

Predictors of mortality and morbidity following admission with chest pain

ABSTRACT – This study aimed to identify the predictors of outcome in 102 patients following their first admission with acute chest pain. Outcome was measured at three months by interview and at five years by questionnaire. Chest pain, change in physical activity, return to work, smoking, psychiatric disorder, and mortality were assessed. The principal predictors of chest pain and smoking were previous psychiatric disorder and a diagnosis of non-specific chest pain; a previous history of psychiatric disorder was associated with a five-fold increase in the risk of continued chest pain at five-year follow-up (95% CI = 1.1–25.0). Psychiatric disorder at five years was predicted by psychiatric disorder at admission (adjusted odds ratio (adj OR) = 3.2; 95% CI 1.0–11.0) and non-specific chest pain (adj OR = 7.5; 95% CI = 1.7–32.1). Mortality at five-year follow-up was independently associated with older age (adj OR = 1.1; 95% CI = 1.01–1.2), an elevated Norris score (adj OR = 1.41; 95% CI = 1.01–1.96) and a previous history of psychiatric disorder (adj OR = 5.06; 95% CI = 1.13–22.0). These findings suggest that prediction of outcome, irrespective of underlying diagnosis, requires careful assessment of previous or current psychiatric symptoms in patients admitted with chest pain. Early intervention with psychological treatment for patients with non-specific chest pain should be considered; this may also involve help to reduce smoking. The study provides further evidence that mortality following myocardial infarction is closely linked to psychiatric disorder, but suggests that prior psychiatric disorder may be more important than ‘post-infarction’ depression. A larger study is needed to confirm these results.

Chest pain is one of the most frequent reasons for urgent admission to hospital. Although the majority of such patients have ischaemic heart disease (IHD), 13–21% of patients have non-specific chest pain^{1,2} and a further 11% have non-cardiac organic pain (eg chronic renal failure, pulmonary embolus)². In all groups of patients there is some association with psychiatric disorder, though the importance of this varies according to diagnosis.

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Among patients with myocardial infarction (MI), approximately 30–40% have psychiatric disorder in the first week of admission, with approximately 15% meeting DSM III (Diagnostic and Statistical Manual of Mental Disorders III) criteria for major depression^{3–6}. One year after MI, psychological symptoms are still present in 20% of subjects^{7–9}.

The importance of psychological factors in MI patients is their association with outcome. In terms of psychological and social outcome, one study found that social functioning one year after a myocardial infarction was more closely associated with psychiatric disorder than with severity of infarction or presence of angina¹⁰. In other studies, patients who were depressed following MI continued to experience psychiatric symptoms one year later and failed to return to work^{6,10,11}. A particular risk factor appears to be the presence of psychiatric symptoms predating admission to hospital as opposed to symptoms which occurred after admission^{7,8}. By contrast, neither the severity of cardiac disease nor the type of treatment received appears to be associated with psychiatric outcome^{4,10}.

These results have been confirmed by studies that have used multivariate analyses which control for interactions between variables and so establish the importance of physical and psychosocial factors as independent predictors of psychosocial outcome^{12–14}.

In terms of physical outcome (angina, arrhythmias and mortality), studies using multivariate analyses have produced conflicting results. In one study, post-infarction depression led to an increased reporting of angina but not of arrhythmias or other cardiac events¹⁵; it has been suggested that this finding could be explained by depressed patients being more likely to report somatic symptoms¹⁶. This study also demonstrated an association between depression and smoking.

With regard to mortality, studies using a standardised psychiatric instrument to measure psychiatric symptoms have reported an association between baseline psychiatric disorder and subsequent death at six-month³, one-year¹⁷, and 18-month follow-up assessments. However, in one cohort of patients only 50% of patients were successfully followed up¹⁷, while in the other, although overall compliance was satisfactory, a large proportion of women refused to participate^{3,18}. Other studies with larger numbers of subjects and higher follow-up rates failed to demonstrate an association^{4,19,20}. Two of these studies did not use a standardised psychiatric instrument, but did find an association between social stress and increased mortality^{19,20}.

Non-specific chest pain is a common reason for

Table 1. Predictors of morbidity three months after a first admission with chest pain

	Chest pain*			Change in physical activity*		
	No (n = 29)	Yes (n = 57)	Crude OR (95% CI)	No (n = 39)	Yes (n = 47)	Crude OR (95% CI)
Age over 40 years old	17 (59%)	32 (56%)	0.9 (0.4–2.2)	20 (51%)	30 (63%)	1.6 (0.7–3.7)
Male	18 (62%)	34 (60%)	1.0	24 (52%)	27 (58%)	1.0
Female	11 (38%)	23 (40%)	1.1 (0.6–1.9)	15 (38%)	20 (42%)	1.1 (0.7–1.8)
Single	8 (28%)	11 (19%)	1.0	13 (33%)	6 (13%)	1.0
Married	14 (18%)	29 (51%)	1.5 (0.5–4.6)	19 (49%)	23 (49%)	2.7 (0.9–8.6)
Widowed	6 (21%)	8 (14%)	0.9 (0.2–3.9)	3 (8%)	12 (25%)	3.3 (0.6–15.9)
Divorced/Separated	1 (3%)	9 (16%)	6.5 (0.7–62.0)	4 (10%)	6 (13%)	8.7 (0.7–42.6)
In work prior to admission	17 (59%)	31 (54%)	0.8 (0.3–2.1)	21 (54%)	22 (56%)	1.1 (0.5–2.6)
Chest pain before episode leading to admission	18 (62%)	39 (71%)	1.5 (0.6–3.9)	22 (56%)	36 (78%)	2.7 (1.1–7.2)
Complications at the time of admission	4 (14%)	11 (19%)	1.5 (0.4–5.2)	4 (10%)	11 (23%)	2.7 (0.8–9.2)
Abnormal cardiac enzymes	5 (17%)	9 (19%)	0.9 (0.3–3.0)	5 (13%)	9 (19%)	1.6 (0.5–5.3)
Fibrinolytics/beta-blockers following admission	9 (31%)	28 (49%)	2.1 (0.8–5.5)	14 (35%)	24 (51%)	1.9 (0.8–4.4)
Past history of psychiatric illness	6 (21%)	17 (28%)	1.6 (0.6–4.7)	10 (26%)	13 (27%)	1.1 (0.4–2.8)
Psychiatric case three months prior to admission	5 (17%)	10 (18%)	1.02 (0.3–3.3)	7 (18%)	8 (17%)	0.9 (0.3–2.9)
Psychiatric case at admission	7 (24%)	18 (32%)	1.5 (0.5–4.0)	11 (28%)	14 (29%)	1.1 (0.4–2.8)
Non-specific chest pain	6 (21%)	17 (28%)	1.6 (0.6–4.7)	11 (28%)	6 (13%)	0.4 (0.1–1.1)

*Data on chest pain and physical activity were missing on two subjects. †Adjusted odds ratio = 10.2 (3.5–30.5), log likelihood ratio $p = 0.000$.

seeking medical attention²¹. It is the most frequent reason for referral to cardiac clinics²², and relatively few are admitted urgently to hospital but, in contrast to outpatients with chronic pain, there is an opportunity to intervene early and, possibly, prevent chronic disability².

In our previous reports, patients with non-specific chest pain experienced significantly more psychiatric disorder than patients with ischaemic heart disease at three-month and five-year follow-up; they also consumed greater amounts of alcohol and tobacco^{2,23}. In addition, patients who had psychiatric disorder at the time of the admission experienced more chest pain at follow-up than the remainder.

In contrast to studies of patients with IHD, those concerning other causes of chest pain have tended to use univariate analysis of possible predictor variables. If findings are to be applied clinically it is important to establish the relative importance of psychological, social and physical predictors by controlling for possible confounding variables.

The aim of the present study was to analyse further the data quoted in our two previous reports^{2,23} to assess predictors of physical and psychosocial outcomes in patients admitted for the first time with chest pain. Previous studies have either been confined to a single group of patients (IHD or non-specific chest pain) or not been confined to first admission patients (previous

admission for MI tends to swamp other factors in a multivariate analysis).

Method

The sample comprised a consecutive series of patients with chest pain admitted for the first time to the coronary care unit or medical wards of Manchester Royal Infirmary and followed up to five years later^{2,23}. In the first wave, patients were interviewed within a few days of admission using the Psychiatric Assessment Schedule (PAS) to record psychiatric morbidity at the time of admission and three months prior to admission²⁴. We also established whether the patient had ever been treated for psychiatric disorder. Other data included demographic characteristics, medication before and after admission, the results of investigations and the occurrence of complications during admission. Further details about subjects' social circumstances were collected using the Social Stress and Support Interview²⁵.

The following assessments of patients' physical status were made: abnormal cardiac enzymes, diagnosis made by the responsible physician based on the history, clinical signs and appropriate investigations including routine electrocardiograms, x-rays, barium studies, stress tests, echocardiograms and coronary angiograms when indicated. At the end of the admis-

Psychiatric caseness
(PAS)

No (n = 56)	Yes (n = 32)	Crude OR (95% CI)
37 (64%)	15 (46%)	0.5 (0.2-1.1)
38 (68%)	16 (50%)	1.0
18 (32%)	16 (50%)	1.3 (0.9-1.9)
13 (23%)	6 (19%)	1.0
30 (54%)	13 (41%)	1.0 (0.3-3.1)
7 (13%)	7 (22%)	2.7 (0.6-10.8)
6 (10%)	6 (19%)	2.3 (0.5-10.3)
32 (55%)	18 (54%)	1.0 (0.4-2.3)
36 (64%)	23 (77%)	1.8 (0.7-5.0)
7 (12%)	8 (24%)	2.5 (0.8-7.6)
10 (18%)	4 (13%)	0.7 (0.2-2.3)
26 (43%)	12 (43%)	0.8 (0.3-1.8)
9 (16%)	17 (52%)	5.8 (2.2-15.5)
4 (7%)	12 (36%)	8.1 (2.4-28.1)
7 (12%)	20 (61%)	11.9 (4.1-33.4)†
7 (13%)	10 (31%)	3.2 (1.1-9.5)

sion, the notes of each patient were reviewed by a cardiologist to confirm the diagnosis and document any complications. Finally, for patients with IHD, the severity of their MI was assessed by the Norris score. This is a rating of the severity of IHD, based on demographic, clinical and investigation findings, and has been shown to predict long-term survival²⁶⁻²⁸.

Three diagnostic groups were identified: ischaemic heart disease, organic pain due to causes other than IHD, and non-specific chest pain. For the purposes of the present study, all three diagnostic categories were included in the analysis.

Three-month follow-up. Three months after the admission, patients were re-interviewed and asked specific questions about chest pain and level of activity. Patients were also asked general questions about smoking, alcohol consumption and employment. The PAS was also repeated to establish the presence of psychiatric symptoms.

Five-year follow-up. At five-year follow-up the surviving patients were sent a questionnaire to assess psychological status (Hospital Anxiety and Depression Scale - HADS). A score of 11 or more on either the anxiety or depression scale indicates probable psychiatric disorder. Another questionnaire recorded details of chest pain, level of physical activity, employment, smoking and alcohol consumption²³.

Patients were divided into groups reflecting out-

come variables identified from previous research^{12,14}. These were: presence of chest pain, changes in physical activity, return to work, psychological symptoms, smoking and mortality. Each of these was used in turn as the outcome measure and the results for chest pain, physical activity, psychological symptoms and mortality are tabulated in the results section. Possible predictor variables included psychiatric disorder before admission and at the time of admission, the presence of complications, the prescription of medication such as fibrinolytics or beta-blockers, the presence of significant chest pain before the episode leading to admission, cardiological assessment, Norris score and ECG findings, as well as the effect of potential confounding factors such as demographic characteristics.

The association between these variables and outcome was initially assessed using odds ratios for categorical variables. Student's t-test or Mann-Whitney U test was used to assess differences for continuous variables such as age.

Variables identified as being associated with subsequent mortality and morbidity were entered stepwise into a logistic regression model to compute adjusted odds ratios.

Results

Socio-demographic and clinical features of the sample

Of the 111 consecutive patients on first admission to hospital with acute chest pain eligible for inclusion in the study, 108 (97%) agreed to be interviewed. Seventy-one patients (66%) were diagnosed as having ischaemic heart disease, and 12 (11%) had pain due to other organic causes such as chronic renal failure, pulmonary embolus, musculoskeletal pain, hiatus hernia and oesophagitis. A further 19 subjects (18%) were diagnosed as having non-specific chest pain. In six patients no definite cause of their symptoms was determined and these were excluded from the analysis.

The sample therefore consisted of 102 subjects with a mean age of 55 years (standard deviation (SD) 14.0), of whom 63 (62%) were men. Three months later, five patients had died, and 90% of the sample (88 patients) were successfully re-interviewed.

Patients with non-specific pain were younger, drank more alcohol and smoked more than their counterparts with organic disease, and were more likely to suffer from psychiatric disorder². At five years, 14 of the original 71 patients with ischaemic heart disease had died, and 43 questionnaires were returned (outcome data were therefore available on 80% of the surviving sample). Of the 12 patients with non-cardiac organic pain, one had died and nine of the remainder returned questionnaires (82%). Sixteen (84%) of the patients with non-specific pain were followed up; none had died.

The patients who were successfully followed up to

Table 2. Predictors of morbidity five years following a first admission with chest pain

	Chest pain			Change in physical activity*		
	No (n = 21)	Yes (n = 47)	Crude OR (95% CI)	No (n = 34)	Yes (n = 32)	Crude OR (95% CI)
Age over 40 years old	13 (62%)	25 (53%)	0.7 (0.2–2.0)	15 (44%)	21 (66%)	2.4 (0.9–6.5)
Male	12 (57%)	27 (57%)	1.0	20 (59%)	18 (56%)	1.0
Female	9 (43%)	20 (43%)	1.0 (0.5–2.0)	14 (41%)	14 (44%)	1.0 (0.7–1.7)
Single	1 (5%)	8 (17%)	1.0	7 (21%)	2 (6%)	1.0
Married	13 (62%)	24 (51%)	0.2 (0.02–5.0)	17 (50%)	19 (59%)	3.9 (0.7–21.6)
Widowed	4 (19%)	9 (19%)	0.3 (0.02–3.3)	5 (15%)	7 (22%)	4.9 (0.7–34.3)
Divorced/Separated	3 (14%)	6 (13%)	2.5 (0.02–3.3)	5 (15%)	4 (13%)	2.8 (0.4–21.7)
In work prior to admission	11 (52%)	24 (51%)	0.9 (0.3–2.5)	19 (56%)	16 (50%)	0.8 (0.3–2.1)
Chest pain before episode leading to admission	14 (67%)	31 (71%)	1.3 (0.4–3.3)	21 (64%)	24 (75%)	1.7 (0.6–4.9)
Complications at the time of admission	2 (10%)	9 (19%)	2.5 (0.4–2.5)	3 (9%)	8 (25%)	3.4 (0.8–14.4)
Abnormal cardiac enzymes	4 (19%)	6 (13%)	0.6 (0.2–1.3)	4 (12%)	6 (19%)	1.7 (0.4–6.8)
Fibrinolytics/beta-blockers following admission	9 (43%)	23 (49%)	1.3 (0.5–3.3)	17 (50%)	15 (47%)	0.8 (0.3–2.3)
Past history of psychiatric illness	2 (9%)	16 (34%)	5.0 (1.1–25.0)	7 (21%)	10 (31%)	1.7 (0.6–5.4)
Psychiatric case three months prior to admission	4 (19%)	11 (23%)	1.3 (0.4–5.0)	7 (21%)	8 (25%)	1.3 (0.4–2.1)
Psychiatric case at admission	5 (24%)	17 (36%)	1.7 (0.2–2.0)	10 (29%)	11 (34%)	1.3 (0.5–3.5)
Non-specific chest pain	8 (24%)	8 (24%)	1.0 (0.3–3.1)	12 (26%)	4 (19%)	0.7 (0.2–2.4)

*Data on physical activity were missing on two subjects.

†Adjusted odds ratio = 3.2 (1.00–11.0); log likelihood ratio $p = 0.06$.

‡Adjusted odds ratio = 7.5 (1.70–32.1), log likelihood ratio $p = 0.004$.

five years after their admission ($n = 68$) had similar demographic characteristics to those patients who could not be traced, and reflected the demographic features of the original consecutive series²³.

Predictors of morbidity at three-month follow-up

Psychological outcome. Psychiatric disorder at three-month follow-up was significantly associated (on univariate analysis) with a past history of psychiatric treatment and presence of psychiatric disorder three months before or at the time of admission and a diagnosis of non-specific chest pain (Table 1).

By contrast, physical factors, such as the presence of complications, use of fibrinolytics or beta-blockers or the presence of raised cardiac enzymes, were not associated with psychiatric disorder at three-month follow-up (Table 1).

On logistic regression only one variable – psychiatric disorder at admission – was significantly associated with psychiatric disorder at three-month follow-up (Table 1).

Smoking. Patients who had psychiatric disorder three months before admission were less likely than the remainder to have reduced their average daily number of cigarettes three months later (mean daily consump-

tion: 3.8 versus 10.9, t -test = -1.98 , $df = 86$, $p = 0.05$). No other variables were significantly associated with this outcome.

Chest pain, physical activity and return to work. Chest pain at three-month follow-up was not significantly associated with any of the baseline predictors. Reduction of physical activity was only significantly associated with one variable – chest pain prior to the index admission (Table 1). There were no significant associations with a return to work among the 48 patients who had been in work before admission to hospital (data not shown).

Social stress and support were not significantly associated with any outcome measure (data not shown), and Norris scores were not associated with either medical or psychosocial outcome (data not shown). Patients with non-specific chest pain were not significantly different from those with an organic cause, in terms of continued chest pain or return to full physical activity (Table 1).

Predictors of morbidity at five-year follow-up

Psychological outcome. At five-year follow-up, probable psychiatric disorder was significantly associated with psychiatric disorder at admission and the diagnosis of non-specific chest pain (Table 2).

Psychiatric caseness
(HADS anxiety scale)

No (n = 48)	Yes (n = 20)	Crude OR (95% CI)
29 (60%)	8 (42%)	0.5 (0.2–1.4)
27 (56%)	12 (58%)	1.0
21 (44%)	8 (42%)	1.0 (0.7–1.3)
6 (13%)	3 (16%)	1.0
28 (57%)	9 (42%)	0.6 (0.1–2.8)
8 (17%)	5 (26%)	2.7 (0.2–7.4)
6 (13%)	3 (16%)	1.0 (0.2–7.0)
24 (50%)	10 (53%)	1.1 (0.4–3.2)
29 (64%)	15 (79%)	2.1 (0.6–7.3)
6 (13%)	5 (26%)	2.5 (0.7–9.5)
8 (17%)	2 (11%)	0.6 (0.1–3.1)
24 (50%)	7 (37%)	0.6 (0.2–1.7)
12 (25%)	6 (31%)	1.4 (0.4–4.5)
9 (19%)	6 (32%)	2.0 (0.6–6.7)
11 (23%)	11 (58%)	4.6 (1.5–14.4) †
6 (13%)	10 (47%)	7.8 (2.2–26.9) ‡

On logistic regression, only non-specific chest pain remained independently predictive ($p = 0.004$); psychiatric disorder at admission just failed to reach significance ($p = 0.06$).

Chest pain. Continued chest pain at five-year follow-up was significantly associated with a past history of psychiatric illness (Table 2). There were no significant baseline predictors of a change in physical activity or return to work. As at three-month follow-up, Norris scores were not associated with either medical or psychosocial outcome (data not shown).

Smoking. Patients with non-specific chest pain were seven times less likely to have reduced their smoking levels than those with organic pain (11 out of 16 (68%) versus 46 out of 52 (93%), odds ratio = 7.0; 95% confidence interval CI = 1.4–33.7).

Mortality at five-year follow-up

At three-month follow-up, five patients had died, all of whom had IHD (7% of patients with IHD). Analysis of variables associated with mortality was not possible due to the small numbers.

At five-year follow-up, 15 patients had died, of whom all but one had IHD (19.7% of patients with IHD). As

none of the patients with non-specific chest pain died, these subjects were excluded from the analysis.

On logistic regression, three baseline variables were significantly associated with greater mortality: older age, raised Norris score and a past history of psychiatric disorder (Table 3). None of the variables associated with social stress and support were significantly associated with mortality (data not shown).

Discussion

The results of this study must be treated with caution because of the small number of patients. The numbers reported in this paper are only half those in the Frasure-Smith study^{3,18}, but, in spite of this, statistically significant associations emerged between predictor variables recorded at admission and subsequent morbidity and mortality.

Other limitations of the present study include reliance on a postal, self-report questionnaire to assess physical, social and psychiatric morbidity at five-year follow-up, and the small number of subjects in the non-IHD and non-specific groups. In addition specific details of medication prescribed on admission to hospital, such as dosages and duration of treatment, were not recorded in the original sample. This may have disguised the therapeutic effect of interventions.

Specific strengths of the present study include the high recruitment (97%) and follow-up (80%) rates and the use of a structured psychiatric interview to measure psychiatric symptoms before admission, during admission and three months subsequently. We only included first admissions, thus avoiding the confounding effect of previous MI³. A range of psychosocial and physical outcomes has been assessed on the same cohort of patients.

The sample included in our study differed from other studies, possibly because the population was drawn from an inner city area. In our sample, 42% of MI patients were women compared to 0–33% in other studies – divorced and depressed women are particularly likely to die following MI^{11,29}. The majority (79%) of the non-specific chest pain group was male, unlike the outpatient groups previously studied, which were predominantly female.

In common with previous studies, three months after admission to hospital, psychosocial variables were more important predictors of psychological or social outcome than cardiological factors^{4,6,10–14}. The key predictor variable in the multivariate analysis was psychiatric disorder at admission. At five-year follow-up the importance of this variable was clear, together with a diagnosis of non-specific chest pain.

With regard to mortality rates in the organic groups (predominantly IHD), the three-month figure of 5% is similar to the rates reported by other studies^{3,11,17}. At five years this proportion had risen to just under 20%, which is higher than the American studies^{18,20}, but similar to the Nottingham study¹⁹. As in previous

Table 3. Predictors of mortality five years after admission with chest pain

	Mortality		Crude Odds Ratio (95% CI)
	Alive (n = 52)	Dead (n = 15)	
Mean age (SD)	56.9 (11.9)	67.6 (7.6)*	
Increase (per year) in age			1.1 (1.03–1.2)‡
Gender			
Male	28 (54%)	8 (53%)	0.97 (0.3–3.1)
Female	24 (46%)	7 (47%)	
Marital status			
Single	6 (12%)	3 (20%)	1.00
Married	30 (57%)	8 (53%)	0.53 (0.1–2.6)
Widowed	10 (20%)	3 (20%)	0.60 (0.1–3.9)
Divorced/Separated	6 (12%)	1 (7%)	0.33 (0.02–4.2)
In work prior to admission	27 (52%)	3 (20%)	0.23 (0.05–0.91)
Chest pain before episode leading to admission	37 (72%)	10 (64%)	0.68 (0.2–2.4)
Complications at the time of admission	10 (19%)	4 (27%)	1.52 (0.4–5.8)
Abnormal cardiac enzymes	10 (19%)	3 (20%)	1.05 (0.2–4.4)
Fibrinolytics/beta-blockers following admission	29 (56%)	4 (27%)	0.28 (0.1–1.0)
Median Norris score (range)	3 (1–6)	6 (3–7) †	
Increase (per unit) in score			1.43 (1.13–1.97)**
Past history of psychiatric illness	11 (21%)	8 (53%)	4.25 (1.3–14.3)***
Psychiatric case three months prior to admission	9 (17%)	0 (0%)	–
Psychiatric case at admission	13 (25%)	2 (13%)	0.5 (0.1–2.3)

* t-test = -3.20, df = 65, $p = 0.002$.

† Mann-Whitney U $z = -2.7$, $p = 0.006$.

‡ Adjusted odds ratio = 1.1 (1.01–1.2), log likelihood ratio $p = 0.006$.

** Adjusted odds ratio = 1.41 (1.01–1.96), log likelihood ratio $p = 0.03$.

*** Adjusted odds ratio = 5.06 (1.13–22.0), log likelihood ratio $p = 0.03$.

studies, none of the non-specific group had suffered a myocardial infarction in the intervening years^{1,30}.

Our findings in relation to mortality are similar to those of Frasure-Smith *et al*¹⁸ but are interesting because they demonstrate that previous psychiatric history is more predictive than psychiatric disorder at the time of admission. One study has suggested that people with prior depression have more severe heart dysfunction during the acute phase of MI³¹. Our findings also suggest that social stress at the time of the MI is less predictive of subsequent mortality than depression³¹.

The reasons for the association between past psychiatric symptoms and mortality are unclear. Previous studies have suggested that the increased mortality among patients with psychiatric illness could be the result of physiological changes³² or be linked indirectly to physical ill health through neglect of symptoms, increased smoking or reduced compliance with treatment regimens. Our results confirm previous findings that psychiatric disorder prior to MI is associated with continued smoking³³.

This study requires replication with a larger sample

of patients and more detailed documentation of extent of MI, cardiac function and social stress, as a precursor of depression. It is conceivable that the importance of previous psychiatric disorder lies in its association with social stresses early in life, which are thought to be associated with later IHD, possibly because of low birth weight^{34,35}.

The clinical implications of this study relate to the importance of proper psychosocial assessment of patients at the time of their first admission with chest pain. As the NHS becomes more preoccupied with the costs and outcome of illness episodes, there is considerable potential for predicting quality of life and health care costs³⁶, provided that an accurate account of previous and current psychiatric disorders is documented during the admission in addition to the accurate assessment of cardiac function. Improved outcomes may be achieved when effective treatment is offered to those with psychiatric disorder and to those who require help to reduce their smoking. The potential to intervene for non-specific chest pain at this early stage is especially appealing because of the poor quality of life and high health care costs associ-

ated with untreated non-specific chest pain³⁰, provided that appropriate psychological treatment is available³⁷.

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