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Profile of documented medical history of chest pain: a multicentre audit of 1,226 consecutive patients with validated acute MI

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Abstract

This study set out to evaluate the completeness of medical records of chest pain. A planned, multicentre, structured abstraction of data from case-notes was made at 20 adjacent acute hospitals in Yorkshire on 1,226 consecutive patients presenting with chest pain and validated myocardial infarction (MI). The hospital records included those collected by ambulance crews, accident and emergency staff, and admitting medical teams. The main outcome measure was completeness of medical records with regard to 10 commonly advocated descriptors of chest pain.

A mean number of 5.62 chest pain descriptors was recorded. This value differed with hospital (range 4.81 to 6.73 factors recorded; p<0.0001); place of admission (medical admissions unit = 6.10; coronary care unit = 5.94; accident & emergency department = 5.62; general ward = 5.08; p<0.0001); gender (male = 5.74; female = 5.39; p=0.004) and age (≤ 68.4 years = 5.83; > 68.4 years = 5.43; p<0.0001). Mean chest pain scores were also significantly different for District General Hospitals (DGHs) without angiography facilities as compared to DGHs with angiogram facilities and tertiary centres (respectively 5.46 *vs.* 5.81 *vs.* 5.81 p<0.007).

Contrary to standard medical texts and teaching, we observed that documentation of chest pain histories was abbreviated in many cases.

Key words. chest pain, history, myocardial infarction.

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Introduction

Standard cardiology texts strongly emphasise the importance of a well taken history in the evaluation of a patient presenting with chest pain. One such text writes: "Although a wide variety of laboratory tests is available to aid the differential diagnosis of chest pain, without question the medical history remains the most valuable mode of examination. In obtaining a history of a patient with chest pain it is helpful to have a mental checklist and to ask the patient to describe the location, radiation and character of the discomfort; what causes and relieves it; time relationships, including the duration, frequency and pattern of recurrence of the discomfort; the setting in which it occurs; and associated symptoms".[1]

All of the major clinical trials of thrombolytic therapy have utilised the inclusion criteria of 'typical' chest pain, as also have international systems of classification and definition.[2] To quote one medical textbook: "The chest pain associated with evolving MI (myocardial infarction) is typically retrosternal, crushing and severe. Pain often radiates to the neck, arms or back. There is often associated nausea, sweating and vomiting. The pain usually lasts at least 20 minutes".[3] Quotes like this, however, are handed down from one text to another without any reference to the objective evidence on which such a description is based. Furthermore, there is even less emphasis on the fact that many patients provide other descriptions and a quarter of patients who present to hospital with symptomatic MI do so with symptoms other than chest pain.[4] We wondered whether the textbook definition accurately reflects the description of pain elicited from consecutive patients with a discharge diagnosis of myocardial infarction. Furthermore, we were keen to

*The full listing of the EMMACE-1 Study Collaborators appears at the end of reference 4.

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Table 1. Frequency of recorded chest pain characteristics according to descriptive factor. Shaded areas indicate the most common descriptor based on cases where an answer was recorded. Boxes indicate the most common situation with regard to data recorded or in the case of six characteristics, not recorded

Site of pain	Radiation	Onset	Duration	Character	Severity	Course	Relieving factors	Aggravating factors	Associated symptoms
Central chest 68.6% (841)	None 17.3% (212)	Sudden 50.3% (617)	Seconds 0% (0)	Crushing 9.2% (113)	Mild 1.2% (15)	Increasing 4.0% (49)	None 26.4% (324)	None 11.2% (137)	None 9.7% (119)
Right side 1.0% (12)	Left arm 17.9% (220)	Gradual 2.3% (28)	Minutes 11.1% (136)	Burning 2.8% (34)	Moderate 1.9% (23)	Decreasing 12.6% (154)	GTN 12.3% (151)	Exertion 7.9% (97)	Nausea 4.3% (53)
Left side 4.4% (54)	Right arm 2.7% (33)		Hours 54.6% (670)	Sharp 3.1% (38)	Severe 23.4% (287)	Constant 23.7% (290)	Antacids 0.7% (9)	Breathing 1.0% (12)	Vomiting 1.7% (21
Generalised 3.8% (46)	Both arms 11.3% (138)		Days 3.3% (41)	Acheing 6.0% (73)	Unbearable 1.1% (14)	Intermittent with relief 7.7% (94)	Rest 1.2% (16)	Coughing/sneezing 0.1% (1)	Belching 0.2% (2)
	Neck/jaw 3.8% (46)			Tight 11.8% (145)		Intermittent with background 2.0% (24)	Position 0.7% (9)	Movement 0.4% (5)	Short of breath 8.0% (98)
	Back 3.3% (41)			Heavy 4.6% (57)			Other 2.8% (34)	Pressure 0% (0)	Feeling cold 0.2% (3)
	Abdomen 0.2% (3)			Tearing 0% (0)			Combination 0.7% (9)	Position 1.5% (19)	Sweaty 10.3% (126)
	Other 4.0% (49)			Other 8.6% (106)				Other 0.8% (10)	Other 1.7% (21)
	Combination 16.2% (199)			Combination 8.1% (99)				Combination 0.8% (10)	Combination 49.5% (607)
Not recorded 22.3% (273)	Not recorded 23.3% (285)	Not recorded 47.4% (581)	Not recorded 31.0% (379)	Not recorded 45.8% (561)	Not recorded 72.4% (887)	Not recorded 50.3% (615)	Not recorded 55.0% (674)	Not recorded 76.3% (935)	Not recorded 14.4% (176)

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evaluate what factors doctors record in their analysis of a presenting complaint of chest pain.

Methods

Setting and participants

We conducted a detailed audit of the medical records of 1,226 patients admitted to one of 20 acute hospitals in Yorkshire with a validated occurrence of definite myocardial infarction based on the World Health Organization definition.[5] These patients were identified from a total of 3,684 consecutive cases of possible myocardial infarction identified from one of three sources: coronary care unit registers, biochemistry lab registers and hospital patient recorded systems.[5] Of these, 2,189 were given a discharge diagnosis of myocardial infarction by the attending medical team – 1,661 (75.9%) patients had a presenting complaint of chest pain, while 421 (24.1%) had no evidence of chest pain, having another mode of presentation.[4] All case notes, electrocardiograms (ECGs) and cardiac enzyme results were reviewed by a Cardiology Registrar (RJS) to assess whether the criteria for definite myocardial infarction had been met. These require two or more of the following to be present: i) chest pain typical of myocardial infarction; ii) evolving ECG changes characteristic of myocardial infarction; and iii) elevation of cardiac enzymes to a level that is twice the upper limit of the normal range. Some 1,226 patients with chest pain fulfilled these criteria and were included in the present study.

Design

In each case we noted the recorded description of chest pain, based on the presence or absence of 10 subcategories of information as recommended in many medical textbooks.[1,6] These were: i) site of pain, ii) radiation, iii) onset, iv) duration, v) character, vi) severity, vii) course, viii) relieving factors, ix) aggravating factors and x) associated symptoms. Each subcategory included a number of mutually exclusive descriptors that are summarised in table 1. Importantly, the absence of any recorded information was also noted. We sought information cumulatively from all parts of the medical records, including GP letters, ambulance records, assessments by nurses and doctors in accident and emergency departments, and hospital admission clerking by admitting junior and middle-grade medical staff.

As part of the NHS R&D commissioned EMMACE-1 (Evaluation of the Methods and Management of Acute Coronary Events -1) Project, additional information was collected to describe the clinical presentation and the medical care received. The mean number of chest pain descriptors for different subgroups of patients were compared using analysis of variance.

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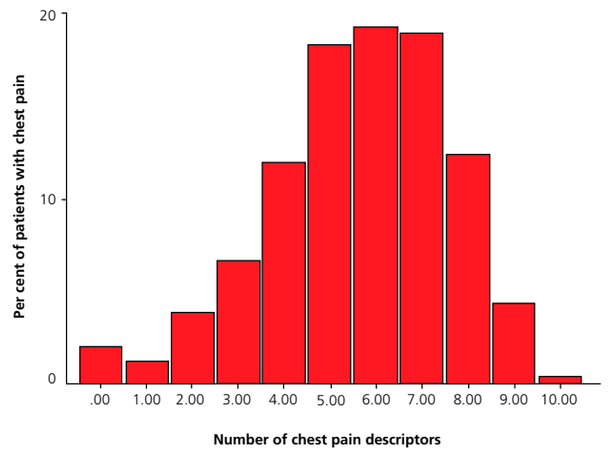
Figure 1. Bar-chart showing the number of characteristics of chest pain recorded in the medical records. In some cases this was zero, indicating that in a few cases the presence of chest pain was recorded, but not any description of that pain



Results

It is pertinent to note that 24% of patients who were eligible for inclusion, based on the occurrence of validated myocardial infarction, were then excluded due to the absence of chest pain as a presenting symptom. As outlined in a previous publication,[4] the presenting features in these patients were: shortness of breath (31.8%); collapse (16.2%); upper body discomfort other than chest (10.5%); non-specifically unwell (14.0%); other (14.4%).

Table 1 shows the 10 features of chest pain that we looked for, together with the frequency with which each descriptive subcategory was recorded as being present. The proportion of cases where no information was recorded is also shown. Based on these data, it would appear that the chest pain caused by myocardial infarction is typically: central in location; radiating to the left arm; sudden in onset; lasting for hours; tight in character; severe in intensity; follows a constant course; without relieving or aggravating factors; and associated with a combination of other symptoms.

There was an absence of recorded information in all of the 10 categories evaluated. This ranged from 176 (14.4%) cases where there was no record of associated symptoms through to 935 (76.3%) cases where there was no record of aggravating factors. Indeed, taking into account the occasions when information was missing, the most commonly recorded history of chest pain was abbreviated to being: central in location; sudden in onset; lasting for hours; with multiple associated symptoms.

To further describe the absence of information concerning a presenting symptom of chest pain, we scored each case using a simple system in which the presence of an item of information within each category was allocated a single point. Figure 1 illustrates the distribution of scores, ranging from 0 to 10. A mean number of 5.62 chest pain descriptors was recorded in the notes. This value differed according to hospital (range 4.81 to 6.73 factors recorded; p<0.0001); place of admission (medical admissions unit = 6.10; coronary care unit 5.94; accident & emergency department = 5.62; general ward = 5.08; p<0.0001); gender (male = 5.74; female = 5.39; p=0.004) and age (≤ 68.4 years = 5.83; > 68.4 years = 5.43; p<0.0001). Hospitals were categorised as being a: i) tertiary cardiac referral centre, ii) District General Hospital (DGH) with catheter laboratory on site, iii) DGH without angiography facilities, having mean chest pain scores of 5.81, 5.81 and 5.46 respectively (p=0.007). A comparison was then made of the 10 hospitals ranked as having the highest as compared to the lowest mean chest pain scores (table 2). A number of significant differences were observed between these two groups of hospitals.

Discussion

The most commonly recorded description of chest pain in patients with validated myocardial infarction is an abbreviated one of sudden onset central chest pain lasting for hours and associated with multiple other symptoms. This description

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Table 2. Summary characteristics of hospitals when split into two groups based on ranking for mean 'chest pain score'.

	10 hospitals with highest 'chest pain scores' (848 MI patients)	10 hospitals with lowest 'chest pain scores' (829 MI patients)	Statistical significance (p value)
Mean 'chest pain score' (range)	5.95 (6.73 to 5.64)	5.29 (5.63 to 4.86)	p<<0.0001
Tertiary centre	34.4% (292)	20.9% (173)	p<<0.0001
DGH (cath lab)	35.0% (297)	11.0% (91)	
DGH (no cath lab)	30.5% (259)	68.2% (565)	
Admitted to CCU	79.0% (670)	73.6% (610)	p=0.036
Admitted to cardiology	45.2% (373)	38.2% (304)	p=0.003
Aspirin at admission	88.0% (727)	83.5% (670)	p=0.005
Thrombolytic given	50.1% (423)	51.1% (420)	p=0.35 (NS)

Key: MI = myocardial infarction; DGH = District General Hospital; CCU = coronary care unit

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Key messages

- Approximately 24% of patients with myocardial infarction present without chest pain
- Most commonly, six characteristics of a presenting symptom of chest pain were recorded in the medical records
- Abbreviated chest pain histories were more common in patients with ST-elevation on ECG as well as those who were female or elderly
- A significant association was observed between hospital type and completeness of chest pain history
- A focused clinical history and examination remain essential to the competent care of patients with chest pain

approximates those put forward in commonly used medical textbooks. However, information regarding the character, radiation, severity, course, aggravating and relieving factors for the presenting chest pain was typically absent. The mean number of descriptive characteristics of the chest pain present at admission was 5.62 for the entire cohort, being lower than this for female patients (5.39), or those admitted to the general ward (5.08), or the elderly (5.43). Among the 20 participating hospitals, the lowest mean chest pain score was 4.81 and the highest 6.73. Dichotomising the 20 hospitals into two groups of 10 based on the observed mean number of chest pain characteristics recorded revealed a pattern of association in which the more abbreviated histories occurred for patients less likely to receive specialist cardiology/CCU care, both within and also between hospitals. Early aspirin, but not use of thrombolytic therapy, was also significantly reduced.

An obvious explanation for our observations is that the admitting medical team did not consider it necessary to elicit more than an abbreviated history, or that they elicited, but did not record, a comprehensive description of the presenting chest pain. Support for this contention comes from comparison of the 798 patients who had a diagnosis of myocardial infarction at time of admission and the remaining 428 who had an incorrect admission diagnosis of angina or other cause of chest pain. The first of these two groups had a less complete description of chest pain (mean of 5.53 descriptors recorded) than did the second (mean 5.81; ANOVA p=0.019). Furthermore, when ST elevation was present on the admission ECG, fewer chest pain characteristics were documented (5.45 *vs.* 5.87; unpaired t-test p<0.0001).

Despite the number of potential alternate explanations as to why chest pain histories were incomplete in many cases, this state of affairs is counter to standard medical teaching, though it may represent accepted clinical practice. One consequence of inadequate documentation of chest pain must be an increased diagnostic dependence on ECG and enzyme data. Indeed, the absence of chest pain in 24% of patients who were otherwise eligible for this study, required a diagnosis to be made solely on the grounds of ECG and enzyme data. We have previously shown the value of chest pain as an indicator treatable-risk, as patients with silent presentations are much less likely to be given appropriate early and late secondary care as well as being 60% more likely to die over the following year (95% CI 30 to 97%; p<0.001).[4] Given the known limitations with both ECG interpretation and and cardiac enzyme measurement[7] and also given the recent advent of a much broader definition of myocardial infarction,[2] the accepted value of a well taken history of chest pain – by specialists and non-specialists alike – should by no means be forgotten.

Contributions

ASH and MBR led and contributed to all aspects of this work; RJS validated cases, and supervised data abstraction performed also by BMJ and CM. ASH, NK, CAH and PM performed supervised work or analysis and reporting of data, also preparing the initial draft manuscript. RD and MED developed the risk adjustment model, performed additional analyses and contributed to writing of the manuscript.

Funding and ethical approval

The study was supported by an NHS Research and Development grant from Northern & Yorkshire Regional Health Authority. The work was approved by the Local Research Ethics Committees (LRECs) of each of the participating hospitals.

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Conflict of interest

None declared.

References

1. Braunwald E. *Heart disease. A textbook of cardiovascular medicine. Part 1- Examination of the patient.* USA: WB Saunders,1997;4.
2. Joint European Society of Cardiology/American College of Cardiology Committee. Myocardial infarction redefined:a consensus document of the Joint European Society of Cardiology Committee for the redefinition of myocardial infarction. *Eur Heart J* 2000;**21**:1502-13.
3. Ghuran A, Uren N, Nolan J. *Emergency cardiology – an evidence-based guide to acute cardiac problems.* London: Hodder Headline Group, 2003;5.
4. Dorsch MF, Lawrance RA, Sapsford RJ *et al*. Poor prognosis of patients presenting with symptomatic myocardial infarction but without chest pain. *Heart* 2001;**86**:494-8.
5. Sapsford R, Lawrance R, Dorsch M *et al*. Methods of identification of acute myocardial infarction cases; effects on treatment, mortality and implications for National Service Framework audit: *Q J Med* 2003;**96**: 203-09.
6. Macloud J. *Clinical examination.* 5th Edition. Edinburgh: Churchill Livingstone. 1979;30.
7. Collinson PO, Stubbs PJ. Are troponins confusing? *Heart* 2003;**89**:1285-7.

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