HAND AND WRIST PROBLEMS IN GENERAL PRACTICE: DIAGNOSIS AND PROGNOSIS

Marinda Spies-Dorgelo

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geboren te Kampen

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CHAPTER 1

General introduction

BACKGROUND

Musculoskeletal diseases are one of the major causes of disability around the world.[1-4] Besides having a large impact on the individual, they are also a major burden on health care and society. Musculoskeletal disorders account for more than half of all chronic conditions and are the most common cause of severe, long-term pain and disability.[5] In 2003 Picavet et al. carried out a population-based survey on musculoskeletal pain in the Netherlands in order to provide information on the prevalence of the problem.[4] Almost three-quarter (74.5%) of the Dutch population aged 25 years and over reported any musculoskeletal pain during the past 12 months. They concluded that, also in the Netherlands, musculoskeletal pain is common and has far-reaching consequences for health, work and the use of health care. In the past years research has been done on several musculoskeletal disorders, such as low back pain, knee problems, neck problems and upper limb disorders.[4;6-13] Research specifically aimed at hand and wrist problems is scarce. The prevalence of hand and wrist problems in the general Dutch population has been estimated at 12.5%.[4] The prevalence rates are higher in some occupational groups, e.g. visual display units workers or dental hygienists, and in older people. Based on the increasing numbers of elderly and prolonged average life expectancy, one may expect that prevalence and incidence of joint pain, including hand and wrist problems, will increase in the near future. The growing older population will have an additional impact on the health care system and the costs due to musculoskeletal symptoms.[14]

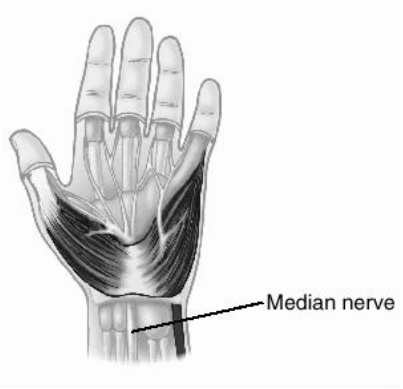
Not all people with hand or wrist problems consult their GP. The incidence in general practice is estimated at 4.6/1000/year for wrist problems and 7.8/1000/year for hand and finger problems.[6] Most frequent hand or wrist problems are osteoarthritis, nerve entrapment (including carpal tunnel syndrome), tenosynovitis (trigger finger, De Quervain), rheumatoid arthritis, ganglion, and non-specific or activity related problems of the hand or wrist.

Osteoarthritis of the hand or wrist

Osteoarthritis (OA) refers to a clinical syndrome of joint pain accompanied by varying degrees of functional limitation and reduced quality of life. It is the most common form of arthritis and one of the leading causes of pain and disability worldwide. Knees, hips and small hand joints are most commonly affected. Although pain, reduced function and participation restriction can be important consequences of osteoarthritis, structural changes often occur without accompanying symptoms. Osteoarthritis is a metabolically active repair process that takes place in all joint tissues and involves localised loss of cartilage and remodelling of adjacent bone. A variety of joint traumas may trigger the need to repair. Osteoarthritis is a slow but efficient repair process that often compensates for the initial trauma, resulting in a structurally altered but symptom-free joint. In some people, either because of overwhelming trauma or compromised repair potential, the process cannot compensate, resulting in continuing tissue damage and eventual presentation with symptomatic osteoarthritis or 'joint failure'.[15] The main symptoms are acute pain, swelling, stiffness, and causing loss of ability (grip and pinch). Osteoarthritis of the hand mostly occurs in three places: the thumb base (carpometacarpal (CMC) joints), the distal interphalangeal (DIP) joints, and the proximal interphalangeal (PIP) joints. Osteoarthritis of the wrist mainly occurs on the radial side of the wrist. The majority of people aged 55 years and over have radiographic signs of hand or wrist OA, and about 20% of this population have symptomatic hand OA.[16] Information about the incidence of hand OA in general practice is scarce. In the second National Survey of General Practuce (NS2) which is a large nation-wide morbidity survey in the Netherlands the incidence of OA in joints other than the knee or hip has been estimated at 5 episodes per 1000 patient years for women, and 2 episodes per 1000 patient years for men aged between 45 and 65 years.[17]

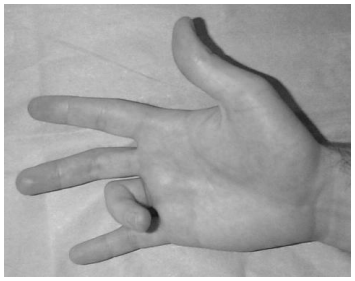
Nerve entrapment

Entrapment of the median nerve (carpal tunnel syndrome) at the wrist is probably the most frequent encountered peripheral nerve lesion.[18;19] Patients typically have nocturnal pain, paraesthesiae and numbness involving the median nerve innervated fingers, and are awakened by these symptoms. The pain often radiates up the arm towards or even beyond the elbow. Muscular weakness is a less frequent complaint. These symptoms may also occur during the day. Both hands may be involved, but the dominant one is usually most affected.[18] Estimates of the prevalence of carpal tunnel syndrome in the general population are 0.6% in men and 5.8% in women.[20] The incidence in Dutch general practices has been estimated at 2.9 per 1000 patient years for women and 0.9 per 1000 patient years for men.[17]



Trigger finger

Trigger finger is a common cause of pain and disability in the hand. It presents with discomfort in the palm during movement of the involved digits. Gradually, or in some cases acutely, the flexor tendon causes a painful click as the patient flexes and extends the digit. The condition has a reported incidence of 28 cases per 100 000 population per year, or a lifetime risk of 2.6% in the general population.[21] Trigger fingers are more common in women than men. They occur most frequently in people who are between the ages of 40 and 70 years[21-23], and are more common in people with certain medical problems, such as diabetes and rheumatoid arthritis.



De Quervain's tenosynovitis

De Quervain's tenosynovitis is an inflammation of one or more tendons in the wrist. It is characterized by pain on the radial side of the wrist and thumb base, impairment of thumb function, and thickening of the ligament structure covering the tendons in the first dorsal compartment of the wrist.[24;25] De Quervain is mainly observed in women between 25 and 55 years of age, and more often during pregnancy.[26] The prevalence rate in an English general population has been estimated at 0.5% for men and 1.3% for women.[13]

Rheumatoid arthritis

Rheumatoid arthritis is a chronic, systemic, inflammatory autoimmune disorder causing symmetrical polyarthritis of large and small joints, typically presenting between the ages of 30 and 50 years.[27] Commonly involved joints are the elbow, wrist, hand, knee, ankle, and foot. The typical presentation is polyarticular, with pain, stiffness, and swelling of multiple joints in a bilateral, symmetric pattern. Patients usually note morning stiffness lasting more than an hour.[28;29] The prevalence of rheumatoid arthritis in the general Dutch population has been estimated at about 10 per 1000. The prevalence in general practice has been estimated at 2 per 1000 for men and 5 per 1000 for women.[30;31]

Ganglion

Ganglia are the most common benign soft tissue tumours of the hand. The mucin-filled cyst sac is usually attached to a joint capsule or tendon sheath and is lined with collagen fibres.[32;33] They may cause cosmetic deformity and discomfort which can restrict function. Ganglia could arise gradually or at once, and they resolve spontaneously in about 30-63% of the patients.[34;32] The cause of a ganglion is not completely clear, but micro traumata, instability of the joint, higher mobility and osteoarthritis are factors for developing a ganglion.[35] The incidence is 3.3 per 1000 patient years and the prevalence is 4.5 per 1000 patients per years. Ganglia are more often observed in women, and more often between 20 and 40 years of age.[34;36]

Non-specific or activity related symptoms of the hand or wrist

Besides the more specific conditions described above, a lot of people suffer from non-specific or activity related symptoms of the hand or wrist where the symptoms are diffuse and the tissue responsible for the pain cannot be localized. Some years ago, these symptoms often were labelled as Repetitive Strain Injury (RSI). In a cross-sectional study Walker-Bone et al. investigated the prevalence of non-specific pain in the upper limb among adults.[13] They found an estimated prevalence of non-specific wrist/hand pain in the general population of 8.7% for men and 11.5% for women. It is unclear in how many patients presenting in primary care the GP will make a diagnosis of non-specific symptoms of the hand or wrist.

In the Netherlands, the general practitioner (GP) acts as a gatekeeper in the health-care system and is responsible for most referrals to medical specialists and professionals allied to health care. The primary care population is a heterogeneous population consulting with a wide range of hand and wrist problems. Little is known about the characteristics of patients consulting the GP for these problems, and there is little information about the impact, course and prognosis of these problems in primary care, nor about potential prognostic indicators of outcome, such as the duration or intensity of symptoms, diagnosis, physical load or psychosocial factors. Because of this lack of information, it is difficult for GP's to make adequate decisions regarding the management of these problems.

OBJECTIVES AND OUTLINE OF THIS THESIS

This thesis focuses on the diagnosis and prognosis of hand and wrist problems in general practice.

Hand problems are common, painful and have a significant influence on many dimensions of health, including daily activities and cosmetic perceptions.[16;37] Not all people with hand or wrist problems consult their GP. Our first research question is *How often and for which problems do patients with hand or wrist problems consult their general practitioner, and which factors predict consultation for these symptoms?* To answer this question, we used data of a population-based cohort study on the course and impact of physical symptoms. For this study, a self-administered general questionnaire about health was distributed among a random sample of 4741 adults

registered with five general practices in The Netherlands. We selected responders who indicated in the questionnaire that they had had hand or wrist problems in the past month (n=563). Some of these responders were not registered with the participating GP anymore, or could not be traced in the GP electronic data system because of incomplete or incorrect information about address or date of birth. There were 537 responders for whom consultation data have been extracted. The results of our analyses are described in **chapter 2**.

As mentioned before, the primary care population is heterogeneous. Little information is available about the prevalence of several hand or wrist conditions in primary care, nor about the choice of management. Furthermore, little is known about the characteristics of patients presenting with hand and wrist problems in primary care, and their impact on functioning. Our second and third research questions were *Which diagnoses and management decisions do GPs make in patients with hand or wrist problems?* and *What is the impact of hand or wrist problems on physical and social functioning?* We conducted an observational cohort study in 32 general practices (44 GPs) in the Netherlands. Before the start of the study GPs received a three-hour instruction on the diagnosis of hand and wrist problems. Instruction was given on how to recognise important symptoms and signs, and how to carry out relevant physical tests. Furthermore, the most common diagnoses and their characteristics were discussed. From July 2004 to December 2005, GPs recruited 301 patients with a new episode of hand or wrist problems. In total, 267 patients consented to participate and completed the baseline questionnaire. Follow-up questionnaires were mailed after 3, 6 and 12 months. GPs were asked to complete a standardised registration form after the first consultation, recording information about history, physical examination, medical diagnoses and management of the hand or wrist problem. After one year GPs were asked to complete a final registration form, on which they recorded if the diagnosis had changed during the past year and if additional management decisions had been made. Answers to both these research questions are given in the **chapters 3 and 4**.

The prognosis of hand or wrist problems has not yet been fully investigated in a primary care population. We know from research on other musculoskeletal disorders, such as low back pain, neck pain, shoulder pain and elbow symptoms, that the intensity and course of symptoms may be associated with socio-demographic, physical, psychological and social factors.[4;6-10;13] Information on prognostic indicators in patients with hand or wrist problems may help GPs to provide patients with

adequate information regarding the most likely course of their symptoms. Such information may support decisions on management and referral. Our final research question was *What is the course of hand or wrist problems, and which factors predict an unfavourable outcome?* For answering this question we used the follow-up data. We had to make a decision which outcome measure we should use, and therefore we determined the clinimetric properties of two questionnaires assessing hand symptoms (Dutch version of the Symptom Severity Scale) and physical functioning (Dutch version of the hand and finger subscale of the Arthritis Impact Measurement Scale). Both questionnaires have been found to be valid and reliable in their respective target populations: people with carpal tunnel syndrome and people with rheumatoid arthritis. We wanted to determine whether these questionnaires are also applicable in our less specific group of patients who consulted their general practitioner for hand and wrist problems. The results of this clinimetric study are described in **chapter 5**. In our heterogeneous primary care population the Symptom Severity Scale was found to be a suitable instrument to assess the severity of symptoms, whereas the hand and finger subscale of the Dutch-AIMS2 was less suitable for the measurement of physical functioning. We, therefore, defined insufficient improvement of symptoms on the Symptom Severity Scale as poor outcome and used this outcome measure to develop a short-term and long-term prognostic model. Results regarding course and prognosis of hand and wrist problems are described in **chapter 6**.

Finally, **chapter 7** contains a general discussion of the methods and results of this study. This thesis ends with a summary in both English and Dutch.

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CHAPTER 2

Hand and wrist problems in primary care: factors associated with GP consultation

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Submitted for publication

ABSTRACT

Background

Hand and wrist problems are common in the population, but little is known about consultation and predictors thereof in primary care for this problem.

Objectives

1) to describe how often adults with hand or wrist problems consult their GP and for which problems, and 2) to analyse potential predictors of consultation.

Methods

This study was part of a population-based cohort study. A self-administered general questionnaire about physical symptoms and health was distributed among a random sample of adults registered with five general practices in The Netherlands. We selected responders who indicated that they had hand or wrist problems in the past month (n=537). Consultation data were extracted from computer-based medical records covering a period of one year after sending the questionnaire. The association between potential predictors and consultation rate was studied using logistic regression analyses, adjusting associations for potential confounding by age and sex.

Results

Only 6.0% consulted their GP for hand or wrist problems specifically; 76% for other reasons, mostly musculoskeletal, respiratory, and circulatory problems. The median consultation frequency was 3 visits. Only frequency and impact of the problem on everyday activities were significantly associated with consultation for hand or wrist problems specifically. Anxiety, depressive symptoms and poor health predicted consultation for other reasons.

Conclusion

Few people with hand or wrist problems consult their GP for these symptoms, despite significant pain and limitations in physical functioning. Consultation rate is high however, and seems to be driven by other mental or physical health problems.

INTRODUCTION

Hand and wrist problems are common, the prevalence in the general population has been estimated at 12.5%.[1] The impact of hand and wrist problems is considerable[2] and many people who seek health care still report problems after one year.[3] Not all people with hand or wrist problems consult their GP. The incidence in general practice is estimated at 4.6 / 1000 / year for wrist complaints and 7.8 / 1000 / year for hand and finger complaints,[4] which means that about 10% present these problems to their GP. Population-based studies and studies in primary care patients with musculoskeletal problems, such as neck, upper limb and knee pain have shown that psychological factors (e.g. anxiety and depression), demographic factors (e.g. age, sex and work status), severity of the symptoms (e.g. duration and reported physical symptoms), and perceived health are associated with consultation in primary care,[5-10] but no information is available for hand or wrist problems. We designed a population-based study to investigate how often adults with hand or wrist problems consult their GP (consultation frequency), and for which problems. The main objective was to analyse potential predictors of consultation in people with hand or wrist problems.

METHODS

Study design and population

This study is part of a population-based cohort study on the course and impact of physical symptoms.[11] For this study, a self-administered general questionnaire about symptoms and health was distributed among a random sample of adults registered with five general practices in The Netherlands. As nearly all residents in the Netherlands are registered with a general practitioner (GP),[12] practice registers provide a convenient sampling frame for a population-based cohort. The five participating practices varied with respect to size (2730 to 6537 registered patients), number of GPs (2 to 5), and location (rural and urban, more and less deprived areas). Detailed information about study design has been published elsewhere.[11] For our purpose, we selected responders who indicated in the questionnaire that they had hand or wrist problems in the past month.

Ethical approval of the study was obtained from the Medical Ethics Committee of the VU University Medical Center in Amsterdam.

Data collection

The following variables were measured in the questionnaire:

- Socio-demographic variables: age, sex, marital status, educational level, work status, and self-reported chronic diseases (asthma, heart disease, diabetes, cancer, rheumatoid arthritis/osteoarthritis, or fibromyalgia).
- Body mass index (calculated from self-reported weight and height). Underweight/normal weight was defined as BMI of 25 or lower, overweight as BMI between 25 and 30, and obesity as BMI of 30 or higher.
- Lifestyle factors: alcohol consumption (number of units per week), previous or current smoking, and physical activity. Adults were coded as meeting the Dutch Norm for Healthy Activity (yes or no) if they reported 30 minutes or more of moderate-intensity physical activity on at least five days of the week.[13;14] Additionally, they were coded as meeting the American College of Sports Medicine (ACSM) position stand (yes or no) if they performed physical exercise or sports at least 3 times a week.[15]
- Anxiety and depression were measured with the Hospital Anxiety and Depression Scale (HADS, 0-21), a validated scale that is particularly useful as a screening tool for anxiety and depression in the general population.[16;17] For both subscales, scores of 0 to 7 points indicated no anxiety or depression, and scores of 8 or higher possible or probable anxiety or depression.[16;18]
- Perceived health was measured using the Dutch version of the Short-Form 36 (SF-36).[19;20] The eight scales measured by the SF-36 are physical functioning, role limitations in physical functioning, role limitations in emotional functioning, social functioning, bodily pain, mental health, vitality, and general health perceptions. Scale scores range from 0 to 100 with higher scores representing better perceived health. Results were compared with those of a Dutch reference population.[19]
- Physical symptoms were measured by asking to indicate the presence (lasting at least 24h in the past month)[21-23] of the following symptoms: fatigue, headache, dizziness, abdominal pain, and musculoskeletal pain (seven locations, including hand or wrist problems). We used this question to select responders with hand or wrist problems for our study. If present, for each symptom additional questions were asked concerning the duration of symptoms (<1 month, 1-3 months, 3-6 months, >6 months); frequency and impact on daily activities (both analysed as sometimes to often (about 5 days/month or less) versus very often (on more than half of all days)), and previous consultation for hand or wrist problems.

GP consultations:

Consultation data were extracted from computer-based medical records covering a period of one year after sending the questionnaire. The participating GPs routinely record all consultations and classify the symptoms or diagnosis at each consultation according to the International Classification of Primary Care (ICPC).[24] The ICPC-classification is made up of a letter (representing organ systems or domains, e.g. digestive system, psychological problems) followed by a number representing the symptom or diagnosis/disease. We used the following ICPC codes to identify consultations that were likely to be related to hand or wrist problems: L11 (wrist symptom/complaint), L12 (hand/finger symptom/complaint), L87 (bursitis/tendinitis/ synovitis), L88 (rheumatoid/seropositive arthritis), L91 (osteoarthritis other), N05 (tingling fingers/feet/toes), and N93 (carpal tunnel syndrome).

Statistical analysis

Consultation rate for hand or wrist problems was calculated as the proportion of all responders consulting at least once for hand or wrist problems; consultation rate for other reasons was calculated as the proportion of responders with at least 1 consultation over one year for any reason, but not hand or wrist problems. Descriptive statistics were used to describe characteristics of consulters and non-consulters with hand or wrist problems.

As potential predictors of consultation rate we considered those factors found in previous other research to be associated with GP consultation for musculoskeletal problems, that is, having paid work,[6] relevant chronic disease (we selected self-reported rheumatoid arthritis or osteoarthritis),[7;8] other musculoskeletal problems (we selected self-reported neck-upper extremity symptoms, and self-reported hip or knee symptoms),[8;9] anxiety,[8;9] depression,[5;6;8;10] and perceived health[9] measured using the first item of the general health perceptions subscale (SF-1) of the SF-36. We dichotomised this scale into good (scores 1-3) versus poor perceived health (score 4-5). We additionally considered factors specifically related to hand or wrist problems (duration, frequency, and impact of the symptom). We studied the strength of the association between each of the factors and consultation rate using logistic regression analyses, adjusting associations for potential confounding by age and sex. For dichotomous variables we only considered those variables with a prevalence of at least 10%. We presented Odds Ratios (ORs) along with the 95% confidence intervals (95% CI).

RESULTS

A total of 4741 questionnaires were distributed. A total of 2447 responders completed the questionnaire, resulting in an adjusted response rate of 53.5%. Responders more often were female (58.4% compared to 53.8% in the total population) and older (mean age 49.9 compared to 46.8 years). 563 responders indicated the presence of hand or wrist problems lasting at least 24h in the past month. Some of these responders were not registered with the participated GP anymore, or could not be traced in the GP system because of incomplete or incorrect information about address or date of birth. Consultation data from 537 responders have been extracted.

Consultation frequency and recorded problems

The median consultation frequency (all reasons) was 3 visits, with a minimum of 0 (n=97, 18.1%) and a maximum of 32 visits. Only 32 responders (6.0%) consulted their GP for hand or wrist problems (37 consultations), and 408 responders (76%) consulted for other reasons. Table 1 shows the problems most frequently recorded by the GPs, categorised in ICPC chapters. GPs could indicate more than 1 ICPC-code per consultation. The three most frequently recorded problems were musculoskeletal problems (321 times), respiratory problems (303 times), and circulatory problems (215 times).

Table 1: Number of ICPC-codes recorded over a period of one year in responders indicating the presence of hand or wrist problems (n=537)*

Problems	
Musculoskeletal problems	321
Upper extremity (arm/neck/shoulder) problems	63
Lower extremity (hip/leg/knee/ankle/foot) problems	62
Osteoarthritis of knee or hip	20
Hand or wrist	37
Respiratory problems	303
Circulatory problems	215
Skin problems	200
Endocrine/metabolic/nutritional problems	150
Digestive problems	125
Urinary system problems	75
Psychological problems	74

* more than 1 ICPC-code per consultation possible

Characteristics of consulters and non-consulters

Table 2 presents socio-demographic characteristics, self-reported chronic disease, lifestyle factors, symptom characteristics, and psychological factors separately for consulters and those without GP consultations (non-consulters). The results show that responders consulting for hand or wrist problems more often reported to have rheumatoid arthritis or osteoarthritis (34%) than responders consulting for other reasons (22%) or non-consulters (12%). They were more often obese (37% versus 18% respectively 10%), and the frequency and impact of the hand/wrist problems was higher. Increased scores for anxiety or depression (>7 points) were more common in responders consulting for other reasons (37% and 26% respectively), compared to non-consulters and those consulting for hand or wrist problems (26-25% and 17-16%). Those who consulted the GP in the year of follow-up reported more often that they had consulted before for hand or wrist problems (28% and 19% versus 11% in non-consulters). In total 98 responders (18.2%) indicated in the questionnaire that they had consulted their GP in the preceding 3 months, before completing the questionnaire. The characteristics of responders reporting GP consultation in the preceding 3 months were largely comparable to those who consulted in the year of follow-up; responders consulting in the preceding 3 months were slightly more often male and had a lower educational level, but all other characteristics were similar.

Perceived health

Our responders scored lower (varying between 4-26 points) on the eight subscales of the SF-36 compared to a Dutch reference population (fig.1).[19] For physical functioning, physical role functioning and bodily pain the mean scores of responders consulting for hand or wrist problems or for other reasons were very similar, and approximately 13 points lower than the mean scores of non-consulters. Significant differences (t-test, $p<0.05$) were found for physical role functioning between responders consulting for hand or wrist problems versus non-consulters (mean difference 18.3 (95%CI 1.8;34.8)) and between responders consulting for other reasons versus non-consulters (mean difference 15.1 (95%CI 6.0;24.3)). Furthermore, significant difference was found for physical functioning between responders consulting for other reasons versus non-consulters (mean difference 10.3 (95%CI 4.5;16.1)).

Table 2: Characteristics of responders indicating the presence of hand or wrist problems stratified by consultation rate and reason (n=537)

	No consultation (n=97)		**Consultation for hand/wrist (n=32)**		**Consultation for other reasons (n=408)**	
Demographic variables						
Age in years: mean (SD)	49.0	(15.9)	57.1	(14.0)	53.9	(16.0)
Gender: n (% female)	61	(62.9)	26	(81.3)	291	(71.3)
Educational level: n (%)						
Primary	22	(22.7)	9	(28.1)	154	(37.9)
Secondary	57	(58.8)	16	(50.0)	185	(45.6)
College/university	18	(18.6)	7	(21.9)	67	(16.5)
Paid work: n (%)	46	(48.4)	13	(40.6)	168	(41.8)
Marital status: n (% living together / married)	61	(62.9)	21	(65.6)	254	(62.4)
Chronic disease (self-reported): n (%)						
Rheumatoid arthritis or osteoarthritis	12	(12.4)	11	(34.4)	88	(21.6)
Heart disease	7	(7.2)	4	(12.5)	42	(10.3)
Asthma or chronic obstructive pulmonary disease	4	(4.1)	2	(6.3)	39	(9.6)
Diabetes	1	(1.0)	6	(18.8)	30	(7.4)
Fibromyalgia	3	(3.1)	1	(3.1)	21	(5.1)
Cancer	1	(1.0)	2	(6.3)	12	(2.9)
Care for young children <5 years old	12	(12.4)	3	(17.6)	49	(16.4)
Body Mass Index: n (%)						
<25 (underweight/normal)	52	(54.2)	9	(30.0)	166	(41.4)
25 to 30 (overweight)	34	(35.4)	10	(33.3)	164	(40.9)
>30 (obese)	10	(10.4)	11	(36.7)	71	(17.7)
Physical activity: n (%)						
ACSM position stand[#]	14	(14.7)	4	(13.3)	65	(16.3)
Dutch Norm Healthy Activity	33	(34.4)	14	(43.8)	138	(34.7)
Smoking: n (%)						
No	65	(67.0)	28	(87.5)	299	(73.5)
Yes	32	(33.0)	4	(12.5)	108	(26.5)
Alcohol consumption: n (%)						
≤1 unit per week	39	(40.2)	18	(56.3)	195	(47.9)
2 to 10 units per week	35	(36.1)	10	(31.3)	146	(35.9)
>10 units per week	23	(23.7)	4	(12.5)	66	(16.2)

Table 2: Continued

	No consultation (n=97)		**Consultation for hand/wrist (n=32)**		**Consultation for other reasons (n=408)**	
Characteristics of hand/wrist symptoms						
Duration						
<3 months	19	(19.8)	5	(15.7)	84	(20.9)
≥3 months	77	(80.3)	27	(84.4)	317	(79.0)
Frequency						
Sometimes/often	62	(65.3)	8	(25.0)	178	(45.2)
Very often	33	(34.7)	24	(75.0)	216	(54.8)
Impact on daily activities						
Sometimes/often	68	(76.4)	14	(46.6)	233	(60.2)
Very often	21	(23.6)	16	(53.3)	154	(39.8)
Self reported GP consultation for hand/wrist problems in the past 3 months: n (%)	11	(11.3)	9	(28.1)	78	(19.1)
Psychological factors						
Anxiety (HADS): n (%)						
Score 0-7	71	(73.2)	24	(75.0)	256	(63.2)
Score ≥8	25	(25.8)	8	(25.0)	149	(36.8)
Depressive symptoms (HADS): n (%)						
Score 0-7	80	(83.3)	27	(84.4)	302	(74.4)
Score ≥8	16	(16.7)	5	(15.7)	104	(25.6)
Poor perceived health (SF-1): n (%)	27	(27.8)	11	(34.4)	189	(46.9)

[#] American College of Sports Position Stand

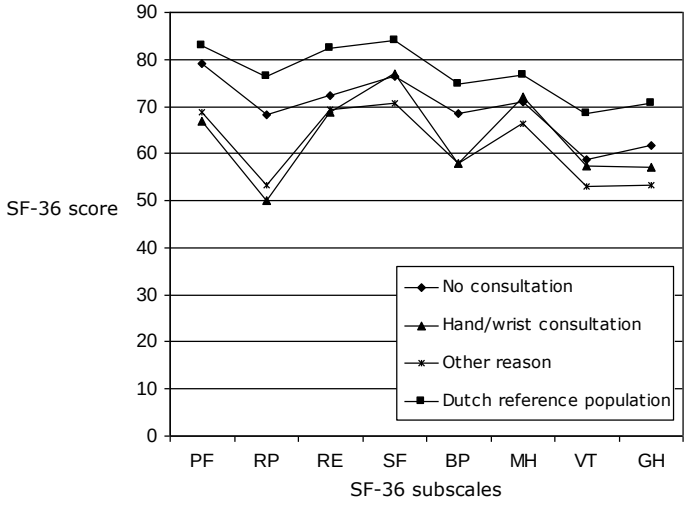

Figure 1: SF-36 scores for consulters (for hand/wrist problems or other reasons), non-consulters and for a Dutch reference population[22;23] (SF-36 subscales: PF=physical functioning; RP=role functioning physical; RE=role functioning emotional; SF=social functioning; BP=bodily pain; MH=mental health; VT=vitality; GH=general health)

Factors associated with consultation rate

Table 3 presents the associations, adjusted for age and gender, of factors with consultation rate using no consultation as the reference group. Possibly due to the small number of consultations for hand or wrist problems, significant associations were only found for frequency and impact of the problem on everyday activities. Paid work, self-reported rheumatoid arthritis or osteoarthritis, and having other upper extremity symptoms (arm, neck, shoulder) also seemed to be more strongly associated with consultation for hand or wrist problems than for other reasons, but these associations were not significant. Increased anxiety or depression scores, and poor perceived health were more strongly associated with consultation for other reasons; associations were statistically significant for anxiety and perceived health.

Table 3: Univariable association of factors with consultation rate of responders indicating the presence of hand or wrist problems (n=537)* (reference group: no consultation)

	Consultation for hand/wrist (n=32)		**Consultation for other reason (n=408)**	
	OR*	95%CI	OR*	95%CI
Demographic factors				
Having paid work (vs not having paid work)	1.77	[0.62;5.00]	1.12	[0.67;1.87]
Self-reported rheumatoid arthritis or osteoarthritis	2.47	[0.90;6.81]	1.47	[0.74;2.93]
Characteristics of hand/wrist problems				
Duration ≥3 months (vs < 3 month)	1.12	[0.36;3.48]	0.78	[0.44;1.38]
Frequency (vs sometimes / often)				
Very often	4.29	[1.67;11.00]	2.00	[1.24;3.23]
Impact on daily activities (vs sometimes / often)				
Very often	3.04	[1.22;7.60]	1.92	[1.11;3.31]
Additional upper extremity symptoms (vs no)	2.68	[0.90;7.92]	1.08	[0.67;1.75]
Additional hip or knee symptoms (vs no)	1.23	[0.53;2.86]	0.98	[0.62;2.55]
Psychological factors				
Anxiety (HADS) (vs score 0-7)				
Score ≥8	0.87	[0.33;2.28]	1.72	[1.04;2.84]
Depressive symptoms (HADS) (vs score 0-7)				
Score ≥8	0.71	[0.22;2.27]	1.73	[0.96;3.11]
Poor perceived health (SF-1) (vs good)	1.22	[0.49;3.01]	2.23	[1.37;3.65]

*Adjusted for age and sex

DISCUSSION

Summary of main findings

Only 6.0% of those who reported hand or wrist problems consulted their GP for these problems, and 76% consulted for other reasons, mostly musculoskeletal, respiratory, and circulatory problems. The median consultation frequency over a period of one year was 3 visits. Consulters for either hand/wrist problems or other reasons scored very similar on subscales of perceived health; for the subscales physical functioning, physical role functioning and bodily pain, these scores were lower than for non-consulters and a Dutch reference population. Only frequency and impact of the

problem on everyday activities were significantly associated with consultation for hand and or wrist problems specifically.

Strengths and limitations of this study

Our study addressed a large population-based sample, with a substantial number of responders (23%) indicating the presence of hand or wrist problems in the past month. Our prevalence is slightly higher than the prevalence reported in another survey (12.5-17.5%),[1] which might be the result of slightly different definitions for hand-wrist problems, or of a selective response of people with problems in our study. Possibly people with hand or wrist problems or other symptoms are more likely to complete the questionnaire than people without any problems. Nonresponders who provided a reason for not participating often indicated that they had no health problems.[11]

Consultation data were extracted from computer-based medical records. GPs recorded consultations and classified the symptoms or diagnoses according to the ICPC. We noticed in our data that GPs did not always allocate codes to consultations; in 26% of the consultations no ICPC code was available. This percentage is comparable to other GP consultation databases. In 2004 Jordan et al. conducted a systematic review assessing the quality of morbidity coding in primary care records in the UK;[25] percentages of coded consultations varied between practices, ranging from 67 to 99%. To determine the effect of the missing codes on the association of factors with consultation rate, we performed a sensitivity analysis where we excluded responders (n=38) who consulted their GP but did not have an ICPC code. The regression coefficients hardly changed, therefore we decided not to exclude these responders, but assumed they consulted for other reasons than hand or wrist problems.

Comparison with existing literature

Among all responders indicating the presence of hand or wrist problems, the percentage of GP consultations for hand or wrist problems was low (6%). This low percentage is partly explained by the design of this study. A questionnaire was sent to adults registered with GPs and prevalent cases were followed for one year, so cases could be captured at any moment during their episode of hand/wrist pain. 98 responders (18.2%) indicated in the questionnaire that they had consulted their GP in the preceding 3 months, of whom 89 did not consult again for hand or wrist problems in the year after. The characteristics of these responders were comparable to

responders consulting during the year of follow-up. Because 18% had consulted in the preceding 3 months, we expect that the annual consultation rate can be higher than 6%. But, it has to be taken into account that the 18% is the result of retrospective data collection, and the results will be less reliable than our prospective data.

Another possible explanation could be the direct access to physiotherapy which was introduced in the Netherlands in 2006. In 2006, 28% of the patients seen by a physical therapist used direct access, and especially patients with non-specific back or neck problems were more likely to refer themselves to a physical therapist.[26] Hand or wrist problems were not listed in the top 5.

The prevalence in general practice of hand and wrist problems studied in the second Dutch national survey was estimated at 23/1000/year (2.3%).[4] In our study 32 of the total of 2447 responders (1.3%) consulted their GP for hand or wrist problems, which closely matches the estimate of the Dutch national survey, confirming the external validity of our findings. The problems most frequently recorded by the GPs were largely the same as reported in another Dutch study in general practice, in which the three most frequently recorded problems were also musculoskeletal, respiratory or circulatory problems, only in different order.[27]

We previously showed that adults who consult their GP for hand or wrist problems report considerable pain and reduction in function,[2] and many still have problems after one year.[3] We therefore expected higher consultation frequency for hand or wrist problems. Possibly, the impact of the hand or wrist symptoms is not so high in the general population and responders who do consult do so for other reasons. Hand or wrist symptoms may also have been mentioned as additional problem, for example when consulting for other musculoskeletal problems, but not separately recorded by GPs. Alternatively, impact may be high, but people may see the problem as an inevitable part of ageing, as has been reported for osteoarthritis in older people.[28;29] They may feel that GPs do not have much to offer in terms of treatment, which might discourage patients to consult.

Implications for future research or clinical practice

Few people with hand or wrist problems consult their GP for these symptoms, despite pain and limitations on daily activities. Many of these people, however, do present in primary care, and these visits may be associated with increased levels of anxiety, depression and poor perceived health. This seems to imply that hand or wrist problems are often accompanied by other problems that influence health and functioning. When consulted for hand or wrist problems GPs could especially pay attention to the frequency and impact of these problems on daily activities when making decisions regarding management.

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CHAPTER 3

Diagnosis and management of patients with hand and wrist problems in general practice

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ABSTRACT

Objectives

(1) to describe diagnoses made by GPs in patients with hand or wrist problems, (2) to describe management, and (3) to determine the association between diagnostic information and two outcomes: persistent symptoms and specialist referral.

Methods

GPs recruited patients with hand or wrist problems and completed a standardised form recording information about patient history, observations, palpation, and physical tests. Patients were sent a questionnaire at baseline, 3 and 12 months containing questions on characteristics and symptom severity. Logistic regression analyses were used to determine the association between diagnostic information and the odds of persistent symptoms or specialist referral.

Results

Three most frequently recorded diagnoses were osteoarthritis (17%), tenosynovitis (16%), and nerve entrapment (13%). Wait-and-see (30%) and painkillers (24%) were most often advised. Higher probability of persistent symptoms at both 3 and 12 months was associated with being female, higher age, long baseline symptom duration, and higher baseline pain intensity score; positive DeQuervain test was associated with lower probability of persistent symptoms. Having a recurrent problem was associated with the odds of specialist referral.

Conclusion

In primary care information about physical signs, and physical tests are of importance to make a diagnosis in patients with hand or wrist problems, but provide less prognostic information.

INTRODUCTION

Musculoskeletal problems have a major impact on population health.[1-3] Hand problems are common, painful and have a significant influence on many dimensions of health, including daily activities and cosmetic perceptions.[4-7]

The primary care population is a heterogeneous population consulting with a wide range of hand and wrist problems, including various types of rheumatic conditions and work-related problems.[6] There is little information about the prevalence of these conditions in primary care. Therefore, we aimed to describe the diagnoses made by GPs in patients presenting with hand or wrist problems in more detail. Once a diagnosis has been made, GPs make decisions regarding management, which may vary from wrist splints, medication, steroid injections, to referral.[8-10] The choice of management may depend on the severity and duration of the symptoms, and the medical diagnosis. The second objective of this study was to describe management offered to patients with hand or wrist problems, stratified by diagnostic category.

Diagnostic information is important for prognostic and therapeutic decisions, and eventually for patient outcomes.[11;12] Therefore, finally, we determined the association between diagnostic information available to GPs and two outcomes: specialist referral and patient outcome in terms of the likelihood of persistent symptoms.

METHODS

Study design and population

We conducted an observational cohort study in 32 general practices (44 GPs) in the Netherlands.[6] Before the start of the study GPs received a three-hour instruction on the diagnosis of hand and wrist problems. Instruction was given on how to recognise important symptoms and signs, and how to carry out relevant physical tests. Furthermore, the most common diagnoses and their characteristics were discussed. As this was an observational study we did not instruct GPs regarding management of hand and wrist problems.

From July 2004 to December 2005, GPs recruited patients with a new episode of hand or wrist problems. An episode was considered to be 'new' if participants had not visited their GP for the same problems during the preceding 3 months. Inclusion criteria were: 18 years or older, and capable of completing Dutch questionnaires.

Patients were excluded from the study if they presented symptoms caused by an acute injury or by vascular or skin disorders. Written informed consent was obtained from all patients. The study was approved by the Medical Ethics Committee of the VU University Medical Center in Amsterdam.

Data collection

GPs were asked to complete a standardised registration form for the first consultation, with information on:

- Characteristics of the problem: symptom duration, recurrences (previous episodes of the same problem; yes/no), dominant side affected (yes/no), other joints affected (none, neck-upper extremities, lower extremities, low back).
- Problem-related symptoms: pain/stiffness, radiating pain, cramps, tingling, numbness, morning stiffness, loss of coordination or strength (yes/no).
- Signs (inspection and palpation): muscle atrophy, skin problems, differences in skin temperature, swelling, nodes, pain, bony enlargements (yes/no).
- Physical tests: range of motion (passive extension/flexion of the wrist, making a fist), carpal tunnel syndrome provocation tests (Tinel's sign, Phalen's sign, flick sign), test for DeQuervain's tenosynovitis (Finkelstein's test), each scored as: test not done, test done and negative, test done and positive.
- Diagnoses: rheumatoid arthritis, osteoarthritis, tenosynovitis, nerve entrapment (including carpal tunnel syndrome), ganglion, work-related problem, unknown, or other (yes/no).
- Management: wait-and-see, splint, medication, referral to a specialist (rheumatologist, neurologist, surgeon), allied health professional (e.g. physical therapist), or occupational physician (yes/no).

After one year GPs were asked to complete a final registration form, on which they recorded if the diagnosis had changed during the past year and if additional management decisions had been made.

Furthermore, we asked patients to complete self-administered postal questionnaires at baseline and at 3 and 12 months follow-up with questions on socio-demographic variables, characteristics of hand and wrist problems, and severity of symptoms.[6;7]

Outcome measures

For the third research question we studied the association of diagnostic information with two outcomes: specialist referral and patient outcome. Specialist referral was based on information from the final registration form. Patient outcome (persistent symptoms) was measured by asking patients if they had completely recovered from their symptoms (yes/no) at short-term (3 months) and at long-term (12 months) follow-up.

Statistical analysis

Logistic regression analysis was used to explore the contribution of elements of diagnostic information to 1) the decision to refer for specialist opinion and 2) patient outcome (persistent symptoms). Variables in the analyses were those available to the GP during consultation: socio-demographic variables, characteristics of the problem, problem-related symptoms (based on patient history), signs (from inspection and palpation), and physical test results. Because the prevalence of a positive outcome of some variables was low, we dichotomized scores: other joints affected (yes/no), patient history (≥2 symptoms/<2 symptoms), and number of signs on inspection and palpation (≥1 signs/none). For physical tests we made three groups: positive range of motion test (passive extension/flexion of the wrist, or making a fist), positive carpal tunnel syndrome provocation test (Tinel's sign, Phalen's sign, or flick sign), and positive DeQuervain test (Finkelstein's test). Univariable logistic regression analyses were performed to present the association between each of the potential predictors and outcome (Odds Ratios (ORs) and 95% confidence interval (95% CI)). For the multivariable analysis all potential predictors were entered in blocks using a sequence that meets up with a regular consultation; socio-demographic variables first, characteristics of the problem next, problem-related symptoms third, signs fourth, and physical test results last. We retained variables in the model that added significant information to the model (p-value<0.10). The ability of the models to discriminate between patients with and without the outcome was studied by calculating the area under the ROC-curve.[13] Furthermore, we calculated the percentage of explained variance (R^2).

All statistical analyses were performed using SPSS for Windows Version 12.0.1.

RESULTS

GPs asked 301 patients with hand or wrist problems to participate in this study. A total of 267 patients (89%) consented and completed the baseline questionnaire. GPs returned information on diagnosis and management decisions for 266 patients. A full registration form including all details on history and physical examination after the first consultation was available for 241 patients. Baseline characteristics are shown in Table 1. Mean age was 49.0 (SD 16.1) years, and 73% were female. Half of the patients had their symptoms for longer than three months when they consulted the GP. In those only given one diagnosis the three most frequently recorded diagnoses were osteoarthritis (17%), tenosynovitis (16%), and nerve entrapment, including carpal tunnel syndrome (13%).

Diagnosis

During one year follow-up, 64% (n=169) of the patients visited their GP only once. Some diagnoses were changed during follow-up. In 14% (n=36) the diagnosis changed from, for example, rheumatoid arthritis to tenosynovitis (n=3), or from non-specific symptoms/unclear to tenosynovitis (n=2) or osteoarthritis (n=1). Characteristics of patients within specific final diagnostic categories are shown in Table 2. Older patients, patients who had more than one joint affected, patients suffering from morning stiffness and loss of strength, and patients with a positive range of motion test were often diagnosed with osteoarthritis (61 years, 50%, 44%, 36%, and 52% respectively) or rheumatoid arthritis (52 years, 14%, 12%, 13%, and 32% respectively). Patients reporting tingling (43%), numbness (59%), had a positive Tinel sign (76%), Phalen sign (90%) or flick sign (80%) were often diagnosed with nerve entrapment. Patients with a positive Finkelstein's test were most often diagnosed with tenosynovitis (68%).

Table 1: Patient characteristics and characteristics of the hand or wrist problem at baseline (n=267).

Patient characteristics		
Age in years: mean (SD)	49.3	(16.0)
Female: n (%)	198	(74.2)
Living together / married: n (%)	186	(70.2)
Highest level of education: n (%)		
primary	67	(25.2)
secondary	140	(52.6)
college / university	59	(22.2)
Self-reported chronic disease: n (%)		
Rheumatoid arthritis or osteoarthritis	42	(15.7)
Fibromyalgia	4	(1.5)
Asthma or chronic obstructive pulmonary disease	28	(10.5)
Diabetes	12	(4.5)
Heart disease	4	(1.5)
Stroke	1	(0.4)
Hypertension	31	(11.6)
Cancer	4	(1.5)
Psychological problem	37	(13.9)
Paid job: n (%)	133	(50.6)
Characteristics of the hand and wrist problem at baseline		
Dominant side affected: n (%)	185	(69.3)
Recurrent problem*: n (%)	57	(24.6)
Duration of symptoms at baseline: n (%)		
<4 weeks	84	(31.6)
1-2 months	48	(18.0)
3-6 months	54	(20.3)
>6 months	80	(30.1)
Diagnosis according to GP at first consultation: n (%)		
Osteoarthritis	46	(17)
Tenosynovitis	43	(16)
Nerve entrapment (including carpal tunnel syndrome)	35	(13)
Non-specific symptoms / unclear	31	(12)
Repetitive Strain Injury / Work related upper limb disorder	29	(11)
Ganglion	24	(9)
Rheumatoid arthritis	20	(8)
Other	14	(5)
>1 Diagnosis	24	(9)

*data from registration form returned by GP after the first consultation (n=241)

Table 2: Baseline characteristics stratified by final diagnosis (n=261)[$]

	Final diagnosis						
	Osteoarthritis (n=47)	Tenosynovitis (n=46)#	Nerve entrapment (including carpal tunnel syndrome) (n=32)	Rheumatoid arthritis (n=16)	RSI / Work related upper limb disorder (n=27)	Ganglion (n=24)	Other (n=69)
Socio-demographic factors							
Age in years: mean (SD)	61 (11.6)	47 (15.5)	50 (16.1)	52 (15.5)	39 (11.7)	42 (14.9)	42 (14.8)
Female: n (%)	38 (20)	31 (16)	25 (13)	11 (6)	20 (10)	19 (9)	50 (26)
Living together / married: n (%)	35 (19)	32 (18)	25 (14)	12 (7)	18 (10)	14 (8)	45 (25)
Highest level of education: n(%)							
primary	14 (21)	10 (15)	14 (21)	7 (11)	3 (5)	4 (6)	14 (21)
secondary	26 (19)	24 (18)	14 (10)	6 (4)	18 (13)	12 (9)	36 (27)
college / university	7 (12)	12 (21)	4 (7)	3 (5)	6 (10)	7 (12)	19 (33)
Paid job: n (%)	14 (11)	26 (20)	12 (9)	6 (5)	22 (17)	15 (12)	34 (26)
Body Mass Index: n (%)							
<25 (underweight/normal)	20 (15)	22 (16)	12 (9)	7 (5)	15 (11)	16 (12)	43 (32)
25 to 30 (overweight)	16 (19)	15 (18)	12 (14)	8 (9)	7 (8)	7 (8)	20 (24)
>30 (obese)	10 (31)	9 (28)	5 (16)		3 (9)		5 (16)
Characteristics of the problem							
Symptom duration >3 months: n (%)	34 (26)	13 (10)	25 (19)	6 (5)	11 (8)	10 (8)	32 (25)
Recurrent problem (previous episodes): n (%)	15 (27)	6 (11)	6 (11)	5 (9)	5 (9)	7 (13)	12 (22)
Intensity of pain (scale 0-10): mean (SD)	4.5 (2.3)	4.4 (2.4)	4.4 (2.7)	4.7 (2.4)	4.0 (1.9)	3.0 (2.3)	2.8 (2.4)
Other joints affected: n (%)							
No	27 (15)	35 (20)	26 (15)	4 (2)	20 (11)	18 (10)	47 (27)
Upper joints	1 (7)	2 (13)	2 (13)	2 (13)	3 (20)		5 (33)
Lower joints	5 (33)			3 (20)	3 (20)	1 (7)	3 (20)
Low back	1 (14)	2 (29)	1 (14)	2 (29)	1 (14)		
Combination of joints	7 (50)		1 (7)	2 (14)		1 (7)	3 (21)

Table 2: Continued

Problem-related symptoms: n (%)*							
pain / stiffness	38 (21)	32 (18)	11 (6)	13 (7)	26 (14)	14 (8)	48 (27)
radiating pain	5 (9)	13 (24)	8 (15)		12 (22)	2 (4)	14 (26)
cramps		1 (11)	2 (22)	1 (11)	1 (11)	1 (11)	3 (33)
tingling	5 (9)	3 (5)	24 (43)	1 (2)	5 (9)	1 (2)	17 (30)
numbness		1 (5)	13 (59)		1 (5)		7 (32)
morning stiffness	18 (44)	4 (10)	2 (5)	5 (12)	4 (10)		8 (20)
loss of coordination	1 (50)						1 (50)
loss of strength	11 (36)	2 (7)	4 (13)	4 (13)	2 (7)	1 (3)	7 (23)
Signs							
Inspection and palpation*: n (%)							
muscle atrophy	1 (17)		2 (33)				3 (50)
skin problems	3 (38)	2 (25)		1 (13)		1 (13)	1 (13)
differences in skin temperature		2 (40)		2 (40)	1 (20)		
swelling	10 (23)	6 (14)	1 (2)	6 (14)	4 (9)	10 (23)	7 (16)
pain	19 (22)	15 (17)	4 (5)	8 (9)	13 (15)	5 (6)	24 (27)
bone enlargements	9 (64)	1 (7)	1 (7)				3 (21)
Physical test results							
Physical tests positive*: n (%)							
passive extension/flexion of the wrist	6 (20)	2 (7)	5 (17)	4 (13)	3 (10)	1 (3)	9 (30)
making a fist	10 (32)	3 (10)	3 (10)	6 (19)	2 (7)		7 (23)
Tinel's sign	1 (5)	1 (5)	16 (76)				3 (14)
Phalen's sign			9 (90)				1 (10)
Flick sign		1 (10)	8 (80)				1 (10)
Finkelstein's test	2 (7)	19 (68)	1 (4)	1 (4)	1 (4)		4 (13)

[$] 5 missings final diagnosis; * More than one answer possible; # 50% De Quervain

Table 3: Management stratified by final diagnosis: n (%)

	Final diagnosis						
Final management*	Osteoarthritis (n=47)	Tenosynovitis (n=46)	Nerve entrapment (including carpal tunnel syndrome) (n=32)	Rheumatoid arthritis (n=16)	RSI / Work related upper limb disorder (n=27)	Ganglion (n=24)	Non-specific symptoms / unclear (n=28)
Wait and see	20 (43)	6 (13)	3 (9)	4 (25)	7 (26)	10 (42)	9 (32)
NSAID/Cox-2-inhibitors	6 (13)	15 (33)	2 (6)	7 (44)	2 (7)	1 (4)	3 (11)
Paracetamol	4 (9)				1 (4)		1 (4)
Corticosteroïd injection	1 (2)	5 (11)	4 (13)				
Splint	2 (4)	3 (7)	2 (6)		1 (4)		
Referral to a specialist	1 (2)	9 (20)	8 (25)	4 (25)	1 (4)	6 (25)	2 (7)
Referral to a allied health professional	5 (11)	5 (11)	4 (13)	1 (6)	8 (30)		3 (11)
Other	4 (9)	2 (4)	6 (19)		2 (7)	3 (13)	3 (11)
Total number of consultations: mean (SD)	1.7 (1.1)	1.9 (1.1)	1.6 (1.1)	1.6 (1.0)	1.3 (0.8)	1.2 (0.5)	1.3 (0.5)

*incidental missings

Management

Management of hand and wrist problems mainly consisted of wait-and-see (30%), prescription of NSAIDs/Cox-2-inhibitors (24%), or referral to a specialist (10%). In 41% of all patients (n=109) new or additional management decisions were made during follow-up. For example, wait-and-see was followed by corticosteroïd injection (n=2) or referral to a specialist (n=6) and prescription of NSAIDs/Cox-2-inhibitors by wait-and-see (n=10). Table 3 shows management over 12 months stratified by final diagnosis. Wait-and-see was most often advised to patients with osteoarthritis (43% of OA patients), ganglion (42% of patients with ganglion), and non-specific symptoms (32%). Patients diagnosed with tenosynovitis or rheumatoid arthritis were often prescribed NSAIDs/COX-2-inhibitors (33% and 44% respectively). Those diagnosed with work-related disorders were most often referred to allied health professionals (30%).

Association between diagnostic information and outcome

77% of the patients (n=191) reported persistent symptoms after 3 months, and 58% (n=140) after 12 months follow-up; 15% of the patients (n=41) were referred to a specialist. Table 4 presents the univariable associations of all diagnostic variables with the outcomes 'persistent symptoms' and 'specialist referral'. Table 5 shows per block the variables retained in the multivariable models for persistent symptoms after backward stepwise selection along with the AUC and explained variance (R^2). Problem-related symptoms, signs and physical tests did not add significant information to a model including socio-demographic variables and descriptive characteristics of the problem. A higher probability of persistent symptoms at 3 months was associated with a combination of being female, higher age, higher educational level, long baseline symptom duration, and higher baseline pain intensity score; a positive DeQuervain test was associated with lower probability of persistent symptoms (AUC 0.77 (95%CI 0.70;0.84); explained variance 24%). A higher probability of persistent symptoms at 12 months was associated with a combination of being female, higher age, longer symptom duration at baseline, dominant side affected, and higher baseline pain intensity; a positive DeQuervain test was associated with lower probability of persistent symptoms (AUC 0.81 (95%CI 0.76;0.87); explained variance 38%).

Table 4: Univariable association of potential predictors with 'persistent symptoms' at short-term (n=247)[#] and long-term (n=243)[#] and 'specialist referral' (n=266)[#]

	Short-term (3 months)			Long-term (12 months)			Specialist referral		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Socio-demographic factors									
Female (vs male)	2.27	[1.19;4.31]	0.01	4.75	[2.55;8.84]	<0.001	0.93	[0.44;1.97]	0.84
Age (per year)	1.02	[1.00;1.04]	0.06	1.03	[1.01;1.04]	<0.001	1.01	[0.98;1.03]	0.67
Education level (vs primary)									
secondary	1.67	[0.83;3.34]	0.15	1.14	[0.61;2.13]	0.68	1.20	[0.52;2.77]	0.67
college/university	1.68	[0.71;3.97]	0.24	0.71	[0.34;1.49]	0.36	1.34	[0.51;3.57]	0.56
Marital status (vs single/widowed)	1.03	[0.53;2.00]	0.92	0.79	[0.45;1.40]	0.42	1.15	[0.54;2.43]	0.72
Having paid work (vs not having paid work)	0.53	[0.29;0.97]	0.04	0.51	[0.30;0.85]	0.01	0.72	[0.37;1.41]	0.34
Body mass index (vs < 25)									
25 – 30	1.13	[0.58;2.17]	0.73	0.81	[0.46;1.42]	0.45	1.71	[0.84;3.48]	0.14
>30	2.12	[0.69;6.54]	0.19	1.54	[0.65;3.67]	0.33	0.91	[0.29;2.88]	0.87
Care for young children <5 years old (vs no)	0.48	[0.21;1.11]	0.09	0.46	[0.21;1.05]	0.06	0.51	[0.15;1.77]	0.29
Characteristics of the problem									
Duration of current symptom (vs ≤ 2 months)									
> 3 months	4.07	[2.09;7.96]	<0.001	4.06	[2.36;7.00]	<0.001	0.82	[0.42;1.60]	0.56
Dominant side affected (vs no)	2.26	[1.22;4.17]	0.01	2.85	[1.62;4.99]	<0.001	1.09	[0.53;2.26]	0.81
Recurrent problem (vs no)	1.15	[0.54;2.46]	0.72	2.38	[1.21;4.67]	0.01	2.15	[1.02;4.54]	0.04
Pain intensity	1.13	[0.99;1.28]	0.07						
3-5 (vs 0-2)				2.55	[1.36;4.77]	<0.001	1.20	[0.52;2.75]	0.67
6-10 (vs 0-2)				2.29	[1.17;4.49]	0.02	1.46	[0.62;3.44]	0.39
No other joints affected (vs other joints affected)	0.65	[0.28;1.51]	0.32	0.51	[0.25;1.02]	0.06	1.74	[0.64;4.76]	0.28

Table 4: Continued

	Short-term (3 months)			Long-term (12 months)			Specialist referral		
	OR	95% CI	*p*	OR	95% CI	*p*	OR	95% CI	*p*
Problem related symptoms									
Suffering from (vs < 2 symptoms) ≥ 2 symptoms	1.25	[0.67;2.34]	0.49	1.96	[1.14;3.37]	0.02	0.71	[0.35;1.44]	0.34
Signs									
Inspection and palpation (vs none) ≥ 1 signs	1.54	[0.82;2.88]	0.18	1.34	[0.78;2.30]	0.28	0.69	[0.34;1.40]	0.30
Physical tests (vs negative)									
Positive range of motion test	0.94	[0.45;1.95]	0.87	1.23	[0.66;2.30]	0.52	0.51	[0.19;1.38]	0.19
Positive carpal tunnel syndrome provocation test	1.52	[0.50;4.65]	0.46	1.12	[0.48;2.60]	0.80	1.90	[0.75;4.79]	0.17
Positive DeQuervain test	0.26	[0.12;0.60]	<0.001	0.29	[0.12;0.69]	0.01	0.38	[0.09;1.65]	0.19

[#] incidental missings; OR=Odds Ratio; CI=confidence interval; p=p-value; vs=versus

Table 5: Multivariable association of predictors with 'persistent symptoms' at short-term (n=242) and long-term (n=237)

	Short-term (3 months)				Long-term (12 months)			
	OR	95% CI	*p*	*AUC ; 95% CI ; R^2*	OR	95% CI	*p*	*AUC ; 95% CI ; R^2*
1st block								
Socio-demographic factors								
Female (vs male)	2.48	[1.27;4.83]	0.01		5.86	[3.03;11.32]	<0.001	
Age (per year)	1.03	[1.01;1.05]	0.01		1.03	[1.02;1.05]	<0.001	
Education level (vs primary) secondary college/university	 2.40 2.55	 [1.11;5.20] [0.99;6.58]	 0.03 0.05					
				0.67 [0.59;0.74] 10%				0.73 [0.66;0.79] 20%
2nd block								
Socio-demographic factors								
Female (vs male)	2.18	[1.07;4.42]	0.03		6.01	[2.84;12.72]	<0.001	
Age	1.02	[1.00;1.05]	0.05		1.03	[1.01;1.05]	0.01	
Education level (vs primary) secondary college/university	 2.70 3.62	 [1.17;6.26] [1.29;10.19]	 0.02 0.02					
Characteristics of the problem								
Duration of current symptom (vs ≤ 2 months) > 3 months	 3.39	 [1.68;6.86]	 <0.001		 3.25	 [1.75;6.03]	 <0.001	
Dominant side affected (vs no)					3.09	[1.59;6.02]	<0.001	
Pain intensity 3-5 (vs 0-2) 6-10 (vs 0-2)	1.17	[1.01;1.35]	0.04		 2.00 2.33	 [0.96;4.18] [1.07;5.07]	 0.06 0.03	
				0.75 [0.68;0.82] 20%				0.80 [0.75;0.86] 36%

Table 5: Continued

	Short-term (3 months)				Long-term (12 months)			
	OR	95% CI	*p*	*AUC ; 95% CI ; R^2*	OR	95% CI	*p*	*AUC ; 95% CI ; R^2*
3rd block								
Socio-demographic factors								
Female (vs male)	2.08	[1.01;4.29]	0.05		5.87	[2.76;12.47]	<0.001	
Age	1.03	[1.00;1.05]	0.04		1.03	[1.01;1.05]	0.01	
Education level (vs primary) secondary college/university	 2.96 3.83	 [1.25;7.00] [1.35;10.91]	 0.01 0.01					
Characteristics of the problem								
Duration of current symptom (vs ≤ 2 months) > 3 months	 3.03	 [1.47;6.22]	 <0.001		 2.99	 [1.59;5.60]	 <0.001	
Dominant side affected (vs no)					2.92	[1.49;5.73]	<0.001	
Pain intensity 3-5 (vs 0-2) 6-10 (vs 0-2)	1.20	[1.04;1.39]	0.02		 2.13 2.57	 [1.02;4.47] [1.16;5.69]	 0.05 0.02	
Physical test								
Positive DeQuervain test (vs negative)	0.26	[0.10;0.66]	<0.001		0.33	[0.12 ;0.90]	0.03	
				0.77 [0.70;0.84] 24%				0.81 [0.76;0.87] 38%

OR=Odds Ratio; CI=confidence interval; p=p-value; AUC=Area Under the Curve; R^2=explained variance; vs=versus

The univariable analysis for the outcome specialist referral showed five significant ($p<0.20$) associations: higher body mass index, recurrent problems, positive carpal tunnel syndrome provocation test, and not having a positive DeQuervain or range of motion test. When entered in a multivariable model, only having a recurrent problem was retained in the model (Odds Ratio 2.15; 95%CI 1.02;4.54).

DISCUSSION

To our knowledge this is the first observational study of hand and wrist problems presented to primary care. We addressed a large, heterogeneous population and, thereby, our findings regarding diagnosis and management reflect wrist and hand problems as they are presented to the GP in every day clinical practice. Response and follow-up rates were high, and there were only small differences between responders and non-responders at baseline or during follow-up.[6;7]

Diagnosis

Most of the patients visited their GP only once. This low number of GP visits correspond with findings from a recently completed study on GP consultation for hand or wrist problems in a population-based cohort. The main finding from this study was that consultation rate for hand or wrist problems specifically was low (only 6% consulted the GP for these problems), although the mean number of consultations was 3 per year. People did consult the GP, but for lots of other reasons (unpublished data). The three most frequently recorded diagnoses were osteoarthritis (17%), tenosynovitis (16%), and nerve entrapment (13%). These diagnoses were associated with several patient characteristics, reported symptoms and results of physical examination (Table 2). However, this study was not designed as a formal diagnostic accuracy study in which the participating GPs performed a standardised diagnostic protocol in each participant, and the results describing the association between test results and diagnoses therefore cannot be interpreted as measures of diagnostic performance. This also means that it is not clear if GPs made the diagnosis only after conducting a history and physical examination or if the GPs selected questions and tests based on early suspicions of specific diagnoses and used the tests as confirmation. This could be the reason why the proportion of positive Tinel signs,

Phalen signs or flick signs was so high for patients with nerve entrapment (compared to reports on their diagnostic performance).

Management

Overall, wait-and-see and painkillers were most often advised to the participants. Dutch general practice guidelines for hand or wrist problems are not yet available, but the guideline for rheumatoid arthritis recommends prescription of NSAID's, and referral to a rheumatologist if the RA is still active following adequate use of NSAID's.[9] European guidelines for hand osteoarthritis recommend advice, education and exercise as first-line management for all patients with hand osteoarthritis.[8] In a Dutch multidisciplinary guideline for carpal tunnel syndrome, wait-and-see is recommended if the syndrome is not interfering with daily activities. If there is persisting functional limitation, referral to a surgeon is recommended.[10] Management in our study is fairly in agreement with the recommended management in these guidelines. It is of interest that half of the patients had had symptoms for a long time, but the mean total number of consultations was low (less than two per patient). Patients who had already been diagnosed with rheumatoid arthritis may already receive specialist treatment and therefore not consult their GP very often. Many patients with other conditions apparently did not feel the need to consult their GP more frequently.

Association between diagnostic information and outcome

Diagnostic information is important for prognostic and therapeutic decisions, and eventually for patient outcomes.[11] For persistent symptoms findings of inspection, palpation, and physical examination (except not having a positive DeQuervain test) did not add significantly to the association with patient outcome. Only socio-demographic factors and general characteristics of the problem were significant predictors of outcome. For specialist referral, having a recurrent problem was retained in the multivariable model, but physical tests were univariately associated with outcome, indicating that diagnostic information does influence the decision to refer, although recurrence of a problem may be the most important determinant. An interesting finding is that a positive DeQuervain test or clear limitation in range of movement was associated with the decision not to refer, whereas positive signs of carpal tunnel syndrome were associated with referral. This seems to indicate that GPs are more confident about primary care management in patients with clear signs of tenosynovitis or osteoarthritis, but appreciate a specialist opinion in some patients with a possible diagnosis of carpal tunnel syndrome.

Strengths and limitations

To our knowledge, this is the first prospective cohort study describing hand and wrist problems as they are presented in general practice. There are several issues, however, that may have affected the reliability or validity of our findings.

A bias in the distribution of diagnoses could result from selective recruitment of GPs or patients. The participating general practices were mainly situated in different geographic areas in the Netherlands, and varied with respect to size, number of GPs and rural or urban location. Therefore, we think this was a representative sample of GPs. Although a large number of GPs participated in the study, some recruited only few patients. The main reason indicated by GPs for missing eligible patients was busy office hours or simply forgetting about the study. In order to estimate if we enrolled a selective sample, we compared gender and age of our sample to the incidence of hand or wrist problems in the second National Survey of General Practice (NS2).[14] Our population consisted of slightly more females and slightly more middle-aged patients. This may be the result of some selective enrolment by GPs, but may also reflect selective non-response by patients.

Participating GPs may have changed their approach when examining patients with hand or wrist problems following the training before the start of the study. They possibly used some physical tests more often than usual in general practice. This could be of influence on the distribution of diagnoses, and therefore on the generalisability of the results. One of the main objectives of our study was to describe diagnoses in patients presenting with hand-wrist problems in general practice. In order to increase the reliability of diagnoses made by the participating GPs, we offered them a brief training focusing on patient history, physical examination, and diagnoses in patients with hand and wrist problems. The aim of this training was to standardize the assessment of hand/wrist problems, but as we did not want to intervene in usual management of these problems by the GPs, the training did not include any recommendations regarding treatment. In this way we aimed to strike the right balance between obtaining reliable data on diagnoses without much interference with usual management of wrist or hand problems.

When designing the study we aimed to recruit a sufficient number of people to develop predictive models for the outcome of with hand-wrist problems. The total incidence of hand and wrist problems has been estimated at 12/1000/year. With about 30 participating general practices, a mean practice size of 2500 patients, and an estimated non-response and exclusion percentage of about 60% we estimated the total number of participants at about 350 before the start of the study. During the

study, some GPs recruited few patients, and eventually 267 patients consented to participate. The sample per diagnostic category was small, but the overall sample was large enough to develop predictive models. By adding predictors in blocks during model development we made sure that the number of predictors entered in the multivariable models did not exceed the number of events/10. This optimised the stability of the models.

Implications of the study

Socio-demographic factors and descriptive information about the problem seem to predict short-term and long-term outcome of hand and wrist problems in primary care more than the results of physical examination. Prediction rules could be developed based on models using this (diagnostic) information; these models had good predictive performance and were composed of information that is easy to obtain during routine clinical practice. The predictive performance of such prediction rules should be evaluated in other populations and their applicability and usefulness tested in clinical practice.

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CHAPTER 4

Hand and wrist problems in general practice: patient characteristics and factors related to symptom severity

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ABSTRACT

Objectives

Hand and wrist problems are common, but little is known about characteristics of patients consulting the GP for these problems. The objectives are: 1) To describe wrist and hand problems presented to the GP in terms of severity of symptoms, and their impact on physical, emotional and social functioning; 2) to describe patient and disease characteristics across different diagnostic categories; and 3) to study factors related to the severity of hand or wrist problems.

Methods

Patients consulting their GP with hand or wrist problems were sent a questionnaire containing questions on socio-demographic variables, characteristics of the complaint, physical activity and psychosocial factors. The GP recorded information on symptoms, signs and medical diagnosis. We studied the cross-sectional association between a variety of factors and severity of hand or wrist problems, using the Symptom Severity Scale as outcome measure.

Results

Mean age of the 267 participants was 49.3 years and 74% were female. The three most frequently recorded diagnoses were osteoarthritits (17%), tenosynovitis (16%) and nerve entrapment (12%). The characteristics of patients varied slightly across diagnostic categories. Patients who did not have paid work, had longer duration of symptoms, diagnosis of entrapment, higher pain intensity, higher body mass index, and higher scores on worrying reported significantly higher scores on severity of hand or wrist problems (p-value<0.10).

Conclusion

Primary care patients with hand or wrist problems report pain and reduced function. Impact on other aspects of perceived health is limited. Severity seems to be associated with socio-demographic, physical, and psychosocial factors, more than with medical diagnosis.

INTRODUCTION

Hand and wrist problems are common. In recent studies, the prevalence in the Dutch population has been estimated at 12.5%.[1] Not all people suffering from hand and wrist problems consult their general practitioner. The incidence in general practice is estimated at 4.6 / 1000 / year for wrist complaints and 7.8 / 1000 / year for hand and finger complaints.[2] A good hand and wrist function is indispensable for performing activities of daily living. Therefore, the impact of, for example, hand osteoarthritis, hand rheumatoid arthritis or carpal tunnel syndrome is considerable.[3-6] In the Netherlands, as in several other European countries, the general practitioner (GP) provides care for the majority of patients with musculoskeletal disorders. Nevertheless, studies in primary care, in which the patient population is more heterogeneous compared to rheumatology practice, are rare. Little is known about the characteristics of patients presenting with hand and wrist problems in primary care. Because of this lack of information, GPs may encounter difficulties in managing hand and wrist problems. The objectives of this paper are 1) to describe wrist and hand problems presented to the GP in terms of severity of symptoms, and their impact on physical, emotional and social functioning; 2) to describe patient and disease characteristics across different diagnostic categories; and 3) to investigate which factors were most strongly related to the severity of hand or wrist problems.

METHODS

Study design and population

We conducted an observational study in 32 general practices (44 GPs) in the Netherlands. The GPs received a three hour training session before the start of the study focused on diagnosing hand and wrist problems (relevant history, physical examination, differential diagnosis). Between July 2004 and December 2005, GPs were asked to recruit 10 consecutive patients with a new episode of hand or wrist problems. An episode was considered to be 'new' if participants had not visited their GP for the same problem during the preceding 3 months. Patients were eligible for participation in the study if they were 18 years or older and capable of completing Dutch questionnaires. Patients were excluded if the presented symptoms were caused by an acute injury (fracture, dislocation, sprain) or by vascular or skin problems. Eligible patients were informed about the study by their GP. If interested, the investigator sent

additional information about the study, a consent form and a self-administered postal questionnaire to the patient. A reminder was sent after twelve days. Patients who still did not return the questionnaire were contacted by telephone within 3 weeks. Patients who returned an incomplete questionnaire were contacted to complete the questionnaire by telephone interview. Furthermore, we asked the GPs to complete a diagnosis and management registration form after the first consultation. On this registration form, they recorded information about history, physical examination, medical diagnoses and management of the hand or wrist problem (wait and see, advice, splint, additional diagnostic tests, medication and referrals). The study was approved by the Medical Ethics Committee of the VU University Medical Center in Amsterdam.

Data collection

The questionnaire contained several questions on socio-demographic variables, characteristics of hand and wrist complaints, physical activity, physical load, body mass index and psychosocial factors.

Outcome measures

Severity of hand and wrist problems was measured by the Symptom Severity Scale.[7] The Symptom Severity Scale (SSS) is a self-administered questionnaire originally developed to assess the severity of symptoms in patients with carpal tunnel syndrome. It incorporates six clinical areas, namely pain, paraesthesia, numbness, weakness, nocturnal symptoms, and over-all function. The questionnaire contains eleven questions with response options ranging from 1 point (mildest) to 5 points (most severe). The total symptom severity score is calculated as the mean of the scores for the eleven individual items. In a recent study, the Symptom Severity Scale was shown to be reliable and responsive in our heterogeneous primary care population with hand or wrist problems.[8] The second outcome measure, perceived health, was measured using the short form health survey (SF-36).[9] The SF-36 is designed to assess eight health concepts relevant to a person's functional status and well being: physical functioning (PF), role limitations in physical functioning (RP), role limitations in emotional functioning (RE), social functioning (SF), bodily pain (BP), mental health (MH), vitality (VT) and general health (GH). Scale scores range from 0 to 100 with higher scores representing better perceived health.

Patient and disease characteristics

The following factors were measured at baseline:

- Socio-demographic factors: age, gender, marital status, educational level, and work status.
- Body mass index (calculated from self-reported weight and height). Underweight/normal weight was defined as BMI of 25 or lower, overweight as BMI between 25 and 30, and obesity as BMI of 30 or higher.
- Physical load during work and leisure time, using the 20-item Dutch musculoskeletal questionnaire (DMQ) with a score ranging between 0 (no physical workload) and 100 (highest physical workload).[10]
- Characteristics of hand or wrist problems: duration of symptoms, previous episodes, dominant/non dominant side affected, GP diagnosis, and pain intensity (0-10 point rating scale).
- Physical activity: we used two questions to measure frequency and intensity of physical activity. Patients were coded as meeting the Dutch Norm for Healthy Activity (yes or no) if they reported 30 minutes or more of moderate-intensity physical activity on at least five days of the week.[11,12] Additionally, they were coded as meeting the American College of Sports Medicine (ACSM) position stand (yes or no) if they performed heavy physical exercise or sports at least 3 times a week.[13]
- Psychosocial factors: coping was measured with the Pain Coping Inventory (PCI), consisting of 6 scales: pain transformation, distraction, reducing demands, retreating, worrying, and resting.[14,15] A higher score indicates more use of the strategy concerned. Personal control was measured by the subscale personal control of the Revised Illness Perception Questionnaire (IPQ-R, 1-5).[16,17] A higher score indicates stronger personal control. Distress and somatisation were measured using the 16-item subscales of the 4 Dimensional Symptom Questionnaire (4DSQ, 0-32).[18] A cut-off score of >10 for both distress and somatisation discriminates between 'cases' and 'non-cases'.[19,20] Fear avoidance beliefs were measured by the 4-item physical activity subscale of the Fear Avoidance Beliefs Questionnaire (FABQ, 0-24), with a higher score indicating more fear avoidance.[21] Social support was measured with the Social Support Scale (12-60) on which a higher score indicates less social support.[22] Anxiety and depression symptoms were measured with the Hospital Anxiety and Depression Scale (HADS, 0-21), with higher scores indicating more severe symptoms.[23] For both subscales, scores of 0 to 7 points indicated no anxiety

or depression, scores of 8 or higher indicates possible or probable anxiety or depression.[24]

Statistical analysis

Univariable linear regression analyses were performed to check whether there was a linear association between each of the patient or disease characteristics and symptom severity (score on the SSS). For dichotomous variables we only considered those variables with a prevalence of at least 10%. Factors that were non-linearly related to the outcome were in principle divided into tertiles (low, medium high), with the "low-category" as reference category. However, when this was not possible, or when cut-off scores were available from the literature, factors were dichotomised. We present the univariate regression coefficients (*b*) along with the 95% confidence intervals (95% CI). Factors that are associated with the outcome (p-value<0.20) were pre-selected for the multivariable analysis. Before multivariable analysis was applied, the correlation among the factors was checked. In case of a strong correlation (Spearman r>0.5) between two variables the factor with the strongest univariable association with the outcome was retained in the multivariable regression model. Because the number of factors to be entered in the model exceeded n/10, the factors were entered in blocks (socio-demographic factors, BMI, and physical load first, characteristics of the complaint next, physical activity third and psychosocial factors last).[25] We developed a multivariable model that included the combination of factors that was most strongly associated with the severity of hand or wrist problems. The best model was constructed using a manual backward selection method. We sequentially deleted factors from the model until only factors with a p-value<0.10 were retained and further elimination resulted in a considerable drop in the explained variance of the model. For the final model the percentage of explained variance (R^2) was calculated.

All statistical analysis were performed using SPSS for Windows Version 12.0.1.

RESULTS

Study population and baseline characteristics

GPs asked 301 patients with hand or wrist problems to participate in this study. In total, 267 patients (89%) consented to participate and completed the baseline questionnaire. Baseline characteristics of these 267 patients are shown in Table 1. Mean age was 49.3 (SD 16.0) years, and 74% were female. For 25 patients (9.4%) the GPs recorded more than one diagnosis on the registration form. Of those given only one diagnosis the three most frequently recorded diagnoses were osteoarthritis (16.9%), tenosynovitis (15.8%) and nerve entrapment, including carpal tunnel syndrome (12.4%). Half of the patients had suffered from their symptoms for longer than three months when they consulted the GP. In 57 patients (slightly more often with a diagnosis of osteoarthritis compared to other diagnostic categories) the problem was recurrent. The mean severity of symptoms was 2.1 (SD 0.6), and the mean intensity of pain was 4.0 (SD 2.4). Non-responders (n=34) were less often female (62%) and slightly younger (mean 44.4 years) than responders.

Our responders scored similar or slightly lower (0-5 points) on most of the eight subscales of the SF-36 compared to the Dutch reference population (fig.1).[26] For physical role functioning and bodily pain the mean scores among our responders were approximately 15 points lower.

Table 1: Patient and problem characteristics at baseline (n=267)*

Patient characteristics		
Age in years: mean (SD)	49.3	(16.0)
Gender: n (% female)	198	(74.2)
Marital status: n (% living together / married)	186	(70.2)
Education: n (%)		
primary	67	(25.2)
secondary	141	(53.0)
college / university	58	(21.8)
Paid job: n (%)	133	(50.6)
Body Mass Index: n (%)		
<25 (underweight/normal)	140	(54.3)
25 to 30 (overweight)	86	(33.3)
>30 (obese)	32	(12.4)
Physical activity: n (%)		
ACSM position stand[#]	38	(14.6)
- Dutch Norm Healthy Activity	110	(41.7)
Characteristics of the hand or wrist problem		
1 Diagnosis according to GP: n (%)		
Rheumatoid arthritis	21	(7.9)
Osteoarthritis	45	(16.9)
Tenosynovitis	42	(15.8)
Nerve entrapment, including carpal tunnel syndrome	33	(12.4)
Ganglion	24	(9.0)
Repetitive Strain Injury (problems related to recurrent activity)	30	(11.3)
Non-specific symptoms / unclear	31	(11.7)
Other	15	(5.6)
> 1 Diagnosis	25	(9.4)
Duration of symptoms at baseline: n (%)		
< 2 weeks	34	(12.8)
3 – 4 weeks	50	(18.8)
1 – 2 months	48	(18.0)
3 – 6 months	54	(20.3)
> 6 months	80	(30.1)
Recurrent problem (previous episodes): n (%)	57	(24.6)
Severity of symptoms (SSS; 0-5): mean (SD)	2.1	(0.6)
Intensity of pain (scale 0-10): mean (SD)	4.0	(2.4)
Perceived cause of the hand or wrist problem (top5): n (%)		
Overload during work	56	(21.0)
Osteoarthritis / rheumatoid arthritis	56	(21.0)
Ageing	47	(17.6)
Overload during leisure activities	43	(16.1)
Unknown	109	(40.8)

* incidental missings (1-9) [#] American College of Sports Position Stand

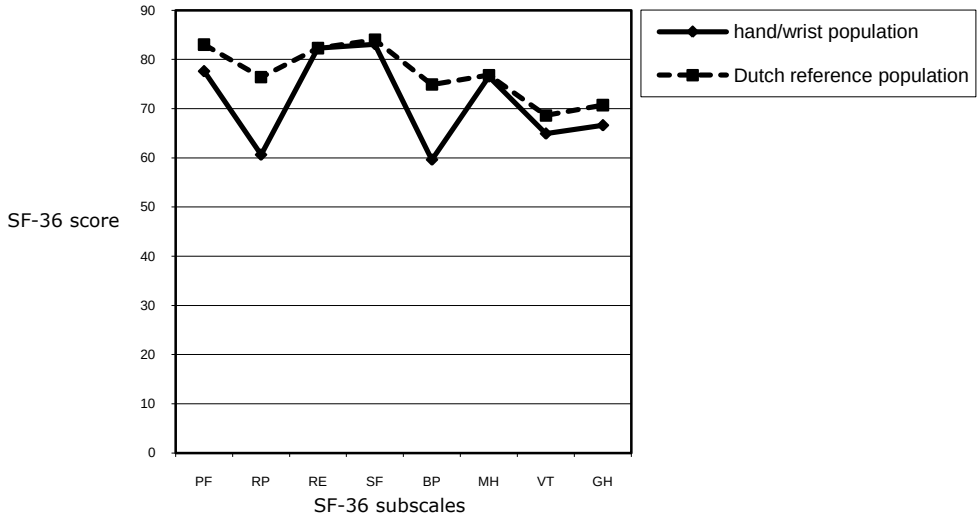

Figure 1: SF 36 scores for patients with hand or wrist problems and a Dutch reference population[26] (SF-36 subscales: PF=physical functioning; RP=role functioning physical; RE=role functioning emotional; SF=social functioning; BP=bodily pain; MH=mental health; VT=vitality; GH=general health)

Table 2 describes patient and disease characteristics stratified by GP diagnosis, presenting differences and similarities across diagnostic categories. Patients with osteoarthritis were on average the oldest, and patients with repetitive strain injury the youngest participants. Patients suffering from rheumatoid arthritis were less often female, scored slightly higher on pain, the pain coping strategy 'worrying', anxiety, distress, and somatization and were less physically active according to the Dutch Norm for Healthy Activity compared to patients with other diagnoses. Patients with a ganglion had the lowest score on severity of symptoms. Patients diagnosed with repetitive strain injury had increased scores on static posture/repetitive movements, sitting and visual display units (VDU) work, and they were most physically active. Furthermore, patients with more than one diagnosis were more often female, and had slightly increased scores on the pain coping strategies 'pain transformation', and 'distraction' compared to patients with only one diagnosis. Overall, however, differences between the diagnostic categories were small. For further analyses the total population was used and GP diagnosis included as a factor potentially related to symptom severity.

Table 2: Baseline scores stratified by diagnosis according to the GP

Baseline scores	Total population (n=267)	1 diagnosis (n=241)	>1 diagnosis (n=25)	Rheumatoid arthritis (n=21)	Osteoarthri-tis (n=45)	Tenosyno-vitis (n=42)	Nerve entrapment (n=33)	Ganglion (n=24)	Repetitive Strain Injury (n=30)
Age: mean (SD)	49.3 (16.0)	48.2 (15.8)	59.7 (14.7)	48.9 (14.4)	62.0 (11.3)	48.1 (15.7)	48.7 (16.0)	40.9 (13.8)	37.8 (10.8)
Gender (% female)	74	72	96	52	80	71	79	75	70
SSS: mean (SD)	2.1 (0.6)	2.1 (0.6)	2.3 (0.5)	2.5 (0.6)	2.2 (0.5)	2.0 (0.5)	2.5 (0.6)	1.7 (0.5)	2.0 (0.4)
Pain on an 11-point numerical rating scale: mean (SD)	4.0 (2.4)	3.9 (2.4)	4.3 (2.0)	4.9 (2.1)	4.4 (2.2)	4.0 (2.6)	4.3 (2.6)	2.9 (2.3)	3.8 (1.9)
Pain coping: mean (SD)									
Pain transformation	7.8 (2.8)	7.7 (2.7)	9.0 (3.3)	8.3 (2.6)	8.8 (3.1)	7.3 (2.6)	8.1 (2.9)	7.3 (2.2)	7.2 (2.2)
Distraction	9.4 (3.6)	9.3 (3.6)	11.0 (3.3)	9.5 (3.6)	10.3 (3.8)	9.1 (3.0)	8.4 (3.5)	9.5 (3.9)	8.8 (3.4)
Reducing demands	6.0 (2.0)	6.0 (2.0)	6.2 (2.2)	6.6 (1.4)	6.3 (1.9)	6.0 (1.8)	5.4 (2.1)	5.4 (2.3)	5.7 (1.5)
Retreating	9.4 (2.9)	9.3 (2.8)	10.2 (3.6)	10.7 (3.4)	9.2 (2.6)	9.4 (2.8)	8.6 (2.8)	10.0 (3.4)	8.8 (2.3)
Worrying	15.2 (4.1)	15.1 (4.1)	16.0 (4.1)	17.6 (4.8)	15.2 (3.8)	14.8 (4.3)	15.4 (4.1)	14.2 (4.1)	14.4 (3.1)
Resting	8.5 (2.6)	8.5 (2.6)	8.7 (2.7)	9.0 (2.7)	8.6 (2.4)	8.8 (2.6)	7.7 (2.2)	8.2 (3.2)	8.9 (2.5)
Personal control	3.0 (0.9)	3.1 (0.8)	2.8 (1.0)	3.2 (0.8)	2.9 (0.8)	3.2 (0.9)	2.9 (0.8)	3.1 (0.8)	3.4 (0.9)
Fear avoidance beliefs: mean (SD)	12.7 (6.1)	12.6 (6.0)	12.9 (7.0)	13.0 (5.8)	13.4 (6.3)	12.6 (6.6)	8.9 (6.5)	12.3 (3.7)	14.3 (4.9)
Physical load: mean (SD)									
Heavy physical workload	21.7 (17.5)	21.8 (17.9)	20.4 (13.1)	22.5 (18.2)	22.7 (20.0)	19.0 (16.6)	25.1 (16.5)	19.9 (19.4)	21.5 (20.0)
Static posture/repetitive movements	34.6 (25.6)	34.7 (25.9)	32.6 (24.2)	29.2 (25.2)	26.2 (20.9)	29.0 (24.9)	32.4 (28.9)	39.8 (21.9)	56.1 (23.9)
Sitting and VDU-work	36.4 (34.0)	37.5 (34.6)	25.0 (26.9)	41.3 (34.8)	27.1 (28.4)	29.7 (30.2)	26.6 (27.1)	47.9 (41.8)	60.0 (37.5)
Mood (HADS): mean (SD)									
Anxiety	5.4 (3.7)	5.4 (3.7)	4.8 (3.9)	7.0 (3.8)	5.3 (3.6)	4.9 (4.0)	6.5 (4.0)	5.3 (3.1)	4.2 (3.5)
Depression	3.6 (3.4)	3.7 (3.3)	3.3 (3.9)	4.0 (2.5)	3.9 (3.7)	3.2 (3.2)	4.5 (3.4)	3.9 (3.3)	3.3 (3.9)
Distress: mean (SD)	8.3 (7.0)	8.4 (7.0)	6.8 (7.4)	10.0 (6.7)	8.6 (7.3)	7.2 (7.7)	10.6 (7.1)	9.0 (7.7)	8.5 (7.0)
Somatisation: mean (SD)	8.1 (5.4)	8.2 (5.4)	7.4 (5.5)	11.1 (5.9)	8.7 (5.7)	6.2 (3.6)	10.0 (5.4)	8.1 (5.6)	7.9 (5.3)

Table 2: Continued

Baseline scores	Total population (n=267)	1 diagnosis (n=241)	>1 diagnosis (n=25)	Rheumatoid arthritis (n=21)	Osteoarthri-tis (n=45)	Tenosyno-vitis (n=42)	Nerve entrapment (n=33)	Ganglion (n=24)	Repetitive Strain Injury (n=30)
Social support: mean (SD)	19.0 (8.6)	18.8 (8.4)	19.7 (9.9)	19.0 (8.5)	18.5 (7.9)	18.4 (9.9)	18.2 (7.7)	20.3 (10.1)	20.5 (8.4)
Physical activity (% met)									
Dutch Norm Healthy Activity	41.7	41.6	44.0	20.0	40.9	28.6	40.6	45.8	60.0
ACSM position stand[#]	14.6	14.9	12.0	14.3	11.6	7.3	18.8	12.5	24.1

[#] American College of Sports Position Stand

Factors related to symptom severity

Univariable analyses

The results of the univariable linear regression analyses are presented in Table 3. Almost all baseline and disease characteristics, except marital status, the diagnoses osteoarthritis, repetitive strain injury (RSI) and non-specific symptoms, and physical activity, were univariably associated with severity of symptoms. Next, the correlation between the associated factors was checked. Retreating as a coping strategy was not entered in the multivariable model because of a strong correlation with the coping strategies distraction and resting (Spearman r=0.60 and r=0.54).

Multivariable analyses

The variables retained in the model after manual backward selection are presented in Table 4. Not having paid work, longer duration of symptoms, the diagnosis nerve entrapment, higher pain intensity, higher body mass index, and higher scores on worrying were significantly associated with increasing severity of hand or wrist problems (p-value<0.10). The explained variance of the model was 0.55.

Table 3: Factors related to severity of hand-wrist problems: results of univariable analyses (n=267)#

	b	95% CI	p
Socio-demographic factors			
Female (vs male)	0.16	[-0.00;0.31]	0.05*
Age (vs <40)			
40-65	0.15	[-0.01;0.31]	0.06*
> 65	0.07	[-0.13;0.26]	0.51
Education level (vs primary)			
secondary	-0.10	[-0.27;0.06]	0.23
college/university	-0.28	[-0.48;-0.08]	0.01*
Marital status (vs single/widowed)	0.03	[-0.12;0.18]	0.72
Employed (vs unemployed)	-0.29	[-0.42;-0.15]	0.00*
Body mass index (vs < 25)			
25 – 30	0.25	[0.10;0.40]	0.00*
>30	0.33	[0.11;0.54]	0.00*
Heavy physical workload (vs no)			
medium	0.22	[0.05;0.39]	0.01*
high	0.06	[-0.11;0.22]	0.50
Static posture or repetitive movements (vs no)			
medium	-0.15	[-0.32;0.02]	0.07*
high	-0.19	[-0.36;-0.02]	0.03*
Sitting and VDU-work (vs no)			
medium	-0.06	[-0.24;0.11]	0.48
high	-0.23	[-0.40;-0.05]	0.01*
Characteristics complaint			
Duration of current complaint (vs ≤ 2 months)			
> 3 months	0.23	[0.09;0.36]	0.00*
Recurrent problem (previous episodes) (vs no)	0.15	[-0.03;0.32]	0.10*
Dominant side affected (vs no)	0.20	[0.06;0.35]	0.01*
Diagnosis			
Osteoarthritis	0.01	[-0.17;0.20]	0.89
Tenosynovitis	-0.16	[-0.35;0.03]	0.10*
Nerve entrapment (including CTS)	0.44	[0.23;0.64]	0.00*
Repetitive Strain Injury	-0.15	[-0.36;0.07]	0.19
Non-specific symptoms	-0.10	[-0.32;0.11]	0.34
Pain intensity	0.16	[0.14;0.18]	0.00*
Physical activity			
ACSM position stand (vs not met)	-0.01	[-0.21;0.19]	0.93
Norm Healthy Activity (vs not met)	-0.05	[-0.19;0.09]	0.48

Table 3: Continued

	b	95% CI	p
Psychosocial factors			
Coping with pain (vs low)			
pain transformation (medium)	0.22	[0.05;0.39]	0.01*
pain transformation (high)	0.37	[0.22;0.53]	0.00*
distraction (medium)	0.09	[-0.08;0.27]	0.29
distraction (high)	0.28	[0.12;0.44]	0.00*
reducing demands (medium)	0.16	[-0.02;0.33]	0.08*
reducing demands (high)	0.20	[0.04;0.36]	0.01*
retreating (medium)	0.11	[-0.07;0.28]	0.23
retreating (high)	0.24	[0.07;0.40]	0.00*
worrying (medium)	0.29	[0.14;0.45]	0.00*
worrying (high)	0.65	[0.49;0.80]	0.00*
resting (medium)	0.19	[0.03;0.36]	0.02*
resting (high)	0.32	[0.16;0.48]	0.00*
Personal control (vs low)			
high personal control	-0.15	[-0.29;0.00]	0.05*
Distress (vs no case)	0.22	[0.06;0.37]	0.06*
Somatisation (vs no case)	0.36	[0.21;0.51]	0.00*
Fear-avoidance beliefs (vs low score)			
medium score	0.22	[0.05;0.38]	0.01*
high score	0.20	[0.02;0.37]	0.03*
Social support (vs low)			
medium	0.12	[-0.05;0.28]	0.17*
high	0.17	[0.01;0.34]	0.04*
Anxiety (vs no anxiety)	0.27	[0.11;0.43]	0.00*
Depression (vs no depression)	0.39	[0.18;0.60]	0.00*

incidental missings (1-10);
* p<0.20; *b*=regression coefficient; CI=confidence interval; vs=versus; p=p-value.

Table 4: Factors related to severity of hand-wrist problems: results of multivariable analyses (n=253)

	b	95% CI	p
Having paid work (vs not having paid work)	-0.09	[-0.19;0.01]	0.07
Body mass index (vs < 25)			
25 – 30	0.14	[0.03;0.24]	0.01
>30	0.12	[-0.03;0.28]	0.12
Duration of current complaint (vs ≤ 2 months)			
> 3 months	0.14	[0.04;0.24]	0.01
Diagnosis			
Nerve entrapment (including CTS)	0.32	[0.17;0.47]	0.00
Pain intensity	0.13	[0.11;0.15]	0.00
Coping with pain (vs low)			
Worrying (medium)	0.09	[-0.04;0.21]	0.18
Worrying (high)	0.26	[0.12;0.39]	0.00

b=regression coefficient; CI=confidence interval; vs=versus; p=p-value.

DISCUSSION

The present study describes patient characteristics and factors related to severity of hand and wrist problems as presented to the GP. The results showed that the most frequently recorded diagnoses were osteoarthritis, tenosynovitis and nerve entrapment, but we did not find large differences between diagnostic categories in terms of patient and disease characteristics. Patients reported lower perceived health on the subscales physical role functioning and bodily pain of the SF-36, but scores on other subscales were comparable to a Dutch reference population. The combination of the following six factors was most strongly associated with the severity of hand and wrist problems: not having paid work, higher body mass index, longer duration of symptoms, the diagnosis nerve entrapment, higher pain intensity, and higher scores on worrying.

Patient and disease characteristics

Musculoskeletal pain comprises an important public health problem due to high impact on disability. In a population-based study Picavet et al. showed that roughly 30% of responders with pain reported limitations in daily life due to their musculoskeletal pain.[1] They also reported that sick leave for wrist or hand pain was less frequent than for neck, shoulder or back pain. This indicates that the impact of hand and wrist problems on daily living is less than that of many other musculoskeletal problems. The results of our study are consistent with their findings. Our population of patients with hand or wrist problems did not report very high scores for symptoms and pain, and scores on most aspects of perceived health were similar to a reference population. Studies looking at perceived health in more homogeneous populations, for example consisting only of patients with rheumatoid arthritis or osteoarthritis, reported poorer perceived health.[27,28] We examined subgroups of patients with rheumatoid arthritis or osteoarthritis in our population, but SF-36 scores were not much different from the total population. Patients consulting the GP may have less severe symptoms or present in an earlier phase of the disease than patients in secondary care.

Factors related to the severity of hand and wrist problems

In our study we found that a combination of six factors was most strongly associated with the severity of hand and wrist problems. Comparing these findings with other studies is difficult as, to our knowledge, indicators of the severity of hand and wrist

problems in primary care have not yet been investigated. Nevertheless, most of the factors we found to be associated with symptom severity have been shown to be of importance in other upper limb disorders, either as predictor of the onset of symptoms, or as predictor of outcome. Not being employed has been described as a determinant of the occurrence of neck and upper limb pain in a population-based study by Walker-Bone et al., and may indicate that poorer socioeconomic status is associated with more severe pain problems.[29]

Higher body mass index has frequently been described as a risk factor for the development of osteoarthritis or rheumatoid arthritis, mostly with respect to lower extremity osteoarthritis.[30-34] Data regarding the association of obesity with hand osteoarthritis are conflicting.[35] Some studies did show an association of obesity with hand osteoarthritis,[36-39] while other studies did not find any association[40-42]. If indeed there is a relationship between hand osteoarthritis and obesity, other mechanisms than a heavy load on joints are presumably responsible. BMI may also be a marker of other factors that are associated with more severe symptoms, such as poorer general health, poorer socioeconomic status, or more distress or depression.[43,44]

High pain intensity and longer symptom duration has been demonstrated to be associated with a poor outcome in most musculoskeletal problems, including shoulder pain[45-47] and tennis elbow[48]. As our outcome measure (SSS) included items on pain intensity it is no surprise that pain intensity showed a strong relation with overall symptom severity. The explained variance of our final model was 55%, which is relatively high. This could very well be caused by the fact that pain intensity was retained in the model. When we excluded pain intensity, the explained variance of the model reduced to 37%.

The fact that worrying was associated with more severe symptoms seems to indicate that psychosocial factors may play a role in hand or wrist problems, either as a cause or as a consequence of pain, as has also been demonstrated for other neck-upper limb disorders. Bot et al. studied predictors of outcome in neck and shoulder complaints, and showed that more worrying at baseline was consistently associated with poorer outcome at follow-up.[45] Few studies have specifically addressed 'worrying' as a passive coping strategy in upper limb pain, but general distress has been found to be a predictor of poor outcome in several studies.[49-51]

Finally, we found that a diagnosis of nerve entrapment (which includes carpal tunnel syndrome) was strongly associated with the severity of hand and wrist problems. This finding is not unexpected because the SSS has been developed to assess the severity of symptoms in patients with carpal tunnel syndrome, and asks

specifically about numbness or tingling sensations in the hand and pain at night time which are characteristics of nerve entrapment.[7] We chose to use this questionnaire because it was the most appropriate one to assess severity of symptoms in patients with a variety of hand or wrist problems, and showed good psychometric performances in our primary care population.[8]

Strengths and weaknesses

Previous research has mostly been carried out in secondary care settings focusing on specific hand and wrist diagnoses, whereas our study addressed a large, heterogeneous population of primary care patients and, thereby, reflects wrist and hand problems as they are presented to the GP. The problems were diagnosed by the participating GPs, who had received a three hour training session before the start of the study. The diagnosis was not confirmed by a specialist. This may have resulted in some diagnostic misclassification, perhaps partly explaining the absence of large differences in patient characteristics between diagnostic categories. However, the main objective of our observational study was to describe diagnosis and impact of hand or wrist problems as identified in everyday primary care, in order to optimise the external validity (generalisability) of findings.

The response to our study was high with 89% of eligible and invited patients consenting to participate. The non-responders were less often female and slightly younger than the responders, which also resulted in a slightly different distribution of diagnoses, with a slightly higher number of patients with rheumatoid arthritis and lower number with osteoarthritis among the non-responders. However, this non-response is unlikely to have affected the reported associations between patient characteristics and severity of symptoms in the population.[52] The GPs were instructed to recruit 10 consecutive patients meeting the eligibility criteria. However, there was considerable variation in the number of patients recruited by GPs. The main reason indicated by GPs for missing eligible patients was busy office hours or simply forgetting about the study. Therefore, we do not expect that the GPs enrolled a highly selective sample. We do not have reliable information to gain insight in the total number of eligible patients in the participating practices. Therefore, we compared gender and age of our sample to patients consulting for hand or wrist problems in the second National Survey of General Practice (NS2) which is a large nation-wide morbidity survey in the Netherlands.[53] Our population consisted of slightly more females and slightly more middle aged patients. This may be the result of some

selective enrolment by GPs, but may also reflect some selective non-response (as described above).

Finally, we would like to emphasize that we have used cross-sectional data, and cannot draw conclusions regarding the direction or causality of the reported associations between determinants and severity of hand and wrist problems. Longitudinal research is needed to look more closely at the temporal relationship of these associations.

In conclusion, primary care patients with hand or wrist problems report pain and reduction in function, but the impact on other aspects of perceived health is limited. Severity of the problem seems to be associated with socio-demographic, physical, and psychosocial factors, more than with the medical diagnosis given by the GP.

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CHAPTER 5

Reproducibility and responsiveness of the Symptom Severity Scale and the hand and finger function subscale of the Dutch Arthritis Impact Measurement Scales (Dutch-AIMS2-HFF) in primary care patients with wrist or hand problems

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ABSTRACT

Background

To determine the clinimetric properties of two questionnaires assessing symptoms (Symptom Severity Scale) and physical functioning (hand and finger function subscale of the AIMS2) in a Dutch primary care population.

Methods

The first 84 participants in a 1-year follow-up study on the diagnosis and prognosis of hand and wrist problems completed the Symptom Severity Scale and the hand and finger function subscale of the Dutch-AIMS2 twice within 1 to 2 weeks. The data were used to assess test-retest reliability (ICC) and smallest detectable change (SDC, based on the standard error of measurement (SEM)). To assess responsiveness, changes in scores between baseline and the 3 month follow-up were related to an external criterion to estimate the minimal important change (MIC). We calculated the group size needed to detect the MIC beyond measurement error.

Results

The ICC for the Symptom Severity Scale was 0.68 (95% CI: 0.54-0.78). The SDC was 1.00 at individual level and 0.11 at group level, both on a 5-point scale. The MIC was 0.23, exceeding the SDC at group level. The group size required to detect a MIC beyond measurement error was 19 for the Symptom Severity Scale. The ICC for the hand and finger function subscale of the Dutch-AIMS2 was 0.62 (95% CI: 0.47-0.74). The SDC was 3.80 at individual level and 0.42 at group level, both on an 11-point scale. The MIC was 0.31, which was less than the SDC at group level. The group size required to detect a MIC beyond measurement error was 150.

Conclusion

In our heterogeneous primary care population the Symptom Severity Scale was found to be a suitable instrument to assess the severity of symptoms, whereas the hand and finger function subscale of the Dutch-AIMS2 was less suitable for the measurement of physical functioning in patients with hand and wrist problems.

BACKGROUND

Health status questionnaires have become increasingly popular as measurement instruments in epidemiological studies. However, the scores on these instruments can be difficult to interpret. Therefore, there is a need to define which scores or changes in scores on these questionnaires are important. We designed a 1-year follow-up study on the diagnosis and prognosis of hand and wrist complaints in primary care, in which self-administered questionnaires were used to study the impact and prognosis of hand and wrist problems. We determined the clinimetric properties of two questionnaires in a Dutch primary care population of patients with hand and wrist problems: 1) the Dutch version of the Symptom Severity Scale, assessing symptoms[1] and 2) the hand and finger function subscale of the Arthritis Impact Measurement Scales (Dutch-AIMS2-HFF), assessing physical functioning[2,3]. The two questionnaires have been found to be valid and reliable in their respective target populations: 1) people suffering from carpal tunnel syndrome and 2) people suffering from rheumatoid arthritis (RA). Our aim was to determine whether these questionnaires are also applicable in a less specific group of patients who consult their general practitioner (GP) for hand and wrist problems. We assessed the reproducibility and responsiveness of these questionnaires, and also estimated the minimal important change.

METHODS

Questionnaires

The Symptom Severity Scale is a self-administered questionnaire that has been developed to assess the severity of symptoms in patients with carpal tunnel syndrome. This questionnaire contains eleven questions with multiple-choice responses, with a score ranging from 1 point (mildest) to 5 points (most severe) (Appendix). The total symptom severity score is calculated as the mean of the scores for the eleven individual items.[1] In a clinical study, Levine et al. demonstrated that the instrument had good reproducibility, consistency, validity and responsiveness in patients with carpal tunnel syndrome.[1]

The Arthritis Impact Measurement Scales (AIMS) were designed specifically to assess health status in patients with rheumatic diseases.[4] The AIMS2 is a revised and extended version of the AIMS, and has been translated into Dutch to assess RA

patients in the Netherlands.[5] The Dutch-AIMS2 is a self-administered questionnaire which measures 3 different domains of health status: physical, psychological and social aspects. In the present study we only used questions pertaining to the physical domain, namely questions about hand and finger function. The patients were asked to indicate, on a 5-point Likert scale, how often during the previous 4 weeks they had been limited in hand and finger function while performing 5 specific tasks: writing with a pen or pencil; buttoning up a shirt; turning a key; tying knots or shoelaces; opening a jar. The scores, ranging from 1 (every day) to 5 (never) for each of the items, were transformed to a total score, ranging from 0 (representing good health status) to 10 points (representing poor health status). The Dutch AIMS2 has been found to have good measurement properties.[2,3,5]

Study design and population

The study population consisted of participants in a 1-year follow-up study on the diagnosis and prognosis of hand and wrist problems. Patients were eligible for participation in the study if they were 18 years of age or older, and capable of filling in questionnaires in the Dutch language. Patients were excluded from the study if their symptoms were caused by acute trauma, injury, fracture, vascular problems or skin problems. The study was approved by the Medical Ethics Committee of the VU University Medical Center in Amsterdam.

The first 84 participants who returned the baseline questionnaire received the Symptom Severity Scale and the Dutch-AIMS2-HFF a second time within 1 to 2 weeks after the date on which they completed the first questionnaire. These data were used to assess reproducibility. To assess test-retest reproducibility the time-interval needs to be sufficiently short to support the assumption that the condition remains stable, and sufficiently long to prevent recall.[6] The baseline and 3-month follow-up data were used to assess responsiveness.

Data-analysis: reproducibility

Reproducibility concerns the degree to which repeated measurements in stable persons provide similar results. In other words, reproducibility is the extent to which an instrument is free of measurement error. This was assessed by rating test-retest reliability and agreement.[7]

Test-retest reliability

As a parameter of reliability, we computed the intraclass correlation coefficient ($ICC_{agreement}$) for the Symptom Severity Scale and the Dutch-AIMS2-HFF by using a two-way random effects model.[8] An ICC > .70 is generally considered to indicate good reliability.[9]

Agreement

The Bland and Altman method was used to quantify agreement, by calculating the mean difference (Mean Δ) between the two measurements and the standard deviation (SD) of this difference.[10] The closer the Mean Δ is to zero and the smaller the SD of this difference, the better the agreement. The 95% limits of agreement were defined as the mean difference between the measurements ±1.96*SD of the differences. We also computed the standard error of measurement (SEM) for both scales. The smaller the measurement error, the smaller the changes that can be detected beyond measurement error. The SEM was estimated by calculating the square root of the within subject variance of the patients ($SEM=\sqrt{\sigma^2_{between\ measurement} + \sigma^2_{residual}}$).[7]

Smallest detectable change

The smallest detectable change (SDC) was based on this absolute measurement error. To be 95% confident that the observed change is real change, and not caused by measurement error, the smallest detectable change at individual level (SDC_{ind}) was calculated as $1.96*\sqrt{2}*SEM$. The smallest detectable change at group level (SDC_{group}) was calculated as $(1.96*\sqrt{2}*SEM)/\sqrt{n}$.[11,12]

Data-analysis: responsiveness

Responsiveness refers to an instrument's ability to detect important change over time in the concept being measured.[13,14] Responsiveness can be tested by relating the smallest detectable change (SDC) to the minimal important change (MIC). The absolute measurement error should be smaller than the minimal amount of change in the scale that is considered to be important.[15] We used an anchor-based approach to determine the minimally important change for the Dutch-AIMS2-HFF and the Symptom Severity Scale. At each follow-up measurement, the patients were asked to score the change in their ability to perform daily activities. The seven response options were: (1) 'very much improved'; (2) 'much improved'; (3) 'little improved'; (4) 'no change'; (5) 'little deterioration'; (6) 'much deterioration'; (7) 'very much deterioration'. This

measure of change was used as the anchor (external criterion) for the evaluation of responsiveness.

The minimal important change (MIC) was quantified by constructing receiver operating characteristic (ROC) curves.[16] The ROC curve is the result of using different cut-off points for change scores, each with a given sensitivity and specificity. To determine the MIC we defined the optimal cut-off point as the point closest to the upper left corner of the ROC curve, which is assumed to represent the lowest overall misclassification. This MIC was related to the SDC by computing the group size needed to achieve an SDC_{group} that equals the MIC ($n=(SDC/MIC)^2$).[11]

We also computed the area under the curve (AUC), which can be interpreted as the probability of correctly identifying an improved patient from randomly selected pairs of improved and stable patients.[17,18] An AUC of 1.0 indicates perfect discrimination between these two health states. An instrument that does not discriminate any better than chance will have an AUC of 0.50.[18]

Finally, we assessed the presence of floor and ceiling effects, by examining the frequency of the highest and lowest possible scores at baseline. Floor effects were considered to be present if more than 15% of the patients had a minimal score at baseline (1 on the Symptom Severity Scale or 0 on the Dutch-AIMS2-HFF); ceiling effects were considered to be present if 15% of the patients had a maximum baseline score (5 on the Symptom Severity Scale or 10 on the Dutch-AIMS2-HFF).[19] The responsiveness of questionnaires is limited by the presence of floor or ceiling effects, because changes can not be measured in such cases.

All statistical analyses were performed in SPSS for Windows, Version 12.0.1.

RESULTS

The questionnaire was completed by 84 participants at baseline. Their mean age was 52.0 years (SD 15.6), and 74% were female. All 84 participants completed the retest Symptom Severity Scale (on average 10 days later), but 3 participants had more than 20% missing answers on the Dutch-AIMS2-HFF. These 3 cases were not included in the analysis of the Dutch-AIMS2-HFF. Table 1 presents the characteristics of the study

population at baseline, including age, gender, paid job, diagnosis according to the GP, and the duration of symptoms on presentation. The three most frequent diagnoses were osteoarthritis (23.1%), Repetitive Strain Injury (RSI) (20.5%) and non-specific symptoms/unclear (20.5%). More than one quarter of the patients had suffered from their symptoms for longer than six months.

Table 1: Characteristics of patients who returned the questionnaires at baseline and at 1-week follow-up

Characteristics	
Age in years: mean (SD) (N=84)	52.0 (15.6)
Gender (% female) (N=84)	74%
Paid job (N=84)	52.4%
Diagnosis according to the GP*(N=78)	
Rheumatoid arthritis	5.1%
Osteoarthritis	23.1%
Tenosynovitis	16.7%
Entrapment, including carpal tunnel syndrome	15.4%
Ganglion	11.5%
Repetitive Strain Injury	20.5%
Non-specific symptoms / unclear	20.5%
Other	10.3%
Duration of symptoms at baseline (N=84)	
< 2 weeks	15.5%
3 – 4 weeks	19.0%
1 – 2 months	17.9%
3 – 6 months	21.4%
> 6 months	26.2%

* more than one answer possible; 30 patients were given >1 diagnosis

Results concerning the Symptom Severity Scale

Reproducibility

The mean score at baseline, and at retest (on average 10 days later), and the mean change score are presented in Table 2. This table shows that over this period a small mean improvement was found on the Symptom Severity Scale (1-5).

Results concerning the test-retest reproducibility of the Symptom Severity Scale are also presented in Table 2. The $ICC_{agreement}$ was 0.68 (95% CI: 0.54-0.78), which indicates moderate reliability and the SDC at individual level was 20% (1.00 on a 5-point scale).

Table 2: Test-retest reproducibility results for the Symptom Severity Scale and the Dutch-AIMS2-HFF

	N	Mean baseline (SD)	Mean 10 days (SD)	Δ Mean (SD)	Limits of agreement	ICC agreement (95%CI)	SEM	SDC ind	SDC group
Symptom Severity Scale* *(1-5)*	84	2.09 (0.57)	1.98 (0.69)	0.11 (0.50)	-0.87 to 1.09	0.68 (0.54 to 0.78)	0.36	1.00	0.11
Dutch-AIMS2-HFF* *(0-10)*	81	1.85 (2.09)	2.21 (2.37)	-0.32 (1.93)	-4.10 to 3.46	0.62 (0.47 to 0.74)	1.37	3.80	0.42

* higher score means worse functioning; SD = standard deviation; $ICC_{agreement}$ = intra-class correlation coefficient for agreement; CI = confidence interval; SEM = standard error of measurement; SDC_{ind} = smallest detectable change at individual level; SDC_{group} = smallest detectable change at group level.

Responsiveness

To evaluate responsiveness we used perceived improvement in ability to perform daily activities as external criterion. The Symptom Severity Scale correlated moderately with this anchor (Spearman's rho 0.69). Table 3 shows the changes between baseline and 3-month follow-up scores for the 77 participants who completed the Symptom Severity Scale after three months. Very few patients reported a deterioration in daily functioning, and we therefore clustered the scores of patients reporting little, much or very much deterioration. The mean change scores increased with greater self-reported improvements in daily functioning.

Table 3: Changes in scores between baseline and 3-month follow-up for ability to perform daily activities

	Symptom Severity Scale				
Daily functioning	N	Δ ± sd	median	Percentiles	
				25th	75th
Very much improved	17	0.93 ± 0.63	1.00	0.41	1.41
Much improved	11	0.56 ± 0.39	0.45	0.27	1.00
Little improved	6	0.59 ± 0.34	0.64	0.30	0.86
No change	34	-0.03 ± 0.42	0.00	-0.14	0.18
Deterioration	9	-0.24 ± 0.38	-0.18	-0.45	0.05
	Dutch-AIMS2-HFF				
	N	Δ ± sd	median	Percentiles	
				25th	75th
Very much improved	16	1.47 ± 1.44	1.00	0.13	3.00
Much improved	11	2.18 ± 2.80	1.00	0.00	4.00
Little improved	6	1.10 ± 1.41	1.06	-0.13	2.25
No change	34	-0.18 ± 1.36	0.00	-0.50	0.50
Deterioration	9	-0.89 ± 2.33	0.00	-1.25	0.00

Figure 1 presents the ROC curve generated for changes on the Symptom Severity Scale. Based on the distribution of scores presented in Table 3, we compared patients reporting any improvement on the external criterion (n=34) with those reporting no change (stability, n= 34). True positive rates (sensitivity) and false positive rates (1-specificity) for the discrimination between improvement and stability were plotted for multiple cut-off points. The AUC for the Symptom Severity Scale was 0.90 (95% CI: 0.83-0.97). A cut-off point of 0.23 approximates the optimal cut-off point (MIC) between sensitivity (85%) and specificity (86%).

We determined responsiveness by relating the SDC to the MIC. For the Symptom Severity Scale, the SDC_{group} (0.11) was smaller than the MIC (0.23). The group size required to detect a MIC beyond measurement error was 19.

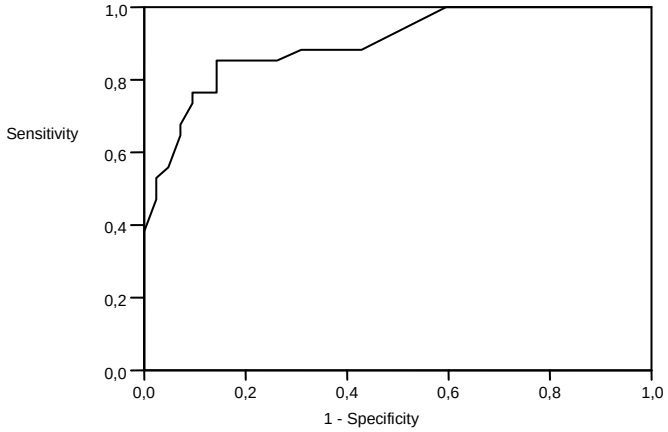

Figure 1: Receiver operator characteristic (ROC) curve for changes on the Symptom Severity Scale.

Results concerning the Dutch-AIMS2-HFF

Reproducibility

Table 2 shows a small mean deterioration on the Dutch-AIMS2-HFF (0-10) between the baseline score and the retest scores. Test-retest reproducibility showed moderate reliability ($ICC_{agreement}$: 0.62;95% CI: 0.47-0.74). The SDC_{ind} was 3.80 on an 11-point scale (35%).

Responsiveness

The Dutch-AIMS2-HFF also correlated moderately with our anchor (Spearman's rho 0.52). Table 3 shows the mean changes for categories of improvement in daily activities in patients who completed the questionnaire after three months (n=76). Although self-reported improvement was associated with an improvement on the scale, there was no gradual increase in scores over categories of improvement.

Figure 2 presents the ROC curve generated for changes on the Dutch-AIMS2-HFF. Again, we compared patients reporting any improvement on the external criterion (n=33) to those reporting no change (stability, n= 34). The AUC was 0.79 (95% CI: 0.69-0.90); the optimal cut-off point (MIC) approximated 0.31 (sensitivity=70%; specificity=76%). The SDC_{group} was not smaller than the MIC for the Dutch-AIMS2-HFF

(SDC_{group} of 0.42; MIC of 0.31). The group size required to detect a MIC beyond measurement error was 150. We found a floor effect for the Dutch-AIMS2-HFF; 30% of the patients had a minimum score of 0 at baseline.

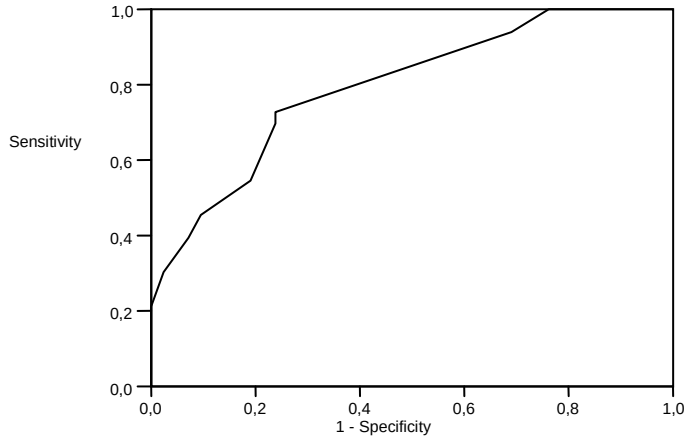

Figure 2: Receiver operator characteristic (ROC) curve for changes on the Dutch-AIMS2-HFF.

DISCUSSION

In this study we investigated the clinimetric properties of two questionnaires, the Symptom Severity Scale and the Dutch version of the hand and finger function subscale of the Arthritis Impact Measurement Scales (Dutch-AIMS2-HFF). In our population of primary care patients with hand or wrist problems, the Symptom Severity Scale had good reproducibility and responsiveness; the Dutch-AIMS2-HFF performed less well. The measurement error (SEM) for the Symptom Severity Scale was smaller (0.36 on a 1-5 scale) than the measurement error for the Dutch-AIMS2-HFF (1.37 on a 0-10 scale). The Symptom Severity Scale detected smaller changes than the Dutch-AIMS2-HFF (20% versus 35%). The responsiveness of the Symptom Severity Scale was also better, with an AUC of 0.90, compared to 0.79 for the Dutch-AIMS2-HFF, which means that the Symptom Severity Scale discriminated better between improved and stable patients. It should be noted that we did not aim to compare the properties of the two questionnaires. Each questionnaire measures its

own concept: the Symptom Severity Scale measures the severity of symptoms and the Dutch-AIMS2-HFF measures physical aspects of health status. Our aim was to examine if these questionnaires could also be applied in a group of patients for whom the questionnaires were not designed.

Measurement properties of the Symptom Severity Scale

Levine et al. tested the measurement properties of the Symptom Severity Scale in a clinical study of patients with carpal tunnel syndrome.[1] They demonstrated that the Symptom Severity Scale is highly reproducible (Pearson's correlation coefficient, r=0.91), internally consistent (Cronbach's alpha, 0.89), valid, and responsive to clinical change (expressed as the effect size: 1.4 for severity of symptoms).

In our more heterogeneous population, the measurement properties of the Symptom Severity Scale were found to be satisfactory.

Measurement properties of the Dutch-AIMS2

Meenan et al. tested the measurement properties of the AIMS2 in subjects with rheumatoid arthritis (RA) and subjects with osteoarthritis (OA).[2] Internal consistency coefficients were 0.72-0.91 in the RA group and 0.74-0.96 in the OA group. Test-retest reliability was 0.78-0.94. Validity analyses in both the RA and the OA group showed that patient designation of an area as a problem or as a priority for improvement was significantly associated with a poorer AIMS2 score in that area. Meenan et al. concluded that the AIMS2 is a questionnaire with excellent measurement properties that should be useful in arthritis clinical trials and in outcome research. Riemsma et al. and Evers et al. assessed the reliability and validity of the Dutch version of the AIMS2 (Dutch-AIMS2).[3,5] The internal consistency coefficients for the health status scales ranged from 0.66 to 0.89[3] and from 0.65 to 0.91[5]. Test-retest reliability with a time-interval of 1 month was high (between 0.73-0.92).[5] The construct validity of the Dutch-AIMS2 was confirmed by the results of factor analysis, which identified the three different domains.[3,5]

In our study the MIC for the Dutch-AIMS2-HFF was small (0.31), but the measurement error was so large that the MIC could not be discriminated from measurement error. The Dutch-AIMS2-HFF was developed for the assessment of patients with RA[2,3], whereas the patients in our study suffered from a variety of hand and wrist problems. It is possible that the Dutch-AIMS2-HFF is not suitable for this more heterogeneous primary care population. The presence of a floor effect seems to confirm this suggestion; because many patients (30%) reported no limitation in hand

and finger function (score 0) at baseline, it was not possible to detect any improvement in these patients.

Another possible explanation for the poorer performance of the Dutch-AIMS2-HFF may be the number and nature of its items. It contains only five questions, all of which concern almost equally difficult functions. This may affect the ability of the instrument to measure within-subject change.

Methodological considerations

The baseline results showed that almost 50% of the patients had suffered from their symptoms for more than three months, and could therefore be defined as chronic. It is plausible to assume that test-retest reliability would be higher in patients with chronic symptoms than in patients with acute or sub-acute symptoms. We performed a sub-group analysis, in which we compared the $ICC_{agreement}$ between patients with chronic symptoms to that of patients with more acute symptoms. The results showed very small differences, indicating that the duration of symptoms did not affect test-retest reliability.

In our study we used the scores for perceived change in ability to perform daily activities as external criterion (anchor) for assessing responsiveness. We could, however, have opted for pain improvement, or scores for overall improvement, but these other options did not correlate any better with the two questionnaires than the external criterion that we used. A correlation of more than 0.5 is considered to be appropriate when selecting an external criterion for assessing responsiveness.[20]

We used an anchor-based approach to determine the MIC. However, there are also several other methods that can be used to determine MIC; for example, Jaescke et al.[21], Norman[22] and Wyrwich[23] used other methods. Jaescke et al. used the mean change score in people reporting a small improvement to determine the MIC. With this method, the MIC for the Symptom Severity Scale would be 0.59 (the mean change among patients reporting little improvement), and for the Dutch-AIMS2-HFF it would be 1.10. Norman et al. found that under many circumstances the estimates of MIC fall very close to half a $SD_{baseline}$. With this method, the MIC for the Symptom Severity Scale would be 0.29 and for the Dutch-AIMS2-HFF it would be 1.05. Wyrwich proposed one SEM as a measure for MIC.[24] Following this method, the MIC for the Symptom Severity Scale would be 0.36 and for the Dutch-AIMS2-HFF it would be 1.37. The anchor-based approach we used estimates the change score at which the questionnaires discriminate best between improved and stable patients. This method results in smaller MIC estimates, compared to the other methods, but may be closer to

the *minimal* important change. The definition of an optimal cut-off point (MIC) may depend on the objective for which the questionnaire is used. For example, if users (researchers or clinicians) want to be certain that *only* improved patients are identified by the questionnaire, a higher cut-off score can be defined for the MIC, but this approach will fail to identify more patients with smaller, yet important changes. We prefer to use the ROC curves for defining MIC, because this method clearly illustrates the consequences of selecting different MICs.

Conclusions

In conclusion, the properties of a questionnaire always depend on the characteristics of the population in which the questionnaire is used. In our heterogeneous, primary care population, the Symptom Severity Scale seems to be a suitable instrument to assess the severity of symptoms, whereas the hand and finger function subscale of the Dutch-AIMS2 seems to be less suitable for the measurement of physical functioning in patients with hand and wrist problems.

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APPENDIX

The Symptom Severity Scale.[1]

1. How severe is the hand or wrist pain that you have at night?

1. I do not have hand or wrist pain at night
2. Mild pain
3. Moderate pain
4. Severe pain
5. Very severe pain

2. How often did hand or wrist pain wake you up during a typical night in the past two weeks?

1. Never
2. Once
3. Two or three times
4. Four or five times
5. More than five times

3. Do you typically have pain in your hand or wrist during the daytime?

1. I never have pain during the day
2. I have mild pain during the day
3. I have moderate pain during the day
4. I have severe pain during the day
5. I have very severe pain during the day

4. How often do you have hand or wrist pain during the daytime?

1. Never
2. Once or twice a day
3. Three to five times a day
4. More than five times a day
5. The pain is constant

5. How long, on average, does an episode of pain last during the daytime?

1. I never get pain during the day
2. Less than 10 minutes
3. 10 to 60 minutes
4. Greater than 60 minutes
5. The pain is constant throughout the day

6. Do you have numbness (loss of sensation) in your hand?

1. No
2. I have mild numbness
3. I have moderate numbness
4. I have severe numbness
5. I have very severe numbness

7. Do you have weakness in your hand or wrist?

1. No weakness
2. Mild weakness
3. Moderate weakness
4. Severe weakness
5. Very severe weakness

8. Do you have tingling sensations in your hand?

1. No tingling
2. Mild tingling
3. Moderate tingling
4. Severe tingling
5. Very severe tingling

9. How severe is numbness (loss of sensation) or tingling at night?

1. I have no numbness or tingling at night
2. Mild
3. Moderate
4. Severe
5. Very severe

10. How often did hand numbness or tingling wake you up during a typical night during the past two weeks?

1. Never
2. Once
3. Two or three times
4. Four or five times
5. More than five times

11. Do you have difficulty with the grasping and use of small objects such as keys or pens?

1. No difficulty
2. Mild difficulty
3. Moderate difficulty
4. Severe difficulty
5. Very severe difficulty

CHAPTER 6

Clinical course and prognosis of hand and wrist problems in primary care

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ABSTRACT

Objectives

The objectives of this study are (1) to describe the course of a new episode of hand and wrist problems in general practice, and (2) to identify predictors that are associated with poor outcome at short-term and long-term follow-up.

Methods

Patients consulting their GP with hand or wrist problems (no prior consultation in preceding 3 months) were sent a questionnaire at baseline, 3, 6 and 12 months of follow-up. Potential predictors included socio-demographic variables, characteristics of the complaint, physical activity and psychosocial factors. GPs recorded information on symptoms, signs and medical diagnosis. Main outcome measure was insufficient improvement of symptoms using the Symptom Severity Scale at short-term (3 months) and long-term (12 months).

Results

23% of the patients reported complete recovery after 3 months, increasing to 42% one year after first presentation. Higher probability of poor outcome at 3 months was associated with being female, a low pain intensity at baseline, and lower personal control at baseline; at 12 months it was associated with higher age, being female, having complaints for longer than 3 months at baseline, low scores on the coping strategy 'reducing demands', and a higher score on somatization. Discriminative ability of the models was moderate with an area under the curve after bootstrapping of, respectively, 0.60 and 0.69.

Conclusions

More than half of all patients reported residual symptoms at one year. Whilst poor outcome was difficult to predict, age, gender, duration of symptoms, and psychosocial factors were associated with poor outcome of hand and wrist problems.

INTRODUCTION

Musculoskeletal conditions of the hand or wrist, such as hand osteoarthritis, rheumatoid arthritis or carpal tunnel syndrome, are well recognised diagnoses in general practice. The incidence in general practice is estimated at 4.6/1000/year for wrist symptoms and 7.8/1000/year for hand and finger symptoms.[1] The prognosis of these conditions has not yet been fully investigated in a primary care population. We know from research on other musculoskeletal disorders, such as low back pain, neck pain, shoulder pain and elbow symptoms, that the intensity and course of symptoms may be influenced by socio-demographic, physical, psychological and social factors.[1-7] Information about these prognostic indicators in patients with hand or wrist problems may help general practitioners (GPs) to provide patients with adequate information regarding the most likely course of their symptoms. Such information may support decisions on treatment and referral.

In our study we set out to study hand and wrist problems in their most general form. All types of symptoms (pain, stiffness, tingling) related to the hand or wrist were included, except symptoms caused by acute injury, vascular or skin problems. The first objective of this study was to describe the course of a new episode of hand and wrist problems in terms of perceived recovery, pain intensity, symptom severity and perceived health. The second objective was to identify predictors that were associated with poor short-term and long-term outcome defined as insufficient improvement of symptoms on the Symptom Severity Scale.[8] We chose to study predictors of poor outcome rather than a good outcome as this may help GPs to identify patients who need treatment or referral. Furthermore, identification of barriers to recovery may help making decisions regarding the type of treatment.

PATIENTS AND METHODS

Study design and recruitment

We carried out an observational study in general practice in the Netherlands. Forty-four general practitioners (GPs) from 32 practices participated in the study. Before the start of the study the GPs received a three-hour instruction about the diagnosis of hand and wrist problems (history, physical examination, differential diagnosis). Between July 2004 and December 2005 the GPs recruited patients consulting for a new episode of hand or wrist problems. An episode was considered to be 'new' if

participants had not visited their GP for the same problem during the preceding 3 months. GPs asked patients to participate if they were 18 years or older and had sufficient knowledge of the Dutch language to complete written questionnaires. Patients were excluded from the study if the presented symptoms were caused by an acute injury (fracture, dislocation, sprain) or by vascular or skin problems. Written informed consent was obtained from all patients.

Baseline and follow-up (3, 6 and 12 months) postal questionnaires were mailed to patients. Furthermore, we asked the GPs to complete a diagnosis and management registration form on which they recorded information about history, physical examination, medical diagnoses and management of the hand or wrist problem (wait and see, advice, splint, additional diagnostic tests, medication and referrals). The study was approved by the Medical Ethics Committee of the VU University Medical Center in Amsterdam.

Outcome measures

The primary outcome measure was change from baseline in symptom severity at 3 months (short-term) and 12 months (long-term) follow-up, measured using the Symptom Severity Scale (SSS).[8] The SSS is a self-administered questionnaire originally developed to assess the severity of symptoms in patients with carpal tunnel syndrome. It incorporates six clinical areas, namely pain, paraesthesia, numbness, weakness, nocturnal symptoms, and over-all function. The questionnaire contains eleven questions with response options ranging from 1 (mildest) to 5 points (most severe). The total symptom severity score is calculated as the mean of the scores for the eleven individual items. In a recent study, the SSS was shown to be reliable and responsive in our primary care population.[9] The minimal important change in this population was quantified as 0.23 points. In this study, poor outcome was defined as a change of <0.23 points (that is, insufficient improvement of symptom severity) at 3 and 12 months, and used as outcome measure in the prognostic analyses.

We measured perceived recovery by asking patients if they were completely recovered from their symptoms (yes or no), and if not, they scored improvement on a 7-point transition scale (very much improved to very much deteriorated).

The third outcome measure, perceived health, was measured using the short form health survey (SF-36).[10] The SF-36 is designed to assess eight health concepts relevant to a person's functional status and well being: physical functioning (PF), role limitations in physical functioning (RP), role limitations in emotional functioning (RE), social functioning (SF), bodily pain (BP), mental health (MH), vitality (VT) and general

health (GH). Scale scores range from 0 to 100 with higher scores representing better perceived health.

Predictors of outcome

The baseline questionnaire contained a variety of potential predictors of outcome representing socio-demographic variables, physical, psychological and social factors. Socio-demographic factors were age, gender, marital status, educational level, and work status. Body Mass Index (BMI) was calculated from self-reported weight and height (overweight BMI 25 to 30; obesity BMI ≥30). For physical load during work and leisure time, we used the 20-item Dutch Musculoskeletal Questionnaire (DMQ; 0-100) with 0 representing no physical workload and 100 representing highest physical workload.[11]

The following characteristics of hand or wrist problems were included: duration of symptoms, previous episodes, dominant/non dominant side affected, GP diagnosis, and pain intensity (0-10 point rating scale).

For physical activity we used two questions measuring frequency and intensity of physical activity. Patients were coded as meeting the Dutch Norm for Healthy Activity (yes or no) if they reported 30 minutes or more of moderate-intensity physical activity on at least five days of the week.[12,13] Additionally, they were coded as meeting the American College of Sports Medicine (ACSM) position stand (yes or no) if they performed heavy physical exercise or sports at least 3 times a week.[14]

We assessed the following psychological factors: coping, measured with the Pain Coping Inventory (PCI) consisting of 6 scales: pain transformation, distraction, reducing demands, retreating, worrying, and resting, with a higher score indicating more use of the strategy concerned[15,16]; personal control, using the subscale personal control of the Revised Illness Perception Questionnaire (IPQ-R, 1-5) with a higher score indicating stronger personal control[17,18]; distress and somatization, using the two 16-item subscales of the 4 Dimensional Symptom Questionnaire (4DSQ, 0-32)[19]. A cut-off score of >10 for both distress and somatization discriminates between 'cases' and 'non-cases'[20,21]; fear avoidance beliefs, using the 4-item physical activity subscale of the Fear Avoidance Beliefs Questionnaire (FABQ, 0-24), with a higher score indicating more fear avoidance[22]; anxiety and depressive symptoms, using the Hospital Anxiety and Depression Scale (HADS, 0-21), with higher scores indicating more severe symptoms[23]. For both subscales of the HADS, scores of 0 to 7 points indicate no anxiety or depression, scores of 8 or higher indicate possible or probable

anxiety or depression.[24]

Finally, social support was measured using the Social Support Scale (12-60) on which a higher score indicates less perceived support from others.[25]

Statistical analysis

Descriptive statistics were used to describe the clinical course of hand and wrist problems, and MANOVA for repeated measures was used to test significance of changes during the 12 months follow-up for each outcome, and subsequently to determine at which time points changes were significant (complete case analysis).

Univariable logistic regression analyses were performed to check whether there was a linear association between each of the potential predictors and poor outcome (i.e., less than a minimal important improvement of 0.23 points on the SSS) at 3 months and 12 months. For dichotomous variables we only considered those variables with a prevalence of at least 10%. Potential predictors showing a non-linear relation with the outcome were dichotomised when cut-off scores were available from the literature. Otherwise they were divided into tertiles (low, medium high), with the "low-category" as reference category, or, when this was not possible, dichotomised. We presented univariable Odds Ratios (ORs) along with the 95% confidence intervals (95% CI). Variables that were associated with the outcome (p-value<0.20) were pre-selected for the multivariable analysis. Before multivariable analysis was applied, the correlation among predictors was checked. In case of a strong correlation (Spearman r>0.5) between variables, only the predictor with the strongest univariable association with consult behaviour was retained in the model.

We developed two multivariable models (short-term and long-term) that included the combination of predictors that was most strongly associated with poor outcome. For the short-term model, all predictors were entered simultaneously in a multivariable logistic model. However, because the number of predictors to be entered in the long-term model exceeded the number of events/10 (events=number of patients with poor outcome), the predictors were entered in blocks (socio-demographic factors and physical factors first, characteristics of the problem next, and psychosocial factors last).[2] The best predictive model was constructed using manual backward selection. We sequentially deleted variables from the initial model until only variables with a p-value<0.10 (Wald statistic) were retained in the final model.

All these statistical analyses were performed using SPSS for Windows Version 12.0.1.

Predictive performance of the models

Calibration of the models, which is related to reliability, was assessed by plotting the predicted probabilities of poor outcome against the observed frequencies.[26] For this, patients were grouped into deciles according to their predicted probability. The prevalence of the outcome measure within each decile equals the observed frequency. If the predicted probabilities and the observed frequencies are in agreement, the estimates are close to the diagonal. Discrimination was studied by calculating the area under the ROC-curve, which illustrates the ability of the models to discriminate between patients with and patients without poor outcome at subsequent cut-off points along the range of the predicted probabilities.[26] An area under the curve (AUC) of 0.5 indicates no discrimination above chance, whereas an AUC of 1.0 indicates perfect discrimination.

Prediction models perform better in the development cohort than in other, but similar populations. After the multivariable analyses we used bootstrap samples to adjust for this overoptimism in model performance.[26-28] Bootstrap samples were drawn with replacement (200 replications) from the full data set and used to compute an adjusted AUC. This adjusted AUC provides a more precise estimation of the performance of the model in similar, future patients. The bootstrap analysis was performed using R version 2.5.0.

RESULTS

Study population and baseline characteristics

GPs asked 301 patients with hand or wrist problems to participate. A total of 267 patients (89%) consented to participation and completed the baseline assessment. Table 1 lists the baseline characteristics. GPs recorded more than one diagnosis in 25 patients (9.4%). In patients given only one diagnosis the three most frequently recorded diagnoses were osteoarthritis (16.9%), tenosynovitis (15.8%) and nerve entrapment, including carpal tunnel syndrome (12.4%). The mean symptom severity score at baseline was 2.1 (SD 0.6) and the mean pain intensity score was 4.0 (SD 2.4); half of the patients had suffered from their symptoms for longer than three months when they consulted the GP.

Table 1: Patient and problem characteristics at baseline (n=267)*

Patient characteristics		
Age in years: mean (SD)	49.3	(16.0)
Gender: n (% female)	198	(74.2)
Marital status: n (% living together / married)	186	(70.2)
Education: n (%)		
primary	67	(25.2)
secondary	141	(53.0)
college / university	58	(21.8)
Having paid work: n (%)	133	(50.6)
Body Mass Index: n (%)		
<25 (underweight/normal)	140	(54.3)
25 to 30 (overweight)	86	(33.3)
>30 (obese)	32	(12.4)
Physical activity: n (%)		
ACSM position stand[#]	38	(14.6)
Dutch Norm Healthy Activity	110	(41.7)
Characteristics of the hand or wrist problem		
Location of the problem: n (%)		
Unilateral	198	(74.2)
Bilateral	69	(25.8)
1 Diagnosis according to GP at first consultation: n (%)		
Osteoarthritis	45	(16.9)
Tenosynovitis	42	(15.8)
Nerve entrapment, including carpal tunnel syndrome	33	(12.4)
Non-specific symptoms / unclear	31	(11.7)
Repetitive Strain Injury	30	(11.3)
Ganglion	24	(9.0)
Rheumatoid arthritis	21	(7.9)
Other	15	(5.6)
> 1 Diagnosis	25	(9.4)
Duration of symptoms at baseline: n (%)		
< 2 weeks	34	(12.8)
3 – 4 weeks	50	(18.8)
1 – 2 months	48	(18.0)
3 – 6 months	54	(20.3)
> 6 months	80	(30.1)
Severity of symptoms (1-5): mean (SD)	2.1	(0.6)
Intensity of pain (scale 0-10): mean (SD)	4.0	(2.4)

* incidental missings (1-9) [#] American College of Sports Position Stand

At the first consultation, GPs prescribed medication in 36% of the patients, e.g. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) (n=69), or corticosteroïd injection (n=16), and 5% were provided with splints. In 38% of the patients the treatment policy was 'wait and see', and 17% of the patients received additional diagnostic tests, e.g. blood tests (n=24), or X-ray (n=22). 22% of the patients were referred, most frequently to a neurologist (n=20), physiotherapist (n=19), or rheumatologist (n=6).

In total, 248 patients (93%) completed the 3 months follow-up, 249 patients (93%) the 6 months follow-up, and 248 patients (93%) the 12 months follow-up questionnaire. 237 patients completed all four questionnaires. Baseline characteristics (including age, gender, duration or severity of symptoms) were largely similar between these completers and the 267 enrolled patients, e.g. mean age of completers was 50.1 (SD 15.9) compared to 49.3 (SD 16.0) of non-completers; 75% of the completers was female compared to 74% of the non-completers.

Clinical course

The rates of complete recovery after 3, 6 and 12 months were respectively 23% (n=56), 32% (n=80) and 42% (n=103). Of the patients who did not report full recovery at 3 months (n=191), 26% reported (very) much improvement and 22% reported some improvement compared to baseline. These rates hardly changed at longer-term follow-up. The course of self-reported pain intensity, symptom severity and perceived health was analysed for the 237 patients who completed all four questionnaires. Self-reported pain intensity and symptom severity significantly improved during follow-up ($p<0.001$); as well as scores on the subscales physical functioning, physical role functioning, emotional role functioning, bodily pain, and vitality of perceived health ($p<0.05$) (Table 2). Pain intensity and bodily pain improved significantly at each follow-up measurements; symptom severity and physical role functioning improved significantly over the first 6 months; physical functioning and emotional role functioning between baseline and 3 months; and vitality between 6 months and 12 months ($p<0.05$).

Table 2: Mean scores of self-reported pain intensity, symptom severity, and perceived health at baseline, 3, 6 and 12 months follow-up (n=237)

	Baseline	3 months	6 months	12 months	MANOVA
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	p-value
Pain intensity (0-10)	4.0 (2.3)	3.1 (2.6)	2.6 (2.5)	2.3 (2.5)	0.01
Symptom severity (1-5)	2.2 (0.6)	1.8 (0.7)	1.7 (0.6)	1.6 (0.6)	0.01
Perceived health (0-100)					
Physical functioning	77.9 (19.4)	80.3 (20.2)	81.3 (20.7)	81.3 (21.4)	0.01
Role functioning physical	61.3 (39.4)	67.3 (40.5)	73.1 (39.3)	74.3 (38.7)	0.01
Role functioning emotional	82.6 (33.1)	76.3 (38.6)	79.5 (38.0)	82.2 (34.4)	0.03
Social functioning	83.1 (19.0)	82.3 (22.1)	83.5 (21.5)	85.5 (22.2)	0.09
Bodily pain	59.7 (19.1)	71.0 (21.0)	75.4 (22.0)	78.0 (23.0)	0.01
Mental health	76.7 (16.3)	74.5 (17.2)	74.8 (18.1)	76.3 (17.8)	0.07
Vitality	65.3 (17.7)	64.0 (19.0)	65.1 (19.8)	67.3 (18.0)	0.01
General health	66.4 (19.8)	67.5 (20.1)	68.2 (20.6)	68.5 (21.6)	0.12

Short-term and long-term prognosis

Table 3 presents the short-term and long-term univariable association of potential predictors with poor outcome. Variables which showed univariable association ($p \leq 0.20$, marked '*' in Table 3) were entered in the multivariable model. Table 4 shows the variables that were included in the final short-term and long-term prediction models after backward selection. A higher probability of poor outcome at 3 months was associated with a combination of being female, having a low pain intensity score and lower personal control at baseline. A higher probability of poor outcome at 12 months follow-up, was associated with a combination of higher age, being female, having complaints for longer than 3 months at baseline, lower scores on the coping strategy 'reducing demands' and a higher score on somatization.

Table 3: Univariable association of potential predictors with poor outcome at short-term (n=247)[#] and long-term (n=248)[$]

	Short-term (3 months)			Long-term (12 months)		
	OR	95% CI	*p*	OR	95% CI	*p*
Socio-demographic factors						
Female (vs male)	1.83	[1.00;3.33]	0.05*	2.20	[1.15;4.21]	0.02*
Age	1.01	[1.00;1.03]	0.18*	1.02	[1.01;1.04]	0.01*
Education level (vs primary)						
secondary	0.84	[0.46;1.55]	0.58	0.88	[0.47;1.63]	0.68
college/university	0.85	[0.40;1.79]	0.66	0.75	[0.35;1.62]	0.46
Marital status (vs single/widowed)	1.15	[0.66;2.01]	0.63	0.97	[0.55;1.74]	0.93
Having paid work (vs not having paid work)	0.74	[0.45;1.23]	0.24	0.84	[0.50;1.42]	0.52
Body mass index (vs < 25)						
25 – 30	0.74	[0.42;1.29]	0.28	0.85	[0.47;1.52]	0.58
>30	0.68	[0.30;1.52]	0.34	0.96	[0.41;2.25]	0.93
Heavy physical workload (vs no)						
medium (12.1-25.0 vs ≤12.0)	1.08	[0.58;2.01]	0.82	1.19	[0.63;2.25]	0.60
high (≥25.1 vs ≤12.0)	1.26	[0.69;2.33]	0.45	1.00	[0.53;1.90]	1.00
Static posture or repetitive movements						
medium (22.2-44.4 vs ≤22.1)	0.77	[0.41;1.42]	0.39	0.72	[0.38;1.35]	0.31
high (≥44.5 vs ≤22.1)	0.76	[0.40;1.43]	0.39	0.54	[0.28;1.04]	0.07*
Sitting or VDU-work						
medium (16.7-33.3 vs ≤16.6)	1.64	[0.87;3.10]	0.13*	0.90	[0.46;1.74]	0.75
high (≥33.4 vs ≤16.6)	1.05	[0.55;2.00]	0.88	0.93	[0.48;1.80]	0.83
Characteristics symptom						
Duration of current symptom at baseline (vs ≤ 2 months)						
≥ 3 months	1.56	[0.94;2.58]	0.08*	2.81	[1.64;4.84]	0.00*
Recurrent problem (previous episodes) (vs no)	1.37	[0.73;2.56]	0.33	1.81	[0.96;3.39]	0.07*
Dominant side affected (vs no)	1.06	[0.62;1.82]	0.82	1.48	[0.83;2.63]	0.19*
Diagnosis (vs all other diagnoses)						
Osteoarthritis	1.32	[0.69;2.51]	0.41	2.41	[1.23;4.69]	0.01*
Tenosynovitis	0.67	[0.34;1.35]	0.27	0.48	[0.22;1.06]	0.07*
Entrapment (including CTS)	1.33	[0.60;2.96]	0.49	0.68	[0.29;1.62]	0.39
Repetitive Strain Injury	0.89	[0.40;1.96]	0.76	1.29	[0.59;2.85]	0.52
Non-specific	0.72	[0.31;1.66]	0.45	0.72	[0.30;1.73]	0.46
Pain intensity (vs 0-2)						
3-5	0.46	[0.25;0.86]	0.01*	0.86	[0.46;1.61]	0.64
6-10	0.61	[0.32;1.17]	0.14*	0.70	[0.35;1.38]	0.30

Table 3: Continued

	Short-term (3 months)			Long-term (12 months)		
	OR	95% CI	*p*	OR	95% CI	*p*
Physical activity						
ACSM position stand (vs not met)	0.60	[0.29;1.25]	0.17*	0.74	[0.35;1.59]	0.45
Norm Healthy Activity (vs not met)	0.92	[0.55;1.54]	0.75	0.92	[0.54;1.56]	0.75
Psychosocial factors						
Coping with pain: PCI						
pain transformation (7-8 vs ≤6)	1.20	[0.63;2.28]	0.58	1.04	[0.52;2.07]	0.91
pain transformation (≥9 vs ≤6)	1.21	[0.67;2.19]	0.52	1.77	[0.96;3.27]	0.07*
distraction (8-10 vs ≤7)	1.16	[0.61;2.20]	0.66	1.13	[0.57;2.22]	0.73
distraction (≥11 vs ≤7)	1.07	[0.58;1.95]	0.84	1.38	[0.73;2.59]	0.32
reducing demands (6 vs ≤5)	0.67	[0.35;1.29]	0.24	0.62	[0.32;1.23]	0.17*
reducing demands (≥7 vs ≤5)	0.93	[0.52;1.67]	0.81	0.71	[0.39;1.29]	0.26
retreating (8-9 vs ≤7)	1.01	[0.53;1.92]	0.98	1.16	[0.60;2.26]	0.66
retreating (≥10 vs ≤7)	1.02	[0.56;1.83]	0.96	1.27	[0.68;2.35]	0.45
worrying (13-16 vs ≤12)	0.84	[0.45;1.57]	0.59	0.76	[0.40;1.44]	0.40
worrying (≥17 vs ≤12)	0.53	[0.28;1.01]	0.05*	0.72	[0.37;1.38]	0.33
resting (8-9 vs ≤7)	0.98	[0.53;1.83]	0.96	1.94	[1.02;3.68]	0.04*
resting (≥10 vs ≤7)	0.84	[0.46;1.53]	0.57	0.76	[0.40;1.45]	0.41
Personal control: IPQ-R	0.73	[0.53;0.99]	0.04*			
medium (2.5-3.0 vs ≤2.4)				0.64	[0.33;1.23]	0.18*
high (≥ 3.1 vs ≤2.4)				0.58	[0.31;1.08]	0.08*
Distress: 4DSQ (vs no case)	0.95	[0.54;1.67]	0.86	1.27	[0.72;2.27]	0.41
Somatization: 4DSQ (vs no case)	1.41	[0.80;2.48]	0.24	2.38	[1.33;4.26]	0.00*
Fear-avoidance beliefs: FABQ						
medium score (12-15 vs ≤11)	0.74	[0.40;1.36]	0.33	0.72	[0.39;1.35]	0.31
high score (≥16 vs≤11)	1.17	[0.62;2.22]	0.63	0.72	[0.37;1.41]	0.34
Social support: SSS						
medium (13-20 vs 12)	1.09	[0.60;1.99]	0.77	0.99	[0.53;1.84]	0.97
high (≥21 vs 12)	0.87	[0.47;1.61]	0.66	0.87	[0.46;1.63]	0.65
Anxiety: HADS (vs no anxiety)	1.16	[0.64;2.08]	0.63	1.15	[0.63;2.13]	0.65
Depression: HADS (vs no depression)	0.86	[0.38;1.97]	0.73	1.57	[0.67;3.68]	0.30

[#] incidental missings (1-8); [$] incidental missings (1-9); OR=Odds Ratio; CI=confidence interval; * p<0.20; vs=versus

Table 4: Multivariable association of predictors with poor outcome at short-term (n=239) and long-term (n=242)

	Short-term (3 months)			Long-term (12 months)		
	OR	95% CI	*p*	OR	95% CI	*p*
Socio-demographic factors						
Female (vs male)	1.91	[1.01;3.64]	0.05	2.12	[1.07;4.23]	0.03
Age				1.02	[1.01;1.04]	0.01
Characteristics symptom						
Duration of current symptom at baseline (vs ≤ 2 months)						
≥ 3 months				2.16	[1.20;3.89]	0.01
Pain intensity (vs 0-2)						
3-5	0.40	[0.21;0.76]	0.01			
6-10	0.60	[0.30;1.19]	0.14			
Psychosocial factors						
Coping with pain: PCI						
reducing demands (6 vs ≤5)				0.49	[0.24;1.03]	0.06
reducing demands (≥7 vs ≤5)				0.58	[0.30;1.14]	0.11
Personal control: IPQ-R	0.70	[0.51;0.97]	0.03			
Somatization: 4DSQ (vs no case)				2.39	[1.26;4.54]	0.01

OR=Odds Ratio; CI=confidence interval; vs=versus

Performance of the models

Figure 1 and Figure 2 show the calibration plots for both prognostic models. In both calibration plots not all plotted points are close to the 45° line, demonstrating moderate calibration. Discrimination of both models was also considered to be moderate with an AUC of 0.63 (95%CI 0.56;0.70) for the short-term model, and 0.71 (95%CI 0.65;0.78) for the long-term model. After bootstrapping the AUC of the models was adjusted to 0.60 (3 months) and 0.69 (12 months).

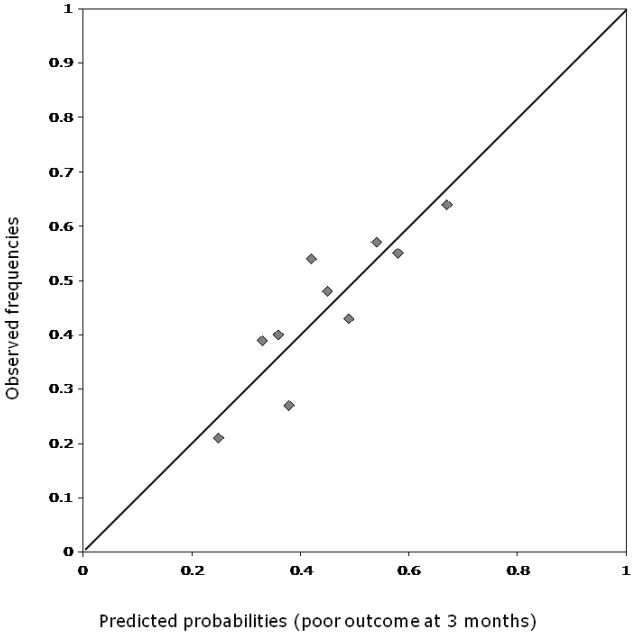

Figure 1: Calibration plot showing the observed frequencies versus the predicted probabilities for patients with poor outcome at 3 months of follow-up.

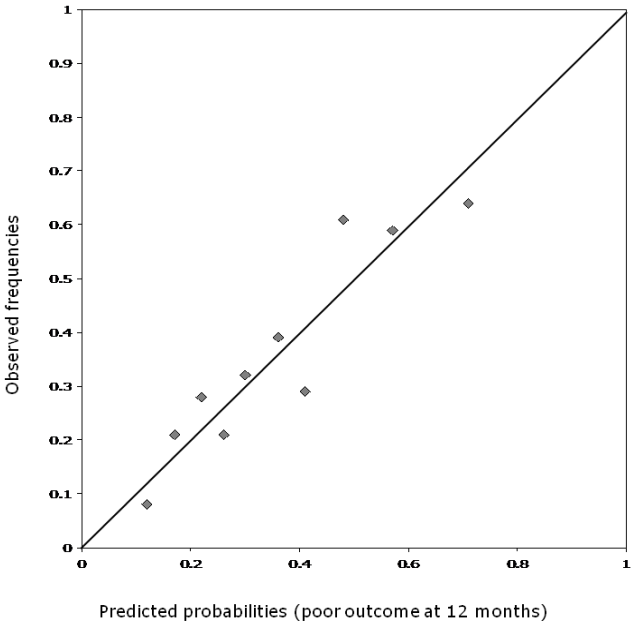

Figure 2: Calibration plot showing the observed frequencies versus the predicted probabilities for patients with poor outcome at 12 months of follow-up.

DISCUSSION

Our observational follow-up study evaluated the clinical course of hand and wrist problems in primary care and investigated prognostic indicators of poor outcome. Twenty-three percent of the patients reported complete recovery after 3 months, and this proportion increased to 42% at 1 year after first presentation. A higher probability of poor outcome at 3 months was associated with a combination of being female, a low pain intensity at baseline and lower personal control at baseline. At 12 months, a higher probability of a poor outcome was associated with a combination of higher age, being female, having complaints for longer than 3 months at baseline, low scores on the coping strategy 'reducing demands' and a higher score on somatization.

Clinical course

During follow-up, gradual improvement occurred in terms of perceived recovery, pain intensity, symptom severity and perceived health. After 12 months however, a considerable percentage of patients (58%) still reported problems. This recovery rate is fairly consistent with that in studies on other musculoskeletal problems. Full recovery after 6-12 months in neck, shoulder and upper limb problems in primary care is reported to range between 34 and 60%.[2,29-32] A substantial part of our population suffered from chronic hand or wrist conditions, such as osteoarthritis and rheumatoid arthritis. Therefore, we did not expect to see full recovery in the large majority of our participants.

Prognosis

A recent review summarized evidence on prognostic factors for musculoskeletal pain in primary care.[33] The review included prognostic studies on a wide variety of musculoskeletal conditions, but no primary care-based observational studies of hand pain were identified. Most factors we found in our models to be associated with insufficient improvement of symptoms were also identified in this review. Older age was associated with a poor outcome in several studies, for example in low back pain, shoulder pain and elbow pain. Likewise, longer pain duration at baseline and higher somatic perceptions were indicative of poor prognosis.[33]

Socio-demographic factors

Irrespective of length of follow-up, a poorer prognosis was found for female patients. Osteoarthritis was the commonest single diagnosis, and is a chronic long-term condition, and more prevalent in women. This may partly explain the prognostic value of sex, and the fact that a diagnosis of osteoarthritis was not retained in our models. There are a number of studies on sex differences in musculoskeletal pain. These studies show a clear trend towards higher severity of pain reporting in women than in men.[34-36] Explanations for these sex differences can be divided into three groups: 1) women are, more than men, willing to report pain; 2) women are, more than men, exposed to risk factors for pain (for example, a study showed that at work women spent more time using computers, did more repetitive movements, and reported using poorer and less comfortable equipment[35]); and 3) women are more vulnerable than men to develop musculoskeletal pain[35,37]. It is unclear which mechanism is most important, and research is needed to investigate the relative role of these sex differences.

Characteristics of the hand or wrist problem

In our short-term model, low pain intensity at baseline was associated with poor outcome, which means that many patients showed little improvement on the SSS. Patients with more pain at baseline have more room for improvement, resulting in a higher probability of reaching the threshold of a minimal important change. Whilst pain levels may reduce over time in those with high baseline levels of pain, they may still have considerable pain at follow-up. Less pain intensity at baseline was also found to be a predictor of poor outcome in other prognostic studies using change in pain or symptoms as main outcome.[2,38]

Coping styles

Higher scores on passive coping strategies have been reported to be associated with poor outcome across different pain syndromes.[39-42] In our study a lower score on the active coping strategy 'reducing demands' was retained in the long-term model. This is interesting, as active coping styles might be more susceptible to intervention. Further study may explore the causal association between active coping styles and outcome of symptoms, and explore the possibilities for intervention.

Illness perceptions may influence health outcomes such as pain or disability.[43,44] Personal control, which is one of the subscales of the IPQ-R assessing illness representations, indicates the extent to which the patient believes their

condition can be controlled.[17,18] In our study low personal control was related to a poor outcome at 3 months follow-up. This is in agreement with previous studies which have shown that a favourable course of illness is associated with high scores on perception of internal personal control.[45,46]

Predictive performance

The performance of both models was considered moderate. The calibration plots (Figures 1 and 2) show that there was some deviation of predicted probabilities from the observed risk of a poor outcome. Adjustment for over-optimism resulted in small reductions in the AUC, but the models could only moderately discriminate between patients with either good or poor outcome. However, the AUC scores found in our study were comparable to AUC scores in other studies.[3,4,47,48] One of the reasons the models did not fit extremely well could be the choice of our primary outcome measure: change in symptom severity, although this instrument was developed for hand problems and was shown to be responsive in our hand and wrist primary care population.[9] The heterogeneity of our population, including a variety of medical conditions and a number of mild self-limiting cases, may be another reason for the moderate performance of our models. Diagnosis had no predictive value in either our short–term or our long-term model. Poor outcome may be better predicted in those presenting to secondary care, who form a more homogeneous population with respect to severity of symptoms and diagnosis.

Our models certainly identified relevant predictors, but further research is needed to confirm the predictive value of these factors in other populations.

Methodological considerations, strengths and weaknesses

As far as we know, our study is the first prognostic study of hand and wrist problems in primary care. The response to our study was high with 89% of eligible and invited patients participating. The non-responders were less often female and slightly younger than the responders, and showed a slightly different distribution of diagnoses, with a higher number of patients with rheumatoid arthritis and lower number with osteoarthritis. The response to follow-up was also high, 93%. Baseline characteristics of the patients completing all questionnaires (n=237) were similar to those of the enrolled population. Therefore, the models built on the completers are valid for our total study population. Our study addressed a large, heterogeneous population of primary care patients and, thereby, reflecting wrist and hand problems as they are presented to the GP, indicating good generalizability of our results in primary care. A

variety of diagnoses were recorded by the GPs. This may have affected the performance of our models, but 'diagnosis' was not retained in our multivariable models and other factors were more important in determining changes in symptom severity. It is possible that good predictive models can be developed within diagnostic groups (e.g. osteoarthritis, rheumatoid arthritis or CTS), but this would require larger cohorts.

In our study we collected information about the management of hand and wrist problems by the GP. GPs prescribed medication in 36% of the patients, and 22% of the patients were referred; those interventions may have influenced prognosis. Nevertheless, we decided not to consider treatment as a potential predictor in the models. The prognostic models have been developed to help GPs to make good decisions regarding treatment and referral, and should be based on general patient and disease characteristics. Confounding by indication cannot be avoided in observational studies; GPs will probably prescribe more intensive treatments to patients with more severe symptoms. Standardizing or randomizing treatment is the only way to avoid this, but is not realistic in observational settings.

In conclusion, a poor outcome of hand and wrist problems in terms of insufficient improvement in symptom severity is difficult to predict. Nevertheless, some factors were shown to be significantly associated with poor outcome, including age, gender, duration of symptoms and psychosocial factors. Further research should confirm associations between prognostic factors and outcome of hand and wrist problems and investigate possibilities for addressing modifiable predictors.

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CHAPTER 7

General discussion

The central aim of this thesis was to describe the diagnosis and prognosis of hand and wrist problems in general practice. In order to gather information on consultation frequency, predictors of consultation, diagnosis and management, impact of hand and wrist problems and the course and prognosis of the problem we have carried out an observational cohort study in general practice. Furthermore, we have used data of a population-based cohort study on the course and impact of physical symptoms.

This chapter starts with an overview of our main findings. Next, we will address three questions that arose from this study. Finally, we will discuss methodological considerations of the study and implications for general practice.

MAIN FINDINGS

Consultation frequency and predictors of consultation

We found that only few people (6%) who reported hand or wrist problems in our survey consulted their GP for these symptoms over one year. However, 76% of the people with hand or wrist problems consulted their GP for other reasons, mostly other musculoskeletal, respiratory, or circulatory problems. Paid work, self-reported rheumatoid arthritis or osteoarthritis, and having other upper extremity symptoms (arm, neck, shoulder) seemed to be more strongly associated with consultation for hand or wrist problems than with consultation for other problems, but these associations were not significant. Only frequency and impact of the problems on everyday activities were significantly associated with consultation for hand or wrist problems. Similar to previous studies, anxiety, depressive symptoms and poor perceived health also predicted consultation in our cohort *(chapter 2)*.

Diagnosis and management

In our study we found that the three most frequently recorded diagnoses were osteoarthritis, tenosynovitis, and nerve entrapment (including carpal tunnel syndrome). During one year follow-up, 64% of the patients visited their GP only once. Furthermore, we looked at characteristics of patients within specific diagnostic categories. Older patients, patients who had more than one joint affected, patients suffering from morning stiffness and loss of strength, and patients with a positive range of motion test were more often diagnosed with osteoarthritis or rheumatoid arthritis. Patients reporting tingling, numbness, had a positive Tinel sign, Phalen sign

or flick sign were more often diagnosed with nerve entrapment. Patients with a positive Finkelstein's test were most often diagnosed with tenosynovitis. Management of hand and wrist problems mainly consisted of wait-and-see, prescription of NSAIDs/Cox-2-inhibitors, or referral to a specialist. We also determined the association between diagnostic information available to GPs and two outcomes: specialist referral and patient outcome in terms of the likelihood of persistent symptoms (perceived non-recovery based on a single question). Higher probability of persistent symptoms at both 3 and 12 months was associated with being female, higher age, longer symptom duration at baseline, and higher baseline pain intensity score; a positive DeQuervain test was associated with lower probability of persistent symptoms. Having a recurrent problem was associated with specialist referral *(chapter 3)*.

Impact of hand and wrist problems

Patients participating in our study reported lower perceived health particularly on the subscales physical role functioning and bodily pain of the SF-36. Scores on the other subscales were comparable to a Dutch reference population. The combination of the following six factors was positively associated with the severity of hand and wrist problems: not having paid work, longer duration of symptoms at baseline, the diagnosis nerve entrapment, higher pain intensity, higher body mass index, and higher scores on worrying. These factors seemed to be more strongly associated with symptom severity than the diagnosis *(chapter 4)*.

Course and prognosis

We found that only 23% of our patients reported a complete recovery after 3 months, increasing to 42% one year after first consultation *(chapter 6)*. Before studying predictors of poor outcome, we had to make a decision on the outcome measure to use in our prognostic models. We focused on the clinimetric properties of two questionnaires assessing symptom severity or hand function: the Dutch version of the Symptom Severity Scale (SSS) and the Dutch version of the hand and finger subscale of the Arthritis Impact Measurement Scale (Dutch-AIMS2-HFF), as these two questionnaires seemed to be suitable for our population and represented outcome measures that were relevant to our research question. The Symptom Severity Scale was found to be the better instrument to assess outcome, as it had good reproducibility and responsiveness in our population. The measurement error was smaller than the measurement error of the Dutch-AIMS2-HFF, and it detected smaller

changes than the Dutch-AIMS2-HFF *(chapter 5)*. The Minimal Importance Change on the SSS was determined to be a change of at least 0.23 points (on a scale from 1 to 5). When investigating the short-term and long-term prognosis of hand and wrist problems, we defined an improvement of symptoms on the SSS less than this MIC as poor outcome. Higher probability of poor outcome at 3 months was associated with being female, a low pain intensity at baseline, and lower personal control at baseline; at 12 months it was associated with higher age, being female, having complaints for longer than 3 months at baseline, low scores on the coping strategy 'reducing demands', and a higher score on somatization. Discriminative ability of the models was moderate with an area under the curve after bootstrapping of, respectively, 0.60 and 0.69 *(chapter 6)*.

IS IT IMPORTANT TO MAKE A MEDICAL DIAGNOSIS IN GENERAL PRACTICE?

One of the questions arising from the findings of our research concerns the importance of identifying the specific cause of the hand problem. Before the start of the cohort study among GP consulters the participating GPs received a three-hour instruction which focused on patient history, physical examination, and diagnoses in patients with hand and wrist problems. We tried to standardize the assessment of hand and wrist problems and aimed for reliable, consistent diagnostic decision-making. In our observational study we did not want to interfere too much with the usual management of these problems by the GPs, so the training did not include recommendations for treatment. 74% of the patients were diagnosed with only one specific medical diagnosis; in 86% of these patients the diagnosis was not revised by the GP during the follow-up period of one year. From these results it appears to be possible to make a specific diagnosis in the majority of patients with hand or wrist problems, contrary to what is reported for several other musculoskeletal problems. Research on back pain, for example, shows that a high percentage of patients (approximately 90%) are classified with non-specific back problems, which means that no specific cause can be identified explaining the pain problem.[1;2] Also with other musculoskeletal problems, for example shoulder pain, it is not easy to identify the exact cause of the problem.[3-5] The reason why it seems to be easier to make a specific diagnosis in hand or wrist problems contrary to some other musculoskeletal problems, might be the fact that many hand and wrist problems can be easily identified by inspection or palpation, or have specific characteristics (e.g. carpal tunnel syndrome). Another explanation may be that people with non-specific hand or wrist problems do not visit their GP, for

example because of a lower impact of the problem on daily activities, resulting in a selection of problems that are presented to the GP which may be more easy to diagnose.

But, is it really important to make a diagnosis in general practice? The results of our study showed that the diagnosis was not associated with the severity of hand or wrist problems (cross-sectional data from chapter 4), nor with the short-term and long-term prognosis (data from chapter 6). Although the management of patients with hand or wrist problems mainly consisted of wait-and-see policy and prescription of painkillers, there was some variation across diagnostic categories. When looking at treatment stratified by diagnosis it seemed that management decisions were at least partly based upon the diagnosis. Patients diagnosed with nerve entrapment were often referred to a specialist, those diagnosed with tenosynovitis or rheumatoid arthritis were often prescribed NSAIDs/COX-2-inhibitors, and patients diagnosed with osteoarthritis or work-related disorders often received the advice to wait-and-see. The GP will first make a diagnosis, than decide on management which may finally affect the prognosis of the hand or wrist problem. It seems that the diagnosis has influence on management decisions, but may not directly impact on prognosis, which may explain why the diagnosis was not retained in the final prognostic models. In the literature, there is more debate concerning the need to make a specific, medical diagnosis. Dinant et al. asked the question: "Do doctors really need to establish an etiological diagnosis in general practice each time a patient presents? Or might it often be more effective to treat simply on the basis of symptoms and signs alone, relying on research and on our experience of outcomes for patients who presented in similar ways in the past?".[6] Trying to confirm this statement, we explored the association between pain intensity and management decisions in our data set. Because of the small number of patients in some treatment categories we could neither confirm nor refute the statement, but it seems that patients with a very low pain intensity were more likely to receive the advise wait-and-see while patients with higher pain intensity were more likely to be referred to a specialist. To get more insight into the clinical reasoning of GPs when managing hand or wrist problems, (qualitative) research could be aimed at the way diagnostic information is collected and processed, how GPs make a diagnosis, which management decisions are made and for what reason, and how this could influence the course of hand and wrist problems.

ARE HAND AND WRIST PROBLEMS REALLY A PROBLEM?

In our population-based cohort only few people (6%) with hand or wrist problems consulted their GP for these problems over one year; 76% for other reasons. This is a low percentage in comparison with consultation frequency for other musculoskeletal disorders. Jinks et al. reported in their study that 33% of all knee pain sufferers had consulted their GP about their symptom in the last year.[7] In a study by Van der Windt et al. 21% of patients with neck-upper limb pain consulted their GP at least once for this problem[8], and in a study by Holmberg et al. also 21% of the people reporting neck and/or low back pain had had at least one primary care consultation for these problems[9]. The only significant predictors of consultation for hand or wrist problems were frequency and impact of the problem on everyday activities. It seems that people visit their GP only if the problems influence their everyday functioning, and impact on function is perhaps not so large for the majority of people with hand or wrist problems. Alternatively, the problems could be serious but people may see the problem as an inevitable part of ageing where primary care treatment may not be very helpful. In our population-based sample of patients with hand or wrist problems, reported scores for symptom severity and pain intensity were not very high. Nevertheless, pain intensity scores were comparable to scores in other musculoskeletal problems, including elbow, neck, shoulder, knee and hip problems.[10-14] The scores on most aspects of perceived health were similar or slightly worse (0-5 points) to a reference population; for physical role functioning and bodily pain the mean scores were approximately 15 points lower. Remarkably these two aspects were also the only two significant predictors of consultation for hand or wrist problems, although measured in a different way.

Furthermore, the results of our prospective cohort study among GP consulters show that only 23% of the patients reported complete recovery after 3 months, increasing to 42% one year after first presentation. However, a considerable percentage of patients still reported problems. These percentages were measured using the following question: "Are you completely recovered from your symptoms?", with the response options yes or no. Even when symptoms have improved considerably, but not completely recovered, this question would be answered with 'no'. This could be an explanation for the low percentage recovered patients, but when looking at other studies on musculoskeletal problems comparable recovery rates have been reported.[11;15-18] Yet, few of our participants repeatedly consulted their GP. Apparently

the problems were not severe enough to seek health care again, and maybe patients have learned to manage their problems. This does not count for every patient. In our prognostic model higher probability of poor outcome was associated with low scores on the coping strategy 'personal control', which means that patients with persisting problems may not be able to manage their problem adequately.

Coming back to the question "Are hand and wrist problems really a problem?" there is not one single answer to give. The answer could be no, because symptom severity, pain intensity and impact on most aspects of perceived health were not very high in our population sample, and the percentage patients consulting their GP was low. It is also justified to say that the answer is yes, because many people who consult for hand or wrist problems still have problems after one year, and scores for bodily pain and physical functioning are poorer than in a reference population. Qualitative research is needed to get better understanding of hand and wrist problems, and to explore reasons why many patients do not consult their GP more often, despite persisting problems.

IS IT POSSIBLE TO ACCURATELY PREDICT THE OUTCOME OF HAND AND WRIST PROBLEMS?

The third overarching question concerns the prediction of outcome of hand and wrist problems. For our prospective cohort among GP consulters we developed two types of prognostic models. One type was based on diagnostic information available to the GP during consultation, and used the outcomes specialist referral and perceived non-recovery (i.e. no large improvement of symptoms based on a single question regarding perceived recovery). The other type was based on information regarding a wide range of potential prognostic factors, mostly provided by patients in the baseline questionnaire. Poor outcome in these latter models was defined as insufficient improvement of symptoms on the Symptom Severity Scale. The predictive performance of the models based on simple diagnostic information appeared to be better than the predictive performance of the more elaborated models using insufficient improvement of symptoms as outcome measure (AUC 0.77 and 0.81 versus AUC 0.60 and 0.69 after bootstrapping). It is important to notice that the models cannot be compared directly given the difference in outcome measures. The choice of the outcome measure could be one of the reasons why the models using insufficient improvement of symptoms as outcome measure were less predictive; a

simple question regarding perceived recovery may better reflect individual patient outcome than a 11-item questionnaire on hand symptoms. The Symptom Severity Scale, however, was developed for hand problems and was shown to be responsive in our hand and wrist primary care population.[19] When we had to make a decision about the outcome measure, using a clear cut-off score on a reliable and responsive questionnaire seemed to be the optimal outcome measure.

It could also be that the predictors we decided to include in our questionnaire were not sufficiently comprehensive, or were not well enough measured. We measured a broad spectrum of variables including physical, psychological and social variables, based on other prognostic research in musculoskeletal conditions. Nevertheless, it could be that the way these variables were measured was not suitable for patients with hand or wrist problems. For example the questions we used to measure social support were aimed at the number and quality of social contacts patients have in their environment, while for patients with hand or wrist problems support they can get for self-care or other daily activities may be more relevant.

We intended to develop a prediction rule based on the more elaborate prognostic models presented in Chapter 6, but decided not to because of their disappointing predictive performance. The low AUCs indicated that the model was not able to discriminate very well between patients with a good or poor prognosis. A prediction rule based on inaccurate prognostic models would lead to misclassification of many patients, and possibly inadequate management decisions.

The predictive performance of the models based on diagnostic information using perceived non-recovery as outcome measure was better. The first goal when developing these models was to look for relevant components of diagnostic information. From our results it seems that a combination of a few simple questions may result in a reasonably good prognostic model. In future studies we would recommend to develop a prognostic prediction rule based on models using diagnostic information that is easy to obtain in clinical practice, to evaluate its predictive performance in other populations, and test its usefulness in clinical practice.

One clear answer to the question if it is possible to accurately predict the outcome of hand and wrist problems could not be given. It seems that the information available to the GP during consultation might be useful for making an estimate of prognosis. On the basis of all the information from the baseline questionnaire, however, it was not

possible to make an accurate prediction of the outcome of hand and wrist problems in individual patients. This does not mean that these prognostic models will not be useful in the development of further research. Several factors were significantly associated with outcome, and some of these factors, for example coping strategies and personal control, may be responsive to treatment. Future studies could confirm their prognostic value, and test the effectiveness of interventions specifically targeting these factors.

METHODOLOGICAL CONSIDERATIONS

Cohort study in general practice: GP selection

This observational cohort study was carried out in 32 general practices in the Netherlands (44 GPs). The practices were mainly situated in the west of the Netherlands, and some practices in the east. The participating practices varied with respect to size, number of GPs and rural or urban location, and therefore a representative sample of GPs participated in our study.

Cohort study in general practice: Patient selection and participation

The GPs recruited patients consulting for a new episode of hand or wrist problems. An episode was considered to be 'new' if participants had not visited their GP for the same problem during the preceding 3 months. GPs asked patients to participate if they were 18 years or older and had sufficient knowledge of the Dutch language to complete written questionnaires. During the inclusion period we received a preliminary consent form from 301 patients. The response to our study was high, 89% (267 patients) consented to participation and completed the baseline assessment. In order to increase the response rate, a reminder was sent after twelve days. Patients who still did not return the questionnaire were contacted by telephone within 3 weeks. The response to follow-up was also high, 93%. Based on the total number of participating GPs we expected more eligible patients with hand or wrist problems. The GPs were instructed to recruit 10 consecutive patients meeting the eligible criteria. However, there was considerable variation in the number of patients recruited by GPs. This could result in selection bias. The main reason reported by GPs for missing eligible patients was busy office hours or simply forgetting about the study. Therefore, we do not expect that GPs enrolled a highly selective sample. We do not have information about the number of patients that GPs did not invite to participate. Neither do we have information about the number of patients who were asked by their GP to participate

but refused to. We compared gender and age of our sample to patients consulting for hand or wrist problems in the second National Survey of General Practice (NS2) which is a large nation-wide morbidity survey in the Netherlands.[20] Our population consisted of slightly more females and slightly more middle aged patients. This may be the result of some selective enrolment by GPs, but may also reflect some selective non-response by patients who initially accepted the invitation but did not complete the baseline questionnaire and by patients who refused to participate at all.

As far as we know, our study is the first study of hand and wrist problems in a primary care population. Previous research has mostly been carried out in secondary care settings focusing on specific hand and wrist conditions, whereas our study addressed a large, heterogeneous population of primary care patients, and thereby, reflecting wrist and hand problems as they are presented to the GP, strengthening the generalizability of our results to primary care populations.

Population-based cohort study: GP selection

Results from chapter 2 of this thesis (consultation frequency and predictors of consultation) were based on a population-based cohort study on the course and impact of physical symptoms. As nearly all residents in the Netherlands are registered with a general practitioner[20], practice registers provide a convenient sampling frame for a population-based cohort. The five participating practices varied with respect to size (2730 to 6537 registered patients), number of GPs (2 to 5), and location (rural and urban, more and less deprived areas), reflecting a small, but representative sample of GPs.

Population-based cohort study: Patient selection and participation

A random sample of approximately 20% of adults (≥18 years) per practice was selected, sampling only one adult from each household to avoid contamination.[21] Prior to the mailing, samples were checked by the GPs in order to exclude those with a terminal disease, severe psychiatric illness, and those unable to complete written questionnaires due to language or cognitive problems. A total of 4741 questionnaires were distributed, of which 171 were returned because people had died or addresses were incorrect. A total of 2447 responders completed the questionnaire, resulting in an adjusted response rate of 53.5% which was similar compared with several other symptom surveys in the general population.[22-25] 536 responders indicated the presence of hand or wrist problems lasting at least 24h in the past month. Some of

these responders were not registered with the participated GP anymore, or could not be traced in the GP system because of incomplete or incorrect information about address or date of birth. Consultation data from 537 responders could be extracted.

Quality of data

The data for the GP consultation cohort were collected using self-administered questionnaires mailed to patients. These questionnaires were scanned, and after a quality check no data-entry mistakes were found. Besides data from the questionnaires, GPs were asked to complete a diagnosis and management registration form on which they recorded information about history, physical examination, medical diagnoses and management of the hand or wrist problem. It was not compulsory to fill in every part of the form; for example not all physical tests were carried out in all patients, and therefore information about physical tests was lacking in many patients. We asked GPs to do what they always do, and use clinical reasoning to decide which questions to ask or physical tests to perform. This means that our study was not designed as a diagnostic accuracy study, where each diagnostic test is carried out according to a standardised protocol and is compared to a reference test. Consequently, no conclusions can be made regarding the diagnostic performance of physical test. However, given the lack of evidence on many aspects of inspection, palpation, or physical tests in the diagnosis of hand and wrist problems, a diagnostic accuracy study may still be of importance to test the diagnostic performance of these tests.

For the population-based cohort study consultation data were extracted from computer-based medical records to be able to get insight into consultation frequency and predictors of consultation. These data were not always easy to extract and not easy to analyse. Some patients could not be found, for example because they were not registered with the participating GP anymore, or could not be traced in the GP system because of incomplete or incorrect information about address or date of birth (n=71). The GPs did not always classify the symptoms or diagnosis at each consultation according to the International Classification of Primary Care (ICPC), and methods of coding consultations may have varied across GPs which could result in a number of missing consultations for hand or wrist problems. Our consultation frequency of 6% could be an slight underestimation.

IMPLICATIONS FOR GENERAL PRACTICE AND RESEARCH

- This is the first prospective cohort study on diagnosis and prognosis of hand and wrist problems in primary care. The results of this project are included in a national guideline for hand and wrist problems, which is currently being developed by the Dutch College of General Practitioners. Data on the severity of the problem and prognostic indicators are used to provide background information on the problem, and to inform GPs about factors that can influence the outcome of hand or wrist problems, even though our models are not yet suitable to estimate prognosis in individual patients.
- An educational program for general practitioners aimed at the diagnosis and management of hand and wrist problems has been developed and is at the moment being carried out in the GP vocational training programme of the VU University Medical Center in Amsterdam. If the educational program has been evaluated well, the program could be more widely implemented.
- The association between diagnostic information, making a diagnosis, making management decisions and the course of hand and wrist problems has to be studied further in order to get more insight in the importance of making a medical diagnosis in general practice. Qualitative research, using for example interviews or video or voice recording during consultation, could be used to obtain information about the reasons for clinical decisions made by the GP.
- Qualitative research may also be applied to explore reasons why patients often do not consult their GP despite their problems. Having more insight in the type of patients who consult, the severity of their hand or wrist problem and the role of other health problems may help to improve primary care for patients with hand or wrist problems.
- The prognostic value of psychosocial factors (particularly personal control and coping strategies) has to be studied further, because these factors may offer possibilities for developing effective interventions for patients with hand or wrist problems. In the literature we found studies on for example back problems where interventions aimed at psychosocial factors were not very effective[26-28], but we also found studies where change in self-efficacy or self-management was found to be associated with better health status outcomes[29-31].

- Prediction rules could be developed based on our models using diagnostic information; these models had good predictive performance and were composed of information that is easy to obtain during routine clinical practice. The predictive performance of such prediction rules should be evaluated in other populations and their applicability and usefulness tested in clinical practice.

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CHAPTER 8

Summary

The central aim of this thesis was to describe the diagnosis and prognosis of hand and wrist problems in general practice. Consultation frequency, predictors of consultation, diagnosis and management, impact of hand and wrist problems, and the course and prognosis of the problem were described.

In ***Chapter 1*** we described background information about hand and wrist problems. Subsequently our objectives were introduced and an outline of this thesis was provided.

In ***Chapter 2*** we described how often adults with hand or wrist problems consult their GP and for which problems, and we analysed potential predictors of consultation. The study was part of a population-based cohort study. A self-administered general questionnaire about physical symptoms and health was distributed among a random sample of adults registered with five general practices in The Netherlands. We selected responders who indicated that they had had hand or wrist problems in the past month (n=537). Consultation data were extracted from computer-based medical records covering a period of one year after sending the questionnaire. The association between potential predictors and consultation rate was studied using logistic regression analyses, adjusting associations for potential confounding by age and sex.

Only 6.0% consulted their GP for hand or wrist problems specifically; 76% consulted for other reasons, mostly musculoskeletal, respiratory, and circulatory problems. The median consultation frequency was 3 visits. Only frequency and impact of the hand problem on everyday activities were significantly associated with consultation for hand or wrist problems specifically. Anxiety, depressive symptoms and poor health predicted consultation for other reasons. We concluded that few people with hand or wrist problems consult their GP for these symptoms, despite significant pain and limitations in physical functioning. Consultation rate is high however, and seems to be driven by other mental or physical health problems.

In ***Chapter 3*** we described the diagnoses made by GPs in patients with hand or wrist problems, and we described management for specific diagnostic categories. Furthermore, we determined the association between diagnostic information and two outcomes: persistent symptoms and specialist referral. GPs recruited patients with hand or wrist problems and completed a standardised form recording information about patient history, observations, palpation, physical tests, diagnoses and management. Patients were sent a questionnaire at baseline, 3 and 12 months

containing questions on characteristics and symptom severity. Logistic regression analyses were used to determine the association between diagnostic information and the odds of persistent symptoms or specialist referral.

GPs asked 301 patients with hand or wrist problems to participate in this study. A total of 267 patients (89%) consented and completed the baseline questionnaire. GPs returned information on diagnosis and management decisions for 266 patients. A full registration form including all details on history and physical examination after the first consultation was available for 241 patients. Mean age was 49.3 (SD 16.0) years, and 74% were female. The three most frequently recorded diagnoses were osteoarthritis (17%), tenosynovitis (16%), and nerve entrapment (13%). Wait-and-see (30%) and painkillers (24%) were most often advised. Higher probability of persistent symptoms at both 3 and 12 months was associated with being female, higher age, long baseline symptom duration, and higher baseline pain intensity score; positive DeQuervain test was associated with lower probability of persistent symptoms. Having a recurrent problem was associated with the odds of specialist referral. We concluded that in primary care information about physical signs, and physical tests are of importance to make a diagnosis in patients with hand or wrist problems, but provide less prognostic information.

Chapter 4 described wrist and hand problems presented to the GP in terms of severity of symptoms, and their impact on physical, emotional and social functioning. Furthermore, patient and disease characteristics across different diagnostic categories were described and factors related to the severity of hand or wrist problems were studied. Patients consulting their GP with hand or wrist problems were sent a questionnaire containing questions on socio-demographic variables, characteristics of the complaint, physical activity and psychosocial factors. The GP recorded information on medical diagnosis. We studied the cross-sectional association between a variety of factors and severity of hand or wrist problems, using the Symptom Severity Scale as outcome measure.

Mean age of the 267 participants who completed the baseline questionnaire was 49.3 years and 74% were female. The characteristics of patients varied slightly across diagnostic categories. Patients with osteoarthritis were on average the oldest, and patients with repetitive strain injury the youngest participants. Patients suffering from rheumatoid arthritis were less often female, scored slightly higher on pain, the pain coping strategy 'worrying', anxiety, distress, and somatization and were less physically active according to the Dutch Norm for Healthy Activity compared to

patients with other diagnoses. Patients with a ganglion had the lowest score on severity of symptoms. Patients diagnosed with repetitive strain injury had increased scores on static posture/repetitive movements, sitting and visual display units (VDU) work, and they were most physically active. Furthermore, patients with more than one diagnosis were more often female, and had slightly increased scores on the pain coping strategies 'pain transformation', and 'distraction' compared to patients with only one diagnosis. Significantly higher scores on severity of hand or wrist problems (p-value<0.10) were found for patients who did not have paid work, had longer duration of symptoms, diagnosis of entrapment, higher pain intensity, higher body mass index, and higher scores on worrying reported. We concluded that primary care patients with hand or wrist problems report more pain and reduced function compared to a randomly selected reference sample. Impact on other aspects of perceived health appeared to be limited. Severity of hand symptoms seems to be associated with socio-demographic, physical, and psychosocial factors, more than with medical diagnosis.

In ***Chapter 5*** we determined the clinimetric properties of two questionnaires assessing hand symptoms (Symptom Severity Scale) and physical functioning (hand and finger function subscale of the AIMS2) in a Dutch primary care population. The first 84 participants of our prospective cohort study completed the Symptom Severity Scale and the hand and finger function subscale of the Dutch-AIMS2 twice within 1 to 2 weeks. The data were used to assess test-retest reliability (ICC) and smallest detectable change (SDC, based on the standard error of measurement (SEM)). To assess responsiveness, changes in scores between baseline and the 3 month follow-up were related to an external criterion to estimate the minimal important change (MIC). We calculated the group size needed to detect the MIC beyond measurement error.

The ICC for the Symptom Severity Scale was 0.68 (95% CI: 0.54-0.78). The SDC was 1.00 at individual level and 0.11 at group level, both on a 5-point scale. The MIC was 0.23, exceeding the SDC at group level. The group size required to detect a MIC beyond measurement error was 19 for the Symptom Severity Scale. The ICC for the hand and finger function subscale of the Dutch-AIMS2 was 0.62 (95% CI: 0.47-0.74). The SDC was 3.80 at individual level and 0.42 at group level, both on an 11-point scale. The MIC was 0.31, which was less than the SDC at group level. The group size required to detect a MIC beyond measurement error was 150. In our heterogeneous primary care population the Symptom Severity Scale was found to be a suitable instrument to assess (changes in) the severity of hand symptoms, whereas

the hand and finger function subscale of the Dutch-AIMS2 was less suitable for the measurement of (changes in) physical functioning in patients with hand and wrist problems.

Chapter 6 described the course of a new episode of hand and wrist problems in general practice, and identified predictors that are associated with poor outcome at short-term and long-term follow-up. Patients consulting their GP with hand or wrist problems (no prior consultation in preceding 3 months) were sent a questionnaire at baseline, 3, 6 and 12 months of follow-up. Potential predictors included socio-demographic variables, characteristics of the complaint, physical activity and psychosocial factors. GPs recorded information on symptoms, signs and medical diagnosis. Main outcome measure was insufficient improvement of symptoms using the Symptom Severity Scale at short-term (3 months) and long-term (12 months) follow-up.

23% of the 248 patients reported complete recovery after 3 months, increasing to 42% one year after first presentation. Higher probability of poor outcome at 3 months was associated with being female, a low pain intensity at baseline, and lower personal control at baseline; at 12 months it was associated with higher age, being female, having complaints for longer than 3 months at baseline, low scores on the coping strategy 'reducing demands', and a higher score on somatization. Discriminative ability of the models was moderate with an area under the curve after bootstrapping of, respectively, 0.60 and 0.69. We concluded that more than half of all patients reported residual symptoms at one year. Whilst poor outcome was difficult to predict, age, gender, duration of symptoms, and psychosocial factors were associated with poor outcome of hand and wrist problems.

In ***Chapter 7*** an overview of the main findings was given. Next, three questions arising from the study were argued. The first question was 'Is it important to make a medical diagnosis in general practice?'. Our results showed that the diagnosis had influence on management decisions, but may not directly impact on prognosis. With our data we could neither confirm nor refute the hypothesis that it may be more effective to treat simply on the basis of symptoms and signs alone rather than on a medical diagnosis. More research could be aimed at the clinical reasoning of physicians when collecting diagnostic information, making a diagnosis, and making management decisions, and how this can influence the course of hand and wrist problems. The second question was 'Are hand and wrist problems really a problem?'. The answer

could be no, because scores on most aspects of perceived health and functioning were not very high in our population sample, and the percentage of patients consulting their GP for hand/wrist problems was low. It is also justified to say that the answer is yes, because many people who consult for hand or wrist problems still have problems after one year, and scores for bodily pain and physical functioning are poorer than in a reference population. The last question was 'Is it possible to accurately predict the outcome of hand and wrist problem?'. It was also difficult here to give a clear answer. On the basis of all the information from the baseline questionnaire it was not possible to reliably predict the outcome of hand and wrist problems. However, simple information on sociodemographic and characteristics of the hand/wrist problem available to the GP during consultation seemed useful for making an estimate of the prognosis. Finally, we discussed several methodological issues, including GP selection, patient selection and participation, and the quality of the data. Next to the methodological considerations we proposed some implications for general practice and research.

CHAPTER 9

Samenvatting

Klachten aan pols en hand komen veel voor; bij 9 tot 12.5% van de Nederlandse volwassenen. Niet alle mensen bezoeken de huisarts voor pols- of handklachten. De huisarts wordt 2 tot 3 keer per maand geraadpleegd door een patiënt met een nieuwe klacht aan de pols of hand. Bij pols- en handklachten kan een brede variatie aan diagnosen worden gesteld. In enkele gevallen gaat het om een reumatische of neurologische aandoening, soms wordt een peesontsteking vastgesteld. Bij de meeste mensen kan echter geen specifieke diagnose worden vastgesteld. Er is weinig informatie beschikbaar over het beloop van pols- of handklachten en over de verschillende factoren die het herstel van klachten kunnen beïnvloeden, zoals de duur en ernst van klachten, diagnose, fysieke belasting of psychosociale factoren. Door het ontbreken van deze informatie is het voor de huisarts niet eenvoudig goede beslissingen te nemen ten aanzien van de behandeling van pols- en handklachten. In dit proefschrift stonden de volgende vragen centraal:

1) Hoe vaak en voor welke problemen raadplegen mensen met pols- of handklachten de huisarts? En welke factoren voorspellen of mensen wel of niet de huisarts bezoeken?
2) Welke diagnosen worden door de huisarts gesteld en welke behandeling wordt gegeven bij mensen met pols- of handklachten?
3) Hoe groot is de invloed van pols- en handklachten op het dagelijks functioneren?
4) Hoe is het beloop van pols- en handklachten en welke factoren voorspellen een ongunstig beloop van de klachten?

We hebben geprobeerd deze vragen te beantwoorden door middel van het uitvoeren van een prospectief cohortonderzoek, wat betekent dat we een groep mensen met pols- en handklachten hebben gevolgd in de tijd.

Consult frequentie en voorspellers voor consultgedrag

In *hoofdstuk 2* van dit proefschrift hebben we beschreven hoe vaak mensen naar de huisarts gaan voor pols- en handklachten en we hebben bekeken welke factoren bepalen wie wel en wie niet naar de huisarts gaat. Voor het beantwoorden van deze vragen hebben we gebruik gemaakt van een groep mensen met pols- en handklachten in de algemene bevolking. Deze mensen werden geworven door middel van een gezondheidsvragenlijst die werd gestuurd naar een steekproef van ruim 4700 volwassenen ingeschreven in 5 huisartspraktijken in Nederland. Van de 2447 mensen

die de vragenlijst retourneerden gaven 537 mensen aan last te hebben van hun pols of hand. Informatie over huisartsbezoek door deze mensen werd uit de computersystemen van de huisartsen gehaald. Hoewel 440 mensen de huisarts bezochten in het jaar volgend op het invullen van de vragenlijst, waren pols- of handklachten slechts bij 32 mensen de belangrijkste reden (6%). De belangrijkste voorspellers voor het consulteren van de huisarts voor pols- of handklachten waren een hoge frequentie van de klachten (vaak last) en de grote invloed van de klachten op dagelijkse activiteiten.

Diagnose en behandeling bij pols- en handklachten

In *hoofdstuk 3* hebben we een beschrijving gegeven van de diagnosen gesteld door de huisarts bij pols- en handklachten en de voorgestelde behandeling. Verder hebben we gekeken welke informatie die de huisarts tijdens het consult tot zijn/haar beschikking heeft een relatie heeft met de kans op aanhoudende klachten na 3 tot 12 maanden. Tot slot werd onderzocht welke informatie een relatie heeft met de beslissing om de patiënt te verwijzen naar een specialist. Voor het beantwoorden van deze vragen hebben we gebruik gemaakt van de gegevens van patiënten die de huisarts bezochten voor pols- of handklachten. 44 huisartsen namen deel aan het onderzoek, en zij hebben 301 patiënten gevraagd mee te doen waarvan 267 toestemming gaven voor deelname. De huisartsen vulden voor iedere patiënt een formulier in met informatie over de resultaten van anamnese, lichamelijk onderzoek, de gestelde diagnose en de behandeling. Deze informatie was van 241 patiënten beschikbaar. Patiënten vulden 3 keer een vragenlijst in: aan het begin van het onderzoek, na 3 maanden en na 12 maanden. De drie meest gestelde diagnosen door de huisarts waren artrose, peesontsteking en inklemmingssyndromen (waaronder carpale tunnel syndroom). De meeste patiënten kregen het advies het beloop van klachten af te wachten en/of pijnstillers te gebruiken. Patiënten die vaker een episode van pols- of handklachten hadden meegemaakt werden vaker verwezen voor een specialistisch advies of aanvullende diagnostiek. Slechts enkele gegevens die de huisarts verkrijgt tijdens het consult voorspellen het beloop van de klachten: leeftijd, geslacht, duur en ernst van klachten en een positieve test voor het hebben van een peesontsteking.

Invloed van pols- en handklachten op dagelijkse activiteiten

In *hoofdstuk 4* hebben we gekeken naar de invloed van pols- en handklachten op lichamelijk, emotioneel en sociaal functioneren. Verder hebben we gekeken naar factoren die gerelateerd zijn aan de ernst van de klachten. De deelnemers aan het

onderzoek rapporteerden een lagere ervaren gezondheid, met name voor de subschalen fysiek rolfunctioneren en pijn. Scores op de andere subschalen (waaronder emotioneel en sociaal functioneren) waren vergelijkbaar met scores van een Nederlandse referentiepopulatie. De ernst van klachten was groter bij mensen zonder betaald werk, meer overgewicht, een lange klachtenduur bij het eerste consult, een diagnose carpale tunnel syndroom, hogere pijnscore, en bij mensen die veel piekeren over de klachten.

Beloop van pols- en handklachten

In *hoofdstuk 6* hebben we het beloop van pols- en handklachten beschreven, en gekeken welke factoren het beloop beïnvloeden. Meer specifiek hebben we gekeken welke factoren bepalen of iemand na 3 of na 12 maanden nog steeds klachten heeft. Voor het bepalen van een goede maat om dit te meten, hebben we in *hoofdstuk 5* de klinimetrische eigenschappen van 2 vragenlijsten bekeken, de "Symptom Severity Scale" en de Nederlandse versie van de "hand and finger function subscale of the Arthritis Impact Measurement Scales". De "Symptom Severity Scale" bleek in onze populatie een geschikt instrument te zijn om verandering in ernst van klachten te meten; de reproduceerbaarheid van de vragenlijst bleek goed en de lijst was goed in staat veranderingen van klachten in de tijd te detecteren. Om deze reden werd deze lijst gebruikt om vast te stellen of iemand na 3 of 12 maanden nog steeds flinke klachten aan pols of hand had. De respons van de deelnemers aan het onderzoek na 3 en 12 maanden was hoog; 93% vulde de vragenlijst in en stuurde de lijst terug. 23% van de deelnemers rapporteerde volledig herstel van klachten binnen 3 maanden na het bezoek aan de huisarts, dit percentage nam toe tot slechts 42% na 1 jaar. Een hoge kans op aanhoudende klachten na 3 maanden was gerelateerd aan vrouwelijk geslacht, lage pijn intensiteit en een lagere score voor persoonlijke controle aan het begin van het onderzoek. Aanhoudende klachten na 1 jaar was gerelateerd aan hogere leeftijd, vrouw zijn, een lange duur van klachten bij het eerste consult, een minder actieve copingstrategie en het rapporteren van meer (aspecifieke) lichamelijke klachten (somatisatie).

Hoofdstuk 7 is het afsluitende hoofdstuk van dit proefschrift, en daarin worden de belangrijkste resultaten bediscussieerd aan de hand van 3 vragen die tijdens het schrijven van dit proefschrift naar boven kwamen. Ten eerste: 'Is het in de huisartspraktijk belangrijk om een diagnose te stellen?' Uit ons onderzoek bleek dat de diagnose invloed heeft op behandelbeslissingen, maar niet direct van invloed is op het

beloop van de klachten. De hypothese dat het misschien beter is om alleen op basis van symptomen en klachten te behandelen in plaats van de diagnose kunnen we noch bevestigen noch weerleggen. Daarvoor is meer onderzoek nodig naar de wijze waarop huisartsen een diagnose stellen en de achtergrond van behandelingbeslissingen. De tweede vraag is: 'Zijn pols- en handklachten echt een probleem?'. Ook op deze vraag kunnen wij geen duidelijk antwoord geven. Het antwoord zou 'nee' kunnen zijn, omdat de klachten geen grote invloed hebben op de ervaren gezondheid, en het percentage patiënten die de huisarts bezoekt voor pols- en handklachten is laag. Het antwoord op de vraag zou ook 'ja' kunnen zijn, omdat een grote groep mensen na 1 jaar nog steeds klachten heeft. De laatste vraag was: 'Is het mogelijk om het beloop van pols- en handklachten goed te voorspellen?'. Ook bij deze vraag is het lastig een duidelijk antwoord te geven. Op basis van de informatie uit onze vragenlijst was het niet mogelijk om de uitkomst van pols- en handklachten betrouwbaar te voorspellen. Aan de andere kant leek het wel mogelijk om een schatting te maken van de prognose op basis van eenvoudige informatie die beschikbaar is tijdens het consult. Dit hoofdstuk sluit af met enkele methodologische overwegingen en aanbevelingen voor zowel huisartsen als onderzoekers.

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Marinda

About the author

List of publications

Marinda Nicole Dorgelo was born on December 23, 1975 in Kampen, The Netherlands. She followed her secondary education at Johannes Calvijn Lyceum in Kampen, from which she graduated in 1995. Following this, she started to study Human Movement Sciences at the University of Groningen, from which she graduated in 2000. After graduation she started to work at NIVEL (Netherlands Institute for Health Services Research), as a junior researcher. She worked on several projects at the department of allied health care. In January 2004, she began as a PhD-student at the EMGO Institute at the VU University Medical Center in Amsterdam, where she conducted the study as described in this thesis. During her PhD-project, she followed the Master program Epidemiology at the VU University Medical Center, from which she graduated in 2006. Currently, Marinda is working as a researcher at NIVEL.

Marinda is married with Stephan Spies and together they have a son and a daughter: Guido (2005) and Maura (2008).

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