

Non-cardiac chest pain: a retrospective cohort study of patients who attended a Rapid Access Chest Pain Clinic

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Background. Rapid Access Chest Pain Clinics have recently been introduced to assist in the management of primary care patients experiencing suspected cardiac chest pain.

Objective. To study the longer term outcome for patients referred to a Rapid Access Chest Pain Clinic and then given a non-cardiac diagnosis.

Methods. The study collected retrospective data from a cohort of all patients attending the Rapid Access Chest Pain Clinic based in the cardiorespiratory Department at the York District Hospital, England. Questionnaires were sent to all patients who attended the Rapid Access Chest Pain Clinic during the previous 14 months and were diagnosed with non-cardiac chest pain. Participants reported on their chest pain, subsequent episodes of primary and secondary care and their beliefs about causation of pain.

Results. Of the patients referred to the Rapid Access Chest Pain Clinic, 235 (52%) did not have cardiac chest pain. Of these patients, 161 (69%) returned the questionnaire, nearly half of whom reported ongoing chest pain. The mean time since Clinic attendance was approximately 8 months and the median duration of ongoing chest pain was 5.4 months. Women were twice as likely as men to continue to be experiencing pain but did not report more frequent or severe pain on average. More than 50% of the non-cardiac group were not convinced by their negative cardiac diagnosis.

Conclusion. There is an ongoing challenge to support patients with non-cardiac chest pain, including the provision of reassurance that their pain is very unlikely to be caused by their heart.

Keywords. Chronic disease management, cohort study, non-cardiac chest pain, primary care.

Introduction

When a patient presents in primary care with chest pain, the priority is usually identification of a potential underlying cardiac cause. However, a proportion of patients with chest pain who either present at emergency departments, 21%¹ or 10–30%,² or are referred to cardiac clinics, 57%,³ are diagnosed with non-cardiac chest pain. Non-cardiac chest pain is a prevalent condition in the general population. For example, Eslick *et al.*⁴ found that 33% of an Australian population sample reported having experienced non-cardiac chest pain at some time.

The term non-cardiac chest pain covers a wide number of possible complaints and diagnosing a single

cause for a patient's pain is often difficult as there are a number of possible factors that can contribute to the condition.^{5,6} There are various potential organic causes including gastrointestinal and musculoskeletal disorders and also a strong and complex association between non-cardiac chest pain and psychological factors.⁷ These factors may include underlying problems such as anxiety, panic attacks and depression. Indeed, anxiety sensitivity, the fear of anxiety-related sensations, has been linked to non-cardiac chest pain in women.⁸

Research suggests that few patients with non-cardiac chest pain then experience cardiac problems.⁹ Indeed, further long-term follow-up has indicated low mortality in this patient group.^{10–14} However, the

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continuing prevalence of non-cardiac chest pain post-diagnosis has been reported as being high, even years after diagnosis.¹⁵ In a US study, Ockene *et al.*¹⁶ reported that 58% of patients who had received a non-cardiac diagnosis for chest pain after undergoing angiography still had chest pain 16 months after receiving their diagnosis. Additionally, 44% of these patients still believed their chest pain was caused by their heart. In a UK study, 3 years after attending a cardiac clinic, 35% of people with non-cardiac chest pain still had pain.³ Furthermore, 6 months after their appointment, 54% of participants were dissatisfied with their medical treatment from primary care and 35% were dissatisfied with treatment from secondary care. The majority of these participants remained worried that their pain had a cardiac cause.³ This study's UK population had generally been managed in primary care for a long period before referral and it was suggested that this wait might have contributed to their anxieties. It is clear that ongoing chronic non-cardiac chest pain has serious consequences for the patient in terms of pain and impaired quality of life.¹⁵ There is considerable morbidity among sufferers not only in continuing pain but also in avoidance of activity that may be influenced by the belief that they have a cardiac condition. There is also increased use of medical resources by this patient group.¹²

In 2000 the National Service Framework for coronary heart disease was published; one of the targets was that there should be no more than 14 days delay between a GP referral of a patient with possible cardiac chest pain and an appointment with a cardiac specialist. To meet this aim, the majority of hospitals providing cardiology services have established a Rapid Access Chest Pain Clinic to enable investigation and treatment with minimal delay.^{17,18} To date, recent audits suggest that the services are successful in allowing the early and accurate diagnosis of identifying cardiac problems such as angina.^{17,19,20} However, it has been reported that up to half of referrals will be diagnosed with non-cardiac chest pain.¹⁹ There remains a dearth of information on what happens to these patients after diagnosis at a Rapid Access Chest Pain Clinic—with a subsequent care pathway involving a return to primary care. For example, it is unclear whether such patients are more or less convinced by the non-cardiac diagnosis, even if speedier, compared to those observed in the previous studies conducted in traditional cardiac clinics. It is also unclear whether these patients receive further explanation for their pain.

This study aimed to identify characteristics of patients referred from primary care to a Rapid Access Chest Pain Clinic who were subsequently given a diagnosis of non-cardiac chest pain. We also aimed to explore factors associated with ongoing chest pain up to 14 months after diagnosis, to look at use of GP

referral and out-patient/in-patient episodes and to identify factors associated with the participant's belief that their pain was caused by their heart.

Methods

Rapid Access Chest Pain Clinic

The study collected retrospective data from a cohort of all patients attending the Rapid Access Chest Pain Clinic at York Hospital over a 14-month period (from August 2003 to October 2004). The clinic has a catchment population of 260 000 from York and the surrounding area and receives patients referred from primary care 5 days a week. In terms of demographics, using data collected in 2001, the population of York is similar to that of England and Wales in terms of age distribution; however, the area does have a higher percentage of white and lower percentage of ethnic minorities compared to national figures.²¹ In the 2004 Indices of Deprivation, York was ranked at 219 out of 354 local authorities in England (1 = most deprived area and 354 = least deprived).²¹

Patients are eligible for referral from their GPs if they have chest pain symptoms believed to be potentially cardiac in origin. There is no age limit for referral, although patients must be fit enough to walk on a treadmill. Patients are referred, by fax, to the Cardiorespiratory Department, where the Rapid Access Chest Pain Clinic is held. Patients are then contacted by telephone and a Rapid Access Chest Pain Clinic appointment is arranged within 14 days of their initial GP appointment.

At their Rapid Access Chest Pain Clinic appointment, patients are assessed by a senior cardiac physiologist and have an electrocardiogram (ECG) and a standard treadmill exercise test, if the patient is able, using the Bruce protocol. This is followed by a consultation with a cardiologist or GP with special interests. A history of the presenting chest pain is taken and the patient is assessed for cardiac risk factors such as smoking, high blood pressure, family history of heart disease, hypertension and diabetes. Based on the ECG and treadmill tests, an assessment is made of the probability that the patient has a cardiac cause for the pain.

If there is no evidence of a cardiac problem, any indication of a further organic cause for the pain will be considered (usually gastro-oesophageal or musculo-skeletal). If possible, a diagnosis is made and patients are informed of this at the Clinic. Patients' GPs are sent a full report of the investigations and diagnosis.

Study population

All patients seen in the Rapid Access Chest Pain Clinic at York District Hospital, UK, over a 14-month period, who did not receive a cardiac diagnosis were

identified from records by a cardiac specialist nurse. Those patients with an unclear diagnosis but who were to undergo further tests for possible cardiac problems were not included in the study population.

Included participants were sent a two-page self-administered questionnaire at a single point in time. This questionnaire was designed specifically for use in this study and aim to collect information on the status of patients' chest pain subsequent to their visit to the Rapid Access Chest Pain Clinic (see Box 1). If a completed questionnaire was not received after 2 weeks, a reminder letter and a further copy of the questionnaire was sent. Ethical approval for the study was received from the local Research Ethics Committee (York).

Basing our sample size calculation on what we perceived to be an important predictor for no longer having non-cardiac chest pain (sex), we calculated that in order to detect a difference of approximately 15 weeks or more in time to disappearance of pain between men and women with 90% power we would require a sample size of 156 ($\alpha = 0.05$) assessed patients who had attended the Rapid Access Chest Pain Clinic over a 14-month period ($n = 235$) to allow for non-response. We assumed that the addition of covariates in our statistical models would have no effect on power, ensuring that the power calculation was conservative.

Data analysis

All analysis was carried out using SPSS (version 12). For the univariate analysis of categorical data, the chi-square test was used. For continuous data, Student's *t*-test was used. All significance tests were two sided and the 5% significance level was used to denote statistical significance.

To assess factors associated with continuing chest pain, time to event analysis was carried out using Cox regression, the event being no longer in pain. Covariates included in the model were as follows: age, sex, duration of chest pain prior to Rapid Access Chest

Pain Clinic appointment, smoking status (treated as a trend variable) and the diagnosis given at Rapid Access Chest Pain Clinic.

To assess factors associated with participants' belief, at 14 months, that the cause of chest pain was cardiac, all the covariates above were used in an ordinal logistic regression model with strength of belief about the cause of chest pain as the dependent variable (0 = non-cardiac, 1 = do not know and 2 = cardiac). Also included in this model was a covariate relating to people's chest pain status (pain had gone or pain was still present).

Results

From 14 months of Rapid Access Chest Pain Clinic records, 456 people were identified as having attended the Rapid Access Chest Pain Clinic. In total, 199 (44%) of those referred had a definite or probable diagnosis of coronary heart disease and 22 (5%) were to undergo further tests for possible cardiac problems. Thus, a study population of 235 patients (52% of all patients) were identified as having not been given a cardiac diagnosis after their appointment. The mean time since consultation at Rapid Access Chest Pain Clinic for this group was approximately 8 months (Table 1). All 235 patients were sent a questionnaire and the response rate was 161 (69%) (Table 1). Some response bias was observed (Table 1).

Ongoing chest pain

Of responders, 76 (47%) reported that they still had ongoing chest pain. The median duration for chest pain was 5.4 months (inter-quartile range = 0.0–9.2). Cox regression suggested an association between sex and ongoing chest pain (Table 2), with females more likely to report ongoing pain than males [hazard ratio = 2.2; $P = 0.01$; 95% confidence interval (CI) = 1.21–3.99] (see Fig. 1).

Of those who still reported pain, 6 (9%) suffered pain everyday (Table 3). Intensity of pain was moderate or severe for about 15 (21%) of respondents (Table 3). Of those experiencing pain, 24 (34%) described it as a moderate or severe problem in their lives. There were no significant differences between men and women in the proportions of frequency or severity of disease.

Use of health care resources

Participants in this study were asked to report their chest pain-related use of GP or hospital services following their appointment at the Rapid Access Chest Pain Clinic. The most widely used health service was primary care, with 45 (28%) of the responders having visited their GPs at least once because of their chest pain following their Rapid Access Chest Pain Clinic appointment (Table 4). In total, 61 (81%) participants

Box 1 Self-reported data collected by the questionnaire

The following data were collected in the questionnaires:

Whether chest pain was considered to be gone

How long the chest pain had been gone for

If people still had pain, the frequency, intensity of the pain and its impact on people's lives

Subsequent use of GP appointments and hospital in-patient/out-patient episodes

Whether patients received a further diagnosis after their Rapid Access Chest Pain Clinic appointment

People's views about the cause of their chest pain

People's smoking status

TABLE 1 Characteristics of the study population, and comparison of responders and non-responders

	All with non-cardiac diagnosis (n = 235)	Responders (n = 161)	Non-responders (n = 74)	P-value (responders/non-responders)
Mean age years (SD)	56.4 (10.6)	58.3 (10.6)	52.4 (9.6)	<0.005
Sex in %, female (n)	51.9 (122)	57.8 (93)	39.2 (29)	0.008
Median duration of chest pain at time of consultation in months (inter-quartile range)	1.03 (0.69–3.67)	1.38 (0.69–3.67)	0.917 (0.69–6.0)	0.546
Diagnosis at Rapid Access Chest Pain Clinic (%)				
No clear diagnosis	57.4 (135)	54.0 (87)	66.2 (49)	0.462
Gastrointestinal/oesophageal	14.5 (34)	14.9 (24)	13.5 (10)	
Musculoskeletal	14.0 (33)	16.1 (26)	9.5 (7)	
Respiratory	5.1 (12)	5.6 (9)	4.1 (3)	
Other (includes stress)	8.5 (20)	9.3 (15)	6.8 (5)	
Mean time since consultation at Rapid Access Chest Pain Clinic in months (SD)	8.5 (3.9)	8.6 (3.9)	8.4 (4.2)	0.833
Smoking status at time of questionnaire (%)				
Current smoker	N/A	16.4 (26)	N/A	N/A
Ex-smoker (<5 years)		8.2 (13)		
Ex-smoker (>5 years)		28.9 (47)		
Non-smoker		46.5 (75)		

TABLE 2 Predictors of ongoing chest pain, results from Cox regression

	exp B hazard ratio ^a	95% CI	P-value
Age (years)	1.02	0.990–1.04	0.24
Sex			
Female (reference catalogue)			
Male	2.20	1.21–3.99	0.01
Duration of chest pain at time of consultation (months)	0.99	0.96–1.01	0.21
No clear diagnosis (reference catalogue)			
Gastrointestinal/oesophageal	1.42	0.57–3.53	0.65
Musculoskeletal	0.64	0.29–1.42	0.93
Respiratory	1.25	0.48–3.29	0.30
Other (includes hypertension and stress)	1.33	0.39–4.53	0.94
Smoking status	1.22	0.92–1.61	0.16

^aIn this model, the event or hazard is that of no longer having pain.

reported that they had not been given any explanation for their pain.

Belief that chest pain is cardiac

Participants were asked whether, regardless of what they had been told, they thought their chest pain was caused by their heart. In total, 11 (14%) of the responders did think their pain was cardiac, 36 (48%) did not think that their pain had been or was cardiac and 29 (38%) did not know. We used ordinal logistic regression to investigate the factors associated with patients’ beliefs that their chest pain was cardiac. Chest pain status and duration of chest pain prior to appointment were both significantly associated with peoples’ strength of beliefs about the cause of their pain. People were less likely to believe that their pain was cardiac if they no longer had pain [(B = -1.17;

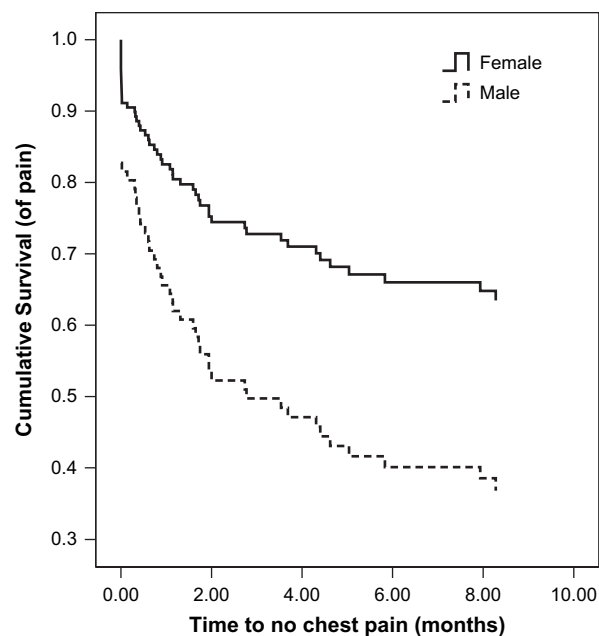


FIGURE 1 Time to being chest pain free in men and women

95% CI = -2.104 to -0.321; P = 0.007) (exp B = 0.310; 95% CI = 0.122–0.725)] or had experienced pain prior to their Rapid Access Chest Pain Clinic appointment for a longer period of time [(B = -0.035; 95% CI = -0.065 to -0.004; P = 0.025) (exp B = 0.966; 95% CI = 0.937–0.996)].

Discussion

Summary of main findings

As with previous work,¹⁹ this study suggests that approximately half of all patients attending a Rapid Access Chest Pain Clinic had non-cardiac chest pain.

TABLE 3 Details of pain over the previous week in respondents who recorded ongoing chest pain^a

	n (%)
Intensity of pain (n = 71)	
No pain	14 (19.7)
Very mild pain	19 (26.8)
Mild pain	23 (32.4)
Moderate pain	13 (18.3)
Severe pain	2 (2.8)
Frequency of pain (n = 69)	
Once a week or less	33 (47.8)
Not everyday but more than once a week	28 (40.6)
Everyday	6 (8.7)
More than once a day	2 (2.9)
Impact of pain on life (n = 70)	
Not a problem	9 (12.9)
A mild problem	37 (52.9)
A moderate problem	23 (32.9)
A severe problem	1 (1.4)

^aSome patients recorded they had ongoing chest pain but that they had suffered no pain over the previous week and so data were not included in this table.

TABLE 4 Respondents' use of health services since their visit to the Rapid Access Chest Pain Clinic (n = 160)

	Number of visits (% of respondents)				
	0	1	2	3	≥4
GP visits (surgery)	71.9	15.0	6.3	3.8	3.1
GP visits (home)	98.8	1.2	–	–	–
Out-patient	87.5	6.9	3.8	1.3	0.6
In-patient	96.9	2.5	0.6		

Furthermore, women in this study were approximately twice as likely as men to continue to suffer from ongoing non-cardiac chest pain, a finding which is also supported by previous data.^{2,8,22} Over half of participants who had received a non-cardiac diagnosis from the Rapid Access Chest Pain Clinic either believed that their chest pain was, or had been, cardiac or did not know if this was the case despite there being only a short wait between referral and diagnosis. Those patients who continued to believe that the pain was cardiac in origin or who remained unsure, despite a negative diagnosis, were more likely to still have pain and more likely to have had their pain for less time prior to their Rapid Access Chest Pain Clinic appointment compared to those who accepted their non-cardiac diagnosis. It may be that as time passes from a diagnosis of non-cardiac chest pain, the lack of any major cardiac event helps to confirm the diagnosis in the minds of patients. It may also be that during this period of time a further diagnosis is made, although the majority of people with ongoing pain in this study had not received an explanation as to the underlying cause of their pain.

Implications of finding on future practice

The data presented here suggest that having access to improved diagnostic facilities has not changed the proportion of patients with chest pain who are referred to secondary care but who have non-cardiac pain.

As these non-cardiac chest pain patients are referred back to primary care, it is likely that further reassurance, explanation and any future treatment may be sought from a GP. For such patients, a two-way discussion about why the patient remains concerned about their diagnosis, discussion of the benign prognosis for people with non-cardiac chest pain and discussion of the many other potential causes of the pain and treatment may be useful. We also suggest that such reassurance is particularly important soon after the non-cardiac diagnosis is given.

Previous treatment studies

Around 30% of those with non-cardiac chest pain reported that the pain was moderately to severely affecting their life. There have been a few studies that have attempted to use cognitive therapy, either individually or in groups, to help these patients.^{23–25} All have been helpful but none could be typified as overwhelmingly successful and it seems likely that these patients are not a homogenous group who will all respond well to the same treatment. For example, in some cases the non-cardiac chest pain problem appeared to be musculoskeletal, in others it is known to reflect to anxiety and panic. Furthermore, it has been noted that outcomes may be poorer in those who continue to believe that their pain is caused by their heart.¹⁴ Additional research is required to investigate this population, with a view to making differential diagnoses of the underlying causes and to compare alternative management strategies for each group.

Strengths and limitations of the study

This is the first study that has investigated the outcomes of patients given a diagnosis of non-cardiac chest pain at a Rapid Access Chest Pain Clinic. Referrals to such clinics are made by GPs; yet, as we have observed, around half of the patients are likely to be given a non-cardiac diagnosis and then be referred back to their GPs for further consultation. Thus, it is vital that data on the outcome of patients seen at Rapid Access Chest Pain Clinics were communicated back into primary care.

The response rate of the postal questionnaire was sufficiently high at 69% for us to draw some reasonably useful conclusions about the population as a whole. However, in relation to the finding that more women suffered ongoing chest pain, it is important to note that there was a potential response bias, with a higher proportion of female respondents and on average younger respondents when compared to non-responders. Finally, we did not collect psychological

information from the questionnaire. This information would have been useful, given the recognized association between non-cardiac chest pain and psychological factors, and should be considered in further work.

Future research

We acknowledge that this was a small study with data collected only from non-cardiac patients and at one, non-fixed, time point only. However, we hope that this work from this under-researched population highlights the need for prospective studies. Such research could include all non-cardiac chest pain patients in primary care, and be designed to be of use to GPs, patients and other professionals who work in this and related areas.

Furthermore, although this research suggests that women are more likely to experience ongoing chest pain, it is important to check if this finding is robust in future research, especially by considering further variables in an analysis. Such predictors could include family history, diabetes and obesity. However, from a theoretical viewpoint there seems to be no obvious reason why these factors, if associated with chest pain, would be unevenly distributed between men and women in such a manner as to confound the results.

Given the ongoing burden of non-cardiac chest pain in primary care, a useful next step would be to explore in detail what current treatment options are and to review the evidence for these. Where under-researched treatments look promising, there will be a case for developing the existing evidence base. In particular for patients with musculoskeletal diagnoses, which is one of the larger subgroups, alternative treatments to medication may need to be evaluated.

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Ethical approval: Ethical approval for the study was obtained from York Research Ethics Committee.

Conflicts of interest: None.

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