National survey of emergency department management of patients with acute undifferentiated chest pain

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Abstract

Acute, undifferentiated chest pain (chest pain ?cause) presents a frequent and difficult challenge to clinicians working in the emergency setting. We aimed to survey current management of this problem in UK accident and emergency departments by sending a postal questionnaire to the lead clinician or first named consultant in every major A&E department in the UK.

Responses were received from 177/238 departments (74%). Although 74 departments (42%) had formal guidelines, many referred only to diagnosed coronary syndromes. Guidelines for undifferentiated chest pain usually recommended observation for six to 12 hours followed by troponin testing. Short-stay facilities were available in 38 departments (21%) and were planned for 55 departments (31%). Provocative cardiac testing could be accessed by 38 departments (21%). Patients were admitted by general physicians in 152 hospitals (86%) and cardiologists in 18 (10%). The estimated proportion of patients admitted was extremely variable. Although 45 departments (25%) employed specialist nurses, only in 20 did they manage patients with undifferentiated chest pain.

Reported management of acute, undifferentiated chest pain in the UK shows wide variation. Innovative technologies and diverse methods of service delivery are being adopted in a number of departments. These innovations require thorough evaluation.

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Introduction

Chest pain is a common cause for hospital attendance in the UK.[1] Initial assessment in the accident and emergency (A&E) department typically consists of clinical assessment, electrocardiograph (ECG) and, where appropriate, chest X-ray. If this provides evidence of acute myocardial infarction (MI) or unstable angina, then subsequent care can be provided according to guidelines published in the National Service Framework for Coronary Heart Disease.[2] For a substantial proportion of patients, these investigations will be normal or non-diagnostic. Such patients can be characterised as having acute, undifferentiated chest pain, or 'chest pain ?cause'.

The appropriate management for these patients is not clear. The sensitivity of the ECG for acute MI is inadequate to rule out an acute coronary event.[3] Cardiac markers do not achieve acceptable sensitivity until at least six hours after the onset of pain,[4] yet patients should be encouraged to present to hospital much earlier than this.[5] Most patients are admitted to hospital after initial assessment, although only a minority will have an acute coronary syndrome.[6] Despite this it has been estimated that 6% of patients discharged from the emergency department after attendance with acute, undifferentiated chest pain have prognostically significant myocardial damage.[7]

These shortcomings have led to the development of several innovations: there are new cardiac markers that appear more sensitive and specific than traditional markers;[8,9] and the use of serial ECG recordings, continuous ECG monitoring and observation facilities may improve the sensitivity of the 12-lead ECG.[10] These technologies may be combined on a Chest Pain Observation Unit (CPOU), where patients are observed and monitored with serial ECG and cardiac enzyme measurements before undergoing provocative cardiac testing.[11] Chest pain nurses – whose role initially was to promote the audit and administration of thrombolytic therapy[12] – have the background and training to be potentially ideal candidates to assist in the assessment of acute, undifferentiated chest pain.

Despite the size of this healthcare problem very little is known about the routine management of acute, undifferentiated chest pain in the UK. Audits of practice in single departments have been published,[13-15] as have descriptive studies of innovative strate-

gies.[16-18] Yet we are unable to characterise present routine practice. The aim of this study was to survey current management of acute, undifferentiated chest pain across the UK; to determine what constitutes 'routine practice' at each institution, and to describe any variations in practice.

Materials and methods

Between January and March 2001 all 238 major, adult A&E departments in the UK were identified by their listing in the 1999 British Association for Accident and Emergency Medicine (BAEM) Handbook[19] and sent the postal questionnaire survey (see figure 1). The survey was addressed to the lead clinician or the first named consultant. If no response was received within four weeks a second questionnaire was sent. Respondents were not promised confidentiality or an opportunity to review the composite data.

Consultants were also asked to send a copy of any guidelines they had relating to the management of acute, undifferentiated chest pain. These guidelines were reviewed and separated into:

- Guidelines referring to management of diagnosed cardiac ischaemia only.
- Guidelines providing advice regarding management of acute, undifferentiated chest pain but no specific instructions.
- Guidelines that contained specific instructions regarding management of acute undifferentiated chest pain.

The specific guidelines outlined in the last group were recorded and compared.

Data were analysed using SPSS for Windows, version 9 (SPSS Inc., Chicago). Logistic regression tested the hypothesis that response to the survey was predicted by departmental size (new attendances per year), departmental staffing (number of consultants) or departmental location by NHS region. As this was a descriptive study, no specific hypotheses relating to the survey responses were specified *a priori* or tested in the statistical analysis. However, to explore whether availability of guidelines, 'new' cardiac enzyme tests (CK-MB [mass], troponin T or troponin I), provocative cardiac testing, short-stay facilities or specialist nurses were predictive of the estimated proportion admitted, regression analysis was carried out using the aforementioned factors as independent variables and estimated proportion admitted as the dependent variable.

Results

Responses were received from 177 out of 238 departments (74%) – 125 (52%) from the first mailing and 52 (22%) from the second mailing. Response to the survey was not predicted by the number of new attendances per annum (p=0.98); number of consultants (p=0.71); and NHS region, (p=0.49).

Formal guidelines for the management of chest pain were used in 74 departments (42%). A copy of the guidelines was returned with the questionnaire by 28 departments. Of these, eight related to diagnosed cardiac ischaemia only, five provided advice regarding the management of acute undifferentiated chest pain but no specific instructions, and 15 provided specific instructions. In all but one case, the specific instructions involved measurement of troponin T or I after a defined time interval varying between six and 12 hours. After negative troponin measurement, four departments advised early exercise testing while the remainder discharged patients home.

The availability of cardiac enzyme testing to emergency departments is outlined in table 1. In 65 departments (37%), use was restricted according to time from symptom onset, varying

Figure 1. Questionnaire used for the survey of management of patients with acute, undifferentiated chest pain

UK SURVEY: How should we manage patients with chest pain ?cause

Chest pain ?cause is defined here as- chest pain unexplained by recent trauma, ECG or chest X-ray abnormality

Please tell us how such patients are managed in your department.

1) Do you have any formal guidelines for managing **chest pain ?cause.** Y / N

If YES, we would be grateful if you could enclose a copy.

2) Which of the following cardiac enzymes are routinely available in your department? *(please circle)*

Creatinine kinase	CK-MB	CK-MB (mass)	Troponin T	Troponin I	LDH

Any others? (please specify)

3) Is the use of these markers restricted according to time from onset of pain? Y / N

If YES, please specify:

4) Is the use of these markers restricted in any other way? Y / N

If YES, please specify:

5) Do you have any short-stay facilities for patients with **chest pain ?cause.** Y / N
(thus allowing observation for 2 to 12 hours)

If YES, who is responsile for this facility? *(please circle one)*

A&E	Cardiology	General medicine	Other

6) Do you have any intention to establish a short-stay facility? Y / N

If YES, who would be responsible for this facility? *(please circle one)*

A&E	Cardiology	General medicine	Other

7) Do you have access to any form of provocative cardiac testing? Y / N
(e.g. exercise ECG, radionuclide stress test)

If YES, is it available

Immediately	The same day	The next day

8) Who is usually responsible for admitting patients with **chest pain ?cause.**

General medicine	Cardiology	Other

9) On average, what proportion of patients with **chest pain ?cause** would you expect to admit from your department

<20%	20–40%	40–60%	60–80%	Over 80%

10) Would you expect patients admitted with **chest pain ?cause** to routinely have:

ECG monitoring? Y / N
ST segment monitoring? Y / N
Intravenous access Y / N

11) Do you have any specialist cardiac, chest pain, or thrombolysis nurses in your department Y / N

If YES, what roles do they undertake from the following: *(please tick)*

- Administration of thrombolysis ☐
- Thrombolysis audit ☐
- Assessment and management of definite cardiac patients ☐
- Assessment of patients with **chest pain ?cause** ☐
- Assistance with ECG interpretation ☐
- Teaching of nursing staff ☐
- Teaching of junior doctors ☐
- Any other roles? .....

Table 1. Cardiac enzymes available to emergency departments in the UK

Cardiac enzyme	Number of departments (n=175)	Percentage of departments (%)
Creatinine kinase	129	73
CK-MB (activity)	89	50
CK-MB (mass)	25	14
Troponin T	57	32
Troponin I	41	23
Lactate dehydrogenase	52	29

from over four hours from symptom onset to over 12 hours. Other restrictions were applied to cardiac enzyme use in 44 departments (25%). In most cases, this involved restriction to office hours only or to senior or specialist members of staff.

A short-stay facility for patients with undifferentiated chest pain was available to 38 departments (21%). This was under emergency department control in 17; the remainder being under general medical control (15), cardiology control (4), or unspecified control (2). Some 55 departments (31%) stated that they intended to create such a short-stay facility. In most cases (23 departments, 42%), this was planned to be under emergency department control.

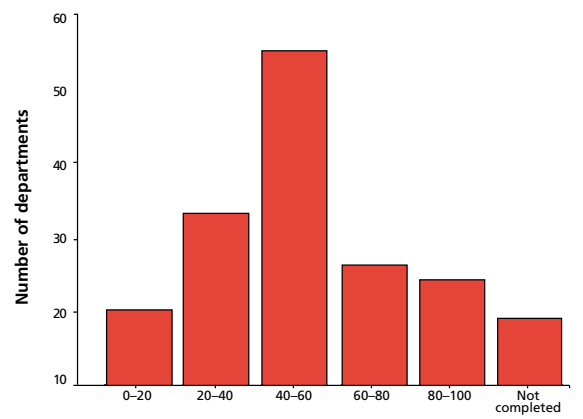
Provocative cardiac testing was available to 38 departments. This was available immediately in three departments, the same day in 12 departments and the next day in 20 (not stated by three). Patients with undifferentiated chest pain were admitted by the general physicians in 152 hospitals (86%) and by the cardiologists in 18 (10%). This data item was not recorded in seven replies (4%).

The estimated proportion of patients admitted varied widely, from less than 20% in 20 departments to over 80% in 24 departments (figure 2). Some 152 consultants (86%) reported that they would expect admitted patients to receive ECG monitoring, 61 (34%) expected patients to receive ST-segment monitoring, and 166 (94%) expected patients to have intravenous access.

Finally, 45 departments (25%) employed specialist cardiac, thrombolysis or chest pain nurses. Their duties included: administration of thrombolysis in 34 departments (76%); thrombolysis audit in 37 (82%); assessment and management of definite cardiac patients in 28 (62%); assessment of patients with undifferentiated chest pain in 20 (44%); assistance with ECG interpretation in 31 (69%); teaching of nursing staff in 38 (84%) and teaching of junior doctors in 31 (69%).

Figure 3 summarises all the data above by recording the number of departments providing each element of care. Availability of short-stay facilities was significantly associated with a lower estimated proportion admitted (p=0.007). There was no significant association between availability of guidelines (p=0.19), cardiac enzyme testing (p=0.91), provocative testing (p=0.54) or specialist nurses (p=0.42) and estimated proportion admitted.

Figure 2. Estimated percentage of patients with acute undifferentiated chest pain admitted from emergency departments in the UK



Discussion

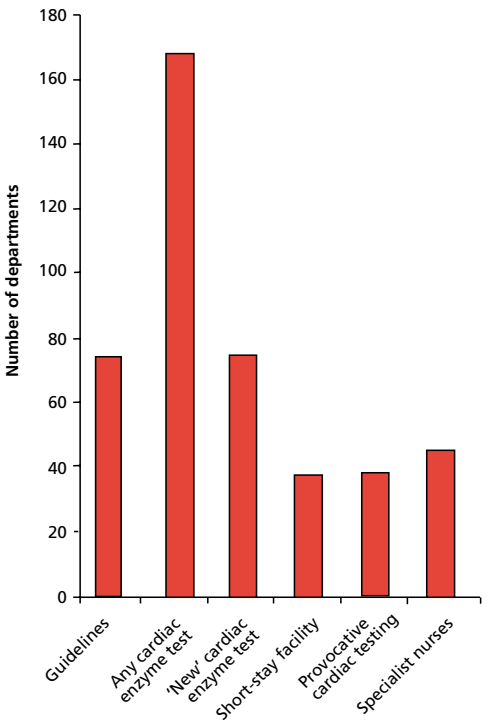
The survey has described wide variations in the reported management of acute, undifferentiated chest pain across the UK. Only 42% of emergency departments have guidelines for this condition. Creatinine kinase is the most commonly available blood test. Many departments have access to newer and more sensitive assays, but restrictions upon use are common. Short-stay facilities remain uncommon, although 31% of consultants expressed an intention to develop such a unit. Access to provocative cardiac testing was also limited. ECG monitoring and intravenous access appear to be accepted standards of care, while most consultants did not consider ST-segment monitoring to be necessary. Finally, the role of chest pain nurses is developing but they currently feature in only a quarter of departments.

Variation in management

One of the most striking variations reported was in the estimated proportion of patients with acute, undifferentiated chest pain admitted to hospital. Admittedly, this estimate is based on the consultant's opinion, rather than empirical data. However, one would expect consultants to be as likely to underestimate the degree of variability in practice, as overestimate. It has been recognised that the lower the proportion of patients admitted to hospital, the greater the risk of inadvertent discharge of a patient with acute MI.[20] Determining the 'appropriate' ratio of admissions to discharges, therefore, depends upon weighing up the cost of unnecessary admissions and the risk of inappropriate discharge. The results of this judgement seem to vary widely among consultants.

We found that availability of a short-stay unit was associated with a lower estimate of the proportion admitted, while availability of guidelines, 'new' cardiac enzyme tests, provocative testing and specialist nurses showed no apparent association. The questionnaire did not clarify whether short-stay unit patients should be considered to be 'admitted' but the results suggest

Figure 3. Number of emergency departments providing each element of care



that respondents did not consider these patients to be true admissions. Given the potential for bias in the estimate of the responding consultant, formal quantitative assessment of these findings might be worthwhile.

Non responders

As with any survey, the validity of the findings may be undermined by non-response. The response rate was acceptable at 74% and analysis of departmental characteristics revealed no significant predictor of survey response. Responders might be more likely, however, to come from departments with a stronger interest in cardiac problems. Hence our results may overestimate the true availability of new cardiac enzymes, short-stay facilities, provocative testing and specialist nurses. Another potential limitation is that we relied upon self-report of available facilities by consultants within the department. Although the questions were relatively factual and uncontroversial, consultants may have been keen to present their department in a favourable light and may, therefore, have overestimated the availability of facilities. Conversely, because we asked specifically about routinely available cardiac markers, respondents may not have recorded those with limited availability, hence underestimating availability.

Further research

This survey demonstrates a clear need for further research into this neglected, but important and rapidly changing area of healthcare. Plenty of research into acute chest pain has been carried out in coronary care units in the UK and in emergency departments in the US. Differences in the prevalence of cardiac disease and in clinical practice mean that these data are of limited relevance to the emergency setting in the UK; there are also dangers inherent in inappropriate extrapolation of findings from one setting to another. It is, therefore, important that future research should be locally relevant, and include the full range of emergency presentations with chest pain.

Key messages

- The management of acute, undifferentiated chest pain in the UK is characterised by a lack of formal guidelines and wide variation in practice
- This may reflect the lack of data applicable to emergency practice in the UK
- Innovative technologies and approaches to service delivery are being adopted
- These should be subject to formal evaluation to ensure that future developments are evidence based, well planned and consistent

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