Non-traumatic Arm, Neck, and Shoulder Complaints in General Practice

Incidence, Course and Management

ANITA FELEUS

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Incidence, Course and Management

Niet-traumatische klachten aan arm, nek, en schouder in de huisartsenpraktijk
Incidentie, beloop en beleid

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General introduction

BACKGROUND

Complaints of the arm, neck and/or shoulder are very common in Western societies[1-5]. In the Netherlands the 12-month period prevalence in the general population was estimated at 31.4% for neck pain, 30.3% for shoulder pain, 11.2% for elbow pain and 17.5% for wrist or hand pain. About 30% of those with pain in the neck or upper extremities reported limitations in daily life, and 16-20% of those with work reported sick leave due to these complaints during the previous 12 months. About 30-40% of the respondents with pain reported to have had contact with a general practitioner (GP) due to musculoskeletal pain at the arm, neck or shoulder, in the previous 12 months[3]. A study in Norway reported that 45% of adults experiencing non-inflammatory musculoskeletal pain consulted a GP during the previous year[6].

Reported symptoms in this region include pain in rest or when active, tingling, stiffness, numbness, cold feeling in shoulder, arm, hand, and less hand coordination[7,8]. The reported functional limitations can be diverse, ranging from difficulties with opening a jar, getting dressed, or carrying a bag, to difficulty with sleeping due to pain or tingling. Sometimes the problems are so limiting that it is impossible to perform work tasks.

For non-traumatic arm, neck and shoulder complaints many names and classification systems are available[9,10]. In these classifications a distinction is usually made between specific (such as epicondylitis, carpal tunnel syndrome) and non-specific diagnoses.

In 2000, the Health Council of the Netherlands reported on the current level of knowledge on repetitive strain injury[7]. The diagnostic subgroups mentioned in this report were mainly based on the Saltsa report[8]. In this latter report, the term upper extremity disorders (specific or non-specific) is used. The authors developed case definitions for 11 specific disorders and were based on a time rule (symptoms present now, or on at least 4 days during the last 7 days), the symptoms (history taking) and a physical examination. Furthermore, criteria were formulated to determine the extent of work-relatedness.

In 2001 we started the KANS study that is described in this thesis. It is a large cohort study on patients who consulted their GP with non-traumatic arm, neck and shoulder complaints. The diagnostic tests and criteria as proposed in the Saltsa report were not feasible to apply in our cohort study in a general practice setting. Additionally, the Saltsa report primarily focuses on workers, whereas the GP is consulted by patients both with and without employment.

The GPs participating in the KANS study made their diagnoses as in everyday clinical practice, and recorded the diagnosis of eligible patients.

In 2004, a Dutch multidisciplinary consensus on terminology (CANS model) was reached among health care professionals to define upper extremity musculoskeletal disorders. The objective was to help professionals classify patients unambiguously and to improve communication amongst health care workers. In this consensus many disciplines of care providers participated, including GPs and occupational physicians. The consensus was not especially focused on workers. Therefore we decided to classify the recorded diagnoses by the GP according to the terminology of the CANS model[11].

Incidence

In the Netherlands virtually everybody is registered with a GP (who, acts as a gatekeeper) and refers patients to other care providers within the primary, secondary or tertiary care. Therefore, the GP is usually the first person to be consulted when seeking medical care.

The availability of incidence estimates of patients consulting a GP with complaints of neck and upper extremity is limited [12-14]. A recent study on arm, neck, and shoulder complaints in general practice reported an incidence of 66 consultations per 1000 person-years, attributable to a new complaint or new episode of a complaint[12]. Here, trauma patients were also included.

No data are available on the incidence of arm, neck and shoulder complaints with a non-traumatic onset.

Incident consultation rate in general practice can give a reasonable reflection of the number of people seeking medical care due to these complaints.

Course

Evidence on the clinical course of arm, neck, and shoulder complaints and the factors that may be associated with good or poor prognosis is growing. Until now, site-specific research in general practice reported on predictive factors in complaints located at neck[15] neck-shoulder[16], shoulder[17,18], or elbow[19,20]. However, studies in the general population showed that in 50% of the cases, the complaints are not restricted to a single site[3,21], and prognostic indicators may not be site-specific. Regarding the possible prognostic variables, only the more recent studies have included a large range of patient, complaint and psychosocial variables[16,17,19]. Furthermore, the heterogeneous population of a general practice comprises patients with and without employment. Until now the evaluation of physical and psychosocial work variables was mainly restricted to studies performed in specific occupational settings[22-25] and is scarce in primary care[20].

Non-recovery may be explained through the cognitive-behavioural oriented model for persistence of pain, validated in chronic low back pain[26]. In this model, kinesiophobia (also known as fear of movement/(re)injury) leads to avoidance behaviour resulting in hypervigilance to bodily sensations, followed by disability, disuse and depression, which may lead to a vicious circle of fear and avoidance in patients experiencing pain.

Studies in primary care on acute low back pain and osteoarthritis have confirmed the relationship between fear avoidance and disability[27-29]. However, in non-traumatic complaints of the arm, neck and shoulder little is known about the degree of kinesiophobia and its association with the development of chronic complaints[26,29].

Management

After the first consultation for a non-traumatic complaint of the arm, neck, or shoulder management is initiated and can vary from information and 'wait and see', to referral and prescriptions of medication. In relation to these complaints, guidelines issued by the Dutch College of General Practitioners are available for patients diagnosed with epicondylitis and shoulder complaints only[30,31]. These guidelines reflect the state of the art in medical science.

However, no studies have reported on management of the total range of complaints, including the group with non-specific diagnoses. Comparisons of management of the different diagnostic groups (such as shoulder impingement, carpal tunnel syndrome, epicondylitis, and non-specific neck-shoulder pain) are also lacking.

Management may vary both between and within diagnostic groups. No studies have evaluated the indicators that may contribute to the variation in management of these complaints.

Although we expect that some of this variation may be explained by the diagnosis, corresponding natural course and recommendations in the available guidelines, other variables may also play a role in management choices.

In other study populations, patient and complaint characteristics previously reported to be associated with management options are distress, poor perceived health, age and gender[32-34]. In addition, the GP characteristics including gender, years of experience, and type of practice, have also been reported to influence management decisions[35,36].

OBJECTIVES OF THIS THESIS

This thesis focuses on the incidence, course and management in non-traumatic arm, neck and shoulder complaints in general practice. The objectives are:

Incidence

- To estimate the 12-month incidence of non-traumatic arm, neck, and shoulder complaints in Dutch general practice.

Course

- To evaluate the clinical course of non-traumatic arm, neck and/or shoulder complaints in general practice and to identify predictors of non-recovery.
- To examine the degree of kinesiophobia in patients with non-traumatic arm, neck, and shoulder complaints in general practice.

Management

- To determine management up to 6 months after the first consultation, in patients consulting the GP with a new episode of non-traumatic arm neck and shoulder complaints.
- To evaluate the associations of diagnosis, patient, complaint, and GP characteristics with five common management decisions (i.e. additional diagnostic testing, prescription of medication, applying a corticosteroid injection, referral for physiotherapy and referral for medical specialist care) in patients with non-traumatic arm, neck, and shoulder complaints in general practice.

OUTLINE OF THIS THESIS

Chapter 2 presents the results of an incidence study of non-traumatic arm, neck and shoulder complaints in 13 general practices, based on registration according to the International Classification of Primary Care (ICPC)[37]. In addition to the frequent use of disease or region-specific code registration (such as 'epicondylitis', 'shoulder symptom') arm, neck and shoulder complaints registered under non-region-specific codes (such as 'muscle pain') are also included.

In the following chapters data from a prospective cohort of patients with a new episode or new non-traumatic complaint of the arm, neck, and/or shoulder were used to answer the research questions.

Chapter 3 describes the 6-month clinical course and identifies prognostic indicators of non-recovery for both the total population and the subgroup of those who are employed. Additionally, the additive value of the final model is compared with the overall estimated prognosis by the GP alone.

In **Chapter 4**, the degree of kinesiophobia in the cohort and associated variables is determined. In the subgroup of patients who do not recover in the preceding 12 months, possible change over time is evaluated.

Chapters 5 and 6 focus on the management of non-traumatic arm, neck and shoulder complaints. In Chapter 5, management up to 6 months after the first consultation is evaluated and management differences between diagnostic groups are determined. Chapter 6 continues by investigating which variables might explain variation in management decisions. Therefore the associations of the diagnosis and the patient, complaint and GP characteristics with five common management decisions (additional diagnostic testing, prescription of medication, applying a corticosteroid injection, referral for physiotherapy and referral for medical specialist care) made within the first weeks are determined.

Chapter 7 reflects on the main findings of the previous chapters and discusses implications for future research and clinical practice.

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2

Incidence of non-traumatic complaints of arm, neck and shoulder in general practice

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ABSTRACT

Background and Objective Incidence densities in primary care are often based on disease or region-specific code registration (e.g. 'epicondylitis', 'shoulder symptom') according to the International Classification of Primary Care (ICPC). Few estimates are available on arm, neck and shoulder complaints. Unknown, is the proportion missed due to registration with a non-region-specific code (e.g. 'muscle pain'). Therefore, we estimated the incidence in non-traumatic arm, neck and shoulder complaints in the age-group 18-64 years, and determined the contribution of non-specific codes to the total figure.

Materials and Methods In this prospective registration study, 21 general practitioners (GPs) from 13 Dutch general practices classified and registered patient's symptoms and diagnoses according to ICPC at each consultation during 12 consecutive months. Incidence densities were calculated.

Results The incidence density was 97.4/1000 person-years (95% CI: 91.2-103.7). This results in 147 (95%CI: 138-157) incident cases/year for an average-sized GP-practice (2,350 patients). Main contributors were: shoulder (L92, L08) and neck complaints (L01, L83). Of all incident consultations, 23% were registered with non region-specific codes, mainly 'other musculoskeletal disease' (L99).

Conclusion Non-traumatic complaints of arm, neck and shoulder are frequently consulted for in Dutch primary care. When estimating morbidity in primary care, based on diagnostic codes, one should be aware of possible underestimation of morbidity and corresponding workload, when excluding codes not specific for that region or disease.

INTRODUCTION

Complaints of the arm, neck and/or shoulder are very common in Western societies[1-5]. In the Netherlands the 12-month period prevalence in the general population was estimated at 31.4% for neck pain, 30.3% for shoulder pain, 11.2% for elbow pain and 17.5% for wrist or hand pain. About 30% of those people with pain in the neck or upper extremities reported limitations in daily life during the previous 12 months, and 16-20% of the workers reported sick leave. Besides 30-40% of the respondents with pain reported contact with a general practitioner (GP) due to these complaints[2]. A study in the general population in Norway, reported that 45% of adults experiencing non-inflammatory musculoskeletal pain consulted a GP in the previous 12 months[6].

Previous studies[6-8] identified factors associated with consulting a GP[6,8], or health care in general[7]. Among the prominent factors they found: high pain intensity[6,7], much disability[7], sickness absence[6,8], long duration of the complaint[6,8], and widespread pain[6]. Thus, when complaints are annoying, people are more likely to consult their GP. There are, however, only a few estimates on the incidence of neck and upper extremity complaints in primary care[9-11].

In the Netherlands virtually everybody is registered with a GP. At the time of the study the GP acted as gatekeeper and referred patients to other care providers within primary or secondary care. This implies that incident consultation rate in general practice is also a reasonable reflection of the number of people seeking medical care.

To categories a complaint, diagnosis or intervention in general practice, the World Organization of Family Doctors (WONCA) developed the International Classification of Primary Care (ICPC) as the ordering principle of family practice domain[12]. The ICPC registration gives the opportunity to determine morbidity in primary care.

A recent high-quality study in Dutch general practice based on ICPC registration showed an incidence of 66 consultations per 1000 person-years attributable to a new complaint or new episode of a complaint of neck or upper extremity. This indicates approximately 3 consultations each week in an average practice with 2500 registered persons[10]. These figures are based on location-specific codes for symptoms or diseases of arm, neck and shoulder within the ICPC registration system.

Research among the general population, however, showed that in about 50% of those reporting pain, the complaint is not restricted to a single site[2,13]. Therefore, multiple-sited complaints and complaints the GP cannot clearly diagnose at the first consultation, might be registered under an ICPC code that is not specific for that location (e.g. neck or shoulder or hand) or disease (e.g. epicondylitis or carpal tunnel syndrome). Studies based on location-specific complaints alone, probably

do not reflect the complete picture. Little is known however, about the proportion of complaints that is missed.

The aim of our study was to estimate the 12-month incidence of non-traumatic arm, neck and shoulder complaints in the age-group 18-64 years in Dutch general practice based on registration of both region-specific or disease-specific ICPC-codes and non region-specific ICPC codes.

METHODS

Design and setting

This prospective study on the incidence of arm, neck and shoulder complaints was carried out in general practices in the southwest region of the Netherlands. GPs could participate in the study if they worked with an electronic medical record-system, which was used by almost all GPs since 2000. They further had to agree to code all consultations during their 12-month registration period plus the previous 6 months according to the ICPC[12]. The Medical Ethics Committee of the Erasmus Medical Center approved the study protocol.

Consultations

The inclusion criteria were: a new consultation for a complaint of arm, neck or shoulder and age 18 through 64 years. A consultation was defined 'new' when patients had not consulted their GP for the same complaint in the 6 months prior to the consultation date. Consultations were excluded if a complaint could be explained by a trauma, fracture, malignancy, amputation, prosthesis, congenital defect or previously diagnosed systemic and/or generalised neurological disorder.

In this broad search we included 34 ICPC codes that could be used to register non-traumatic arm, neck and shoulder complaints. Of these 34 codes, 10 were *specific* for the region of arm, neck and shoulder (see Appendix 1, ICPC codes specific for arm, neck and shoulder are presented in bold). The remaining 24 were codes that could *possibly* be used by the GP to register complaints of arm, neck and shoulder. This latter group consisted mainly of non region-specific codes.

Procedures

The age and gender distribution of each practice population was registered to determine the denominator. To account for possible changes in practice population,

the mid-time population was determined, using the mean of the patients registered at the start and at the end of the study registration period.

Specific software programs were used to determine the numerator during the 12-month registration period. To guarantee privacy, all analyses were performed using anonymous records. The search result consisted of: ICPC code, consultation date, code of the GP, patient number, date of birth and gender. Consultations were excluded if patients were not already registered with that GP 6 months prior to the consultation and therefore exclusion criteria could not be checked, and if the contact was of a temporary nature (e.g. during vacation, consultations as locum).

Subsequently, the researcher (authorised by the GP) checked the inclusion criteria in the patient medical files. For reasons of efficiency a 25% random-check of identified cases was made according to a strict protocol. Because differences in incidence densities were expected based on gender and age, 4 subgroups were defined: men aged 18-40 years, men aged 41-64 years, women aged 18-40 years and women aged 41-64 years. First, the numerator file was sorted on gender and age. Then, within each of the 4 strata, the inclusion criteria of 25% of the patients were randomly checked. In one practice the total number of ICPC hits was checked.

If the inclusion criteria were not clearly met, the GP was asked for additional information and consensus was achieved.

Statistical analyses

To estimate the incidence density we calculated the number of patients with a first consultation for arm, neck or shoulder complaints in the 12-month study period, divided by the sum of person-years at risk. The 95% confidence interval (CI) was computed with the variance stabilizing square root transformation[14]. This transformation was used to get a symmetrical distribution.

Patients contributed person-years to the denominator when they were registered within that year. If an incident arm, neck or shoulder complaint was recorded, that person remained at risk for other complaints (e.g. epicondylitis and carpal tunnel syndrome). Persons becoming 18 or 65 years during the study year contributed only those months that they were aged 18 years or 64. Of persons becoming 40 years old during the study-year, the age half way through the 12-month study period determined in which age group they were included. Incidence densities were calculated for the total population, the four subgroups (18-40 years and male, 18-40 years and female, 41-64 years and male, 41-64 years and female) and for each ICPC code separately, also showing the contribution of the region-specific and non region-specific codes.

Because the 12-month incidence was based on the consultations included in the 25% random sample only, we used the sum of person-years at risk of the corresponding 25% of the total population. In one practice the complete practice population aged 18-64 years was checked and could be included in its entirety.

All calculations were carried with the statistical package SPSS (Version 11.0) for Windows (SPSS Inc, Chicago, Illinois, USA).

RESULTS

Population at risk

In total 21 GPs working in 13 practices participated in this study. Nine of the 13 practices were single-handed, and 4 were group practices with 2 to 4 GPs. For the various GP practices, the first 12-month study period was September 2001 to September 2002, and the last April 2002 to April 2003 (i.e. all the data were generated between September 2001 and April 2003).

The number of patients per practice ranged from 2,113 (solo) to 11,492 (4 GPs), resulting in a total population of 49,414 patients, of which 50% was male. On average 66% of the total population was aged 18-64 years and thus contributed 32,775 patient-years to the denominator.

Figure 1 shows that within the study year, more than 5,000 consultations were registered with an eligible ICPC code. Of the total number of consultations present in the random sample, 42% was excluded. The most frequent reasons for exclusion were: the musculoskeletal complaint is not located in the arm, neck or shoulder 214/666 (32%), a prior consultation had taken place within the past 6 months 196/666 (29%), or the GP was consulted for a complaint other than a musculoskeletal complaint 122/666 (18%). In a few cases, the complaint could be explained by a trauma or existing systemic or generalized neurological disease.

The number of incident consultations for arm, neck or shoulder was 937/1603 (58%). From the total number of checked hits, the total number of person-years at risk was 9623.47. This results in a total incidence figure of 97.4/1000 person-years (95%CI: 91.2-103.7), ranging from 55.0/1000 person-years (95% CI: 46.0-64.8) for men aged 18-40 years to 140.5/1000 person-years (95% CI: 126.1-155.7) for women aged 41-64 years (Table 1).

For an average practice with 2350 patients and age and gender distribution according to the Dutch general population[15], this results in 147 (95%CI: 138-157) incident cases per year in the age group 18-64 years. Figure 2 shows the distribution of

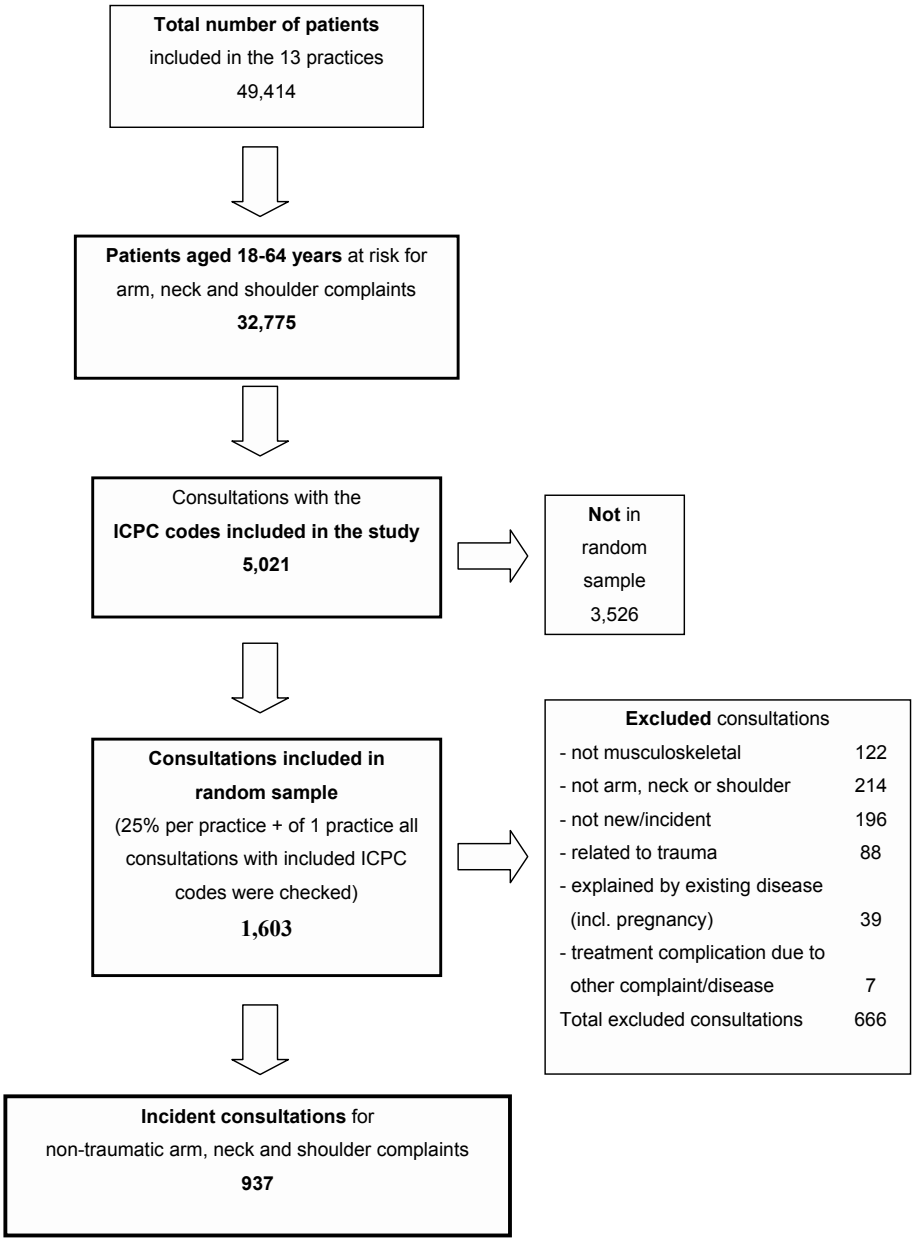

Figure 1. Flow chart of the incident consultations

the incidence of non-traumatic arm, neck and shoulder complaints by ICPC code. Clearly, most incident cases are registered under a code specific for arm, neck or shoulder, or a code for a specific complaint/syndrome in that region such as tennis elbow and carpal tunnel syndrome. In total 77% of the incident cases are registered

Table 1 Incidence of consultations for non-traumatic arm, neck and shoulder complaints per 1000 person-years.

	Total 18-64 years	Men 18-40 years	Men 41-64 years	Women 18-40 years	Women 41-64 years
Incidence	97.4	55.0	97.4	94.9	140.5
95% CI*	(91.2-103.7)	(46.0-64.8)	(85.6-110.1)	(82.6-108.1)	(126.1-155.7)

* 95% confidence interval after square root transformation[14]

with a region-specific code. In 23% of the cases non region-specific codes were used, most frequently L99 (musculoskeletal disease, other), followed by L18 (muscle pain) and N02 (tension headache).

The main contributors to the total incidence density figure were: consultations for shoulder complaints 29.5/1000 person-years (L92 and L08) followed by neck complaints 20.6/1000 person-years (L01 and L83) and epicondylitis (L93) 11.0/1000 person years. The distribution of ICPC codes is similar for men and women, but neck and wrist and hand complaints are more common in women.

DISCUSSION

Summary of main findings

In this morbidity study in general practice we calculated a 12-month incident consultation rate of 97.4/1000 person-years (95% CI: 91.2-103.7) for non-traumatic arm, neck and shoulder complaints. When divided into 4 subgroups (by age and gender) the incidence ranged from 55.0/1000 person-years for men aged 18-40 years to 140.5/1000 person- years for women aged 41-64 years. Overall, this consultation rate results in 147 (95%CI: 138-157) incident cases/year for an average-sized GP-practice with 2,350 patients.

The main contributors to the total incidence figure were: consultations for shoulder complaints 29.5/1000 person-years (L92 and L08) followed by neck complaints 20.6/1000 person-years (L01 and L83), and epicondylitis (L93) 11.0/1000 person-years. Less important, but still relevant contributors are the non region-specific codes that make up 23% of the total incidence figure, mainly L99 (musculoskeletal disease, other), L18 (muscle pain), N02 (tension headache), L87 (ganglion joint/ tendon), and N05 (tingling fingers/feet/toes).

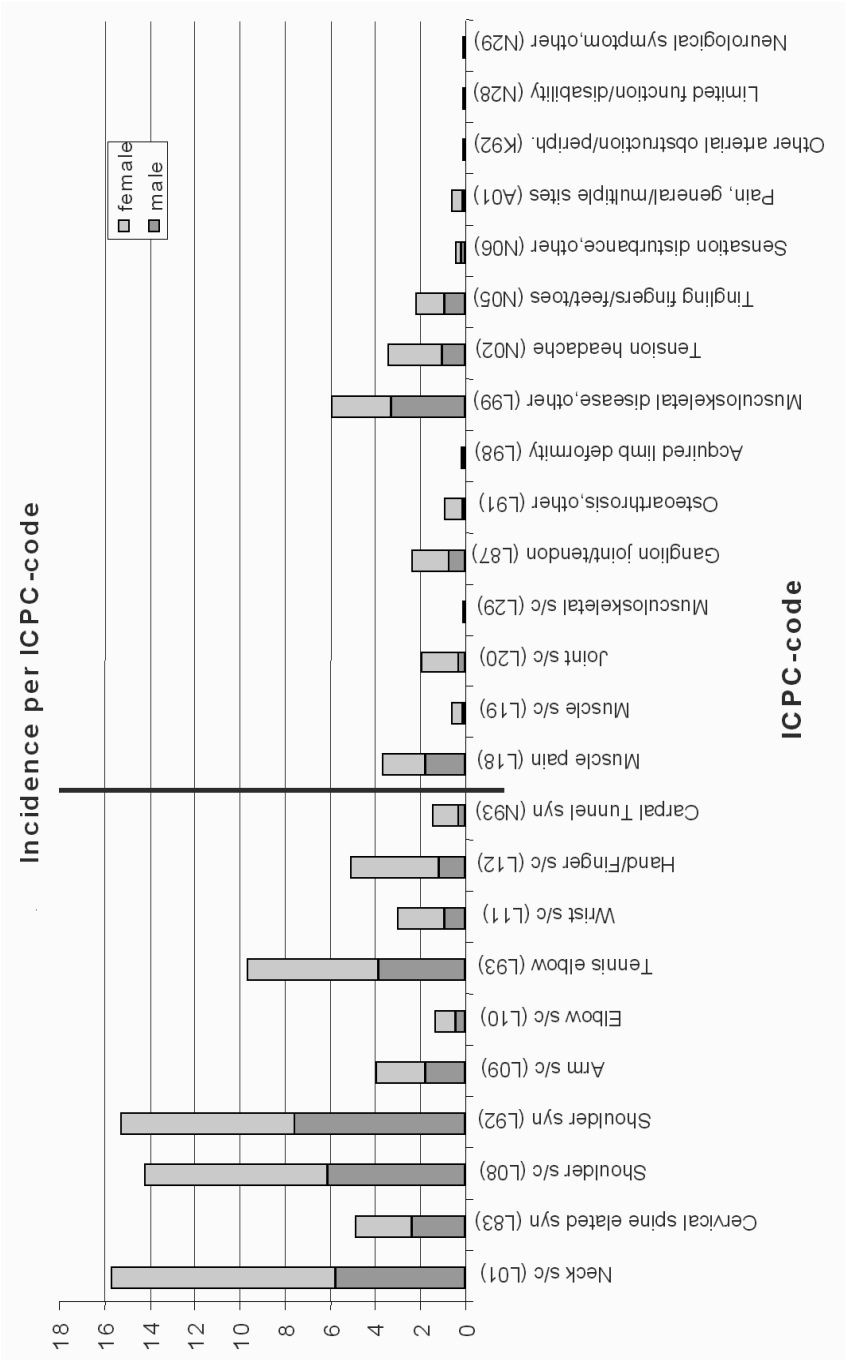

Figure 2. Incidence of non-traumatic arm, neck and shoulder complaints per ICPC code for the total population, and for men and women separately. Incidence per 1000 person-years; s/c= symptoms or complaints; syn=syndrome. The bold vertical line divides the codes into codes specific for arm, neck or shoulder and non-specific codes used to register arm, neck and shoulder complaints.

Strengths and the limitations of this study

The relevant proportion of complaints registered under non region-specific codes indicates that complaints of the arm, neck and shoulder are sometimes difficult to classify in a disease-specific or location-specific complaint, and in case of L18 (muscle pain) and L87 (ganglion joint/tendon) the classification for a specific structure is preferred. Possible reasons for this may be: having complaints at more than one site[2,13] or having referred pain. Further, for some complaints an acute presentation or the need for additional tests can make it more difficult to establish an accurate diagnosis at the first consultation, and a symptom description may therefore be preferred. Thus registration under a non region-specific code may have a legitimate reason and is not necessarily less informative compared to a location-specific code.

In the present study we evaluated incidence rate, based on data from day-to-day practice. It is possible, that GPs may have diagnosed a case differently based on the same information, or may have had a preference for a particular ICPC code. However, when consulting with a set of symptoms or signs, there is still the option of more than one ICPC-code being applicable. One can register under location, structure or diagnosis (e.g. elbow symptom/complaint, muscle symptom/complaint, epicondylitis). Furthermore, a diagnosis as e.g. rotator cuff tendonitis, can be coded under shoulder syndrome, which contains several other diagnoses (L92: shoulder syndrome: bursitis of shoulder, frozen shoulder, rotator cuff syndrome, etc.). Therefore, the ICPC has limitations when used to study morbidity in more detail in this region.

Whether more detailed registration of diagnoses, may always result in more valid information remains questionable, especially in shoulder complaints. In an epidemiological study[5] on arm, neck and shoulder complaints in the general population, standardised tests (history taking and physical examination) were performed in a sample of the patient population. This examination resulted from a multidisciplinary workshop and demonstrated face validity when tested against diagnoses made by clinicians. Despite the information of history taking and physical tests, considerable overlap was reported on several diagnoses, especially in shoulder complaints. Much overlap was found in adhesive capsulitis and rotator cuff tendonitis and to a lesser extent bicipital tendonitis, subacromial bursitis and acromioclavicuar disorder. These diagnoses within the shoulder region may frequently coexist, or as others report may be difficult to distinguish[16-18]. Additionally, a recent systematic review on diagnostic evaluation of shoulder pain, found no accuracy studies on signs and symptoms related to rotator cuff disorders in primary care[19].

Because of the less detailed diagnostic level of the ICPC, we expect most ICPC-codes to be used correctly, despite the lack of standardised tests. This, because

mainly location specific codes were used for which we expect history taking to supply enough labelling information.

Furthermore, patients could contribute more than one ICPC-code to the total number of consultations, which may result in a slight overestimation if these complaints are in fact related. When we checked this, we found 29 patients who consulted two or three times for a non-traumatic arm, neck or shoulder complaint within the 12 month registration period. Their contribution of 62 consultations to the total number, all registered under different ICPC codes, could in fact be 62 new complaints or 29 complaints with other related symptoms, which we can not distinguish. However, if all these consultations are all related, this will still result in a total incidence rate of 93.9 per 1000 person-years (95% CI: 87.9-100.2) instead of the 97.4/1000 person-years (95%CI: 91.2-103.7).

On the other hand there may be a possibility for underestimation of the incidence density. If a patient consults for several complaints, these complaints may not all be registered separately due to time constraints. Although there are no figures to confirm this hypothesis, we expect that if the GP was consulted for a main complaint located elsewhere, concerning e.g. the stomach, and another complaint located at arm, neck or shoulder, he/she will probably register both complaints in case active treatment was initiated.

Besides, the occurrence of shoulder and neck complaints is often described as being very dynamic and following an episodic course[20-22]. In the present study we define an incident case as not having consulted the GP in the 6 months prior to the consultation date. Before that period, they might of course have consulted for the same complaints.

Comparison with existing literature

When comparing our findings to Bot et al.[10], we found a similar distribution of the location-specific incidence with an even higher incidence of shoulder complaints. Though the results of both the distribution of the location-specific incidence and the total corresponding incidence they found of 66/1000 person years are in line with our results, we have to point out a few differences regarding the studied populations and inclusion criteria. In contrast to their study, we excluded trauma and people aged 65 and over and included the specific code for carpal tunnel syndrome, and added the non region-specific codes.

Analogue to others[2,6,10] we found that incidence rate (i.e. study consultation rate) increased with age; the higher consultation rate may indicate slower recovery at older age, or being less fit.

Prevalence studies on pain in the arm, neck and shoulder generally reported higher rates in women compared to men, both in the general population[2,10,23] and in primary care[24,25]. Similar to Bot et al.[10], we also found higher incidence densities in women compared to men.

Implications for future research or clinical practice

From previous studies can be concluded that when complaints are annoying, people are more likely to seek medical care[6-8]. Studies in the general population reported that of the total of people experiencing musculoskeletal complaints, 30-45% decided to consult a GP[2,6].

In the present study, the incidence figures, probably present a reasonable estimate of the total of patients with arm, neck and shoulder complaints with non-traumatic onset, for which patients seek medical treatment. This, because at the time of the study, the GP was the first care provider to consult in the Netherlands in the case of a medical complaint.

Since January 2006, this situation changed. As in some other countries, a referral is no longer required to consult a physiotherapist for a musculoskeletal complaint. Figures on physiotherapy consultation in the first 6 months of 2006, showed that 26.5% of the patients consulted a physiotherapist without referral[27].

Because patients can now consult a physiotherapist without referral, general practice figures on morbidity no longer give the complete picture of the group of patients hindered enough to seek medical care. Because data on morbidity remains valuable to inform on the burden of these complaints and the workload of care providers, adequate registration in physiotherapy practice (and other practices of care providers with direct access) could fill this gap.

An indication of the group of patients with these complaints of arm, neck and shoulder that is referred for physiotherapy before direct access, is given by Karels et al.[28]. In their cohort study on management in physiotherapy practice they also reported on the distribution of the diagnoses. The main contributors were: radiating neck complaints 72%, rotator cuff syndrome (19%) and epicondylitis (11%).

In conclusion, non-traumatic complaints of arm, neck and shoulder are frequently consulted for in Dutch primary care. In 23%, the complaint is registered under non region-specific codes. When estimating morbidity in primary care, based on diagnostic codes, one should be aware of possible underestimation of morbidity and corresponding workload, when excluding codes not specific for that region or diagnosis/disease.

ACKNOWLEDGEMENTS

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Appendix 1. The International Classification of Primary Care (ICPC) codes selected for the present study.

ICPC code	
L01	**Neck symptom/complaint**
L08	**Shoulder symptom/complaint**
L09	**Arm symptom/complaint**
L10	**Elbow symptom/complaint**
L11	**Wrist symptom/complaint**
L12	**Hand/Finger symptom/complaint**
L18	Muscle pain
L19	Muscle symptom/complaint NOS
L20	Joint symptom/complaint NOS
L28	Limited function/disability
L29	Musculoskeletal symptom/complaint, other
L83	**Syndromes related to cervical spine**
L87	Ganglion joint/tendon
L91	Osteoarthrosis, other
L92	**Shoulder syndrome**
L93	**Tennis elbow**
L98	Acquired deformity of limb
L99	Musculoskeletal disease, other
N02	Tension headache
N05	Tingling fingers/feet/toes
N06	Sensation disturbance, other
N18	Paralysis/weakness
N93	**Carpal Tunnel syndrome**
A01	Pain, general/multiple sites
A28	Limited function/disability NOS
A29	General symptom/complaint, other
A99	Disease/condition of unspecified nature/site
K92	Other arterial obstruction/peripheral *(includes Raynaud)*
L27	Fear of musculoskeletal disease, other
N28	Limited function/disability (N)
N29	Neurological symptom/complaint, other
N99	Neurological disease, other
P75	Somatization disorder
Z05	Work problem

Indicated in bold are the codes specific for neck and upper extremity complaints.
NOS: Not otherwise specified. Remark: Only incident consultations for a non-traumatic complaint of arm, neck or shoulder that fulfilled the inclusion criteria, were included.

3

Prognostic indicators for non-recovery of non-traumatic complaints at arm, neck and shoulder in general practice: 6-months follow-up

Feleus A, Bierma-Zeinstra SMA, Miedema HS, Verhagen AP, Nauta AP, Burdorf A, Verhaar JAN, Koes BW. Rheumatology 2007; 46: 169-176.

ABSTRACT

Objectives To identify predictors of non-recovery in non-traumatic complaints at the arm, neck and shoulder in general practice 6 months after the first consultation.
Methods A prospective cohort study set in Dutch general practice. Consulters with a first or new episode of non-traumatic arm, neck or shoulder complaints and age 18 through 64 years entered the cohort. Complaint, patient, physical, psychosocial and work characteristics, were investigated as possible predictors of non-recovery at 6 months using multiple logistic regression analyses (backward Wald).
Results At 6 months, 46% of the total population (n=612) and 42% of the working subpopulation (n=473) still reported complaints. Complaint characteristics (long duration of the complaint before consultation, recurrent complaint, musculoskeletal comorbidity and complaint mainly located at wrist or hand) were most predictive of non-recovery followed by psychosocial characteristics (more somatization, and experiencing less social support). Having a specific diagnosis was associated with recovery.

In the working subpopulation the same variables were predictors of non-recovery. Additionally low supervisory support was associated with non-recovery. The models correctly classified 72-75% of the patients (explained variance 0.27-0.28).
Conclusions Besides questions on complaint characteristics, information on somatization and support can help a general practitioner to recognise patients at risk of persistent complaints.

INTRODUCTION

Complaints of arm, neck and shoulder are common in Western societies[1,2]. In the Netherlands the 12-months prevalence in the general population was estimated at 31% for neck pain, 30% for shoulder pain, 11% for elbow pain, and 18% for wrist or hand pain[1]. About 30% of those with pain in the neck or upper extremity reported functional limitations in daily life during the past 12 months and 16-20% of the workers reported sick leave during the past 12 months due to these complaints. Roughly 30-40% of the respondents with pain reported contact with a general practitioner (GP) due to these complaints[1].

In the Netherlands virtually everybody is registered with a GP who acts as a gatekeeper and refers patients to other care providers within the primary, secondary or tertiary care. Recent figures in Dutch general practice show 66 consultations per 1000 person-years attributable to a new episode of a neck or upper extremity complaint, which is approximately 3 every week in an average practice with 2500 registered persons[3].

In these common complaints, evidence on the prognosis and factors that may be associated with it is growing. Recent prognostic studies were set in primary care and investigated the prognosis and the predictive factors of complaints at neck[4], neck-shoulder[5], shoulder[6,7] or elbow[8,9]. Research among the general population showed, however, that in about 50% of those reporting pain, the complaint is not restricted to a single site[1,10]. Besides, prognostic indicators may not be site-specific. Furthermore, the heterogeneous practice population of a GP contains of patients with and without employment. Studies in neck and upper extremity complaints that also included physical and psychosocial work variables were mainly executed in specific occupational settings[11-14] and are scarce in primary care[9].

In this study we evaluated the clinical course of non-traumatic arm, neck and/or shoulder complaints in general practice and identified prognostic indicators of poor prognosis, including work variables and psychosocial variables. The aim was: to identify predictors of non-recovery in non-traumatic complaints at the arm, neck and shoulder in general practice 6 months after the first consultation. Besides we determined the additive value of the final model compared to the prognosis of the GP alone.

METHODS

Design and setting

This prospective cohort study was conducted in general practices in the Southwest region of the Netherlands. At baseline and after 6 months, data were collected by means of self-administered questionnaires. The Medical Ethics Committee of the Erasmus Medical Center in Rotterdam approved the study protocol.

Study population

In total, 36 GPs from 21 practices recruited eligible patients from September 2001 through December 2002. Inclusion criteria were: patients who visited their GP with a new complaint or new episode of complaints of neck, upper back, shoulder, upper arm, elbow, forearm, wrist or hand; age 18 through 64 years; and able to complete Dutch language written questionnaires. The episode was considered 'new' if patients had not visited their GP for the same complaint during the preceding 6 months. Patients were excluded when complaints could be explained by a trauma, fracture, malignancy, amputation, prosthesis, congenital defect, or previously diagnosed existing systemic disorder and/or generalised neurological disorder or when they reported to be recovered at the time of filling in the questionnaire.

Procedures

During the first consultation patients received study information, a consent form and the baseline questionnaire from their GP. A fax was sent by the GP to the investigators with a patient number, age and gender of the patient, and diagnosis and expected prognosis of the complaint. After the research team received the completed informed consent and the first questionnaire within 8 weeks, inclusion criteria were verified in the computerised medical records. At six months after the first consultation, the follow-up questionnaire was sent from the research centre.

Outcomes

The primary outcome measure was non-recovery of complaints at 6 months. Patients were considered to have persistent complaints if they reported being "worse than ever" to "slightly improved" on a 7-point ordinal scale. The scores "much improved" or "completely recovered" were considered as being recovered.

Secondary outcomes included complaint severity during the previous week, functional limitations and general health. Complaint severity was measured on an 11-point numerical rating scale from 0 (no complaints) to 10 (unbearable complaints). Functional limitations of the arm, neck, shoulder or hand were measured with the Disability of Arm Shoulder and Hand (DASH) questionnaire[15]. Each item was scored on a 5-point Likert scale. Response scores were summed and transferred to a score ranging from 0 (no disability) to 100 (completely disabled). General health was measured with the SF-12, containing a physical component summary scale (PCS-12) and a mental component summary scale (MCS-12), ranging from 0 to 100, with higher scores representing better health[16].

Prognostic indicators

At baseline the following possible prognostic indicators were assessed.

Patient characteristics. Age, gender, body mass index (BMI) was calculated from reported length and weight, educational level, work participation. Someone was coded as 'having paid work', if the question "Are you currently (self-)employed?" was answered with yes.

Complaint characteristics. Duration of the complaints at baseline, complaint severity during the last week, functional limitations and perceived health. For perceived health the categories of the first question of the SF-12 were recoded into "good" ("excellent", "very good", "good") and "poor" ("fair" or "poor"). Besides, a trauma of arm, neck or shoulder in the past, musculoskeletal comorbidity, non-musculoskeletal comorbidity and recurrence were assessed. For the region with the most pain/complaints during the last week, the patient indicated the location on a manikin. We defined three regions: neck-shoulder (including neck, upper part of thoracic spine, shoulder and upper arm), elbow-fore arm, and wrist-hand. A complaint was defined regional if the area of the complaint on the manikin was restricted to one of these three regions, and defined multiple region when more than one region was indicated. Moreover, the diagnosis as registered by the treating GP (Appendix 1), was dichotomised by the researcher into specific or non-specific based on a categorisation by Sluiter et al.[17] and by a consensus procedure[18], where a diagnosis was categorised as specific when it could be attributed to a specific medically objectifiable disorder. When the GP indicated more than one diagnosis, the specific diagnosis was given priority.

Physical activity in leisure time. Patients were coded as active in sports when participating at least 1 hour a week. The frequency of doing physical activities (besides sports) was scored using 6 items (housekeeping, taking care of chronic patients and/or disabled persons, do-it-yourself work, gardening, computer use, and

handcrafts). These items were scored from 0 'seldom' to 3 'almost always'. The item scores were summed and resulted in a sum score for 'heavy physical activities in leisure time' (4 items) and for 'static repetitive activities in leisure time' (2 items).

Psychosocial characteristics. Somatization and distress were both measured with the Four Dimensional Symptom Questionnaire (4DSQ)[19]. Social support was measured with the Social Support Scale (SOS), a Dutch version of the 'Social Support Questionnaire' (SSQ) [20]. Catastrophizing was measured with a subscale of the Dutch adaptation of the Coping Strategy Questionnaire[21]. Kinesiophobia was measured using the shortened version of the Tampa scale without the 4 reversed items[22]. Of all psychosocial variables, higher scores indicate more of the measured characteristic. Health locus of control was assessed by one simple question 'Do you believe you can influence your health through your behaviour?' scored on a 4-point Likert scale. The scores "considerable" or "to a large extent" were considered as 'yes'.

Work characteristics. Full-time work (working 36 hours a week or more) or part-time work (working less than 36 hours a week), less than 5 years working in current job, sick leave due to complaints of arm, neck or shoulder in the past 6 months, and work-relatedness of complaints were included. Complaints were defined as work related if participants with a paid job confirmed one of the three following questions:

1) Do the complaints return or worsen during the activities at work?
2) Have you adapted or reduced your activities at work because of your complaints?
3) Do the complaints diminish after several days off work?

Physical load at work (PWQ) was measured with a validated short version of the Dutch Musculoskeletal Questionnaire. The items were scored on a 4-point Likert scale ranging from 1 "seldom" to 4 "always". Two sum scores were calculated: "heavy physical workload" and "long-lasting postures and repetitive movements"[23]. The psychosocial factors at work were measured with the Dutch translation of the core Job Content Questionnaire (JCQ),[24] including: quantitative job demands, skill discretion, decision authority, supervisor support, and co-worker support. Job insecurity was measured with the item "My job security is good". High job strain was derived from the combination high (above the sample median) demands combined with low (below the sample median) control (a weighted sum of decision authority and skill discretion).

Prognosis GP. The treating GP scored expected non-recovery at 6-months on a 4 point Likert scale ranging from 1 'very likely' to 4 'very unlikely' at the first consultation. These scores were dichotomized into likely or unlikely.

Statistical methods

The relation between the prognostic variables and "non-recovery" was modelled with logistic regression analysis. For possible prognostic factors with clinical relevant classifications or validated classes, the existing cut-offs were used. If not, ordinal scores were split based on the median score of the total population at baseline. Variables that were univariately associated with "non-recovery of complaints" ($p<0.10$) were selected for a multivariate analysis by a step backward procedure (backward Wald).

First the backward procedure was executed per domain. Variables with a statistically significant odds ratio (p-value<0.10) entered the final model. Only variables with a statistically significant odds ratio (p-value <0.05) were retained in the final model. To also include work factors, two models were built: one in the total population and one in the working subpopulation separately. In order to retain comparable multivariate models, prognostic factors present in the model of the total population were also included in the workers' model and vice versa. In both multivariate models we adjusted for gender and age.

The percentage of explained variance (Nagelkerke's R^2) and percentage correctly predicted (with a cut-off value of 0.5 for the estimated probability) were calculated to give an indication of the fit of the final regression models.

To check whether the variables associated with non-recovery in the total population also applied for different regions of complaints, we also executed stratified univariate logistic regression per region.

We also used logistic regression analysis to identify available baseline variables (Table 1) associated with "dropout at 6 months", according to the same approach as stated above. Variables related to "dropout at 6 months" were included in the multivariate analysis of "non-recovery of complaints", irrespective of their association with non-recovery.

Last, we determined the additive value of the final model compared to the GP-prognosis alone.

Therefore, we determined the univariate relationship of the prognosis of the treating GP with non-recovery. We reported the percentage correctly predicted as persistent or recovered at 6 months by both the prognosis of the GP and the final model. The additive value of the model was tested with the likelihood-ratio-test ($p<0.05$).

All analyses were performed with the Statistical Package of Social Sciences, version 11.0 for Windows (SPSS Inc, Chicago, Illinois, USA).

RESULTS

In total, 798 patients fulfilled the criteria of which 682 (86%) entered the cohort after they returned the completed questionnaire and informed consent. The mean time between consultation and filling in the questionnaire was 2 weeks.

Table 1 shows the distribution of the baseline characteristics for both the total study population and the subgroup with paid work. Of the total study population 47% was male, and 78% reported having a paid job. The duration of the complaint was for 50% of the population less than 6 weeks before consulting their GP. Musculoskeletal comorbidity was experienced by 49% and non-musculoskeletal comorbidity by 21%. The complaints were most frequent mainly located at neck, shoulder or upper arm (n=528), followed by elbow or forearm (n=170) and wrist or hand (n=128). The total area in which patients experienced complaints was in 42% not restrict to one region.

Of the subgroup workers, 58% reported to work fulltime and 71% reported that their complaints were influenced by work activities. In 24% workers reported sick leave in the previous 6 months due to complaints of arm, neck or shoulder.

At 6 months 70 participants (10%) had dropped out. Logistic regression analysis showed that younger age (18-44 years) (odds ratio 2.85, 1.65 to 4.93) and being a male (odds ratio 1.84, 1.11 to 3.04) were significantly related to being a dropout.

Course

In the total population, 25% of the participants reported complete recovery and 29% much improvement at 6 months (Table 2). In 46% of the total population and 42% of the working subgroup, the complaints were persistent. In both populations, the scores on mean complaint severity and functional limitations had roughly halved at 6 months. The mean scores on the physical component of general health improved half a standard deviation, while scores on the mental component remained stable.

Predictors of non-recovery

The results of the univariate regression analyses are presented in Table 3.

In the domains complaint specific variables and psychosocial characteristics, the strongest univariate associations with non-recovery were seen.

Multivariate regression analyses (Table 4) resulted in four characteristics of the complaint (duration of the complaint before consultation, recurrent complaint, musculoskeletal comorbidity and a complaint located at wrist or hand) that were independent predictors of non-recovery in the total population. Having a specific

Table 1. Baseline characteristics

	Total population (n=682)	Working population (n=534)
Patient characteristics		
Age (years) [18-64], median [range]	45 [18-64]	43 [18-64]
Male, n (%)	283 (42)	253 (47)
Body Mass Index (kg/m²), median [range]	25·0 [16·0-55·4]	25·0 [16·1-42·0]
Educational level* Low, n (%)	244 (36)	165 (31)
Medium, n (%)	243 (36)	198 (37)
High, n (%)	194 (28)	170 (32)
Paid work, n (%)	534 (78)	534 (100)
Complaint characteristics		
Duration of the complaint: 0-6 weeks, n (%)	344 (50)	275 (51)
6 weeks- 6 months, n (%)	162 (24)	125 (24)
>6 months, n (%)	175 (26)	133 (25)
Trauma arm, neck or shoulder in the past, n (%)	125 (18)	95 (18)
Comorbidity musculoskeletal, n (%)	331 (49)	248 (46)
Comorbidity non-musculoskeletal, n (%)	145 (21)	98 (18)
Recurrent complaint, n (%)	191 (28)	145 (27)
Region†, n (%) Neck or upper back or Shoulder or Upper arm	528 (77)	412 (77)
Elbow or Forearm	170 (25)	138 (26)
Wrist or Hand	128 (19)	92 (17)
Multiple region complaint, n (%)	287 (42)	219 (41)
Specific diagnosis, n (%)	402 (59)	310 (58)
Baseline scores outcome measures		
Severity in the last week [0-10], median [range]	6 [1-10]	6 [1-10]
Functional limitations, DASH [0-100], median [range]	35·3 [2·6-99·1]	34·5 [2·6-99·1]
Perceived general health: poor, n (%)	86 (12)	50 (9)
Physical activity in leisure time		
Sports participation, n (%)	302 (44)	252 (47)
Physical activities in leisure time		
- Heavy physical load [0-12], median [range]	3 [0-9]	3 [0-9]
- Static repetitive load [0-6], median [range]	2 [0-6]	2 [0-6]
Psychosocial characteristics		
Somatization, 4DSQ [0-48], n median [range]	6 [0-30]	6 [0-28]
Distress, 4DSQ [0-48], n median [range]	8 [0-32]	8 [0-32]
Social support, SOS [12-60], n median [range]	56 [26-60]	57 [27-60]
Patient characteristics		
Catastrophizing, CSQ [0-60], n median [range]	9 [0-53]	9 [0-53]
Kinesiophobia, Tampa-AV 13-item scale [13-52], median [range]	24 [13-46]	24 [13-46]
Yes, I can influence my health through my own behaviour, n (%)	402 (59)	319 (60)
Work variables		
Fulltime work, n (%)	n.a.	310 (58)
Working less than 5 years in current job	n.a.	156 (29)
Work-related complaints, n (%)	n.a.	374 (71)

Table 1 continued

	Total population (n=682)	Working population (n=534)
Sick leave related to arm/neck/shoulder-complaints in past 6 months, n (%)	n.a.	127 (24)
Physical workload, PWQ		
- Heavy physical load [0-100], median [range]	n.a.	19·0 [0-100]
- Static repetitive load [0-100], median [range]	n.a.	41·7 [0-100]
Psychosocial factors, JCQ		
Quantitative job demands [12-48], median [range]	n.a.	30 [12-48]
Skill discretion [12-48], median [range]	n.a.	34 [12-48]
Decision authority [12-48], median [range]	n.a.	36 [12-48]
High job strain, n (%)	n.a.	113 (21)
Supervisor support [4-16], median [range]	n.a.	12 [4-16]
Co-worker support [4-16], median [range]	n.a.	12 [4-16]
Job insecurity, n (%)	n.a.	66 (13)

SD= Standard Deviation; n=number of patients, n.a.= not applicable; DASH=disability of arm shoulder and hand questionnaire; 4DSQ=four-dimensional symptom questionnaire; SOS=social support scale; CSQ=coping strategy questionnaire; TAMPA-AV= tampa adjusted version; PWQ=physical workload questionnaire; JCQ=job content questionnaire .* Educational level: low: no education, primary school or lower vocational school; medium: lower or higher general secondary school level or middle vocational school); high: higher vocational school or university); † More than one region is possible.

Table 2. Course of arm, neck and shoulder complaints

	Total population		Working population	
Measurement	**Baseline** (n=682)	**6 months** (n=612)	**Baseline** (n=534)	**6 months** (n=473)
Extent of recovery n (%)	n.a.		n.a.	
Worse than ever		1 (0)		1 (0)
Much worsened		16 (3)		10 (2)
Slightly worsened		51(8)		33(7)
No change		88 (15)		64 (14)
Slightly improved		123 (20)		92 (19)
Much improved		178 (29)		147 (31)
Completely recovered		154 (25)		126 (27)
Severity of complaints [0-10], mean (sd)	5·8 (2·0)	2·9 (2·7)	5·7 (2·0)	2·7 (2·7)
Functional limitations, DASH [0-100], mean (sd)	36·8 (18·8)	18·9 (18·4)	35·8 (18·4)	17·0 (17·3)
General health, SF-12				
- Physical component [0-100], mean (sd)	43·5 (8·4)	48·3 (8·7)	44·1 (8·1)	49·2 (6·1)
- Mental component [0-100], mean (sd)	51·5 (9·8)	51·7 (8·7)	51·6 (9·7)	52·1 (8·4)

sd=standard deviation; []= score range; n.a=not applicable; DASH=disability of arm shoulder and hand questionnaire.

Table 3. Predictors of non-recovery of complaints, 6 months after the first consultation: results of univariate logistic regression analyses

		Total population (n=612)		Working population (n=473)	
Variables		**% all**	**OR (95% CI)**	**% all**	**OR (95% CI)**
Patient characteristics					
Older age (45-64 years)		52	**1·7 (1·2-2·3)**	45	**1·4 (1·0-2·0)**
Male		40	0·9 (0·7-1·2)	46	1·0 (0·7-1·4)
Body Mass Index (kg/m²), score >25·0		50	**1·4 (1·0-1·9)**	49	1·2 (0·9-1·8)
Educational level*	Low	36	1	31	1
	Medium	36	**0·7 (0·5-1·0)**	37	0·8 (0·5-1·2)
	High	28	0·7 (0·5-1·1)	32	0·9 (0·6-1·4)
Having paid work		77	**0·6 (0·4-0·8)**	100	
Complaint specific determinants					
Duration of the complaint: 0-6 weeks		49	1	51	1
6 weeks -6 months		24	**2·0 (1·3-3·0)**	23	**1·8 (1·1-2·8)**
>6 months		27	**5·4 (3·6-8·2)**	26	**5·1 (3·2-8·2)**
Complaint severity in the last week, score >6		40	1·1 (0·8-1·5)	38	1·0 (0·7-1·4)
Functional limitations, DASH score >35·34		50	**1·6 (1·2-2·2)**	48	1·3 (0·9-1·9)
Poor perceived general health		13	**3·2 (1·9-5·3)**	10	**2·5 (1·3-4·6)**
Trauma of arm, neck or shoulder in the past		18	**1·5 (1·0-2·3)**	17	1·3 (0·8-2·2)
Musculoskeletal comorbidity		49	**2.1 (1·6-2·7)**	47	**2·0 (1·5-2·8)**
Non-musculoskeletal comorbidity		22	**1·6 (1·1-2·4)**	19	1·4 (0·9-2·2)
Recurrent complaint		28	**2·6 (1·8-3·7)**	27	**2·6 (1·7-3·9)**
Region: Neck,upper back,shoulder-upper arm		78	1·4 (0·9-2·0)	77	**1·5 (1·0-2·4)**
Elbow or forearm		25	1·0 (0·7-1·5)	27	1·1 (0·7-1·6)
Wrist or hand		19	**1·7 (1·1-2·5)**	18	**1·3 (0·8-2·2)**
Multiple region complaint		43	**1·5 (1·1-2·1)**	42	1·2 (0·8-1·7)
Specific diagnosis		59	0·8 (0·6-1·1)	59	**0·7 (0·5-1·0)**
Physical activity in leisure time					
Active sports participation, >=1hour/week		44	**0·7 (0·5-1·0)**	47	0·8 (0·6-1·2)
Physical activities in leisure time					
- Heavy physical load [0-12], score >3		25	0·8 (0·6-1·2)	23	0·9 (0·6-1·3)
- Static repetitive load [0-6], score >2		24	1·3 (0·9-1·9)	25	1·3 (0·9-2·0)
Psychosocial characteristics					
Somatization, 4SDQ [0-32]:	Low [0-10]	74	1	76	1
	Medium [11-20]	22	**3·3 (2·2-5·0)**	21	**3·5 (2·2-5·6)**
	High [21-32]	4	**5·8 (2·3-14·7)**	3	**3·4 (1·1-10·2)**

Table 3 continued

Variables	Total population (n=612) % all	Total population (n=612) OR (95% CI)	Working population (n=473) % all	Working population (n=473) OR (95% CI)
Distress, 4DSQ [0-32]: Low [0-10]	64	1	63	1
Medium [11-20]	24	**1·4 (1·0-2·1)**	25	1·5 (1·0-2·3)
High [21-32]	12	**2·2 (1·3-3·6)**	12	**1·8 (1·0-3·2)**
Low Social support, SOS [12-60], score <56	50	**2·0 (1·4-2·7)**	48	**2·0 (1·4-2·9)**
Much catastrophizing, CSQ [0-60], score >9	48	**1·6 (1·2-2·2)**	47	**1·6 (1·1-2·4)**
Much kinesiophobia, Tampa-AV [13-52], score >24	49	**1·4 (1·0-2·0)**	49	1·2 (0·9-1·8)
Yes, I can influence my health through my own behaviour	59	**0·7 (0·5-0·9)**	60	0·8 (0·5-1·1)
Work variables				
Fulltime (>=36 hours/week)	n.a.	n.a.	57	1·3 (1·0-1·9)
<5 years working in current job	n.a.	n.a.	29	0·9 (0·6-1·4)
Work relevant complaints	n.a.	n.a.	70	0·8 (0·5-1·1)
Sick leave related to arm/neck/shoulder-complaints in past 6 months, n (%)	n.a.	n.a.	23	1·4 (0·9-2·2)
Physical workload, PWQ				
- Heavy physical load, score >19.0	n.a.	n.a.	54	1·4 (1·0-2·0)
- Static repetitive load, score>41.7	n.a.	n.a.	56	1·4 (0·9-2·0)
Psychosocial work factors (JCQ)				
High Quantitative job demands, score >30	n.a.	n.a.	45	1·0 (0·7-1·4)
Low Skill discretion, score <34	n.a.	n.a.	39	1·1 (0·8-1·6)
Low Decision authority, score <36	n.a.	n.a.	34	1·2 (0·8-1·8)
High Jobstrain	n.a.	n.a.	20	1·1 (0·7-1·8)
Low Supervisor support, score <12	n.a.	n.a.	49	**1·6 (1·1-2·4)**
Low Co-worker support, score <12	n.a.	n.a.	23	**1·6 (1·0-2·5)**
Job insecurity, yes %	n.a.	n.a.	13	1·0 (0·6-1·7)

OR= odds ratio; n.a.= not applicable; n=number of patients; DASH=disability of arm shoulder and hand questionnaire;4DSQ=four-dimensional symptom questionnaire; SOS=social support scale; CSQ=coping strategy questionnaire; TAMPA-AV= tampa adjusted version; PWQ=physical workload questionnaire; JCQ: Job Content Questionnaire. * Educational level: low: no education, primary school or lower vocational school; medium: lower or higher general secondary school level or middle vocational school; high: higher vocational school or university. Variables with a p-value <0·10 are given in bold.

diagnosis was associated with recovery. Of the psychosocial characteristics, low social support and high somatization were predictive of non-recovery of complaints.

Among workers we found the same results, though the association of the complaint location at wrist or hand was less strong. In line with low social support, we found low supervisor support to be predictive of persistent complaints.

In the calculations for the final model among workers, 449 of the 473 cases could be included. Of the 24 cases that had a missing, 18 reported that questions on supervisor support were not applicable to their situation because they were self-employed.

Table 4. Predictors of non-recovery of complaints at 6 months after the first consultation among patients with arm, neck or shoulder complaints: results of multiple regression analyses.

		Total population (n=607)		Working population (n=449)	
Variables		**OR**	**95% CI**	**OR**	**95% CI**
Patient characteristics					
Age 45-64 years vs 18-44 years		**1·6**	**(1·1-2·3)**	1·4	(0·9-2·1)
Male		1·2	(0·8-1·8)	1·4	(0·9-2·1)
Complaint specific determinants					
Duration of the complaint:	0-6 weeks	1		1	
	6 weeks -6 months	**2·1**	**(1·4-3·3)**	**2·3**	**(1·4-3·9)**
	>6 months	**3·8**	**(2·4-6·0)**	**4·5**	**(2·6-7·7)**
Musculoskeletal comorbidity		**1·6**	**(1·1-2·4)**	**1·5**	**(1·0-2·4)**
Recurrent complaint		**1·7**	**(1·1-2·7)**	**1·7**	**(1·0-2·7)**
Region wrist or hand		**1·7**	**(1·1-2·7)**	1·4	(0·8-2·4)
Specific complaint		**0·7**	**0·4-1·0**	**0·5**	**(0·3-0·9)**
Psychosocial characteristics					
Somatization, 4DSQ	Low [0-10]	1		1	
	Medium [11-20]	**2·3**	**(1·5-3·7)**	**2·4**	**(1·4-4·2)**
	High [21-32]	**3·1**	**(1·1-8·4)**	1·6	(0·5-5·7)
Low Social support, SOS [12-60], score <56		**1·9**	**(1·3-2·7)**	**2·1**	**(1·4-3·2)**
Work variables					
Low Supervisor support, score <12		-	-	**1·5**	**(1·0-2·4)**
Constant		0·2		0·1	
Explained variance (Nagelkerke's R^2)		0·27		0·28	
% Correctly predicted*		72		75	

4DSQ=four-dimensional symptom questionnaire; SOS=social support scale. Age and gender are kept in the model irrespective of p-value. OR= odds ratio; CI= confidence interval.*We used a cut-off value of 0.5 for the estimated probability.

No correlations higher than 0.24 were found between the variables that remained in the multivariate model. The explained variance of the multivariate models was 0.27 (72% correctly classified) for the total population and 0.28 (75% correctly classified) for the working subpopulation respectively.

Stratified univariate analyses per region are presented in Appendix 2. In general we found the same associations for the three subgroups, though the strength of the relation sometimes differed which can be due to the different population sizes. In the subgroup elbow or forearm complaints, having a recurrent complaint and experiencing little social support seems to be of less importance in non-recovery compared to the other regions. Also older age (45-64 years) and high scores on functional limitations were found to be more important in non-recovery of complaints at wrist or hand compared to complaints mainly located at the neck-shoulder or elbow-forearm.

Additive value of the final model versus the GP prognosis

The prognosis of the treating GP was a strong predictor of non-recovery at 6 months (odds ratio 3.3, 2.3 to 4.7). The explained variance of the GP-prognosis was 0.10 and 64.3% of the patients were classified correctly, compared to respectively 0.27 and 72% with the final model in the total population and 0.28 and 75% in the working population. When we added the final model of the total population and the working population to the GP-prognosis, all included variables still contributed though the association of the prognosis of the GP became less strong (odds ratio 2.0, 1.3 to 3.0). The changes in the odds ratios of the other variables were 10% or less.

The likelihood ratio-test showed a significant additive value of the models (both p-values<0.001).

DISCUSSION

In this prognostic cohort study in general practice, 46% of the subjects reported non-recovery of non-traumatic arm, neck and shoulder complaints 6 months after the first consultation. Similar results on non-recovery were found after 6 months in shoulder pain[7]. In a study on neck and shoulder complaints[5], 24% reported complete recovery after 3 months increasing to 32% after 12 months. Moreover, a study on elbow complaints reported 13% complete recovery and 24% much improvement (63% non-recovery) at 3 months compared to 34% and 21% at 12 months (45% non-recovery), respectively[8]. A study on neck pain in general practice, reported 37%[4] non-recovery after 12 months. Most studies[5,7,8] consisted of patients with a 'new' complaint or episode meaning that the GP had not been consulted in the previous 3 months, respectively 6 months as in our study. Our population consisted mostly of patients with complaints at neck, shoulder, or elbow.

The complaint-specific predictors of poor outcome in our study were: long duration of the complaint, having a recurrent complaint and musculoskeletal comorbidity. Of these complaint-specific predictors, long duration is most frequent reported in studies on neck, shoulder and elbow complaints[4,5,6,7,8,11]. The predictor recurrent complaint was also found in several studies on complaints of neck[4], neck and shoulder[5] and elbow[8]. Musculoskeletal comorbidity is more difficult to compare, because of differences in definition. We defined it as concomitant musculoskeletal complaints, mainly consisting of low back pain, followed by osteoartritis of hip or knee; only a few (n=23) reported comorbidity of arm, neck or shoulder. Though these were not the

complaints they consulted for, these complaints may be related. When we run the analyses excluding these cases it did not change the model.

In other studies concomitant musculoskeletal complaints[8] or low back pain[4,7,25] was also predictive of poor outcome.

We found no association of baseline complaint severity and functional limitations with non-recovery as in two studies on neck pain[4,25]. In contrast, Kuijpers et al[7] and Haahr et al.[9] found high pain severity to be predictive of persistence at 6 months. Bot et al.[5] only found baseline pain intensity predictive at 3 months, not at 12 months. Besides, studies reported on other outcomes as (change in) pain intensity/severity and (change in) functional limitations[4,5,8].

Having a complaint mainly located at wrist or hand was related to non-recovery at 6 months in the total population. When we looked closer at the group with mainly wrist-hand complaints, more non-recovery was present among participants with a non-specific diagnosis and concomitant complaints at neck-shoulder (data not shown).

Further, we found that having a specific diagnosis was associated with recovery. However, the total group with specific diagnoses mainly consisted of specific shoulder complaints (e.g. bursitis, rotator cuff, frozen shoulder) followed by epicondylitis and the non-specific complaints were mainly located at the neck-shoulder region, the same trend was also found in the three regions separately.

The variable 'specific diagnosis' was accomplished by dichotomisation of the diagnosis given by the treating GP at the first consultation. Because of this and the fact that this diagnosis was realised in a non-standardised manner, we cannot rule out some misclassification. This may have resulted in less contrast between the two groups and a less strong relation with non-recovery.

Many psychosocial variables were univariately related to non-recovery at 6 months, but only two were independent predictors. Less social support predicted non-recovery at 6 months. Bot et al.[8] found an association with changes in pain severity and disability at 3 months and Bonde et al [14] with slow recovery at 12 months. Social support may be important in order to cope with the consequences of these complaints.

Besides, high scores on somatisation predicted non-recovery. Thus when having a musculoskeletal complaint and besides bodily symptoms as reaction to stress this was predictive of poor outcome. This was analogous to poor outcome in, musculoskeletal complaints[26], back pain[27] and acute whiplash patients[28].

On work variables, we found that low supervisory support was related to non-recovery of complaints at six months. This was similar to the results of Bonde et al.[14] on slow recovery after 1 year in a working population with shoulder tendonitis.

Haahr et al[9], however, found no relation of supervisor support with unchanged or worse overall development in tennis elbow state after 1 year.

An explanation for the influence of such support may be that, it may help emotionally, but also in a practical way to make adjustments to the work situation in order to continue one's tasks. In contrast to others [11,14], we did not find an impact of job demands on poor outcome. Neither did we find an impact of physical work strain, which was in line with Bonde et al.[14], where worker independent observational methods were used to quantify physical strain, but in contrast to Haahr et al.[9] where job title was used to classify physical strain.

Because our heterogeneous population consists mostly of patients with complaints at neck, shoulder, or elbow, we checked whether the univariate results for the total population applied for the separate regions. In the subgroup elbow or forearm complaints, having a recurrent complaint and experiencing little social support seems to be of less importance for non-recovery compared to the other regions. Further age and functional limitations seems more important in wrist or hand complaints. But in general we found the same associations for the three subgroups, though the strength of the relation sometimes differed which can be due to the different population sizes.

Further, we found additive value of the final models compared to the prognosis of the GP alone.

Thus, information on these variables at the first consultation can help a GP to make a better estimation whether a patient will still have complaints after 6 months. The decline in relationship of the GP prognosis with non-recovery, when the variables of the final model are added, indicates that the prognosis is at least partly based on information of these variables.

Although we investigated a wide range of possible prognostic variables, we could only correctly identify some as predictive of non-recovery of complaints. In our observational study no data on physical examination were available. A reduced range of motion might be a prognostic variable that possibly overlaps with the variable functional limitations we included. Here, we chose to measure functional limitations with the DASH[15], a validated complaint specific instrument for arm, hand and shoulder. Though this questionnaire was originally not developed for neck complaints, we saw similar scores in patients with neck complaints compared to patients with arm, shoulder and hand complaints.

Besides we checked whether the DASH was equally predictive of non-recovery in both 'only neck complaints' and 'no neck complaints' with stratified univariate logistic regression. The strength of the relation in both subgroups seemed comparable, but the difference of group sizes is large.

Besides the variables included in the final model, treatment may also predict outcome. However, we chose not to add treatment in the model because treatment decisions depend on differences in the presented complaints (e.g. diagnosis, severity of complaints, comorbidity) and treatment can be adapted when changes occur in the presentation of these complaints. Interpretation of treatment as a predictive variable is therefore very difficult.

In a heterogeneous general practice population, we have identified variables, predictive of non-recovery of arm, neck and shoulder complaints at 6 months after the first consultation. In the total population, 46% reported non-recovery at 6 months. Variables most predictive of non-recovery included in the final model were complaint characteristics, high somatization, little social support, and little supervisory support. Having a specific complaint was positively associated with recovery. According to these results, besides questions on complaint characteristics, information on psychosocial characteristics can help a GP to identify patients at risk of non-recovery at 6 months. Attention should therefore also be paid to somatization and experienced support both in the private and the work situation.

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Appendix 1. Diagnoses included in the study

	Number of patients
Specific diagnoses	
Cervical hernia	5
Subacromial impingement syndrome (rotator cuff syndrome, tendinoses, bursitis)	220
Frozen shoulder	9
Biceps tendinosis	2
Lateral/medial epicondylitis	93
Bursitis elbow	3
Osteoarthritis of elbow (no RA)	2
Cubital tunnel syndrome	2
Peritendinitis/tenosynovitis flexors/extensors forearm	13
Quervain's syndrome	13
Guyon's tunnel syndrome	5
Radial tunnel syndrome	1
Carpal tunnel syndrome	11
Free body of wrist or hand	1
Raynaud's phenomenon and peripheral neuropathy in combination with exposition to hand-arm vibration	1
Trigger finger	2
Ganglion	5
Osteoarthritis of wrist or hand (no RA)	14
Non-specific	
All other arm, neck and shoulder complaints not attributable to trauma or systemic diseases	280

Appendix 2. Predictors of non-recovery of complaints at 6 months after the first consultation among patients with arm, neck or shoulder complaints: results of univariate logistic regression analyses stratified per region.

	Neck or shoulder (n=476)		Elbow or forearm (n=155)		Wrist or hand (n=118)	
Variables	**% all**	**OR (95% CI)**	**% all**	**OR (95% CI)**	**% all**	**OR (95% CI)**
Patient characteristics						
Age 45-64 years vs 18-44 years	51	1·7 (1·2-2·4)	61	1·6 (0·8-3·1)	55	3·0 (1·4-6·3)
Male	40	0·9 (0·6-1·3)	39	0·8 (0·4-1·5)	37	1·1 (0·5-2·2)
Body Mass Index (kg/m²) >25·0	50	1·4 (0·9-1·9)	54	2·1 (1·1-4··0)	48	1·2 (0·6-2·4)
Educational level:* Low	36	1	39	1	38	1
Medium	38	0·7 (0·5-1·0)	33	0·5 (0·20-1·1)	35	0·6 (0·2-1·4)
High	26	0·7 (0·5-1·1)	28	0·8 (0·4-1·7)	27	0·4 (0·2-1·0)
Having paid work	77	0·6 (0·4-1·0)	81	0·5 (0·2-1·2)	70	0·3 (0·1-0·8)
Complaint specific determinants						
Duration of the complaint: 0-6 weeks	50	1	48	1	36	1
6 weeks –6 months	22	2·6 (1·6-4·3)	30	1·4 (0·7-3·0)	26	1·4 (0·5-3·6)
>6 months	28	5·5 (3·4-8·7)	23	5·3 (2·2-13·1)	37	7·6 (2·8-20·3)
Complaint severity in the last week >6	43	1·1 (0·7-1·5)	39	1·2 (0·6-2·3)	40	1·5 (0·7-3·2)
Functional limitations, DASH >35·34	51	1·5 (1·1-2·2)	57	1·8 (1·0-3·5)	52	3·5 (1·6-7·6)
Poor perceived general health	14	3·9 (2·2-7·1)	12	3·8 (1·3-11·0)	18	2·3 (0·8-6·3)
Trauma of arm, neck or shoulder in the past	17	1·8 (1·1-3·0)	17	1·0 (0·4-2·3)	25	1·8 (0·8-4·3)
Musculoskeletal comorbidity	48	2·1 (1·5-2·8)	55	1·8 (1·0-3·1)	54	3·2 (1·7-6·0)
Non-musculoskeletal comorbidity	24	1·4 (0·9-2·1)	20	1·5 (0·7-3·4)	28	1·9 (0·8-4·3)
Recurrent complaint	30	3·0 (2·0-4·5)	23	1·3 (0·6-2·8)	23	3·6 (1·3-9·7)
Specific complaint	52	0·8 (0·6-1·2)	77	0·7 (0·4-1·3)	68	0·7 (0·3-1·6)
Multiple region complaint vs regional complaint	42	1·6 (1·1-2·3)	72	1·9 (0·9-4·0)	71	1·7 (0·7-3·7)
Physical activity in leisure time						
Active sports participation	42	0·7 (0·5-1·0)	42	0·6 (0·3-1·1)	36	0·8 (0·4-1·7)
Physical activities in leisure time						
- Heavy physical load [0-12], score >3	25	0·7 (0·5-1·1)	27	0·9 (0·4-1·8)	24	1·9 (0·8-4·7)
- Static repetitive load [0-6], score >2	22	1·4 (0·9-2·2)	27	1·1 (0·6-2·3)	25	1·0 (0·5-2·4)

Appendix 2 continued

		Neck or shoulder (n=476)		Elbow or forearm (n=155)		Wrist or hand (n=118)	
Variables		**% all**	**OR (95% CI)**	**% all**	**OR (95% CI)**	**% all**	**OR (95% CI)**
Psychosocial characteristics							
Somatization [0-32]:	Low [0-10]	71	1	70	1	73	1
	Medium [11-20]	24	2·9 (1·9-4·5)	25	5·4 (2·4-12·3)	23	1·6 (0·7-3·9)
	High [21-32]	5	2·9 (2·8-24·8)	5	4·7 (0·9-25·2)	4	N·A·
Distress [0-32]:	Low [0-10]	61	1	68	1	64	1
	Medium [11-20]	26	1·3 (0·8-1·9)	19	2·3 (1·0-5·4)	25	1·7 (0·7-4·0)
	High [21-32]	13	2·7 (1·5-4·8)	13	1·4 (0·5-3·7)	11	2·2 (0·6-7·7)
Kinesiophobia, Tampa-AV [13-52], score>24		50	1·6 (1·1-2·4)	53	1·1 (0·6-2·1)	46	2·3 (1·1-5·0)
Low Social support, SOS [12-60], score <56		52	2·3 (1·6-3·3)	53	1·2 (0·6-2·3)	45	2·1 (1·0-4·5)
Catastrophizing, CSQ [0-60], score >9		51	1·6 (1·1-2·3)	42	1·3 (0·7-2·6)	42	1·4 (0·7-3·0)
Yes, I can influence my health through my own behaviour		60	0·7 (0·5-1·1)	58	0·4 (0·2-0·8)	45	0·5 (0·2-1·0)

OR= odds ratio; n.a.= not applicable; n=number of patients; DASH=disability of arm shoulder and hand questionnaire;4DSQ=four-dimensional symptom questionnaire; SOS=social support scale; CSQ=coping strategy questionnaire; TAMPA-AV= tampa adjusted version; PWQ=physical workload questionnaire; JCQ: Job Content Questionnaire. * Educational level: low: no education, primary school or lower vocational school; medium: lower or higher general secondary school level or middle vocational school); high: higher vocational school or university.

4

Kinesiophobia in patients with non-traumatic arm, neck and shoulder complaints: a prospective cohort study in general practice

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ABSTRACT

Background and Objective Complaints of arm, neck and shoulder are common in Western societies. Of those consulting a general practitioner (GP) with non-traumatic arm, neck or shoulder complaints, about 50% does not recover within 6 months.

Kinesiophobia, (also known as fear of movement/(re)injury) may also play a role these complaints, as it may lead to avoidance behaviour resulting in hypervigilance to bodily sensations, followed by disability, disuse and depression. However, in relation to arm, neck and shoulder complaints little is known about kinesiophobia and its associated variables.

Therefore this study aimed to: describe the degree of kinesiophobia in patients with non-traumatic complaints of arm, neck and shoulder in general practice; to determine whether mean scores of kinesiophobia change over time in non-recovered patients; and to evaluate variables associated with kinesiophobia at baseline.

Methods In this prospective cohort study set in general practice, consulters with a first or new episode of non-traumatic arm, neck or shoulder complaints (aged 18-64 years) entered the cohort. Baseline data were collected on kinesiophobia using the Tampa Scale for Kinesiophobia, the13-item adjusted version: TSK-AV, and on patient-, complaint-, and psychosocial variables using self-administered questionnaires. The mean TSK-AV score was calculated. In non-recovered patients the follow-up TSK-AV scores at 6 and 12 months were analyzed with the general linear mixed model. Variables associated with kinesiophobia at baseline were evaluated using multivariate linear regression analyses.

Results The mean TSK-AV score at baseline was 24.8 [SD: 6.2]. Among non-recovered patients the mean TSK-AV score at baseline was 26.1 [SD: 6.6], which remained unchanged over 12- months follow-up period. The strongest associations with kinesiophobia were catastrophizing, disability, and comorbidity of musculoskeletal complaints. Additionally, having a shoulder complaint, low social support, high somatization and high distress contributed to the kinesiophobia score.

Conclusions The mean TSK-AV score in our population seems comparable to those in other populations in primary care. In patients who did not recover during the 12- month follow-up, the degree of kinesiophobia remained unchanged during this time period. The variables associated with kinesiophobia at baseline, appear to be in line with the fear-avoidance model.

BACKGROUND

Complaints of arm, neck and shoulder are common in Western societies[1,2]. In the Netherlands, the 12 months prevalence in the general population has been estimated at 31% for neck pain, 30% for shoulder pain, 11% for elbow pain and 18% for wrist or hand pain[1]. The general practitioner (GP) is often consulted for these complaints[1,3,4]. In Norway 45% of adults experiencing non-inflammatory musculoskeletal pain reported consulting a GP within 12 months[3]. In persons with arm, neck and shoulder pain in the Netherlands this was about 30-40%[1].

A multi-disciplinary consensus was recently reached in the Netherlands to define upper extremity musculoskeletal disorders, to help professionals classify patients unambiguously and to improve communication amongst health care workers[5]. For the present study, we defined complaints as the symptoms for which a patient consults his/her GP, e.g. pain when active, pain in rest, tingling, stiffness, loss of strength, numbness, cold feeling in shoulder, arm or hand[5,6].

In the Netherlands, GPs are consulted 66 times annually per 1000 registered persons for a new complaint or new episode of neck or upper extremity complaints[4].

Despite treatment of these complaints, many patients do not completely recover within 3, 6 or 12 months after the first consultation. Previous work in the present population of non-traumatic arm, neck and shoulder complaints showed that, 46% of the patients still reported non-recovery after 6 months[7]. Similar results were found after 6 months in studies on shoulder pain[8,9]. Another study on neck and shoulder complaints reported 24% complete recovery after 3 months increasing to 32% after 12 months[10]. In a study on elbow complaints 13% reported complete recovery and 24% much improvement at 3 months compared with 34% and 21%, respectively, at 12 months[11].

Non-recovery in complaints of arm, neck and shoulder may be explained through the cognitive-behavioural oriented model for persistence of pain[12]; this model has been validated in chronic low back pain. Here, kinesiophobia, (also known as fear of movement/(re)injury) may lead to avoidance behaviour resulting in hypervigilance to bodily sensations, followed by disability, disuse and depression which may lead to a vicious circle of fear and avoidance in patients experiencing pain. This is in contrast to non-catastrophizing patients in whom not pain-related fear but rather a rapid confrontation with daily activities is likely to occur, leading to faster recovery. In support of this model, studies on patients with chronic low back pain reported that patients with higher levels of pain-related fear, have higher scores on pain and disability[12-15]. Furthermore, studies on acute low back pain and osteoarthritis in primary care have confirmed the relation between fear avoidance and disability [14,16,17].

In contrast to low back pain, for non-traumatic complaints of the arm, neck and shoulder little is known about the degree of kinesiophobia as measured with the Tampa Scale for Kinesiophobia[18] and its associated variables[12,17].

So far, no studies have investigated whether kinesiophobia remains stable during the transition period from new episode to chronic complaint. However, we expect the mean kinesiophobia scores to remain stable over time, because kinesiophobia was not specifically intervened upon.

In addition, we expect that those variables of the fear-avoidance model involved in low back pain will also be associated with kinesiophobia in the case of non-traumatic arm, neck and shoulder complaints.

The aims of the present study were: (1) to examine the degree of kinesiophobia in patients with non-traumatic complaints of arm, neck and shoulder in general practice; (2) to establish whether the mean scores of kinesiophobia change over time in non-recovered patients; and (3) to evaluate variables associated with kinesiophobia in these patients at baseline.

METHODS

Design and setting

The present study was part of a larger prospective descriptive cohort study which was performed in the Southwestern region of the Netherlands in 21 general practices.

During the 12- month study period, individual patient data were collected using self-administered questionnaires.

Subjects

A total of 36 GPs from 21 practices recruited eligible patients from September 2001 through December 2002.

Inclusion criteria were: patients who visited their GP with a new complaint or new episode of complaints of neck, upper back, shoulder, upper arm, elbow, forearm, wrist or hand[6], age 18 through 64 years, and able to complete Dutch language written questionnaires. The episode was considered 'new' if patients had not visited their GP for the same complaint during the preceding 6 months.

Excluded were patients for whom the presented complaint could be explained by a trauma, fracture, malignancy, amputation, prosthesis, congenital defect or existing systemic and/or generalised neurological disorder and patients without a baseline score on the Tampa Scale for Kinesiophobia (TSK).

For the question on non-recovered patients, an additional inclusion criterion was applied, i.e. patients had to report on non-recovery. When they reported being "worse than ever" to "slightly improved" on a 7-point ordinal scale at both 6 and 12 months follow-up, they were considered to be non-recovered. Patients scoring "much improved" or "completely recovered" were considered to be recovered.

The Medical Ethics Committee of the Erasmus Medical Center in Rotterdam approved the study protocol. Written informed consent was obtained from all patients.

Procedures

During the first consultation, patients received from their GP the study-information, an informed consent form, and the baseline questionnaire. A fax was sent by the GP to the investigators with a patient ID number, and information on age, gender, diagnosis and expected prognosis. After the research team received the completed informed consent form and the baseline questionnaire (within 8 weeks), inclusion criteria were verified in the computerized medical records. After inclusion, two follow-up questionnaires were sent from the research centre, one at 6 months and another at 12 months after the first consultation. All three questionnaires were self-administered.

(1) Tampa Scale for Kinesiophobia

Kinesiophobia was measured using the Dutch version of the TSK[18]. Each item is scored on a 4-point Likert scale with scores ranging from 1 "strongly disagree" to 4 "strongly agree". Good internal consistency, test-retest reliability and validity of the TSK in patients with low back pain and fibromyalgia have been demonstrated [12,19,20]. Originally, the TSK consisted of 17 items, including 4 reversed items. However, recent studies showed that the 4 reversed items had weak associations with the total TSK score and leaving out these items improved the factor structure of the TSK[18-20]. Therefore, we omitted these reversed items and used the adjusted version of the TSK with 13 items (TSK-AV). The total score can range from 13 to 52, with a higher score indicating a higher degree of kinesiophobia.

The TSK-AV was measured at baseline in all patients, and at 6 months and 12 months; at the two latter follow-up moments only patients who were not recovered had to complete the TSK-AV.

(2) Changes over time in non-recovered patients.

Patients were included when they reported non-recovery at both 6 and 12 months follow-up (Fig. 1).

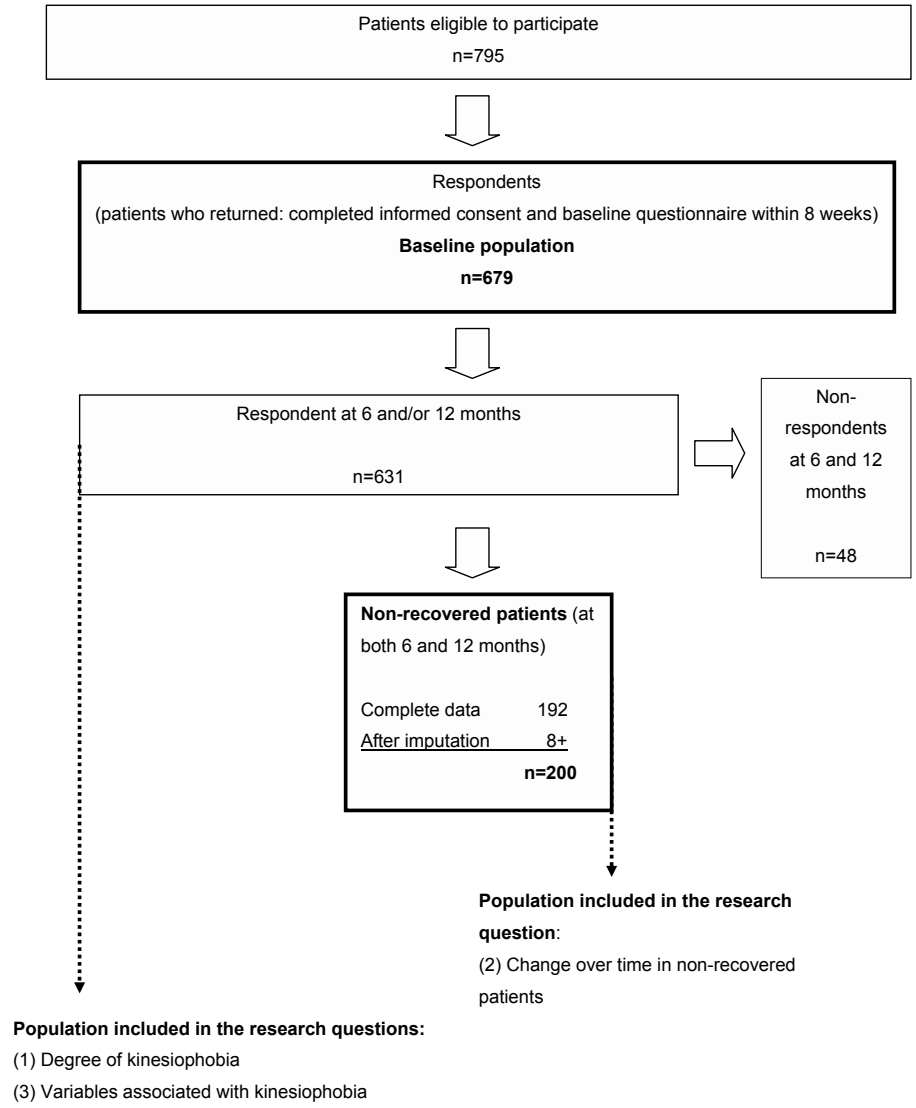

Figure 1. Flow-chart showing progression of the study

(3) Variables possibly associated with kinesiophobia

In the current study the variables explored were based on variables previously investigated in chronic (low back) pain[12,15]. Also included were other variables that seemed necessary based on the fear-avoidance model: i.e. active participation in sports (confrontation), musculoskeletal comorbidity (fear due in part to other complaints), recurrent complaint (good/bad previous experience with avoidance or confrontation), whether or not the complaint was located at a single site (thus more

controllable), whether it matters where the complaints are located, and whether catastrophizing is the most important variable or whether other psychosocial variables are more or equally strongly associated with kinesiophobia.

The following variables were included in the model:

Patient characteristics. Age, gender, education level (low: no education, primary school or lower vocational school; medium: lower or higher general secondary school level or middle vocational school); high: higher vocational school or university), having paid work ('yes' when the question 'are you currently (self-)employed' was answered with the affirmative), and doing sports ('yes' when 'at least one hour a week actively performing sports intensely enough to became sweaty');

Complaint-specific determinants. Duration of the complaint before consulting the GP (0-6 weeks; 6 weeks-6 months; >6 months), complaint severity in the previous week measured on an 11-point numerical scale from 0 (no complaints) to 10 (unbearable complaints). Disability of the arm, neck, shoulder or hand was measured with the Disability of Arm Shoulder and Hand (DASH)- questionnaire [21]. Each item was scored on a 5-point Likert scale. Response scores were summed and transferred to a score ranging from 0 (no disability) to 100 (completely disabled); a single- sited complaint (the patient indicated a single location on a manikin) versus multiple- sited complaint, location of the complaint (more than 1 is possible) and musculoskeletal comorbidity (other than the complaint consulted for), and recurrent complaints.

Psychosocial characteristics. Somatization and distress, both measured with the Four Dimensional Symptom Questionnaire (4DSQ), have been validated in Dutch populations in primary care[22]. A higher score indicates a higher degree of somatization or distress: Scores: low (0-10), medium (11-20), high (21-32).

Social support was measured with the Social Support Scale (SOS), a Dutch version of the 'Social Support Questionnaire' (SSQ)[23] and validated in Dutch primary care[24]. A higher score indicates a higher degree of social support.

Catastrophizing was measured with a subscale of the Dutch adaptation of the Coping Strategy Questionnaire (CSQ)[25,26], validated in a Dutch population. A higher score indicates a higher degree of catastrophizing.

An impression of health locus of control was assessed by one simple question 'Do you believe you can influence your health through your behaviour?' scored on a 4-point Likert-scale. The scores "considerable" or "to a large extent" were considered as 'yes'[27].

Statistical analyses

(1) Degree of kinesiophobia

The mean TSK-AV score of the total population was calculated.

(2) Changes over time in non-recovered patients

In case a patient reported non-recovery at either 6 or 12 months and had a missing at the other follow-up time, 'belonging to the non-recovery group' was estimated using the multiple imputation technique[28]. This was done to decrease the possibility of selection bias. Multiple imputation assumes that data are missing at random (attrition depends on observed, not on unobserved variables) [29]. The computations were carried out with IVE ware (IVE ware, version 2.0, University of Michigan, USA, 2002). The variables univariately associated with non-recovery in this population ($p<0.10$), extensively described in a previous study[7], were used for the imputation of non-recovery. We decided that when the value 1 (i.e. complaints) was imputed at least 6 times out of 10 for a particular patient, this patient would be considered as non-recovered.

The final group that reported non-recovery was used to analyze whether or not there was a change in the mean TSK score over 12 months. This was analyzed with the general linear mixed model, which takes correlation within subjects into account. No assumptions regarding the co-variance matrix were made. The analysis takes measurement error into account.

(3) Variables associated with kinesiophobia

Linear regression analysis was used to assess which determinants at baseline are related to kinesiophobia, with the TSK-AV score (range 13-52) as independent variable.

All independent variables were measured with a self-administered questionnaire. All scores were categorised. For possible determinants with clinically relevant classifications or predefined validated cut-offs, the existing cut-offs were used. If such cut-off points were not available for our population, the score was dichotomised according to the median score. Median scores were used for age, disability, social support and catastrophizing.

Variables that were univariately associated with kinesiophobia ($p<0.10$) were selected for a multivariate analysis (step backward) procedure. When only one category of a categorical variable had a p-value less than 0.10, this variable also entered the model. The assumption of linear regression of homoscedasticity (constant variance of the residuals) was checked. Variables remained in the final model when they had a p-value<0.05.

Differences between respondents and non-respondents regarding age, gender and recurrent or incident complaint, were analysed by multivariate logistic regression analyses (step backward). Variables remained in the final model when they had a significance level <0.05.

Regression analyses were performed using SPSS version 11.0 (Chicago, IL, USA). Analyses of repeated measurements with the general linear mixed model were performed in SAS 8.2 (Cary, NC, USA).

RESULTS

A total of 795 patients fulfilled the criteria, of which 679 (85%) entered the cohort after they returned the completed questionnaire and informed consent form. The mean time between consultation and filling in the questionnaire was 2 weeks. Being a respondent was associated with older age (>45 years) (odds ratio: 1.6; 95%CI: 1.0-2.3).

The number of patients entering the cohort and responding to the second (6 months) and third (12 months) questionnaire was 606 (89%) and 565 (83%), respectively. In total there were 48 non-responders on both the second and the third questionnaire.

(1) Degree of kinesiophobia

At baseline, the mean score on the TSK-AV was 24.8 [SD: 6.2]. The median age of the study population was 45 years and 41% (n=281) was men. The majority had paid work (78%) and less than half of the group practiced sports (44%). In 51% of the cases the GP was consulted within 6 weeks after onset of the complaint, 49% reported musculoskeletal comorbidity and 28% had endured the same complaint prior to the current episode.

Additional data on baseline characteristics are presented in Table 1.

(2) Changes over time in non-recovered patients

A total of 192 patients reported non-recovery at both 6 and 12 months. For 32 patients it was unknown at one point in time whether or not they were in fact non-recovered. After the multiple imputation procedure, 8 of these 32 patients were defined as non-recovered. This resulted in a total cohort of 200 non-recovered patients at 6 and 12 months (Fig. 1).

In total, 48 patients were lost to follow-up at both 6 and 12 months. Mean score of the 48 dropouts on the TSK-AV (24.9 [SD: 5.6]) at baseline was similar to that of the 192 selected patients at baseline (26.0 [SD: 6.6]).

For the total of 200 non-recovered patients there was no significant change in kinesiophobia at 6 and 12 months compared to baseline (Table 2). When this analysis was repeated for the 192 non-recovered patients with complete data, the same result emerged.

Table 1. Baseline characteristics of the study population.

Variables		Internal missings *(n items)*	Total population *(n=679)*
Patient characteristics			
Age (yrs) (18-64), *median (range)*		0	45.0 (18-64)
Male, *n (%)*		0	281 (41.4)
Educational level[a] ,*n (%)*	low	0	243 (35.8)
	medium		242 (35.6)
	high		194 (28.6)
Having paid work, *n (%)*		0	532 (78.4)
Active sports participation, ≥1h/week, *n (%)*		0	302 (44.5)
Complaint- specific determinants			
Duration of the complaint, *n (%); n=678*	0-6 weeks	1	343 (50.6)
	6 weeks-6 months		161 (23.7)
	>6 months		174 (25.7)
Severity in the last week (0-10), *median (range); n=677*		2	6 [1-10]
Disability, DASH (0-100), *median (range); n=678*		3	35.3 (2.6-99.1)
Comorbidity musculoskeletal, *n (%)*		0	330 (48.6)
Recurrent complaint, *n (%)*		0	191 (28.0)
Multiple- sited complaint		0	263 (38.7)
Location[†], *n (%)*	neck	0	211 (31.1)
	upper back		53 (7.8)
	shoulder		374 (55.1)
	upper arm		86 (12.7)
	elbow		147 (21.6)
	forearm		41 (6.0)
	wrist		47 (6.9)
	hand		86 (12.7)
Psychosocial characteristics			
Kinesiophobia, Tampa-AV 13-item scale (13-52),*median (range)* ,	*mean (SD*	0	24.0 (13-46) 24.8 (6.2)
Social support, SOS (12-60), *median (range)*		0	56.0 (26-60)
Catastrophizing, CSQ (0-60), *median (range); n=678*		6	9.0 (0-53)
Somatization, 4DSQ (0-48), *n (%), n=678* low (0-10)		21	500 (73.8)
medium (11-20)			148 (21.8)
high (21-32)			30 (4.4)
Distress, 4DSQ (0-48) *n (%)*	low (0-10)	0	430 (63.4)
	medium (11-20)		170 (25.0)
	high (21-32)		79 (11.6)
Yes, I can influence my health through my own behaviour, *n (%)*		0	401 (59.1)

SD: standard deviation; n=number of patients. [a] Educational level: low: no education, primary school or lower vocational school; medium: lower or higher general secondary school level or middle vocational school); high: higher vocational school or university); [b] More than one location is possible; DASH=disability of arm shoulder and hand questionnaire;4DSQ=four-dimensional symptom questionnaire; SOS=social support scale; CSQ=coping strategy questionnaire; TAMPA-AV=Tampa adjusted version.

Table 2. Change in kinesiophobia score in non-recovered patients during 12- months follow-up.

Time	Mean score	Estimate of changes in kinesiophobia *(n=200)* ß (95% CI)
Baseline	26.12	0
6 months	26.89	0.77 (-0.12, 1.65)
12 months	26.14	0.01 (-0.97, 1.00)

Results from general linear mixed model. Of the 200 non-recovered cases, 8 were defined as non-recovered after imputation. Of the total 600 observations (3 per case) 583 could be used in the analyses.

(3) Variables associated with kinesiophobia

The results of the univariate and multivariate regression analyses are presented in Table 3. After multivariate regression analysis, 7 variables were significantly related to the score on kinesiophobia. Positive relations with kinesiophobia were found for a high degree of catastrophizing, a high degree of disability, and comorbidity of musculoskeletal complaints. Having a shoulder complaint was also related to a higher score on kinesiophobia. Further, low social support, high somatization and high distress contributed to the score, however the later two showed no clear dose- response relation with kinesiophobia.

DISCUSSION

Recent studies in primary health care, reported mean TSK-AV scores similar to our study group; these populations consisted of patients with chronic neck pain [30], osteoarthritis[17], and acute low back pain[16]. However, in secondary care two studies on chronic low back pain reported mean TSK-AV scores of 31.6 (SD: 7.2)[19] and 33.8 (SD: 7.6)[18]. In the non-recovered patients in our study group the mean TSK-AV score at 12 months follow-up was 26.1 (SD: 7.8).

A possible explanation for differences in mean kinesiophobia scores between primary care populations and patients with chronic complaints at other care levels, might be that fear is a predictive factor in developing chronic complaints. This would imply, that patients who develop chronic complaints more frequently have a higher baseline score compared to quick recovered patients. In previous work in the present population of patients with non-traumatic arm, neck or shoulder complaints, we found a univariate relation (odds ratio 1.4; 1.0 to 2.0) of the TSK-AV score (higher than the median score) with non-recovery at 6 months[7]. However, kinesiophobia did not contribute to the multivariate model on non-recovery[7].

Another study in general practice reported a small and only borderline significant effect of high fear avoidance predicting less future pain (at 3 and 12 months) and less functional disability (at 3 months)[10]. In both studies, other psychosocial variables

Table 3. Associations with kinesiophobia: results of univariate and multivariate linear regression analyses.

		Total population (*n=679*)	
		Univariate	Multivariate
Associated variables		B (95% CI)	B (95% CI)
Patient characteristics			
Older age (45-64 yrs)		0.67 (-0.26, 1.60)	
Male		0.33 (-0.61, 1.28)	
Educational level[a]	low	0	
	medium	0.98* (0.01, 1.95)	
	high	-1.58* (-2.64, -0.56)	
Having paid work		-0.03 (-1.16, 1.10)	
Active sports participation, ≥1h/week		-1.14* (-2.07, -0.20)	
Complaint- specific determinants			
Duration of the complaint	0-6 weeks	0	
	6 weeks-6 months	-0.66 (-1.76, 0.43)	
	>6 months	1.28* (0.21, 2.34)	
Complaint severity in the last week, score >6		1.80* (0.86, 2.74)	
Disability, DASH score >35.34		3.90* (3.01, 4.78)	2.78 (1.92,3.65)
Musculoskeletal comorbidity		2.38* (1.46, 3.29)	1.89 (1.05,2.74)
Recurrent complaint		1.08* (0.04, 2.11)	
Multiple- sited complaint		1.53* (0.58, 2.48)	
Location[b]	neck	-0.00 (-1.01, 1.01)	
	upper back	0.82 (-0.92, 2.56)	
	shoulder	1.44* (0.51, 2.37)	0.86 (0.04,1.69)
	upper arm	-0.49 (-1.89, 0.91)	
	elbow	1.06 (-0.70, 2.19)	
	forearm	0.56 (-1.39, 2.52)	
	wrist	-0.73 (-2.57, 1.10)	
	hand	-0.15 (-1.55, 1.25)	
Psychosocial characteristics			
Low social support, SOS (12-60), score <56		2.33* (1.37, 3.29)	1.17 (0.28,2.05)
Much catastrophizing, CSQ (0-60), score >9		4.26* (3.39. 5.14)	3.15 (2.27,4.03)
Somatization,4DSQ (0-32)	low (0-10)	0	0
	Medium (11-20)	0.45 (-0.68, 1.57)	-1.27 (-2.35,-0.19)
	high (21-32)	6.84* (4.63, 9.05)	2.39 (0.19, 4.60)
Distress, 4DSQ (0-32)	low (0-10)	0	0
	Medium (11-20)	0.78 (-0.30, 1.85)	0.07 (-0.96, 1.09)
	High (21-32)	4.22* (2.80, 5.64)	1.61 (0.12, 3.10)
Yes, I can influence my health through my own behaviour		-0.55 (-1.50, 0.40)	

n=number of patients; B=unstandardized coefficients; * p < 0.10; [a]Educational level: low: no education, primary school or lower vocational school; medium: lower or higher general secondary school level or middle vocational school); high: higher vocational school or university); [b] More than one location is possible; DASH=disability of arm shoulder and hand questionnaire; 4DSQ=four-dimensional symptom questionnaire; SOS=social support scale; CSQ=coping strategy questionnaire. Multivariate linear regression analysis: Adjusted R^2 = 0.24 (explained variance) and the intercept=21.17; total number of complete cases, n=675.

(such as worrying and somatization) were more important predictors of poor outcome than kinesiophobia[7,10]. A study in physiotherapy practice in these complaints, reported that high kinesiophobia, high catastrophizing and high somatization were predictors of non-recovery[31].

Differences in the distribution of population characteristics may affect the importance of kinesiophobia as a predictor of outcome. At baseline, our population consisted of 58% women, compared to 71% in the study of Karels et al.[31], duration of complaints less than 6 weeks: 50% vs 24%; 6 weeks-6 months: 24% vs 41%; and more than 6 months: 26% vs 35%; specific diagnosis (59% vs 36%).

Besides, distribution of population characteristics, the time period can play a role as well. Bot et al.[10] reported that the psychosocial variables predictive of outcome at 12 months, are different from those predictive of outcome at 3 months; which was in line with the findings of both Boersma and Linton[32] and van der Windt et al.[33] who reported that associations of several psychological variables and outcome can be different in subgroups with a longer duration of complaints.

Therefore, no consistent conclusions can yet be drawn about the prognostic value of kinesiophobia and fear avoidance, in the outcome in non-traumatic arm, neck and shoulder complaints and its consequences for treatment.

Furthermore, van der Windt et al. reported that possible differences on scores may be due to the location of complaints as well. In their prognostic study in primary care low back pain patients scored higher on catastrophizing, distress and somatization, compared to patients with shoulder pain. However, scores on fear avoidance did not significantly differ[33].

In our study population there was no change over time on mean TSK-AV scores in patients who did not recover from complaints of arm, neck or shoulder. However, no definite conclusion about the stability of scores in the transition from a new episode to chronic complaint, can be based solely on this result. Although all patients had a new episode of complaints for which they had not consulted their GP in the previous 6 months, at baseline 25.7% of them already reported that they had endured their symptoms for more than 6 months.

In an intervention study on treatment of kinesiophobia in 6 patients with chronic low back pain[34], the scores in the 4-week baseline period also seemed stable. Here, kinesiophobia scores were only reduced by an exposure in vivo intervention (not during graded activity). In this chronic low back pain population influencing kinesiophobia seems to require specific treatment. Although the results of the latter study seem to be in line with our results, it should be noted that these low back pain patients were recruited in rehabilitation, with a median pain duration of 4 years, and had to have a relatively high score (>=40) on the TSK to be included in the study[34]

Additionally, at baseline we found no multivariate relation of duration of complaint with the TSK-AV score. Time did not explain differences in the degree of kinesiophobia in primary care.

In our total population, at baseline, positive associations were found between kinesiophobia and a high degree of catastrophizing, a high degree of disability, and comorbidity of musculoskeletal complaints. Based on the 'fear- avoidance model'[12], the association between catastrophizing and the TSK score was expected, as also confirmed in patients with low back pain[13,19,20] and patients with chronic musculoskeletal and neuropathic diagnoses[20].

The association of disability, also part of the fear-avoidance model, has also been confirmed in other studies[15,16,18,20], some of which report on functional disability or functional limitations[17].In the present study, we used the disability of arm, shoulder and hand questionnaire (DASH), which, according to its developers focuses on physical function. According to the International Classification of Functioning (ICF), the DASH mainly focuses on disability at the level of activity limitations[35].

A noteworthy finding was that the presence of musculoskeletal comorbidity was associated with a higher score on kinesiophobia. On closer inspection of the subgroup reporting musculoskeletal comorbidity (n=330), we found that the majority also had low back pain, followed by a smaller group reporting osteoarthritis of hip or knee, and a few (n=23) reporting comorbidity of arm, neck or shoulder. However, we have no information on the duration of this co-occurring musculoskeletal complaint. This raises the question, whether the higher score on kinesiophobia was mainly the effect of the concurrent chronic low back pain, or a previous negative experience in general.

Although heterogeneity is the reality of the general practice population, we checked whether having comorbidity modified the association between the variables in the final model and kinesiophobia. This was not the case.

Furthermore, most psychosocial variables remained in the final multivariate model. Pearson correlation coefficients between the variables included in the final model ranged from –0.21 to 0.47, of which the highest was for distress and catastrophizing. Thus, distress, somatization and social support, do not measure the same thing, and each variable has its independent association with kinesiophobia. However, catastrophizing showed the strongest association with kinesiophobia.

Because in the present study the area of possible complaints was extensive (compared with studies on e.g. low back pain) we also included location of complaints as a variable. The results show that complaints involving the shoulder were positively related to kinesiophobia; we have no clear explanation for this finding. A possible explanation may be that the shoulder is a large and central joint (compared to

elbow, wrist and hand) providing stability and mobility in many stances and movements of the whole upper extremity. However, this was not confirmed by additional analyses in which we compared mean disability scores. Further, we did not find more musculoskeletal comorbidity among patients with shoulder complaints. Besides a true association, this association may partly be explained by a larger group size and accompanying smaller confidence intervals and smaller p-values compared with, e.g., complaints located at the elbow.

The present study has some limitations that need to be addressed. First, the questions on the TSK-AV relate to 'pain', whereas our patients reported on 'complaints' (as defined in the introduction) and not exclusively on pain. However, 675 (99%) patients reported pain when active and/or in rest, and only 4 patients, without pain, reported on tingling. Therefore, our results will also hold when excluding these 4 latter patients. Besides, although the cognitive-behavioural oriented model was developed for persistence of pain, the concept of avoidance behaviour may also be applicable in patients reporting other complaints, such as tingling. Nevertheless, no definite conclusions can be drawn on this matter. In patients with chronic fatigue syndrome however, fear- avoidance has also been reported[36]. After our inclusion period had started in September 2001, we found reports on an adjusted Tampa scale for patients with chronic fatigue syndrome where the term 'pain' had been replaced by 'symptoms'[36]. In the present study, replacing 'pain' by another term might have been a better option.

Since its development in chronic and later acute low back pain patients, the TSK has also been introduced in other populations (e.g. chronic fatigue syndrome[36], osteoarthritis[17], chronic neck pain[30], pain- free people[37]). In patients with non-traumatic arm, neck and shoulder complaints, the TSK has been used as a possible predictor in prognostic studies[7,11,31], and as outcome measure in randomised clinical trials in chronic neck pain[30]. So far, no studies have reported on the psychometric properties of the TSK in arm, neck and shoulder complaints. Although our mean score seems comparable to those in other primary care populations, and associated variables seem in line with other studies, future studies on psychometric properties need to confirm whether the TSK is a valid measurement instrument in this particular population.

Another limitation is that we used one simple question to give an indication of 'health locus of control', instead of using a validated multi-item questionnaire; therefore, the strength of the association should be interpreted with caution. However, the negative direction of the association was as expected, i.e. a higher degree of kinesiophobia was associated with less health locus of control.

Despite also being part of the fear avoidance model, we did not measure depression in our patients. Although we did include questions on several other psychosocial variables, we considered that the questions of the 4DSQ depression scale (e.g.: "During the past week, did you feel that life was meaningless?"; Did you feel that life is not worth while?; "Did you feel that you would be better off if you were dead?") were less appropriate in our population with new non-traumatic arm, neck and shoulder complaints. In the validation study of the 4DSQ, Terluin et al. reported that the applicability of their depression scale was limited in an unselected sample of primary care patients (n=2,127) because of the low mean scores on depression, due to the relatively low prevalence of depressive disorders; they further concluded that the distress score that was measured, gives an indication of psychosocial dysfunctioning in general, including mild depressive symptoms[22]. However, including depression in our study would have yielded some additional information.

The mean TSK-AV score in our population of patients with non-traumatic arm, neck and shoulder complaints seems comparable to those in other populations in primary care.

In patients who did not recover during the 12- month follow-up, the degree of kinesiophobia remained unchanged during this time period.

The variables associated with kinesiophobia at baseline appear to be in line with the fear-avoidance model.

Future studies are needed to provide more data on the psychometric properties of the TSK-AV and the prognostic value of kinesiophobia on outcome in this particular population.

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5

Management in non-traumatic arm, neck and shoulder complaints;

differences between diagnostic groups

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ABSTRACT

Background Arm, neck and/or shoulder complaints are common in western societies. In the Netherlands, general practice guidelines are issued on shoulder pain and epicondylitis only. Little is known about actual management of the total range of diagnoses.

Objectives To determine management in patients consulting the GP with a new episode of non-traumatic arm neck and shoulder complaints up to 6 months after the first consultation. To evaluate differences in management between patients with specific diagnoses versus non-specific diagnoses and between specific diagnostic groups.

Methods Prospective cohort study in general practice. We recruited 682 eligible patients. Data on diagnosis, management, patient and complaint characteristics were collected. Co-occurrence of treatment options was presented in scaled rectangles.

Results After 6 months, additional diagnostic tests had been performed in 18% of the patients, mainly radiographic examination (14%). Further, 49% had been referred for physiotherapy and 12% to the medical specialist. Patients with specific diagnoses were more frequently referred for specialist treatment, and patients with non-specific diagnoses for physiotherapy. Corticoisteroid injections (17%) were mainly applied specific diagnoses (e.g. impingement syndrome, frozen shoulder, carpal tunnel, and M. Quervain). Frequencies of prescribed medication (51%) did not differ between specific and non-specific diagnoses. In 19% of the patients no referral, prescribed analgesics or injection was applied. Braces (4%) were mainly prescribed in epicondylitis.

Conclusions Management most frequently consisted of prescribed analgesics and referral for physiotherapy. Specific and non-specific diagnostic subgroups differed in the frequency corticosteroid injections were applied, and referrals to physiotherapy and to a medical specialist.

INTRODUCTION

Complaints of arm, neck and shoulder are very common in Western societies[1,2]. In the Netherlands, the 12 months prevalence in the general population has been estimated at 31.4% for neck pain, 30.3% for shoulder pain, 11.2% for elbow pain and 17.5% for wrist or hand pain[1].

The general practitioner (GP) is often consulted for these complaints[1,3,4].

Studies in the general population in Norway reported that 45% of the adults with non-inflammatory musculoskeletal pain consulted a GP in the previous 12 months[3]. In persons with arm, neck and shoulder pain in the Netherlands, this was about 30-40%[1].

Incidence figures in patients (aged 18-64 years) with non-traumatic arm, neck or shoulder complaints in Dutch general practice, reported 97 consultations per 1000 registered persons annually. This indicates approximately 3 consultations per week in an average practice with 2350 patients[5].

Among the prominent factors in patients with musculoskeletal pain associated with consultation of a GP[3,6] or health care in general[7] are: high pain intensity[3,7], much disability[7], sickness absence[3,6], long duration of the complaint[3,6] and widespread pain[3]. Thus, when people feel hindered by their complaints, they are more likely to consult their GP.

To define upper extremity musculoskeletal disorders (not caused by acute trauma or systemic disease) a multi-disciplinary consensus was recently reached in the Netherlands. The aim was to help professionals classify patients unambiguously and to improve communication amongst health care workers. Within these complaints, 23 disorders were classified as specific because they were judged as diagnosable disorders by experts[8].

Distinction between diagnostic groups is important if these groups have different prognoses or require different management decisions.

For management in these complaints, guidelines issued by the Dutch College of General Practitioners are only available for patients diagnosed with epicondylitis and shoulder pain[9,10].

So far, no studies reported on how non-traumatic arm, neck and shoulder complaint are managed after a patient consults his/her GP, nor compared management between different diagnostic groups (such as: shoulder impingement, carpal tunnel syndrome, epicondylitis, and non-specific neck-shoulder pain). Therefore, data on management can help to define usual care in these complaints, or may show that there is a large variation in care. This insight may serve as information important for future trials, providing evidence of efficacy of the various treatments used and their cost utility.

Our objectives are: to determine management in patients consulting the GP with a new episode of non-traumatic arm neck and shoulder complaints up to 6 months after the first consultation. To evaluate differences in management between patients with specific diagnoses versus non-specific diagnoses and between specific diagnostic groups.

METHODS

Design and setting

The present study was part of a larger prospective cohort study on course and management, which was performed in the Southwestern region of the Netherlands in 21 general practices. At baseline and after 6 months, data were collected from patients by means of self- administered questionnaires. The Medical Ethics Committee of the Erasmus Medical Center in Rotterdam approved the study protocol.

Patients

In total, 31 GP's recruited eligible patients from September 2001 through December 2002. Inclusion criteria were: patients who consulted their GP for a new complaint or new episode of complaints of neck, upper back, shoulder, upper arm, elbow, forearm, wrist or hand (age 18-64 years) and able to complete Dutch language written questionnaires. The episode was considered 'new' if patients had not visited their GP for the same complaint during the preceding 6 months. We excluded patients of whom the presented complaint could be explained by a trauma, fracture, malignancy, amputation, prosthesis, congenital defect or previously diagnosed systemic and/or generalised neurological disorder.

Procedures

During the first consultation, patients received from their GP the study-information, an informed consent form, and the baseline questionnaire. A fax was sent by the GP to the investigators with a patient ID number, information on age, gender, diagnosis, recurrence, and prognosis.

After the research team received the completed informed consent form and the baseline questionnaire (within 8 weeks), inclusion criteria were verified in the computerized medical records. After inclusion, the follow-up questionnaire was sent from the research centre at 6 months after the first consultation. Data on management

and patient and complaint characteristics, were extracted from the self-administered questionnaires.

Measurements

The following variables were measured:

- Patient characteristics: age, gender, educational level and being employed.
- Complaint characteristics: duration of the complaints at the first consultation, musculoskeletal comorbidity, non-musculoskeletal comorbidity and recurrence. Furthermore, a complaint was defined as 'regional' or 'multiple regional', based on the area with the most pain or complaints during the last week indicated on a manikin. Three regions were defined: neck-shoulder (including neck, upper part of thoracic spine, shoulder and upper arm), elbow-fore arm, and wrist-hand. A complaint was defined 'multiple regional' when more than one region was indicated. The diagnosis as registered by the treating GP (Appendix 1) was dichotomised by the researcher into specific or non-specific based on a consensus procedure[8], where a diagnosis was categorised as specific when it could be attributed to a specific medically objectifiable disorder. When the GP indicated more than one diagnosis, the specific diagnosis was given priority.
- Hindrance: complaints during leisure activities, sports activities and work activities, and sick leave were registered.

Complaint severity was measured on an 11-point numerical rating scale from 0 (no complaints) to 10 (unbearable complaints).

Functional limitations of the arm, neck, shoulder or hand was measured with the Disability of Arm Shoulder and Hand (DASH) questionnaire[11]. Each item was scored on a 5-point Likert scale. Response scores were summed and transferred to a score ranging from 0 (no disability) to 100 (completely disabled).

- Management: Information on diagnostic procedures, consulted care providers and treatment received both at baseline and at 6 months was gathered by self-administered questionnaires. Participants were asked: which care provider did you consult related to this arm, neck or shoulder complaint, how often, and what treatment did you receive. The types of diagnostic procedures, if any, were also registered.

Statistical analyses

Descriptive statistics were used to present the patient, complaint, symptoms and hindrance for both the total population and the two subgroups of patients with specific or non-specific diagnoses.

Selective non-response and selective dropout among the patients was evaluated using logistic regression analysis (step backward Wald, significance level <0.05) in SPSS version 11.0 (Chicago, IL, USA). The variables on the fax form submitted by the GP (age, gender, specific diagnosis, recurrent complaint and expected prognosis of the GP) were included for the analyses on non-responders, and the baseline variables (Table 1) were used in the analyses on dropouts.

Frequencies on treatment options are presented for both the total population and subsequently grouped per diagnostic category. Differences in distribution of treatment variables between the group with a specific diagnosis and non-specific diagnosis at 6 months were tested using Pearson's Chi-square (2-sided) test $p<0.05$.

In scaled rectangle diagrams[12] co-occurrence of the four main treatment options are presented for the group with specific diagnoses and non-specific diagnoses, 6 months after the first consultation. Here, co-occurrence implies that different treatments can take place at the same time or after one another within the 6-month study period.

With the exception of the scaled rectangles, all analyses were performed with SPSS, version 11.0 for Windows (SPSS Inc, Chicago, Illinois, USA).To produce scaled rectangle diagrams, SPAN software was used. This was downloaded from http://www.auckland.ac.nz/mch/span.

RESULTS

Study population

In total 798 patients fulfilled the criteria of which 682 (85.5%) returned a completed baseline questionnaire and informed consent and entered the cohort. The mean time between consultation and filling in the questionnaire was 2 weeks.

No differences were found between responders and non-responders on distribution of age (18-40 years: 50% vs. 61%; p=0.09), males (41% vs. 44%; p=0.31), specific diagnosis (59% vs. 54%; p=0.11), recurrent complaint (28% vs. 24%; p=0.34) or poor prognosis according to the GP (32% vs. 30%; p=0.92).

Of all 682 participants, 42% was male and the median age was 45 years. The complaints were mainly located at the neck, upper back, shoulder or upper arm (77%), followed by elbow-forearm (25%) and wrist or hand (19%), and involved more than one region in 42%. Most patients reported complaints were pain when active (86%) or in rest (52%) (more than one is possible). About 50% reported complaints during leisure activities, sports or work (Table 1). According to our clas-

Table 1. Patient characteristics at baseline (n=682)

Variables		Specific diagnoses n=402	Non-specific diagnoses n=280	Total population n=682
Patient characteristics				
Age (years) [18-64], median [range]		41 [18-64]	48 [18-64]	45 [18-64]
Male, n (%)		184 (46)**	99 (36)	283 (42)
Educational level*	- Low, n (%)	158 (39)	86 (31)	244 (36)
	- Medium, n (%)	141 (35)	102 (37)	243 (36)
	- High, n (%)	103 (26)	91 (32)	194 (28)
Having paid work, n (%)		310 (77)	224 (80)	534 (78)
Complaint characteristics				
Duration of the complaint:	- 0-6 weeks, n (%)	189/401 (47)**	155 (55)	344/681 (50)
	- 6 weeks- 6 months, n (%)	107/401 (27)**	55 (19)	162/681 (24)
	- >6 months, n (%)	105/401 (26)	70 (25)	175/681 (26)
Comorbidity musculoskeletal, n (%)		203 (51)	128 (46)	331 (49)
Comorbidity non-musculoskeletal, n (%)		88 (22)	57 (20)	145 (21)
Recurrent complaint, n (%)		92 (23)**	99 (36)	191 (28)
Region of main complaint†, n (%)				
Neck, upper back, shoulder, upper arm		273 (67)**	255 (91)	528 (77)
Elbow or forearm		133 (33)**	37 (13)	170 (25)
Wrist or hand		87 (22)**	41 (15)	128 (19)
Multiple region complaint, n (%)		186 (46)**	101 (36)	287 (42)
Specific complaint, n (%)		n.a.	n.a.	402 (59)
Symptoms				
Pain when active, n (%)		350 (87)	234 (84)	584 (86)
Pain in rest, n (%)		200 (50)	153 (55)	353 (52)
Loss of strength, n (%)		232 (58)**	91 (32)	323 (47)
Stiffness, n (%)		141 (35)**	152 (54)	293 (43)
Tingling, n (%)		98 (24)	74 (27)	172 (25)
Numbness, n (%)		77 (19)	63 (23)	140 (21)
Cold feeling shoulder, arm, hand, n (%)		61 (15)	52 (19)	113 (17)
Less hand coordination, n (%)		75 (19)**	34 (12)	109 (16)
Hindrance				
Complaints during leisure activities, n (%)		231/401 (58)	144/280 (51)	375/680 (55)
Complaints during sports activities (among participants doing sports, n=302), n (%)		108/182 (59)**	61/120 (51)	169/302 (56)
Complaints during working activities (among working population, n=534), n (%)		172/310 (56)	142/223 (63)	315/533 (59)
Related sick leave in past 6 months (working population, n=534), n (%)		55/310 (18)**	72/224 (32)	127/534 (24)
Severity of complaints (0-10), mean (sd)		5.6 (2.0)	6.0 (1.9)	5.8 (2.0)
Functional limitations, DASH (0-100), mean (sd)		38.7 (19.0)	34.1 (18.2)	36.8 (18.8)

SD= Standard Deviation; n= number of patients; n.a.= not applicable; DASH, disability of arm, shoulder and hand Questionnaire; * Educational level- low, no education; primary school or lower vocational school; medium, lower or higher general secondary school level or middle vocational school; high, higher vocational school or university. † More than one region is possible; **, different distribution between the two subgroups. Pearson's Chi-square tested (2-sided), p-value <0.05

sification, 59% of the complaints was diagnosed as specific, mostly impingement of the shoulder (Appendix 1).

Between the specific and non-specific diagnostic subgroups, no differences were found in severity of complaints and functional limitations.

However, in the group with non-specific diagnoses complaints during working activities were reported more frequently, and complaints during sports activities less frequently. Stiffness was more frequently reported in the non-specific group, and loss of strength and coordination less frequently compared to the specific group. Further, the complaints are more frequently located in the neck- shoulder region compared to the specific group, and the elbow-forearm and wrist-hand region were less frequently involved. In non-specific diagnoses, complaints are more frequently recurrent. Additionally, distribution of duration of complaints differed and the percentage women was higher in the non-specific group.

Selective dropout

For 603 participants data on treatment were available at both baseline and 6 months (88.4%).

Being a dropout was significantly related to younger age (18-44 years) (odds ratio 2.8, 1.7 to 4.7) and being a male (odds ratio 1.9, 1.2 to 3.0).

Additional diagnostic tests

At baseline, 9% of the patients reported that additional diagnostic tests (additional to history and physical examination) were performed, which was doubled after 6 months (Table 2). The diagnostic procedures were mainly radiographic examinations (14%), followed by laboratory tests (6%) and EMG analysis (4%). No differences were found between the subgroups with specific versus non-specific diagnoses (Pearson X^2=0.73). In the specific diagnoses group EMG analysis was most frequently applied in patients with carpal tunnel syndrome. In specific diagnostic groups in the forearm and wrist/hand region radiology was applied in 17-30%.

Referral

Of all the consulters, 26% reported to be referred at baseline, increasing up to 55% after 6 months. After 6 months, 49% was referred for physiotherapy and 12% to a medical specialist, mostly an orthopaedic surgeon (6%) or a neurologist (5%) (Table 3).

Patients with a non-specific diagnosis were more frequently referred to a physiotherapist (Pearson X^2<0.0001) and patients with a specific diagnosis were more

Table 2. Additional diagnostic tests at baseline, and from baseline to 6 months follow-up.

	Additional diagnostic tests							
	None		Radiology		Lab		EMG	
GP diagnosis at first consultation	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)
Non-specific	250/280 **(89)**	202/248 **(82)**	21/280 **(8)**	36/248 **(15)**	9/280 **(3)**	16/248 **(7)**	3/280 **(1)**	6/248 **(2)**
Specific total	373/402 **(93)**	293/355 **(83)**	24/402 **(6)**	49/355 **(14)**	7/402 **(2)**	20/355 **(6)**	4/402 **(1)**	15/355 **(4)**
Subacromial impingement syndrome.+biceps tendinoses	210/222 **(95)**	167/196 **(85)**	11/222 **(5)**	25/196 **(13)**	3/222 **(1)**	10/196 **(5)**	0/222 **(0)**	2/196 **(1)**
Lateral/medial epicondylitis	90/93 **(97)**	75/82 **(92)**	2/93 **(2)**	5/82 **(6)**	1/93 **(1)**	2/82 **(2)**	1/93 **(1)**	1/82 **(1)**
Osteoarthritis elbow/wrist/hand	12/16 **(75)**	11/14 **(79)**	4/16 **(25)**	3/14 **(21)**	0/16 **(0)**	0/14 **(0)**	0/16 **(0)**	0/14 **(0)**
Peritendinitis/tenosynovitis flexors/extensors forearm	13/13 **(100)**	10/13 **(77)**	0/13 **(0)**	3/13 **(23)**	0/13 **(0)**	2/13 **(15)**	0/13 **(0)**	1/13 **(8)**
Quervain's syndrome	12/13 **(92)**	7/10 **(70)**	1/13 **(8)**	3/10 **(30)**	1/13 **(8)**	2/10 **(20)**	0/13 **(0)**	1/10 **(10)**
Carpal tunnel syndrome	7/11**(64)**	3/11 **(27)**	2/11 **(18)**	3/11 **(27)**	1/11 **(9)**	2/11 **(18)**	3/11 **(27)**	7/11 **(64)**
Frozen shoulder	8/9 **(89)**	6/8 **(75)**	1/9 **(11)**	2/8 **(25)**	0/9 **(0)**	1/8 **(13)**	0/9 **(0)**	0/8 **(0)**
Cubital tunnel+Guyon's tunnel+radial tunnelsyndrome	6/8 **(75)**	4/6 **(67)**	1/8 **(13)**	1/6 **(17)**	1/8 **(13)**	1/6 **(17)**	0/8 **(0)**	1/6 **(17)**
Cervical hernia	3/5 **(60)**	3/5 **(60)**	2/5 **(40)**	2/5 **(40)**	0/5 **(0)**	0/5 **(0)**	0/5 **(0)**	1/5 **(20)**
Other*	12/12 **(100)**	7/10 **(70)**	0/12 **(0)**	2/10 **(20)**	0/12 **(0)**	0/10 **(0)**	0/12 **(0)**	1/10 **(10)**
Total	623/682 **(91)**	495/603 **(82)**	45/682 **(7)**	85/603 **(14)**	16/682 **(2)**	36/603 **(6)**	7/682 **(1)**	21/603 **(4)**

Other: Free body of wrist or hand(1) Raynaud's phenomenon and peripheral neuropathy in combination with exposure to hand-arm vibration (1), Trigger finger (2), ganglion (5), bursitis elbow (3).

Table 3. Referrals at baseline, and from baseline to 6 months follow-up.

	Referral to					
	None		Physiotherapy		Medical specialist	
GP diagnosis at first consultation	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682(%)	**Up to 6 months** N=603(%)
Non-specific	191/280 **(68)**	94/248 **(38)**	85/280 **(30)**	148/248 **(60)**	7/280 **(3)**	21/248 **(9)**
Specific total	312/402 **(78)**	176/355 **(50)**	73/402 **(18)**	150/355 **(42)**	24/402 **(6)**	54/355 **(15)**
Subacromial impingement syndrome+biceps tendinoses	177/222 **(80)**	95/196 **(49)**	38/222 **(17)**	83/196 **(42)**	11/222 **(5)**	25/196 **(13)**
Lateral/medial epicondylitis	68/93 **(73)**	38/82 **(46)**	23/93 **(25)**	41/82 **(50)**	3/93 **(3)**	5/82 **(6)**
Osteoarthritis elbow/wrist/hand	16/16 **(100)**	13/14 **(93)**	0/16 **(0)**	1/14 **(7)**	0/16 **(0)**	0/14 **(0)**
Peritendinitis/tenosynovitis flexors/extensors forearm	11/13 **(85)**	5/13 **(39)**	2/13 **(15)**	7/13 **(54)**	0/13 **(0)**	4/13 **(31)**
Quervain's syndrome	12/13 **(92)**	5/10 **(50)**	1/13 **(8)**	4/10 **(40)**	0/13 **(0)**	1/10 **(10)**
Carpal tunnel syndrome	5/11 **(46)**	3/11 **(27)**	2/11 **(18)**	2/11 **(18)**	4/11 **(36)**	8/11 **(73)**
Frozen shoulder	6/9 **(67)**	3/8 **(38)**	3/9 **(33)**	5/8 **(63)**	1/9 **(11)**	2/8 **(25)**
Cubital tunnel+Guyon's tunnel+radial tunnel syndrome	4/8 **(50)**	2/6 **(33)**	2/9 **(25)**	2/6 **(33)**	2/8 **(25)**	2/6 **(33)**
Cervical hernia	3/5 **(60)**	1/5 **(20)**	2/5 **(40)**	4/5 **(80)**	1/5 **(20)**	3/5 **(60)**
Other*	10/12 **(83)**	5/10 **(50)**	0/12 **(0)**	1/10 **(10)**	2/12 **(17)**	4/10 **(40)**
Total	503/682 **(74)**	270/603 **(45)**	158/682 **(23)**	298/603 **(49)**	31/682 **(5)**	75/603 **(12)**

* Other: Free body of wrist or hand(1) Raynaud's phenomenon and peripheral neuropathy in combination with exposition to hand-arm vibration (1), Trigger finger (2), ganglion (5),bursitis elbow (3).

frequently referred to a medical specialist (Pearson-X^2=0.014). Though the largest group, subacromial impingement has the largest referral rates to specialist care; in percentages carpal tunnel syndrome and cervical hernia score relatively the highest referral rates. Furthermore, 50% of the patients diagnosed with epicondylitis were referred for physiotherapy, 6 months after the first consultation. In other specific diagnostic groups concerning tendon complaints, figures from 40-54% were reported.

In the group diagnosed with osteoarthritis of elbow/wrist/hand, no referrals were made to a medical specialist.

Medication and braces

At baseline, 35% received analgesics (paracetamol/NSAID), 10% a cortocisteroid injection and 1% a brace. After 6 months, 51% prescribed analgesics, 17% had received a corticosteroid injection, and 4% a brace (Table 4). Injections were more frequently applied in specific diagnoses (Pearson X^2<0.00001). The highest percentages were found in impingement syndrome, frozen shoulder, carpal tunnel syndrome and M. Quervain. Between specific and non-specific diagnoses no significant difference (borderline) was found in medication use (Pearson X^2=0.057). Braces were mostly applied in specific diagnoses (Pearson X^2=0.006), mainly in epicondylitis.

Co-occurrence of different treatment options

The four most frequently reported treatment options up to 6 months (treatment by a physiotherapist, medical specialist, prescription of analgesics or corticosteroid injection) are presented in scaled rectangle diagrams for the group with non-specific diagnoses (Figure 1) and with specific diagnoses (Figure 2). In the non-specific group, 21% received none of the 4 options, 46% received one option and 33% more than one option, mainly medication in combination with physiotherapy. In the specific group, 17% received none of the 4 options, 43% received one option and 40% more than one option, mainly analgesics in combination with physiotherapy. Though the percentages are similar, the specific group shows more corticosteroid injections in combination with more referrals to a medical specialist. On the whole, 112 patients (19%) did not receive any of the four options within 6 months.

Table 4. Management at baseline, and from baseline to 6 months follow-up.

	Overall treatment							
	None		Prescribed medication		Corticosteroid injection		Brace	
GP diagnosis at first consultation	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)	**At baseline** N=682 (%)	**Up to 6 months** N=603 (%)
Non-specific	190/280 **(68)**	125/248 **(50)**	84/280 **(30)**	116/248 **(47)**	7/280 **(3)**	15/248 **(6)**	0/280 **(0)**	4/248 **(2)**
Specific total	202/402 **(50)**	112/355 **(32)**	151/402 **(38)**	194/355 **(54)**	64/402 **(16)**	87/355 **(25)**	5/402 **(1)**	22/355 **(6)**
Subacromial impingement syndrome+biceps tendinoses	97/222 **(44)**	48/196 **(25)**	92/220 **(41)**	119/196 **(61)**	48/222 **(22)**	61/196 **(31)**	0/222 **(0)**	3/196 **(2)**
Lateral/medial epicondylitis	57/93 **(61)**	33/82 **(40)**	30/93 **(32)**	38/82 **(46)**	5/93 **(5)**	13/82 **(16)**	2/93 **(2)**	13/82 **(16)**
Osteoarthritis elbow/wrist/hand	9/16 **(56)**	8/14 **(57)**	6/16 **(38)**	5/14 **(36)**	3/16 **(19)**	1/14 **(7)**	0/16 **(0)**	0/14 **(0)**
Peritendinitis/tenosynovitis flexors/extensors forearm	8/13 **(62)**	6/13 **(46)**	4/13 **(31)**	6/13 **(46)**	0/13 **(0)**	0/13 **(0)**	1/13 **(8)**	1/13 **(8)**
Quervain's syndrome	6/13 **(46)**	2/10 **(20)**	3/13 **(23)**	5/10 **(50)**	4/13 **(31)**	4/10 **(40)**	0/13 **(0)**	0/10 **(0)**
Carpal tunnel syndrome	8/11 **(73)**	5/11 **(46)**	1/11 **(9)**	3/11 **(27)**	2/11 **(18)**	3/11 **(27)**	1/11 **(9)**	2/11 **(18)**
Frozen shoulder	1/9 **(11)**	1/8 **(13)**	6/9 **(67)**	6/8 **(75)**	2/9 **(22)**	4/8 **(50)**	0/9 **(0)**	0/8 **(0)**
Cubital tunnel+Guyon's tunnel+radial tunnel syndrome	5/8 **(63)**	2/6 **(33)**	3/8 **(38)**	4/6 **(67)**	0/8 **(0)**	0/6 **(0)**	1/8 **(13)**	2/6 **(33)**
Cervical hernia	2/5 **(40)**	2/5 **(40)**	3/5 **(60)**	3/5 **(60)**	0/5 **(0)**	1/5 **(20)**	0/5 **(0)**	1/5 **(20)**
Other*	9/12 **(75)**	5/10 **(50)**	3/12 **(25)**	5/10 **(50)**	0/12 **(0)**	0/10 **(0)**	0/12 **(0)**	0/10 **(0)**
Total	392/682 **(58)**	237/603 **(39)**	235/682 **(35)**	310/603 **(51)**	71/682 **(10)**	102/603 **(17)**	5/682 **(1)**	26/603 **(4)**

* Other: Free body of wrist or hand(1) Raynaud's phenomenon and peripheral neuropathy in combination with exposition to hand-arm vibration (1), Trigger finger (2), ganglion (5).

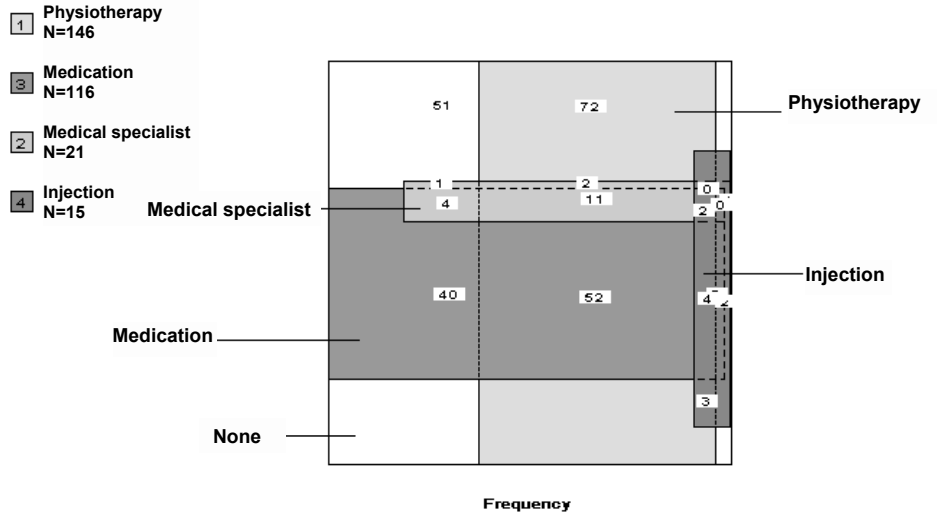

Figure 1 Non-specific diagnoses and treatment up to 6 months after the first GP consultation.

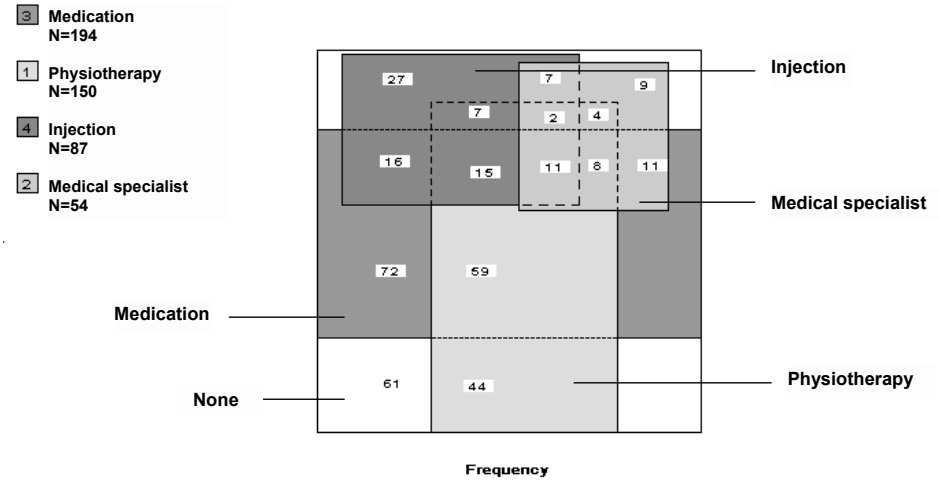

Figure 2 Specific diagnoses and treatment up to 6 months after the first GP consultation.

DISCUSSION

Management

Management of non-traumatic arm, neck and shoulder complaints presented in general practice up to 6 months after the first consultation mainly consisted of prescribed analgesics (51%) and referral to physiotherapy (49%), followed by corticosteroid injections (17%) and referral for medical specialist care (12%). In 19% of the patients none of these options was applied.

Medical care in general, will most likely match the diagnosis[13] and the expected corresponding natural course[14]. From the distribution of the management options in patients diagnosed with impingement and frozen shoulder, it seems that management is in accordance with the Dutch guideline[10] that recommends a stepwise approach: i.e. information and wait and see, analgesics (ideally: paracetamol; NSAID as second line intermittently if no contraindications exist), followed by corticosteroid injections and, if functional limitations are still present after 6 weeks referral for exercise therapy. Studies on cost effectiveness in shoulder pain, favoured injection over physiotherapy[15].

In epicondylitis a similar approach is recommended; information and wait and see, followed by analgesics or corticosteroid injections if pain hinders function. In the present study, 46% of the patients was prescribed medication.

In the present study, 50% was referred for physiotherapy although there is no explicit recommendation for physiotherapy in the guideline[9]. Additionally, cost effectiveness studies, concluded no preference for physiotherapy over a brace[16], and no preference for physiotherapy or corticosteroid injections over 'wait and see'[17]. Reasons for the large percentage of referral may be that obvious options do not give the desired results. Besides, patient's circumstances and preferences may play a role as well[18].

The low percentages of additional diagnostic tests in specific shoulder diagnoses and epicondylitis, seem in line with the practice guidelines, where additional diagnostic tests are not recommended (unless in case of deviating course or severe pathology) because the results have no consequences for management[9,10].

The results of management in the small group with CTS (n=11), seems to be in line with a Dutch multidisciplinary guideline published after our study closed[19]. In which is noted that a probability diagnosis of CTS can be stated in primary care based on information from history taking, and the GP can start matching treatment. Referral to secondary care is advised when complaints persist. For this relatively small group special treatment or confirmation from a medical specialist seems to be preferred.

Regarding the prescription of analgesics, we could not always distinguish between paracetamol and NSAIDs from our own data. Data from the second Dutch national survey of general practice, based on the International Classification of Primary Care, demonstrated that in many musculoskeletal complaints (ranging from shoulder complaints, arm symptoms, elbow complains, wrist and hand complaints, cervical syndromes, shoulder syndromes, epicondylitis), diclofenac is the most frequently prescribed medication[20]. Despite the rationale behind the choice for NSAIDs, analgesic potential and their inflammatory action, so far no studies evaluated the effectiveness of NSAIDs versus paracetamol (acetaminophen) or additional to paracetamol in non-traumatic arm, neck and shoulder complaints. In 1995, a review on NSAIDs in shoulder complaints already pointed out that future studies should establish whether the use of NSAIDs is more favourable than simple analgesics, especially in the light of the higher risk of adverse reactions from NSAIDs[21].

Karels et al. evaluated the contents of physical therapy treatment in patients with non-traumatic arm, neck and shoulder complaints. They reported that most patients were treated with exercise therapy (93%), massage (87%) or a combination of both. In 30% of the patients, the treatment included physical modalities (such as ultrasound), and in 20% of the patients treatment included manipulation techniques[22].

Differences in management

Differences between the specific and non-specific diagnostic groups, on the distribution of referral to a medical specialist, was mainly due to specific diagnoses of forearm, wrist and hand. This may be for confirmation of the diagnosis, non-conservative treatment, or reassuring the patient, but we have no data to verify this hypothesis.

The application of corticosteroid injections, mainly in specific shoulder diagnoses, is according to the practice guideline. However, the effect of the application of corticosteroid injections in epicondylitis, shoulder pain, and carpal tunnel syndrome, seems to be mainly restricted to short term relief of symptoms [23-25].

For the largest subgroup with 'non-specific diagnoses' in arm, neck, and shoulder, no guidelines are available. That patients with non-specific diagnoses are more frequently referred for physiotherapy than patients with specific diagnoses, seems in line with the distribution of the diagnoses in a cohort study in physiotherapy practice where the majority of the study population were patients with non-specific diagnoses[22].

However, a Cochrane review reported only limited evidence for the effectiveness of exercises in patients with chronic non-specific neck and shoulder complaints[26].

Variance within a certain diagnostic group may (partly) be explained by differences in hindrance, as mentioned in both guidelines for epicondylitis[9] and shoulder pain[10].

Another reason may be lack of solid evidence in favour of one of the studied treatment options in the total range of non-traumatic arm, neck and shoulder complaints. Although there is limited or short term effect (mainly short-term pain relief) of some of the treatment options, solid evidence in favour of any one of the studied treatment options in this population lacks[27]. The lack of clear evidence of effective treatments may leave more room for personal preferences of both GP and patient.

Besides, patient- and other complaint- characteristics, such as age, employment, or psychosocial factors may lead to differences in management decisions as well. These factors probably contribute to the GP's prognosis[28], which may influence management. Therefore, we checked the univariate association of the 6-months prognosis according to the GP with the five different management options. Poor GP- prognosis showed a positive association with additional diagnostic tests (OR 2.7;1.7-4.6) and with referral for physiotherapy (OR 2.1;1.5-3.0). The association with referral for medical specialist care (OR 1.6;0.7-3.5) was not significant. Besides the low OR, the prevalence of the outcome was also low. Prescription of medication (OR 1.1;0.9-1.5) and application of corticosteroid injection (OR 0.9;0.6-1.1), however, did not show a relation with the expected prognosis. This is in line with short- term relief of symptoms as treatment goal in these options.

Strengths and the limitations of this study

This is the first study to compare the management of different diagnostic groups in non-traumatic arm, neck, and shoulder complaints. Some of the diagnostic subgroups are large (e.g. shoulder complaints and epicondylitis) and others are very small, reflecting everyday clinical practice[5,29]. Therefore, the reported management mainly represents these larger diagnostic subgroups.

In the present study, we used the diagnosis registered at the first consultation. However, in some cases the initial diagnosis may have changed after time; due to difficult differential diagnostics within the limited consultation time or the need for additional diagnostic tests, or true changes[13], what may affect the therapeutic approach. Because of this, and the fact that the diagnosis was realised in a non-standardised manner, we cannot rule out some misclassification. This may have resulted in less contrast between the specific and non-specific group.

In the present study, 15 out of the 682 participants received two diagnoses of whom 8 participants received two specific diagnoses within the same region, which may indicate difficult differential diagnostics. Besides, 7 participants were diagnosed with both impingement syndrome and a specific forearm diagnosis (epicondylitis/tendonitis/carpal tunnel syndrome). We chose to work with the most centrally located diagnosis, here impingement syndrome.

Due to the response time of 8 weeks, in 21% of the patients the data on management at baseline were not restricted to a single consultation.

Another issue was that the follow-up questionnaire referred to the previous 6 months. We accounted for possible overlap of treatment options due to recollection of information by reporting 'management up to 6 months'.

In the small group that is referred to a medical specialist, part of the reported decisions on management may be made on the specialists' own initiative.

A recent development in the Netherlands is that since January 2006, patients no longer need a referral for physiotherapy. This may have implications for the overall treatment in the future.

Conclusions

In non-traumatic arm, neck and shoulder complaints, analgesics and referral for physiotherapy were the treatment options most frequently used, followed by corticosteroid injections and referral for medical specialist care. Patients with a non-specific diagnosis were more frequently referred for physiotherapy and less frequently to a medical specialist compared to patients with a specific diagnosis. Corticoisteroid injections were mainly applied in specific diagnoses (e.g. impingement syndrome, frozen shoulder, carpal tunnel, and M. Quervain).

Future intervention studies could provide evidence of effective treatments, especially for the large group of non-specific diagnoses, mainly located at the neck-shoulder region. Others may help to clarify the influence of variables, other than diagnoses, on the variance in management decisions between and within diagnostic groups.

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Appendix 1. Diagnoses included in the study

	Number of patients
Specific diagnoses	
Cervical hernia	5
Subacromial impingement syndrome (rotator cuff syndrome, tendinoses, bursitis)	220
Frozen shoulder	9
Biceps tendinosis	2
Lateral/medial epicondylitis	93
Bursitis elbow	3
Osteoarthritis of elbow (no RA)	2
Cubital tunnel syndrome	2
Peritendinitis/tenosynovitis flexors/extensors forearm	13
Quervain's syndrome	13
Guyon's tunnel syndrome	5
Radial tunnel syndrome	1
Carpal tunnel syndrome	11
Free body of wrist or hand	1
Raynaud's phenomenon and peripheral neuropathy in combination with exposition to hand-arm vibration	1
Trigger finger	2
Ganglion	5
Osteoarthritis of wrist or hand (no RA)	14
Non-specific	
All other arm, neck and shoulder complaints not attributable to trauma or systemic diseases	280

6

Indicators of initial management decisions in non-traumatic complaints of arm, neck and shoulder in general practice

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ABSTRACT

Objective To evaluate associations of diagnosis and, patient, complaint, and general practitioner (GP) characteristics with initial management decisions in non-traumatic arm, neck and shoulder complaints in general practice.

Methods Observational cohort study set in 21 Dutch general practices, including 682 patients with non-traumatic complaints of arm, neck and shoulder. Outcome measure: (yes/no) application of a specific management option.

Results Separate multilevel analyses (adjustment for treating GP) revealed that longer duration of complaints, multiple regional complaints, and being a less experienced GP were associated with additional diagnostic tests. Having 'epicondylitis' and consulting a GP in a group practice were negatively associated with additional diagnostic tests.

Having a 'specific shoulder diagnosis', more functional limitations, more somatization, shorter duration of complaints and consulting a male GP were associated with prescription of medication.

Corticosteroid injections were more often applied in 'specific shoulder diagnosis' or 'other specific diagnosis' by GPs interested in musculoskeletal complaints, if complaint duration was longer, if there were more functional limitations, and in older patients.

Longer duration of complaints, recurrent complaint, more distress and consulting a GP in less urbanised areas were positively associated with physiotherapy referral. Having a 'shoulder specific' or 'other specific diagnosis' was negatively associated with physiotherapy referral but strongly positively associated with medical specialist referral. Also, more functional limitations and consulting a less experienced GP were associated with medical specialist referral.

Conclusions Overall, besides diagnosis, mainly long duration of complaints, more functional limitations and GP characteristics determine 'who gets what' in non-traumatic arm, neck and shoulder complaints.

INTRODUCTION

Complaints of arm, neck and shoulder are very common in Western societies[1,2]. In the Netherlands the estimated 12-months prevalence in the general population was 31% for neck pain, 30% for shoulder pain, 11% for elbow pain, and 18% for wrist or hand pain[1]. About 30-45% of the respondents with pain contact their general practitioner (GP) because of these complaints[1]. In Norway, 45% of adults experiencing non-inflammatory musculoskeletal pain consult a GP within 12 months[3]. Incidence figures in patients (aged 18-64 years) with non-traumatic arm, neck or shoulder complaints in Dutch general practice, reported 97 consultations per 1000 registered persons annually[4].

The management received by patients with non-traumatic complaints of arm, neck and shoulder shows wide variation, both between and within diagnostic groups[5]. So far, no studies have evaluated the determinants that contribute to variation in the management of these complaints.

Part of this variation may be explained by the diagnosis, the corresponding natural course, and available guidelines. In the Netherlands, guidelines issued by the Dutch College of General Practitioners are available for epicondylitis[6] and shoulder complaints[7]; in both these guidelines, management advice is partly based on differences in the levels of hindrance (pain severity and functional limitations). However, for other diagnostic groups and complaints in the region of arm, neck and shoulder without a specific diagnosis, no guidelines are available.

Furthermore, having a job or indicators of poor prognosis, may influence the choice of more active treatment options. In a previous study, indicators of poor prognosis in our population were: long duration of the complaints at baseline, having musculoskeletal comorbidity, recurrent complaint, low social support and a high somatization level[8].

Patient and complaint- characteristics previously reported to be associated with management options in other study populations are: distress, poor perceived health, age and gender[9-11].

Furthermore, GP- characteristics such as gender, years of experience, and type of practice, are also reported to influence management decisions[12,13]. However, in a well- organised healthcare system, the diagnosis, and patient and complaint characteristics will probably show the strongest associations with management options, with no or only marginal influence of the GP- characteristics.

Our objective is to evaluate the associations between diagnosis, and patient, complaint, and GP characteristics and five common management decisions (i.e. additional diagnostic testing, prescription of medication, applying a corticosteroid

injection, referral for physiotherapy, and referral for medical specialist care) in incident non-traumatic arm, neck and shoulder complaints consulting in general practice, within the first weeks after initial consultation.

METHODS

Design and setting

The present study is part of a larger cohort study performed in the Southwestern region of the Netherlands involving 21 general practices.

The Medical Ethics Committee of the Erasmus Medical Center approved the study protocol.

Study population

In total, 31 GP's recruited eligible patients from September 2001 through December 2002. Inclusion criteria were: patients (age 18-64 years) who consulted their GP for a new complaint or new episode of complaints of neck, upper back, shoulder, upper arm, elbow, forearm, wrist or hand and were able to complete Dutch- language written questionnaires. The episode was considered 'new' if patients had not consulted their GP for the same complaint during the preceding 6 months. We excluded patients of whom the presented complaint could be explained by a trauma, fracture, malignancy, amputation, prosthesis, congenital defect, or previously diagnosed systemic and/or generalised neurological disorder.

Procedures

Before the GP started to recruit patients, GP- characteristics were gathered during a structured interview.

During the first consultation patients received study information, an informed consent form, and a self-administered questionnaire from their GP. A fax was then sent by the GP to the investigators with the diagnosis, expected prognosis at 6 months, and whether or not it was a recurrent complaint. After the research team received the completed informed consent and questionnaire (within 8 weeks), inclusion criteria were verified in the electronic medical file. Data on management and patient and complaint characteristics were extracted from the self-administered questionnaire.

Outcome

Data on five common management options were gathered: yes/no additional diagnostic tests (additional to history taking and physical examination), yes/no application of a corticosteroid injection, yes/no prescription of medication (injections excluded), yes/no referral to a physiotherapist, and yes/no referral to a medical specialist.

Variables possibly associated with management

- Diagnosis: because of the availability of Dutch guidelines for shoulder complaints and epicondylitis, the diagnoses were categorised into 4 groups: 'specific shoulder diagnosis' (impingement/frozen shoulder/biceps tendonitis), 'epicondylitis', 'other specific diagnosis', and 'non-specific diagnosis'[14],

- Patient and complaint characteristics: age, gender, being unemployed, duration of the complaints at consultation, pain/ complaint severity measured on a numerical rating scale from 0 (no pain/complaints) to 10 (intolerable pain/complaints)[15], and functional limitations of arm, neck, shoulder and hand measured using 29 items of the Disability of Arm Shoulder and Hand (DASH)-questionnaire[16]. Each item was scored on a 5-point Likert scale and summed and transferred to a score ranging from 0 (no disability) to 100 (completely disabled). For perceived health, the categories of the first question of the SF-12 were recoded as "good" ("excellent", "very good", "good") and "poor" ("fair" or "poor")[17]. Besides, the presence of musculoskeletal comorbidity and recurrence was assessed. Furthermore, a complaint was defined as 'regional' or 'multiple regional' based on the area with the most pain or complaints during the previous week as indicated on a manikin. Three regions were defined: neck-shoulder (including neck, upper part of thoracic spine, shoulder and upper arm), elbow-fore arm, and wrist-hand. A complaint was defined as 'multiple regional' when more than one region was indicated.

Social support was measured with the Social Support Scale (SOS) a Dutch version of the 'Social Support Questionnaire' (SSQ)[18] on which a higher score indicates more support.

Both somatization and distress were measured with the Four Dimensional Symptom Questionnaire (4DSQ) on which a higher score indicates more somatization or distress[19].

- GP- characteristics: gender, years of practice, special interest in musculoskeletal complaints, retrained in treatment of musculoskeletal complaints, group practice versus single- handed practice, level of urbanisation; little/not urbanised (≤ 1000 inwoners/km^2) versus moderately/strongly urbanised (>1000 inwoners/km^2)[20].

In addition, the treating GP scored expected non-recovery at 6- months on a 4- point Likert scale ranging from 1 'very likely' to 4 'very unlikely' at the first consultation. These scores were dichotomised into 'likely' or 'unlikely'.

Statistical analyses

We evaluated the independent relationship of the variables of three domains: diagnosis, GP- characteristics, and patient/complaint- characteristics, with the five management options by means of logistic regression for repeated measurements (Generalized Estimating Equations)[21,22], with GPs as units of analysis and compound symmetry as variance/covariance structure. This model takes into account the correlation between patients consulting the same GP (SAS 8.2 PROC GENMOD).

For the five different management options separate models were constructed. For possible associated factors with clinical relevant classifications or validated classes, the existing cut-off points were used. If not available, ordinal scores were split based on the median score of the total population. Analyses were performed both in univariate and multivariate models, resulting in the assessment of odds ratios (OR) and corresponding 95% confidence intervals (95% CI). First, variables with $p<0.20$ in the univariate model were selected for multivariate analysis (enter procedure) within the domains: GP- characteristics and patient/complaint-characteristics separately. Second, variables with $p<0.20$ in the multivariate model per domain were selected for the final analyses. Finally, variables with a significant OR (p-value <0.05) were kept in the multivariate model and presented in the results. The variable 'diagnostic group' entered the multivariate model and was kept in the multivariate model independent of significance level.

RESULTS

Response

In total, 798 patients fulfilled the criteria of which 682 (86%) entered the cohort after they returned the completed questionnaire and informed consent. The mean time interval between consultation and filling in the questionnaire was 2 weeks.

Patient/complaint characteristics

Table 1 shows the distribution of the patient/complaint characteristics of the 682 patients in the current study. Of the total study population 47% was male and median age was 45 years. Half of the participants consulted their GP within 6 weeks after developing the complaint. After consultation 229 patients (34%) received a specific shoulder diagnosis (impingement, biceps tendonitis, frozen shoulder), 95 (14%) the

Table 1 Data on patient-, complaint-, en GP- characteristics included in the model

Variables		N (%)
Diagnosis		**n=682**
Epicondylitis		95 (14)
Impingement, biceps tendonitis, frozen shoulder		229 (34)
Other specific diagnosis		78 (11)
Non-specific diagnosis		280 (41)
Patient and complaint characteristics		**n=682**
Age (years) [18-64], median [range]		45 [18-64]
Female, n (%)		399 (58)
Not Having paid work, n (%)		148 (22)
Duration of the complaint:	0-6 weeks, n (%)	344 (51)
	6 weeks–6 months, n (%)	162 (24)
	>6 months, n (%)	175 (25)
Complaint severity in the last week [0-10], median [range]		6 [1-10]
Functional limitations, DASH [0-100] median [range]		35.4 [2.9-99.1]
Poor perceived general health, n (%)		86 (13)
Musculoskeletal comorbidity, n (%)		331 (49)
Recurrent complaint vs incident complaint, n (%)		191 (28)
Multiple-region complaint, n (%)		287 (42)
Low Social support, SOS [12-60], score <56		342 (50)
Somatization, 4DSQ [0-32]:	low [0-10]	503 (74)
	medium [11-20]	148 (22)
	high [21-32]	30 (4)
Distress, 4DSQ [0-32]:	low [0-10]	432 (63)
	medium [11-20]	170 (25)
	high [21-32]	79 (12)
GP- characteristics		**n=31**
Female, n (%)		5/31 (16%)
Years of practice, median [range]		13 [1-35years]
Special interest in musculoskeletal complaints, n (%)		16/31 (53%)
Retrained in musculoskeletal complaints, n (%)		13/31 (41%)
GP- practices		**n=21**
Group practice, n (%)		11/21(52%)
Little/not urbanised, n (%)		8/21 (38%)

n=number of patients, DASH=disability of arm shoulder and hand questionnaire; 4DSQ=four-dimensional symptom questionnaire; SOS=social support scale.

Table 2 Management of non-traumatic arm, neck and shoulder complaints

Management option	Total population (n=682), n (%)
Additional diagnostic tests	59 (9)
Corticosteroid injection	71 (11)
Prescription of medication	235 (35)
Referral to physiotherapy	158 (23)
Referral to medical specialist	31 (5)

More than one option is possible.

diagnosis epicondylitis, 78 (11%) another specific diagnosis (e.g. carpal tunnel syndrome, M. Quervain, etc.), and in 280 patients (41%) no specific diagnosis was registered (Appendix 1). Complaint severity in the previous week showed a median score of 6 [range 1-10] and functional limitations of arm, neck and shoulder a median score of 35.4 [range 2.9-99.1].

GP- characteristics

Of the 31 recruiting GPs, 5 (16%) were female. The reported years of practice as a GP ranged from 1 to 35 years (median 13) years. Half (53%) reported to have special interest in musculoskeletal complaints. Half of the practices were single-handed and the remainder group practices.

Management

Table 2 presents the treatment options applied. Within a maximum of 8 weeks, 9% received additional diagnostic testing, in 11% corticosteroid injections were applied, and in 35% medication was prescribed. Of all patients, 23% were referred for physiotherapy treatment and 5% for medical specialist consultation. In 41% of the patients none of the specified options was applied.

Indicators of management

Additional diagnostic tests

Variables positively associated with the application of additional diagnostic tests were: longer duration of complaints, a multiple regional complaint, and the GP having less than 13 years of practice (Table 3). Negatively associated variables were: having been diagnosed with epicondylitis, compared to a non-specific diagnosis, and the GP working in a group practice.

Table 3 Additional diagnostic testing and associated variables; results of univariate and multivariate logistic regression analyses (multilevel)

		Total population (n=682)	
		univariate	multivariate
Variables		**OR (95% CI)**	**OR (95% CI)**
Diagnosis			
Epicondylitis		**0.3 (0.1-0.6)**	0.2 (0.1-0.5)
Impingement, biceps tendonitis, frozen shoulder		**0.5 (0.2-1.2)**	0.5 (0.2-1.2)
Other specific diagnosis		**1.7 (1.2-2.4)**	1.3 (0.9-2.0)
Non-specific diagnosis (ref)		1	1
Patient and complaint characteristics			
Younger age (18-45 years) vs older age (46-64 years)		0.9 (0.6-1.6)	
Female vs male		1.2 (0.7-2.1)	
Not having paid work vs being employed		1.0 (0.6-1.9)	
Duration of the complaint:	0-6 weeks (ref)	1	1
	6 weeks -6 months	**2.1 (0.9-4.7)**	2.1 (0.9-5.1)
	>6 months	**5.2 (2.6-10.5)**	5.0 (2.4-10.5)
High complaint severity in the last week (score >6) vs low		1.3 (0.7-2.4)	
Much functional limitations (score>35.34) vs little		1.4 (0.8-2.4)	
Poor perceived general health vs good		**1.9 (0.8-4.3)**	
Musculoskeletal comorbidity vs no		1.4 (0.8-2.1)	
Recurrent complaint vs incident complaint		**1.7 (1.1-2.8)**	
Multiple-region complaint vs single region		**2.3 (1.3-4.0)**	2.3 (1.2-4.3)
Low social support (score<56) vs high		1.0 (0.5-1.8)	
Somatization [0-32]:	low [0-10] (ref)	**1**	
	medium [11-20]	**1.8 (0.9-3.5)**	
	high [21-32]	**5.0 (2.2-11.2)**	
Distress [0-32]:	low [0-10] (ref)	1	
	medium [11-20]	1.3 (0.5-3.2)	
	high [21-32]	**2.0 (1.2-3.5)**	
GP- characteristics			
Female vs male		0.7 (0.2-1.9)	
Few years of practice <13 years vs many		**2.5 (1.4-4.2)**	2.9 (1.8-4.7)
Special interest in musculoskeletal complaints vs no		1.1 (0.6-2.3)	
Retrained in musculoskeletal complaints vs not		1.0 (0.5-1.8)	
Group practice vs single-handed practice		**0.5 (0.2-1.0)**	0.5 (0.3-0.9)
Little/not urbanised vs strongly/moderately urbanised		**1.6 (0.9-3.0)**	

Variables with a univariate association with a p-value <0.20 are given in bold. All variables in the final model have a multivariate association with a p-value <0.05. OR= odds ratio; n=number of patients, DASH=disability of arm shoulder and hand questionnaire; 4DSQ=four-dimensional symptom questionnaire; SOS=social support scale.

Prescription of medication and application of corticosteroid injection

Having a 'specific shoulder diagnosis', high functional limitations, high somatization, short duration of complaints and the GP being male, were positively associated with prescription of medication.

Table 4 Associations of prescription of medication and steroid injection: results of univariate and multivariate logistic regression analyses (multilevel)

	Prescription of medication		**Steroid injection**	
	Univariate	Multivariate	Univariate	Multivariate
Variables	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Diagnosis				
Epicondylitis	**1.1 (0.8-1.6)**	1.2 (0.8-1.6)	**2.2 (0.9-5.4)**	2.0 (0.8-5.2)
Impingement, biceps tendonitis, frozen shoulder	**1.7 (1.2-2.4)**	1.7 (1.2-2.5)	**9.5 (5.3-17.2)**	9.6 (4.9-18.7)
Other specific diagnosis	**1.0 (0.6-1.6)**	1.1 (0.7-1.8)	**4.1 (1.5-11.2)**	3.7 (1.4-9.7)
Non-specific diagnosis, ref	1	1	1	1
Patient and complaint characteristics				
Younger (18-45 years) vs older (46-64 years)	1.0 (0.8-1.3)		**0.6 (0.4-0.8)**	0.6 (0.4-0.9)
Female vs male	**1.3 (0.9-1.7)**		**0.7 (0.5-1.0)**	
Not having paid work vs being employed	1.2 (0.8-1.8)		1.4 (0.8-2.4)	
Duration of the complaint: 0-6 weeks (ref)	1	1	1	1
6 weeks –6 months	**0.6 (0.5-0.8)**	0.7 (0.5-1.0)	**1.4 (0.8-2.2)**	1.3 (0.8-2.1)
>6 months	**0.9 (0.6-1.2)**	0.6 (0.4-0.9)	**1.8 (1.2-2.7)**	1.7 (1.0-2.8)
High complaint severity in the last week (score>6) vs low	**1.6 (1.1-2.3)**		**1.7 (1.3-2.4)**	1.8 (1.1-2.9)
Much functional limitations (score>35.34) vs few	**1.9 (1.4-2.7)**	1.7 (1.2-2.4)	**1.8 (1.3-2.4)**	1.6 (1.1-2.4)
Poor perceived general health vs good	1.0 (0.7-1.6)		**1.2 (0.6-2.2)**	
Musculoskeletal comorbidity vs no	**1.2 (1.0-1.6)**		**1.3 (0.9-1.7)**	
Recurrent complaint vs incident complaint	0.9 (0.7-1.2)		**1.4 (0.9-2.1)**	
Multiple-region complaint vs single region	0.9 (0.7-1.2)		1.1 (0.8-1.7)	
Low social support (score<56) vs high	1.0 (0.6-1.5)		1.0 (0.8-1.4)	
Somatization [0-32]: low [0-10] (ref)	**1**	1	**1**	
Medium [11-20]	1.0 (0.7 –1.5)	1.0 (0.7-1.5)	0.9 (0.6-1.6)	
high [21-32]	**2.9 (1.5-5.6)**	2.5 (1.2-5.2)	**2.1 (1.3-3.3)**	

Table 4 continued

		Prescription of medication		Steroid injection	
		Univariate	Multivariate	Univariate	Multivariate
Variables		**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Distress [0-32]:	low [0-10] (ref)	1		1	
	Medium [11-20]	1.2 (0.7-1.9)		1.2 (0.7-2.2)	
	High [21-32]	**1.5 (0.9-2.6)**		1.6 (0.7-3.4)	
GP- characteristics					
Female vs male		**0.6 (0.3-1.0)**	0.6 (0.4-0.9)	0.4 (0.1-1.6)	
Few years of practice (<13 years) vs many		1.2 (0.7-1.9)		1.1 (0.4-3.0)	
Special interest in musculoskeletal complaints vs no		0.8 (0.5-1.1)		**2.5 (0.9-6.6)**	4.4 (1.7-11.4)
Retrained in musculoskeletal complaints vs not		**0.8 (0.5-1.1)**		**2.0 (0.8-5.3)**	
Group practice vs single-handed practice		1.2 (0.8-1.8)		0.6 (0.2-1.5)	
Little/not urbanised vs strongly/moderately		0.8 (0.5-1.3)		1.8 (0.7-4.9)	

Variables with a univariate association with a p-value <0.20 are given in bold. All variables in the final model have a multivariate association with a p-value <0.05. OR= odds ratio; n=number of patients, DASH=disability of arm shoulder and hand questionnaire; 4DSQ=four-dimensional symptom questionnaire; SOS=social support scale..

Table 5 Associations of referral to physiotherapist and medical specialist: results of univariate and multivariate logistic regression analyses (multilevel)

	Physical therapist		Medical specialist	
	Univariate	Multivariate	Univariate	Multivariate
Variables	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
Diagnosis				
Epicondylitis	0.8 (0.3-1.8)	0.9 (0.4-2.2)	1.3 (0.5-3.4)	1.6 (0.5-4.7)
Impingment, biceps tendonitis, frozen shoulder	**0.5 (0.3-0.8)**	0.5 (0.3-0.8)	**2.2 (1.0-4.5)**	2.0 (0.9-4.6)
Other specific diagnosis	**0.3 (0.2-0.5)**	0.3 (0.2-0.5)	**5.1 (2.4-10.6)**	5.0 (2.2-11.3)
Non-specific diagnosis, ref	1	1	1	1
Patient and complaint characteristics				
Younger age (18-45 years) vs older (46-64 years)	1.0 (0.7-1.4)		0.8 (0.4-1.6)	
Female vs male	**1.4 (1.1-1.9)**		1.1 (0.5-2.5)	
Not having paid work vs being employed	0.8 (0.6-1.1)		1.3 (0.5-3.2)	
Duration of the complaint: 0-6 weeks (ref)	1	1	1	1
6 weeks –6 months	**1.4 (0.8-2.8)**	1.7 (0.9-3.1)	**4.3 (1.1-16.9)**	4.9 (1.2-20.4)
>6 months	**2.5 (1.4-4.4)**	2.4 (1.4-4.3)	**15.9 (5.4-47.0)**	16.4 (4.9-54.8)
High complaint severity in the last week (score >6) vs low	**1.5 (1.1-2.0)**		**1.8 (0.7-4.1)**	
Much functional limitations (score >35.34) vs little	**1.5 (1.1-2.0)**		**2.2 (1.0-4.7)**	2.1 (1.1-4.1)
Poor perceived general health vs good	**1.7 (1.1-2.6)**		**2.1 (1.1-4.2)**	
Musculoskeletal comorbidity vs no	**1.2 (0.9-1.6)**		**2.3 (1.0-4.9)**	
Recurrent complaint vs incident complaint	**2.0 (1.5-2.7)**	1.6 (1.2-2.1)	**1.9 (1.0-3.6)**	
Multiple-region complaint vs single region	**1.4 (1.0-2.0)**		1.5 (0.7-3.4)	
Low social support (score<56) vs high	**1.2 (0.9-1.7)**		1.9 (0.6-5.7)	
Somatization [0-32]: low [0-10] (ref)	1		**1**	
Medium [11-20]	**1.9 (1.3-2.6)**		**1.9 (0.8-4.4)**	
High [21-32]	**2.4 (1.2-4.7)**		**5.8 (2.1-15.7)**	
Distress [0-32]: low [0-10] (ref)	1	1	1	
Medium [11-20]	**1.5 (1.1-2.1)**	1.4 (1.0-2.0)	**1.6 (0.7-3.3)**	
High [21-32]	**2.1 (1.2-3.2)**	1.9 (1.3-2.8)	**2.7 (1.1-6.6)**	

Table 5 continued

	Physical therapist		Medical specialist	
	Univariate	Multivariate	Univariate	Multivariate
Variables	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**	**OR (95% CI)**
GP- characteristics				
Female vs male	**1.6 (0.9-2.8)**		0.7 (0.2-2.6)	
Few years of practice (<13 years) vs many	0.9 (0.8-1.7)		**2.2 (1.1-4.2)**	2.3 (1.2-4.6)
Special interest in musculoskeletal complaints vs no	1.0 (0.8-1.4)		1.4 (0.6-3.3)	
Retrained in musculoskeletal complaints vs not	1.0 (0.7-1.4)		1.2 (05-2.8)	
Group practice vs single-handed practice	1.0 (0.7-1.4)		0.6 (0.3-1.5)	
Little/not urbanised vs strongly/moderately	**1.5 (1.0-2.5)**	1.9 (1.2-3.1)	1.0 (0.5-1.9)	

Variables with a univariate association with a p-value <0.20 are given in bold. All variables in the final model have a multivariate association with a p-value <0.05. OR= odds ratio; n=number of patients, DASH=disability of arm shoulder and hand questionnaire; 4DSQ=four-dimensional symptom questionnaire; SOS=social support scale.

Having a specific shoulder diagnosis or other specific diagnosis, consulting a GP with special interest in musculoskeletal complaints, longer duration of complaints, high functional limitations, and being older were positively associated with application of corticosteroid injections.

Referral to physiotherapy or a medical specialist

Variables positively associated with referral for physiotherapy were: longer duration of complaints, having a recurrent complaint, having more distress, and consulting a GP in a less urbanised area.

Having been diagnosed with a 'specific shoulder diagnosis' or 'other specific diagnosis was negatively associated with referral for physiotherapy.

In contrast, the diagnoses 'specific shoulder diagnosis' and 'other specific diagnosis' were strongly positively associated with referral to a medical specialist. Further, higher functional limitations and consulting a GP with less years of experience also associated.

DISCUSSION

Besides the diagnostic category, a longer duration of complaints and higher functional limitations proved to be the patient and complaint variables most frequently associated with the five evaluated management options in the initial management of patients with non-traumatic arm, neck and shoulder complaints.

That patient and complaint characteristics are important in management decisions was earlier reported by Salem-Schatz et al.[23]. However, included indicators of referral were limited to data on age, gender and severity of illness based on diagnostic codes from automated medical record systems In the present study we had the opportunity to include a wider series of patient and complaint characteristics, e.g. functional limitations, complaint severity, etc., and we expected the GP- characteristics to play only a limited role.

Influence of GP characteristics

In contrast to our expectations, several GP characteristics did play an independent role in management choices. Besides the associated variables 'long duration of complaints' and 'multiple region complaint', the GP characteristics 'working in single-handed practice', and 'less practice experience' were associated with additional diagnostic tests.

The latter variable was also associated with referral to a medical specialist. Possibly the characteristics may imply some uncertainty regarding the diagnosis.

More referral to the physical therapists by GPs in less urbanised areas may reflect a closer cooperation between caregivers in such areas.

Furthermore, female GPs prescribed relatively less medication compared with their male colleagues, although they did not use any other option more frequently.

Corticosteroid injections were most frequently applied by those GPs especially interested in musculoskeletal complaints. A possible explanation may be that this interest contributes to more knowledge and training related to these complaints, including application of a corticosteroid injection, resulting in more confidence and more frequent application. A study on confidence in primary care management demonstrated that GPs reported low scores on doing a joint injection/aspiration[24]. In addition to lack of interest, the authors discussed that lack of training and experience is likely to explain the lower scores on confidence. On the other hand, the evidence on corticosteroid injections so far is mainly restricted to short term relief of symptoms[25-28], what may be a reason for other GPs to choose for this application less frequently.

Influence of diagnosis

In the large subgroups of shoulder pain and epicondylitis, initial management usually consists of information and 'wait and see'. However, when a patient reports much hindrance, the GP will more frequently consider one of the four treatment options. Overall, medication is prescribed frequently in patients with non-traumatic arm, neck, and shoulder complaints. However, if a patient has had complaints for a long time, other options are explored[6,7]. Additionally, high somatization was positively associated with prescription of medication. An explanation for this association, may be that these bodily symptoms (as reaction to stress) are interpreted as more hindrance.

For the largest subgroup of 'non-specific complaints' no guidelines are available. These patients are relatively frequently referred for physiotherapy, while in the small subgroup with 'other specific diagnosis', patients are relatively often referred to a medical specialist. Although we only report on initial treatment, these findings seem to be in line with the findings of the 2nd Dutch National Survey of General Practice. There, the ICPC-codes most frequently referred to secondary care included complaints located at wrist/hand or fingers, with the highest referral rate for carpal tunnel syndrome[29]. For this relatively small group and in case of long duration of complaints and high functional limitations, special treatment or confirmation from a medical specialist seems to be preferred.

Influence of prognosis

A priori, we expected indicators of poor prognosis also to be indicators of management. The associations of 'long duration of complaint', 'having a recurrent complaint' and 'high somatization' were in line with our expectation. However, little social support and having musculoskeletal comorbidity were not associated with any of the five management options.

Perhaps the GPs' prognosis directly influences management, rather than the included indicators of poor prognosis; however, there may be some overlap. Because we had collected the 6-months prognosis according to the GP, we also explored its univariate relationship with the five management options. Poor GP- prognosis showed a positive association with additional diagnostic tests (OR 2.7;1.7-4.6) and with referral for physiotherapy (OR 2.1;1.5-3.0). The association with referral for medical specialist care (OR 1.6;0.7-3.5) was not significant. Besides the low OR, the prevalence of the outcome was also low.

Prescription of medication (OR 1.1;0.9-1.5) and application of corticosteroid injection (OR 0.9;0.6-1.1), however, did not show a relation with the expected prognosis. This is in line with short- term relief of symptoms as treatment goal in these options, while waiting for a positive natural course.

Furthermore, in contrast to our expectation, being employed was not an indicator of management.

Treatment options and evidence

Although there is evidence of short term effect (mainly short-term pain relief) of some of the treatment options in non-traumatic arm, neck and/or shoulder complaints, solid evidence in favour of any of the studied treatment options in our population is lacking[30].

This may explain the variability in management and may leave more room for the personal preferences of both the GP and the patient. Aiming at short- term relief of symptoms may lead to favouring a corticosteroid injection, while contra-indications or fear of side effects of NSAIDS may lead to favouring any alternative.

Strengths and limitations of the study

In the present study we only studied initial management in non-traumatic complaints of arm, neck and/or shoulder, thus additional management options may be applied if the complaints persist.

Also, due to the 8 week response time, 21% of the patients consulted their GP more than once before filling in the questionnaire. The variable 'number of consultations' -that we added to the final model-, was associated with all five outcomes. Thus, the more consultations, the more management options will be applied. However, adding the number of consultations to the models hardly changed the OR of the other variables.

Furthermore, the different management options were not mutually exclusive. Therefore, we also checked for co-occurrence of management options. In the initial phase of management multiple options were applied in 114 (17%) of the patients, mainly oral medication and something else (n=94; 14%). The most frequent combination was with referral for physiotherapy (n=57; 8%).

Because our heterogeneous population mainly consists of patients with complaints at neck, shoulder, or elbow, these results mainly apply to these subgroups. For patients with certain specific diagnoses (such as carpal tunnel syndrome, osteoarthritis of elbow, wrist/hand, or hernia of the neck) these results need to be interpreted carefully due to the lower numbers.

In the present study we focused on the diagnosis, and patient/ complaint- and GP- characteristics and their association with management options. However, other variables may also play a role. In a prescriptive model for evidence-based clinical decisions, Haynes et al.[31] describe a combination of patient's circumstances, patients' preferences and actions and best evidence research, with an overlap area representing clinical expertise. Although we included many variables, we did not include patient preference.

Furthermore, we did not include economic variables (such as insurance/costs) that may also contribute to management choices[32]. A study on medical practice variation in general practice, however, concluded that a clinical rather than an economic model was more plausible to explain inter-practitioner variation[33].

Conclusions and consequences for practice and future

Besides diagnostic category, long duration of complaints and high functional limitations were most frequently associated with the choice for a management option. Several GP- characteristics also played a role in management decisions.

The fact that less experience was related to more additional diagnostic tests and more referral for medial specialist care, may imply uncertainty regarding the diagnosis.

Regarding treatment options, lack of solid evidence in favour of one certain option seems to leave room for personal preferences.

Further evidence on the effectiveness of management, especially in the large group of non-specific diagnoses, may reduce variability due to GP- characteristics.

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Appendix 1. Diagnoses included in the study

	Number of patients
Specific diagnoses	
Cervical hernia	5
Subacromial impingement syndrome (rotator cuff syndrome, tendinoses, bursitis)	220
Frozen shoulder	9
Biceps tendinosis	2
Lateral/medial epicondylitis	93
Bursitis elbow	3
Osteoarthritis of elbow (no RA)	2
Cubital tunnel syndrome	2
Peritendinitis/tenosynovitis flexors/extensors forearm	13
Quervain's syndrome	13
Guyon's tunnel syndrome	5
Radial tunnel syndrome	1
Carpal tunnel syndrome	11
Free body of wrist or hand	1
Raynaud's phenomenon and peripheral neuropathy in combination with exposition to hand-arm vibration	1
Trigger finger	2
Ganglion	5
Osteoarthritis of wrist or hand (no RA)	14
Non-specific	
All other arm, neck and shoulder complaints not attributable to trauma or systemic diseases	280

7

General discussion

INTRODUCTION

This thesis focuses on the incidence, course and management of non-traumatic arm, neck and shoulder complaints presented in general practice.

The 12-month incidence was studied in 13 general practices, based on registration according to the International Classification of Primary Care (ICPC)[1].

The study objectives regarding the course and management and its associated factors were studied in a descriptive prospective cohort study among patients (aged 18-64 years) who consulted their general practitioner (GP) for a new complaint or new episode of non-traumatic arm, neck, and shoulder complaints using self-administered questionnaires.

In this chapter, we summarize and reflect on the most important findings, discuss implications for practice, and make recommendations for future research.

INCIDENCE

Main findings

The overall 12-month incident consultation rate for non-traumatic arm, neck and shoulder complaints was estimated at 97.4/1000 person-years. This results in 147 incident cases per year for an average-sized general practice with 2,350 patients.

Similar to other reports, we found that the incidence rate (i.e. study consultation rate) was higher for women[2,4-7] and increased with age[2-4]. The distribution of the region-specific incidence (only including consultations specific for the arm, neck and shoulder region), with shoulder and neck complaints as the main contributors to the total incidence figure, was in line with the findings of Bot et al.[4]. However, our study differed on some inclusion criteria. For example, in contrast to Bot et al.[4] we excluded trauma and patients aged under 18 and over 65 years. Furthermore, we included the specific code for carpal tunnel syndrome, and added the non region-specific codes.

Almost one out of four consultations regarding non-traumatic arm, neck, or shoulder complaints, were registered under a non-region-specific code, mainly 'other musculoskeletal disease'. Possible reasons to register under a non-specific code may vary from having complaints at more than one site[2,8] or having referred pain, to difficulties with establishing an accurate diagnosis at the first consultation, or simply preferring registration under a specific structure (such as muscle pain or ganglion joint/tendon). Therefore, registration under a non-region-specific code may have a legitimate reason and is not necessarily less informative compared to a location-specific code.

However, leaving out the non-region-specific codes leads to an underestimation of the total incidence figure of non-traumatic arm, neck and shoulder complaints.

At the time of our study, the GP acted as a gatekeeper who referred patients to other care providers. This indicates that the incidence figures we reported probably represent a reasonable estimate of the total number of patients with arm, neck and shoulder complaints with non-traumatic onset for which patients seek medical treatment. After the study period closed, changes took place in Dutch health care that have consequences for morbidity figures in general practice. Since 2006 a referral is no longer required in the Netherlands to consult a physiotherapist for a musculoskeletal complaint, as is still the case in some countries. In addition, direct access is planned for exercise therapists (e.g. Cesar and Mensendieck exercise therapists) from July 2008. Recent data from the National Information Network of Allied Health Care on physiotherapy consultation in 2006, showed that 28% of the patients consulting a physiotherapist did so without referral[9]; preliminary results from 2007 show that there is a trend towards about 33% making direct access without referral (personal communication: Dr. Leemrijse, National Information Network of Allied Health Care). Consequently, general practice data on morbidity collected nowadays will no longer give an estimate of the complete picture of musculoskeletal morbidity in primary care.

Patients who mainly used direct access are characterized by younger age, higher education level, acute complaints, recurrent complaints, patients who had previous physical therapy, and patients with (low) back pain or neck pain[9].

This indicates that the GP will probably be consulted by a more selected group of patients with musculoskeletal complaints (long-lasting non-recurrent complaints), and that the introduction of direct access might decrease the workload of GPs in relation to these musculoskeletal complaints.

Future research

In future morbidity studies on musculoskeletal complaints, one needs to be aware of the possible underestimation of morbidity when excluding codes that are not specific for that region or disease/disorder. Also, trends over time are difficult to monitor and interpret due to changes in the organization of primary health care. Furthermore, depending on the objectives, a decision can be made as to whether studies restricted to general practice are sufficient. After the introduction of direct access for physiotherapy and exercise therapy, information on consultations in general practice and these allied professions will need to be combined in order to estimate the total incidence in primary care.

COURSE

Main findings

Six months after the first consultation, 46% of the subjects reported not to be recovered from their non-traumatic arm, neck and shoulder complaints. This is in line with the results of other studies in general practice on patients with a new complaint or episode of the neck, shoulder or elbow with follow-up periods ranging from 3 to 12 months[10-12]. Also, in several studies the occurrence of shoulder and neck complaints is described as being very dynamic and following an episodic course[13-16].

The GPs consulted by our study population estimated that only 30% of the patients would not be recovered after 6 months; their optimistic expectations may be explained in part by the positive course as reported in the Guideline on Shoulder Complaints at the time of the study[17]. The Guidelines describe that half of the patients will recover within 6 weeks, mainly based on one study available at that time. Another explanation is provided in a study on non-traumatic knee complaints, in which only 1 in 3 patients with persistent complaints returned for follow-up consultations; they suggest that the 'wait and see' approach of the GP may discourage patients to return, and the GP may assume that patients who do not return have recovered[18].

One may hypothesize that, although 46% of the patients were not recovered after 6 months, their complaints may be less severe. Therefore we further examined the scores of these non-recovered patients. However, most of them (94%) reported no real difference in their situation, defined as feeling 'slightly worsened' to 'slightly improved'. This was confirmed by the mean scores on disability (31.3, SD 17.9) and complaint severity (4.9, SD 2.0) at 6 months compared with the scores at baseline: disability 38.8 (SD 17.8); complaint severity 5.9 (SD 1.9). Thus in the non-recovered patients the complaint severity and degree of functional limitations indeed improved only slightly over a 6-month period[19].

The variables predictive of non-recovery at 6 months after the first consultation were: complaint characteristics (long duration of the complaint before consultation, recurrent complaint, musculoskeletal comorbidity and complaint mainly located at wrist or hand), high somatization, lack of social support, and lack of supervisory support among workers.

By checking the additive value of the model with the expected prognosis of the treating GP, we concluded that information on these prognostic variables at the first consultation can help a GP to make a better estimation as to whether a patient will still have complaints after 6 months.

The prognostic value of the complaint characteristics 'long duration of the complaint', 'having a recurrent complaint' and 'musculoskeletal comorbidity' was consistent with other studies[10-12,20-22], even though definitions on musculoskeletal comorbidity sometimes differed.

In this thesis, severity of the complaint and functional limitations at baseline had no predictive value for non-recovery after 6 months in non-traumatic arm, neck and shoulder complaints. When comparing these results with other studies, we found inconsistent results[10,12,20,23,24]. These inconsistencies may be partly explained by: differences in outcome measures [non-recovery, (change in) pain intensity/severity, (change in) functional limitations] and differences in study period, making it difficult to draw conclusions about the role of these variables.

In daily practice complaints are either labelled with a specific diagnosis or, if not, as non-specific; therefore, we decided to also include this variable as a possible prognostic variable. The results demonstrated that having a specific diagnosis was positively associated with recovery. Besides availability of possible specific treatment, the differences in recovery between the patients with specific and non-specific diagnoses may partly be explained by differences in the distribution of prognostic patient, complaint or psychosocial variables across both groups. In future research, stratified analyses can be used to evaluate these differences.

Of the many psychosocial variables that were included in the present study, only lack of social support, lack of supervisory support among workers, and high scores on somatization predicted non-recovery at 6 months. This was similar to Bot et al.[11] who found an association of social support and changes in pain severity and disability at 3 months, and Bonde et al.[25] with slow recovery at 12 months. Social support may be important in order to cope with the consequences of these complaints; it may also imply more practical support in making adjustments in the private or work situation in order to continue one's tasks. However, despite support of the supervisor on the work floor, the possibility to make adjustments will further depend on the combination of work tasks and work environment.

The finding that high scores on somatization predicted non-recovery was similar to other findings in musculoskeletal complaints[26], back pain[27] and acute whiplash patients[28]. However, studies in general practice on arm, neck or shoulder complaints also reported other psychosocial variables to be predictors of poor outcome, ranging from less vitality, more worrying[10], using retreating as coping style, less social support[11], and co-existing psychological complaints[29] to high scores of distress[24]. These differences in findings may be explained by differences in the included psychosocial variables. Therefore, it is difficult to draw definite conclusions as to which prognostic psychosocial variables are the most important in these complaints. It is clear, however, that these variables do play a role in the course of complaints located at the

arm, neck or shoulder. Besides, in contrast to most other prognostic variables (e.g. long duration of complaint or comorbidity) these psychosocial variables might be modified with an intervention aiming to positively influence the course. Until now only a few randomised clinical trials have evaluated the effect of a (bio)psychosocial approach in these complaints in primary care. A study in chronic shoulder complaints reported a small effect of graded exercise therapy compared to usual care, on restoring the performance of daily activities[30]. In acute and sub-acute shoulder complaints, an education and activation programme showed no difference in effect compared to usual care on both reported recovery and functional limitations [31]. Future studies can provide additional evidence on the effectiveness of psychosocial interventions in primary care.

In Chapter 6, we evaluated some aspects of kinesiophobia in non-traumatic arm, neck and shoulder complaints, not exclusively pain. The mean score on the Tampa scale for kinesiophobia (without reversed items) was 24.8 (SD: 6.2), reflecting the degree of kinesiophobia in these complaints. This score is comparable to those in other populations in primary care[32-34], and is lower compared to scores of chronic low back pain patients in secondary care[35,36].

In patients who did not recover during the 12-month follow-up, the degree of kinesiophobia remained unchanged during this time period. This result indicates the stability of scores in the transition from a new episode to a chronic complaint. However, it should be noted that 1 out of 4 patients already reported persistence of symptoms for more than 6 months before the first consultation with their GP.

Positive associations with kinesiopobia were found for much catastrophizing, high disability, having musculoskeletal comorbidity, high somatization and distress, low social support, and complaints located at the shoulder. The positive associations found for both catastrophizing and disability with kinesiopobia are in line with the fear avoidance model[37], and similar to findings in other populations[33-36,38-40].

Despite being part of the fear avoidance model, we did not measure depression in our patients with new non-traumatic arm, neck and shoulder complaints. From a validation study it was concluded that the distress score we measured gives an indication of psychosocial dysfunction in general, including mild depressive symptoms[41]. This may explain the positive association of distress with kinesiophobia.

Based on the results of Chapter 3 and other studies[10], the role of kinesiophobia on the prognosis of arm, neck and shoulder complaints in general practice still remains unclear. Besides kinesiophobia, other psychosocial variables associated or not associated with kinesiophobia may be more important in predicting outcome (e.g. somatization, lack of social support, or worrying)[10,42]. Additionally, the distribution of population characteristics and the studied time period can play a role in the

prognostic effect of psychosocial variables, or within certain subgroups (such as long-lasting complaints, non-specific diagnoses) these factors may be more important[10,43,44].

Generalisability

The inclusion criteria of all the recruited patients were verified in the electronic medical file (EMD).

The total number of recruited patients was smaller than could be expected based on the incidence study (Chapter 2). It was not possible to check whether there is some selection regarding the severity of complaints. However, the distribution of the complaints in our cohort study with neck and shoulder complaints as main contributors to the incidence figure, followed by more distal and smaller locations, seems to reflect everyday clinical practice[4,45]. Furthermore, no differences were found between the patients entering the cohort and non-participants (Chapter 5) on the distribution of age, gender, specific diagnosis, recurrent complaint, and prognosis according to the GP. The number of patients entering the cohort and responding to the second (6 months) and third (12 months) questionnaire was satisfactory (Chapter 4). When we checked for selective dropout on all available baseline variables, we found that being younger and being male was associated with dropping out at 6 months. In the prognosis study we adjusted for both these variables by including them in the final model (Chapter 3).

We do not expect selection bias to have a strong impact on the presented results, and assume that the results may be generalised to other patients consulting the GP with a non-traumatic arm, neck or shoulder complaint.

Future research

In the large group of patients who reported non-recovery after 6 months, the degree of functional limitations and complaint severity had only slightly improved

Although episodic courses have been reported in studies on shoulder and neck complaints[13-16], additional studies can provide information on the long-term course regarding the pattern (occurrence, recurrence, continuous) and impact (complaint severity, functional limitations, sick leave) in this heterogeneous population, especially in specific locations or diagnostic groups other than neck and shoulder. Information on pattern and impact not only provides insight into the disease course, but may also have implications for management[16].

Future studies can strengthen the current evidence on possible prognostic variables, especially regarding psychosocial variables which have been less frequently

evaluated. Furthermore, the possibility to modify psychosocial variables with an intervention in primary care, and the effect of this intervention on outcome, should be explored.

Additionally, stratified analyses can be performed to evaluate whether there are differences in the distribution of prognostic variables and its associations between patients with a specific versus a non-specific diagnosis, which may also have implications for treatment choices.

For assessment of the most likely predictors, especially the psychosocial variables, we used multiple-item questionnaires. However, compact questionnaires are generally more practical for both research and clinical practice, as suggested by others[10,12]. Future studies can further evaluate whether these multi-item questionnaires can be condensed into valid and reliable brief versions, or into a single item or a few questions but without loss of information[46].

Implications for practice

Six months after the first consultation, 46% of the patients still reports non-recovery, while mean scores on severity of complaints and functional limitations in these non-recovered patients hardly changed.

Including questions on the predictive variables (long duration of complaints, recurrence, musculoskeletal comorbidity, location of the main complaint at hand/wrist, non-specific diagnosis, much somatization, little social support and little supervisor support) during history taking at the first consultation can help a GP to better estimate which patients are at risk of non-recovery after 6 months compared to the global prognosis made by the GP.

So far, the role of kinesiophobia on the prognosis in these complaints remains unclear.

MANAGEMENT

Main findings

Management of non-traumatic arm, neck and shoulder complaints presented in general practice up to 6 months after the first consultation mainly consisted of prescribed analgesics (51%) and referral to physiotherapy (49%), followed by corticosteroid injections (17%) and referral for medical specialist care (12%). In 19% of the patients none of these options was applied.

Subgroup analyses showed that patients with specific diagnoses were more frequently referred for specialist treatment, and patients with non-specific diagnoses for physiotherapy. Referrals to a medical specialist were mainly made in specific diagnoses of forearm, wrist and hand, probably for confirmation of the diagnosis, for non-conservative treatment, or to reassure the patient. However we have no data to verify this latter hypothesis. Corticosteroid injections were mainly applied in specific diagnoses (e.g. impingement syndrome, frozen shoulder, carpal tunnel, and M. Quervain).

Management in the total range of complaints in arm, neck and shoulder is mainly in line with the Dutch guidelines on shoulder complaints and epicondylitis[17,47]. These guidelines recommend giving information, and advise stepwise treatment consisting of paracetamol (described as the first choice to treat pain), followed by non-steroidal anti-inflammatory drugs (NSAIDs) if no contraindications exist, followed by corticosteroid injections. One difference with the guideline was found for epicondylitis whereby about 50% of the patients was referred for physiotherapy, an option not recommended in the guideline. With regard to prescribed medication, we could not always distinguish between paracetamol and NSAIDs from our own data. Other data showed that in many musculoskeletal complaints (e.g. shoulder complaints, arm symptoms, elbow complains, wrist and hand complaints, cervical syndromes, shoulder syndromes, epicondylitis), diclofenac is the most frequently prescribed medication[48]. Despite the rationale behind the choice for NSAIDs, their analgesic potential and inflammatory action, so far no studies have evaluated the effectiveness of NSAIDs versus paracetamol (acetaminophen) or additional to paracetamol in non-traumatic arm, neck and shoulder complaints. In 1995 van der Windt et al.[49] (in a review on NSAIDs in shoulder complaints) stated that future studies are needed to establish whether the use of NSAIDs is more favourable than simple analgesics, especially in the light of the higher risk of adverse reactions from NSAIDs.

The results of Chapter 5 on initial management decisions showed that besides diagnosis, mainly long duration of complaints, more functional limitations and several GP characteristics determine the application of five common management options in non-traumatic arm, neck and shoulder complaints. The importance of the duration of complaints, functional limitations and severity of complaints was expected because these variables are taken into consideration when deciding on a treatment option, according to the Guideline recommendations[17,47].

Therefore, GPs will probably consider one of the four treatment options in patients reporting a 'long duration of complaints' or 'high functional limitations'. That the option 'prescribed medication' was less likely to be used in patients with long duration

of complaints indicates that providing relief of symptoms while waiting for a positive natural course is no longer the most logical choice.

In contrast to our expectations, several GP characteristics (clinical experience, gender, special interest in musculoskeletal complaints and practice characteristics) did play an independent role in management choices. GPs with less clinical experience more frequently applied for additional diagnostic tests and referred more frequently to a medical specialist, which may imply more uncertainty regarding the diagnosis. Corticosteroid injections were most frequently applied by those GPs especially interested in musculoskeletal complaints. A possible explanation for this could be that this interest contributes to more knowledge and training related to these complaints, including application of a corticosteroid injection, resulting in more confidence and more frequent application[50]. On the other hand, evidence for corticosteroid injections is mainly restricted to short-term relief of symptoms[51-53],

which may be why other GPs less frequently choose this application.

Aiming at short-term relief of symptoms whilst waiting for a positive natural course is in line with the finding that 'having a poor prognosis according to the GP' (still having complaints 6 months after the first consultation) was not associated with either prescription of medication or application of a corticosteroid injection.

Although there is evidence of a short-term effect (mainly short-term pain relief) of some of the treatment options in non-traumatic arm, neck and/or shoulder complaints[54,55], solid evidence in favour of any of the studied treatment options in our population is lacking. This may leave room for personal preferences of the GP and the patient[56]. However, we did not measure such preferences.

Whether reported inconsistent or limited effects of the treatment interventions should only be viewed as such, or contain a subgroup of patients for whom the intervention is more strongly effective, is still to be explored. Those who recently reported on this issue found that the view that treatment effectiveness might be improved by closer matching of treatments to patient characteristics was already suggested by Crohnbach in 1957, and still seems to apply today[57].

Classification

Distinction between diagnostic groups may be important if these groups have different prognoses or require different management decisions. Therefore, we included the variable specific and non-specific diagnosis in the prognostic study on non-recovery, and accounted for diagnosis in the Chapters 5 and 6 on management. We already pointed out (Chapter 3) that the variable specific diagnosis was accomplished by dichotomization of the diagnosis given by the treating GP at the first consultation. Because of this, and due to the fact that this diagnosis was realized in a non-

standardized manner, we cannot rule out some possible misclassification. In the prognostic model (Chapter 3); this may have resulted in less contrast between the two groups and a less strong relation with non-recovery. In the management studies, we found differences in management between diagnostic groups, although choices in management could also be explained by several other factors.

These diagnoses, established by the treating GP, were categorized according to the CANS model[58]. In this Dutch multidisciplinary consensus on terminology in arm, neck and shoulder complaints, many disciplines of care providers participated. This model is a starting point to establish a broadly accepted classification system of arm, neck and shoulder complaints with non-traumatic onset. In the future, studies on diagnostic criteria and validation studies are needed to further develop this model into a practical applicable model for health care professionals.

Future research

In general practice, non-traumatic arm, neck and shoulder complaints are frequently treated with NSAIDS. Future studies should compare the effectiveness of NSAIDS versus paracetamol in these complaints, an option with less risk for adverse effects.

Intervention studies can provide evidence for (cost)effective treatments, especially for the large group of non-specific diagnoses, mainly located at the neck-shoulder region.

A possible explanation for currently known inconsistent or limited effects may be that a certain intervention is only or most effective in a specific subgroup. Future studies may reveal whether certain treatment options, taking into account their supposed rationale/working mechanism, are especially/only effective in specific subgroups.

Diagnostic accuracy studies (on history items and physical examination) may contribute to valid and informative criteria for further development of the CANS model.

Implications for practice

Besides diagnostic category, long duration of complaints and high functional limitations were most frequently associated with the application of a management option in general practice. This seems logical and is in line with the guidelines on epicondylitis and shoulder complaints.

That several GP characteristics also played a role in management decisions may partly be explained by the lack of solid evidence in favour of one of the treatment options for these complaints. Uncertainty about the diagnosis is a probable reason for GPs with less practice experience to order additional tests more frequently and refer more often to medial specialist care, compared to their colleagues with more years

of practice experience. GPs working in a group practice have more opportunity to make use of the experience, specific interests or working skills of a more experienced or specialised colleague.

The findings presented in this thesis, and new findings emerging from ongoing and future research, will hopefully further improve the optimal management of patients with non-traumatic arm, neck or shoulder complaints in primary care.

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Summary

Non-traumatic arm, neck and shoulder complaints are common in Western societies. In the Netherlands the 12-month period prevalence in the general population was estimated at 31.4% for neck pain, 30.3% for shoulder pain, 11.2% for elbow pain and 17.5% for wrist or hand pain. Reported symptoms in this area are: pain, tingling, stiffness, numbness, cold feeling in shoulder, arm, hand, and less hand coordination. These complaints can result in functional limitations in daily life and sometimes even lead to sickness absence. In the period that this research was conducted, the general practitioner (GP) was a gatekeeper in health care and was therefore the first person to consult when seeking medical care. Little is known about the incidence of these complaints in general practice, their course and the variables related to them, and the management options applied and their related variables.

The prognostic registration study in **chapter 2** estimates the 12-month incidence in non-traumatic arm, neck and shoulder complaints in patients aged 18 to 64 years in general practice. Incidence densities in primary care are often based on disease or region-specific code registration (e.g. 'epicondylitis', 'shoulder symptom') according to the International Classification of Primary Care (ICPC). So far, the proportion missed due to registration with a non-region-specific code (e.g. 'muscle pain') is unknown. Therefore, in our study we included both specific and non-specific codes. In total, 21 GPs from 13 Dutch general practices classified and registered patients' symptoms and diagnoses according to the ICPC at each consultation during 12 consecutive months. Incidence densities were calculated. The incidence density was 97.4 per 1000 person-years (95% CI 91.2-103.7). This results in 147 (95%CI: 138-157) incident cases/year for an average-sized GP practice (2,350 patients). The most common complaints were shoulder and neck complaints. Of all incident consultations, 23% were registered with non-region-specific codes, mainly 'other musculoskeletal disease'. When estimating morbidity in primary care based on diagnostic codes, one should be aware of possible underestimation of morbidity and the corresponding workload, when excluding codes not specific for that region or disease.

Data from our prospective cohort study of patients with a new episode or new non-traumatic complaint of the arm, neck, and/or shoulder (aged 18-64 years) in general practice, were used to address the research questions in the following chapters.

Chapter 3 describes a prospective cohort study in which predictors of non-recovery are identified in non-traumatic complaints at the arm, neck and shoulder in general practice 6 months after the first consultation. Complaint, patient, physical, psychosocial and work characteristics were investigated as possible predictors of

non-recovery at 6 months using multiple logistic regression analyses. Two models were built, one for the total population and one for the working population. At 6 months, 46% of the total population (n=612) and 42% of the working subpopulation (n=473) still reported complaints. Complaint characteristics (long duration of the complaint before consultation, recurrent complaint, musculoskeletal co-morbidity and complaint mainly located at wrist or hand) were most predictive of non-recovery followed by psychosocial characteristics (more somatization, and experiencing less social support). Having a specific diagnosis was associated with recovery.
In the working subpopulation the same variables were predictors of non-recovery. In addition, low supervisory support was associated with non-recovery. The models correctly classified 72-75% of the patients (explained variance 0.27-0.28). Besides questions on complaint characteristics, information on somatization and support can help a GP to recognise patients at risk of persistent complaints.

Chapter 4 evaluates several aspects of kinesiophobia (also known as fear of movement/(re)injury) in our cohort study. It describes the degree of kinesiophobia, determines whether mean scores of kinesiophobia change over time in non-recovered patients, and evaluates variables associated with kinesiophobia at baseline.
In low back pain patients kinesiophobia can play a role in persistence of complaints, and may lead to avoidance behaviour resulting in hypervigilance to bodily sensations, followed by disability, disuse and depression (fear avoidance model). However, in patients with arm, neck and shoulder complaints little is known about kinesiophobia and its associated variables.
Baseline data were collected on kinesiophobia using the Tampa Scale for Kinesiophobia (the13-item adjusted version; TSK-AV), and on patient, complaint, and psychosocial variables using self-administered questionnaires. The mean TSK-AV score was calculated. In non-recovered patients the follow-up TSK-AV scores at 6 and 12 months were analyzed with the general linear mixed model. Variables associated with kinesiophobia at baseline were evaluated using multivariate linear regression analyses. The mean TSK-AV score at baseline was 24.8 (SD: 6.2). Among non-recovered patients the mean TSK-AV score at baseline was 26.1 (SD: 6.6), which remained unchanged over a 12-month follow-up period. The strongest associations with kinesiophobia were catastrophizing, disability, and comorbidity of musculoskeletal complaints. Additionally, complaints located at the shoulder, low social support, high somatization and high distress contributed to the kinesiophobia score. The mean TSK-AV score in our population is comparable to those in other populations in primary care. In patients who did not recover during the 12-month follow-up, the degree of kinesiophobia remained unchanged during this time period.

The variables associated with kinesiophobia at baseline, appear to be in line with the fear-avoidance model.

Chapter 5 determines management up to 6 months after the first consultation in non-traumatic arm, neck and shoulder complaints, and evaluates differences in management between patients with specific diagnoses versus non-specific diagnoses and between specific diagnostic groups.
In the Netherlands, general practice guidelines have been issued on shoulder pain and epicondylitis. Little is known about actual management of the total range of diagnoses. We recruited 682 eligible patients; data on diagnosis, management, patient and complaint characteristics were collected. Co-occurrence of treatment options was presented in scaled rectangles. After 6 months, additional diagnostic tests were performed in 18% of the patients, mainly radiographic examination (14%). Further, 49% had been referred for physiotherapy and 12% to the medical specialist. Patients with specific diagnoses were more frequently referred for specialist treatment, and patients with non-specific diagnoses for physiotherapy. Corticoisteroid injections (17%) were mainly applied for specific diagnoses (e.g. impingement syndrome, frozen shoulder, carpal tunnel, and M. Quervain). Frequencies of prescribed medication (51%) did not differ between specific and non-specific diagnoses. In 19% of the patients no referral, prescribed analgesics or injection was applied. Braces (4%) were mainly prescribed in epicondylitis.
Management most frequently consisted of prescribed analgesics and referral for physiotherapy. Specific and non-specific diagnostic subgroups differed in the frequency that corticosteroid injections were applied, and referrals to physiotherapy and to a medical specialist.

Chapter 6 evaluates associations of diagnosis, and patient, complaint, and GP characteristics with initial management decisions in non-traumatic arm, neck and shoulder complaints in general practice. In total, 5 models were built for the application (yes/no) of a specific management option. Separate multilevel analyses (adjustment for the treating GP) revealed that longer duration of complaints, multiple regional complaints, and being a less experienced GP were associated with additional diagnostic tests. Having 'epicondylitis' and consulting a GP in a group practice were negatively associated with additional diagnostic tests. Having a 'specific shoulder diagnosis', more functional limitations, more somatization, shorter duration of complaints and consulting a male GP were associated with prescription of medication. Corticosteroid injections were more often applied in 'specific shoulder diagnosis' or 'other specific diagnosis' by GPs interested in musculoskeletal complaints, if there was a longer duration of complaints, if there were more functional limitations, and in older patients.

Longer duration of complaints, recurrent complaint, more distress and consulting a GP in less urbanised areas were positively associated with physiotherapy referral. Having a 'shoulder specific' or 'other specific diagnosis' was negatively associated with physiotherapy referral but strongly positively associated with medical specialist referral. Reporting more functional limitations and consulting a less experienced GP were also associated with medical specialist referral.
Overall, besides diagnosis, mainly long duration of complaints, more functional limitations and GP characteristics determine 'who gets what' in non-traumatic arm, neck and shoulder complaints.

Chapter 7 reflects on the findings of this thesis and recommendations are made for practice and research.

Samenvatting

Klachten aan de arm, nek en schouder zonder voorafgaand trauma komen vaak voor in Westerse maatschappijen. In Nederland wordt de 12-maands prevalentie in de algemene bevolking geschat op 31.4% voor nekpijn, 30.3% voor schouderpijn, 11.2% voor elleboogpijn en 17.5% pijn aan pols of hand. Symptomen die gerapporteerd worden zijn: pijn, tintelingen, stijfheid, doof gevoel, koud gevoel in schouder, arm, hand, en verminderde handcoördinatie. Deze klachten kunnen hinder geven in het dagelijks leven en soms zelfs leiden tot ziekteverzuim.

In de periode dat deze studie werd uitgevoerd was de huisarts de poortwachter van de gezondheidszorg, en daarom de eerste die geraadpleegd werd wanneer iemand medische hulp zocht. Over het vóórkomen van een nieuwe klacht aan de arm, nek en schouder in de huisartsenpraktijk (incidentie), het beloop en voorspellende factoren voor het beloop, het beleid dat wordt toegepast en daarmee samenhangende variabelen is nog weinig bekend.

In de prognostische registratie studie in hoofdstuk 2, is berekend hoe vaak de huisarts geconsulteerd wordt voor een nieuwe niet-traumatische klacht aan de arm, nek of schouder. Incidentiecijfers in de eerste lijn zijn vaak gebaseerd op de registratie van aandoeningen of klachtengebieden onder een specifieke code (zoals 'epicondylitis', 'schouder symptoom') volgens de 'International Classification of Primary Care' (ICPC). Naast registratie onder een code die specifiek is voor een aandoening of regio, is registratie onder een niet-regio specifieke code (zoals 'spierpijn') ook mogelijk. Tot dusver is de bijdrage van de niet-regio specifieke codes onbekend. In deze studie werden zowel de specifieke als niet-specifieke codes meegenomen waaronder een arm, nek of schouderklacht kan worden geregistreerd. In totaal, namen 21 huisartsen van 13 praktijken deel, die gedurende 2 maanden van elk consult de klachten van de patiënt (leeftijdsgroep 18-64 jaar) classificeerden en registreerden volgens de ICPC. De incidentie dichtheid was 97.4 per 1000 persoonsjaren (95% BI: 91.2-103.7). Dit resulteerde in 147 (95% BI: 138-157) nieuwe gevallen per jaar voor een gemiddelde huisartsenpraktijk met 2.350 patiënten. Klachten aan de schouder en nek kwamen het meest voor. Van alle nieuwe consulten was 23% geregistreerd onder een niet specifieke code, meestal onder 'andere aandoening van het bewegingsapparaat'.

Bij het schatten van morbiditeit in de eerste lijn, gebaseerd op diagnose codes, zou men alert moeten zijn op mogelijke onderschatting van de morbiditeit en de bijbehorende werkbelasting, door het weglaten van codes niet specifiek voor een regio of aandoening.

Data van de prospectieve cohort studie met patiënten (leeftijd 18-64 jaar) die de huisarts hebben geconsulteerd met een nieuwe klacht of een nieuwe episode van een

klacht aan de arm, nek of schouder zonder voorafgaand trauma, werden gebruikt om de onderzoeksvragen in de volgende hoofdstukken te beantwoorden.

In hoofdstuk 3 worden voorspellende factoren in kaart gebracht voor het niet hersteld zijn op 6 maanden na het eerste consult met de huisarts. Onderzocht wordt welke klacht, patiënt, fysieke, psychosociale en werkfactoren een rol spelen. Twee modellen werden gemaakt, één voor de totale groep, en één voor de subgroep met betaald werk. Na 6 maanden, gaf 46% van de totale groep (N=612) en 42% van de werkende subgroep (N=473) aan nog niet te zijn hersteld. De beste voorspellers waren klachtkenmerken (lange duur van de klacht voorafgaand aan het consult, recidiverende klacht, co-morbiditeit van het bewegingsapparaat, en bij een klacht van pols of hand), gevolgd door psychosociale factoren (veel somatiseren, weinig sociale steun ervaren). Het hebben van een specifieke diagnose hing samen met herstel.

In de werkende subgroep werden dezelfde factoren gevonden. Daarnaast hing het ervaren van weinig steun van de leidinggevende samen met het niet hersteld zijn.

Naast vragen naar klachtkenmerken, kunnen informatie over somatisatie en ervaren steun, de huisarts helpen om patiënten te herkennen met een slechte prognose.

In hoofdstuk 4 werden verschillende aspecten van bewegingsangst (angst voor bewegen/(weer) oplopen van letsel) bestudeerd.

Van patiënten met lage rugpijn is bekend dat bewegingsangst een rol kan spelen in het voortduren van klachten. Door angst, vermijdingsgedrag en verhoogde aandacht voor lichaamssignalen kan een vicieuze cirkel ontstaan die kan leiden tot beperkingen, disuse, en depressie (fear avoidance model). In patiënten met arm, nek en schouder klachten is weinig bekend over bewegingsangst en daarmee samenhangende variabelen.

Baseline gegevens werden verzameld over patiënt, klacht, en psychosociale variabelen. De mate van bewegingsangst werd gescoord op de verkorte 13-item versie van de Tampa schaal voor kinesiofobie (TSK-AV). De gemiddelde TSK-AV score werd berekend op baseline. In niet-herstelde patiënten werden ook de vervolgscores op de TSK-AV op 6 en 12 maanden geanalyseerd. Daarnaast is nagegaan welke variabelen samenhangen met de bewegingsangst score op baseline. De gemiddelde TSK-AV score op baseline was 24.8 (SD: 6.2). Onder de groep patiënten die na verloop van tijd niet herstelden was de gemiddelde score op het eerste consult 26.1 (SD: 6.6), deze bleef onveranderd over de daaropvolgende 12 maanden. Catastroferen (negatieve gedachten hebben over de pijn), functionele beperkingen en de aanwezigheid van co-morbiditeit aan het bewegingsapparaat lieten de sterkste samenhang zien met bewegingsangst. Daarnaast, droegen een klacht van

de schouder, het ervaren van weinig sociale steun, hoge score op somatisatie en distress bij aan de score op bewegingsangst. De gemiddelde TSK-AV score in onze populatie lijkt vergelijkbaar met andere populaties in de eerste lijn. In patiënten die niet herstellen is de mate van bewegingsangst na 12 maanden niet veranderd. De variabelen die samenhangen met bewegingsangst op het eerste consult lijken in overeenstemming met het 'fear-avoidance model'.

Hoofdstuk 5 brengt het beleid in kaart bij niet-traumatische arm, nek en schouderklachten tot 6 maanden na het eerste consult. Daarnaast worden verschillen in beleid onderzocht tussen patiënten met een specifieke diagnose en een aspecifieke diagnose, en binnen de groep met specifieke diagnoses.Voor het beleid bij schouderklachten en epicondylitis in de huisartsenpraktijk zijn in Nederland richtlijnen voorhanden. Weinig is bekend over het uitgevoerde beleid bij de totale groep van arm, nek en schouderklachten.Van 682 deelnemende patiënten werden gegevens verzameld over: de diagnose, het beleid, en patiënt en klachtkenmerken. Na 6 maanden, was bij 18% van de patiënten aanvullende diagnostiek uitgevoerd, voornamelijk röntgendiagnostiek (14%). Verder was 49% van de patiënten verwezen naar de fysiotherapeut en 12% naar de specialist. Patiënten met een specifieke diagnose werden vaker verwezen naar de specialist, en patiënten met aspecifieke diagnose vaker naar de fysiotherapeut. Corticoisteroïd injecties (17%) werden voornamelijk toegepast bij specifieke diagnoses (zoals. impingement syndroom, frozen schouder, carpaal tunnel syndroom, en de ziekte van Quervain). In de frequentie van het voorschrijven van medicatie (51%) was geen verschil tussen specifieke en aspecifieke diagnoses. Bij 19% van de patiënten vond geen verwijzing plaats en werd geen medicatie voorgeschreven of corticosteroïd injectie gegeven. Braces (4%) werden vooral toegepast bij epicondylitis.

Het beleid bestond meestal uit het voorschrijven van medicatie en verwijzen voor fysiotherapie. De groepen met een specifieke en aspecifieke diagnose verschilden in de frequentie waarin corticosteroïd injecties werden toegepast, en waarin verwijzingen naar de fysiotherapeut en de medisch specialist plaatsvonden.

Hoofdstuk 6 brengt factoren in kaart die samenhangen met behandelkeuzes bij niet-traumatische arm, nek, en schouder klachten in de huisartsenpraktijk, in het begin van de behandeling. Naast de diagnose, wordt de invloed van klacht, patiënt, en huisartsfactoren nagegaan. In totaal zijn 5 modellen gemaakt voor het wel/niet toepassen van een bepaalde behandeloptie.

Het hebben van een langdurige klacht, een uitgebreid klachtengebied, en het consulteren van een minder ervaren huisarts hingen samen met het aanvragen van aanvullend diagnostisch onderzoek. Bij patiënten met 'epicondylitis', en huisartsen

werkzaam in een groepspraktijk werd minder aanvullende diagnostisch onderzoek uitgevoerd.

Het hebben van een 'specifieke schouder diagnose', meer functionele beperkingen, hogere somatisatie score, kortere klachtenduur en het consulteren van een mannelijke huisarts, hingen samen met het voorschrijven van medicatie. Corticosteroïd injecties warden vaker toegepast in 'specifieke schouder diagnoses' of 'andere specifieke diagnoses' door huisartsen met specifieke interesse voor klachten aan het bewegingsapparaat, bij langdurige klachten, veel functionele beperkingen, en in oudere patiënten.

Langere klachtenduur, recidiverende klacht, hogere distress score en een huisarts werkzaam in een minder dichtbevolkt gebied hingen positief samen met verwijzen naar de fysiotherapeut. Bij het hebben van een 'specifieke schouder' of 'andere specifieke diagnose' werd minder vaakverwezen voor fysiotherapie, maar vaker verwezen naar de medisch specialist. Daarnaast werd bij veel functionele beperkingen en door een minder ervaren huisarts ook vaker verwezen naar een medisch specialist.

Naast de diagnose, bepalen lange klachtenduur, veel functionele beperkingen en huisartsfactoren 'wie wat krijgt' in niet-traumatische arm, nek en/of schouderklachten.

In Hoofdstuk 7 wordt ingegaan op de gevonden resultaten in dit proefschrift en worden aanbevelingen gedaan voor de praktijk en voor onderzoek.

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Over de auteur

Anita Feleus werd op 26 november 1969 geboren in Vlissingen. Na het behalen van haar VWO diploma aan het Petrus Hondius College in Terneuzen, startte ze in 1988 met de opleiding fysiotherapie in Breda. Ze vervolgde haar studie in 1993 aan de Universiteit Maastricht, waar ze gezondheidswetenschappen studeerde. Deze ronde ze in 1995 af met een studie naar de ontwikkeling van een meetindex voor mensen met het complex regionaal pijnsyndroom. Ze staat geregistreerd als Master of Science in Epidemiologie.

Gedurende 5 jaar werkte ze als fysiotherapeut in diverse praktijken, een revalidatiecentrum en een verpleeghuis. Eind 1999 startte ze me het uitvoeren van wetenschappelijk onderzoek. Van 1999-2001 werkte ze op de afdeling Interne Geneeskunde van het Academisch ziekenhuis in Maastricht. Daar inventariseerde ze problemen die mensen met chronisch inflammatoire darmziekten ervaren bij het uitvoeren van betaald werk en met het afsluiten van verzekeringen. In 2001 kwam ze in dienst bij de afdeling Huisartsgeneeskunde en het Nederlands Kenniscentrum voor Arbeid en Klachten Bewegingsapparaat van het Erasmus MC, en voerde onderzoek uit bij patiënten die vanwege klachten aan arm, nek en schouder hun huisarts raadplegen. Deze studie heeft geleid tot dit proefschrift.

Daarna was ze korte tijd werkzaam bij het Nederlands Huisartsen Genootschap.

Sinds maart 2008, is ze werkzaam als onderzoeker bij de Kenniskring Participatie, Arbeid en Gezondheid van de Hogeschool Rotterdam.

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