	-	+	?	+	+	+	+	+	+	+	+	+	16	89
Kuijpers	2006	+	+	+	?	?	+	+	+	+	+	+	+	+	+	+	+	+	+	16	89
Kuroda	2001	?	?	+	?	?	+	+	?	?	?	?	?	?	+	-	?	?	+	5	28
Luime	2004	-	?	+	?	?	+	+	-	-	?	+	+	+	+	+	+	+	-	10	56
Macfarlane	1998	-	?	+	+	?	+	+	-	+	?	+	+	+	+	+	+	+	+	13	72
Miranda	2001	?	?	+	+	+	+	+	?	?	?	+	+	+	+	-	+	+	+	12	67
Morrison	1997	?	+	-	?	?	+	+	+	?	+	+	+	?	+	+	-	-	+	10	56
Mulcahy	1994	-	?	+	?	?	+	-	-	?	+	+	?	?	?	-	-	-	-	4	22
O'Malley	2004	?	?	+	?	?	+	-	-	+	+	+	+	+	+	+	+	+	-	11	61
Shaffer	1992	-	+	+	?	?	+	+	-	?	-	+	?	?	+	-	-	-	-	6	33
Solomon	2001	-	+	+	?	?	+	+	?	?	?	+	+	?	-	+	+	+	-	9	50
Thomas	2004	+	+	+	?	?	+	+	+	?	+	+	+	?	+	+	+	+	+	14	78
Viikari	2000	+	?	+	-	+	+	-	?	?	?	+	?	?	+	+	+	+	+	10	56
Windt	1996	+	+	+	+	-	+	+	+	-	-	+	+	?	+	+	+	+	+	14	78
Windt	2007	+	+	+	?	?	+	-	+	+	+	+	+	+	+	+	+	+	+	15	83



## **Characteristics of studies**

Study characteristics are presented in Appendix B. Eight studies were conducted in a primary care setting; ten in a secondary care setting and seven in an occupational setting. In total, 60 potential prognostic factors were evaluated. Pain, duration of symptoms, disability, age, gender and psychological factors were reported on most often. In all new studies, through multivariable analysis, an attempt was made to determine a set of prognostic factors with the highest prognostic value. Many studies conducted their analyses on more than one or on a combined outcome measure. This resulted in a wide variety of outcome measures including pain, disability, range of movement, patient perceived recovery, shoulder instability, recovery and several shoulder questionnaires combining these measures.

## **Evidence for prognostic factors**

A best evidence synthesis was performed to summarize prognostic factors of shoulder disorders. This included the results of the previous systematic review on this topic by Kuijpers et al. (2004)<sup>8</sup>.

In Table 4, prognostic factors studied at least twice and their relationship with outcome are presented. It shows that there is strong evidence that higher shoulder pain intensity, concomitant neck pain and a longer duration of symptoms predict poorer outcome in primary care settings. In secondary care populations, strong evidence was found for the association between greater disability and poorer outcome and between the existence of previous shoulder pain and poorer outcome. In this population there is moderate evidence that higher education is associated with better outcome.

**TABLE 4.** Overall level of evidence for prognostic factors and their association with outcome

<b>Prognostic factor assessed at baseline</b>	<b>Outcome</b>	<b>QS &gt; 60 %</b>	<b>QS ≤ 60 %</b>	<b>Level of evidence</b>
<i>Primary care</i>				
Higher shoulder pain intensity <sup>14,15,18,22</sup>	Poorer	4/5	—	Strong
	Better	1/5	—	
Concomitant neck pain <sup>5,15,18</sup>	Poorer	3/3	—	Strong
Longer duration of symptoms <sup>14,15,18,22,23</sup>	Poorer	4/4	1/1	Strong
Precipitating cause (trauma) <sup>5,15</sup>	Better	1/2	—	Inconclusive
	No association	1/2	—	
Greater disability <sup>14,15,18,22,23</sup>	Poorer	2/4	1/1	Inconclusive
	No association	2/4	—	Inconclusive
Previous episode of pain <sup>14,15,23</sup>	Poorer	—	1/1	Inconclusive
	No association	2/2	—	
Female gender <sup>5,14,15,18,22</sup>	Better	1/5	—	Inconclusive
	Poorer	1/5	—	
	No association	3/5	—	
Gradual onset <sup>14,15,18,22</sup>	Poorer	2/4	—	Inconclusive
	No association	2/4	—	
<i>Secondary care</i>				
Greater disability <sup>11,17,24,25</sup>	Poorer	2/2	1/2	Strong
	Better	—	1/2	
No previous shoulder pain <sup>11,17</sup>	Better	2/2	—	Strong
Higher education <sup>11,25</sup>	Better	1/1	1/1	Moderate
Gradual onset <sup>24,26,27</sup>	Poorer	—	1/3	Inconclusive
	No association	—	2/3	
Long duration of complaints <sup>11,24,26-28</sup>	Poorer	—	2/4	Inconclusive
	No association	1/1	2/4	
Non-dominant side involved <sup>24,26-28</sup>	Better	—	1/4	Inconclusive
	No association	—	3/4	
Diagnosis (large tear) <sup>17,24,25,29</sup>	Poorer	—	1/3	Inconclusive
	No association	1/1	2/3	
Physical workload (manual work) <sup>11,28</sup>	Poorer	—	1/1	Inconclusive
	No association	1/1	—	
Health status <sup>11,17</sup>	Better	1/2	—	Inconclusive
	No association	1/2	—	
<i>Occupational setting</i>				
Longer duration of symptoms <sup>16,30</sup>	Poorer	—	2/2	Inconclusive
Higher age <sup>12,13,16,31,32</sup>	Poorer	2/2	1/3	Inconclusive
	No association	—	2/3	
Female gender <sup>12,13,16,32</sup>	Better	—	1/3	Inconclusive
	Poorer	—	1/3	
	No association	1/1	1/3	
Work related psychosocial factors <sup>16,31,32</sup>	Poorer	2/2	—	Inconclusive
	No association	—	1/1	
High physical workload <sup>13,16,30-34</sup>	Poorer	1/2	1/5	Inconclusive
	No association	1/2	3/5	
Sporting activities <sup>13,16,31,32,34</sup>	Better	—	1/3	Inconclusive
	Poorer	1/2	—	
	No association	1/2	2/3	

Table 5 gives an overview of prognostic factors studied at least twice that have shown no association with outcome. It shows that there is strong evidence that range of motion, age, psychological factors, education, comorbidity, muscle strength, dominance and medication use do not predict outcome in primary care populations. Body Mass Index appears not to be associated with outcome in occupational populations and gender, age, previous physiotherapy, GP treatment, psychological factors and, to a lesser extent, range of motion show no relationship with outcome in secondary care populations.

**TABLE 5.** Overall level of evidence for prognostic factors with no association with outcome

<b>Prognostic factor assessed at baseline</b>	<b>Outcome</b>	<b>QS &gt; 60 %</b>	<b>QS ≤ 60 %</b>	<b>Level of evidence</b>
<i>Primary care</i>				
Restricted range of motion <sup>14,15,22,23</sup>	Poorer	—	1/1	Strong
	No association	3/3	—	
Younger age <sup>5,14,15,18,22</sup>	Better	1/5	—	Strong
	No association	4/5	—	
Comorbid psychological factors <sup>5,14,15,22,35</sup>	No association	5/5	—	Strong
Education <sup>15,35</sup>	No association	2/2	—	Strong
Comorbidity <sup>11,27</sup>	No association	2/2	—	Strong
Muscle strength <sup>14,35</sup>	No association	2/2	—	Strong
Dominance <sup>5,15,18</sup>	No association	3/3	—	Strong
Medication use <sup>14,18</sup>	No association	2/2	—	Strong
<i>Secondary care</i>				
Gender <sup>11,17,24-26,28,36</sup>	No association	2/2	5/5	Strong
Older age <sup>11,17,24-28,36</sup>	Poorer	—	1/6	Strong
	No association	2/2	5/6	
Previous physiotherapy <sup>11,17</sup>	No association	2/2	—	Strong
GP treatment (medication) <sup>11,17</sup>	No association	2/2	—	Strong
Psychological factors <sup>11,17</sup>	No association	2/2	—	Strong
ROM <sup>11,24</sup>	No association	1/1	1/1	Moderate
<i>Occupational setting</i>				
BMI <sup>12,13,16,32</sup>	No association	1/1	3/3	Strong

## Discussion

A few conclusions can be drawn from this update of the literature on prognostic factors on shoulder disorders. In primary care populations, higher shoulder pain intensity, concomitant neck pain and a longer duration of symptoms seem to show an association with a poorer outcome whilst range of motion, age, psychological factors, education, comorbidity, muscle strength, arm dominance and medication use do not seem to be associated with outcome. In occupational populations it is less evident which prognostic factors are associated with outcome. Greater disability and the existence of previous shoulder pain show an association with a poorer outcome in secondary care population.

In general, it is remarkable that most factors of prognostic importance are clinical variables.

This systematic review summarises 25 studies of which nine were published since the original review in 2004. Twelve studies were of high quality of which six were published since the original review. Relatively many new studies were conducted in primary care settings. This increase in studies conducted in primary care reflects reality much better since most patients only receive care from a general practitioner or a physiotherapist. However, only one study was conducted in physiotherapy practices, which limits the possibility for studying possible predictors of outcome in this specific setting.

A few findings, viz. on disability, pain, duration of the complaint and psychological factors, need further exploration. In spite of four high quality studies, there are conflicting results on the effect of baseline disability on outcome in primary care. This might be due to the number of outcome measures involved, which vary from solely pain to merely disability and several questionnaires incorporating both. The prognostic importance of pain seems to be more straightforward; more pain at baseline predicts poorer outcome. However, looking at the results in more detail, Thomas et al. (2005) showed that more severe pain was associated with more pain at follow-up but not with disability or general perceived recovery<sup>18</sup>. Kennedy et al. (2006) found that more pain was associated with *more* improvement in a combined pain/disability outcome measurement but not with absolute pain/disability at the end of treatment<sup>14</sup>. In addition, present review indicates these associations are different in secondary care; in this setting, more severe disability is related to poorer outcome and the evidence on pain is inconclusive. As a result, conclusions on pain and disability as a prognostic indicator for outcome seem prone to several factors and need to be interpreted with some caution. For duration of the complaints, in secondary care the evidence is conflicting but consists of four low and just one high quality study in which duration is not associated with outcome. The latter is easily explained because only patients with chronic shoulder complaints were included so little variation could be expected. Also in primary care quite some people wait long before they seek help for shoulder pain and this distribution is reflected in research. However, included studies do contain patients with acute, sub-acute and chronic complaints and reveal that there is very strong evidence that longer duration is associated with poorer outcome. Many clinicians may endorse this finding from clinical experience. As for psychological factors, in recent years this has been the subject or special interest of many studies. Although it is a broad construct including an array of psychological traits, present summary of the literature suggests that they have no clear association with outcome in either primary or secondary care settings.

A limitation of current study is that some predictors have become quite broad in definition, increasing the risk on finding conflicting evidence on their relationship with outcome. This grouping did make it possible to give an overview of factors that have no prognostic importance or have not been investigated often enough. Also outcome

measures were very diverse and often consisted of a combination of several things at once, such as the SPADI, DASH and UCLA questionnaires, which measure pain and disability and some also range of motion, strength and/or patient satisfaction. Since pain and disability are the most common outcome measures, the choice was either to exclude studies in which other measures were used leaving the problem of combined measures, or to classify outcome as better or poorer. The authors agreed on this simplification, aware of the loss of nuance that might be relevant to the individual patient and clinician. Included tables should provide them with more detailed information or the reference as to where to find it.

For future research, we recommend to carry out more research in physiotherapy practices since only one study was conducted in this setting, which indicates that the influence of age, gender, onset and pain on outcome in this setting might be different from general practice. Even more so since these complaints are very common and in many countries patients do not need a referral from a physician (anymore) to visit a physiotherapist. Kuijpers et al. (2004) uncovered the need for well-conducted prospective cohort studies<sup>8</sup>. Those published since are indeed of much higher quality and the prognostic factors, however many, much better described. However, regardless of the setting, before starting new studies, researchers should consider the wide variety in outcome measures that exists which hamper synthesis of results. In our opinion, research into patient reported outcome measures (PROM's) is useful here since PROM's not only reflect the patients' perception but also because when standardized, they facilitate comparison between studies. The methods for conducting systematic reviews of studies regarding prognostic questions itself are still in development, as well as a system for rating the quality of a body of evidence. In the future the GRADE system, which is widely used for questions regarding interventions, will be available for the subject of prognosis as well<sup>20,21</sup>.

There are some implications for clinical practice as well. From previous research it is known that patients with shoulder problems are mainly treated in primary care by general practitioners or physiotherapists. Present review shows that pain severity, concomitant neck pain and duration of symptoms have prognostic value for outcome in primary care settings. Since these are clinical variables that can be influenced, clinicians may take these factors into account in the management of their patients. Whereas current Dutch guidelines for general practitioners advise a wait-and-see policy for all patients with shoulder pain at first, they may decide to monitor those patients with a worse prognosis more frequently and alter the treatment plan timely if complaints persist.

## **Conclusions**

Present review shows that there is strong evidence that higher shoulder pain intensity, concomitant neck pain and a longer duration of symptoms predict poorer outcome in primary care settings. In secondary care populations, strong evidence was found for the association between greater disability and poorer outcome and between the existence of previous shoulder pain and poorer outcome. Since these are clinical variables that can be influenced, clinicians may take these factors into account in the management of their patients.

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## **Appendix A. Explanation of the criteria from Table 1**

A. Positive if patients were identified at an early uniform point (inception cohort) in the course of their disease (first episode, with restriction to duration of symptoms, of shoulder pain in lifetime or first treated episode of shoulder pain).

B. Positive if criteria were formulated for at least: age, duration of symptoms, relevant co-morbidity (i.e cervical radiculopathy, luxation)/systemic diseases.

C. Positive if was described in what setting the patients were recruited (i.e. general practice, hospital, occupational setting).

D. Positive if the response rate was  $\geq 75\%$ .

E. Positive if information was presented about patient/disease characteristics of responders and non-responders or if there was no selective response.

F. Positive if a prospective design was used, also positive in case of an historical cohort in which the determinants had been measured before outcome was determined.

G. Positive if the follow-up period was at least 6 months.

H. Positive if the total number of participants was  $\geq 80\%$  on the last moment of follow-up compared to the number of participants at baseline.

I. Positive if demographic/clinical information (patient/disease characteristics such as age, sex and other potential prognostic predictors) was presented for completers and those lost to follow-up/ drop-outs at the main moment of outcome measurement, or no selective drop-outs/lost to follow up, or no drop-outs/lost to follow-up.

J. Positive if treatment subsequent to inclusion in cohort is fully described or standardised. Also positive in case of no treatment given.

K. Positive if standardised questionnaires or objective outcome measurements of at least 1 of the following 5 outcome measures were used for each follow-up measurement: pain, general improvement, functional status, general health status or lost days of work.

L. Positive if standardised questionnaires or objective measurements were used at baseline for at least 4 of the following 8 potential prognostic factors: age, sex, pain,

functional status, duration of complaints, neck complaints, physical workload, or dominant shoulder affected.

M. Positive if standardised questionnaires or objective measurements were used at baseline of at least 1 of the following 6 potential prognostic factors: depression, somatisation, distress, fear and avoidance, coping strategies, or psychosocial workrelated factors (social support, psychological demands, and job decision latitude).

N. Positive if frequency, percentage or mean, median (Inter Quartile Range) and standard deviation/CI (confidence interval) were reported for the most important outcome measures.

O. Positive if frequency, percentage or mean, median (Inter Quartile Range) and standard deviation/CI were reported for the most important prognostic factors.

P. Positive if univariate crude estimates were provided for the association of a prognostic factor with outcome.

Q. Attempt is made to determine a set of prognostic factors with the highest prognostic value.

R. Positive if the number of cases in the multivariate analysis was at least ten times the number of independent variables in the analysis (Altman, 1991)

## Appendix B. Characteristics of studies

Author	Study quality (%)	Study population	Duration follow-up/ outcome measures	Prognostic factor(s)	Strength of association (95% CI)
<b>Primary care</b>					
Brox and Brevik (1996)	78	125 patients; Rotator tendinosis Referred by general practitioner	6 months Neer shoulder score (0–100) Success: ≥80 points	Not on sick leave Not on regular medication Active treatment (ref = not active) Years of education, overhead work activity, comorbidity, isometric strength endurance, locus of control beliefs, emotional distress	Multivariate analysis, adjusted for age, gender, symptom duration, baseline Neer score OR = 4.4 (1.6, 12.1) OR = 4.2 (1.5, 11.1) OR = 4.8 (1.7, 13.6) n.s.
Croft et al. (1996)	50	166 patients Shoulder pain General practice	6 months Validated 22-item disability questionnaire	Baseline disability score >10, symptom duration (>1 month), injection at baseline, previous episodes of shoulder pain, severely restricted passive elevation (<101°).	Poorer outcome (P < 0.05) (Beta's not presented)
Kennedy et al. (2006)	89	361 patients Shoulder complaints Physiotherapy practice	max 12 weeks DASH at discharge (higher DASH is greater disability)	Age (older) Gender (female) Function/disability (baseline DASH) Workers' compensation claim Therapist predicts more restriction of patient return to usual activity Onset, duration of pretreatment symptoms, familiar with shoulder complaints, pain (intensity), pain (global rating injury/pain), pretreatment ROM (restriction), pretreatment weakness (muscle strength), general health (SF 36 physical), additional medical problems (co-morbidity), work status, surgery, GP treatment (prescribed medication), psychological factors (SF 36 mental), patient outcome expectancy (patient prediction recovery)	Multivariate analysis (higher log 1 + DASH at discharge) $\beta$ by <i>decaraf</i> = 0.13 (0.06, 0.19), p = 0.0004 $\beta$ = -0.24 (-0.45, -0.04), p = 0.0219 $\beta$ = 0.02 (0.01, 0.03), p < 0.0001 $\beta$ = 0.55 (0.18, 0.92), p = 0.0036 $\beta$ = 0.42 (0.21, 0.63), p < 0.0001 n.s.

Kuijpers et al. (2006)	89	587 patients Shoulder pain General practice	6 months Persistent symptoms at 6 weeks	Change in DASH (larger improvement)	Age (younger)	$\beta$ by decade = 1.58 (0.21, 2.96), $p = 0.0243$
					Duration of pretreatment symptoms (shorter)	$\beta = 4.04$ (1.60, 6.47), $p = 0.001$
				Pain (higher intensity, NRS 10-100)	$\beta = -1.56$ (-2.56, -0.57), $p = 0.02$	
				General health (worse SF 36)	$\beta = 0.25$ (0.01, 0.05), $p = 0.0448$	
				Surgery (past six months)	$\beta = -15.73$ (-22.55, -8.9), $p < 0.0001$	
				Gender, onset, familiar with shoulder complaints, pain (global rating injury/pain), function/disability (baseline DASH), pretreatment ROM (restriction, pretreatment weakness (muscle strength), additional medical problems (comorbidity), work status, GP treatment (prescribed medication), psychological factors (SF 36 mental), patient outcome expectancy (patient prediction recovery) function/disability (baseline DASH)	n.s.	
				Onset (gradual)	Multivariate analysis OR = 1.8 (1.1, 2.9)	
				Duration of pretreatment symptoms	OR <sub>7-12/0-6weeks</sub> = 1.9 (1.1, 3.3)	
				Pain (0-10)	OR <sub>&gt;12/0-6weeks</sub> = 2.6 (1.5, 4.4)	
				Neck problems (pain, 0-18)	OR = 1.1 (1.0, 1.2)	
				Repetitive movements	OR = 1.1 (1.0, 2.7)	
				Psychological factors (comorbid)	OR = 2.0 (1.2, 3.1)	
				Age, gender, education, dominance, precipitating cause, familiar with shoulder complaints, pain (with movement), function/disability, pretreatment ROM, additional musculoskeletal problems, physical activity, physical workload, psychological factors (coping, 4DKL, fear avoidance, kinesiophobia)	OR = 2.3 (0.9, 6.4)	
				Onset (gradual)	n.s.	
				Duration of pretreatment symptoms	OR = 1.4 (1.0, 1.8)	
				Pain (0-10)	OR <sub>7-12/0-6weeks</sub> = 1.4 (0.9, 2.3)	
				Additional musculoskeletal problems (low back pain)	OR <sub>&gt;12/0-6weeks</sub> = 1.9 (1.2, 3.0)	
				Shoulder pain physical examination	OR = 1.1 (1.0, 1.2)	
				Age, gender, education, dominance, precipitating cause, familiar with shoulder complaints, pain (with movement), function/disability, pretreatment ROM, neck problems (pain),	OR = 1.6 (1.1, 2.5)	
				Persistent symptoms at 6 months	OR = 1.0 (1.0, 1.1)	
					n.s.	

neck problems (pain, ROM, with movement), physical activity, repetitive movements, physical workload, psychological factors (comorbid, coping, 4DKL, fear avoidance, kinesiophobia)

Macfarlane et al. (1998)	72	135 patients Shoulder pain	3 years % Shoulder pain	Pain at baseline Symptom duration (>1 year) Shoulder related disability (≥5 items on 22-item questionnaire) Age, sex, GP visit, area of pain, sudden onset, distress (GHQ), restricted ROM	Multivariate analysis, adjusted for age and sex OR = 3.1 (1.1, 8.2) OR = 2.9 (1.1, 7.7) OR = 3.1 (0.9, 11.0) n.s.
Thomas et al. (2005)	78	316 patients Shoulder problems General practice	12-18 months Severity of shoulder disability (higher)	Onset (gradual) Duration of pretreatment symptoms Function/disability (baseline, SDQ, per point) Neck problems (pain) Age, gender, dominance, pain, GP treatment (use of painkillers in previous 48 hours)	Multivariate analysis $\beta$ = 7.77 (0.53, 15.0), $p < 0.10$ $\beta$ = 0.52 (0.08, 0.95), $p < 0.10$ $\beta$ = 0.52 (0.36, 0.68), $p < 0.10$ $\beta$ = 6.57 (0.21, 12.90), $p < 0.10$ n.s.
			Pain severity (higher)	Gender (male) Duration of pretreatment symptoms Pain (baseline, per point) Function/disability (baseline SDQ) Age, dominance, onset, neck problems, GP treatment (use of painkillers in previous 48 hours)	$\beta$ = 5.77 (0.74, 10.80), $p < 0.10$ $\beta$ = 0.30 (-0.06, 0.65), $p < 0.10$ $\beta$ = 0.13 (0.01, 0.28), $p < 0.10$ $\beta$ = 0.15 (0.03, 0.26), $p < 0.10$ n.s.
			Patient perception of outcome (worsening)	Gender (male) Onset (gradual) Function/disability (baseline SDQ) Age, dominance, duration of pretreatment symptoms, pain, neck problems, GP treatment (use of painkillers in previous 48 hours)	OR = 2.57 (1.10, 5.94), $p < 0.10$ OR = 3.21 (0.91, 11.3), $p < 0.10$ OR = 1.03 (1.01, 1.05), $p < 0.10$ n.s.
Van der Windt et al. (1996)	78	349 patients Shoulder pain General practice	12 months % Shoulder pain	Concomitant neck pain High pain intensity Precipitating trauma Diagnosis (acute bursitis) Age, gender, arm dominance	Multivariate analysis OR = 2.8 (1.7, 4.6) OR = 2.0 (1.2, 3.3) OR = 0.4 (0.2, 0.9) OR = 0.4 (0.2, 0.8) n.s.

Van der Windt et al. (2007)	83	587 patients Shoulder pain General practice	3 months Perceived recovery (persistent symptoms) Functional disability (persistent disability)	Psychological factors (pain catastrophising, distress, somatisation, fear-avoidance)  Psychological factors (pain catastrophising, distress, somatisation, fear-avoidance)	Multivariate analysis n.s.
<b>Secondary care</b>					
Bartolozzi et al. (1994)	56	170 patients Impingement syndrome Orthopaedic dept	Mean 20 months Shoulder rating system University of California Los Angeles ( $\geq 29$ points)	Female Age  Dominance Onset of symptoms Duration of pre-treatment symptoms*  Functional impairment*  Recreational or occupational demands  Instability ROM  Weakness Rotator cuff pathology:* Partial or small full thickness tear Moderate or large tear Treatment	Univariate analysis RR <sub>female/male</sub> = 1.03 (0.81, 1.31) RR <sub>40-60 / &lt;40y</sub> = 1.10 (0.78, 1.56) RR <sub>&gt;60 / &lt;40y</sub> = 1.23 (0.89, 1.71) RR <sub>non-dominant/dom</sub> = 0.95 (0.74, 1.24) RR <sub>insidious/acute</sub> = 0.97 (0.75, 1.26) RR <sub>3, 6 mths / &lt;3 mths</sub> = 0.90 (0.72, 1.14) RR <sub>&gt;6 mths / &lt;3 mths</sub> = 0.69 (0.52, 0.91) RR <sub>moderate/mild</sub> = 0.81 (0.60, 1.09) RR <sub>severe/mild</sub> = 0.65 (0.46, 0.91) RR <sub>moderate/low</sub> = 1.18 (0.85, 1.64) RR <sub>severe/low</sub> = 1.25 (0.97, 1.62) RR <sub>present/absent</sub> = 0.97 (0.64, 1.46) RR <sub>mild/none</sub> = 0.85 (0.60, 1.20) RR <sub>moderate/none</sub> = 0.78 (0.45, 1.36) RR <sub>severe/none</sub> = 0.96 (0.63, 1.46) RR <sub>yes/no</sub> = 0.68 (0.49, 0.93) RR = 1.0 RR = 0.82 (0.53, 1.26) RR = 0.34 (0.14, 0.80) No significant differences
Binder et al. (1984)	50	42 patients Frozen shoulder Patients Rheumatology dept	Mean 44 months ROM	Non-dominant side involved Manual work Therapy: mobilisation versus injections, ice, or no additional treatment	Mean difference abduction Better: 12° (P < 0.05) Worse: 15° (P < 0.05) Worse: 15° (P < 0.05)

Engelbrechtsen et al. (2010)	83	104 patients	12 months	Age, sex, symptom duration	n.s.
		Subacromial shoulder pain > 3 months	SPADI (higher SPADI is greater disability)	Education level	Multivariate analysis adjusted for age and gender
		Physical medicine and rehabilitation dept		Familiar with shoulder complaints	$\beta$ college, uni/ <12 yrs school = -14.3 (-23.5, -5.2), p = 0.003
				Function/disability (baseline SPADI)	$\beta$ = 11.0 (1.4, 20.6), p = 0.026
				Age, gender, duration of pretreatment symptoms, pain (intensity at rest), pretreatment ROM, neck problems (pain), general health (EQ-vas), work status, working above shoulder level, physical workload (frequency heavy lifting), previous physiotherapy, GP treatment (pain/sleeping/relax medication), psychological factors (emotional distress, self-efficacy for pain)	$\beta$ = 0.37 (0.15, 0.59), p = 0.001
				Function/disability (baseline SPADI)	n.s.
			Work status (working)	Function/disability (baseline SPADI)	OR <sub>college, uni/ &lt;12 yrs school</sub> = 4.3 (1.3, 14.9), p = 0.02
				General health (EQ-vas)	OR = 1.06 (1.0-1.1), p = 0.001
				Age, gender, education level, duration of pretreatment symptoms, familiar with shoulder complaints, pain (intensity at rest), function/disability (baseline SPADI), pretreatment ROM, neck problems (pain), work status, working above shoulder level, physical workload (frequency heavy lifting), previous physiotherapy, GP treatment (pain/sleeping/relax medication), psychological factors (emotional distress, self-efficacy for pain)	n.s.
Kuroda et al. (2001)	28	341 patients	≥ 3years Recovery	Stopping overhead sports	RR for recovery
		Atraumatic shoulder instability		Stopping non-overhead sports	RR = 8.67 (2.7, 27.1)
		Shoulder disorder clinic (hospital)		Female	RR = 1.37 (0.55, 3.43)
				Age	RR = 0.94 (0.56, 1.58)
					P = 0.01
O'Malley et al. (2004)	61	199 patients	3 months	Familiar with shoulder complaints (no chronic conditions)	Multivariate analysis
		Shoulder problems	Shoulder function (better)	Function/disability (baseline)	$\beta$ = 3.23 (SE = 1.39), p = 0.02
		Orthopedic dept		Surgery (no surgery during study)	$\beta$ = 0.54 (SE = 0.12), p < 0.001
				Patient outcome expectancy	$\beta$ = 6.76 (SE = 1.71), p < 0.001
				Age, gender, pathology/diagnosis, general health (SF-12)	$\beta$ = 0.46 (SE = 0.14), p = 0.002
					n.s.



physical), physical therapy (during study), previous physical therapy treatment, surgery (previous shoulder surgery), GP treatment (new medication during study), psychological factors (SF-12 mental)

Age  
 $\beta = 0.03$  (SE = 0.03),  $p = 0.29$   
 $\beta = 0.14$  (SE = 0.06),  $p = 0.01$   
 $\beta = -0.24$  (SE = 0.81),  $p = 0.77$   
 $\beta = 0.35$  (SE = 0.10),  $p = 0.001$   
 n.s.

Patient outcome expectancy

Function/disability (change)  
 Surgery (no previous surgery)  
 Patient outcome expectancy

Age, gender, familiar with shoulder complaints, pathology/diagnosis, function/disability (baseline), general health (SF-12 physical), physical therapy (during study), previous physical therapy treatment, surgery (previous shoulder surgery, surgery during study), GP treatment (new medication during study), psychological factors (SF-12 mental)

Morrison et al. (1997) 56 667 patients Subacromial impingement syndrome Center for sports medicine Mean 27 months Shoulder rating system University of California Los Angeles ( $\geq 28$  points)

Female  
 Dominance: dominant  
 Non-dominant  
 Bilateral  
 Type Acromion: Type I  
 Type II  
 Type III  
 Tenderness acromioclavicular joint Yes/no  
 Age < 20  
 Age 21-40  
 Age 41-60  
 Age > 60  
 Onset: Acute  
 Non-acute  
 Chronic

Univariate analysis  
 RR = 0.97 (0.86, 1.09)  
 RR = 1.0  
 RR = 0.92 (0.81, 1.05)  
 RR = 0.87 (0.67, 1.13)  
 RR = 1.0  
 RR = 0.74 (0.65, 0.84)  
 RR = 0.7 (0.61, 0.8)  
 RR = 0.83 (0.7, 0.98)  
 RR = 1.0  
 RR = 0.88 (0.7, 1.11)  
 RR = 1.0 (0.8, 1.25)  
 RR = 0.76 (0.57, 1.01)  
 RR = 1.0  
 RR = 0.81 (0.7, 0.94)  
 RR = 0.86 (0.75, 0.99)

Mulcahy et al. (1994) 22 51 patients Hospital < 6 months Better, unchanged, worse Tears (vs. no tears)

RR = 0.77 (0.47, 1.28)

Shaffer et al. (1992) 33 92 patients Frozen shoulder Mean 7 years ROM

Age, dominance, side,

n.s.

Orthopaedic clinic

acute or gradual onset,  
minor trauma or spontaneous onset,  
duration of symptoms at baseline, treatment,  
response to treatment,  
bilateral involvement,  
associated medical problems

Solomon et al. (2001)	50	63 patients Acute shoulder pain Hospital	12 months Shoulder Pain and Disability Index	Multivariate associations: Referred Worse baseline pain, per point Worse baseline function per point Older age per year Female More education, per year Longer pain duration per month Osteoarthritis Rotator cuff tear	Improvement/pain / Improvement/function $\beta = -2.4, p = 0.02 / \beta = -1.4, p = 0.17$ $\beta = -4.2, p < 0.001 /$ Not in the model Not in the model / $\beta = -4.9, p < 0.001$ $\beta = 1.2, p = 0.24 / \beta = -0.8, p = 0.46$ $\beta = 1.4, p = 0.2 / \beta = 1.3, p = 0.20$ $\beta = 3.3, p = 0.0019 / \beta = 2.1, p = 0.047$ $\beta = -2.2, p = 0.038 / \beta = -1.2, p = 0.24$ $\beta = 2.3, p = 0.026 / \beta = 1.0, p = 0.34$ $\beta = -1.4, p = 0.026 / \beta = 1.1, p = 0.26$
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**Occupational/general**

Cassou et al. (2002)	83	1804 patients Chronic neck-shoulder pain Occupational physicians' files	5 years % Disappearance of pain	Year of birth (ref = 1953) 1948 1945 1938 Repetitive work (ref = never) In 1990 Before 1990 High job demand Previous musculoskeletal disorders Sporting activities Precise movements, awkward work, repetitive work, job control, shift work	Multivariate analysis: Men / Women OR = 1.5 (0.9, 2.5) / OR = 0.8 (0.5, 1.2) OR = 1.2 (0.8, 1.9) / OR = 0.6 (0.4, 0.8) OR = 1.0 (0.6, 1.5) / OR = 0.6 (0.4, 0.9)  Univariate only / OR = 0.8 (0.5, 1.3) Univariate only / OR = 0.5 (0.3, 0.7) OR = 0.7 (0.5, 0.9) / OR = 0.7 (0.6, 0.9) OR = 0.4 (0.3, 0.6) / OR = 0.6 (0.5, 0.8) OR = 1.5 (1.1, 2.1) / Univariate only n.s. / n.s.
Chard et al. (1988)	61	137 Rotator cuff tendinitis Shoulder clinic	19 months Shoulder pain resolved	Precipitating cause: Unknown Injury Employment Precipitating Cause Overuse/strain	Univariate analysis RR = 1.0 RR = 0.76 (0.40, 1.42) RR = 0.63 (0.29, 1.40) RR = 1.30 (0.82, 2.06)

Author (Year)	Study Population	Exposure	Outcome	OR (95% CI), p-value		
Gill et al. (2013)	50	408 patients	Occupation Housewife/retired	RR = 1.0		
			Manual	RR = 0.88 (0.52, 1.51)		
	50	Shoulder complaints General population	Non-manual	RR = 1.09 (0.67, 1.76)		
			Multivariate analysis adjusted for age, sex & BMI			
			Smoking	OR = 2.10 (1.19, 3.73), p = 0.011		
			Depressive symptoms	OR 1.96 (1.07, 3.58), p = 0.029		
			Knee pain	OR = 3.30 (2.09, 5.20), p < 0.001		
			Hip pain	OR = 1.89 (1.10, 3.27), p = 0.022		
			Back pain	OR = 3.88 (2.36, 6.37), p < 0.001		
			Hand pain	OR = 2.77 (1.79, 4.29), p < 0.001		
			Higher range of shoulder flexion	OR = 0.98 (0.97, 1.00), p = 0.027		
			Higher range of shoulder abduction	OR = 0.98 (0.96, 0.99), p = 0.008		
			Work status	OR <sub>retired/employed</sub> = 0.47 (0.23, 0.99), p = 0.046		
			Age, gender, BMI, work status (part-time/casual, unemployed, home duties, other)	OR <sub>student/employed</sub> = 0.03 (0.01, 0.13), p < 0.001 n.s.		
Herin et al. (2012)	56	734 patients	Resolved shoulder pain	OR = 3.21 (1.87, 5.52), p < 0.001		
			Higher grip strength	OR = 1.04 (1.01, 1.07), p = 0.004		
	56	Persistent chronic shoulder pain Under supervision of occupational physician	Knee pain	OR = 1.68 (1.05, 2.69), p = 0.031		
			Back pain	OR = 2.75 (1.79, 4.24), p < 0.001		
			Hand pain	OR = 2.00 (1.19, 3.36), p = 0.009		
			Higher range of shoulder abduction	OR = 0.97 (0.96, 0.98), p < 0.001		
			Higher range of external rotation	OR = 0.98 (0.97, 1.00), p = 0.026		
			Age, BMI	n.s.		
			Multivariate analysis adjusted for age, gender, sport, BMI and social class			
			Age	OR <sub>5/37years</sub> = 1.41 (1.03, 1.92), p = 0.03		
			Gender (women/men)	OR = 1.50 (1.17, 1.94), p < 0.001		
			Sporting activities	OR = 0.72 (0.58, 0.90), p < 0.001		
			Posture	OR = 1.26 (1.00, 1.60), p = 0.05		
			Body mass index, social class, psychological factors (psychological demand, decision latitude), biomechanical factors (forceful effort, effort with tools, heavy loads, movements, vibration)	n.s.		

Kaergaard and Andersen (2000)	33	40	Neck-shoulder disorders Working population	2 years % Recovery	Work exposure Physical activity at leisure time	n.s. n.s.
Luime et al. (2004)	56	199 patients Shoulder complaints Workers of nursing homes	max 2 years Recurrent complaints	Duration of pre-treatment symptoms (>3 months) Age, gender, BMI, general health, working above shoulder level, repetitive movements, physical activity, physical workload, psychological factors (low job control, high work demands, low supervisory support, low support from colleagues)	Multivariate analysis OR = 1.91 (1.36, 2.67) n.s.	
Miranda et al. (2001)	67	419 patients Shoulder pain Working population	12 months % Persistent severe pain	Individual factors: Age < 35 Age 35 – 44 Age 45–54 Age ≥ 55 Sports activity added score > 156 vs < 52 Gender (female) Overload at work (definite vs none) Other work load factors (e.g. working above shoulder level), mental stress, body mass index	Multivariate analysis OR = 1.0 OR = 0.9 (0.3, 2.6) OR = 3.6 (1.3, 10.2) OR = 1.6 (0.5, 4.8) OR = 0.7 (0.4, 1.3) OR = 0.7 (0.4, 1.2) OR = 3.8 (1.8, 8.0) n.s.	
Vilkkari-Juntura et al. (2000)	56	474 patients Neck-shoulder pain Occupational health service	60 days Sick leave >3 days	Worker group (blue collar) Sick leave preceding examination Symptom duration > 7 days vs. 0-2 days Continuous pain High pain intensity Interaction continuous pain x intensity Pain during rotation of the head Pain in shoulder in abduction of arm Other symptoms and signs	Multivariate analysis OR = 6.8 (2.1, 22.4) OR = 6.5 (2.1, 20.4) OR = 0.1 (0.0, 0.3) OR = 1.7 (0.5, 5.7) OR = 1.1 (0.3, 4.0) OR = 5.2 (1.0, 28.1) OR = 7.8 (3.0, 20.1) OR = 5.9 (2.7, 12.7) n.s.	

# 6

## **Do therapist effects determine outcome in patients with shoulder pain in a primary care physiotherapy setting?**

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## Abstract

**Objectives** To explore whether a therapist effect exists in physiotherapists treating patients with shoulder pain and to identify if personality traits of the physiotherapist influences patients outcome.

**Design** Observational cohort study

**Setting** Primary care physiotherapy practices

**Participants** Data on patients with shoulder complaints that started and finished treatment between 2009 and 2012 were derived from the NIVEL Primary Care Database. Personality traits of the physiotherapist were identified using the Big Five Inventory. Data of 2,814 patients and 56 physiotherapists were analysed using multi-level linear regression.

**Main outcome measure** Severity of complaint was measured on a 10-point Likert scale at the start and end of treatment. Change score is used as outcome.

**Results** A therapist effect exists in the rehabilitation of patients with shoulder complaints in a physiotherapy setting; the physiotherapist explained 12% of variance and the personality trait extraversion showed a significant association ( $p = 0.03$ ) with change in treatment outcome.

**Conclusion** Current explorative study suggests that patients who were treated by therapists that tend to be more outgoing and energetic achieved better treatment results. Additional studies are needed to unravel the interplay between personality traits and other variables of importance, like patients' personality traits or psychological factors, in treating patients with shoulder complaints.

## Introduction

Why do some patients recover and others don't? This key question for patients, clinicians and researchers, has for patients with musculoskeletal pain mainly been addressed by studying the effects of different treatment options. To date, not one type of treatment can clearly be favoured over another<sup>1,2</sup>. In fact, an evaluation of different studies found that less than 2% of the total variance in outcome was actually explained by treatment across trials<sup>3</sup>.

Treatment is delivered by different therapists. Therefore, it is plausible that variability in treatment outcome is also influenced by differences between practitioners. This so-called 'therapist effect' has been established in psychotherapy professions and shown to account for between 0-18% of variability in patient outcomes<sup>4</sup>. Research within the field of primary care physiotherapy exists but is much scarcer. One study on patients with low back and neck pain compared three RCTs in which a wide variation of treatment types was applied. Therapist effect was found to account for 3-7% of the variance<sup>3</sup>. A recent observational study on patients with chronic diseases confirmed a therapist effect to account for 7%<sup>5</sup>.

In general medicine and psychotherapy, it is known that personality traits of the clinician affect patients and effect outcome<sup>6</sup>. Within the field of physiotherapy, one study on patients with chronic diseases found that therapists that tend to be calmer and more secure (less neurotic) produce better treatment outcomes<sup>5</sup>. Other research identifying which factors explain therapist effect is limited mostly to age, experience and education and shows conflicting results and small effects<sup>7</sup>. So, exploration of the 'therapist effect' is needed to further elucidate factors attributing to recovery. In this study, the influence of personality of the physiotherapists was explored using the Big Five Inventory (BFI) questionnaire<sup>8</sup>. This questionnaire captures the commonalities among the existing systems of personality description and thus provides an integrative descriptive taxonomy for personality research. It investigates five domains of personality as summarized by the broad concepts of extraversion, neuroticism, agreeableness, conscientiousness, and openness to experiences<sup>9</sup>.

Shoulder pain is the most common complaint in the average physiotherapy practice after lower back and neck problems<sup>10</sup>. It has an unfavourable long-term outcome in many patients concerning pain and impairment of ordinary activities of daily living, as about 40-60% have recovered within six months to two years<sup>11,13</sup>. Despite its commonness, as yet only few prognostic factors (duration of complaints, pain severity and concomitant neck pain) have been identified<sup>14</sup>. Although longer duration of complaints is known to predict poorer outcome, many patients already have chronic complaints (> 3 months) before they see a physiotherapist. This requires therapists to deliver psychosocial and behavioural focused treatment strategies, in which a practitioner effect is known to be more pronounced than, for example, in manual therapy<sup>3</sup>.



So, the first aim of current study was to investigate whether a therapist effect exists in treatment of patients with shoulder pain. The second aim was to explore if personality traits of the physiotherapist are associated with treatment outcome.

## Method

### Design

For this study, data were derived from the electronic medical records of physiotherapists who participated in the NIVEL Primary Care Database (NPCD)<sup>7</sup>. Since 2001, NPCD has continuously collected healthcare-related information registered by physiotherapists working in private practices throughout the country. A random sample was drawn from the Human Resources Registers for physiotherapists for this purpose. To be eligible for participation, physiotherapists had to be working in a private practice as a general physiotherapist at least half of their time. Information was obtained through regular patient registration software used to reimburse treatment visits and through an additional module. Data were submitted on a monthly basis and were entered into the database after a standardised quality control check. For participation, physiotherapists received financial compensation, benchmark information and points for accreditation in the quality register. A comparison with national data on physiotherapists showed that there were no differences concerning the therapists' age, number of working hours and year of graduation. More male therapists register for NPCD and more group practices. Practices were representative with respect to geographical distribution and degree of urbanisation.

According to the Dutch Medical Research Involving Human Subject Act this study does not require ethics approval. The NIVEL Primary Care Database extracts data according to strict guidelines for the privacy protection of patients and physiotherapists. In addition, we sought and obtained permission for this work from the board of the NIVEL network. The study did follow the Declaration of Helsinki. Pursuant to the Personal Data Protection Act, data were collected anonymously, patients were informed about NPCD by leaflets and posters in the waiting room and patients could refuse participation.

In addition to NPCD data, for the present study, physiotherapists were sent an online questionnaire regarding the personality traits extraversion, neuroticism, agreeableness, conscientiousness, and openness to experiences. The Dutch version of the Big Five Inventory which is a 41-item questionnaire using a 5-point-Likert scale, was used for this purpose (BFI)<sup>11</sup>. Extraversion implies an energetic approach toward the social and material world and includes traits such as sociability, activity assertiveness and positive emotionality. Neuroticism contrasts emotional stability and even-temperedness with negative emotionality, such as feeling anxious, nervous, sad and tense. Agreeableness contrasts a prosocial and communal orientation toward others with

antagonism and includes traits such as altruism, tender-mindedness, trust and modesty. Conscientiousness describes socially prescribed impulse control that facilitates task- and goal-directed behaviour, such as thinking before acting, delaying gratification, following norms and rules and planning, organizing and prioritizing tasks. Openness to experience (vs. closed-mindedness) describes the breadth, depth, originality and complexity of an individual's mental and experiential life. The questionnaire was sent digitally to all 73 participating physiotherapists in NPCD in February 2012. Reminders by email were sent to non-responding therapists 10 and 20 days after the questionnaire was originally sent. A maximum of three years passed between treatment and sending the questionnaire, however, generally, personality is not expected to change significantly during this time.

### **Study sample**

The convenience sample of this longitudinal observational study was based on data from 4072 adult (> 18 years) patients with shoulder complaints that started and finished treatment between 2009 and 2012. In NPCD, diagnosis was registered according to the International Classification of Primary Care (ICPC). All patients with ICPC L08 (shoulder complaints) or L92 (shoulder syndromes) were selected, however those with dislocations, fractures, surgery, osteoporosis, malignancies, rheumatic or neurological diseases were excluded (n = 739).

### **Outcome measures and independent variables**

The outcome of the present study was patients' change in severity of the complaint measured by the Numeric Rating Scale (NRS). The NRS ranges from 0.0-10.0 with higher scores indicating more severe complaints. Patients were asked the severity of their shoulder complaint both at the start and end of their treatment and the difference score was calculated by subtracting the baseline severity score from the discharge score. Therefore, a negative value for change in severity indicates improvement.

The independent measures at the physiotherapist level extracted from NPCD at the start of treatment were age and gender. Additional independent variables on the physiotherapist level were the domain scores on each of the five dimensions of the BFI (extraversion, neuroticism, agreeableness, conscientiousness and openness to experiences).

Independent measures on patient level extracted from NPCD at the start of treatment were age, gender, mode of referral (general practitioner, medical specialist or via direct access), duration of the complaint, whether it concerned a recurrent complaint (when the complaints appeared after a symptom-free period of at least four weeks and at most two years) and origination (gradually or suddenly). These characteristics including baseline severity were -first- included in the model as confounders.

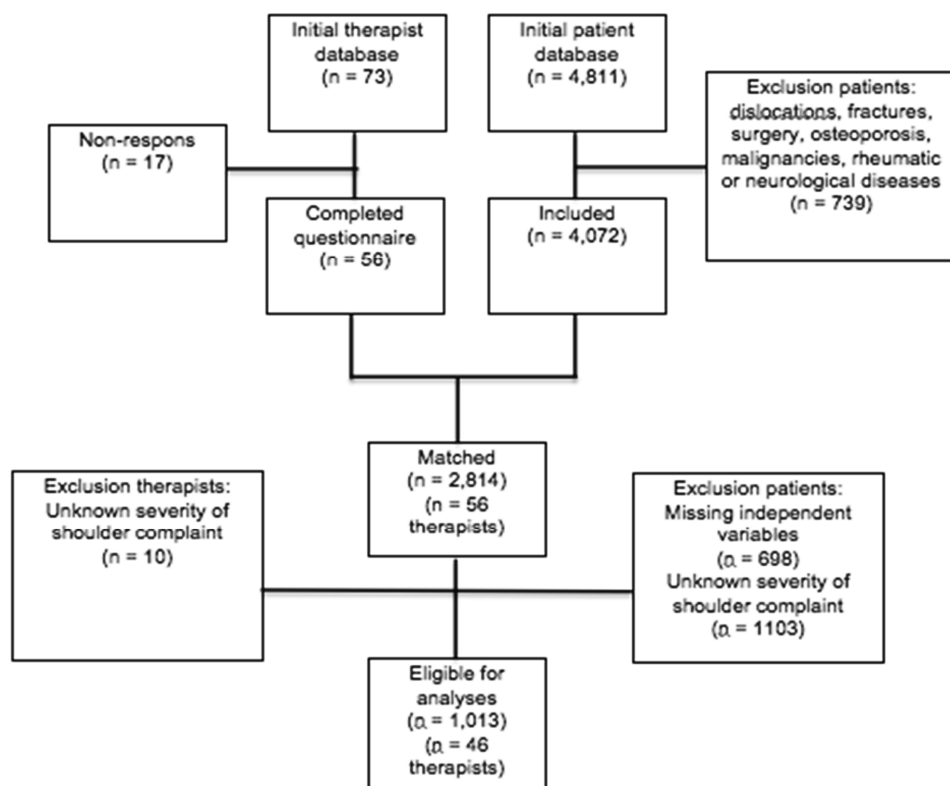
## Data analysis

Descriptive analyses were calculated for all variables. Because patients were nested within physiotherapists, multilevel linear analyses were performed to explore factors associated with change in severity of shoulder complaints. Data was checked for normal distribution. All analyses were conducted using Stata version 13. Two models were developed: model 0: intercept-only, model 1: variables at patient level and physiotherapist level (the personality trait dimensions of the BFI, therapists' age and gender). These were entered based on their univariate significance level ( $p < 0.25$ )<sup>13</sup>. All variables were centered around their grand means for interpretable meaning. For model 1, associations were expressed as regression coefficients along with standard errors, 95% confidence intervals and p values. Analyses were performed with complete data and alpha was set on 0.05.

## Results

### Study sample

The BFI questionnaire was returned by 77% of the therapists ( $n = 56$ ). Non-response analysis revealed that responding therapists did not differ from non-responders with regard to gender ( $p = 0.59$ ) but were older ( $p = 0.04$ ). After matching patients with shoulder complaints from the NPCD database with participating physiotherapists, 2,814 patients were included in the study of whom 2,116 had complete data on independent variables (figure 1).



**FIGURE 1.** Flowchart of participating patients and physiotherapists

There was a wide variety (3-100%) in the percentage of missing data on the dependent variable between physiotherapists. This was not correlated to the mean difference in severity of shoulder complaints ( $r = -0.061$ ). 10 physiotherapists did not register severity of the complaint for any patient resulting in 1,013 patients and 46 therapists eligible for further analysis. In table 1 the characteristics of participating physiotherapists are presented.

**TABLE 1.** Characteristics of participating physiotherapists

		<b>Participating therapists (n = 46)</b>
Age, mean (SD)		50 (13)
Gender (%)		
	Male	65
	Female	35
Big Five, mean (SD)		
	Neuroticism	2.40 (0.53)
	Extraversion	3.52 (0.48)
	Agreeableness	3.82 (0.37)
	Conscientiousness	3.74 (0.48)
	Openness to experiences	3.38 (0.47)

Table 2 shows that patients with complete data were different with respect to age, whether it concerned a recurrent complaint and origination of the complaint compared to patients with missing severity of shoulder complaints.

**TABLE 2.** Characteristics of patients with complete and missing data on severity of their shoulder complaints

		<b>Complete data (% (n = 1013))</b>	<b>Missing severity (%) (n = 1103)</b>	<b>P value</b>
Age, mean (SD)		53 (16)	5 (17)	0.01
Gender				0.35
	Male	44	42	
	Female	56	58	
Referral				0.19
	GP	53	56	
	Medical specialist	6	6	
	Direct access	41	38	
Duration of complaint				0.41
	< 1 month	35	33	
	1-3 months	31	30	
	> 3 months	34	37	
Recurrent complaints				<0.001
	Yes	23	33	
	No	77	67	
Origination				0.01
	Acute	29	24	
	Gradual	71	76	

### Factors associated with change in severity of shoulder complaints

Mean severity of shoulder complaints at the start of treatment was 6.5 (sd 1.7, 95% CI 6.4;6.6), mean severity at the end of treatment was 1.8 (sd 2.1, 95% CI 1.7;2.0). During treatment, the severity of shoulder complaints significantly decreased ( $p < 0.001$ ) with 5.0 points (95% CI -5.4; -4.6), adjusted for the patient and therapist variables of model 1. The proportion of total variance explained (intraclass correlation coefficient) in change in severity was 0.88 at patient level and 0.12 at the physiotherapist level meaning that 12% of variance in change of severity of the shoulder complaint was explained by (characteristics of) physiotherapists.

Table 3 presents the results of the univariate analysis of possible predictors of change in severity of shoulder complaints.

**TABLE 3.** Univariate analysis of potential factors associated with change in severity of shoulder complaints (n = 1,013)

Prognostic factors		B	SE	95% CI	p
<b>Patient</b>					
Age		0.008	0.004	0.000;0.017	0.05*
Gender (ref man)	Woman	0.165	0.139	-0.108;0.438	0.24*
Referral (ref GP)	Medical specialist	0.541	0.292	-0.031;1.114	0.06*
	Direct access	-0.021	0.149	-0.313;0.271	0.89
Duration of complaints (ref < 1 month)	1-3 months	0.040	0.168	-0.290;0.370	0.81
	>3 months	0.639	0.166	0.314;0.965	<0.001*
Recurrent complaints (ref no)	Yes	0.358	0.166	0.032;0.683	0.03*
Origination (ref suddenly)	Gradually	0.263	0.152	-0.034;0.560	0.08*
<b>Therapist</b>					
Age		0.010	0.014	-0.017;0.037	0.48
Gender (ref man)	Woman	-0.056	0.349	-0.740;0.628	0.87
Extraversion		-0.436	0.326	-1.076;0.203	0.18*
Neuroticism		0.497	0.292	-0.075;1.069	0.09*
Agreeableness		-0.231	0.423	-1.060;0.598	0.59
Conscientiousness		-0.220	0.321	-0.849;0.409	0.49
Openness		-0.074	0.323	-0.708;0.559	0.82

\*significant at  $p < 0.25$  level

Variables significant at the  $p < 0.25$  level were entered in the multi-level analysis (model 1), which is shown in table 4. It shows that the personality trait extraversion has a significant relationship with change in severity of shoulder complaints. This suggests that therapists who tend to be more energetic and outgoing influence treatment outcome positively. At the patient level, higher age, longer duration and recurrent complaints had a statistically significant relationship with change in severity of complaints and predicted poorer outcome.

**TABLE 4.** Multi-level analysis of factors associated with change in severity of shoulder complaints (n = 1,013)

Prognostic factors		B	SE	95% CI	p
<b>Patient</b>					
Age		0.009	0.004	0.002;0.017	0.01*
Gender (ref man)		0.235	0.123	-0.006;0.476	0.06
Referral (ref GP)	Medical specialist	0.395	0.259	-0.113;0.903	0.13
	Direct access	-0.116	0.132	-0.375;0.143	0.38
Duration of complaints (ref < 1 month)	1-3 months	-0.080	0.151	-0.375;0.215	0.60
	>3 months	0.390	0.152	0.091;0.689	0.01*
Recurrent complaints (ref no)	Yes	0.340	0.150	0.047;0.634	0.02*
Origination (ref suddenly)	Gradually	-0.303	0.138	-0.300;0.240	0.83
<b>Therapist</b>					
Extraversion		-0.567	0.257	-1.071;0.064	0.03*
Neuroticism		0.219	0.239	-0.249;0.687	0.36
Intercept		-5.006	0.190	-5.378;-4.633	<0.001*

\*significant at the  $p < 0.05$  level

## Discussion

The present study suggests that a therapist effect exists in the rehabilitation of patients with shoulder complaints in primary care physiotherapy settings. The physiotherapist explained 12% of variance in change of severity of the shoulder complaint, which on average decreased by 5.0 points. Additionally, the personality trait extraversion showed a significant association ( $p = 0.03$ ) with change in treatment outcome, indicating that therapists who tend to be more outgoing and energetic achieve better treatment results.

The size of the therapist effect found in current study is in accordance with existing literature from the psychotherapy profession and higher than figures found within the field of physiotherapy<sup>3-5</sup>. Since most of these studies were RCTs restricting freedom of variability in treatment options and thereby variety between therapists, a higher therapist effect could indeed have been expected in observational research<sup>16</sup>. One study did allow choice of treatment by therapists but found no effect<sup>4</sup>. However, due to small sample size and thus small variation between therapists, treatment turned out to be limited mainly to manual therapy. Hence this lack of therapist effect was not surprising as Lewis et al. (2010) showed that therapist effect is smaller in this type of therapy than in behavioural treatment strategies<sup>3</sup>.

The result with respect to the influence of personality traits is more difficult to put into perspective. As far as we know, only one study investigated these traits in physiotherapy settings so far; it showed that patients with chronic diseases treated by less neurotic physiotherapists achieved better outcome compared to patients treated by therapists who were less calm, secure and resilient<sup>5</sup>. Univariate analysis in current study also indicated a possible association of neuroticism with outcome. However, in the final model, only extraversion was found to significantly influence severity of complaints. Extraversion includes traits as sociability, assertiveness and positive emotionality. On the introvert-extravert spectrum, we recognise those who get energized by being around other people as more extraverted personalities and those who get energized by being with themselves as introverts. This could be one explanation as to why this trait is positively associated with decrease of complaints; possibly patients sense this way of making contact and get energized themselves to engage actively in their treatment process.

Two studies within the field of psychotherapy specifically investigated the effect of the BIG 5 personality traits on outcome<sup>17,18</sup>. Their findings suggest influence of several personality traits on satisfaction of the patient and on the patient-therapist working alliance. Yet, associations were moderated by duration of the physician-patient relationship, age, medical burden of the patient, the levels of each trait and it was even suggested that the relationship might be non-linear by nature.

In summary, there is scant research on this topic and results are known to interact with many other factors whilst the influence of patient characteristics has, as

yet, even been disregarded<sup>19</sup>. The findings of present study should therefore be seen as a stepping-stone towards more research, in which personality traits deserve to be taken into account.

### **Study limitations**

Limitations of present study include the fact that the physiotherapist recorded patients' opinion on outcome and that 'severity of complaints' is a broad construct. This is one disadvantage of using previously gathered data. However, the same method was used at the beginning and end of treatment, allowing comparison in time. The database from which data were derived for this study, now holds more specific patient reported outcome measures, which is to be preferred.

Also, there was a relatively high number of patients with missing data on severity of complaints. Patients with missing data were younger, more often had a recurrent complaint which more frequently arose gradually. Although the existing body of evidence shows conflicting results regarding these characteristics, current study identified age and recurrent complaints as predictors of outcome, therefore, caution is needed in interpreting our findings. On the other hand, the percentage of missing data on the dependent variable between physiotherapists differed greatly and was not correlated to the mean difference in severity of shoulder complaints. This suggests that missing data is at least partly explained by general poor registration by physiotherapists instead of selectively omitting disappointing results.

Lastly, it is difficult to put the BIG 5 scores into perspective because norm scores barely exist, let alone for a comparable sample of trained professionals. Lack of heterogeneity could be an explanation for not finding an association between personality traits and treatment outcome. This can only be verified through future studies. Nevertheless, one benefit of a cohort study like this is that it does allow variability in other aspects and thus reflects actual practice more accurately; physiotherapists of different practices participated and were free in choice of treatment. Another strength of current study is that data was collected on a large number of patients and we were able to investigate prognostic factors both at the physiotherapist and at the patient level in an attempt to increase our understanding of its interaction. Since neither personality traits nor psychological factors like fear avoidance beliefs were measured at the patient level, we recommend exploring these in future research.

### **Conclusions**

In conclusion, a therapist effect exists in the rehabilitation of patients with shoulder complaints in primary care physiotherapy settings. The physiotherapist explains 12% of variance in change of severity of the shoulder complaint and further investigation of this effect showed that therapists with more extraverted personalities influenced treatment



outcome positively. Seen the complexity of the concept of personality as it is and the multiple interaction effects known in related fields, additional studies are necessary to further explore how characteristics of the physiotherapist influence treatment outcome in patients with shoulder complaints.

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# 7

## **General discussion**



It is increasingly recognised that the multidimensionality characterizing pain in musculoskeletal complaints such as shoulder pain, requires an integrative and personalized approach for its treatment<sup>1</sup>. According to the new movement of 'positive health', this means a shift in focus from illness to health; from fixing the disease to opportunities to increase peoples' functioning and vitality, also with pain<sup>2</sup>. It recognizes six dimensions of equal importance: mental wellbeing, meaningfulness, quality of life, participation, daily functioning and bodily functions<sup>3</sup>. For this reason, clinicians face the challenge that management is about functions, activity, movement, rehabilitation and attitudes rather than the traditional model of diagnosis and medical treatment<sup>4</sup>.

This challenge certainly applies to the management of patients with shoulder pain in primary care, where diagnostic uncertainty exists in combination with the lack of robust evidence for effective treatment.

To explore some leads for improvement, in this thesis, we opted for a pause to reflect on the current management of patients with shoulder pain by physiotherapists and general practitioners. In this final chapter, we will discuss the results presented earlier and make suggestions where we could go from here.

## **I Patients with shoulder pain in primary care**

Shoulder complaints often arise gradually (*chapter 2*) and are frequently considered relatively harmless and 'part-of-the-job'<sup>5</sup>. As a consequence, many patients with shoulder pain already have chronic complaints when they present themselves at the clinician (*chapter 2*). And because of the relatively low number of patients with shoulder pain who access the physiotherapist through direct access (*chapter 2*), the potential influence of the general practitioner on management is considerable.

In accordance with national and international guidelines and opposed to the situation in many other countries, Dutch general practitioners do not very often refer patients to secondary care (*chapter 2 & 3*), which is to be appraised. However, management by GPs and physiotherapists in primary care itself draws attention due to a rather substantial rate of applied interventions in patients with non-traumatic shoulder complaints (*chapter 3*). The tendency toward action rather than inaction by clinicians, referred to as commission bias, is an area for improvement in the process and content management of shoulder pain.

### **Process of care**

In two thirds of the patients with shoulder pain referred by the general practitioner for physiotherapy, the referral was given during the first consultation (*chapter 2*), which is not in line with the wait-and-see policy advocated by the current clinical guideline for general practitioners<sup>6</sup>. It should be noted however, that early proactive treatment is known to lead to decrease pain intensity, improve activity levels and reduction of

chronic problems<sup>5</sup>. In addition, facilitation of timely access to care contributes to a positive patient experience and satisfaction<sup>7</sup>. Factors determining referrals amongst clinicians have been expounded upon and were found to be exceedingly complex<sup>8</sup>.

A high rate of referrals between clinicians could indicate willingness to collaborate in the patient's best interest. In practices performing musculoskeletal ultrasound, many requests come from GPs and physiotherapists performing musculoskeletal ultrasound tend to refer more quickly and specifically for consultation with a GP in case of conflicting findings (*chapter 5*). At the same time, a high rate of referrals between clinicians could also suggest insecurity on the right management including keep/refer decision-making. In patients with severe or long-lasting complaints, GPs and physiotherapists seem to start treatment and refer for other treatment at the same time (*chapter 3*). Previous research showed that information on the keep/refer aspect of care is lacking in most guidelines<sup>9</sup>.

### **Content of care**

The tendency toward action rather than inaction by clinicians, is a likely reason why general practitioner and physiotherapist treatment contain a myriad of different interventions simultaneously and correspond less with each other in subgroups of patients with shoulder pain characterized by persisting complaints or when pain is prominent (*chapter 3*). Also from the literature it is known that when patients report considerable hindrance, clinicians will more often consider an active treatment option<sup>10</sup>.

Less obvious but probably not less important, commission bias can also be recognized in the finding that both clinicians indicate they do not pay too much attention to giving advice and to the psychosocial aspect(s) of the complaint, more so in patients with persisting complaints (*chapter 3*). Research reveals that patient education was viewed as important by patients but not physiotherapists. This ambivalence may raise the issue of how physiotherapists see their role and scope of practice and what are considered 'skills' for good treatment<sup>11</sup>.

### **Limitations**

A potential downside concerning the results presented in this paragraph is that data are partly based on clinical vignettes and partly on electronic health records. Clinical vignettes measure stated rather than actual practice with the risk of socially desirable answers. Another disadvantage is that neither method provides the possibility of in-depth questions and nuanced responses, thus sometimes withholding us the opportunity for evenly nuanced conclusions and recommendations.

### **So where do we go from here?**

In the light of the results above and our aim towards positive health, I suggest that for primary care clinicians, taking the role of coach and making time for a good conversation is the first step forward. Providing knowledge is important for changing beliefs, self-efficacy and thus treatment outcomes<sup>12</sup>. Models on lay perspectives, i.e. how people



think about health, show that patients need to know about the variability and development of symptoms as it affects their self-care and care-seeking behaviour<sup>13</sup>. Self-management is an outcome of any successful treatment as it empowers a person to cope with the dynamic process of wellness and illness. Combined with the professional perspective, such empowerment opens up the possibility to co-create effective, personalized management of shoulder pain.

### **Recommendations for clinical practice and research**

First of all, awareness of clinicians is required on the pitfall of being inclined to act, whether this concerns referrals to others or interventions like pain medication or therapy. Listening and giving advice is not only just as good an intervention; it is an indispensable part of treatment.

By educating patients, clinicians also facilitate preventive treatment strategies for those presenting with mild symptoms and -as yet- few limitations in function and participation. This is especially important in absence of clear underlying aetiological mechanisms.

As a step beyond bringing together members from different disciplines, an integrated education of professions could be a fruitful path to deepen understanding of and build trust in each other's knowledge and abilities, thereby strengthening collaboration in primary care<sup>7,8,14,15</sup>.

Because current thesis does not focus on the effects of earlier versus later referral and the capability of primary care clinicians to do so, this multifaceted and very important issue remains for further investigation. More specifically, concerning the timing of referrals, it is important to address the question why a discrepancy between recommended and actual care exists, and not put aside the accumulated clinical experience of general practitioners.

Future research should also incorporate both the perspective of patients and clinicians in an attempt to identify more precisely whether it is the patient who needs more education on his or her complaints or the clinician on the importance of educating the patient.

## **II Diagnosis and prognosis**

Previous research extensively points out the relatively poor outcome for patients with shoulder pain<sup>16,17,18</sup>. Our study added on that by showing that 37% of patients referred for physiotherapy returned to their GP afterwards (*chapter 2*). This close observation of pain-related healthcare utilization beyond the treatment episode is less common but may indicate suboptimal treatment response, the presence of more complex needs or unwarranted escalation of care<sup>19</sup>. As the socio-economic impact as a result of

musculoskeletal pain is rising<sup>20</sup>, early assessment of patients at risk for downstream healthcare use is important to focus limited health care resources towards patients who are most in need and identify those who require coordination of multiple providers<sup>19,21,22</sup>.

In other words, modern clinical practice needs a way forward that reduces suffering and costs. Traditionally, diagnosis was considered the key component and guide for treatment. Recent research points in the direction of the influence of a multiplicity of biological, clinical and psychosocial factors that inform the likelihood of future outcome for each patient. Prognostic classification provides a framework that incorporates this individuality<sup>23</sup>.

### **Musculoskeletal ultrasound**

Musculoskeletal ultrasound could possibly contribute to this framework. Our study on the uptake of musculoskeletal ultrasound showed that one in six physiotherapy practices in the Netherlands offer this possibility (*chapter 4*). Of the questioned physiotherapists working with musculoskeletal ultrasound, 71% indicated they focused on patients with shoulder pain. More specifically, in this group they used it for detecting tissue damage and for making a diagnosis. These findings emphasize the professional need for help in 'diagnosing' patients with shoulder pain.

A recent study explored the feasibility of musculoskeletal ultrasound to classify treatment strategy based upon the therapeutic consequences instead of traditional diagnostic labels<sup>24</sup>. It showed that the agreement between physiotherapists and radiologists was indeed higher in stratifying patients with shoulder pain into these new treatment related categories. This was especially true for 'referral to secondary care'; the categories 'indication for physiotherapy' and 'watchful waiting' showed moderate agreement between professions. It was concluded that in future musculoskeletal ultrasound might be of value at first consultation to facilitate keep/refer decision-making but that further research to assess the consequences of this new subgrouping for clinical care is required first.

### **Prognostic factors and research**

In our systematic review on prognostic factors of outcome in patients with shoulder pain, strong evidence was found that higher pain intensity, concomitant neck pain and a longer duration of symptoms at baseline predict poorer outcome in primary care settings (*chapter 5*).

Evidence now suggests that on average, musculoskeletal conditions including shoulder pain share a comparable clinical pathway despite differences in aetiology and presentation<sup>17,25,26</sup>. In most trials, symptom improvement mainly occurred over the first three to six months and specific treatments used were only modestly and equally effective<sup>17,26-28</sup>. There too is view that some factors predicting outcome may be similar regardless of pain site<sup>17,19</sup>. Multisite pain, high pain intensity, high functional disability,

long pain duration at baseline, somatisation, higher age and presence of previous pain episodes were mentioned in two systematic reviews on this topic<sup>22,25</sup>.

### **Limitations**

Our meta-analysis provides us with the scientifically most objective evidence for a clear and thus workable set of prognostic factors. Our survey provides us with less robust yet detailed information on the opinions and experiences of clinicians. A disadvantage of both studies is that they focus on the part of treatment by the clinician. Patients' thoughts and beliefs on a switch to prognostic instead of diagnostic based treatment and use of musculoskeletal ultrasound, would have added to a more complete image.

### **So where do we go from here?**

It is very interesting that our findings in patients with shoulder pain match the brief set of generic prognostic factors already acknowledged. For patients with shoulder pain without a clear biomedical diagnosis (e.g. suspicion of full rotator cuff tear), this similarity supports targeting treatment based on prognostic factors rather than pain site and diagnosis alone.

That being said, reservations from existing literature mentioned above alert us not to replace diagnosis for its own sake by classification on future outcome for its own sake<sup>29</sup>. With musculoskeletal ultrasound, only the category 'referral to secondary care' showed higher agreement between clinicians and this is precisely the group of patients in which least uncertainties exist and traditional diagnostic labels suffice. Considering this and the costly investment of equipment and education, current prevalence of musculoskeletal ultrasound is already quite extensive.

For patients presenting with a more complex complaint (e.g. those with a longer duration of complaints, a gradual onset, concomitant pain in other areas and/or persisting pain), a more comprehensive approach is required. Still, the question is whether the changing nature of the constellation of symptoms in clinical practice can be caught in the prognostic approach<sup>23</sup>. Also a prognostic model needs new input, by monitoring patients over time, to reflect the situation of the patient as well as possible and modify treatment correspondingly.

All things considered, I think that for a small group of patients (e.g. suspicion of full rotator cuff tear) we shouldn't complicate things while for the other, large group of patients, we should acknowledge that management isn't simple. Whether it concerns usage of musculoskeletal ultrasound or a prognostic model, input by the patient is essential.

### **Recommendations for clinical practice and research**

For patients with a traumatic cause of shoulder pain (e.g. suspicion of full rotator cuff tear), musculoskeletal ultrasound may be used to verify tissue damage to facilitate appropriate referral to secondary care. For those patients without a clear medical

diagnosis, when using musculoskeletal ultrasound, findings should at least always be placed in the clinical context based on physical examination and especially history taking.

In patients without a clear biomedical diagnosis, GPs and physiotherapists should be very aware that concomitant neck pain, long duration at the start of treatment and high pain intensity are important drivers of (non-)recovery. More specifically, presence of (one of) these factors requires extra attention on keep/refer decision-making and prioritizing of patient education.

There seems to be promising consensus on generic prognostic factors. Still the majority of studies on this topic concentrated on patients with low back pain. For this reason, there is a need to enlarge the body of evidence for prognostic factors in other anatomical pain sites to assess true generality.

Prognostic models appear to match our broader aim towards health and vitality, yet its usefulness for clinical care is largely unknown. Evidence for such new categorisations is indispensable, as is information on appropriate measurement intervals. What is more, not only clinicians but also patients are used to treatment based on diagnosis. In my opinion, it would be worthwhile to investigate how they feel about refraining from a diagnosis and targeting treatment based on prognosis; 'clinical usefulness' is also about the patients' trust in and mandate for the proposed treatment.

### **III Context factors**

"In the absence of effective treatment, clinicians have always understood that prognosis can be highly variable in persons with a particular diagnosis"<sup>23</sup>.

This mystery 'variable' is likely endorsed by many GPs and physiotherapists in clinical practice. It concerns factors other than specific treatment effect including characteristics related to the patients, practitioners, setting and the way treatments are designed and delivered<sup>26,28,30</sup>. Non-specific or context factors have been investigated within the field of psychotherapy for a longer time and shown to account for between 0 to 18% of variability in patient outcomes<sup>31</sup>. More recently they have started to get recognized in research on patients with musculoskeletal complaints too. Context factors might explain the heterogeneity between responses such as expectations regarding treatment<sup>27</sup>. At the same time, these factors are an explanation why across large numbers of trials, conditions and treatment strategies a similar pattern of improvement emerges. The size of the influence of context factors is largely unknown but it is suggested that it dominates any individual response to treatment<sup>26,30,32</sup>.

## **Influence of the therapist**

In an attempt to unravel some of the mystery, we investigated first whether a therapist effect exists in physiotherapists treating patients with shoulder pain and second if personality traits of the physiotherapist influence patients outcome. It was found that the physiotherapist-effect explained 12% of variance and that being more extravert was associated with better treatment results (*chapter 6*).

Literature on therapist effects in primary care settings is very scarce and on the influence of intrinsic factors non-existing. One study on patients with low back and neck pain compared three RCTs in which a wide variation of treatment types was applied. It found that less than 2% of the total variance in outcome was explained by treatment across trials whereas therapist effect was found to account for 3-7% of the variance<sup>33</sup>. The only study on the influence of personality traits of the physiotherapist on outcome (in patients with chronic complaints) confirmed inter-therapist variation of around 7%<sup>34</sup>. In addition, their findings carefully indicated that less neurotic therapists seemed to influence outcome positively. It is also known that a therapist effect is more pronounced in delivering psychosocial and behavioural treatment strategies than in, for example, manual therapy<sup>33</sup>. Psychosocial and behavioural treatments strategies are particularly required in patients presenting with long-lasting complaints, such as most patients with shoulder pain.

## **Limitations**

As a consequence of being explorative, the methodology of this research is not flawless. By nature, personality traits are complex constructs; hence there are many ways to measure them. Combined with a lack of research on therapists' effect on outcome, the specific findings of present study on the influence of being extravert should be interpreted with care and mainly considered an incentive for further research. Furthermore, part of the findings is based on previously gathered data with the disadvantage of not being able to influence its design. For the current study in particular, this shortcoming concerned that therapists determined treatment outcome based on input by the patient while no direct assessment of the outcome by patients themselves was registered.

## **So where do we go from here?**

It seems that as clinicians we arrived at a time and place where we want to recognize we not only make interventions, but *are* part of the intervention as well. Although it is largely unknown which context factors are of importance, preliminary research in primary care settings point in the direction that context factors at the level of the therapist are operational, as they are known to be in other professions. Also, multi-level analysis is increasingly used to correct for such therapist effects<sup>35</sup>. And it makes sense that for persisting musculoskeletal pain such as shoulder pain, besides generic prognostic factors (common across pain sites) also factors common across therapies impact clinical outcome. Acknowledging this complexity suits the inclusive goal of positive health and

opens the door for freely exploring which and how context factors play a role in the management of patients with musculoskeletal diseases in general and perhaps with shoulder pain specifically.

### **Recommendations for clinical practice and research**

First and foremost, additional studies need to confirm the results on existence of a therapist effect. By doing so in various settings (general practice, physiotherapy practice) and in various groups of patients also the necessary data are collected to gain insight in its effect size.

When such an effect common to most or all physiotherapy / general practitioner encounters is reinforced, the next step is to investigate which factors might contribute substantially. Previous research identifying which factors explain therapist effect in primary care is mostly limited to age, experience and education and shows conflicting results and small effects<sup>36</sup>. Based on psychotherapy common factors and clinical experience in physiotherapy, a first initiative towards a common factors model in physiotherapy proposes an exploration of therapists' pain perceptions and beliefs<sup>28</sup>. Considering our aim for opportunities to increase peoples' functioning and vitality also with pain, this seems a wise next step.

Of course, characteristics of the therapist do not stand-alone. Interaction with many other variables at different levels (patient, setting, patient-therapist interaction) seems obvious and will be a true challenge to unravel in the later future.

Our findings do not yet offer specific recommendations to develop desired behaviour by clinicians. However, who better than physiotherapists and general practitioners themselves could deliver ideas and guide what best to investigate? Besides asking the question 'how might I impact outcome?' in private, discussions with colleagues or in professional intervision groups might yield valuable input for further scientific research based on - years of - clinical experience.

## **Final reflections**

The final paragraph of this thesis on 'management of patients with shoulder pain in primary care' returns to the patient. A patient with pain and impairments, coping as best he can. Consulting a clinician, helping as best he can.

Appreciation of the mutual good intentions, to me, seems the very starting point of every patient-clinician working alliance towards the desired outcome. Obviously, this outcome is 'good health'. Right here though starts the teamwork, because what is good health is very individual.

GPs and physiotherapists are highly trained medical professionals with ditto responsibilities. As seen in this thesis, in treating patients with shoulder pain they should

be aware of: the importance of timely referrals; the pitfall of wanting to do something thereby forgetting that giving advice is just as good an intervention; the lack of uniformity in diagnostic labelling even with the help of add-on techniques like MSU; the switch from diagnosis to prognosis based treatment including specific as well as generic prognostic factors; and finally the influence they themselves have on outcome. All things considered, one would easily forget that every clinician's role is also to listen as a human being to the human being in front of him right there and then.

Pain demands attention; a patient wants to be heard. They need a skilled observer who helps them identify what is *their* main problem and formulate what it is *they* want and someone to ask that same question time and time again. Only this way, the patient is the manager of his own healing process. Which matches the concept of health as the ability of people to adapt and take control, in the face of physical, emotional and social challenges of life.

In a way, it parallels the macro process of management of patients with shoulder pain starting with the question: 'where are we now?' and continues to evaluate itself as a guide towards where we want to go. A more individualized approach with focus on the patients' whole and unique experience including that of pain suits the seemingly natural capricious course of shoulder complaints. While this approach almost inevitably seems to lead to a higher demand on the already pressurized time patient and clinician have together nowadays, in the long run it is more likely to save time and costly interventions than continuing on the same track. And last but not least, lead to health and vitality.

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# Summary



Shoulder pain is one of the most common presentations of musculoskeletal pain.

A definition of shoulder pain is not so easy though. Uniformity in diagnostic labelling is complex because of the weak correlation between structural factors and clinical presentation. Also, meta-analyses on the diagnostic value of physical examination tests contend that no single test is pathognomonic for any specific diagnosis.

Next to difficulties in making a diagnosis, in recent years, a vast number of meta-analyses have revealed that no robust evidence is available that any intervention leads to statistically significant or clinically relevant benefits over one another or placebo.

When more research on diagnosis and interventions does not seem to add to better outcome, we need to decide wisely on the way forward. Therefore, in this thesis, we opt for a pause for reflection on the current management of shoulder pain in primary care. In **chapter 1**, the rationale to do so is described in more detail.

The aim of this thesis is to explore some leads to improve care for patients with shoulder pain by physiotherapists and general practitioners. It addresses the question ‘where are we now?’, which we pose in three domains: process and content of care, diagnosis and prognosis and contextual factors.

## **I Process and content of care**

**Chapter 2** describes the characteristics and current care of patients with shoulder syndromes in primary care general practice and physiotherapy practice. In addition, this study investigated whether there are differences between patients treated by the general practitioner, patients who were referred by the general practitioner for physiotherapy and patients who came to the physiotherapist via direct access. The main conclusions were that there is a considerable group of patients with persistent complaints, that in the majority of patients the complaints developed gradually and that many patients waited a long time before visiting a healthcare provider. It also emerged that patients who were referred for physiotherapy were prescribed less medication but more often consulted a general practitioner than patients who were only treated by the general practitioner. Contrary to the recommendations in the guideline, the referral for physiotherapy was often given in the first consultation.

In **chapter 3**, the treatment of four common types of shoulder complaints by general practitioners and physiotherapists was compared in order to gain more specific insight in what goes well and where there are possibilities for improvement. This vignette study showed that the extent to which general practitioners and physiotherapists agree

depends on the type of complaints that the patient presents. In the case of subacromial complaints or acute ruptures of the rotator cuff, general practitioners and physiotherapists generally agreed on best treatment. The treatment of patients with capsulitis adhesiva, especially when these complaints have been around for some time, showed much more variation both within and between the groups of care providers. In general, both general practitioners and physiotherapists seemed to have a tendency to intervene, especially when pain was prominent or with persistent complaints. Meanwhile, less attention was paid to the psychosocial aspects of the complaint.

## II Diagnosis and prognosis

In **chapter 4**, a questionnaire was used to investigate the current prevalence of musculoskeletal ultrasound in Dutch physiotherapy practices and what the experiences are of physiotherapists who use it. This study showed that one in six physiotherapy practices offer musculoskeletal ultrasound. Furthermore, it appeared that physiotherapists mainly used it in patients with shoulder complaints, especially when tissue damage was suspected, to make a diagnosis and to determine the choice of treatment. Physiotherapists said the biggest advantage of musculoskeletal ultrasound is that they are better able to make a diagnosis. The main disadvantage, they indicated, is that the interpretation is difficult and the risk that the findings of musculoskeletal ultrasound are or become unrelated to the history and the results of the physical examination.

**Chapter 5** provides an overview of the literature and summarizes which factors are already known to be associated with the outcome of treatment in patients with shoulder complaints in primary and secondary care and in the workplace. This study showed that there is strong evidence that a higher intensity of shoulder pain, concurrent neck complaints and longer duration of the complaints have a negative influence on the outcome of the treatment in primary care. In secondary care, strong evidence was found for the relationship between higher disability or a previous episode of shoulder pain and a worse outcome of the treatment.

## III Context factors

In **chapter 6** it was investigated whether there is a therapist effect and whether characteristics of the physiotherapist's personality influence the outcome of the treatment. This research showed that there is indeed a therapist effect and that there is a relationship between the personal trait extraversion and the treatment outcome. Patients treated by physiotherapists with a more outgoing personality, that is, those who

generally get energy from interacting with other people, had better treatment outcomes.

**Chapter 7** provides an overall discussion of the findings of this thesis. It can be concluded that in all three domains investigated there seem possibilities to improve the management of patients with shoulder pain in primary care. Therefore, this chapter also comprises several recommendations for clinical practice and research to guide where we could go from here.





# Samenvatting



Schouderpijn is een van de meest voorkomende vormen van musculoskeletale pijn.

Een definitie van schouderpijn is echter niet zo eenvoudig. Uniformiteit in diagnostische classificaties is complex vanwege de zwakke correlatie tussen weefselschade en de klachten waarmee de patiënt komt. Ook laten diverse meta-analyses naar de diagnostische waarde van lichamelijk tests zien dat geen enkele test pathognomonisch is voor een specifieke diagnose.

Naast diagnostische onzekerheid, heeft een groot aantal meta-analyses de afgelopen jaren aangetoond dat er geen sterk bewijs is dat bepaalde interventies tot statistisch significante of klinisch relevante betere resultaten leiden dan andere interventies of placebo.

Als meer onderzoek naar diagnostiek en behandeling niet leidt tot een beter resultaat, moeten we onszelf bevragen over de te varen koers. Daarom stellen we in dit proefschrift een pauze voor om te reflecteren op de huidige aanpak van schouderpijn in de eerste lijn. In **hoofdstuk 1** wordt dit voorstel nader uitgewerkt.

Het doel van dit proefschrift is om aanknopingspunten te vinden om de zorg voor patiënten met schouderpijn door fysiotherapeuten en huisartsen te verbeteren. We doen dit door de vraag ‘waar zijn we nu?’ te stellen in drie domeinen: proces en inhoud van zorg, diagnose en prognose en contextuele factoren.

## I Zorgproces

**Hoofdstuk 2** beschrijft de kenmerken en het huidige zorggebruik van patiënten met schouder syndromen in de eerstelijns huisarts- en fysiotherapiepraktijk. Daarnaast werd in deze studie onderzocht of er verschillen zijn tussen patiënten die door de huisarts behandeld worden, patiënten die door de huisarts worden doorverwezen voor fysiotherapie en patiënten die via directe toegang bij de fysiotherapeut komen. De voornaamste conclusies waren dat er een behoorlijke groep patiënten is met persisterende klachten, dat bij de meerderheid van de patiënten de klachten zich geleidelijk ontwikkelen en veel patiënten lang wachten voordat zij een zorgverlener bezoeken. Ook kwam naar voren dat patiënten die werden verwezen voor fysiotherapie minder medicatie kregen voorgeschreven maar vaker op consult komen dan patiënten die enkel door de huisarts behandeld werden en dat de verwijzing in tegenstelling tot de aanbevelingen uit de richtlijn, vaak gegeven werd in het eerste consult.

In **hoofdstuk 3** wordt de behandeling van vier veelvoorkomende typen schouderklachten door huisartsen en fysiotherapeuten naast elkaar gelegd om

specifieker inzicht te krijgen in waar knelpunten zitten in de behandeling van patiënten met schouderklachten in de eerste lijn. Deze vignette studie liet zien dat de mate waarin de zorg van huisartsen en fysiotherapeuten overeen komt afhankelijk is van het soort klachten waarmee de patiënt komt. Bij subacromiale klachten of acute rupturen van de rotator cuff waren huisartsen en fysiotherapeuten het over het algemeen met elkaar eens. De behandeling van patiënten met capsulitis adhesiva en dan met name wanneer deze klachten al langer bestaan, liet veel meer variatie zien zowel binnen als tussen de groepen zorgverleners. In het algemeen leken zowel huisartsen als fysiotherapeuten de neiging te hebben om veel te interveniëren, vooral wanneer pijn op de voorgrond is of bij persisterende klachten. Daarentegen besteedden ze weinig aandacht aan de psychosociale aspecten van de klacht.

## II Diagnose en prognose

In **hoofdstuk 4** is door middel van een vragenlijst uitgezocht welk aandeel van de Nederlandse eerstelijns fysiotherapiepraktijken musculoskeletale echografie aanbiedt en wat de ervaringen zijn van fysiotherapeuten die dit gebruiken. Hieruit bleek dat één op de zes fysiotherapiepraktijken de mogelijkheid heeft om een echo te maken. Verder bleek dat fysiotherapeuten echografie vooral gebruikten bij patiënten met schouderklachten en dan met name bij verdenking op weefselschade, om een diagnose te stellen en om de keuze van de behandeling te bepalen. Als grootste voordeel van echografie noemden fysiotherapeuten dat zij beter in staat zijn een diagnose te stellen. Het grootste nadeel vonden zij dat het beoordelen van echo's moeilijk is en het risico dat de bevindingen op de echo niet gerelateerd zijn of worden aan de anamnese en de resultaten van het lichamelijk onderzoek.

**Hoofdstuk 5** betreft een overzicht van de literatuur en vat samen van welke factoren reeds bekend is dat zij geassocieerd zijn met de uitkomst van de behandeling bij patiënten met schouderklachten in de eerste en tweede lijn en op de werkvloer. Uit dit onderzoek bleek dat er sterk bewijs is dat een hogere intensiteit van schouder pijn, bijkomende nekklachten en langere duur van de klachten een negatieve invloed hebben op het resultaat van de behandeling in de eerste lijn. In de tweede lijn werd sterk bewijs gevonden voor de relatie tussen meer beperkingen of een eerdere episode van schouder pijn en een slechter resultaat van de behandeling.

## III Contextuele factoren

In **hoofdstuk 6** is nagegaan of er een therapeuteffect bestaat en of kenmerken van de persoonlijkheid van de fysiotherapeut van invloed zijn op het resultaat van de

behandeling. Dit onderzoek toonde aan dat er inderdaad een therapeutefect bestaat en dat er een verband is tussen het persoonskenmerk extraversie en het resultaat van de behandeling. Patiënten die werden behandeld door fysiotherapeuten met een meer extraverte persoonlijkheid, dus zij die over het algemeen energie krijgen door de omgang met andere mensen, haalden betere behandelresultaten.

**Hoofdstuk 7** bevat een algemene discussie over de bevindingen van dit proefschrift. Geconcludeerd kan worden dat er in alle drie de onderzochte domeinen mogelijkheden lijken om de behandeling van patiënten met schouderpijn in de eerste lijn te verbeteren. Daarom bevat dit hoofdstuk ook verschillende aanbevelingen voor de klinische praktijk en wetenschappelijk onderzoek om te bepalen hoe we verder kunnen gaan vanaf hier.



## **About the author**





Margit Kooijman completed her secondary education in 2000 at the Montessori Lyceum Herman Jordan in Zeist. After travelling the world for a while, she studied physiotherapy at the Hogeschool van Utrecht and graduated in 2005. Subsequently, she started her master's degree in Human Movement Sciences at the Vrije Universiteit Amsterdam and graduated in 2007 with a specialization in sports psychology.

Directly after that, she started her working career as a junior researcher at NIVEL (Netherlands Institute for Health Services Research) in Utrecht and was involved in research on physiotherapy health services use. Working here for some time, she longed to combine her research work with performing clinical care. Looking for a position, she was hired as a lecturer at the postbachelor education Master Specialized Physiotherapy at Avans+ Breda. Here she taught applied statistics and research skills and helped students conduct research in their own private practices. While working as a researcher and lecturer, she also started a position as a physiotherapist at OCA Amsterdam Zuid/Revanu in Amsterdam; a rehabilitation clinic in which interdisciplinary (primary and secondary) care was delivered. Her work at NIVEL enriched with her experiences as a clinician has resulted in this PhD thesis.

This thesis was completed long after leaving NIVEL in 2014; following major life events she combined writing the last parts of this thesis while starting a rigorous education in integrated psychotherapy. Since 2018, she works in her own practice 'Traversum' ([www.traversum.nl](http://www.traversum.nl)). Seen her experience, she especially welcomes clients suffering from chronic pain who wish to understand its origin. In her approach, the wisdom of the body is utilized to help each person find his or her own possibilities to explore its meaning and increase well-being. Recently, with her practice she joined the holistic health center 'de Vrijstad' in Culemborg, a place where physical and psychological care, both regular and complementary is provided ([www.igcdevrijstad.nl](http://www.igcdevrijstad.nl)). Their goal is to support and strengthen the development and individuality of each person. Trust in the strength and resilience of every person is central to their care provision. From a broad perspective, they focus on health and vitality.

Margit lives with Robin and their baby-daughter Filippa in the ecological-area of Culemborg. For now, most of her time she spends being a mother. In due time, next to working as an integrated psychotherapist, her longing is to join a research group in bodymind medicine to contribute to more understanding and advanced treatment for those who live with pain.





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