The Course of Nonspecific Chest Pain in Primary Care

Symptom Persistence and Health Care Usage

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Background: Nonspecific chest pain is common in primary care, yet knowledge is sparse about its course and outcome and how they relate to optimum health care usage. We investigated the following observations: (1) many patients who present with nonspecific chest pain in primary care show symptom persistence for 6 months, (2) many patients with nonspecific chest pain showed signs of overinvestigation, and (3) many patients with chronic chest pain were referred to mental health specialists.

Methods: We conducted a prospective, general physician–based cohort study with 6-week and 6-month follow-ups in 74 primary care offices in Hessen, Germany. Of approximately 190,000 consecutive patients who visited their general physicians from October 1, 2005, to July 31, 2006, 807 patients with nonspecific chest pain were identified by an expert committee (delayed-type reference standard). The dropout rate was 2.7%. Main outcome measures were persistent chest pain at a 6-month follow-up visit and health care usage at 6 months.

Results: The rate of persistent chest pain was 55.5%. A total of 10.7% of patients had inappropriate health care usage, defined as 2 or more visits to a cardiologist or 3 or more cardiac diagnostic investigations. Most patients with persistent nonspecific chest pain were referred to a cardiologist, and less than 2% were referred to mental health specialists.

Conclusions: For most patients with nonspecific chest pain, standard medical care does not offer sufficient help for symptom relief. One-tenth of patients with persistent chest pain underwent additional diagnostic testing of no known clinical benefit. Psychological referrals were rarely given.

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ONSPECIFIC CHEST PAIN IS pain not explainable by a well-established pathophysiologic condition; it is a frequent phenomenon in primary care.1-3 Prevalence rates show that more than 50% of patients with chest pain are classified as having noncardiac chest pain.4 However, knowledge about the course and outcome of this condition is sparse.5-7 Studies8-10 performed with this patient group are problematic because the definition of nonspecific chest pain requires interdisciplinary diagnostic approaches and knowledge of the long-term history of the patient to avoid misclassification of the chest pain. In this article, we prefer the term nonspecific chest pain to the term noncardiac chest pain because the latter term also includes patients with well-established medical conditions (eg, upper respiratory tract infections).10 We focus only on patients with chest pain that is not clearly attributable to a well-defined biomedical condition. Patients with chronic nonspecific chest pain are considered to be difficult to treat.11 Some results indicate that this group is frequently overinvestigated, which results in increased costs because of medical examinations and ineffective treatments.11-13 However, many of these studies are hospital based and therefore include only selected patient samples,6,14; they therefore risk overestimation of rates of inappropriate health care usage. Some studies15 suggest that this subgroup of patients with chronic pain might benefit from psychological interventions, but clear data on referral rates to mental health specialists are missing.5

In this study, we investigated 3 issues. First, we wanted to determine how many patients who present with nonspecific chest pain in primary care show symptom persistence for 6 months, which will help identify the number of patients who are well treated in primary care and the number who need more thorough interventions because of chronic conditions.
Second, we sought to determine how many patients with nonspecific chest pain show signs of overinvestigation, which could offer a basis for calculation of increased costs owing to poor management strategies. Third, we examined how many patients with chronic chest pain are referred to mental health specialists.

## METHODS

### PARTICIPATING GENERAL PHYSICIANS AND PATIENTS

A total of 209 general physicians (GPs) in Hessen, Germany, were approached with regard to the study, and 74 (35.4%) agreed to participate. Participating practices consecutively recruited every patient who had chest pain either as a presenting concern or on questioning. The recruitment period lasted 12 weeks for each practice. Recruitment was staggered in 4 waves from October 1, 2003, through July 31, 2006.

Inclusion criteria were age of 35 years or older with pain localized in the area between the clavicles and lower costal margins and anterior to the posterior axillary lines. We chose the cutoff age of 35 years because the main end point of the study was coronary heart disease (CHD); a lower inclusion age would have included too many patients with chest pain owing to other causes. Patients whose chest pain had subsided for more than 1 month, whose chest pain had been investigated already, and/or who came for follow-up were excluded. The study protocol has been approved by the Ethics Committee of the Faculty of Medicine, Philipps-University of Marburg. The study complies with the Declaration of Helsinki.

### DATA COLLECTION

#### Baseline and Follow-up

After eligibility assessment, GPs took a patient history and performed a physical examination in accordance with a standardized case report form that was piloted and modified accordingly. Index tests covered first impression of the patient, duration, and temporal patterns of pain, character, localization, and associated symptoms, known vascular diseases, risk factors, and relevant findings. The GPs also recorded their preliminary diagnoses, investigations, and treatment related to the chest pain of their patients.

Patients were contacted by telephone 6 weeks, then 6 months, after the index consultation. A study assistant masked to the course of the patient’s chest pain and treatment. The specific question concerning the persistence of chest pain in the follow-up interview was, “Do you have chest pain at present?”

#### Diagnostics

After final follow-up was completed, a reference panel that included 1 cardiologist, 1 GP, and 1 researcher reviewed all patient data collectively. As a delayed-type reference standard, they decided on the presence or absence of CHD or the need for urgent hospital admission at the time of patient recruitment (index consultation). Concerning diagnoses other than CHD, the reference panel members followed International Statistical Classification of Diseases, 10th Revision (ICD-10)\(^\text{10}\) criteria. This design is presented on the basis of the assumption that serious diseases (eg, CHD) would manifest themselves within the mentioned period. Decision making on the part of the panel was based on the National Clinical Practice Guideline for CHD. The panel rated each patient first without the index test (ie, masked to clinical data recorded by GP, including preliminary diagnoses) using only the information gathered at follow-up (masked reference standard). In a second-round follow-up, data were reviewed in a randomly changed order together with history and findings recorded by GPs (unmasked reference standard). These data, presented on the basis of the combined professional judgment of the 3 raters, were included in the following analyses.

### Definition of Nonspecific Chest Pain

Patients diagnosed as having psychologically caused chest pain, chest wall syndrome, gastroesophageal reflux disease, benign stomach problems, neck or shoulder disorders, and other nonspecific somatic diseases/no diagnosis were defined as having nonspecific chest pain.\(^\text{17-19}\) For the purposes of analysis, we further divided all patients with nonspecific chest pain into 2 generic categories: psychologically caused nonspecific chest pain and potentially somatically caused nonspecific chest pain. Other patients with chest pain were excluded because of somatic diagnoses (eg, cardiac disease, chronic obstructive pulmonary disease, upper respiratory tract infections, or trauma).

### Definition of Inappropriate Health Care Usage

There is no conclusive definition of inappropriate health care usage.\(^\text{1,20}\) We operationalized it as repeated, thus unnecessary, cardiologic diagnostic investigations. Therefore, inappropriate health care usage was defined as 2 or more visits to a cardiologist or 3 or more cardiac diagnostic investigations (such as electrocardiograms, angiograms, heart sonograms, stress electrocardiograms, chest radiograph examinations, and scintigrams) within 6 months in patients with nonspecific chest pain.

In addition, we analyzed and compared the proportion of visits to cardiologists and psychiatrists or psychologists of patients with persistent pain. With regard to mental health interventions, we looked only at referrals to mental health care professionals. We included referrals to mental health care professionals into our analyses even if the patient elected not to visit the mental health care professional.

### STATISTICAL ANALYSIS

Analyses were performed by means of SPSS statistical software, version 17.0 (SPSS Inc, Chicago, Illinois). Sex, age, and the categories “psychologically caused nonspecific chest pain” and “somatically caused nonspecific chest pain” were considered potentially influential variables. We used \(\chi^2\) tests and \(t\) tests to identify differences in relevant variables. \(P\) values were Bonferroni corrected (\(P=.02\)), and 95% confidence intervals (CIs) were calculated for proportions.

### IDENTIFICATION OF PATIENTS WITH NONSPECIFIC CHEST PAIN

The 74 participating GPs encountered approximately 190 000 patients during the study period and assessed 1355 patients with chest pain. Seven patients did not meet the general inclusion criteria and 99 refused to participate. For 37 patients, follow-up information was
lacking, incomplete, or ambiguous, such that no final diagnosis could be made (the dropout rate was 2.73%). We finally examined 1212 patients (89.4%) for the cause of their chest pain; 405 (33.4%) were excluded from our analyses because of diagnoses with clear medical origin. A total of 692 patients (57.1%) were diagnosed as having probably somatically caused nonspecific chest pain and 115 (9.5%) as having psychologically caused nonspecific chest pain. Both groups are regarded as having nonspecific chest pain (n=807, 66.6% of the whole chest pain sample). From these, 52 (6.4%) had missing or partly missing follow-up data because of dropping out or incomplete data recording. Basic characteristics of the patients included in the study are presented in the Table.

### Course of Chest Pain

At 6-month follow-up, data were available from 755 patients on the development of their chest pain. A total of 419 patients (55.5%; 95% CI, 51.95%-59.04%) still reported chest pain. Patients with persistent pain were more likely to be female (odds ratio [OR], 1.35; 95% CI, 1.08-1.70) but did not significantly differ with regard to age \((t_{556} = 1.74, P = .09)\). Patients with psychologically caused nonspecific chest pain showed a tendency toward reporting more persistent pain at 6-month follow-up (OR, 1.19; 95% CI, 0.79-1.79) than patients with probably somatically caused nonspecific chest pain.

### Health Care Usage in Patients with Persistent Chest Pain

Of all 419 patients with persistent nonspecific chest pain, 161 (38.4%) underwent testing for heart disease during the 6-month follow-up (range, 0-6 investigations) and 60 (14.3%) visited a cardiologist (range, 0-3 visits). Twenty-eight patients (6.7%) underwent Holter electrocardiography (range, 0-2 procedures), 19 patients (4.5%) underwent angiography (range, 0-1 procedures), 83 patients (19.8%) underwent echocardiography (range, 0-2 procedures), 97 patients (23.2%) underwent stress electrocardiography (0-3 procedures), 57 patients (13.6%) underwent chest x-ray examination (range, 0-2 procedures), and 5 patients (1.2%) underwent nuclear imaging (range, 0-1 procedures). Of 361 patients with valid data, 63 (17.5%) were referred to outpatient clinics or hospitals.

### Inappropriate Health Care Usage

Forty-five (10.7%) of 419 patients (95% CI, 7.78%-13.7%) with persistent chest pain were defined as using health care in an inappropriate manner compared with 24 (7.1%) of 336 patients with remitted chest pain (OR, 1.57; 95% CI, 0.93-2.63). Patients with persistent chest pain and inappropriate health care usage received the diagnosis of psychologically caused chest pain more often than patients with persistent chest pain and a rate of health care usage that was deemed appropriate (OR, 2.2; 95% CI, 1.07-4.53). The groups did not differ by sex \((OR, 0.83; 95\% CI, 0.44-1.56)\) or age \((t_{147} = 1.487, P = .14)\).

### Table. Basic Characteristics of the 807 Study Patients

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>No. (%) of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, mean (SD) [range], y</td>
<td>57.64 (13.25) [35-90]</td>
</tr>
<tr>
<td>Women, No. (%)</td>
<td>488 (60.5)</td>
</tr>
<tr>
<td>Chest pain as reason for consultation (n=806)</td>
<td>710 (88.1)</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
</tr>
<tr>
<td>Psychologically caused chest pain</td>
<td>115 (14.3)</td>
</tr>
<tr>
<td>Chest wall syndrome</td>
<td>565 (70.0)</td>
</tr>
<tr>
<td>Gastroesophageal reflux disease</td>
<td>42 (5.2)</td>
</tr>
<tr>
<td>Benign stomach problem</td>
<td>26 (3.2)</td>
</tr>
<tr>
<td>Neck or shoulder disorders</td>
<td>2 (0.2)</td>
</tr>
<tr>
<td>Other nonspecific somatic diseases</td>
<td>57 (7.1)</td>
</tr>
<tr>
<td>or no diagnosis</td>
<td></td>
</tr>
</tbody>
</table>

The Figure shows the flow of participants concerning diagnoses, persistence of pain, and inappropriate health care usage. Patients with persistent chest pain visited medical specialists 0.87 (SD, 1.07) times on average (range, 0-7) in 6 months. A total of 219 of 419 patients with persistent pain (52.3%) visited a medical specialist at least once. Of these visits, 71 (19.7%) were to a cardiologist (range, 0-3 visits). Psychiatrists or psychologists were visited in 6 instances (1.7%) (range, 0-2 visits). In addition, patients with psychologically caused nonspecific chest pain visited cardiologists twice as often (OR, 2.15; 95% CI, 1.01-4.51) as patients with somatically caused nonspecific chest pain.

### Comment

We showed for a consecutive primary health care sample that for every second patient with nonspecific chest pain, standard medical care does not offer sufficient help for symptom relief. Every tenth patient with persistent chest pain shows signs of overinvestigation. The strengths of our study include a large primary care–based consecutive sample that is highly representative, a prospective design, small dropout rates, and precise delayed-type reference standard diagnostics in an interdisciplinary team.

A limitation is the low response rate of GPs approached to participate in the study, although few other studies have obtained higher participation rates. The proposed new cutoff for inappropriate health care usage constrains the comparability of our study to other findings. Some aspects of health care usage might be limited to the German health care system (eg, compared with US emergency departments, usage is much less common in Germany because GPs have a gatekeeper function and provide on-call services). The age cutoff of 35 years, chosen because older patients have higher risk for CHD, limits the interpretation of our results and does not allow generalization with regard to younger patients.

A further limitation is our definition of nonspecific chest pain. This definition was chosen according to proposals offered by numerous authors. Nevertheless, other more formal definitions of nonspecific chest pain or nonanginal discomfort exist. One of them was defined in the Coronary Artery Surgery Study (CASS) as “chest pain unrelated to activity, unrelieved by nitroglycerin and apparently non-cardiac in origin.”*22(p363)*
The use of the CASS definition of nonspecific chest pain might lead to reports of higher usage rates. However, because our analysis is from a primary care perspective, our data shows lower prevalence of CHD and higher prevalence of other conditions. Therefore, contrary to CASS, we define nonspecific chest pain not in descriptive terms but by the underlying cause. Because of our longitudinal approach, we could provide a positive definition for nonspecific cardiac chest pain because 6 months of follow-up data have provided us the opportunity for this kind of analysis.

The number of patients who report persistent symptoms after 6 months was smaller than in previous, mostly hospital-based studies. However, our sample may be seen as more representative because most patients with nonspecific chest pain never visit an emergency department or inpatient treatment center. Nevertheless, more than 50% of this patient sample showed persistent pain, and this rate builds on earlier results. These facts indicate that there is room for improvement with regard to treatment of these patients within the primary care system.

In contrast to previous reports that originated from inpatient settings and postulated high levels of health care usage, we found only a few patients with nonspecific chest pain to be problematic for the health care system. One reason for these conflicting results could be our specific definition of inappropriate health care usage. In many other studies, a more general level of health care usage (eg, total number of GP visits) was tallied. These measures have different advantages, but the clear cutoff for the inappropriate number of physician visits used in this study is a less ambiguous estimate of problematic health care usage. Our criterion for inappropriate health care use was fulfilled by approximately 10% of patients with nonspecific chest pain. Another reason for this conflicting result could be that we performed a complete consecutive recruitment on a primary health care level. The consecutive recruitment of patients with chest pain in our study may have produced less selection bias and thus a usage rate more representative of actual practice.

Only 6 patients were referred to mental health specialists. This finding is surprising because psychological factors are known to contribute to the development of chronic pain and psychological consultations are covered by the health care system in Germany. In addition, as Martina et al showed, a preliminary diagnosis of nonorganic chest pain made by general physicians proved remarkably accurate. Therefore, it is possible to recognize nonspecific chest pain early and take necessary steps within the health care system. One reason for this surprising result could be that we recorded only a small period of referrals. Nevertheless, taken together, these results with regard to symptom persistence and health care usage indicate that there is room for improvement concerning well-established effective management and treatment guidelines for nonspecific chest pain. Many patients continue to experience chest pain, even though they do not seek further medical treatment.

Our results show that current primary care–oriented interventions do not result in symptom relief for half the patients with nonspecific chest pain. This explains, in part, the high prevalence rate of chest pain in the general population. Patients with psychologically caused nonspecific chest pain showed more problematic health care–seeking behavior but were rarely referred to mental health...
professionals. Patients, GPs, or both seem to be hesitant to involve psychological interventions. Future research should investigate the development of effective interventions for nonspecific chest pain and their implementation within health care systems.

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