Acute Neck Pain in General Practice

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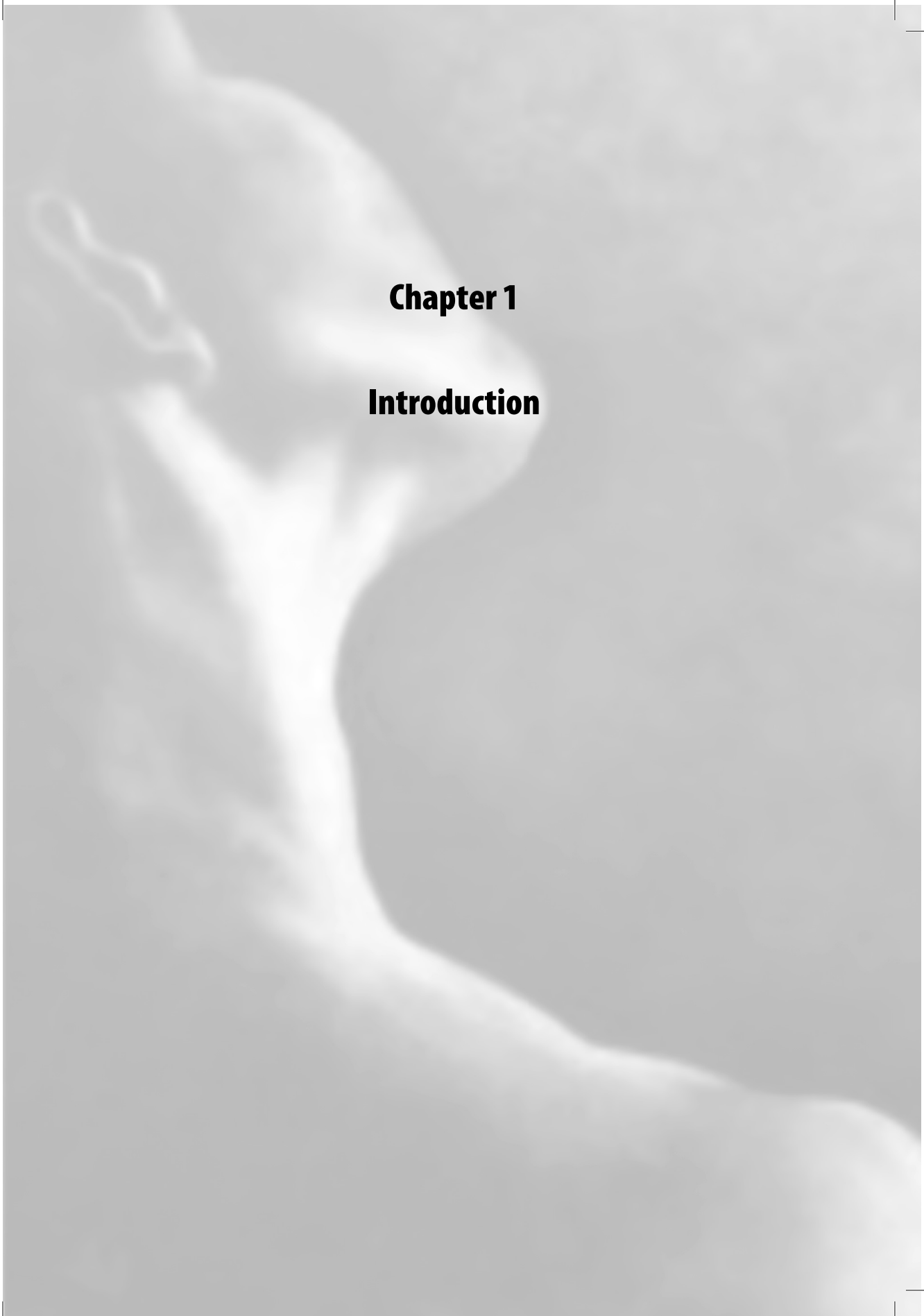

Chapter 1

Introduction

EPIDEMIOLOGY

About two-third of the entire population will experience neck pain at some point in their life.[1,2] Of the musculoskeletal complaints it is the most prevalent after low back pain and shoulder disorders. Annually about 30% of the population experiences neck pain and 14% of this group reports complaints lasting for over 6 months.[2,3,4] In cross-sectional studies on population level point prevalences ranges from 5.9% up to 22.2%, most figures however range between 10-15%.[5] One-year prevalences in occupational settings showed values up to 76% and with higher values for female workers.[6] Reported figures on the prevalence of chronic pain in the general population varied between 16.7% and 75%.[5] The figures for women are all somewhat higher than for men.[5,7,8] In the Netherlands Picavet et al. reported a one year prevalence of neck pain of 31.4%, a point prevalence of 20.6%, and a prevalence of chronic neck pain of 14.3% in the open population.[8] The majority of the patients reported pain at more than one site with a considerable overlap between different sites.[8] Neck pain prevalence increases with age for both men and women, but above the age of fifty years the prevalence does not rise anymore.[9,10,11] Prevalence rates of neck pain in general practice has been estimated to be between 18 and 23 per 1000 registered patients per year.[12,13]

Neck pain forms a major health problem in modern society and although it is usually not life-threatening it can cause much unwell being due to substantial pain and stiffness of the neck.[6] It will influence physical functioning of the patients, and can be a reason for work loss almost as often as low back pain is.[3] The annual costs of neck pain to society are substantial. The total costs of neck pain in the Netherlands in 1997 were estimated at US$ 1.3 billion.[14] The majority of costs are due to sick leave and disability and the related loss of productive capacity.

PATHOGENESIS AND DIAGNOSIS

Neck pain is defined as pain originating from the anatomical defined area between the base of the skull and the first thoracic vertebra and laterally boarded by the sternocleidomastoideus muscles. Besides pain it may cause stiffness and limited range of motion. Headache, dizziness and radiating pain in the arm, shoulder and back can also be present in the combination with neck pain. A generally accepted time-based classification of neck pain is threefold: acute (0-6 weeks), subacute (6-12 weeks) and chronic (> 3 months).[15]

Neck pain can arise from several structures of the neck like facet joints, ligaments, disci and muscles. After history taking and physical examination the exact

structure that causes the pain often cannot be discerned so the origin of the neck pain remains unclear.

Neck pain can therefore better be defined in specific and non-specific causes. Specific causes concern hernia, tumours, vascular malformations, infections etc. The vast majority (around 98%) of patients with neck pain seen in general practice concern non-specific causes.

Known causes of non-specific neck pain all compasses descriptions of the starting mechanism of neck pain (sudden onset, a motor vehicle accident, a fall or bounce of the head) or are due to psychological distress. In most cases a clear cause for neck pain is unknown. Most people that experience neck pain do not visit their GP. Approximately 15% - 27% of subjects in the open population seek some form of health care provider for their neck pain.[16,17,18] In a telephone survey in eight countries in Europe it became clear that 27% of patients had never sought any medical help for their musculoskeletal pain including neck pain.[16] In Sweden, data from a population survey on neck pain showed an estimated 15% GP consultation rate.[17] That means that only one out of seven people with neck pain visited the GP.

Diagnosis made by GPs can be divided in three groups: a general description of the complaint; an attempt to point out the structure that specifically causes the neck pain, and a diagnosis based on the description of the cause. Uniformity in diagnosis making in general practice seems absent.[19]

TREATMENT

In general the treatment given by the GP comprises advices regarding the course of the complaints, the prescription of analgetic medication or muscle relaxants, the advice to take rest or to stay active and referral for physiotherapy or to a specialist. The advice to wait for an expected favourable natural course and the referral to a physiotherapist are the most given ones. A Dutch survey in the general population showed that one third of the patients with neck pain were referred for physiotherapy.[8] Referral for X-rays or to a medical specialist is very limited, especially in non-traumatic cases.[18,20] Self-treatment has an important place for most people and constitutes of all sorts of heat application, to take rest, massage, cervical pillows and home-exercises.[21] In general, there is a lack of information on the clinical course of acute neck pain in primary care. In a systematic review on the clinical course of acute and chronic neck pain, out of 21 studies only one was carried out in a primary care setting.[3] They reported a lack of insight into the course of acute neck pain in primary care. The authors made the suggestion that further research

is needed on acute neck pain in primary care, using an inception cohort. Neck pain is regarded as a self-limiting condition in which recovery occurs in most cases without any medical treatment.

RISK FACTORS

It is generally thought that neck pain has a multifactorial origin. Relations between neck pain on the one hand and physical, occupational and psychological risk factors on the other have been investigated in many studies. The research activities appear to focus, for the working population, on certain occupations, for example office work, assembly line work and industrial work including heavy labour.[6,22,23] Physical risk factors found to be associated with neck pain in cross-sectional studies are: heavy lifting, monotonous work tasks, static work posture, vibrations, repetitive jobs and a high work pace. [6,13,23] Work status is regularly used as a measure of functional limitations. The complex array of psychological, physiological, social and economic determinants of work status is often present on other types pain as well, and theoretically found its description in the "biopsychosocial model of pain".[24]

Psychological risk factors found to be related to disorders of the neck are: a low work content, low social support, a high perceived work load, time pressure, low job control, perceived stress, and high psychological job demands.[25]

PROGNOSTIC FACTORS

A number of cross-sectional and longitudinal studies were performed in order to identify prognostic factors for neck pain.[6,26] Frequently reported prognostic factors for chronicity in neck pain include: older age, female gender, a previous history of trauma, physical work-related factors, pain severity and -localization, pain duration, occupation and radiological findings.[1,6,27] Work related as well as non-work related psychosocial factors are currently accepted as important determinants for chronicity.[27,28]

Information regarding prognostic factors can facilitate clinical decisions concerning the choice of treatment and identification of groups at risk for poor outcome.[29]

It is disputed whether a whiplash-type of trauma is a relevant factor for the development of chronic neck pain. Some studies found that the prevalence of chronic neck pain was associated with a history of injury and state that it is a

distinct and separate risk factor apart from the other predictors of chronic pain.[30,31] Others reported that the prevalence of persistent neck pain after a motor vehicle accident was the same as the prevalence of chronic neck pain in the general population.[32,33]

THE GENERAL PRACTICE PERSPECTIVE

Several guidelines have been published concerning low back pain but, to our knowledge, none dealing with neck pain except for whiplash associated disorders.[34,35,36] Thus there is no clinical guideline available for GPs' how to deal with neck problems. Consequently, it is not surprising that a previous study indicated that GPs showed a large variety regarding the management of neck pain.[37] There is a lack of evidence in the literature about the effect of the applied interventions and advices. The patient compliance and satisfaction with the given treatment is unknown. The role of "gatekeeper" to the health care system is difficult to maintain in the light of all uncertainties the GP is faced up to.

AIMS AND OUTLINE OF THE THESIS

The general aim of this thesis was to gain insight in the course of patients with acute neck pain once they visited their general practitioner. No previous studies were known to us that were restricted to acute neck pain in general practice. The absence of evidence in this field motivated us to undertake this study. The objectives of this thesis are: to describe the clinical course of acute neck pain complaints and to assess factors that influence the prognosis. We performed a prospective, questionnaire based, observational study with a one-year follow-up. Furthermore we describe what GP and patient undertake in managing acute neck pain complaints and evaluate several facets of reproducibility and responsiveness of two clinimetrical instruments.

Chapter 2 presents the results of the test-retest study on the reproducibility measures reliability and responsiveness of the Neck Disability Index. Chapter 3 presents the results of reliability testing of the Acute Low Back Pain Screenings Questionnaire (ALBPSQ). We calculated a cut-off point of the scores of the ALPBSQ in order to predict prolonged sick leave due to neck pain with accompanying sensivity and specificity figures. Chapter 4 presents the clinical course of acute neck pain in a one year follow-up study. We identified several prognostic factors for the outcomes recovery and sick leave. In chapter 5 we describe how

the GP manages patients with acute neck pain and what the patients do about their neck pain complaints with self-treatment. Chapter 6 presents the results of the subgroup study of patients after a motor vehicle accident and the influence of that fact on the clinical course and disability. In chapter 7 we describe the general practitioner's gut feeling about the prognosis of acute neck pain patients. In the general discussion (chapter 8) we give our reflection on the methodological strength and weaknesses of the reported research, some practical considerations are provided and the clinical implications of the presented results besides some recommendations for future research. Finally a summary in English and Dutch is presented.

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Chapter 2

Reliability and Responsiveness of the Dutch version of the Neck Disability Index in patients with Acute Neck Pain in General Practice

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ABSTRACT

Study Design. A prospective cohort study with a one week follow-up.
Objective. To examine the reliability and responsiveness of the Dutch version of the NDI in patients with acute neck pain in general practice.
Background. An increasing number of studies on treatment options is published in which the NDI is used. Reports of the ability of the NDI to detect change over time, often called responsiveness, however have not yet been published.
Methods. At baseline 187 patients (119 women, 68 men) were included. They completed a questionnaire on demographic variables, self-reported cause of their complaints and the NDI. After one week 86 patients were sent the NDI again together with the perceived recovery scale which was used as our external criterion. The scale ranged from 1 (complete recovery) to 7 (complaints are worse than ever).
Results. Response rate was 93%. Test-retest scores on reliability were good (ICC=.90). A Bland and Altman plot and a graph of total sum score differences showed no visible tendency towards unequal spreading of the data. For patients that reported on the perceived recovery scale that they were "improved" we found a responsiveness ratio of 1.82. The standard error of measurement (SEM) was 2.75 what resulted in a minimal detectable change (MDC) of 7.62.
Discussion. The NDI has shown to be a reliable and responsive instrument in patients with acute neck pain in general practice.

INTRODUCTION

Neck pain is a common complaint. It is almost as common as back pain [7]. Annually about 30% of the population experiences neck pain and 14% of this group reports complaints lasting longer than 6 months [5, 7]. Most cross-sectional studies report a point-prevalence between 10 and 22% in the open population [2, 9, 12]. The prevalence rises with age and is higher in women than in men [2, 11 ,12].

The exact number of people attending the general practitioner (GP) with acute neck pain (neck pain lasting no longer than six weeks) is unknown. We estimated that about half of the patients visiting their GP have acute neck pain. Although the "International Association for the Study of Pain" issued a list of over 60 known causes of neck pain, over 90% of the cases in primary care have neck problems without a clear specific cause. Little information is available about the natural course and the prognosis of acute neck pain in general practice [7]. Treating and informing patients with acute non-specific neck pain over the expected course is therefore often difficult for primary care workers.

To assess how neck pain affects activities in daily living Vernon and Mior developed the Neck Disability Index (NDI) [32]. Validity and reliability have been tested before in different groups of patients [1, 19, 30]. Several authors state the NDI to be a reliable and useful instrument in measuring disability in patients with neck pain [18, 24, 32]. In a three year prospective study on the prediction of long-term health problems after whiplash only the NDI was significantly related to outcome [25]. The authors concluded that the analysis of the decrease of the level of activities obtained by the NDI provided a tool to identify individuals at risk for a poor outcome.

These authors also suggested to conduct larger studies on different groups in primary care to investigate its relevance. The relatively easy questions concerning activities of daily life and the short time to complete the questionnaire makes it probably a useful instrument in primary care. An increasing number of studies on treatment options are published in which the NDI is used [4, 6, 25, 28, 29]. Reports of the ability of the NDI to detect change over time, often called responsiveness, however have not yet been published. The objective of our study was to investigate the reliability and responsiveness of the NDI in patients who attended their general practitioner for acute neck pain.

METHODS

Study population.

General practitioners (GP) working in the city of Rotterdam and the suburban region were invited to participate in the study. The study design was a prospective cohort study with a follow-up period of one year. At the baseline consultation patients with first time or recurrent acute neck pain, lasting no longer than six weeks, with a pain free interval of at least three months, were invited to participate in the study. Additional inclusion criteria were: age above 18 years and sufficient knowledge of the Dutch language to be able to complete written questionnaires. Excluded were patients with specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, referred pain from internal organs). After oral consent the GP handed over an envelope containing the baseline questionnaire, a patient information form concerning the content of the study, an informed consent form and a prepaid return envelope. Only after having returned a completed baseline questionnaire as well as a written informed consent form patients were included in the study. The returned questionnaires were checked by the clinical research associate for completion, age, the duration of complaints, the pain free interval and in- and exclusion criteria.

Approval for this study was obtained from the Ethical Committee of the Erasmus University Medical Centre.

Measurements

The baseline questionnaire contained questions on demographic variables, previous history and treatments for neck pain, duration and cause of current neck complaints, previous and concomitant headache, radiating pain, smoking habits and sudden onset of complaints. Patients scored the average severity of their neck pain on a numerical rating scale (NRS) ranging from 0 (no pain) to 10 (unbearable pain). From the NRS the reliability and validity are well established [26]. They were also asked what, in their view, was the cause of their current neck complaints. Next they completed the Dutch version of the NDI. For the test-retest study we made a subgroup of patients from the baseline cohort. Approximately the first half of consecutive patients of the included cohort received after one week for the second time the NDI and a perceived recovery scale which was used as our external criterion. Patients rated their perceived recovery on a separate 7-point ordinal transition scale. The scale ranged from 1 (complete recovery) over 4 (no change) to 7 (my complaints are worse than ever). The perceived recovery scale is a widely used instrument in public health research and patient centred research for assessing patients' own global impression of perceived recovery [21, 27, 33]. In

our study the perceived recovery scale was used as our external criterion in the absence of a "gold standard".

Neck Disability Index

The Neck Disability Index is a 10-item questionnaire containing questions on three different aspects: pain intensity (pain, headache), daily work related activities (work, lifting, concentration) and non-work related activities (personal care, reading, driving, sleeping and recreation). The NDI is a modification of the Oswestry Low Back Pain index [30].

Participants can choose one out of six answer categories for each item. The score of each item lies between 0 (no pain or limitation in activities) and 5 (as much pain as possible or maximal limitation). Total scores range between 0 and 50 points. Vernon and Mior (1991) also suggested a scaling interval for the total scores. Scores from 0-4 were rated as "no disability", between 5-14 as "mild", 15-24 as "moderate", 25-34 as "severe" and scores over 35 as "complete" disability.

We used a Dutch translation of the NDI administered by the Pain Research Centre of the University Hospital of Maastricht [22].

Reliability

The reliability of the NDI was measured before by Vernon and Mior (1991) on whiplash patients and patients with chronic non-traumatic neck complaints. They calculated the Pearson Product Moment correlation score and reported a high degree of test-retest reliability of 0.89.

Reliability scores of individual items were not reported. We calculated the Intraclass Correlation Coefficient (ICC) scores for the total scores after one week (T1). The test-retest reliability score concerned the subgroup of patients that stated at T1 on the perceived recovery scale that they were "stable". An ICC above 0.70 is accepted as good [8].

For evaluation of systematic differences we present a Bland and Altman plot.

Responsiveness

Responsiveness is defined as the ability of the measuring instrument to detect clinically relevant changes over time [3, 33]. There is however no consensus on the most appropriate way for quantifying responsiveness. The relevant change of the variable, one is interested in, is also called the "signal". Signals can be positive or negative. The standard deviation (SD) of that same variable is also known as the "noise". Controversy exists on which standard deviation to use. Some authors suggest using the SD of baseline scores, others the SD of patients that state to be stable or the SD of the change score in improved patients [17].

We used the responsiveness ratio according to Guyatt and determined the relation between the clinically relevant changes one wishes to detect (signal) and the measurement error that is within the subject variability unrelated to relevant clinical changes (noise) in the group of patients that stated to be "stable" [16]. A possible disadvantage of the method we used is that the numerator and denominator were based on different samples. Responsiveness levels above 1.0 are accepted as a "good" level of responsiveness [3, 17]. If the "signal" exceeds the "noise" the instrument may be considered to be responsive, to an extent that is proportional to the magnitude of the responsiveness ratio [16]. For the measurement of the responsiveness ratio of instruments an external criterion is necessary to distinguish between "improved" and "stable" patients. In the absence of a "golden standard" we used the perceived recovery scale. Another approach to investigate responsiveness is by calculating the Minimal Detectable Change (MDC) or Minimally Clinical Important Difference (MCID). The MDC expresses the magnitude of change, with a chance of less than 5% that a patient being stable is truly stable.

Statistical analysis

Frequencies, SD and total scores of all items were measured. We calculated differences in total sum scores after one week compared to baseline scores. For patients unable to complete any of the ten items of the NDI, the score was adjusted by using the mean of the answers on the rest of the questionnaire. Patients who missed two or more items were removed from the analysis.

In order to exclude floor or ceiling effects we calculated the MDC. McHorney et al. suggested for scale width a 15% criterion [23]. If less than 15% of the patients had initial scores within 1 MDC from the theoretical minimum or maximum of the scale this was labelled "good" [23]. The MDC was calculated as $1.96 \times \sqrt{2} \times SEM$ [26]. When the MDC exceeds the SD of the "stable group" of patients than the MDC can be interpreted as clinically important change [27].

The test-rest reliability of each item was measured for the total score by means of the intraclass correlation coefficient (ICC) for an interval of one week for the subgroup of patients that stated on the perceived recovery scale that they were "stable". ICC levels >0.80 and < 0.90 are accepted as "good" and levels of 0.90 or greater as "very good" [27]. We assumed one week time interval between the test and retest measurement to be long enough to prevent recollection bias, which can influence the results. A Bland and Altman plot was computed and a graph of sum score differences. Responsiveness by Guyatt was determined by dividing the difference in total scores of the group of "improved" patients by the standard deviation of the group of patients that were "stable" [35]. A score above 1.0 is

accepted as "good" [3]. Patients reporting 'complete recovery' or 'much improved' on the perceived recovery scale were considered to be improved; 'little improvement', 'no change' and 'slightly worse' were considered to be stable and "much worse" and "worse than ever" as deteriorated. Statistical analyses were performed using the SPSS 10.0 for Windows program.

RESULTS

At baseline 249 patients with acute neck pain were asked by their GP to participate in the study. In total 190 patients (76%) returned the baseline questionnaire together with the signed informed consent form. Excluded were three patients that did not meet the inclusion criteria (two patients had chronic neck pain complaints and one patient was too young). Finally 187 patients formed our inception cohort. After one week (T1) 86 patients were sent the NDI together with the perceived recovery scale. In figure 1 we present the flow chart of patients during the test-retest period.

We received in return 80 out of 86 (93%) sent questionnaires. The dropouts did not differ from the rest of patients concerning age and gender. One T1 questionnaire lacked two items on the NDI and was removed from analysis.

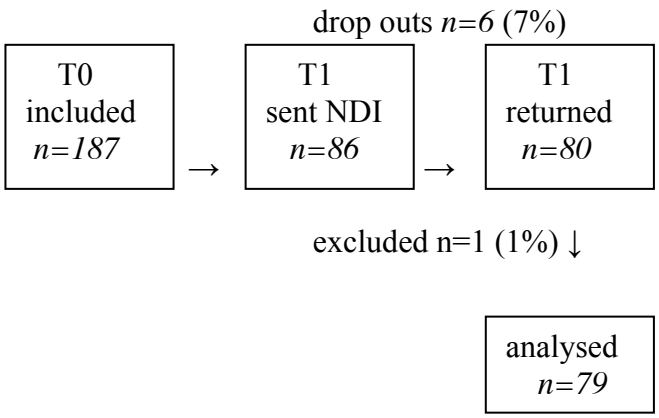

Figure 1. Flow chart of patients at baseline (T0) and after one week (T1).

Patient characteristics

Patient characteristics of the study population are presented in table 1.

Patients were predominantly female (64%) and 62% reported accompanying headache. Almost four out of ten patients were initially on sick leave. Reported neck pain at the numeric pain rating scale (NRS) was slightly higher during daytime (mean score 6.4;SD 2.0) than during nighttime (mean score 5.3; SD 2.7). The self reported causes of neck pain differed substantially. Most patients mentioned that the neck pain occurred spontaneously or the cause was unknown (47%). Motor vehicle accidents were relatively frequent reported (23%).

Table 1. Patient characteristics of the study population at baseline (*n=187).*

	n (percentages)	mean age	(SD)
Gender female	119 (64)	38.2	(13.3)
male	68 (36)	43.2	(14.9)
Employed Yes/No	148 (79)		
Had previous episodes of acute neck pain Yes/No	118 (63)		
Underwent previous treatment for neck pain Yes/No	74 (40)		
Duration of acute neck pain shorter than two weeks	79 (42)		
*Pain radiating to: shoulder(s)	104 (56)		
arm(s)	69 (37)		
back	10 (5)		
between shoulder blades	76 (41)		
Neck pain accompanied by headache Yes/No	117 (62)		
Sudden onset of neck pain	88 (47)		
On sick leave due to neck pain	53 (28)		
Self-reported cause of neck pain:			
Spontaneously / unknown	70 (38)		
Due to a motor vehicle accident	42 (23)		
Noticed after waking up	32 (17)		
After a fall or hitting the head	13 (7)		
Sudden onset	12 (6)		
Stress	10 (5)		
Work related	8 (4)		

* Note that the total of this item is more than 100% because patients could indicate more than one area where they experienced radiating pain.

After one week 35 patients (44%) reported that their condition was much improved or that they were completely recovered, 42 patients (53%) reported that there was little or no change so we judged their situation as stable, and 2 patients (3%) were deteriorated. Mean, standard deviation (SD), and total scores of all items at baseline and after one week are presented in table 2. Severity of disability divided in categories is presented in table 3.

Table 2. Mean and total item scores and standard deviation (SD) of the NDI at baseline (T0) and after one week (T1).

	item	T0 *n=187*		T1 *n=79*	
		mean score	SD	mean score	SD
1	Pain	2.06	0.82	1.54	0.92
2	Personal care	0.53	0.74	0.35	0.64
3	Lifting	1.28	1.07	1.01	1.10
4	Reading	1.66	1.10	1.30	1.04
5	Headache	1.78	1.54	1.82	1.47
6	Concentration	0.87	0.98	0.70	0.82
7	Work	1.26	1.18	1.09	1.11
8	Driving	1.84	1.11	1.38	1.29
9	Sleeping	1.40	1.25	1.04	1.06
10	Recreation	1.71	1.02	1.37	0.98
	Total	14.37	6.85	11.61	7.45

Table 3. Severity of disability divided in categories and total scores at baseline (T0) and one week (T1) in percentages.

Severity of disability	Scoring range of total item scores	T0 *n=187*	T1 *n=79*
None	0-4	6.0%	19.0%
Mild	5-14	46.7%	44.3%
Moderate	15-24	40.8%	30.4%
Severe	25-34	4.9%	6.3%
Complete	35-50	1.6%	0.0%

As patients improved during the week we saw a change from the categories "moderate" and "mild" towards "mild" or "no disability"

Item number 8 of the NDI concerned the influence of experienced neck pain on the ability to drive a car. At baseline for 23 patients (12%) it was impossible to answer that question because they had no drivers' license or were not in the possession of a motor vehicle.

Reliability

In figure 2 we present a histogram of the difference in total scores after one week (T1).

The test-retest reliability score concerned the subgroup of 42 patients that stated at T1 on the perceived recovery scale that they were "stable". The ICC was 0.90 (95% CI 0.82-0.95), which is regarded as a 'very good' level of reliability.

In figure 3 we present the Bland and Altman plot. No visible tendency toward unequal spreading of the data is present. Reference line is the mean of total score difference 0.26 (SD 3.91). Limits of agreement range from –7.40 to +7.92.

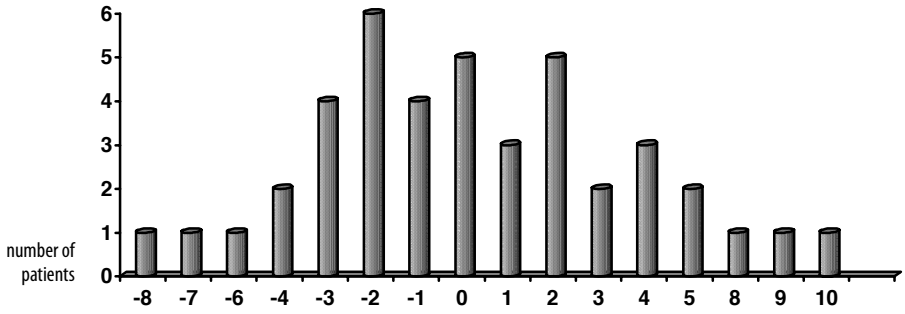

Figure 2. Total somscore differences of the NDI for "stable" patients after one week compared to their baseline scores (*n=42*).

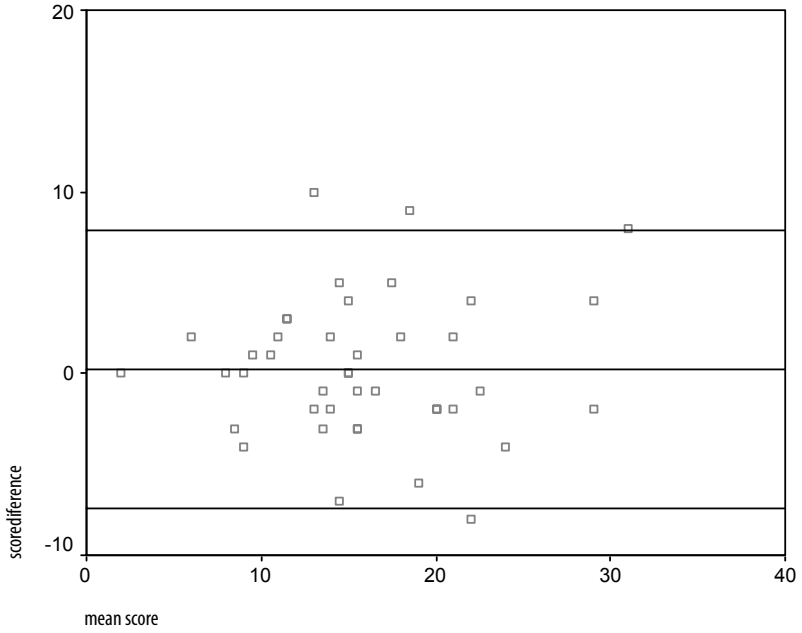

Figure 3. Bland and Altman plot of NDI score differences plotted opposite mean score for stable patients (*n=42*). Limits of agreement at 1.96 SD.

Responsiveness

Table 4 shows the responsiveness ratio according to Guyatt.

The mean NDI score of the patients that reported to be "improved" after one week, was reduced 7.1 points (55%) compared to the baseline value. In patients that reported to be "stable" the mean change of the NDI scores over the same period was 0.3 points (2%). The responsiveness ratios at T1 was 1.82 and can be qualified as "good".

In the group of "stable" patients (n=42) SEM was 2.75 what resulted in a MDC of 7.62. This level of MDC can not be interpreted as a clinically important change.

Table 4. Mean total NDI scores at baseline (T0) and after one week (T1), differences in the total scores, (standard deviations) and calculation of the Responsiveness Ratio according to Guyatt.

	T0 total score	T1 total score	Score (SD) Difference	Responsiveness Ratio
Improved (*n=35)*	13.0 (5.6)	5.9 (4.7)	7.1 (5.9)	7.1 / 3.9 = 1.82
Stable (*n=42)*	16.0 (6.6)	15.7 (6.4)	0.3 (3.9)	

DISCUSSION

We found the NDI to have a good reliability and responsiveness in our study with the test-retest results after one week.

High response rates of the self-rated questionnaires resulted in a sufficient number of cases for evaluation. The other available studies on the reliability of the NDI concerned smaller sample sizes [1, 32]. Correction for missing values was necessary for those patients (12%) that could not answer the item concerning driving. In a study in Hong Kong concerning the reliability of the Northwick Park Neck Pain Questionnaire 61 out of 140 patients (44%) were not able to answer the question about driving [11]. In the Swedish version of the NDI the item concerning driving also was regularly unanswered although the authors did not report how often that happened [1]. The Swedish questionnaire had an additional answer category: "not applicable". If that alternative was chosen the item was excluded.

In our study more women (64%) than men were included. In studies concerning whiplash patients or chronic non-traumatic neck pain patients this difference is also present [12, 14, 18, 20]. The female proportion ranged in these studies from 58 to 66%. A more recent primary care study reported a female proportion of 74% [10].

The distribution at baseline of the total NDI scores when divided in severity groups was mainly "mild" or "moderate". Vernon and Mior found similar results [32]. Mean scores were higher for patients who reported a motor vehicle accident as the cause of their neck pain. Other authors also reported higher scores at the NDI for patients with chronic neck pain after a motor vehicle accident [31, 34]. The higher NRS levels compared to the mean of the NDI scores could reflect the probability that patients with acute neck pain experience relatively more pain than disability. A potential bias could lie in patient selection. The more disabled patients were not able to visit the GP. The emotionally charged concept 'whiplash' could otherwise stimulate patients to visit their GP, resulting in over representa-

tion in our cohort. Co-morbidity could also be a problem. For example the item headache is not necessarily a part of the neck pain syndrome.

The item with the highest mean score in our study after one week was headache. A reasonable amount of patients (41%) reported pre-existing headache. We wondered if every patient was fully aware of the fact that we asked for headache that accompanied the neck pain and not for headache due to other causes. Misunderstanding on this issue could very well result in an overestimation of the scores of this particular item. Ackelman and Lindgren also reported this phenomenon [1]. They made a modified version of the NDI to clarify for the patients that all the items of the NDI referred specifically to neck conditions. They used in every item the words "neck pain" or "due to neck pain" instead of using only the word "pain". They claim that in this way co-morbidity or other non-specific ailments did not produce false increases in the scores. We also think that this could be a useful modification in future use of the NDI.

We found the test-retest reliability score (ICC 0.90) with one-week time-interval, is comparable with the figures of Ackelman [1]. Reliability scores in patients with chronic neck pain tend to be higher. The diversity of causes and the heterogeneity of our cohort of patients with acute neck pain could well be accountable for the somewhat lower scores we found.

For an evaluative instrument the baseline scores should be high enough to be able to demonstrate change over time. Riddle and Stratford suggested a 10% change on the NDI or at least five points improvement of the total item score to be clinically relevant [31]. The mean scores of two items at baseline were very low in our study (personal care 0.53; concentration 0.88). That could scarcely allow any improvement over time. Others also reported low scores for personal care and concentration and this may be a disadvantage of the NDI [18, 19]. Despite this we found good responsiveness ratios after one week by both methods used. Because the external criterion that is used labels the patient as deteriorated, stable or as improved such that the improvement can be considered clinically relevant and that the MDC can be interpreted as clinically important change. The NDI was designed to detect clinical relevant changes over time and it proved in that respect to be an evaluative instrument in this group of patients with acute neck pain in a primary care setting. The relatively low mean scores for the items "personal care" and "concentration" could also introduce the possibility of a "floor vs ceiling" effect. Other authors also recognised this danger but reported not to have observed it. Floor effect was not observed in our study.

Patients who reported deterioration of symptoms were removed from the analysis of responsiveness analogue to the definition of responsiveness by Guyatt [16]. By including the deteriorated patients the 'noise' of the 'stable' patients increases

and consequently decreases the responsiveness ratio. A sensitivity analysis of responsiveness in our study including the deteriorated patients gave no significant different ratios. The small proportion of patients deteriorating (2%) is probably responsible for the negligible differences we found. A responsiveness ratio for the NDI has not been reported before [30]. Therefore we compared our ratios with the responsiveness ratios found in studies for functional outcome in other musculoskeletal disorders. Beurskens et al. reported a responsiveness ratio for the Oswestry scale in patients with low back pain after five weeks of 1.29 [3]. The Shoulder Disability Questionnaire scored a responsiveness ratio of 2.22 after one month and 1.89 after six months [35]. The Chinese version of the Northwick Park Neck Pain Questionnaire was used in a group of patients with acute and chronic neck pain in Hong Kong and scored a responsiveness ratio of 1.36 [11]. Patient specific scales like the problem elicitation technique (PET) showed similar responsiveness ratios [19, 34]. Disadvantage of a change score on a multidimensional scale like the NDI is that it is difficult to determine what the real attribution is of that change in the condition of the patient. Future research can probably demonstrate the value of the ratios we found.

External validity of the presented data accounts only for the diversity of patients with acute neck pain who visited their general practitioner. The NDI is a one-dimensional questionnaire measuring specifically physical aspects of neck pain [18, 19]. Issues concerning emotional and social functioning are not taken into account and so it is not fully reflecting the spectrum of disabilities due to neck pain [18, 19]. In the population of our study the NDI appeared to be a reliable instrument. Combining the NDI with other instruments is necessary to cover the whole spectrum of disabilities due to neck pain.

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Chapter 3

The ability of the Acute Low Back Pain Screening Questionnaire to predict sick leave in patients with Acute Neck Pain

submitted

ABSTRACT

Objective: The aim of this study was to investigate the utility of the Acute Low Back Pain Screening Questionnaire (ALBPSQ) in acute neck pain patients in general practice. The ALBPSQ is a biopsychosocial screenings questionnaire containing twenty items concerning mainly psychosocial variables. Although originally developed for low back pain patients it may also be applicable for neck pain patients. We evaluated its reliability and determined an optimal cut-off point for predicting future sick leave.

Study Design: A prospective study was conducted on consecutive patients with acute neck pain in general practice with a follow-up period of one year. Reliability was determined by means of a test-retest procedure with a one-week interval. The total number of days on sick leave was added up based on self-reported questionnaires.

Results: 187 patients were included in the study of which 180 patients were included in the analysis. Almost half of patients were better or much improved within the first week. Test-retest reliability was high (ICC 0.85; 95% CI 0.73-0.92). Almost 40% of the patients reported sick leave because of neck pain during the follow-up period. An optimal cut-off score of 72 was calculated for predicting future sick leave, with a sensivity of 77% and a specificity of 62%. The area under the curve of the ROC curve was regarded doubtful (0.66; 95% CI 0.56-0.76).

Conclusion: The ALBPSQ has shown to be a reliable instrument and potentially useful in a screenings procedure for future sick leave in patients with acute neck pain in general practice.

INTRODUCTION

In general neck pain occurs almost as frequent as low back pain and is one of the most reported complaints of the musculoskeletal system.[1] Point prevalence ranges from 10% to 22%.[2] In a general population the one-year prevalence of neck pain can be as high as 40%, the prevalence for women being higher.[3] One year prevalences in occupational settings showed values up to 76%, also with higher values for female workers. Neck pain forms a major health problem in modern society.[3] The annual costs of back and neck pain to society are substantial. The majority of costs are due to sick leave and disability and the related loss of productive capacity.

Neck pain is considered to be of multifactorial origin, implying that a number of risk factors contribute to its development. Several studies are performed in order to establish prognostic factors for neck pain.[3,5] Frequently reported prognostic factors for chronicity in neck pain include: older age, female gender, a previous history of trauma[6,7], physical work-related factors and mental stress at work.[3,5] Work related as well as non-work related psychosocial factors are currently widely accepted as important determinants for chronicity.[9]

There is a growing amount of screenings questionnaires available for the assessment of the risk of chronic back pain and disability.[10,11] An instrument that combines physical as well as psychological aspects is the Acute Low Back Pain Screening Questionnaire (ALBPSQ), which was developed to screen for potential determinants for chronic low back pain. The screenings questionnaire has been evaluated for its ability to identify the patients at risk.[10,12] We were interested whether the ALBPSQ is also applicable for neck pain patients. The aim of our study was to determine the test-retest reliability of the ALBPSQ in patients with acute neck pain. Furthermore we aimed to assess the ability of the questionnaire to predict future sick leave in patients with acute neck pain presenting in general practice.

METHODS

A prospective design with a follow-up period of one year was used in which general practitioners were asked to enrol patients. Patients visiting their GP with a (new) episode of acute neck pain were invited to participate. Acute neck pain was defined as: “self-reported neck pain with a duration of complaints less than six weeks at presentation”. A new episode meant: neck pain after a pain free interval of at least three months. Other selection criteria were: 18 years of age

or older, and sufficient knowledge of the Dutch language. Excluded were all patients with specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, referred pain from internal organs). When a patient met the inclusion criteria the general practitioner handed over an envelope containing the baseline questionnaire, an information form about the content of the study and the informed consent form. Only after having returned a completed baseline questionnaire as well as a written informed consent patients were included in the study.

Approval for this study was obtained from the Ethical Committee of the Erasmus University Medical Centre Rotterdam.

Measurements

The Acute Low Back Pain Screening Questionnaire (ALBPSQ) is a biopsychosocial-screening instrument, also known as the rebro Musculoskeletal Pain Questionnaire.[14] The complete questionnaire and scoring instructions were previously published by Hurley et al.[12] It is specifically constructed to be a self-administered instrument. To increase validity and reliability most items are taken from other questionnaires previously shown to be reliable and valid.[10] The questionnaire is composed of 21 items divided in five domains: background, physical functioning, fear-avoidance beliefs, work, the experience of pain and reactions to pain and miscellaneous.

We translated the questionnaire in Dutch and left out one item were the patients could indicate if they, besides neck pain, also experienced pain in lower back or leg. Four items of the questionnaire were directly related to work. People who did not have paid work (retired persons, disabled, volunteers and housewives) were asked to complete the questionnaire as best as they could by relating it to their unpaid activities.

The baseline questionnaire contained questions on demographic variables, previous complaints and episodes of neck pain, work absenteeism; self reported cause of neck pain and the duration of symptoms at presentation. Patients scored their average severity of neck pain on an 11-point numerical pain rating scale (NRS), ranging from 0 (no pain) to 10 (unbearable pain) and completed the Acute Low Back Pain Screenings Questionnaire (ALBPSQ).

One week after the baseline measurement half of the patients were sent the ALBPSQ again. Patients also rated their perceived recovery on a separate 7-point ordinal scale. The scale ranged from 1 (complete recovery) over 4 (no change) to 7 (my complaints are worse than ever).The perceived recovery scale was used as an external criterion for recovery. Patients received by mail after six, 12, 26 and

52 weeks follow-up questionnaires asking to score the pain on the NRS and if the patient was still on sick leave. In case of resuming work we asked

for the duration of their sick leave. If a successive questionnaire was not returned within two weeks, the patient received a written reminder, followed by an additional telephone call two weeks later.

Analysis

The mean frequency score of each item of the ALBPSQ, the total scores and their standard deviation were calculated. Total scores could range between 0-200 points. If a patient was unable to complete the work-related items or one of the other items the score was adjusted by using the mean score of the remaining answers of the questionnaire, all according to the scoring instructions by Hurley et al.[12] Questionnaires missing an additional two or more items were removed from analysis. The Intraclass Correlation Coefficient was used to calculate the ALBPSQ test-retest reliability score for the group that stated on the perceived recovery scale that they were stable. We considered patients "stable" when they scored on the perceived recovery scale 3 (little improvement), 4 (no change) or 5 (slightly worse). ICC's above 0.7 are generally accepted as a good correlation, below 0.5 as an insufficient correlation.

Depending on the total of reported days on sick leave, employed patients were divided into three groups: "no sick leave"(0 days), "short-term sick leave" (1-7 days) and "long-term sick leave" (> 8 days). Independent *t* test was used to determine if there were significant differences between these groups. Calculating sensitivity (Se) and specificity (Sp) percentages for different total ALBPSQ scores was performed. The positive predictive value (PPV) as well as the negative predictive value (NPV) was calculated.

By means of constructing a ROC curve we determined the best fitting cutoff point of the total ALBPSQ score for correctly classifying patients with sick leave for more than 7 days. ROC curves can demonstrate the discriminating power of a diagnostic test, the further the curve is in the upper left corner, the better the test.[17] The area under the curve (AUC) is a measure of the diagnostic power of the test, independent of cutoff points.[17] A non-discriminating test will have an AUC of 0.5. A perfect test will have an AUC of 1.0. An AUC ≤0.60 is considered negative; >0.60 and ≤0.80 as 'doubtful'; >0.80 and <0.90 as 'good' and 0.90 or greater as 'very good'.[17] Statistical analyses were performed using the SPSS 10.0 for Windows program.

RESULTS

General practitioners (GP) working in the city of Rotterdam and the suburban region were invited to participate in the study. Twenty-nine GPs enrolled patients during the recruitment period from March 2001 until August 2002. 249 patients with acute neck pain were asked by their GP to join the study and were simultaneously handed over the starting envelope. In total 190 patients (76%) responded and retuned the baseline questionnaire and a signed informed consent form. Excluded were three patients that did not meet the inclusion criteria. 187 patients formed our inception cohort. Seven patients had two or more missing items on the ALBPSQ and were excluded. Finally 180 patients were included for the analysis of the ALBPSQ. Patient characteristics are presented in table 1.

Table 1. Patient characteristics of the study population at baseline (*n=187)*.

	n (percentages)	mean age
Gender female	119 (64)	38.2
male	68 (36)	43.2
Employed	148 (79)	
On sick leave	53 (36)*	
Smoking	61 (33)	
Previous episodes of acute neck pain	118 (63)	
Underwent previous treatment for neck pain	74 (40)	
Duration of acute neck pain shorter than two weeks	79 (42)	
Pain radiating to: shoulder(s)	104 (56)	
arm(s)	69 (37)	
back	10 (5)	
between shoulder blades	76 (41)	
Self-reported cause of neck pain:		
Spontaneously / unknown	70 (38)	
Due to a motor vehicle accident	42 (23)	
Noticed after waking up	32 (17)	
After a fall or hitting the head	13 (7)	
Sudden onset	12 (6)	
Stress	10 (5)	
Work related	8 (4)	

* reported percentage of patients on sick leave accounts only for employed patients.

The mean age of patients was 39.8 years (SD 13.8; range 18-78 years). Patients were predominantly female and they had a 5-year lower mean age then men. For 61% of the patients the self-reported cause of their neck pain was unknown. Mean pain levels on the numerical rating scale were slightly higher during daytime 6.5 (SD 2.0) than during nighttime 5.2 (SD 2.6).

In table 2 we present the item and total scores for the ALBPSQ at baseline.

Total score values for the ALBPSQ ranged from 14 to 151; mean score was 71.3 (SD 26.8).

The average pain over the last week had the highest mean item score followed by the item concerning the assumption that activity worsens the pain.

Table 2. Mean item and total score (SD) at baseline (*n=180*) of the patients that completed the Acute Low Back Pain Screening Questionnaire.

	Item				
1	Days missed at work	1.15 (1.85)	11	Chance to return to work	1.42 (2.31)
2	Duration current problem	2.76 (3.00)	12	Job satisfaction	3.13 (2.25)
3	Work is monotonous or heavy	4.28 (2.77)	13	Physical activity worsens pain	6.24 (2.86)
4	Average pain last week	6.50 (1.75)	14	Should stop when pain increases	5.81 (3.03)
5	Average pain last 3 months	3.78 (2.76)	15	Stop working with present pain	4.17 (3.27)
6	How many pain episodes	3.39 (3.11)	16	I can do light work	2.44 (2.47)
7	How able to cope pain	5.14 (2.42)	17	I can walk for an hour	2.12 (2.66)
8	Felt anxious past week	4.50 (2.86)	18	I can do household chores	3.22 (2.69)
9	Felt depressed past week	2.83 (2.85)	19	I can go shopping	2.86 (2.57)
10	Risk pain becomes persistent	3.63 (2.90)	20	I can sleep at night	3.42 (2.70)
				Total score	71.3 (26.8)

Reliability

After one week 102 patients were sent the ALBPSQ again together with the perceived recovery scale of which 92 questionnaires (90%) were returned. Three of these were incomplete and removed, leaving in total 89 patients for reliability testing. Almost half of patients (n=42) stated at the perceived recovery scale to be improved, 44 patients were stable and 3 deteriorated. The total score at baseline of the stable group was 71.7 (SD 27.0) and after one week 77.5 (SD 23.6). The increase in total score is mainly attributable to the first two items concerning 'days missed at work' and 'duration of current episode' measured in days. The total score at baseline of the improved patients was 63,5 (SD 24.5) and after one week 55.6 (SD 27.0). The ICC of the total scores on the ALBPSQ of the stable group was 0.85 (95% CI 0.73-0.92).

Sick leave

During follow up we were able to calculate the total amount of sick leave days of 143 employed patients. In total 87 (61%) patients remained working and reported no sick leave at all. The mean total score on the ALBPSQ at baseline for this group was 63.6 (SD 26.2). Short-term sick leave was reported by 17% (n=25)

of the patients with a mean total score on the ALBPSQ at baseline of 81.4 (SD 22.5). Long-term sick leave of more than 7 days was reported by 22% (n=31) with a mean total score at baseline of 78.6 (SD 17.9). Mean scores at baseline were significant different ($p<.01$) between patients on sick leave and those who remained working.

We determined 72 as cut-off point, which gave optimal information of the best possible consensus between predicting long-term sick leave (sensivity) and the absence of long-term sick leave (specificity). PPV was 0.81 and NPV 0.57. We present different cut-off points in table 3 in order to show the occurring change in sensivity and specificity percentages.

Table 3. Examples of the effect of different cut-off scores on the prediction of sick leave for more than 7 days at baseline of the ALBPSQ.

Cut-off score	On sick leave (sensitivity; %)	No sick leave (specificity; %)
60	87	40
65	84	47
70	77	57
72	77	62
75	64	64
80	44	71

Sensitivity: correctly classified by the ALBPSQ as being off work.
Specificity: correctly classified by the ALBPSQ as being at work.

The table shows how various cut-off points affect the accuracy of predicting those patients who were at sick leave of more than 7 days. Increasing cutt-off points result in higher sensitivity levels but at the same time in a decreasing specificity.

A ROC curve is constructed to present graphically the relation between sensitivity and 1-specificity (see figure 1).

The AUC is 0.66 (95% CI 0.56-0.76) and is regarded doubtful. The optimal cut-off point at 72 points corresponds with sensivity 77% and specificity 62%.

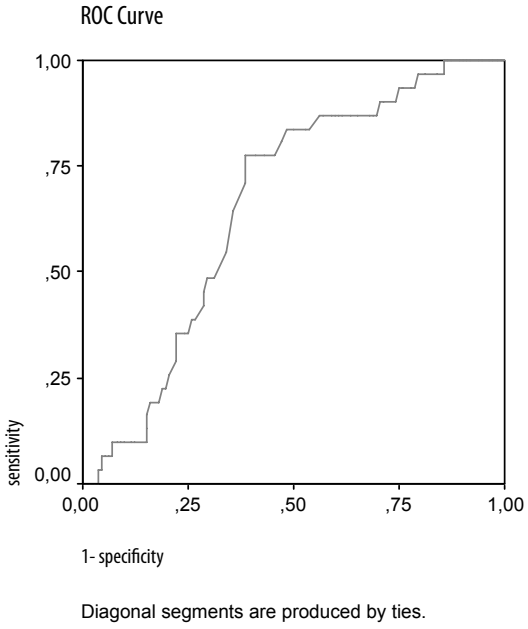

Figure 1. Receiver operator characteristics (ROC) curve for ALBPSQ total scores at baseline. The cut-off score of 72 is the point closest to the upper left hand corner.

DISCUSSION

The test-retest reliability score we found showed to be on a good level. In a prospective design sick leave appeared to be related to total item scores of the ALBPSQ at baseline. A cut-off score of 72 at baseline identified patients with or without long-term sick leave with a sensitivity of 77% and a specificity of 62%.

Our study concerned patients with acute neck pain in a primary care setting with possibly a great variety of causes.

The ALBPSQ contains four questions that were solely applicable for employed patients. In our study 18% of patients were unemployed, and were unable to answer the questions concerning work. The proposed correction for these missing values as suggested by Hurley et al could introduce a form of inaccuracy.[13] In the questionnaire we left out one item asking for radiating pain to lower back and leg. We found this item not appropriate for the presented study in which only patients with acute neck pain were included. This implicated that our questionnaire could only reach a 10-point lower maximum score of 200 instead of 210 in the original questionnaire.

Our ICC on the ALBPSQ is comparable with the reliability figures reported in other studies.[10,15] Linton and Halldèn found in a pilot study of 27 people, a Pearson Product Moment correlation score on reliability of r=0.83[10] and they judged the

ALBPSQ to have acceptable validity. Linton and Boersma reported for the ALBPSQ a test-retest score of 0.80 without giving any further details.[15] This means that more research have to be done to investigate the validity and reliability of the ALBPSQ.

We found a substantial lower optimal cut-off point compared to other studies while sensitivity and specificity percentages were comparable. Linton and Halldèn[10] found in a cohort of patients with acute and chronic musculoskeletal complaints in primary care a cut-off point of 105 (Se 75%, Sp 85%.).[10] Linton and Boersma replicated the study previously undertaken by Linton and Halldèn with patients with (sub)-acute back and neck pain in primary care.[15] They found an optimal cut-off point of 90 (Se 67% for sick leave <30 days, Sp 65%.). Hurley et al.[13] found a cut-off score of 112 (Se 80%, Sp 59%.) in a study with patients treated with physiotherapy for (sub)acute low back pain. Included patients in these studies differ in pain sites, duration of complaints as well as in setting (primary care or secondary care). Referral might introduce a form of selection bias in the direction of more severely affected patients. [18,19] We included in our cohort a reasonable amount of patients with only mild complaints; which might be typical for a general practice setting. This could possibly explain the lower cut-off score we found.

How high should sensivity and specificity figures be for a diagnostic test to be of value in primary care? In general it should be high enough to make it stimulating to use the questionnaire as a diagnostic tool. There is no accepted general rule for the required level of these figures. In general practice high sensitivity figures seem more important than high specificity figures. A false negative finding (missing patients at risk for long term sick leave) seems less acceptable than over diagnosing. The specificity percentage on the ALBPSQ seems high enough to encourage the use of the ALBPSQ in primary care settings.

In conclusion, the ALBPSQ has shown to be potentially useful in a screening procedure for neck pain patients at risk for prolonged sick leave. Prediction for future sick leave can, to some extent, be performed already in the first consultation by the general practitioner. The questionnaire may give the clinician the possibility of a first check of patients at risk for chronicity, which may help preventing unnecessary treatments and optimise management.

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Chapter 4

Clinical Course and Prognostic Factors in Acute Neck Pain; an inception cohort study in General Practice

submitted

ABSTRACT

Objective: To describe the natural course of patients with acute neck pain presenting in general practice and to identify prognostic factors for recovery and sick leave.

Design: We conducted a prospective cohort study with a one–year follow-up in general practice. Questionnaires were collected at baseline and after 6, 12, 26 and 52 weeks. Days of sick leave were dichotomised into two groups: below and above 7 days of sick leave. Logistic regression was used to identify prognostic factors for recovery and sick leave.

Patients: Consecutive patients with non-specific neck pain lasting no longer than six weeks were invited to participate.

Results: 187 patients were included and we have follow-up data of 138 patients (74%). After one-year 76% of the patients stated to be recovered, but 47% still reported neck pain complaints. Almost half of the patients on sick leave at baseline returned to work within 7 days. Multivariate analysis showed that the highest association with recovery was the advice of the GP "to wait and see" (OR 6.7; 95% CI 1.6-31.8). For sick leave referral by the GP, for physical therapy or to a medical specialist, showed the highest association (OR 2.8; 95% CI 1.0-8.4).

Conclusion: Acute neck pain had a good prognosis for the majority of patients but still a relatively high proportion of patients reported neck pain after one-year follow-up. Mainly the advice, given by the GP "to wait and see", is associated with recovery and referral by the GP is associated with prolonged sick leave.

INTRODUCTION

Neck pain is a common condition in the general population affecting many people at some point in life. Point prevalence's in the open population reported by most studies show figures ranging from 10% to 15% [1]. Twelve-month period prevalence's are reported as high as 40%. In most studies prevalence figures for women are higher than for men [2-4]. A higher prevalence of neck pain for women is observed both in the general population and in selected populations [5]. Neck pain prevalence increases with age for both men and women, but above the age of fifty the prevalence does not rise anymore [6,7].

Neck pain is not life threatening but it may cause pain, stiffness, and restriction in daily life and can therefore have a major impact on the quality of life [1]. Apart from human suffering, disorders of the neck often necessitate sick leave and are therefore responsible for substantial costs to society [8]. Neck pain is one of the major musculoskeletal complaints for which health care is sought and contributes substantially to the work load in general practice. In the Netherlands neck pain contributes up to 1% of general practitioners consultations [9].

In general, there is a lack of information on the clinical course of acute neck pain in primary care. Borghouts et al. [10] found in their systematic review 21 studies on the clinical course of acute and chronic neck pain. Twelve studies concerned a secondary setting, eight studies were from an occupational setting but only one was carried out in a primary care setting [10]. They reported a lack of insight into the course of acute neck pain in primary care. Neck pain is regarded as a self-limiting condition in which recovery occurs in most cases without any medical treatment. On the other hand disabling neck pain is reported for 5% of patients in a population survey [11,12].

A number of studies were performed in order to identify prognostic factors for neck pain [10,13,14]. Most frequently reported prognostic factors are age, sex, pain severity, a history of neck pain, concomitant low back pain, pain duration, occupation, previous trauma and radiological findings [1,13,14]. Health care attention should focus on those patients with an expected slow recovery from neck pain [15]. Knowledge of prognostic factors to distinguish between patients with a good prognosis and those with a less favourable prognosis can be helpful for that purpose.

Relations between chronic neck pain on the one hand and physical, occupational and psychological risk factors on the other have been investigated in many studies. The research activities appear to focus on certain occupations, for example office work, assembly line work and industrial work including heavy labour

[1,3,16]. These and other studies showed that work related as well as non-work related psychosocial risk factors are important determinants for chronicity [9].

It is disputed whether a whiplash-type of trauma is a relevant factor for the development of chronic neck pain. Some studies found that the prevalence of chronic neck pain was associated with a history of injury and state that it is a distinct and separate risk factor apart from the other predictors of chronic pain [17,18].

The primary aim of our study was to describe the clinical course of patients with acute neck pain in general practice in a one–year follow-up study. The secondary aim was to identify prognostic factors for self perceived recovery and prolonged sick leave.

METHODS

Study population.

General Practitioners (GP) working in the city of Rotterdam and the suburban region were invited to participate in this study. The study design was a prospective cohort study with a follow-up period of one year. A priori we aimed at including 200 patients with acute neck pain. A generally accepted time-based classification of neck pain is threefold: acute (0-6 weeks), subacute (6-12 weeks) and chronic (> 3 months) [19]. At baseline consultation consecutive patients with first time or recurrent acute neck pain, lasting no longer than six weeks, with a pain free interval of at least three months, were invited to participate in this study. Additional inclusion criteria were: age above 18 years and sufficient knowledge of the Dutch language to be able to complete written questionnaires. Excluded were patients with specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, referred pain from internal organs). A patient could be included only once during the follow-up period. After oral consent the GP handed over an envelope containing the baseline questionnaire, a patient information form concerning the content of the study, an informed consent form and a prepaid return envelope. Only after having returned a completed baseline questionnaire as well as a written informed consent patients were included in the study. Approval for this study was obtained from the Ethical Committee of the Erasmus University Medical Centre.

Non-responders.

Non responders were defined as patients who were approached by their GP to participate but finally did not cooperate. At baseline the GPs filled in a short form

of all patients they asked to participate in the study. GPs were asked to report date of birth, gender, reported cause of neck pain, outcome of physical examination, diagnosis and proposed diagnostic and treatment modalities. We asked the GP to send the short forms immediately after the visit. From the received short forms birth dates were matched with the included cohort to identify the non-responders.

Explanatory variables.

The baseline questionnaire contained questions on age, gender, employment status, previous history of neck pain and (if any) treatments for neck pain, duration, localisation and self-reported cause of current neck complaints, previous and concomitant headache, smoking habits and sudden onset of the neck pain. Patients were asked if they were on sick leave because of neck pain. They were also asked which treatments, advices and referrals were given by the GP. Patients scored their average severity of neck pain on an 11-point numerical pain rating scale (NRS), ranging from 0 (no pain) to 10 (unbearable pain). The NRS validity and reliability are well established [20]. Patients completed the Neck Disability Index (NDI) as well as the Acute Low Back Pain Screenings Questionnaire (ALBPSQ). The NDI is a ten-item disability questionnaire containing questions on three different domains: pain intensity (neck pain, headache), work related activities (work, lifting, and concentration) and non-work related activities (personal care, reading, driving, sleeping and recreation) [21]. Patients choose one out of six answer categories for each item describing the degree of disability from 0 (no activity limitation) to 5 (major activity limitation). All items are summed up, thus the total score ranges between 0-50. The ALBPSQ is a bio psychosocial screening instrument [22]. The questionnaire is composed of 20 items divided in five domains. The questions deal with background, physical functioning, fear-avoidance beliefs, work, the experience of pain and reactions to pain and miscellaneous. Patients scored their answers on an 11 point rating scale thus total score ranges between 0-200 points.

Patients received a follow-up questionnaire 6, 12, 26 and 52 weeks after baseline. Patients were asked if they still experienced neck pain or had a recurrence and to rate their current pain level on the NRS. Patients judged for themselves whether the current pain period should be classified as ongoing or recurrent. We asked if the patient was still on sick leave due to neck pain and, in case of resuming work, how many days they had been on sick leave. Patients also completed the NDI and ALBPSQ. When a successive questionnaire was not returned within two weeks, the patient received a written reminder, followed by an additional telephone call two weeks later.

Outcome measures.

Recovery and sick leave days were chosen as outcome variables. Both outcome measures have been used in similar methodological studies [13,14,18,22]. The follow-up questionnaires contained questions about the total days of sick leave. Patients rated their perceived recovery on a separate 7-point ordinal scale. The scale ranged from 1 (complete recovery) over 4 (no change) to 7 (my complaints are worse than ever). The perceived recovery scale has been frequently used in outcome studies and was validated before [23,24].

Statistical analysis.

Frequencies, means and standard deviation of the explanatory variables and the outcome variables were determined. The same accounts for each item and total scores on the NDI and ALBPSQ. Descriptive statistics was used to calculate the frequencies and means of the outcome variables sick leave and recovery. Differences between responders and non-responders were assessed with a student t-test for independent samples. Non responders were defined as patients who were approached by their GP but decided not to participate. Means of the NRS scores are presented graphically. Frequencies on the perceived recovery scale and sick leave days in every follow-up questionnaire were calculated and graphically presented. Recovery was defined as the joint score 1 ("I am completely recovered") and 2 ("I am much improved") on the perceived recovery scale. The remaining scores were considered as not recovered. The sick leave score was the total of the self-reported days absent from work, due to neck pain, during the follow-up year, whether it was continuous or recurrent. After data collection we dichotomised "days of sick leave" into two groups: less than 7 days of reported sick leave and otherwise 7 days or more. We agreed that several days of sick leave was acceptable and this was also the median time off for those taking sick leave.

Univariate and multivariate logistic regression analysis was performed with "recovery" at 12 months and "sick leave" as the outcome measures. Explanatory variables were controlled for there interdependent correlation by means of a correlation matrix. Variables with a correlation factor above 0.90 were removed. After univariate analysis, variables with a $p< 0.1$ were entered in a final multivariate regression model by means of the backward Wald method. Odds ratios, 95% CI interval and Beta values were calculated. Negative or positive Beta's refer to a negative or positive relation between an individual variable and outcome. The proportion of correctly classified patients with the final model was calculated. We corrected for age and gender by including them in the final analysis. Nagelkerke R square represents the explanatory variance of the model.

Whether non response due to drop-outs during the follow-up year was selective and caused bias was evaluated separately. We imputed the last known data on recovery of every drop-out in the final follow-up outcome data. Imputing in this way is known as the "last measurement carried forward" procedure. Univariate and multivariate logistic regression analysis were performed with available cases and also with imputed data. Imputing will generally result in more conservative results. A higher number of patients will result in less wide confidence intervals in the final model.

All statistical analyses were carried out using the SPSS version 10.0 for Windows program.

RESULTS

Study population.

Twenty-nine GPs enrolled patients during the recruitment period from March 2001 until August 2002. 249 patients with acute neck pain were asked by their GP to join the study and were simultaneously handed over the information packet. 190 patients (76%) responded and returned the baseline questionnaire and the signed informed consent form. Three patients did not meet the inclusion criteria and were excluded (two patients had chronic neck pain and one patient was too young). Finally 187 patients formed our inception cohort. Patient characteristics at baseline are presented in table 1.

Patients were predominantly younger females. Most patients had experienced neck pain episodes before (63%) and had received previous treatments for this complaint. Mean duration of neck pain at baseline was 16 days (SD 13.1). Pain at multiple localisations is common (81% had one or more complementary pain sites). Motor vehicle accidents form a substantial self-reported cause of neck pain (23%).

There were significantly more male (51% versus 36%; $p<0.05$) non-responders ($n=59$). Although non-responders were on average younger (36.8 versus 40.0 years), age as well as the other variables that were taken into account did not differ significantly.

Follow-up:

At the one year follow-up 138 patients (74%) participated. Almost half of the initial cohort (47%) still experienced neck pain and 5.6% of the patients reported a recurrence.

Table 1. Patient characteristics of the study population at baseline (*n=187*).

	n (percentages)	mean age	(SD)
Gender female	119 (64)	38.2	(13.3)
male	68 (36)	43.2	(14.9)
Employed Yes/No	148 (79)		
Had previous episodes of acute neck pain Yes/No	118 (63)		
Underwent previous treatment for neck pain Yes/No	74 (40)		
Duration of acute neck pain shorter than two weeks	79 (42)		
*Pain radiating to: shoulder(s)	104 (56)		
arm(s)	69 (37)		
back	10 (5)		
between shoulder blades	76 (41)		
Neck pain accompanied by headache Yes/No	117 (62)		
On sick leave due to neck pain	53 (28)		
Self-reported cause of neck pain:			
Spontaneously / unknown	70 (38)		
Due to a motor vehicle accident	42 (23)		
Noticed after waking up	32 (17)		
After a fall or hitting the head	13 (7)		
Sudden onset	12 (6)		
Stress	10 (5)		
Work related	8 (4)		

* Note that the total of this item is more than 100% because patients could indicate more than one area where they experienced radiating pain.

Recovery: the scores on the perceived recovery scale during the follow-up year are presented in figure 1.

Two thirds of the patients stated at six weeks after baseline that they regarded themselves recovered. During the rest of the follow-up year an additional 10% reported themselves to be recovered.

Sick leave: the scores regarding sick leave during the follow-up year are presented in figure 2.

At baseline almost one-third (*n=52*) of the employed patients (*n=148*) reported to be on sick leave. Almost half of the patients on sick leave returned to work within 7 days. At baseline sick leave of the male patients was somewhat higher then the female patients (38% versus 33% of employed patients). After one year none of the men was absent from work any more and four women (8%). The duration of the self-reported periods of sick leave were: up to one week for 37% of patients, between one week and one month for 22%; between one and three months for 20%, and above three months for 21% of patients.

Pain: mean scores on the numerical pain rating scale (NRS) are presented in figure 3.

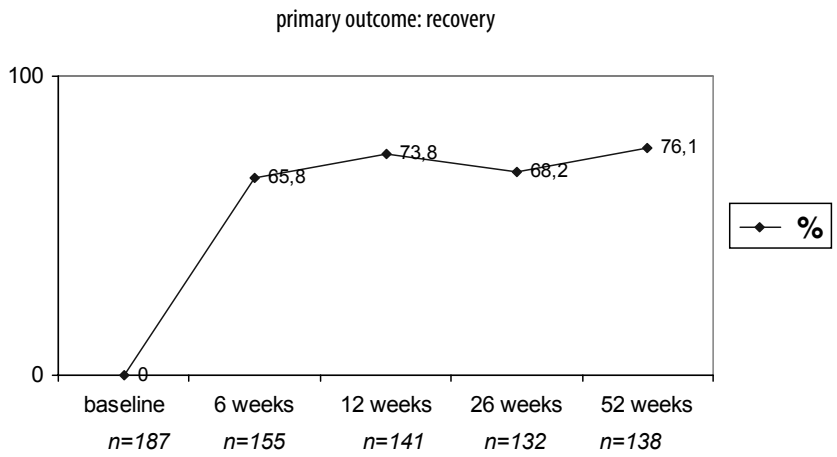

Figure 1. Percentages and number of patients stating at successive measurement points to be recovered.

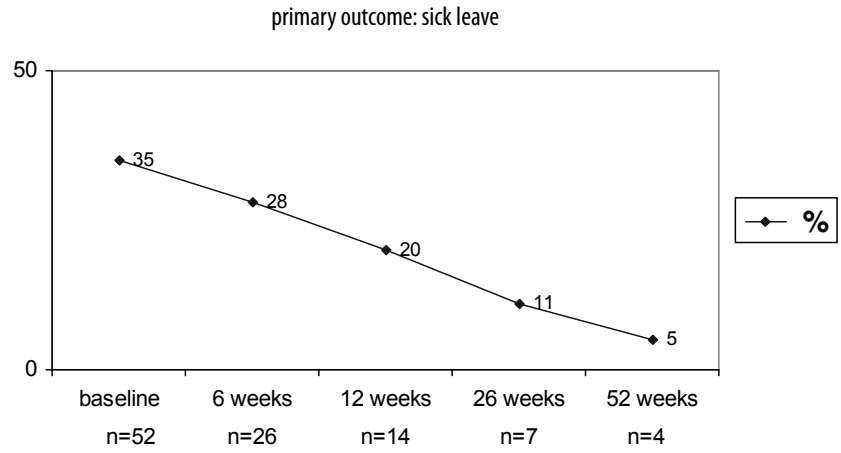

Figure 2. Percentages and number of employed patients that reported to be on sick leave during the follow-up year.

At baseline the mean score on the NRS was 6.4 (SD 2.0). After one-year mean scores for not recovered patients dropped to 5.3 (SD 1.6) and for recovered patients to 2.8 (SD 1.8). Although patients stated to be recovered, they still reported to experience pain, although of much less intensity. After one year follow-up only five patients scored a four or higher on the NRS. The mean total score on the NDI at baseline was 14.4 (SD 6.5) and at the end of follow-up for recovered and non-recovered patients respectively 4.5 (SD 4.3) and 14.3 (SD 6.5). For the ALBPSQ the baseline score was 71.3 (SD 32.2) and for recovered and non-recovered patients 49.8 (SD 28.2) and 87.9 (SD 25.4) respectively.

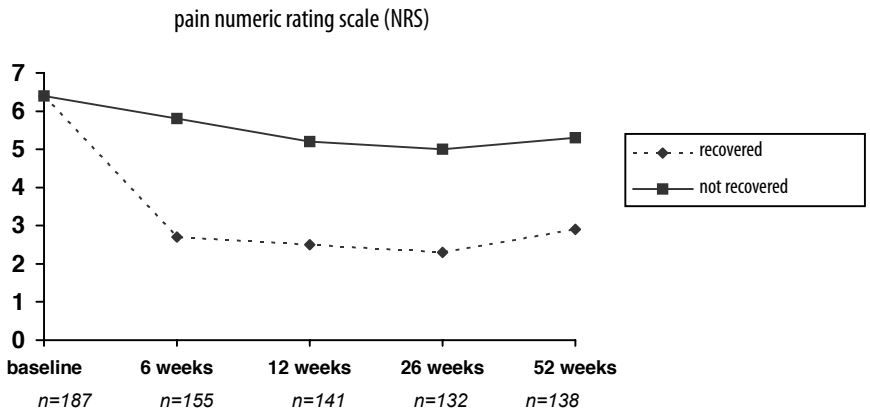

Figure 3. Mean score on the numerical pain rating scale (NRS) for recovered and not-recovered patients during the follow-up year.

Prognostic factors.

Recovery: univariate regression analysis revealed 12 items that were significantly correlated with recovery after 12 months, and after multivariate analysis five items remained (see table 2). The explanatory variance of the model was 38%. The final model correctly classified 83% of patients.

The highest Odds Ratio for recovery was the advice given by the GP at baseline "to wait and see" for an expected favourable natural course (OR 6.7). In the final model "female gender", "radiating pain to the upper part of the neck" and "radiating pain to the back" and "duration of complaints longer than two weeks at baseline" all had a negative association with outcome, meaning that their presence diminishes the chance of recovery.

Sick leave: after one year we gathered data on sick leave of 109 employed patients (74%). Ten items were significantly associated with prolonged sick leave in the univariate regression analysis. After multivariate analysis five items were significantly related to prolonged sick leave (see table 3). The explanatory variance of the model was 38%. The final model correctly classified 79% of patients with prolonged sick leave.

For sick leave "referral by the general practitioner" had the highest positive association (OR 2.8) followed by "the GP made a follow-up appointment" (OR 1.7). The variables concerning actions undertaken directly by GPs had a positive association with sick leave. Imputing data of 30 patients (16%) in a "last measurement carried forward procedure" did not reveal significant differences in the outcome "recovery" as well as in the outcome "sick leave". Therefore we only present data on available cases and none after imputement of data

Table 2. Prognostic factors significantly associated with **recovery** after one year by univariate (p<0.1) and multivariate (p<0.05) logistic regression analysis (*n=138*).

	Univariate analysis	Multivariate analyses
Item	Beta Odds ratio (90%CI)	Beta Odds ratio (95%CI)
Female gender	-0.9 0.40 (0.16-1.01)	-1.5 0.22 (0.07-0.72)
Had neck pain before	-0.2 0.83 (0.71-0.97)	
Treated by physiotherapist before	-0.4 0.80 (0.53-0.91)	
Treated by manual therapist before	-0.3 0.78 (0.60-1.00)	
Accompanying headache	-1.2 0.30 (0.12-0.74)	
Pain in the upper part of the neck	-0.5 0.61 (0.46-0.82)	-0.6 0.54 (0.39-0.76)
Pain radiating between shoulder blades	-0.2 0.85 (0.72-0.99)	
Pain radiating to the back	-0.4 0.69 (0.52-0.92)	-0.6 0.53 (0.35-0.81)
Duration of complaints >2 weeks	-0.9 0.41 (0.18-0.97)	-1.2 0.33 (0.12-0.91)
GP advised to wait and see	1.3 3.82 (1.08-13.4)	1.9 6.68 (1.58-31.8)
Total score on the NDI	-0.1 0.93 (0.88-0.99)	
Total score on the ALBPSQ	-0.2 0.98 (0.97-1.00)	

Table 3. Prognostic factors significantly associated with **sick leave** by univariate (p<0.1) and multivariate (p<0.05) logistic regression analysis (*n=109*).

	Univariate analysis	Multivariate analyses
Item	Beta / Odds ratio (90%CI)	Beta / Odds ratio (95%CI)
Had neck pain before	-1.0 0.35 (0.15-0.82)	-1.4 0.24 (0.09-0.68)
Had previous headache	-0.9 0.40 (0.16-1.00)	
Had physiotherapy for neck pain before	-0.4 0.70 (0.49-1.00)	
Caused by a motor vehicle accident	1.2 3.22 (1.31-7.89)	
GP made a follow-up appointment	0.4 1.45 (1.08-1.96)	0.5 1.67 (1.11-2.49)
GP advised to stop working	0.3 1.40 (0.99-1.99)	
Referral by GP for treatment	1.1 3.10 (1.07-8.99)	1.0 2.76 (1.01-8.39)
Patients did exercises for the neck	-0.2 0.78 (0.66-0.93)	-0.2 0.82 (0.67-1.00)
Total score on NDI	0.1 1.13 (1.06-1.22)	0.1 1.12 (1.03-1.20)
Total score on ALBPSQ	0.0 1.00 (1.00-1.04)	

DISCUSSION

At the end of follow-up 76% of patients stated to be recovered although almost half of patients still experienced some neck pain. The advice from the GP "to wait and see" for an expected favourable course was the strongest predictor for recovery after one-year. For the outcome prolonged sick leave referral by the GP, for physical therapy or to a medical specialist, was the strongest predictive variable.

This study has some limitations. The drop-out number during follow-up was acceptable and we believe that it did not influenced the results we presented. Although it is possible that the drop-outs were more severe cases that did not resolve or whose pain recurred, making the proportion of improvement look better than it actually was. On the other hand, if the drop-outs were patients who recovered completely and did not bother to participate anymore, the proportion of recovery may have been underestimated. We have surveyed the drop-outs for recovery as best as we had available data but found no indication for either one of the posed biases. The study size was moderate resulting in a restriction of the number of prognostic variables that could be used in the final analysis. Another restriction of our study could be that patients with all sorts of self-reported causes were included in the cohort. It might be possible that different prognostic factors are associated with different causes of neck pain but we did not investigate this aspect. On the other hand the diversity of causes in our cohort represents the broad spectrum of patients characteristic for general practice.

Data on the natural course of acute neck pain are sparsely available [1,10,25]. Almost half of patients stated to be recovered or much improved within the first week. A quick recovery seems familiar in primary care back pain research when patients are included shortly after the onset of symptoms [28].

It is generally assumed that the percentage of people in whom neck pain becomes chronic with at least mild to moderate symptoms is about 10% [9,17]. More recent studies report higher percentages of patients still having neck pain after one or more years of follow-up [25]. In our study 47% of patients (38% men and 51% women) still experienced (some) neck pain after one year. The one year prevalence of neck pain in literature ranges from 18 to 66% [12,18,26,27]. The recurrence rate we found was rather low. We defined neck pain as a new episode after a 3-month period free of neck pain. This period is rather arbitrary given the high percentage of patients that reported to have experienced one or more episodes of neck pain before. So we have to be cautious to draw a conclusion on recurrence rates. Neck pain is currently thought to run a recurrent and intermittent course rather than a picture of relentless or continuous symptoms [18].

There was a decrease in reported sick leave indicating that the majority of patients was only moderately affected. In general the number of patients with musculoskeletal complaints is 3-4 times higher than the number of patients on sick leave. Our study is no exception to that rule [15,28,29]. In occupational settings the same proportion is found in almost all regional musculoskeletal pain sites. This finding suggests that in a prospective cohort study in general practice as well as in occupational settings patients continue their regular work while experiencing musculoskeletal pain.

We identified several factors of prognostic value for recovery. In particular the advice given by the GP "to wait and see" for an expected favourable course appeared to be a strong predictor. So far no other studies in neck pain research mentioned this finding. In our study the GP showed to have a good feeling for the prognosis of neck pain. In the Netherlands the GP is the gatekeeper of health care and has a long-lasting relationship with most patients and is therefore familiar with their sickness behaviour. The question arises if the predictive power of the GPs advice is caused by the convincing strength of the advice itself or is due to the GPs selection of probably more severely affected patients the advice is given to. Being female turns out to be a negative prognostic factor and has been reported before [2-4]. Why the female gender has a worse prognosis is unknown up till now. "Radiating pain to the back" as a predictive factor correlates with the finding that multiple pain sites are involved in most musculoskeletal complaints.

Five factors correlated in the multivariate analysis with prolonged sick leave. Two of them concerned actions of the GP and were all positively correlated. Referral by the GP is the most important predictor. Referral means in this situation creating a negative selection of more severely affected patients. The intention of the GP probably is that referral has a beneficial effect on the recovery of his patient. In practice it could well work controversially to the desired effect.

Another significant prognostic factor for sick leave was the GPs initiative to make a follow-up appointment. In general, the GP in the Netherlands does not make follow-up appointments at the end of the consultation. Normally the consultation ends with a general remark like "please return when your complaint does not resolve on its own within 14 days".

Previous periods of neck pain turned out to be a significant prognostic factor with a slight negative correlation with prolonged sick leave meaning that it is associated with less sick leave. Other authors reported that previous complaints of the neck (when medical care was sought) to be significant predictors for future sick leave due to these complaints [14,30,31].

The possibility that performing exercises for the neck, on the patients own initiative, has a positive influence on sick leave is an interesting finding. Perhaps it reassures the patient in the conviction that he can overcome the problem on his own. We however need to be cautious in drawing conclusions about effectiveness in an observational study.

When patients state to be recovered they mean something different than being completely free of neck pain. This finding has implications for reviewing literature. It underlines the necessity to give a sharp definition of the used outcome measures in research, otherwise it hampers comparing results of different studies. A notable finding in this study is that different prognostic factors appeared to be

relevant depending on what kind of outcome measure was chosen. We agree with the suggestion Kjellman et al. gave that researchers should take into consideration that the prognostic factors that appear in an analysis are clearly associated with the outcome measure that is used [32]

Conclusions

This study confirms the finding of others that acute neck pain does not have the favourable natural course it is generally thought to have. Although patients consider themselves recovered, still having neck pain is a common and seemingly accepted fact for many patients. Most patients reported that the pain intensity is on a substantial lower level and probably hardly of clinical importance. This emphasizes the need in future research for a clear definition of the often used outcome 'recovery'. Different outcome measures are associated with different prognostic factors. In reviewing the literature one should bear this in mind. The influence of the GPs advices and referrals as a predictive value for recovery and prolonged sick leave are a new finding. Further research to underline the relationship between GPs actions and outcome is needed.

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Chapter 5

Management of Acute Neck Pain in General Practice; a prospective study

accepted for publication in the British Journal of General Practice.

ABSTRACT

Aim: The aim is to describe the management by the general practitioner (GP) of acute neck pain patients. Diagnostic and therapeutic procedures undertaken by the GP and self-care in patients will be described.

Design: We conducted a prospective cohort study in general practice in the Netherlands with one year follow-up.

Methods: Patients consulting their GP for non-specific acute neck pain lasting no longer than six weeks were invited to participate. Questionnaires were collected from patients at baseline and after 6, 12, 26 and 52 weeks. Patients rated their recovery on a 7-point ordinal scale.

Results: In total 187 patients were included. At baseline for 42% of patients the GP prescribed medication, mostly NSAID's (56%) or muscle relaxation medication (20%) and 51% was referred to a physiotherapist. Referred patients reported at the end of the follow-up year in 74% to be recovered, non-referred patients reported in 79% recovery.

Frequently given advices by the GP were: to "wait and see" (23%), to "improve posture" and "stay active" (22%) or to "take a rest" (18%). Self care by patients constituted mainly in different sources of heat application (79%) and exercises (57%). Complementary medicine was used in 12%. 39% of patients visited their GP again during follow-up. Consultation of a medical specialist and ordering X-rays rarely occurs.

Conclusion: The management by the GP seems to constitute of two almost equal directions: namely a policy to "wait and see" for an expected favourable natural course supported by medication and otherwise referral to a physiotherapist.

INTRODUCTION

Neck pain is one of the most common musculoskeletal complaints. About two-third of the population will experience neck pain at some point in their life.[1,2] In a Canadian study the age standardized 6-month prevalence of low disability neck pain was 40%.[2]

Prevalence rises with age for both men and women and is the highest in the age group between 50-59 years.[1,3] In general, women are almost twice as much affected as men.[4,5] Prevalence rates of neck pain in general practice has been estimated to be between 18 and 23 per 1000 registered patients per year.[6,7] The percentage of people in whom neck pain becomes chronic is generally thought to be about 10%.[1,8]

Disability and sick leave figures for neck pain are substantial but in general on a lower level than low back pain figures.[1] Although most people are only mildly disabled, neck pain may cause severe disability in 5-10% of affected people.[2,9]

Only 15% - 27% of individuals seek a health care provider for their neck pain.[12,13] In a telephone survey in eight countries in Europe, 27% of patients had never sought any medical help for their musculoskeletal pain, including neck pain.[12] In Sweden, data from a population survey on neck pain showed an estimated 15% GP consultation rate.[13] That means that only one out of seven people with neck pain visited the GP. In the Netherlands neck pain contributes up to 1-2% of general practitioner consultations.[1,14] In general, reasons for visiting the GP are: higher pain levels, disabling neck pain and multiple pain sites.[4,8,13]

GPs showed a large variety regarding the management of neck pain.[15] A lack of clinical guidelines and effective therapeutic interventions for neck pain could give rise to a great variety in treatments and referrals. Little is known which diagnostic and therapeutic modalities are applied to patients with acute neck pain. The aim of this study was to describe the management by the GP of patients with acute neck pain. Frequency and directions of diagnostic and therapeutic procedures undertaken by the GP and self-care in patients will be described.

METHODS

Study population.

General practitioners working in the city of Rotterdam and the suburban region were invited to participate in the study. Forty-one GPs agreed to participate and finally twenty-nine GPs enrolled patients during the recruitment period from March 2001 until August 2002. The study design was a prospective cohort study with a

follow-up period of one year. At the baseline consultation consecutive patients with first time or recurrent acute neck pain, lasting no longer than six weeks, with a pain free interval of at least three months, were invited to participate in the study. Inclusion criteria were furthermore: age above 18 years and sufficient knowledge of the Dutch language to be able to complete written questionnaires. Excluded were all patients with specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, referred pain from internal organs). After oral consent the general practitioner handed over an envelope containing the baseline questionnaire, a patient information form concerning the content of the study, an informed consent form and a prepaid return envelope. Only after having returned a completed baseline questionnaire as well as a signed informed consent form patients were included in the study.

Questionnaires.

The baseline questionnaire contained questions on demographic variables, previous history and treatments for neck pain, duration and self-reported cause of current neck complaints, previous and concomitant headache, radiating pain, smoking habits and sudden onset. Patients were also asked which advises were given by their GP, which medication was prescribed, whether the patient was referred for treatment or further examinations, and if a follow-up appointment had been made? We also asked the patient what treatments they had applied on their own initiative.

Follow-up questionnaires were sent after 6, 12, 26 and 52 weeks. Patients were asked if they still experienced neck pain or had a recurrence and therefore consulted their GP again. We specifically asked whether the patient actually visited the health care provider after referral. Patients rated their perceived recovery on a 7-point ordinal scale. The scale ranged from 1 (complete recovery) over 4 (no change) to 7 (my complaints are worse than ever). If a successive questionnaire was not returned within two weeks, the patient received a written reminder, followed by a telephone call an additional two weeks later.

Non-responders were defined as patients that were approached by their GP to participate but finally decided not to cooperate. At baseline the GPs filled in a short form of all patients they asked to participate in the study. GPs were asked to report date of birth, gender, reported cause of neck pain, outcome of physical examination, diagnosis and proposed diagnostic and treatment modalities. Also the GP rated the pain level of the patient on an 11-point numerical pain rating scale, ranging from 0 (no pain) to 10 (unbearable pain).

We asked the GP to send the short forms immediately after the visit. From the received short forms birth dates were matched with the included cohort to identify non-responders.

Statistical analysis.

Descriptive statistics were used to present the frequencies and standard deviation (SD) of diagnostic and therapeutic modalities and referrals. Frequencies of the perceived recovery scale were calculated. Patients scoring 1 on the 7-point perceived recovery scale ("I am completely recovered") and 2 ("I am much improved") were joined together and considered to be "recovered", the remaining scores were considered as not recovered. Differences between responders and non-responders were assessed by a student *t*-test. A *p* value of 0.05 was used as criterion for statistical significance. All statistical analysis was carried out using the SPSS version 10.0 for Windows program.

RESULTS

Study population.

At baseline 249 patients with acute neck pain were asked by their GP to participate in the study. In total 190 patients (76%) responded and returned the baseline questionnaire and the signed informed consent. Three patients did not meet the inclusion criteria and were excluded (two patients had chronic neck pain complaints and one patient was too young). Finally 187 patients formed our inception cohort. Patient characteristics are presented in table 1.

Patients were predominantly younger females. Most patients had experienced neck pain episodes before (63%) and had been treated for this complaint. Concomitant pain in the shoulder, arm or lower back was reported by 81% of patients. Mean duration of neck pain at baseline was 16 days (SD 13.1). Motor vehicle accidents form a substantial cause of neck pain in this cohort (23%). In many patients the neck pain is accompanied by headache (62%). We found no difference in the mean score on the numerical pain rating scale as reported by patients and GPs at baseline.

There were significantly more male (51% versus 36%; p=0.032) non-responders (*n*=59). Although non-responders were on average younger (36.8 versus 40.0 years), age as well as the other variables that were taken into account did not differ significantly.

Table 1. Patient characteristics of the study population at baseline (*n=187*).

	n (percentages)	mean age	(SD)
Gender female	119 (64)	38.2	(13.3)
male	68 (36)	43.2	(14.9)
Employed Yes/No	148 (79)		
Smoking Yes/No	61 (33)		
Had previous episodes of acute neck pain Yes/No	118 (63)		
Underwent previous treatment for neck pain Yes/No	74 (40)		
Duration of acute neck pain shorter than two weeks	79 (42)		
*Pain radiating to: shoulder(s)	104 (56)		
arm(s)	69 (37)		
back	10 (5)		
between shoulder blades	76 (41)		
Neck pain accompanied by headache Yes/No	117 (62)		
Self-reported cause of neck pain:			
Spontaneously / unknown	70 (38)		
Due to a motor vehicle accident	42 (23)		
Noticed after waking up	32 (17)		
After a fall or hitting the head	13 (7)		
Sudden onset	12 (6)		
Stress	10 (5)		
Work related	8 (4)		

* Note that the total of this item is more than 100% because patients could indicate more than one area where they experienced pain beside the neck.

Follow-up.

At the one year follow-up 122 patients (65%) completed all six questionnaires; 138 patients (74%) returned one or more questionnaires of which 76% reported to be recovered. Diagnostic investigations and referrals are presented in table 2.

Physical examination was performed by the GP in 97% of baseline consultation. Not referred for a diagnostic investigation or therapeutic modality at baseline were 89 patients (48%). Referrals for further diagnostic investigation were limited; 15 patients (8%) were referred at baseline for X-rays and 2 patients (1%) to a neurologist. During follow-up an additional 8 patients (4%) were referred for X-rays and 9 patients (5%) to a neurologist or an orthopaedic surgeon.

Treatment modalities concerned mainly referral for physiotherapy (51%). A physiotherapist in the Netherlands delivers mainly traditional physical therapy treatments and sometimes manual therapy. For patients it is often not clear if they received traditional physical therapy or manual therapy. We combined both strategies under the heading physiotherapy. During the follow–up year an additional 23 patients were referred to a physiotherapist. In total 85% of referred patients for physiotherapy did actually visit the therapist. An additional five patients stated

Table 2. Referrals to medical specialists, physiotherapist or further investigations ordered as reported by patients (*n=187*).

	At baseline	During follow-up
	n (%)	n (%)
Physiotherapist	95 (51)	23 (12)
Medical specialist	2 (1)	9 (5)
Social worker	1 (0.5)	- -
X-rays neck	15 (8)	8 (4)
Blood tests	2 (1)	- -
Ultrasound	1 (0.5)	- -

they visited a physiotherapist without being referred by their GP. Patients who were referred to a physiotherapist reported at the end of the follow-up year in 74% to be recovered (40% was completely recovered and 34% much improved). Non-referred patients reported in 79% to be recovered (54% was completely recovered and 25% much improved).

Analgetic medication was significantly more often prescribed to the non-referred patients than to the referred patients (56% versus 29%; $p<0.001$). Therapeutic modalities are reported in table 3

Table 3. Therapeutic modalities applied or advised by the GP (*n=187*).

Modality	n (%)*
Advised the patient to wait and see for the natural course	42 (23)
Advised to improve posture and keep moving	41 (22)
Advised the patient to take a rest	33 (18)
Instructed the patient in home exercises	16 (9)
Advised to stop working and report on sick leave	6 (3)
Some other advice given	6 (3)
No advice given	3 (2)
Prescribed medication**	78 (42)

* Note that the total is more than 100% because the general practitioner could apply several modalities at the same time.
**More women (48%) received pain medications than men (31%) and women received more muscle relaxants (13%) than men (6%).

During the follow-up year 39% of the patients visited the GP again for their neck pain complaints and half of them twice or more. A follow-up appointment was made by the GP in 4% of all cases. Patients that revisited the GP were more often referred to physiotherapy (60% versus 49%) and reported less often to be recovered (56% versus 84%). Patients referred to the physiotherapist revisited the GP more often (44% versus 33%). For 42% of the included cohort the GP prescribed medication at the first consultation, mostly NSAID's (56%) or muscle relaxation medication (20%). A great diversity of advices was given. The following advices were frequently given by the GP: "to wait and see for an expected favourable natural course" (23%), to "improve posture" and "to stay active" (22%).

Reported self-care by patients is presented in table 4.

Patients reported a wide variety of applied modalities based on their own initiative. Various sources of heat application were the most used self-management strategy (79%). Trying to loosen a stiff neck by exercises or auto-manipulation was also often used (57%). None of the GPs prescribed the use of a soft collar but still nine patients reported to have used one. Five of them did so without a self-reported traumatic cause of their neck complaints. The belief that immobilisation of the neck is beneficial seems still present in 39% of patients. Twenty-three patients (12%) used complementary medicine, mainly later in the follow-up year. Most often used was reiki /energy healing therapy and acupuncture.

Table 4. Reported self care by patients at baseline and during the follow-up year (*n=187*).

Modality	*n* (%)*	
Other pillow	57 (30)	Tried another pillow
Sources of heat	148 (79)	Hot oilment, UV lamp, warm blanket/shower/bath, sauna, warm cloths, solarium
Did exercises	107 (57)	Neck loosening exercises; fitness training, improving posture
Take rest	64 (34)	Keeping the neck as still as possible, take a rest
Massage	13 (7)	Massage applied to the neck by others
Soft Collar	9 (5)	Used a soft collar
Adjusted work	8 (4)	Adjusted work or adjusted work load
Complementary medicine	23 (12)	Acupuncturist, chiropractor, craniosacral therapist, nature healer, reiki/ energy healing therapy, magnetiser

* Note that the total is more than 100% because patients could apply several modalities at the same time.

DISCUSSION

Summary of main findings

The management by the GP seems to constitute of two almost equal frequently applied directions: 1) a policy "to wait and see" for an expected favourable natural course often supported by medication and 2) referral to a physiotherapist with a more restricted support of medication. NSAID's are most often prescribed followed by muscle relaxants.

Strength and limitations of the study

The study population cannot be considered to be completely representative for the general population of patients with acute neck pain. Visiting the general practitioner already introduces a form of selection bias. Non response came mainly from younger males as has been reported before.[9,16]

Finally 29 out of 42 GPs (69%) who agreed to participate included one or more patients. This percentage is comparable to the ones found in other studies.[17,18]

Limited cooperation by GPs was reported before. [19,20] Half of the participating general practices were regularly including patients. The other half included just only one or two patients during the whole inclusion period. We compared characteristics of patients, included by GPs who recruited only a few patients, with those of the six most actively recruiting GPs. We found no significant differences in patient characteristics. We estimated the number of eligible patients by full cooperation of participating GPs to be 325 patients. The total of 249 patients who were approached to participate in the study seems acceptable in this respect. The study size was moderate with an acceptable response rate over the follow-up year, in line with other cohort studies on neck pain. [15,23] Our study concerned patients with acute neck pain in a primary care setting with a great variety of self-reported causes representing the wide spectrum of patients' characteristic for general practice.

Comparison with existing literature

A high proportion of patients was referred for physiotherapy. In chronic neck pain referral rates for physical therapy vary between 40% - 50%.[15,21,22] In our study an even higher proportion of patients was eventually referred. The question arises if this is justifiable in the absence of evidence-based guidelines that support these actions.[23] A cost-effectiveness study in patients with chronic neck pain between physiotherapy and GP care favours physiotherapy (in specific manual therapy) to be more cost-effective.[24] In our study referred patients had no significant different outcome but that does not imply that physiotherapy is not effective. It is probably merely the result of the selection process the GP makes at the first consultation.

GPs reported more referrals to a physiotherapist than patients did. In two retrospective studies on chronic neck and low back pain a greater proportion of actual visits to a physiotherapist was found than reported referrals by the GPs.[15,25] Reasons for these differences could be that referrals are not always accurately registered by GPs and that patients not always follow the advice of the GP. The use of complementary medicine increased up to 12% during follow-up. Cross-sectional studies on chronic pain present higher percentages, between 18% and 28%, of complementary medicine use.[26,27] In our study all visits to complementary medicine were self-referrals and happened mainly during the chronic phase of neck pain.

Only 39% of patients visited their GP again for their neck pain complaints during the follow-up year and half of them did so twice or more. In retrospective studies in chronic neck pain revisiting percentages between 41% and 50% were found [8]; 45% in chronic musculoskeletal pain [5] and 80% in low back pain.[25] The somewhat limited number of revisits for neck pain in our study may indicate that

neck pain in general has a more favourable natural course. Revisiting frequencies are in general affected by factors like perceived health, disabling neck pain, female gender, number of pain sites and psychological status.[28] Another explanation for the relatively lower revisiting rates could be that patients have less high expectations of GP help for neck pain being beneficial.[23]

Little is known which self care management actions patients take to relieve their complaints This study shows that all sorts of heat application are still the most popular form of self care.

A substantial part of GPs gave the advice to keep the neck as rigid as possible. A high percentage of patients was also immobilising the neck despite the current tendency in the management of neck and back pain toward early reactivation and avoidance of inactivity.[29] Although there is still no proven effective treatment for acute neck pain it is now generally accepted that staying active is likely to be more beneficial than taking rest.[30] Seemingly it takes a lot of effort before patients as well as general practitioners are familiar with new treatment insights.

The referral rate for X-rays was in our view restricted and probably reflects the generally accepted belief among GPs that X-rays in case of non-specific acute neck pain is not helpful for diagnosis.

Implications for clinical practice and future research

The bivariate strategy the GPs follows seems to fit very well the natural course of acute neck pain. The policy to "wait and see" in which consultation of a medical specialist and X-rays play a numerical subordinate role complies with the fast recovery of almost half of the patients. The GP plays especially an important role in excluding specific causes of neck pain. Only then a policy "to wait and see" can be acceptable for the patient as well as for the doctor. The question arises what the supplementary value for the patient could be of visiting the GP given the use of a great variety of self-care modalities. The limited role the GP further plays in patients with neck pain possibly underlines the patient's perspective on the GPs role in the management of acute neck pain. Expectations of their role in acute neck pain seem to differ substantially between patient and GP. Future research should focus on this aspect and also on patient's preferences.

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Chapter 6

Impact of Motor Vehicle Accidents on Neck Pain and Disability in General Practice

submitted

ABSTRACT

Study design. Prospective cohort study with one year follow-up.

Objective. To compare the differences in perceived pain and disability in patients with acute neck pain due to a motor vehicle accident (MVA) versus other self-reported causes. The secondary aim was to identify prognostic factors for continuous neck pain.

Summary of background data. High levels of continuous neck pain after a MVA are reported in cross-sectional studies. Knowledge of this association in general practice is limited.

Methods. Patients above 18 years of age consulting their general practitioner (GP) for non-specific acute neck pain were invited to participate. Self-administered questionnaires were collected from patients at baseline and after 6, 12, 26 and 52 weeks. The numerical pain rating scale (NRS) and the Neck Disability Index (NDI) were measured. Regression analysis was used to identify prognostic factors with continuous neck pain as outcome measure.

Results. Out of 249 patients that were asked to participate 190 patients responded (76%) and 187 patients were included. The MVA subgroup (n=42) was significantly younger ($p< 0.01$), reported more sick leave ($p<0.05$), had higher levels of headache ($p<0.001$) and higher NDI scores at baseline ($p< 0.02$) but lower scores for previous neck pain and radiating pain in the arm compared to the remaining cohort. At follow-up the MVA subgroup had higher scores for continuous neck pain (63% versus 40%) and the NDI (11.0 versus 7.1). After multivariate analysis "duration of complaints at baseline longer than two weeks" Odds Ratio (OR) = 5.3, a "MVA" (OR = 5.3) and "pain in the upper part of the neck" (OR = 1.6) were significantly correlated with outcome.

Conclusion. Individuals exposed to MVAs constitute a relevant subgroup of patients with neck pain in general practice. A MVA as well as a longer duration of complaints are predictive factors for continuous neck pain at follow-up.

INTRODUCTION

Neck pain is a common complaint [13]. In a population survey 66% of the Saskatchewan adults experienced neck pain at some point in their lifetime and 54% in the recent six months [9]. Most reported figures on the prevalence of chronic pain in the general population lie between 15% and 19%, figures for women being somewhat higher than for men [4, 17, 28]. In the Netherlands Picavet et al. reported a one year prevalence of neck pain of 31.4%, a point prevalence of 20.6%, and a prevalence of chronic neck pain of 14.3% in the open population [36]. The majority of patients reported pain at more than one site with a considerable overlap between different sites [36].

A motor vehicle accident (MVA) is a frequently reported factor that might have a substantial impact on persistent neck pain and disability [7]. Although it is not the only risk factor; all types of neck trauma seem to be associated with chronic neck pain [18].

The concept and prevalence of residual neck complaints caused by an accident-related injury is one of the most debated conditions in medicine [7, 15]. Although not the same, a MVA can result in a Whiplash Associated Disorder (WAD). The most frequently reported complaint in a WAD is neck pain followed by headache. The incidence of WAD varies between countries with rates of 0.7 per 1000 inhabitants in Quebec, 1 per 1000 in Sweden and 1.8 per 1000 in the Netherlands [23, 42, 47]. In Saskatchewan the incidence of reported whiplash injuries dropped after introduction of the no-fault system to 0.3 per 1000 [8]. The apparent controversy in incidences could be the result of the differences in jurisdiction in which the whiplash injuries were reported. In general however, incidence is thought to be about 1 per 1000 in western societies [2]. Some authors suggest that in patients exposed to MVAs the prevalence of chronic pain is the same as in the rest of the population [5, 41]. Cross-sectional studies however consistently report that a history of neck injury is more common in patients with chronic neck pain [4, 29]. Although cross-sectional studies cannot prove a causal relationship, they can show that neck pain is more prevalent in individuals with a history of a MVA [10]. Follow-up studies of selected groups of neck injured patients suggest that their risk of developing chronic neck pain is high [4, 6].

A remarkable contrast exists in reported recovery rates between studies based on patients' samples from insurance companies and clinical settings. The Quebec Task Force advocated that WAD has a "favourable" prognosis. They concluded that 97% of the patients recovered within 12 months after the MVA [43]. Recovery was defined as 'cessation of time-loss compensation'. A Canadian study found

that after one year only 4% was still not recovered. In this study "the moment of closure of the claim for compensation" was used as measure for recovery [22[.

In a review Barnsley et al. concluded that after one year between 14% and 42% of patients exposed to MVAs still had neck pain complaints [2]. It seems that the presented figures in the literature about the prognosis of WAD highly depend upon the used definition for the outcome measure 'recovery', the jurisdiction system and the setting in which the patients were selected.

Most patients recover in the first 2-3 months after injury [2]. Studies on recovery indicate that the outcome is twofold; either the neck pain will resolve in the first few months or it will persist [7, 8, 14]. The chance of recovery is less favourable for women and decreases with age (14% for every decade in the study performed by Harder et al.) [22].

Longer term recovery figures (e.g. after five years) are well comparable with the figures after one year follow-up [6, 16, 44]. The majority of patients reported hardly any change over the years but if change occurs deterioration outbalances improvement. Almost all studies available on the prognosis of WAD are hospital-based [40]. Thus they are referral-based and therefore subject to case-selection bias [2]. In a systematic review of prognosis only two studies out of 29 studies were found with patients recruited from primary care practices [40].

A significant proportion of MVA victims experiences long-term disability. In a postal survey in Sweden 17 years after the first examination 55% had residual disorders possibly due to the original accident [19]. In a systematic review Amera-tunga et al. reported prevalence estimates of post-MVA disability varying from 2% to 87% [1].

The objective of this study was twofold. The primary aim was to compare the differences in perceived pain and disability in patients with acute neck pain due to a MVA versus other self- reported causes. The secondary aim was to identify prognostic factors for continuous neck pain. Both questions will be addressed from the primary care perspective.

METHODS

Study population

General practitioners (GP) working in the city of Rotterdam and the suburban region were invited to participate in the study. The study design was a prospective cohort study with a follow-up period of one year. At the baseline consultation patients with first time or recurrent acute neck pain, lasting no longer than six weeks, with a pain free interval of at least three months, were invited to participate in

the study. A generally accepted time-based classification of neck pain is threefold: acute (0-6 weeks), subacute (6-12 weeks) and chronic (> 3 months) [31]. Additional inclusion criteria were: age above 18 years and sufficient knowledge of the Dutch language to be able to complete written questionnaires. Excluded were all patients with specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, cervical disc herniations, referred pain from internal organs). After oral consent the GP handed over an envelope containing the baseline questionnaire, a patient information form concerning the content of the study, an informed consent form and a prepaid return envelope. Only after having returned a completed baseline questionnaire as well as a written informed consent form patients were included in the study. The returned questionnaires were checked by the clinical research associate for completion, age, the duration of complaints, the pain free interval and in- and exclusion criteria. Approval for this study was obtained from the Ethical Committee of the Erasmus University Medical Centre.

Questionnaires

The baseline questionnaire contained questions on demographic variables, previous history and treatments for neck pain, duration and cause of current neck complaints, previous and concomitant headache, radiating pain, smoking habits and sudden onset of complaints. Patients scored the average severity of their neck pain on a numerical rating scale (NRS) ranging from 0 (no pain) to 10 (unbearable pain) and completed the Neck Disability Index (NDI). From both instruments reliability and validity are well established [21, 34, 45, 46]. The NDI is a ten-item disability questionnaire containing questions on three different domains: pain intensity (neck pain, headache), work related activities (work, lifting, and concentration) and non-work related activities (personal care, reading, driving, sleeping and recreation). Patients choose one out of six answer categories for each item describing the degree of disability from 0 (no activity limitation) to 5 (major activity limitation). All items are summed up, thus the total score ranges between 0-50 [45].

Follow-up questionnaires were sent after 6, 12, 26 and 52 weeks. Patients were asked if they still had neck pain complaints, if they consulted their GP for neck pain again, which advice was given, which medication prescribed, and if they had a referral for physiotherapy, complementary medicine or further examinations. On every occasion they completed the NDI and NRS. If a successive questionnaire was not returned within two weeks, the patient received a written reminder, followed by a telephone call an additional two weeks later.

Statistical analysis

Frequencies, mean, standard deviation (SD), range and total scores of all items were determined. All patients stating at baseline that a MVA was the cause of their current neck pain complaints were considered to be a separate subgroup. Differences in mean scores between the MVA subgroup and the remaining cohort were calculated by means of a student *t*-test for independent samples. A *p* value of less then 0.05 was used as criterion for statistical significance. For patients unable to answer item 8 (driving) of the NDI we imputed round figures that were close to the mean of the remaining 9 items in according to the way proposed by Hains [30]. Patients who missed two or more items were removed from the analysis. Whether dropouts during the follow-up year were selective and caused bias was evaluated separately.

Logistic regression analysis was performed with the baseline predictors as the explanatory variables and with the outcome measure "do you still have or are you again having neck pain". Answers from the outcome measure were dichotomised. Statistical significant variables after univariate analysis were entered in a multivariate regression model by the backward Wald method. P values, OR, 95% CI intervals and Beta values were calculated. Negative or positive Beta's refer to a negative or positive relation between an individual variable and the specific defined outcome. Nagelkerke R square represents the explanatory variance of the model. We imputed the last available data on recovery of every dropout. Imputing in this way is known as the "last measurement carried forward" procedure. Logistic regression analysis was performed with available cases and also with imputed data. All statistical analyses were carried out using the SPSS version 10.0 for Windows program.

RESULTS

Study population

Twenty-nine GPs enrolled patients during the recruitment period from March 2001 until August 2002. In total 249 patients with acute neck pain were asked by their GP to join the study and were simultaneously handed over the starting envelope. 190 patients (76%) responded and sent back the baseline questionnaire and a signed informed consent form. Excluded were three patients that did not meet the inclusion criteria (two had chronic neck pain and one was too young). Finally 187 patients formed our inception cohort.

Non-responders (*n=59*) were significantly younger (36.8 years versus 40.0; $p<0.05$), predominantly male (51% versus 36%; $p<0.001$) and reported more fre-

quently a motor vehicle accident (28% versus 23%; p<0.001). Patient characteristics are presented in table 1.

Patients were predominantly younger females. A majority of patients had experienced neck pain episodes before (63%) and 40% had received previous treatments for this complaint. Mean duration of neck pain at baseline was 16 days (SD 13.1). Pain at multiple pain sites was common (81% had one or more complementary pain sites). Motor vehicle accidents form a considerable number of self-reported causes of neck pain in this cohort (23%). For 62% of patients the neck pain was accompanied by headache.

We compared the means of relevant variables at baseline of the MVA subgroup with those of the remaining cohort. Significant results of the independent samples tests are presented in table 2.

Table 1. Patient characteristics of the study population at baseline (*n=187)*.

	n (percentages)	mean age	(SD)
Gender female	119 (64)	38.2	(13.3)
male	68 (36)	43.2	(14.9)
Employed Yes/No	148 (79)		
Had previous episodes of acute neck pain Yes/No	118 (63)		
Underwent previous treatment for neck pain Yes/No	74 (40)		
Duration of acute neck pain shorter than two weeks	79 (42)		
*Pain radiating to: shoulder(s)	104 (56)		
arm(s)	69 (37)		
lumbar region	10 (5)		
alongside the shoulder blade(s)	76 (41)		
Neck pain accompanied by headache Yes/No	117 (62)		
On sick leave due to neck pain	53 (28)		
Self-reported cause of neck pain:			
Spontaneously / unknown	70 (38)		
Due to a motor vehicle accident	42 (23)		
Noticed after waking up	32 (17)		
After a fall or hitting the head	13 (7)		
Sudden onset	12 (6)		
Stress	10 (5)		
Work related	8 (4)		

* Note that the total of this item is more than 100% because patients could indicate more than one area where they experienced radiating pain.

Table 2. Mean values or percentages of variables that differed significantly in the MVA subgroup compared to the remaining cohort at baseline (*n=187*).

Variable	MVA subgroup	Remaining cohort	p-value
	(n=42)	*(n=145)*	
Mean age	34.8	41.5	0.007
On sick leave	36%	26%	0.037
Had previous neck pain periods	45%	65%	0.015
Duration of neck pain shorter than two weeks	58%	44%	NS*
Accompanying headache	86%	56%	0.001
Pain in the upper part of the neck	41%	46%	NS*
Mean score on the NRS	6.3	6.5	NS*
Pain radiating in the arm	24%	41%	0.034
Pain radiating in shoulders	52%	57%	NS*
pain radiating between shoulder blades	43%	40%	NS*
Mean NDI total score	16.6	13.7	0.018

NS*= non significant

The mean age in the MVA subgroup was lower compared to the remaining cohort. Accompanying headache occurred more frequently in the MVA subgroup and opposite Previous neck pain and radiating pain were less frequent. The disability score (NDI) was significantly higher in the MVA subgroup at baseline. Item analysis of the NDI showed that the MVA subgroup scored significantly higher on the items: "reading", "headache" and "concentration". No differences were found for the remaining variables.

Follow-up

At the one year follow-up 138 patients (74%) participated. Dropouts were almost equally distributed over the remaining cohort (*n=37*; 26%) and the subgroup of MVA patients (*n=12*; 28%). At the end of the follow-up period of one year the subgroup of MVA patients significantly more often stated they still had neck pain complaints (63% versus 40%) and had significantly higher mean scores on the NDI (11.0 versus 7.1) compared to the remaining cohort.

Prognostic factors

The outcome variable we evaluated was continuous neck pain. Univariate regression analysis revealed seven items that were significantly correlated with outcome, and after multivariate analysis three items remained (see table 3). We corrected for age and g ender by including them in the final analysis. The explanatory variance of the model (R square) was 30%.

The two variables with the strongest positive correlation with continuous neck pain were the "self reported MVA at baseline" and "duration of neck pain com-

plaints longer than two weeks" at the first consultation. "Pain in the upper part of the neck" also had a significant positive association with outcome.

Imputing the last available data on recovery of 13 dropouts (7%) in a "last measurement carried forward procedure" did not significantly change the results. Therefore we present only data on available cases.

Table 3. Prognostic factors significantly correlated with **continuous neck pain** after one-year follow-up by univariate ($p<0.1$) and multivariate ($p<0.05$) logistic regression analysis (*n=138*).

	Univariate analysis	Multivariate analyses
Item	Beta Odds ratio (90%CI)	Beta Odds ratio (95%CI)
Treated by physiotherapist before	0.2 1.28 (1.00-1.64)	
Mean score on the NRS	0.2 1.24 (1.02-1.51)	
Pain in the upper part of the neck	0.4 1.48 (1.17-1.87)	0.5 1.63 (1.25-2.12)
Accompanying headache	1.0 2.71 (1.33-5.51)	
Duration of complaints >2 weeks	1.2 3.36 (1.62-6.94)	1.7 5.31 (2.24-12.6)
Motor vehicle accident	0.9 2.51 (1.09-5.80)	1.7 5.34 (1.90-15.0)
Total score on the NDI	0.1 1.07 (1.01-1.13)	

DISCUSSION

The main findings of the presented study are that patients experienced higher levels of continuous neck pain and disability after a MVA compared to patients not reporting such an accident. A MVA seems also to be an important independent prognostic factor for continuous neck pain.

Our study has some restrictions. For instance the sample size is small and external validity may therefore be limited. Studies with larger numbers of patients are necessary to gain a more precise insight in the differences between the two subgroups. A logical third subgroup to compare with would have been patients with acute neck pain following a non-MVA-related injury. We gathered insufficient numbers of these patients to create an acceptable subgroup. We think that the results we present, in some respect, may be flawed by non-response. Non-responders were mainly younger males. The same finding was also reported in other studies [11, 26].

On the other hand the number of dropouts was limited and almost equally divided over both subgroups. Imputation of data did not reveal significant differences. We wondered whether the percentage of MVA patients in our acute neck pain cohort (23%) was representative for GPs daily practice. A history of a MVA cannot be seen to be equivalent with a whiplash-type injury but neck pain as a result of a MVA is a well-known disorder in the general population and there is reason to believe that most patients are well aware of this condition. Besides

that it could well be that the emotionally charged concept 'whiplash' stimulates patients to visit their GP, resulting in selection bias and over representation in our cohort. The patient population with a wide diversity of self-reported causes has the potential to be very heterogeneous. On the other hand represents the diversity of causes in our cohort the broad spectrum of patients characteristic for general practice.

This study showed that the percentage of MVA patients that reported continuous neck pain was significantly higher than in patients with other self-reported causes of neck pain. Reported prevalences of continuous neck pain in patients exposed to MVAs vary widely in the literature and seems to consist of two different groups of figures. Lower prevalence figures of chronic neck pain range between 8,4% and 24% [12, 33, 35, 39]. Higher reported figures range from 43% up to 66% [20, 24, 25, 30, 44]. Marshall reported that even 80% of patients had neck discomfort after a MVA [29]. A direct explanation for this apparent dualism in presented figures is hard to give. The heterogeneity in study design, duration of follow-up, setting and chosen outcome makes it difficult to compare these results with each other. One other reasons for this variation could be the definition of chronicity that is used. The outcome measures 'chronic pain' and 'recovery' are not interchangeable and are each related to different perspectives of the same situation. In general, chronicity is defined as the persistence of symptoms longer than three months. Subsequent episodes of neck pain can be new or recurrent and the link with chronicity is not simple. A pattern of recurrence and intermittent pain may be a more realistic description of a patient's experience after a MVA than the presence of continuous symptoms [11]. It is good to bear in mind that it is not exclusively the MVA but all types of neck trauma that seem to be associated with chronic neck pain [18]. The reason why patients after a MVA experience in a higher percentage chronic neck pain is still under debate. Besides physical factors psychological factors probably play an important role even so insurance and legal issues [2, 39, 40].

The NDI as our measure of disability was able to demonstrate significant differences between the subgroup of MVA patients and the remaining cohort at baseline and after one year follow-up. The usefulness of the NDI for the assessment of disability has been advocated before [32, 37]. In a three year prospective study on the prediction of long-term health problems after a MVA from three simple questionnaires only the NDI was significantly related to outcome [32]. The authors concluded that the analysis of the decrease of the level of activities obtained by NDI provides a tool to identify individuals at risk.

Self-reported pain in the upper part of the neck was also a significant item in the final model. This finding may represent a link with the often-reported headache

in WAD patients. Zygapophyseal joint pain has been suggested being the single most common basis for chronic neck pain and it might be responsible for many of the headaches [3, 27]. The 'International Study group on Cervicogenic Headache' concluded that headache arising from the upper part of the neck is one of the three major criteria for the diagnosis [42]. This finding could have consequences for treatment modalities in general practice and can be implemented in routine examination after a MVA.

A longer duration of complaints than two weeks is also of prognostic value. This item remained by logistic regression analysis in the final model. In the study by Jónsson all patients that were symptomatic after 6 weeks still had complaints at the one and five year follow-ups [25].

A MVA forms a major factor in predicting if patients have a higher risk of developing chronic neck pain. Although there is still a difference of opinion on this aspect, especially the last few years more authors reported on this association [4, 7, 18]. Contrary to prior belief, most individuals with neck pain, do not experience complete resolution of their symptoms and disability. According to the 1996 guidelines of the royal college of general practitioners in the UK most patients can expect a favourable outcome, recurrences are common and 10% can have persistent problems [14]. Two more recent guidelines still advocate acute neck pain after the exposure to a MVA to be of a benign and self-limiting nature [19, 38]. Even a guideline for general practitioners in the US, published this year, shares that optimistic vision on neck pain after a MVA [13]. In our opinion this represents a too optimistic view of this problem.

Conclusion

Motor vehicle accidents are an important factor for acute neck pain in general practice. The presented findings of our study stresses the fact that patients exposed to MVAs constitute a separate subgroup and may be subject to long-lasting neck pain and disability.

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Chapter 7

General Practitioner's gut feeling about the prognosis of Acute Neck Pain patients: an accurate predictor

submitted

ABSTRACT

Context: Prior research in acute low back pain showed that the assessment by the General Practitioner (GP) for the risk of developing chronic pain complaints was an accurate predictor of recovery.

Objective: To investigate whether GPs gut feeling was also applicable for the prognosis in acute neck pain patients in general practice.

Design and setting: We conducted a prospective cohort study from March 2001 until August 2002 with a one-year follow-up in general practice. We analysed the assessment GPs made at baseline of the risk of acute neck pain patients developing chronic neck pain. Regression analysis was used to identify prognostic factors with continuous neck pain as the dependent outcome measure.

Patients: Consecutive patients above 18 years of age consulting their GP for non-specific acute neck pain lasting no longer than six weeks were invited to participate. In total 187 patients were included and we have follow-up data of 138 patients (74%). At baseline consultation we asked the GP to give an assessment of the risk that this patient will develop chronic neck pain (= pain lasting for over six months). From 110 of these 138 patients (80%) we received GPs assessment.

Main outcome measure: The Relative Risk Ratio for continuous neck pain by GPs assessment at baseline.

Results: After logistic regression analysis the GPs assessment had the highest association with continuous neck pain; Odd's Ratio 14.58 (95% CI 2.98-71.3). The Relative Risk Ratio was 2.45 (95% CI 1.71-3.45).

Conclusion: The GP showed to be able to make a good assessment of the susceptibility of acute neck pain patients to develop chronic neck pain.

INTRODUCTION

Neck pain is a common patient complaint, although it is not life threatening it may cause pain, stiffness, and can therefore have a major impact on the quality of life.[1] Apart from human suffering, disorders of the neck often necessitate sick leave and are therefore costly to society.[1] In general, there is not much information on the course of acute neck pain in primary care.[2] Often found prognostic factors concern age, previous trauma, previous neck pain and previous consultation. In literature, up to now, there has been no attempt to incorporate general practitioner's (GPs) unique knowledge about the patients and their backgrounds among the predictive variables.[3,4] GPs seem well aware of the prognosis of their patient's complaints. A Danish study in patients with acute low back pain showed that the GPs prediction was the factor most strongly associated with poor outcome.[4] We wondered if this factor could also be predictive for the prognosis of acute neck pain patients.

The aim of the presented study was to evaluate the value of the gut feeling of poor prognosis in patients visiting the GP with acute neck pain as an independent prognostic factor for persistent neck pain.

METHODS

General practitioners working in the city of Rotterdam and the suburban region were invited to participate in the study. The study design was a prospective cohort study with a follow-up period of one year. At the baseline consultation consecutive patients with first time or recurrent acute neck pain, lasting no longer than six weeks, with a pain free interval of at least three months, were invited to participate in the study. Inclusion criteria were: age above 18 years and sufficient knowledge of the Dutch language to be able to complete written questionnaires. Excluded where patients with specific causes of neck pain (e.g. known vascular or neurological disorders, neoplasm's, rheumatic conditions, referred pain from internal organs). A follow-up questionnaire was sent after 52 weeks. On this occasion patients were asked if they still or again had neck pain. At baseline consultation we asked the GP to give an assessment of the risk that this patient will develop chronic neck pain (= pain lasting for over six months). For this assessment we used a four point scale similar to the one used by Schiøttz-Christensen et al. and consisting of four answer categories (most likely / likely / not likely / not likely at all).[4]

For analysis we dichotomized the answer categories of GPs assessment and also of the outcome measure "do you still have or are you again having neck pain" as the dependent variable. Significant variables after univariate analysis were

entered in a final multivariate logistic regression model. P values, Odds ratios, 95% CI intervals and Beta values were calculated. Negative or positive Beta's refer to a negative or positive relation between an individual variable and the specific defined outcome. Nagelkerke R square represents the explanatory variance of the model. We made a cross-tabulation and calculated the Risk Ratio and corresponding 95% confidence interval. The positive predictive value (PVP) as well as the negative predictive value (NPV) was calculated.

RESULTS

Forty-one GPs agreed to participate and finally twenty-nine GPs enrolled patients during the recruitment period from March 2001 until August 2002. Our inception cohort consisted of 187 patients. After one year 138 patients (74%) had fulfilled follow-up questionnaires. From 110 (59% of the initial cohort) we had previously received GPs assessment at baseline. Patient characteristics are presented in table 1.

Table 1. Patient characteristics of the study population at baseline (*n=110)*.

	n (%)
Gender female	74 (67)
male	36 (33)
Mean age	42.0
Employed	86 (78)
Had previous episodes of acute neck pain	67 (61)
Duration of acute neck pain shorter than two weeks	46 (42)
*Pain radiating to: shoulder(s)	60 (55)
arm(s)	42 (38)
lumbar region	6 (6)
along the shoulder blade(s)	45 (41)
Neck pain accompanied by headache	68 (62)

* Note that the total of this item is more than 100% because patients could indicate more than one area where they experienced radiating pain.

Most patients had experienced neck pain episodes before (61%). Pain at various localisations is common (81% had one or more complementary pain sites). Most patients (38%) cannot mention a cause for their neck pain, but motor vehicle accidents (23%) form a substantial self-reported cause in this cohort.

Univariate regression analysis revealed nine items that were significantly correlated with outcome, and after multivariate analysis five items remained (see table 2). The explanatory variance of the model was 51%.

Table 2. Prognostic factors significantly correlated with **continuous neck pain** after one year by univariate (p<0.1) and multivariate (p<0.05) logistic regression analysis (*n=110*).

	Univariate analysis	Multivariate analysis
Item	Beta Odds ratio (95% CI)	Beta Odds ratio (95% CI)
Female gender	0.7 2.11 (0.92-4.84)	1.3 3.83 (1.26-11.6)
Treated by physiotherapist before	0.3 1.30 (0.99-1.71)	0.5 1.57 (1.06-2.35)
Pain in the upper part of the neck	0.3 1.38 (1.07-1.79)	
Accompanying headache	1.0 2.66 (1.19-5.98)	
Motor vehicle accident	0.9 2.35 (0.95-5.80)	2.0 7.81 (2.16-28.2)
Mean score on the NRS	0.2 1.29 (1.02-1.63)	
Duration of complaints >2 weeks	1.4 4.14 (1.81-9.46)	2.4 11.29 (3.30-38.5)
GP assessment of chronicity	2.5 11.64 (3.19-42.4)	2.7 14.58 (2.98-71.3)
Total score on the NDI	0.1 1.08 (1.02-1.15)	

The association between the GPs assessment at baseline and persistence of complaints at one year follow-up is shown in table 3. The GPs were more optimistic in their assessment of the chance for chronicity (ratio 22:88) than the observed chance (ratio 50:60). PPV was 0.86 NPV 0.64.

We calculated a relative risk ratio of 2.45 (95% CI 1.77-3.40).

Table 3. Cross tabulation for the assessment of the GP at baseline of the likelihood that the patient will develop chronic neck pain. Situation after one year follow-up (*n=110*).

The chance to develop chronic neck pain	Still having neck pain complaints	No more neck pain complaints	total
Likely / very likely	19	3	22
Not likely / not likely at all	31	57	88
total	50	60	110

DISCUSSION

The GP showed to be able to make a good assessment of the susceptibility of acute neck pain patients to develop chronic neck pain as illustrated by the high relative risk ratio we found. The previously identified prognostic factors all have substantial lower relative risk ratios.[3,4] Our study has some restrictions. The limited number of patients included restricts the external validity of our findings. Drop-outs and incomplete cooperation of the participating GPs reduced the number of patients in analysis and could have lead to selection bias.

Rating scales or screenings questionnaires for GPs to assess risks for chronic complaints in patients are available, but most of them are too complicated and time consuming to be useful in daily practice. In stead of using a measurement

scale the global assessment of the prognosis can help the GP to consider different treatment options. The assessment of the GP seems better able to take the complex indicators of adverse long-term outcome into account.[4] On a simple four-point scale, the GPs seemed to obtain a comprehensive integration of the various past and present observations and intuitions that are associated with the long-term prognosis of acute neck pain patients in general practice.

This observation was previously made before in low back pain research but is rather new in neck pain research and underlines the ability of the GP to predict outcome in their patients.

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Chapter 8

General Discussion

Our general aim was to gain insight in the clinical course and management of patients with acute neck pain. Neck pain is a bothersome disorder with currently only limited literature available about the diagnostic en therapeutic problems in daily practice. We conducted an observational cohort study among patients with acute neck pain in general practice. In this general discussion the main results are discussed including the difficulties we encountered while conducting the observational study such as patient recruitment and GP cooperation. We reflect on the methodological strength and weaknesses of the reported research. Furthermore, we examined several aspects of reproducibility of two measurement instruments we used in this study, The prognostic factors including the gut feeling of the GP for the prognosis of the patient with neck pain is also highlighted. We conclude with an overview of implications for daily practice and suggestions for future research

MAIN RESULTS OF THIS THESIS

In a prospective cohort study with one year follow-up we studied the clinical course of 187 patients with acute neck pain. After one-year follow-up 47% of patients still reported neck pain and 5.6% of the patients reported a recurrence. At baseline almost one-third (*n=52*) of the employed patients (*n=148*) reported to be on sick leave because of neck pain. Almost half of the patients on sick leave returned to work within 7 days.

In order to determine prognostic factors for "recovery" and "sick leave" we performed univariate and multivariate logistic regression analysis. The highest association with "recovery" was the advice of the GP "to wait and see" (OR 6.7), for "sick leave" referral by the GP to a physiotherapist showed the highest association (OR 2.8).

The management of patients with acute neck pain by the GP seems to constitute of two directions: namely a policy to "wait and see" for an expected favourable natural course supported by medication and otherwise referral to a physiotherapist.

A subgroup analysis in this thesis focused on patients involved in a motor vehicle accident (MVA). The MVA subgroup (n=42) was significantly younger, reported more sick leave, had higher levels of headache and higher Neck Disability Index (NDI) scores at baseline compared to neck pain patients not reporting a MVA. At follow-up the MVA subgroup had higher scores for continuous neck pain (63% versus 40%) and on the NDI (11.0 versus 7.1). We stated that individuals

exposed to MVAs constitute a relevant subgroup of patients with higher levels of continuous neck pain and disability in general practice.

Along the course of the prospective cohort study we performed a reproducibility study on two measurement instruments the Neck Disability Index (NDI) and the Acute Low back Pain Screenings Questionnaire (ALBPSQ). Both instruments had good levels of reliability (the ICC for the NDI was 0.90 and for the ALBPSQ 0.85). The NDI has shown to be a responsive instrument and the result on the ALBPSQ suggest its usefulness in a screenings procedure for prolonged sick leave.

At baseline we also asked the GP to make an assessment of the chance that this patient will develop chronic neck pain on a 4 point scale. The Relative Risk Ratio was 2.45 (95% CI 1.71-3.45). indicating the increased risk of patients with acute neck pain to develop chronic neck pain if the GP at baseline thought that was likely to occur.

RECRUITMENT OF GPs

During the course of our study it proved hard to recruit the number of patients we had in mind. We initially planned to enrol 200 patients by 30 GPs in one-year. This was based on a reported incidence of 17.9 per 1000 patients and the estimation that half of the patients presenting neck pain complaints in general practice would concern acute complaints.[1]

Acute complaints were defined as complaints that occurred within six weeks of the moment of presentation. In the case of a recurrence an extra condition was that there was a pain free interval of at least three months between the two pain episodes.

Based on these premises we estimated that a standard general practice in the Netherlands including 2350 patients would see about 20 patients with acute neck pain every year. We assumed that the participating GPs would include half of the eligible patients. We also took Lasagne's law into account that states that eligible patients seem to disappear as soon as the recruitment period starts. We stipulated on these premises that 30 GPs would be enough.

Each participating GP was individually selected based on personal acquaintance to the researcher. We hoped this was a solid basis for an active cooperation. We found, with limited effort, 30 GPs willing to participate. Several GPs formed part of the out-of-hours group the researcher also participated in as GP. Others were colleagues who were acquainted to the researcher due to the participation of different training schemes for GPs throughout the past years. Personal acquaintance, however, proved not to be the golden key to success in recruiting a sufficient num-

ber of patients. We experienced that in order to succeed in pertaining the required number of patients the continuous activity and motivation of the participating GPs are essential. During the planned recruitment period of one year we invited an additional 12 GPs to participate in the study and extended the recruitment period with an additional six months. Finally 29 out of 42 GPs (69%) that promised to participate actually did include patients. This percentage is comparable to the ones reported in other studies in neck pain[2,3] and higher than reported in a trial with whiplash patients.[4] Limited cooperation by GPs has been reported before.[3,5,6] In personal communications the most mentioned reasons for non compliance in our study were: 'the GP saw no suitable patients', 'was too busy', and 'there was no financial reward for including patients'. The enrolment procedure showed not to be an obstacle for the willingness to include patients. The development of a short and easy to complete inclusion form, however, did not really help in stimulating GP participation. Additional measures taken to remind GPs to recruit patients were only helpful to a certain degree. These measures were: personal visits, personal communication, newsletters, and small presents. The effect of all these measures seemed only to last for a short period of time. We experienced during the study period that it was important to repeat them regularly.

PATIENT RECRUITMENT

The Ethical Committee of the Erasmus Medical Centre advised us to allow patients the possibility to 'think it over' for several days before they decided whether or not to participate. Patients could acknowledge their cooperation by returning the first questionnaire together with the signed informed consent. This approach influenced in our opinion the degree of participation of patients. One out of four patients decided not to participate despite the positive oral reaction they first gave at the GPs request. This method of recruitment thus might have been a disadvantage for the total numbers of included patients.

We received anonymous information of the GPs about eligible patients before we were informed of the participation of these patients in our study. That gave us a unique possibility to compare the key characteristics of the non-responders to the participants.

Dropouts in our study turned out to be especially younger males as has been reported before.[7]

REPRODUCIBILITY

Different aspects of two measurement instruments used in neck pain research are presented in chapter 2. These aspects concerned reliability and responsiveness ratio in our test-retest study on the NDI.

In literature there is no consensus on the most appropriate strategy for quantifying responsiveness.[9] That placed us for a difficult choice. The responsiveness can be calculated by taking the mean change found in a variable in the changed group (the signal) and dividing it by the standard deviation of that variable in the stable group (the noise).[9] Controversy exists on which standard deviation to take. There are three more or less accepted ways of calculating responsiveness by taking: the standard deviation of the mean score change in stable patients[10], or the standard deviation of the mean score change of improved patients[11] or the standard deviation of the mean baseline scores.[12] We used the standard deviation of the stable patients as described by Guyatt et al. mainly because comparable research in general practice in patients with shoulder complaints[13] and low back pain[9] was done in a similar fashion.

SICK LEAVE

In Chapter 3 we present the Acute Low Back Pain Screenings Questionnaire (ALBPSQ) and the determination of a cutoff point by calculating sensivity and specificity figures for the prediction of long term sick leave. During the follow-up year 39% of the cohort reported sick leave that was due to their neck complaints. After data collection we dichotomised "days of sick leave" into two groups: less than 7 days of reported sick leave and otherwise 7 days or more. We agreed that seven days of sick leave was acceptable and this was also the median time off for those taking sick leave. Short term sick leave (between 1 and 7 days) was reported by 17% and long-term sick leave (8 days or more) by 22% of the participants.

The ALBPSQ was designed especially for low back pain research and clinical practice in order to discriminate between patients with a poor prognosis and those with a good prognosis. It has been tested before in patients with sub-acute and chronic low back pain in which it showed its ability to differentiate between patients with no or hardly any sick leave and those with long term sick leave.[14,15,16] In neck pain research the ALBPSQ is a much less often-used instrument. We found however a substantial lower cut-off point than in these previous studies.[14,15,16] We wonder if the mixed nature of the instrument with disability questions, coping items and psychological aspects is suitable for patients with acute complaints.

It appears that especially the psychological items of the questionnaire did not contribute much to the final score. Further development may focus on reducing the items of the ALBPSQ while keeping its ability to discriminate between patients at risk for (prolonged) sick leave or not.

COURSE OF NECK PAIN

In chapter 4 we describe the clinical course and prognostic factors of patients with acute neck pain. The term "clinical course" is somewhat different than the term "natural course". Natural course involves the absence of any intervention during the follow-up period. [18] In practice this is hardly feasible. A form of selection starts the moment patients with neck pain visit their general practitioner. Most people in the open population with neck pain do not visit their GP.[17] Those who seek health care report more pain, more disability and a worse general health,[18] although seeing a doctor is not a direct measure of pain and disability.[19] Patients apply all sorts of self-treatment with unknown effects on the course of their neck pain. The study of the natural course seems therefore an unreachable goal. The term "clinical course" is thus more applicable.

In our study a substantial proportion of patients improved within two weeks. That could mean that neck pain has a favourable course. It could also be related to the inclusion process. All sorts of causes of neck pain could be included by the participating GPs, but it is unknown on which grounds the GPs decided whether or not to include a particular patient. To investigate the possibility that there was a form of selection bias between the participating GPs we compared the patient characteristics and their outcome of GPs who included only a few patients with those who included more patients and we found no differences.

Almost half of the initial cohort stated at the end of the follow-up year that they still had neck pain. At the same time 75% of patients stated that they were recovered. That clearly implies that "recovered" and "still having neck" pain are different entities for the patient. For the outcome "recovery" we joined the answer categories "completely recovered" and "much improved" together. It is important to realise that choosing different outcome measures lead to obtaining different results.

The score on the numerical pain rating scale (NRS) dropped from an initial 6.5 (range from 0-10) for the whole cohort to a score of 4.2 at the end of the follow-up. The score of patients stating to be recovered and still having neck pain complaints dropped to a mean score of 2.8 (n=29). Only 4 patients scored a 4 or higher on the NRS. A score on the NRS below 4 is generally thought not to be

clinically relevant.[20,21] For the majority of patients still stating to have neck pain the pain intensity appears not to be a dominant factor.

EPISODIC NATURE OF NECK PAIN

What an "episode" of (recurrent) neck problems is, is not well defined in literature. In order to realise more uniformity de Vet et al. proposed the following definition of a new episode: "a complaint persisting for at least 24 hours, preceding and following at least a month free of complaints".[22] Given the fact that in our study two-third of patients had experienced one or more episodes of neck pain before, the question arises whether acute neck pain can be considered to be a separate and distinct entity. The recurrent nature of the complaint, and the high frequency of ongoing complaints makes it questionable if the patient can sincerely declare that it concerns a new episode of neck pain. This point of view has implications for the generalizability of studies on acute neck pain. A clear definition and separation of acute neck pain from recurrent and more chronic forms of neck pain is necessary. Given the episodic nature more information is needed about the factors that cause the complaints to flare up. The following statement made by Croft et al. is relevant in this respect: A pattern of recurrence and intermittent pain may be a more realistic description of an individual's lifetime experience of chronic neck pain than a picture of relentless or continuous symptoms.[7] This creates a new need for data collection because it entails something different than just to determine when the patient passes the border of chronicity. Unknown for instance is how many patients experience recurrent episodes of neck pain without ever fitting in the current definition of chronic neck pain. How frequently do episodes occur and how do these episodes differ in pain intensity and disability? Greater insight in the course of an episode of neck pain would be useful especially with regard to variation in perceived pain and disability. It will of course not be easy to measure these variations during the follow-up period of a cohort study. It requires accurate, almost day-to day, measurements of pain and disability.

DIAGNOSTIC CLASSIFICATION

The diagnostic classification of neck pain complaints lacks uniformity and is a recurrent point of discussion in the literature.[23,24] There is no standard way of labelling or defining neck conditions.[25] The commonly used nomenclature by GPs is based on several aetiological, pathofysiological and clinical classifications.

We collected all diagnosis proposed by the GPs in the baseline short form. In our study 16 different diagnoses were proposed, almost equally divided over the three classification categories. Aetiological based diagnosis, such as 'neck pain due to a trauma', 'a motor vehicle accident', 'extensive workload', or 'stress' all lean on the assumption of a supposed connection between the aetiological factor and the complaints. Evidence for this relationship is often openly questioned.[26] A pathofysiological based diagnosis tries to point out the (change in) physical structure that is causal to the nociceptive origin of the pain. In this respect 'facet blocking', 'limited range of motion', 'blocking of the cervicothoracic junction', 'torticollis', and 'muscle hypertonie' are mentioned. These expressions are based on theories that are held valid in mainly paramedical sciences. Until today real evidence for these theories are lacking. Remarkable is that these expressions also seem to have found ground in general practice. Clinical expressions like 'neck pain', 'cervicobrachialgy', and 'myalgia' try to avoid the previous mentioned flaws in diagnosis making but on the other hand they lack specificity.[23]

The use of the term "non-specific neck pain" is proposed in national guidelines and seems justifiable by following the flag signalling designed to exclude specific causes.[27] Ruling out red flags, however, can be a goal in itself and also seems to lack the desired precision. Besides that, it is not sufficiently helpful in creating a reassuring definition for the GP. We conclude that there is a distinct desire for uniformity in diagnostic classification.

PROGNOSTIC FACTORS

In chapter 4 we present the prognostic factors that were found significantly associated with the outcomes 'recovery' and 'sick leave'. Most frequently reported prognostic factors in previous studies were: age, female gender, pain severity, pain localization, pain duration, occupation and radiological findings.[29] We identified prognostic factors that were not published before in the literature. The advice by the GP "to wait and see for an expected favourable natural course" had a positive association with the outcome 'recovery'. "Referral by the GP", and that "the GP made a follow-up appointment" had a positive association with the outcome 'sick leave'. That implies that these factors enhances the duration of the total days absent from work. These newly found prognostic factors raises the question if it represents especially the general practice setting of our study. Focussing on the various aspects of GP treatment is a new approach in neck pain research.

In chapter 6 we present the prognostic factors for the subgroup of patients with neck pain after a motor vehicle accident (MVA). Two almost equally signifi-

cant prognostic factors turned out to be "the self-reported motor vehicle accident" and "neck pain complaints existing longer than two weeks at baseline". Although we found these factors in a subgroup analysis with a small number of patients we think these results have value because these factors were also found in other studies.[30-33]

OUTCOME MEASURES

In chapter 6 we also described in a subgroup analysis the relationship between a MVA and continuous pain and disability. The Neck Disability Index (NDI) was used as disability measure. The baseline scores for the NDI were rather low (mean: 14.4 points, range 1-40) indicating only mild disability according to the classification of Vernon and Mior.[8] The low baseline scores left only a limited margin for improvement. Mean scores at baseline for the items "personal care" and "concentration" were below 1 point (out of a maximum of 5) and could therefore scarcely allow any improvement over time. In another study with neck pain patients referred for physical therapy, a clinical important change for the total score (with a theoretical maximum of 50 points) was suggested to be at least 5 points.[34] Issues concerning emotional and social functioning are not taken into account and so the NDI is not fully reflecting the spectrum of disabilities due to neck pain.[35] In this respect the NDI may not be the ideal disability measurement instrument in neck pain. Comparison between the NDI and other neck disability measurement instruments, however, pointed out that the NDI was more acceptable for non-specific as well as specific neck pain problems.[35,36] In our cohort different choices of outcome measures resulted in different significant prognostic factors identified. There was a certain overlap in factors but there were also distinct differences. For the interpretation of prognostic factors with an outcome it is important that there is a clear and precise description of the chosen outcome measure.[30] This would enhance the comparability of studies. It would be even better if equal outcome measures, meticulously defined, should be used in future neck pain research.

RECOMMENDATIONS FOR DAILY PRACTICE

It is not always easy to transfer research findings to daily practice. Nevertheless it is an important aspect of reporting research findings. The lack of guidelines and common knowledge of the clinical course and prognostic factors in acute neck pain plays an important role in the course of action taken by the GP.

In our study the NDI showed to be a reliable and responsive measurement instrument. It is easy to fulfil by the patient in 1-2 minutes. The NRS is even easier to use. These two instruments should be strongly advocated for broader use in general practice but GPs rarely use questionnaires in their daily work. Several previously advocated questionnaires in other fields of general practice, like the COOP-Wonca charts, are also hardly used. Our findings underline the desirability of an overall change of attitude towards the use of self-reported questionnaires by the GP.

Half of patients with acute neck pain showed to be spontaneously recovered within two weeks. Waiting for a still expected favourable clinical course after that period seems less realistic. This implicates the need for an active approach especially after two weeks "wait and see" policy.

A MVA and other traumatic causes can lead to substantial higher levels of chronic pain and disability. The dualism in presented causes (traumatic and non-traumatic) and their consequences for the clinical course of neck pain is important to bear in mind. We believe that the whiplash associated disorder warrants an active approach by the GP in the expectation that it will be more beneficial for the patient.[38,40] An active approach entails the encouragement of the patient to stay active, to avoid sick leave and bed rest and to develop an active coping strategy according to the principles of graded activity.

SUGGESTIONS FOR FUTURE RESEARCH

The results of the studies presented in this thesis give rise to new questions that need to be answered. To identify persons at risk for developing chronic neck pain more data are needed to define and identify persons at risk. Risk factors known from occupational and hospital-based studies are available but from general practice studies they are sparse. The development of more feasible measurement instruments for the GP would probably be helpful in the implementation of them in daily practice.

Evidence for the effect of exercise therapy and manual therapy are published recently.[37-40] But evidence for the effect of measures taken by a GP is still absent. Several studies compare the effect of physical therapy with "usual care" by the GP. In our study it became apparent that there is no clear definition of "usual care". The GPs' variation in approach of the patient is reflected in the variety of measures taken by the GP. A study about what can be expected from the GP regarding the content of "usual care" is desirable before new intervention studies can be undertaken. The evaluation of an "active approach" by the GP with an emphasis

on patient education for subgroups of patients at risk for developing chronic neck pain would be of interest.[41]. Given the potential of GPs to give an accurate prediction of the chance for chronicity it would be interesting to investigate what are the predictive elements of the 'gut feeling' of the GP.

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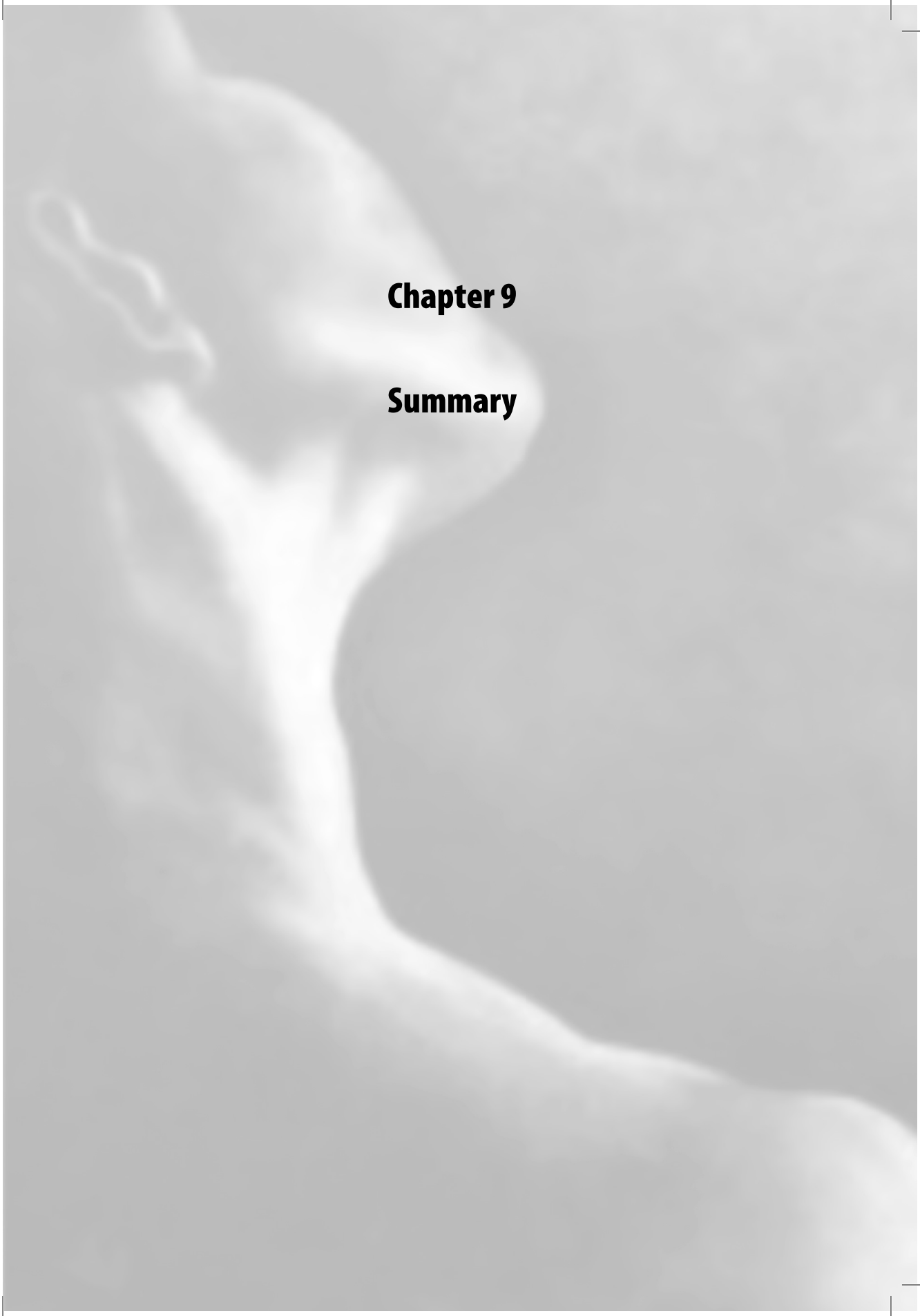

Chapter 9

Summary

Chapter 1 describes the introduction of this thesis and the rationale for us to evaluate the clinical course, prognostic factors and management of patients with acute neck pain in general practice.

Neck pain is one of the most common musculoskeletal complaints and it has been estimated that two-thirds of all individuals will experience an episode of neck pain at some point during their life. What neck pain is, where it can be located and which symptoms it can provoke is relatively clear. In contrast with this diagnosis making lacks validity, reliability and uniformity. Neck pain is generally thought to be self-limiting for most patients although the clinical course of acute neck pain in general practice is unknown. Older age, female gender and a previous history of trauma are accepted prognostic factors but if these factors are also accountable for chronic neck pain in general practice is unclear. The general aim of this thesis was to gain insight in the clinical course and management of patients with acute neck pain from the general practitioners' perspective.

Chapter 2 reports the results of a test-retest study with the Neck Disability Index (NDI).

The objectives were to assess the reproducibility and responsiveness of this instrument. The reliability was determined by measuring the Intraclass Correlation Coefficient (ICC). At baseline 187 patients (119 women, 68 men) were included. They completed a questionnaire on demographic variables, self-reported cause of their complaints and the NDI. After one week 86 patients were sent the NDI again together with the perceived recovery scale, which was used as our external criterion. Response rate was 93%. We found an ICC of 0.90, which can be qualified as "good". A Bland and Altman plot and a graph of total somscore differences showed no visible tendency towards unequal spreading of the data. For patients that reported on the perceived recovery scale that they were "stable" we found a responsiveness ratio of 1.82 according to the method described by Guyatt. Values above 1.0 are accepted as a "good" level of responsiveness. We concluded that the NDI has shown to be a reliable and responsive instrument in patients with acute neck pain in general practice.

Chapter 3 reports on the study of the utility of the Acute Low Back Pain Screenings Questionnaire (ALBPSQ) in patients with acute neck pain. Although originally developed for low back pain patients it may also be applicable for neck pain patients. We evaluated its reliability and determined an optimal cut-off point for predicting future sick leave.

Reliability was determined by means of a test-retest procedure with a one-week interval. The total number of days on sick leave was compiled based on the self-reported questionnaires.

The test-retest reliability was high (ICC 0.85; 95% CI 0.73-0.92). Almost 40% of the patients reported sick leave during the follow-up period. For predicting future sick leave an optimal cut-off score of 72 was calculated, with a sensivity of 77% and a specificity of 62%. The "area under the curve" of the Receiver Operant Curve (ROC) was an acceptable 0.66. Our results suggest the ALBPSQ to be a reliable instrument and potentially useful in a screenings procedure for future sick leave in patients with acute neck pain in general practice.

Chapter 4 reports on the prospective cohort study with one-year follow-up of patients with acute neck pain in general practice. The primary aim was to describes the clinical course and the secondary aim was to identify prognostic factors for the outcomes "recovery" and "sick leave". Patients above 18 years of age consulting their GP for non-specific acute neck pain lasting no longer than six weeks were invited to participate. Self-administered questionnaires were collected from patients at baseline and after 6, 12, 26 and 52 weeks. Patients rated their recovery on a 7-point ordinal scale. Regression analysis was used to identify prognostic factors for "recovery" and "sick leave". In total 187 patients were included and we have follow-up data of 138 patients (74%). After one-year follow-up 47% still reported neck pain. Half of the patients on sick leave at baseline returned to work within 7 days. After one-year four patients were still on sick leave. Regression analysis showed that the highest association with "recovery" was the advice of the GP "to wait and see" (OR 6.7; 95% CI 1.6-31.8), for "sick leave" referral by the GP showed the highest association (OR 2.8; 95% CI 1.0-8.4). The results suggested that a substantial proportion of patients reported neck pain after one-year. In conclusion the advice, given by the GP to wait and see, was associated with "recovery" and referral with prolonged "sick leave".

Chapter 5 describes the management by the general practitioner (GP) of patients with acute neck pain. Furthermore we describe diagnostic and therapeutic procedures undertaken by the general practitioner and self-care by patients. At baseline for 42% of patients the GP prescribed medication, mostly NSAID's (56%) or muscle relaxation medication (20%) and 51% was referred to a physiotherapist. Frequently given advices by the GP were: to "wait and see" (23%), to "improve posture" and "stay active" (22%) or to "take a rest" (18%). Self care by patients constituted mainly in different sources of heat application (79%) and exercises (57%). Complementary medicine was used in 12% and 39% of patients visited their

GP again for their neck pain during follow-up. Consultation of a medical specialist and ordering X-rays rarely occurred.

We concluded that the management by the GP seems to constitute of two almost equal directions: namely a policy to "wait and see" for an expected favourable natural course supported by medication and otherwise referral to a physiotherapist.

Chapter 6 presents the differences in perceived pain and disability in a subgroup of patients with acute neck pain due to a motor vehicle accident (MVA) versus other self-reported causes. The secondary aim was to identify prognostic factors for continuous neck pain. High levels of continuous neck pain after a MVA are reported in cross-sectional studies.

The numerical pain rating scale (NRS) and the Neck Disability Index (NDI) were measured. Regression analysis was used to identify prognostic factors with continuous neck pain as outcome measure.

The MVA subgroup (n=42) was significantly younger ($p< 0.01$), more sick leave ($p<0.05$), had higher levels of headache ($p<0.001$) and higher NDI scores at baseline ($p< 0.02$). On the other hand reported lower scores for previous neck pain and radiating pain in the arm compared to the remaining cohort. At follow-up the MVA subgroup had higher scores for continuous neck pain (63% versus 40%) and on the NDI (11.0 versus 7.1). After multivariate analysis "duration of complaints at baseline longer than two weeks" (OR 5.31; 95% CI 2.24-12.6), a "MVA" (OR 5.34; 95% CI 1.90-15.0) and "pain in the upper part of the neck" (OR 1.63; 95% CI 1.25-2.12) were significantly correlated with outcome.

In conclusion we stated that individuals exposed to MVAs constitute a relevant subgroup of patients with neck pain in general practice. We also concluded that a MVA, as well as a longer duration of complaints, are predictive factors for continuous neck pain at follow-up.

Chapter 7 reports in a research letter on the investigation whether GPs gut feeling was applicable for the prognosis in patients with acute neck pain in general practice.

Prior research in acute low back pain showed that the assessment by the GP for the risk of developing chronic pain complaints was an accurate predictor of recovery.

At baseline we asked the GPs to give on a 4 point scale an assessment of the risk that this patient will develop chronic neck pain (= pain lasting for over six months). In total 187 patients were included and we have follow-up data of 138 patients (74%). From 110 of these 138 patients (80%) we received GPs assessment.

Multivariate logistic regression analysis was used to identify prognostic factors with continuous neck pain as the outcome measure. The GPs assessment had the highest association with continuous neck pain (OR 14.58; 95% CI 2.98-71.3). The Relative Risk Ratio was 2.45 (95% CI 1.71-3.45). In conclusion the GP showed to be able to make a adequate assessment of the susceptibility of patients with acute neck pain to develop chronic neck pain.

Chapter 8 discusses the main findings of this thesis, some methodological issues and several aspects of patients recruitment in general practice. The recurrent nature of neck pain and the differences in the definition of the chosen outcome measures hamper the comparability of studies. Given the relatively large diversity of diagnostic and therapeutic procedures undertaken by the GPs and the absence of clinical guidelines stresses the need for their development. This chapter concludes with the implications of our findings for general practice and some recommendations for future research.

Hoofdstuk 10

Samenvatting

Hoofdstuk 1 beschrijft de introductie van dit proefschrift en de reden om het klinisch beloop, de prognostische factoren en de behandeling van patiënten met acute nekpijn in de huisartsenpraktijk te gaan onderzoeken. Nekpijn is een van de meest voorkomende klachten van het bewegingsapparaat, men schat dat twee derde van alle mensen in hun leven een periode van nekpijn zal doormaken.

Wat nekpijn is, waar het is gelokaliseerd en welke klachten het veroorzaakt is eigenlijk wel duidelijk. Nekpijn gaat meestal wel vanzelf over is de meest gangbare gedachte hoewel het klinische beloop ervan in de huisartsenpraktijk onbekend is.

Een hogere leeftijd, het vrouwelijke geslacht en een voorgeschiedenis van een trauma zijn geaccepteerde prognostische factoren maar of deze factoren ook verantwoordelijk zijn voor chronische nekpijn in de huisartsenpraktijk is onduidelijk. Het algemene doel van dit proefschrift is om inzicht te verkrijgen in het klinische beloop en de behandeling van patiënten met acute nekpijn vanuit het oogpunt van de huisarts.

Hoofdstuk 2 rapporteert de resultaten van een test-hertest onderzoek met de Neck Disability Index (NDI). De doelstellingen waren om de reproduceerbaarheid en responsiviteit te beoordelen van dit met instrument. De betrouwbaarheid werd bepaald aan de hand van de Intraclass Correlation Coefficient (ICC). Er werden 187 patiënten geïncludeerd (119 vrouwen en 68 mannen). Zij vulden een vragenlijst in over demografische gegevens, de zelf gerapporteerde oorzaak van hun klachten en de NDI. Na één week kregen 86 patiënten opnieuw de NDI toegestuurd samen met een 7-punts ordinale schaal van het 'ervaren herstel' welke als ons externe criterium diende. Het antwoord percentage bedroeg 93%. We vonden een ICC van 0.90, welke als 'goed' kan worden beschouwd. Een Bland en Altman plot en een grafiek met de verschillen in totaalscores lieten geen neiging tot een ongelijke verdeling van de data zien. Voor patiënten die op de schaal van het ervaren herstel rapporteerden dat ze "onveranderd" waren vonden we een responsiviteits ratio van 1.82 bepaald volgens de methode van Gyuatt en een minimaal detecteerbaar verschil van 7.62. We concludeerden dat de NDI had laten zien een betrouwbaar en responsief instrument te zijn voor patiënten met acute nekpijn in de huisartsenpraktijk.

Hoofdstuk 3 rapporteert over het onderzoek naar de bruikbaarheid van de Acute Low Back Pain Screenings Questionnaire (ALBPSQ) bij patiënten met acute nekpijn. Hoewel oorspronkelijk ontworpen voor patiënten met lage rugpijn zou het ook bruikbaar kunnen zijn voor patiënten met nekpijn. We onderzochten zijn betrouwbaarheid en bepaalden een zo optimaal mogelijk afkappunt in het voorspellen van ziekteverzuim. De betrouwbaarheid werd bepaald aan de hand

van een test-hertest procedure met een interval van één week. Het totale aantal ziektedagen werd bepaald aan de hand van de zelf ingevulde vragenlijsten. De test-hertest betrouwbaarheid was hoog (ICC 0.85; 95% BI 0.73-0.92). Bijna 40% van de patiënten vermeldden ziekteverzuim gedurende de follow-up periode. Voor toekomstig ziekteverzuim werd een optimaal afkappunt berekend van 72 punten met een sensitiviteits score van 77%, een specificiteits score van 62%, een positief voorspellende waarde van 0.81 en een negatief voorspellende waarde van 0,57. Het 'oppervlakte onder de curve' van de Receiver Operant Curve (ROC) was een twijfelachtige 0.66. Onze resultaten suggereren dat de ALBPSQ een betrouwbaar en potentieel nuttig instrument kan zijn voor de screening van toekomstig ziekteverzuim bij patiënten met acute nekpijn in de huisartsenpraktijk.

Hoofdstuk 4 rapporteert over de prospectieve cohort studie met een follow-up van één jaar bij patiënten met acute nekpijn in de huisartsenpraktijk. Het primaire doel was om het klinische beloop te beschrijven en het secondaire doel om prognostische factoren te bepalen voor de uitkomst maten 'herstel' en 'ziekteverzuim'. Patiënten van 18 jaar en ouder welke hun huisarts bezochten voor niet specifieke acute nekpijn die niet langer bestond dan zes weken werden uitgenodigd om deel te nemen. Door de patiënten zelf ingevulde vragenlijsten werden verzameld na 6, 12, 26 en 52 weken. Patiënten bepaalden hun herstel op een 7-punts schaal. Logistische regressie analyse werd gebruikt om prognostische factoren voor 'herstel' en 'ziekteverzuim' te bepalen. In totaal 187 patiënten werden geïncludeerd en we hebben follow-up data van 138 patiënten (74%). Na één jaar follow-up rapporteerde 47% nog steeds nekpijn. De helft van de patiënten die zich bij het begin ziek hadden gemeld waren binnen 7 dagen weer aan het werk. Na een jaar waren er nog 4 patiënten met ziekteverzuim. Regressie analyses lieten zien dat de hoogste correlatie met 'herstel' het advies van de huisarts was om 'af te wachten' (OR 6.7; 95% BI 1.6-31.8) en voor 'ziekteverzuim' was verwijzing door de huisarts het hoogst gecorreleerd (OR 2.8; 95% BI 1.0-8.4). Deze resultaten suggereren dat een aanzienlijk deel van de patiënten nog nekpijn rapporteert na één jaar. Het advies van de huisarts om 'af te wachten' was positief geassocieerd met herstel en 'verwijzing' was negatief geassocieerd met langduriger ziekteverzuim.

Hoofdstuk 5 beschrijft de behandeling door de huisarts van patiënten met acute nekpijn. Verder beschrijven we de diagnostische en therapeutische interventies van de huisarts en de wat de patiënten er zelf aan hebben gedaan. Bij het begin schreef de huisarts voor 42% van de patiënten medicijnen voor, voornamelijk pijnstillers (56%) of spierontspannende medicijnen (20%) en 51% werd verwezen naar de fysiotherapeut. Vaak gegeven adviezen door de huisarts waren: om "af

te wachten" (23%), de "houding te verbeteren" (22%) of om "rust te nemen" (18%). Wat de patiënten zelf deden bestond voornamelijk uit het toepassen van verschillende soorten warmtebronnen (79%) en oefeningen (57%). Alternatieve geneeswijzen werd door 12% gebruikt en 39% van de patiënten bezocht de huisarts nogmaals voor hun nekpijn gedurende de follow-up periode. Bezoek aan een medisch specialist of het laten maken van röntgenfoto's werd maar sporadisch gerapporteerd. We concludeerden dat de behandeling van de huisarts uit twee min of meer gelijke richtingen bestond: een beleid van afwachten op een verondersteld gunstig natuurlijk beloop ondersteund door medicijnen en anderszins verwijzing naar een fysiotherapeut.

Hoofdstuk 6 presenteert de verschillen in ervaren pijn en beperkingen in een subgroep van patiënten met acute nekpijn na een auto-ongeval vergeleken met de overige zelf gerapporteerde oorzaken. Het tweede doel was om prognostische factoren te ontdekken voor aanhoudende nekpijn. Hoge percentages van aanhoudende nekpijn na een auto-ongeval zijn in cross-sectionele studies gerapporteerd. De numerical pain rating scale (NRS) and the Neck Disability Index (NDI) werden gemeten. Logistische regressie analyse werd gebruikt om prognostische factoren te identificeren voor aanhoudende nekpijn als uitkomstmaat. De subgroep van patiënten na een auto-ongeval was significant jonger ($p<0.01$), rapporteerde meer ziekteverzuim ($p<0.05$), had vaker hoofdpijn ($p<0.001$) en hogere NDI scores ($p<0.02$) op baseline. Daarentegen lagere scores voor vroegere nekpijn en uitstralende pijn naar de arm vergeleken met de rest van het cohort. Bij follow-up na één jaar had de subgroep hogere scores voor aanhoudende nekpijn (63% versus 40%) en de NDI (11.0 versus 7.1). Na multivariate analyse waren "langer dan twee weken klachten op de baseline" (OR 5.31; 95% BI 2.24-12.6), een "auto-ongeval" (OR 5.34; 95% BI 1.90-15.0) en "pijn bovenin de nek" (OR 1.63; 95% BI 1.25-2.12) significant gecorreleerd met chronische nekpijn.

We concludeerden dat individuen die zijn blootgesteld aan een auto-ongeval een relevante subgroep van patiënten met nekpijn vormen in de huisartsenpraktijk. We concludeerden ook dat zowel een auto-ongeval als een langere duur van de klachten voorspellende factoren zijn voor chronische nekpijn bij follow-up.

Hoofdstuk 7 rapporteert in de vorm van een 'research letter' over het onderzoek naar de bruikbaarheid van het inschattingsvermogen van de huisarts voor het bepalen van de prognose bij patiënten met acute nekpijn in de huisartsenpraktijk. Eerder onderzoek bij lage rugpijn patiënten had laten zien dat de inschatting door de huisarts van het risico op de ontwikkeling van chronische rugpijn een goede voorspeller was. Op baseline vroegen wij de huisartsen om een inschatting te

geven, op een vier punts schaal, van het risico van deze patiënt op het ontwikkelen van chronische nekpijn (= pijn die langer dan 6 maanden aanhoudt). In totaal 187 patiënten werden geïncludeerd en we hebben follow-up data van 138 patiënten (74%). Van 110 van deze 138 patiënten (80%) hebben we de inschatting van de huisartsen ontvangen. Met behulp van multivariate logistische regressie analyse hebben we prognostische factoren geidentifeerd voor de uitkomstmaat chronische nekpijn. De inschatting van de huisarts bleek de sterkste associatie met chronische nekpijn te hebben (OR 14.58; 95% BI 2.98-71.3). Het Relatieve Risico was 2.45 (95% BI 1.71-3.45). We concludeerden dat de huisarts had laten zien een adequate inschatting te kunnen maken van de kans dat patiënten met acute nekpijn chronische nekpijn ontwikkelen.

Hoofdstuk 8 bediscussieerd de belangrijkste uitkomsten van dit proefschrift, enkele methodologische aspecten en verschillende praktische zaken bij de rekrutering van patiënten in de huisartsenpraktijk. Het recidiverende karakter van nekpijn en de verschillen in de definities van de gekozen uitkomstmaten hinderen de onderlinge vergelijkbaarheid van studies.

De relatief grote diversiteit in diagnostische en therapeutische activiteiten van de huisartsen en de afwezigheid van klinische richtlijnen benadrukt de noodzaak van de ontwikkeling van zulke richtlijnen. Dit hoofdstuk besluit met de implicaties van onze bevindingen voor de huisartsenpraktijk en enkele suggesties voor verder onderzoek.

Een proefschrift is
een woordenstroom bergop.
De tocht begint
waar de rivier breed is.
Zwem tegen de stroom
van zinnen.
Steeds smaller
soms wat teruggespoeld.
De laatste woorden
zwaarder dan de eerste.
Tenslotte gloort de bron.
Het begin
blijkt het einde.

Michiel en Annaliese van der Klaauw

DANKWOORD

Jaren geleden begon dit project als uitvloeisel van een geleidelijk aan ontstane interesse in het meer willen doen en weten van nekpijn dan alleen het behandelen ervan.

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Je liet iets van je verbazing merken toen je, na bekomen te zijn van de schrik, opmerkte: "en willen jullie dat allemaal in één keer onderzoeken"? Al snel bracht je ons met gerichte vragen terug op aarde.

In de jaren die daarop volgden wilde het geplande onderzoek door gebrek aan subsidie maar niet van de grond komen. Na je verhuizing naar Rotterdam belde je me op en zei je "kom weer eens praten, misschien zijn hier meer mogelijkheden". Je hield me de afgelopen jaren in het juiste spoor. Als ik dreigde af te dwalen dan wees je me weer de goede weg. Je vond op een gegeven moment wel dat ik moest kiezen tussen of promoveren of me bezig houden met allerlei bijbaantjes. Door die opmerking ben ik wel nadrukkelijker gaan selecteren waar ik mij mee bezig hield. Je vroeg je regelmatig af "waar ben je nu?", maar telkens kwam ik toch weer boven water. Zonder jouw niet aflatende hulp is het uiteindelijk toch nog voor elkaar gekomen.

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Als extern onderzoeker bleef mijn contact met mijn mede onderzoekers op de afdeling huisartsgeneeskunde beperkt.

Rene Suurland, je noemde me steevast “de verloren zoon”. Ik heb dat maar als een soort geuzenaam opgevat. Je aanstekelijk enthousiasme en het telkens weer vragen of “het al opschoot” heb ik zeer gewaardeerd.

Nick Flore dank ik voor zijn hulp bij het corrigeren van het Engels. Van het nauwgezet becommentariëren van de artikelen heb ik geleerd hoe weerbarstig de Engelse taal kan zijn. Het oorspronkelijke plan om samen dit onderzoek uit te voeren mocht helaas niet zo zijn. Je enthousiasme ‘langs de zijlijn’ heb ik zeer gewaardeerd.

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De mede cursisten op de EMGO epidemiologie opleiding waren een inspiratiebron voor een zich ontwikkelende interesse in de statistiek en epidemiologie. Ook al

ging het repeteerclubje met Marcel, Ilse en Ruud op een gegeven moment ter ziele toch gaf dit de stimulans om op deze weg door te gaan. De bijeenkomsten in den lande waren heel vermoeiend maar ook heel inspirerend.

De kleine commissie leden Prof. Dr. J.A.N. Verhaar, Prof. Dr. W.J.J. Assendelft, Prof. Dr. Ir. H.C.W. de Vet wil ik bedanken voor het lezen en het beoordelen van mijn proefschrift.

Mijn kinderen Githa, Elvira, Gideon en Birgit hebben de afgelopen jaren niet die volledig steun, inzet en tijd van mij gehad die ik ze zo graag had willen geven. Vooral voor de jongste twee was het wel eens moeilijk te begrijpen dat papa er wel was maar eigelijk ook weer niet. Waarom zat hij elke zaterdag achter zijn bureau maar wilde hij niet met me spelen? Ik hoop, mijn liefsten, het de komende jaren goed te kunnen maken.

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CURRICULUM VITAE

Cornelis Jan (Kees) Vos werd geboren op 17 juli 1953 te Westmaas.

Na het behalen van het HBS-B diploma aan het Johannes Calvijn Lyceum te Rotterdam-Zuid studeerde hij geneeskunde aan de Erasmus Universiteit Rotterdam. In 1980 behaalde hij zijn artsdiploma. Aansluitend volgde hij van 1980 tot 1981 de huisartsopleiding aan het Rotterdams Universitair Huisartseninstituut. Na de vervulling van zijn militaire dienstplicht als onderdeelsarts te 's Hertogenbosch heeft hij in 1982 en 1983 in meerdere huisartsenpraktijken gewerkt als waarnemend huisarts.

In 1983 heeft hij zich als huisarts in Rotterdam-Hillesluis gevestigd en heeft daar tot 2002 gewerkt. Sinds 2002 is hij werkzaam in een HOED-praktijk in Spijkenisse.

Vanaf 1991 is hij op freelance basis bij Mojo Concerts voor de artiesten als arts werkzaam. Sinds 1993 is hij actief betrokken bij diverse nascholingsactiviteiten voor huisartsen.

Van 1996 tot 2004 was hij werkzaam bij het Whiplash Centrum Nederland en is sinds 2000 betrokken bij de ontwikkeling van richtlijnen whiplash van het KNGF en het CBO.

Van 2000-heden volgde part-time promotieonderzoek naar acute nekpijn in de huisartsenpraktijk op de afdeling huisartsgeneeskunde van het Erasmus Medisch Centrum Rotterdam. Sinds 2006 maakt hij deel uit van de wetenschappelijke adviesraad van de Whiplash Stichting Nederland.