ORIGINAL ARTICLE

Development of acute chest pain services in the UK

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Background: In 2001, a survey of emergency departments in the UK showed wide variation in the management of acute undifferentiated chest pain. There has since been substantial development of chest pain services and research into chest pain units (CPUs).

Aim: To determine whether practice had changed in 2006.

Methods: All emergency departments in the UK were surveyed by postal questionnaire to the lead clinician or first named consultant.

Results: Responses were received from 192 of 253 (76%) departments. 25 (10%) stated they had a CPU, although 8 (32%) of these were set up in trials. Many CPUs provided care that was similar to that provided by hospitals without a CPU, with 76% using 10–12 h troponin and 29% only providing delayed access to exercise tolerance testing (up to 2–3 weeks after attendance). Over all departments, the proportion with access to exercise testing had more than doubled between 2001 and 2006, from 21% to 49% (94/190), although only a minority (16%) were able to provide this immediately or within the next working day. Use of departmental guidelines for patients with chest pain had increased from 42% to 72% of departments. Use of troponins increased from 52% to 96%, whereas use of creatine kinase MB decreased from 54% to 31% of departments. Availability of short-stay facilities had more than doubled from 21% to 59%.

Conclusions: Formal development of CPUs has been limited and mostly restricted to trials. However, there has been substantial informal and ad hoc development of acute chest pain services. Development of chest pain services in the UK is progressing in a disorganised way.

In England and Wales, there are approximately 700 000 attendances each year to emergency departments for chest pain, with around 500 000 admissions.¹ Roughly one quarter of these attendances have no clear diagnosis after assessment in the emergency department, and may be described as acute, undifferentiated chest pain. These patients present a management challenge. Most have benign causes for their pain, so hospital admission is unnecessary, but a large proportion have acute coronary syndrome, so discharge home may be risky.²

A survey undertaken in 2001³ showed substantial variation in services and management of acute, undifferentiated chest pain. Since then, there have been rapid developments in the provision of chest pain services. These have involved the development of new diagnostic technologies, such as troponin testing and the development of cardiac and emergency services, through the National Service Framework for Coronary Heart Disease⁴ and Emergency Services Collaborative, respectively, and the development of rapid diagnostic testing protocols and chest pain units (CPUs).^{5–7} CPU care has been developed specifically to improve care for patients with acute, undifferentiated chest pain. Clinical predictors are used to select patients who undergo up to 6 h of observation and cardiac biochemical testing, followed by exercise treadmill testing. Patients with positive results are admitted and those with negative tests can be safely discharged. Randomised trial evidence suggests that CPU care may be more effective and cost effective than routine care.⁸

We would expect these developments to have led to substantial changes in chest pain services over the past 5 years. We therefore aimed to describe services currently available for acute, undifferentiated chest pain, and to identify changes since 2001, specifically the development of CPU care.

METHODS

Between February and April 2006, we surveyed all 253 emergency departments in the UK by postal questionnaire to

the lead clinician or first named consultant. Non-responders were mailed a follow-up questionnaire 1 month later and received a telephone call 1 month after that. The mailing included a covering letter with our definition of a CPU (box 1) and two different one-page (A4) surveys. Only one was to be completed depending on whether the hospital had a CPU or not. These were returned in a prepaid envelope. The surveys are shown in the appendix. In addition, clinicians were asked to send a copy of their CPU protocol or formal guidelines for managing chest pain.

A simple descriptive analysis of the responses was undertaken using SPSS for Windows, V.12.0.

RESULTS

We received responses from 192 of 253 (76%) departments, of whom 25 (13%) had a CPU and 167 (87%) did not.

Departments with a CPU

A total of 8 of the 25 CPUs were set up under trials. Seven were set up as part of the Effectiveness and Safety of Chest pain Assessment to Prevent Emergency Admissions (ESCAPE) trial (a multicentre cluster randomised controlled trial to evaluate the role of chest pain units in the National Health Service)⁹ and one was set up under a previous single-centre trial. These, therefore, had a standardised system of care.

The emergency department was responsible for the CPU at 13 of 25 (52%) hospitals, cardiology at 10 (40%), general medicine at 1 (4%) and acute medicine at 1 (4%). A formal CPU protocol was used at 23 of 25 (92%) hospitals. The protocol used a cardiac marker combination of creatine kinase MB (CK-MB; mass) on arrival, followed by CK-MB (mass) and troponin at least 6 h after the onset of symptoms at eight hospitals that had set up their CPU as part of the trials. Another 14 hospitals used

Abbreviations: CPU, chest pain unit; CK-MB, creatine kinase muscle and brain subunits; ETT, exercise tolerance tests

Box 1: Definition of a chest pain unit

A chest pain unit is used to facilitate rapid and safe discharge of patients with chest pain by providing up to 6 h of observation and biochemical cardiac testing and providing exercise stress testing within 24 h of attendance.

troponin as a sole cardiac marker: 12 at 12 h, 1 at 10 h and 1 at 6 h after the onset of symptoms. One hospital used CK-MB, myoglobin and troponin at 0 and 2 h after arrival at hospital, and the remaining two hospitals did not report their protocol.

The exercise tolerance test (ETT) was provided by 20 of 25 (80%) of the CPUs, and was provided by the cardiology department at 17 hospitals, by the emergency department at 2 and by the clinical physiology department at 1. The ETT was available within 24 h at 10 hospitals, within 48 h at 5, within 2 weeks at 2, over 2 weeks at 1, and at a variable time at 2.

Specialist cardiac, chest pain or thrombolysis nurses staffed 18 of 25 (72%) of the CPUs. The number of nurses staffing the unit varied as follows: seven hospitals employed one nurse, three hospitals employed two, two hospitals employed three, one hospital employed four, three employed more than four, and two did not report this value. Table 1 shows the roles of the specialist nurses.

Departments without a CPU

Despite not having a CPU, 87 of 167 (52%) hospitals had access to an observation facility for patients with chest pain. This was supervised by the emergency department at 29 hospitals (33%), cardiology at 8 (9%), general medicine at 38 (44%), a combination of specialties at 11 (13%) and another specialty at 1 hospital (1%). Formal guidelines for managing chest pain were in use at 118 of 164 (72%) hospitals.

Creatinine kinase was available at 101 (60%) hospitals, CK-MB at 46 (28%), CK-MB (mass) at 6 (4%), troponin T at 98 (59%), troponin I at 72 (43%), lactate dehydrogenase at 27 (16%) and myoglobin at 6 (4%). Marker availability was restricted according to time criteria at 131 of 164 (80%) hospitals. At 101 (77%) hospitals, markers were limited to at least 12 h from symptom onset, at 4 they were limited to at least 8 h, at 6 they were limited to at least 6 h and at 1 they were limited to at least 4 h. Markers were used twice at nine hospitals: at 6 and 12 h at seven, at 4 and 12 h at one, and at baseline and 90 min at one.

The ETT was available at 74 of 167 (44%) hospitals. It was available within 24 h at 9 hospitals (12%), within 48 h at 9 (12%), within 1 week at 18 (24%), within 2 weeks at 10 (14%), >2 weeks at 5 (7%) and at a variable time at 12 (16%), with 5 hospitals giving other responses and 6 not responding.

Table 1 Roles of specialist nurses at hospitals with and without chest pain units

Role	With CPU (%)	Without CPU (%)
Administration of thrombolysis	15/17 (88)	57/79 (72)
Thrombolysis audit	14/17 (82)	72/79 (91)
Assessment and management of definite cardiac patients	14/17 (82)	52/79 (66)
Assessment of patients with chest pain	16/17 (94)	55/79 (70)
Assistance with ECG interpretation	16/17 (94)	54/79 (68)
Teaching of nursing staff	13/17 (76)	65/79 (82)
Teaching of junior doctors	11/17 (65)	56/79 (75)

CPU, chest pain unit; ECG, electrocardiogram.

Specialist cardiac, chest pain or thrombolysis nurses were employed at 79 of 164 (48%) hospitals. The number of nurses employed were: 1 at 37 (47%) hospitals, 2 at 11 (14%), 3 at 8 (10%), 4 at 6 (8%) and >4 at 7 (9%). Nurses were shared with other specialties at 9 hospitals (11%), and 1 hospital did not respond. Table 1 shows the roles of the specialist nurses.

Comparison with 2001 survey

Table 2 compares the main findings from the 2001 survey with the main findings from this survey at hospitals with a CPU, without a CPU and overall. In this survey, more hospitals reported using formal guidelines or a CPU protocol; use of creatinine kinase, CK-MB and lactate dehydrogenase had decreased; and use of troponins had increased. Meanwhile, access to short-stay facilities, ETT and use of specialist nurses had all increased. These changes were more marked in the hospitals that reported having a CPU.

DISCUSSION

This survey has shown little evidence of CPU development outside the research setting. Few hospitals reported having a CPU, and those that did provided a variety of services that in many cases were similar to the services provided by hospitals without a CPU. Despite this, there has been substantial ad hoc development of chest pain services and many hospitals without specific CPUs have developed elements of CPU care. Short-stay facilities have developed for patients with chest pain, early access to ETT has improved and more hospitals employ specialist chest pain nurses. Meanwhile, troponin testing is replacing creatinine kinase and CK-MB.

Development of services in the UK contrasts with the US, where it is now estimated that around 1500 CPUs have been established.¹⁰ This process has been driven by the Society of Chest Pain Centers, which was established in 1998 in the US to provide accreditation of CPUs and promote "protocol based medicine ... to address the diagnosis and treatment of acute coronary syndromes, heart failure, and to promote the adoption of process improvement science by healthcare providers".¹⁰ No such organisation exists to promote service development in the UK.

Limitations

Despite one re-mailing and a telephone follow-up, 24% of hospitals did not respond to the survey, so hospitals with little interest in chest pain care may be under-represented. Furthermore, we relied on reported availability of services,

Table 2 Comparison between 2001 and 2006 chest pain surveys

	2001 (%)	2006	
		Overall (%)	No CPU (%) CPU (%)
Formal guidelines	42	75	72 92
Creatinine kinase	73	53	60 0
CK-MB	50	25	28 8
CK-MB (mass)	14	10	4 28
Troponin T	32	58	59 48
Troponin I	23	44	43 48
Lactate dehydrogenase	29	14	16 0
Short stay	21	58	52 100
ETT	21	49	44 80
ETT (same or next day)	20	18	11 60
Specialist nurses	25	51	48 72

CK-MB, creatine kinase muscle and brain subunits; CPU, chest pain unit; ETT, exercise tolerance tests.

rather than on direct evidence of service availability. Our data may therefore overestimate the true availability of services.

Conclusion

Formal development of CPUs in the UK has been limited and mostly restricted to the research setting, yet there has been substantial informal and ad hoc development of acute chest pain services. Development of chest pain services in the UK is progressing in a disorganised way.

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REFERENCES

- 1 **Goodacre S**, Cross E, Arnold J, *et al*. The health care burden of acute chest pain. *Heart* 2005;**91**:229–30.
- 2 **Collinson PO**, Premachandram S, Hasehmi K. Prospective audit of incidence of prognostically important myocardial damage in patients discharged from emergency department. *BMJ* 2000;**320**:1702–5.
- 3 **Goodacre S**, Nicholl J, Beahan J, *et al*. National survey of emergency department management of patients with acute, undifferentiated chest pain. *Br J Cardiol* 2003;**10**:50–4.
- 4 **Department of Health**. *The National Service Framework for coronary heart disease*. London: DoH, 2000.
- 5 **Goodacre S**, Morris FP, Campbell S, *et al*. A prospective, observational study and cost analysis of a chest pain observation unit. *Emerg Med J* 2002;**18**:6–10.
- 6 **Herren KR**, Mackway-Jones K, Richards CR, *et al*. Is it possible to exclude a diagnosis of myocardial damage within 6 h of admission to an emergency department? Diagnostic cohort study. *BMJ* 2001;**323**:372–4.
- 7 **Taylor C**, Forrest-Hay A, Meek S. ROMEO: a rapid rule out strategy for low risk chest pain. Does it work in a UK emergency department? *Emerg Med J* 2002;**19**:395–9.
- 8 **Goodacre S**, Nicholl J, Dixon S, *et al*. Randomised controlled trial and economic evaluation of a chest pain observation unit compared with routine care. *BMJ* 2004;**328**:254–7.
- 9 The ESCAPE Trial, ISRCTN55318418, <http://www.chestpain.group.shef.ac.uk/> (accessed 11 Dec 2006).
- 10 The Society for Chest Pain Centers, <http://www.scpq.org/> (accessed 11 Dec 2006).

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