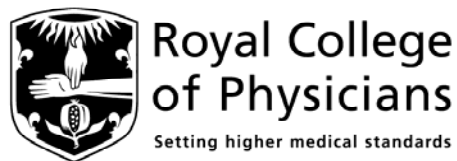


# National Audit of Myocardial Infarction Project (MINAP)

## Management of acute coronary syndromes in England and Wales: a survey of facilities in 2006

Prepared on behalf of the MINAP Steering Group

July 2007



**This report is based on a survey of facilities for the care of patients with acute coronary syndromes in England and Wales that was performed last year. The census date was 1 July 2006.**

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## 1. MINAP Steering Group

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MINAP Academic Group	Professor Adam Timmis Chair
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MINAP Patient/Carer Group	Mr David Geldard President, Heart Care UK

## 2. Executive summary

### Introduction

This survey was performed to establish – as a snapshot in a rapidly developing field – the facilities currently available for the care of acute coronary syndromes in hospitals in England and Wales. The survey follows the pattern of a previous survey performed in 2000, with which comparisons have been made. The previous survey did not include 18 Welsh hospitals. Data were analysed from 228/231 hospitals, and responses were not received from 3 hospitals. Data were collected by means of an on-line survey developed by the Central Cardiac Audit Database group. The census date was 1<sup>st</sup> July 2006, although initial data returns were not complete until late 2006. Following initial analysis hospitals were given draft results for checking, and further analysis took place after corrections and amendments had been made in early 2007. This summary does not distinguish between facilities in England and Wales, details of which are available within the body of the report. Salient comments appear in bold as a bullet point. Where (MINAP data) appears in the text this refers to analyses based on data from the National Audit of Myocardial Infarction which records information on heart attack from all hospitals in England and Wales.

### Hospital characteristics and facilities

The majority of hospitals, 92% that provide services for patients with acute coronary syndromes have 24 hour emergency departments, accepting acute coronary syndromes as a significant proportion of the unselected acute general medical emergency workload. With the development of primary angioplasty networks, hospitals that presently only receive patients from other hospitals – tertiary hospitals – are increasingly accepting patients with ST segment elevation infarction directly from the ambulance service. At the same time larger interventional centres within the M25 motorway boundary are now accepting all patients who have ST segment elevation infarction diagnosed by ambulance paramedic crews, with the effect that other hospitals in the same area now admit far fewer patients with ST segment elevation infarction.

- **Of 228 hospitals 36% had angiographic facilities, 30% also had coronary interventional facilities, and 34% did not have these facilities.**

**Comparison with 2000** In 2006, 75 hospitals had angiographic facilities compared with 49 in 2000, an increase of 53%. In addition 62 hospitals now have interventional facilities compared with 35 in 2000, a 77% increase.

*[Throughout this report comparisons with 2000 are only for English hospitals accepting acute emergency admissions, and exclude 4 tertiary hospitals in both years. The numbers in the main sections cover England and Wales; thus small differences in numbers will be noted when compared to the rest of the text.]*

## **Consultant and other medical staffing numbers**

- **226 hospitals in England and Wales reported 905 consultants in post, with a further 60 (6.1%) posts unfilled. 25% hospitals had unfilled consultant posts, the majority for more than 3 months.**

**Consultant cardiologists' involvement with acute general medicine** In hospitals with accident and emergency departments 64% of cardiologists also had general medical on-call duties. This was not confined to hospitals without angiographic or interventional facilities. Some, including cardiologists with an interventional role, had involvement in a general medical and cardiology rotas.

**Comparison with 2000** The number of 'pure' cardiologists has increased from 198 to 508, an increase of 157%, and for cardiologists with a general medical involvement numbers have increased from 285 to 308, an increase of 8%. While there has been no significant change in the number of hospitals where cardiologists have involvement in general medical rotas, there has been a fall, from 65% to 41%, of the number of hospitals in England where *all* cardiologists have a general medical commitment. In 2000, 59% English hospitals had cardiologists with a general medical commitment; in 2006 this was 64%.

- **The increase in consultant staffing is reflected in an increase in the average number of cardiologists per hospital.** The majority of hospitals have 3 cardiologists (28.6%), 2 consultants (21.4%) or 4 (16.5%).
- **The increase in numbers is seen in all types of hospital.** Hospitals with no angiographic facilities have a median of 2 (interquartile range 2, 3) consultants, hospitals with angiographic facilities 3 (2, 4) and interventional hospitals 6 (4, 9).

**Specialist registrars** 220 hospitals (including tertiary hospitals) reported 492 specialist registrars in England and Wales. Eight hospitals did not respond. Thirty-five hospitals reported that they had no specialist registrars whilst the majority of hospitals, 140/220 (64%) had either 1 or 2. In 2000 there were 172 specialist registrars working in 206 hospitals in England. There are now 464, an increase of 125%.

## **Cardiological beds, nursing staff and other facilities**

**The cardiac care unit (CCU)** Almost all hospitals have a cardiac care unit with a median of 6 (IQR 5, 9) beds. There has been no significant change in the size of cardiac care units since 2000. Care for acute coronary disease is no longer limited to intensive care for a small number of patients with ST segment elevation but now includes the need to care for larger numbers of non ST elevation infarctions that can now benefit from specialised care and intervention.

- **Cardiac beds 25% hospitals did not have designated cardiac beds except those on CCU.**

Three hospitals with interventional facilities and 21 hospitals with angiographic facilities had no cardiology beds. Hospitals with cardiology beds often found that these were occupied by non cardiology patients. 50% reported this was common and 15% said that this occurred most of the time.

**Care for older people on CCU** No hospital reported an age cut off point for admission to CCU. The majority of older patients 207/213 (97%) in England and Wales were admitted to existing facilities such as CCU or cardiac beds. In 6 (3%) English hospitals different arrangements were made for older patients.

**Nurse staffing on CCU** Hospitals were asked if they had staffing difficulties on CCU. Since 2000 there has been an improvement with 56% hospitals reporting that nurse staffing was rarely or never a problem, compared with 45% in 2000.

**Other facilities** Radiographic screening and pressure monitoring facilities were available in slightly fewer hospitals than in 2000; radiographic screening in 64% against 69% in 2000; pressure monitoring in 75% against 69%. These small falls may reflect the increasing availability of alternative facilities within catheter laboratories. Access to telemetry has increased and was available in 93% hospitals compared with 69% in 2000.

**Ward rounds** The majority of cardiac care units had a daily ward round performed by a cardiologist. In 2000 only 29% English hospitals had a (weekday) daily ward round on CCU. In 2006 this was 87%.

**Use of biomarkers to measure cardiac necrosis** Almost universal introduction of troponin assays, either using near patient testing kits or by laboratory assay, has occurred since 2000. There has been a corresponding reduction in use or withdrawal of enzyme tests lacking cardiac specificity.

**Specialist nursing staff** Although no direct comparison with 2000 is available, a substantial increase in specialist nursing staff has occurred. Although some nursing staff have specialist roles,

particularly in relation to catheter laboratory work, others have a multiple skills. Specialist roles widely represented included: thrombolysis nurses, acute coronary syndrome nurses, heart failure nurses, and rapid access chest pain nurses. Nurses having these primary roles were frequently reported to support outpatient clinics for patients after discharge.

### **Assessment of patients with suspected myocardial infarction**

- **Two thirds of patients with suspected infarction are now assessed in the emergency department, and 28% in CCU. In 2000 patients were admitted directly to CCU in 48% hospitals.**

Assessment and treatment in the emergency department is generally associated with shorter delays from admission to thrombolytic treatment. With primary angioplasty direct admission from ambulance to catheter laboratory is likely to increase.

### **Reperfusion strategies for patients with ST elevation infarction**

- **Reperfusion treatment with thrombolytic agents remains by far the most common treatment strategy. In 2006 15% of patients having any reperfusion treatment for ST elevation infarction had primary angioplasty (MINAP data). This percentage is increasing rapidly. However 66% hospitals reported that primary angioplasty was not routinely available for patients with ST elevation infarction. For 15% it was available on site, and for 19% by transfer to an interventional centre.**
- **Pre-hospital thrombolytic treatment In 2006 almost 3000 patients received thrombolytic treatment from ambulance paramedics. This was about 15% of all thrombolytic treatment (MINAP data). In 2000 pre-hospital treatment was given to very small numbers.**
- **Thrombolytic treatment in hospital In 74% hospitals thrombolytic treatment was given in the emergency department, compared with about 30% patients who had thrombolytic treatment in the emergency department in 2001. (MINAP data) The median delay from arrival in hospital to treatment in 2006 was 21 minutes, (IQR 10, 41 minutes).**

## Care for patients with ST elevation infarction

Where primary angioplasty was not performed patients were admitted directly under a cardiologist in 35% hospitals, while the majority was admitted under the on-call consultant physician. By 24 hours another 25% had been handed to the care of a cardiologist. In a minority of hospitals, 12%, care remained with a non cardiologist throughout the admission, and for the rest a mixed pattern of care emerged.

- **In 60% hospitals patients with ST elevation infarction come under the care of a cardiologist during admission.**
- **Follow up arrangements. In 80% hospitals patients with ST elevation infarction are now followed up by cardiologists after discharge.**

**Comparison with 2000** In 2000 care for infarction was provided by a cardiologist, either immediately or during the first 24 hours, in 86/210 (41%) of hospitals. In 2006, using the same criteria, this figure was 124/204 (61%).

## Care for patients having primary angioplasty

This is a rapidly developing picture with more interventional hospitals providing this treatment further evolution of the service will depend on the recommendations of the National Infarct Angioplasty Project (NIAP), data from which are currently being analysed.

- **At 1<sup>st</sup> July 2006, 37 hospitals in England and Wales offered a routine primary angioplasty service,** (although more hospitals provided an occasional service) and 42 hospitals had access to a routine angioplasty service provided elsewhere. However in 25% the provision was less than 24 hours / day. In 66% interventional hospitals the patient remained until discharge rather than transfer back to a referring hospital.

## Care for non ST elevation infarction

- **Less than 50% patients admitted with non ST elevation infarction are admitted to a cardiac facility (CCU or other cardiac ward) (MINAP data 2006).**

Of those that are admitted to CCU 48% are under the care of a non cardiologist, while of those not admitted to a cardiac facility 67% are under the care of a non cardiologist. For 28% hospitals there is a policy of routine transfer to cardiology within the first 24 h. Where a patient is not under the care of a cardiologist, and not on CCU, 80% will have no cardiological review during the

admission. 62% patients admitted with non ST elevation infarction are followed up by a cardiologist, compared with 80% of patients with ST elevation infarction.

### **Angiography and intervention following myocardial infarction**

Availability of angiography following an acute coronary syndrome remains variable.

- **In only 1/3 hospitals can more than 50% eligible patients with myocardial infarction expect to have angiography within 72 h of admission.**

Where interventional facilities were available onsite the proportion of patients having angiography and an intervention within 72 h of admission were approximately twice that where those facilities were not available.

### **Provision of interventional services for other hospitals**

- **Of 64 hospitals having interventional facilities, 40 provided an interventional service for other hospitals (to a median of 5 hospitals) either within or outside their own Trust.**
- **37 hospitals provide a primary angioplasty service, of which 20 reported that they provided a primary angioplasty service for other hospitals, and 17 provided primary angioplasty in-house.**

**Comparison with 2000** In 2000, 35 hospitals in England performed coronary interventional work. Primary angioplasty was performed in 24 hospitals, but of this number only 11 made the service available to other hospitals.

### **Angiographic and interventional policies**

- **Angiography was reported to be performed routinely for ST segment elevation infarction, or after formal assessment of future risk, in 71% hospitals.**
- **For non ST elevation infarction the figure was 86%.**

To what extent these figures are realised in practice is not known. In 2000 only 3% hospitals reported a clinical policy of routine angiography.

### **Rehabilitation services**

Rehabilitation services are increasingly community based. These data refer only to services provided by hospitals. In practice ward nursing staff, and others such as acute coronary syndromes

nurses, none of whom are counted as rehabilitation staff, are frequently involved in initiating the rehabilitation process.

- **There were a total of 659 rehabilitation posts.**
- **The median number of rehabilitation nursing staff was 3 (IQR 2, 5).**

32 hospitals reported that a proportion of rehabilitation funding was paid from non NHS sources.

Since 2000 the number of rehabilitation staff has increased by 69% from 343 to 580. The numbers funded on non NHS money has fallen from 52 in 2000 to 26 in 2006.

### 3. Hospital characteristics and facilities

228/231 (99%) hospitals responded to the questionnaire [1.06]<sup>1</sup>. The majority of hospitals had A&E departments and all except one were open 24 h day. Of 18 Welsh hospitals 16 had A&E departments. Tertiary hospitals that previously only received patients from other hospitals, may in future receive patients with ST elevation infarction directly from the ambulance service, but this is not considered in this survey (tables 1, 2).

**Table 1 Characteristics of hospitals in England and Wales**

Type of hospital	England	Wales	Total
24 h A&E taking acute unselected emergencies*	193	16	209
Hospitals without A&E receiving emergency cardiac patients	13	2	15
Hospital only receiving patients from other hospitals	4	-	4
<b>Total</b>	<b>210</b>	<b>18</b>	<b>228</b>

\* Includes 1 hospital with an A&E department open less than 24 h.

**Table 2 Availability of angiographic and cardiac interventional facilities**

	England		Wales		Combined	
	n	%	n	%	n	%
Angiography alone	75	35.5	7	39	82	36
Coronary intervention	62	29.5	2	11	64	28
Neither	73	35	98	50	82	36
<b>Total</b>	<b>212</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>228</b>	<b>100</b>

Of 82 hospitals with angiography facilities, 11 had an approved outline business case to develop interventional facilities.

**Table 3 Facilities in relation to type of hospital**

	Facilities on site			Total
	Angiography	Intervention	None	
A&E dept	81	56	72	209
No A&E, takes emergency patients.	1	4	10	15
No A&E, takes patients from other hospitals	0	4	0	4
<b>Total</b>	<b>82</b>	<b>64</b>	<b>82</b>	<b>228</b>

#### 3.1 Comparison with 2000

NB all comparisons are for England only, and exclude tertiary hospitals. There has been a substantial increase in availability of facilities for angiography and coronary intervention since 2000.

**Table 4 Hospitals having angiographic and interventional facilities in 2000 and 2006**

	2000	2006	% increase
Angiography alone	49	75	53
Interventional facilities	35	62	77
<b>Total</b>	<b>84</b>	<b>137</b>	<b>63</b>

<sup>1</sup> Square brackets refer to the number of the question in the questionnaire

## 4. Consultant and non consultant numbers

### 4.1 Total consultant numbers

Hospitals were asked ‘What is your complement of consultant cardiologists?’ [2.01]. Two hospitals did not return data. Hospitals in England and Wales reported 905 consultants in post, with a further 60 (6.6%) posts unfilled [2.01]. Some of these posts may be part time, and the numbers quoted here will exceed the equivalent number of whole time posts.

Small numbers of posts were reported in fractions, and it was not clear if this described part time posts or an attempt to distinguish cardiology sessions from a general medical component. Where fractions are recorded this number has been rounded up. The effect was to increase apparent numbers by 8.5 posts, less than 1.0%. There were 863 consultants working in hospitals other than tertiary hospitals, of whom 339 (39%) had a commitment to acute general medicine. One hospital did not respond.

**Table 5 Consultants in post, and unfilled posts (>1 month) at July 1<sup>st</sup> 2006**

	England	Wales	Total
Consultants in post	858	47	905
Unfilled posts	54	6	60
<b>Total</b>	912	53	965

All types of hospital. 2 hospitals did not respond.

### 4.2 Unfilled consultant posts

Hospitals were asked for how long they had not had a full complement of consultant staff [2.02]. 50/60 (85%) gave a period for which the post had been vacant. It is not uncommon for a consultant post to remain unfilled for a period at the time of a retirement, and in 8 hospitals a post had been vacant for up to three months. The majority of posts 42/50, (84%) were unfilled for more than 3 months, 9/50 (18%) between 3 and 12 months, and 15/50, (30%) between 12 and 23 months. There were 18, (9%) longer term vacancies of more than 2 years.

**Table 6 Hospitals with unfilled consultant posts**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Hospitals having unfilled posts</b>	53/209	25	6/17	35	59/226	26%

### 4.3 Consultant numbers in hospitals receiving emergency admissions

Consultant numbers were analysed for hospitals with an A&E department or those receiving patients on an emergency basis from emergency services. Tertiary hospitals were excluded, although it is likely these hospitals will receive ST elevation infarction patients direct from the ambulance services.

**Table 7 Total number of cardiologists including those with commitment to acute general medicine in hospitals (n = 224) admitting acute medical emergencies**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Cardiologists</b>	508	62	16	34	524	60.5
<b>Cardiologists with general medical on-call</b>	308	38	31	66	339	39.5
<b>Total</b>	816	100	47	100	863	100

#### 4.3.1 Comparison with 2000

Table 8 excludes tertiary hospitals for which data were not available in 2000. In 2000 4 hospitals did not return consultant figures, in 2006 there were 2. In 2000, 59% of cardiologists had a general medical commitment, and was about the same, 61% in 2006. However, the increase in consultant staffing has been predominantly in cardiologists without any involvement in general medicine, and this is reflected in a changing pattern where some, but not all cardiologists in a hospital will have general medical duties. See table 9.

**Table 8 Change in consultant numbers 2000 – 2006**

	<b>2000</b>	<b>2006</b>	<b>% change</b>
<b>Cardiologists</b>	198	508	+ 157
<b>Cardiologists with general medical on-call</b>	285	308	+ 8
<b>Total</b>	483	816	+ 69

#### 4.4 Cardiologists with involvement in acute general medical rota

In hospitals receiving emergency admissions, cardiologists very commonly have a commitment to general medical on-call duties.

In 5 (2%) smaller hospitals there was no cardiologist (table 9). In 91 hospitals all cardiologists also had acute general medical responsibilities. In 49 (54%) of these hospitals there were angiography facilities, and in 5 (5%) coronary interventional work was undertaken. The need to combine acute general medical responsibilities with specialty work is not unique to cardiology, and the extent of involvement of cardiologists having general medical commitments to angiography and interventional work cannot be analysed from these data. However there is potential for conflict between the increasing demand for angiography and interventional work, and the effective use of expensive equipment against the competing requirements of acute general medicine.

##### 4.4.1 Comparison with 2000

In 2000 there were 8 hospitals with no cardiologist. In 2006, 5 hospitals were reported not to have a cardiologist. Where there were cardiologists, in 129/203 (63%) hospitals all cardiologists had acute general medical duties. In 2006 this had fallen to 83/204 (41%). This reflects the appointment of cardiologists who do not have acute general medical responsibilities.

**Table 9 Numbers of cardiologists with and without acute general medical on-call duties in hospitals accepting emergency admissions in England and Wales**

		Cardiologists with general medical duties							Total
		0	1	2	3	4	5	8	
Whole-time cardiologists	0	5	12	32	33	11	2	1	96
	1	4	6	20	4	0	0	1	35
	2	10	2	4	0	0	0	0	16
	3	9	2	2	0	1	0	0	14
	4	16	2	0	0	0	0	0	18
	5	8	0	1	0	0	0	0	9
	6	8	3	0	0	0	0	0	11
	7	7	0	0	0	0	0	0	7
	8	3	0	0	0	0	0	0	3
	9	3	0	0	0	0	0	0	3
	10	0	0	1	1	0	0	0	2
	11	2	0	0	0	0	0	0	2
	12	2	0	0	0	0	0	0	2
	14	1	0	0	0	0	0	0	1
	17	2	0	0	0	0	0	0	2
	19	0	0	0	1	0	0	0	1
Total		80	27	60	39	12	2	2	222

Data are missing from 2 hospitals

#### 4.5 Cardiology on-call rotas

There was no cardiology rota in 125/226 (55%) hospitals. Where a rota was reported these were often very complex, reflecting local requirements and preferences. Some described a rota only covering the cardiac care unit, while other provided week-day cover, sometimes specifying a daytime (9-5 pm) rota. Where there was a primary angioplasty rota this was sometimes different (usually longer) than the 'ordinary' rota reflecting support for the rota from colleagues from other hospitals (see section 11.4).

**Table 10 Rotas for cardiologists where there was no general medical commitment**

Cardiologists on rota	No rota	24 h cover	Less than 24 h cover	Total
	n	n	n	n
1	4	0	0	4
2	5	3	2	10
3	4	5	0	9
4	5	9	2	16
5	1	7	0	8
6	0	8	0	8
7	0	7	0	7
8	0	3	0	3
9	0	3	0	3
11	0	2	0	2
12	0	2	0	2
14	0	1	0	1
17	0	2	0	2
	19	52	4	75

In 75 hospitals where cardiologists do not have any involvement in acute general medicine there was no consistent pattern relating numbers of cardiologists to the existence of a rota, save that where there was a rota covering less than 24 h this was likely to be where there were small numbers of cardiologists.

#### 4.6 Consultant numbers in relation to type of hospital

An increase in consultant staffing since 2000 is reflected in an increase in the average number of cardiologists per hospital. The majority of hospitals have 3 cardiologists (28.6%), 2 consultants (21.4%) or 4 (16.5%). See section 5.

**Table 11 Median and mean numbers of consultants in relation to type of hospital**

	Median	IQR	Mean
Angiography only	3	2, 4	3.0
Interventional facilities	6	4, 9	6.8
None	2	2, 3	2.5
Total	3	2, 4.5	4

##### 4.6.1 Comparison with 2000

**Table 12 Numbers of cardiologists in relation to type of hospital in 2000 (England only)**

	Median	IQR	Mean
Angiography only	2	2, 4	2.7
Interventional facilities	5	4, 9	4.8
None	1	1, 2	1.6

#### 4.7 Non consultant grade medical staff

##### 4.7.1 Specialist registrars

221 hospitals (including tertiary hospitals) reported 489 specialist registrars in England and Wales. This excludes those reported as ‘Trust registrars’ who were unlikely to have a national training number. Seven hospitals did not respond. Thirty-six hospitals reported that they had no specialist registrars whilst the majority of hospitals, 140/220 (64%) had either one or two. Comparison with 2000 In 2000 there were 172 specialist registrars working in 206 hospitals in England. The present number, 464 in 206 hospitals, is an increase of 125%.

##### 4.7.2 Associate specialists

Hospitals reported 42 associate specialist posts working an average of 5.8 sessions. Fifteen worked 10 sessions/ week. Comparison with 2000 In 2000 there were 34 associate specialists in post. The present number, 42, is a 23% increase.

##### 4.7.3 Staff grade posts

101/228 (44%) hospitals reported having cardiology staff grade posts, of whom the majority, recorded in 88/101, were in full time (10 session) posts. Comparison with 2000 In 2000 there were 65 posts recorded, of which 40 (61%) were full time. The present number, 101 in 109 hospitals, is a 55% increase.

## 5. Consultant numbers in relation to population served

Population figures, available only for England, were extracted from NHS data for 2004-5 which were expressed as the population served by hospital Trusts. Where a Trust has more than one hospital accepting acute emergency admissions the population has been divided amongst the hospitals within the Trust for this analysis. Hospitals were grouped by quartile of size of catchment population<sup>2</sup>, adjusted to the nearest 1000. Of 228 hospitals, 18 Welsh hospitals and one hospital in Guernsey were excluded. The four tertiary hospitals not presently receiving acute admissions were also excluded.

**Table 13 Whole population numbers per cardiologist, adjusted for involvement in acute general medicine**

Population quartile	< 161000	161 - 200000	200 - 269000	>269000	Total
Number of hospitals	56	49	49	51	205
Mean population per hospital	130775	180943	227564	359361	222769
Cardiologists per hospital	2.9	3.1	4.5	5.7	4.0
Cardiologists adjusted for general medical duties*	2.5	2.5	4.1	5.3	3.6
Population/ cardiologist	57275	66628	71683	84205	69861
Population / cardiologist (adjusted)	73511	88378	84974	99070	86337

\*Adjustment was made for general medical duties at 30% of the working time (as in 2000). Cardiologists having general medical on-call responsibilities were thus counted as 0.7 of a consultant.

**Table 14 Population served per cardiologist for different types of hospital**

Population quartile	< 161000	161000 - 200000	200000 - 269000	>269000	Group total
Number of hospitals	56	49	49	51	205
None	77601	1029466	118707	164210	108529
Angiography	79394	87914	87681	117369	90519
Interventional	34003	66667	45924	61659	55678
Total	73511	88378	84974	99071	86338

The population numbers refer to the mean population per cardiologist in each quartile, England only.

Thus larger hospitals still have more patients per cardiologist. This analysis takes no account of demographic variation such as age. These figures reflect that number of cardiologists reported as being based at the hospital, and not those who are based elsewhere who have sessions. These data reflect mean populations within quartiles, and will not closely reflect local catchment populations where several hospitals are part of a single Trust. In each category of hospital larger hospitals have a larger population per cardiologist.

### 5.1 Comparison with 2000

The median size and interquartile range (IQR) of hospitals in 2000 was closely similar to 2006 and direct comparison for numbers of cardiologists, (not adjusted for general medical involvement), for each quartile is appropriate, table 15.

<sup>2</sup> The precise figures were; median 199589, interquartile range 160677, 269096.

**Table 15 Change in numbers of cardiologists, and population served / cardiologist in hospitals grouped by quartile of population served between 2000 and 2006**

Population quartile	Cardiologist/ hospital		Population/ cardiologist	
	2000	2006	2000	2006
< 161000	1.4	2.9	76996	57275
161000 - 200000	2.2	3.1	80436	66628
200000 - 269000	2.5	4.5	90703	71683
>269000	3.0	5.7	109419	84205

## 6. Cardiological facilities

### 6.1 Angiographic and interventional facilities

Hospitals were asked about availability of on-site angiographic and coronary interventional facilities [6.01-2]. This includes 4 ‘tertiary’ hospitals presently mainly only receiving patients from other hospitals.

**Table 2 (copy) Availability of angiographic and cardiac interventional facilities**

	England		Wales		Combined	
	n	%	n	%	n	%
<b>Angiography alone</b>	75	35.5	7	39	82	36
<b>Coronary intervention</b>	62	29.5	2	11	64	28
<b>Neither</b>	73	35	98	50	82	36
<b>Total</b>	212	100	16	100	228	100

Facilities dedicated to coronary angiography as opposed to facilities shared with a radiology department were most commonly reported. Visiting trucks were used by 4 hospitals.

**Table 16 Type of facilities available in England and Wales**

	England		Wales		Total	
	n	%	n	%	n	%
<b>No angiographic facilities</b>	73	34.5	9	50	82	36
<b>Shared facility</b>	18	8.5	4	22	22	9.5
<b>Dedicated facility</b>	115	55	5	28	120	52.5
<b>Visiting truck</b>	4	2	-	-	4	2
<b>Total</b>	210	100	18	100	228	100

### 6.2 Cardiology beds

All hospitals were asked how many inpatient beds in their hospital were ‘primarily dedicated to use by patients with acute coronary syndromes’ [3.01]. It was clear from replies that some respondents had initially interpreted this quite broadly to mean beds under the nominal charge of a cardiologist with general medical responsibilities, and which were in practice used as general medical beds, rather than beds primarily designated for the care of acute coronary syndromes, and having a higher level of cardiac nursing expertise. Where, on reviewing responses the broader interpretation appeared to have been used, hospitals were asked to confirm the interpretation expected, and data were adjusted. 55/224 (24.5%) hospitals had no designated cardiology beds excepting those on CCU. Four hospitals did not respond.

Three hospitals with interventional facilities and 21 hospitals with angiographic facilities had no cardiology beds. By contrast, 5 hospitals without any facilities having more than 30 cardiology beds, also reported that these beds were used for other general medical patients ‘commonly’ or ‘most of the time’, and should not have strictly included under the definition. Twelve hospitals had a CCU of 10 or more beds which might have been sufficient for all the needs of smaller hospitals.

**Table 17 Cardiology beds in England and Wales**

	England		Wales		Total	
	n	%	n	%	n	%
<b>0 beds</b>	45	22	10	56	55	24
<b>1 – 10</b>	21	10	1	6	22	10
<b>11 – 20</b>	52	25	4	22	56	25
<b>21 – 30</b>	49	24	1	6	50	22
<b>31 – 40</b>	19	9	-	-	20	9
<b>41 - 50</b>	12	6	1	6	11	6
<b>&gt;50 beds</b>	8	4	1	6	10	4
<b>Total</b>	208	100	16	100	224	100

n = number of hospitals

### 6.3 Beds for day-case patients

Beds for day-case patients were available in 113 hospitals [3.02]. However, of 107 hospitals who reported that they did not have day-case beds, a significant number 32 (29%) were hospitals with angiographic facilities and 9 (8%) had interventional facilities. Those having day-case beds were predominantly angiographic and interventional hospitals. Eight hospitals did not respond.

**Table 18 Day-case beds in England and Wales**

	England		Wales		Other	
	n	%	n	%	n	%
<b>None</b>	95	47	12	67	107	48.5
<b>1 – 5 beds</b>	27	13.5	2	11	29	13.5
<b>6 – 10</b>	61	30	2	11	63	28.5
<b>11 – 15</b>	8	4	2	11	10	4.5
<b>16 – 20</b>	8	4	-	-	8	3.5
<b>21 – 25</b>	2	1	-	-	2	1
<b>&gt;25</b>	1	0.5	-	-	1	0.5
<b>Total</b>	204	100	16	100	220	100

**Table 19 Numbers of day-case beds in relation to hospital angiographic and interventional facilities**

	Angiographic facilities		Interventional facilities		None		Total	
	n	%	n	%	n	%	n	%
<b>None</b>	30	37.5	5	8	72	91	107	49
<b>1 – 5</b>	17	21	8	13	4	5	29	13
<b>6 – 10</b>	30	38.5	30	48.5	3	4	63	28.5
<b>11 – 15</b>	-	-	10	16	-	-	10	4.5
<b>16 – 20</b>	1	1.5	7	11.5	-	-	8	3.5
<b>21 – 25</b>	1	1.5	1	1.5	-	-	2	1
<b>&gt;25</b>	-	-	1	1.5	-	-	1	0.5
<b>Total</b>	79	100	62	100	79	100	220	100

n = number of hospitals. 8 hospitals did not respond.

### 6.4 External pressures on cardiology beds

Hospitals that had cardiology beds were asked if they were ever occupied by non cardiac patients [3.03]. Responses were categorised into never, rarely (<8 days per month), commonly (8 – 21 days per month), and most of the time (>21 days per month). 169/173 (98%) hospitals with designated cardiology beds responded; only 3 hospitals reported that beds were never occupied by non

cardiology patients. 56 (33%) reported that this occurred rarely, 84 (50%) reported commonly and 26 (15%) said that this occurred most of the time.

Of 169 hospitals with inpatient cardiac beds 138 provided an estimate of the average overall loss of capacity resulting from non cardiac admissions. Responses were grouped into 1 – 5%, 6 – 25%, 26–50% and more than 50%. Eleven hospitals reported a capacity loss of less than 5%, 50 hospitals between 6 and 25%, 29 hospitals between 26 and 50%, and 6 hospitals considered loss of capacity to be greater than 50% in any month. Note that these data may be biased by any failure to distinguish between designated cardiology beds and general medical beds under the nominal charge of a cardiologist.

### 6.5 The cardiac care unit

Almost all hospitals had a cardiac care unit, by which was meant a specialised ward or area with central cardiographic monitoring and a higher level of numbers of nursing staff per bed. The median number of cardiac care unit beds was 6 (IQR 5, 9). Two hospitals had no cardiac care unit. In both patients were assessed and given immediate treatment, including thrombolytic treatment, in an A&E department before transfer to another hospital within the Trust [3.05].

**Table 20 Types of cardiac care units in England and Wales**

	England		Wales		Total	
	n	%	n	%	n	%
No CCU	2	1	-	-	2	1
Stand alone	155	74	16	89	171	75
Beds on an ITU	5	2	-	-	5	2
Beds on a high dependency unit	14	6.5	1	5.5	15	6.5
Part of a larger cardiology ward	25	12	-	-	25	10.5
Part of a general medical ward	8	4	1	6.5	9	4.5
Other*	1	0.5	-	-	1	0.5
<b>Total</b>	<b>210</b>	<b>100</b>	<b>18</b>	<b>100</b>	<b>228</b>	<b>100</b>

All hospitals including tertiary units are included.

\*Other described a shared CCU and stroke unit with 4 beds.

**Table 21 Numbers of CCU beds**

CCU beds	England	Wales	Total
2	2	-	1
3	2	1	3
4	29	2	31
5	20	2	22
6	48	8	56
7	14	1	15
8	31	3	34
9	10	-	10
10	26	-	26
11	3	-	3
12	4	-	4
13	3	-	3
14	5	-	5
>14	6	-	6
<b>Total</b>	<b>204</b>	<b>17</b>	<b>221</b>

Two hospitals had no CCU (see text), and 5 hospitals did not respond.

**Table 22 Distribution of CCU beds by type of facility**

CCU beds	Stand alone CCU	Beds on ITU	Beds on HDU	Part of cardiology ward	Part of general medical ward	Other	Total
2	-	-	2	-	-	-	2
3	1	1	1	-	-	-	3
4	16	2	6	2	5	1	32
5	16	1	1	4	-	-	22
6	45	1	1	7	2	-	56
7	12	-	1	1	1	-	15
8	30	-	-	2	-	-	32
9	9	-	-	-	1	-	10
10	25	-	-	2	-	-	27
11	3	-	-	-	-	-	3
12	2	-	1	1	1	-	5
13	2	-	1	-	-	-	3
14	5	-	-	1	-	-	6
>14	2	-	1	2	-	-	5
	168	5	15	22	10	1	221

### 6.5.1 Comparison with 2000

In 2000 we did not ask if a CCU was part of a larger cardiac ward. Where CCU was part of a medical ward we asked if care was given by nursing staff with specific cardiological expertise, or by nurses without specific cardiac expertise. We have used this distinction here to equate those who were treated in a medical ward with specialised nurses with a present-day cardiac ward, and those cared for on a medical ward by non-specialised nurses with a present day acute general medical ward. This comparison was made for English hospitals excluding tertiary units. The salient differences in 2006 were the greater use of shared beds on high dependency units, (5.7% against 2.4%) and more cardiac care units being part of a larger cardiac facility (11.6% against 8.0%).

**Table 23 Comparison of CCU types between 2000 and 2006**

	2000	2006
None	1	2
Dedicated CCU	158	152
Beds on an ITU	13	5
Beds on a high dependency unit	5	14
Part of a larger cardiology ward	17	24
Part of a general medical ward	9	9
Other	9	1
Total	212	207

### 6.6 Nurse staffing on the cardiac care unit

Hospitals were asked to estimate how often they had to use locum or agency nurses to staff their CCU [3.07]. While this remains a common problem, with 44% having to do this commonly or most of the time, there was some improvement in comparison with 2000. Six hospitals did not respond (and 2 had no CCU).

**Table 24 Use of locum and agency nursing staff in cardiac care units**

	England		Wales		Total	
	n	%	n	%	n	%
Never	22	11	-	-	22	10
Rarely	93	46	8	44	101	46
Commonly	67	33	10	56	77	35
Most of the time	20	10	-	-	20	9
Total	202	100	16	100	220	100

Hospitals were asked if they had difficulties staffing CCU without resort to locum / agency nurses, and were asked to estimate how much of the time this was a problem [3.07]. Six hospitals did not answer this question in 2006 and 5 in 2000. The use of locum / agency staff has fallen since 2000.

**Table 25 Comparison of use of agency / locum staff between 2000 and 2006**

	2000		2006	
	n	%	n	%
Never	16	8	22	11
Rarely	77	37	93	46
Commonly	87	42	67	33
Most of the time	26	13	20	10
Total	206	100	200	100

## 6.7 Facilities on the cardiac care unit

**Table 26 Facilities for radiographic screening, telemetry and pressure monitoring on CCU [3.09 – 3.11]**

	England	%	Wales	%	Total	%
Radiographic screening (n =228)	139/209	66	10/18	56	149/227	66
Telemetry (n = 227)	194/209	93	17/18	94	211/227	93
Pressure monitoring (n= 225)	161/207	78	12/17	71	173/224	77

### 6.7.1 Comparison with 2000

**Table 27 Comparison of availability of facilities in 2000 and 2006**

	2000	%	2006	%
Radiographic screening	145/209	69	135/205	66
Telemetry	144/209	69	191/205	93
Pressure monitoring	165/209	79	158/204	77

Whilst availability of radiographic screening and pressure monitoring are almost unchanged, there has been a 24% increase in availability of cardiographic telemetry.

## 6.8 Ward rounds on the cardiac care unit

The majority of cardiac care units had a daily ward round performed by a cardiologist, either a consultant or in training. This was much less common at weekends in hospitals without interventional facilities. The occurrence of CCU ward rounds is related to the existence of a cardiology rota; where there is a full 24/7 rota 75/79 (95%) hospitals had a week day ward round, and 64/78 (82%) at weekends, compared with 93/118 (79%) on week days and 7/113 (6%) at weekends in hospitals without a cardiology rota.

**Table 28 Daily ward rounds on CCU**

	England		Wales		Total	
	n	%	n	%	n	%
Angiography only	69/75	92	6/7	86	75/83	90
Interventional facilities	59/62	95	2/2	100	60/64	94
Neither	55/71	77.5	5/9	56	56/75	75
Total	183/208	88	13/18	72	196/226	87

Two hospitals did not respond.

**Table 29 Weekend ward rounds on CCU**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Angiography only</b>	19/74	23	1/6	17	20/80	25
<b>Interventional facilities</b>	47/61	77	2/2	100	49/63	78
<b>Neither</b>	13/69	19	0/9	0	13/78	17
<b>Total</b>	79/204	39	3/17	18	82/221	37

Seven hospitals did not respond

### 6.8.1 Comparison with 2000

In 2000 62/212 (29%) English hospitals had a daily (weekends were not examined) ward round on CCU. In 2006 this was 180/204 (88%). Four hospitals did not respond in 2006.

## 6.9 Use of biomarkers to determine presence of myocardial necrosis

Hospitals were asked about use of markers of myocardial necrosis [8.01]. The majority of hospitals routinely used either a single assay (101/218, 46%), or 2 (96/218, 44%) assays. Only one hospital did not use a troponin assay. Six hospitals did not respond. Tertiary hospitals were excluded.

**Table 30 Use of markers of cardiac necrosis**

	Assay	n
<b>One assay</b>	CK	1
	Troponin I near patient	1
	Troponin I laboratory assay	46
	Troponin T laboratory assay	53
		<b>101</b>
<b>Two assays</b>	Troponin I near patient, other assay	4
	Troponin T near patient, other assay	10
	Troponin I (lab), Creatine kinase	34
	Troponin T (lab), Creatine kinase	38
		<b>86</b>
<b>Three assays</b>	Multiple combinations	<b>25</b>
<b>Four assays</b>	Multiple combinations	<b>6</b>

**Table 31 Use of individual assays**

	Alone	Combination
<b>Troponin T near patient</b>	-	20
<b>Troponin I near patient</b>	1	11
<b>Troponin T lab assay</b>	53	63
<b>Troponin I lab assay</b>	46	102
<b>Creatine kinase (CK)</b>	1	105
<b>Creatine kinase MB</b>	-	24
<b>Creatine kinase MB mass</b>		9
<b>Other</b>	-	8

Where an assay is used in combination, this may be with any other of the assays listed.

Two hospitals also used myoglobin as part of a chest pain assessment strategy, aspartate transaminase was used by 6 hospitals and in one hospital lactate dehydrogenase remained in use.

In 52/221 (53%) hospitals troponin assay was not available throughout the 24 h period, although 16/52 (31%) of these hospitals had access to near patient testing with either troponin T or I assay.

Three hospitals did not respond. In 10/223 hospitals (5%) use of troponin assay was restricted for patients with ST elevation infarction.

### 6.9.1 Comparison with 2000

The main change has been the introduction of troponin assays, predominantly by laboratory assay, and the reduction in use or withdrawal of enzyme tests lacking cardiac specificity. The use of near patient testing has not altered since 2000.

**Table 32 Use of markers of myocardial necrosis, comparison between 2000 and 2006**

	2000		2006	
	Number of hospitals n = 209		Number of hospitals n = 206	
	n	%	n	%
<b>Troponin near patient</b>	34	16	32	15
<b>Troponin lab assay</b>	72	34	190	92
<b>Creatine kinase</b>	193	92	103	50
<b>Creatine kinase MB</b>	127	61	23	11
<b>Creatine kinase MB mass</b>	18	9	8	4
<b>Aspartate transaminase</b>	138	66	6	3
<b>Lactate dehydrogenase</b>	116	55	1	0.5
<b>Myoglobin</b>	10	5	2	1

## 6.10 Care for older people on the cardiac care unit

No hospital reported an age cut off point for admission to CCU. In 12/223 (5.5%) hospitals, one of which was in Wales, there were separate on-call arrangements for older patients, meaning that they came under the care of geriatricians rather than general medical teams. The cut off age was most commonly 75 years in 7 hospitals or 80 years in 3 hospitals.

The majority of older patients 207/213 (97%) in England and Wales were admitted to existing facilities such as CCU or cardiac beds. In 6 (3%), English hospitals different arrangements were made for older patients. Eleven hospitals did not provide data.

Follow up arrangements described for older patients show that in a minority of hospitals older patients are followed up by geriatricians, and that this is commoner in Wales. Table 33.

**Table 33 Separate follow up arrangements for older patients**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Separate follow up arrangements for older patients after ACS</b>	23/201	16	4/16	25	27/217	12.5

## **7. Specialist nursing staff**

Hospitals were asked about numbers of specialist nursing staff. The duties associated with these posts were often not limited to a single role, and the number of nurses involved in each activity may represent an overestimate of the total number of nurses involved. Only 5/228 hospitals, all in England, reported that they did not have any specialist cardiac nurses.

### **7.1 Thrombolysis nurses**

At the time that thrombolytic treatment moved from CCU into the A&E department (for the majority of hospitals) there was an initiative to train nurses to administer thrombolytic treatment independently of medical involvement under a Patient Group Directive. There were thrombolysis nurses in 84 hospitals, and a total of 283 posts. The median number of nurses, where employed, was 2 (IQR 1, 4). However there were a small number of hospitals where a much larger number of nurses had received training in order to be able to provide thrombolytic treatment autonomously. Two hospitals had 10, 4 had 11, and one hospital confirmed that 22 nurses had received training.

### **7.2 Acute coronary syndrome nurses**

Although roles vary between different hospitals, ACS nurses generally have a wider role than thrombolysis nurses and often are involved in supporting the identification and care of patients presenting with acute coronary syndromes, not all of whom are admitted to a CCU or a cardiac ward. For some the role involves the first stage of coronary rehabilitation. We identified 109 posts in 60 hospitals.

### **7.3 Heart failure nurses**

Heart failure nurses have a role which may have a predominantly community based rather than a hospital or outpatient based role. Nevertheless, they are included here. Nurses having a pure community based role will not have been reported. Heart failure nurses were reported in 151 hospitals, where there were 266 posts.

### **7.4 Rapid access chest pain clinic nurses**

This is essentially an outpatient role in many hospitals, although some have involvement with acute chest pain units. There may be some overlap between these nurses and those designated as acute coronary syndrome nurses. Chest pain nurses were reported in 114 hospitals, where there were 146 posts.

### **7.5 Other cardiac nurses**

Hospitals were asked to list other nurses involved in acute care of coronary disease. Thirty-three hospitals reported 71 additional posts of which the commonest were cardiac nurse practitioners, cardiac nurse consultants, and revascularisation nurses involved in aspects of coronary interventional work.

## 8. Assessment of patients with suspected myocardial infarction

This section examines the assessment and immediate care of patients with admitted with suspected myocardial infarction. Although tertiary hospitals are playing an increasing role in direct provision of primary angioplasty these were excluded from analysis.

Demonstration of the presence of ST segment elevation changes on the cardiograph is the first step in triage of a potential candidate for reperfusion treatment. The majority of ambulance Trusts now perform 12 lead electrocardiographs in the ambulance on patients with suspected myocardial infarction. In some areas, such as that covered by the London Ambulance Service (LAS), patients who are recognised by paramedics to have ST segment elevation are now taken direct to an angioplasty centre, bypassing the local hospital. In other areas where ST segment elevation infarction is diagnosed by the paramedic crew local arrangements will determine if the patient is taken first to a local hospital for further assessment before onwards transfer. 35/110 (32%) hospitals reported that they might be bypassed in this way. The numbers responding (110) reinforced the view that many more hospitals have access to an ‘occasional’ primary angioplasty service than those (42) who considered that they had access to a routine service.

Hospitals were asked ‘When a patient presents with ST segment elevation infarction who makes the assessment concerning suitability for angioplasty?’ [5.02] It was assumed that a cardiologist would see and assess a patient’s suitability for primary angioplasty in hospitals where it was performed, and responses to this question were only analysed for those hospitals who had routine access to primary angioplasty by transfer to an interventional centre. Forty-two hospitals had routine access to primary angioplasty. In 9 (22%) the admitting medical on-call team made the assessment, in 9 (22%) a cardiologist, and for the majority, 23 (56%) a member of the A&E team made the assessment. One hospital did not respond.

### 8.1 Pre-hospital thrombolytic treatment

The use of pre-hospital thrombolytic treatment is increasing. In 2006 almost 3000 patients had reperfusion treatment with thrombolytic drugs initiated by ambulance paramedics, and most 165/224 (74%) hospitals reported that they were likely to receive patients for whom thrombolytic treatment and heparin had already been initiated.

Hospitals were asked ‘Where are patients arriving in hospital with suspected myocardial infarction seen and assessed?’ [4.01] This question applied to all acute coronary syndromes. Two hospitals did not respond.

**Table 34 Where patients with suspected infarction are assessed**

	England		Wales		Total	
	n	%	n	%	n	%
A&E	127	62	10	56	137	62
CCU	14	7	-	-	14	6
A&E or CCU	53	26	6	33	59	27
Medical assessment unit	6	3	1	5.5	7	3
Acute chest pain unit	4	2	1	5.5	5	2
<b>Total</b>	<b>206</b>	<b>100</b>	<b>16</b>	<b>100</b>	<b>222</b>	<b>100</b>

We did not include an option for patients admitted directly to the catheter laboratory having had ST elevation infarction diagnosed prior to admission by a paramedic ambulance crew. This is likely to become common practice in interventional hospitals in the future.

#### 8.1.1 Comparison with 2000

The number of hospitals in which CCU was used to assess patients with suspected infarction has fallen since 2000. In 2000 patients were admitted directly to CCU after either GP referral or 999 emergency call in 100/201 (48%) hospitals. We allowed some equivocation in 2006 with the response 'A&E or CCU' for hospitals where both were used equally. In 2006 67/204 (33%) continue to use CCU for initial assessment of some or all patients with suspected myocardial infarction.

## 9. Treatment strategies for patients with ST elevation myocardial infarction

Although primary angioplasty is increasingly the preferred reperfusion strategy, amounting to about 15% of all reperfusion treatment in 2006, treatment with thrombolytic agents remains the most commonly available strategy. Although pre-hospital treatment is now widespread the survey did not ask questions about this. Analyses exclude tertiary hospitals.

### 9.1 Reperfusion treatment with thrombolytic drugs

Hospitals were asked ‘Where is thrombolytic treatment given for the majority of patients?’ [4.02]

**Table 35 Place where the majority of in hospital thrombolytic treatment is given**

	England		Wales		Total	
	n	%	n	%	n	%
<b>A&amp;E</b>	154	76	10	56	164	74
<b>CCU</b>	42	21	8	44	50	22.5
<b>Medical admission unit</b>	3	1.5	-	-	3	1.5
<b>Medical ward</b>	1	0.5	-	-	1	0.5
<b>Acute chest pain unit</b>	3	1.5	-	-	3	1.5
<b>Total</b>	205	100	16	100	221	100

Table 35 includes those hospitals where the preferred reperfusion strategy was primary angioplasty, and where thrombolytic treatment was only given to a minority. However 3 hospitals mainly using primary angioplasty did not respond. In England, and to a lesser extent in Wales, thrombolytic treatment is given to the majority in A&E departments.

#### 9.1.1 Comparison with 2000

In 2000 the use of A&E for thrombolytic treatment was not well advanced. In 62/205 (31%) hospitals thrombolytic treatment was not given in A&E. Where thrombolytic treatment was given in A&E more than half of hospitals 120/209, (57%) estimated that less than 10% of thrombolytic treatment took place there. In 2006, 154/203 (76%) hospitals gave the majority of thrombolytic treatment in A&E, and 42/203 (21%) mainly used CCU.

### 9.2 Thrombolytic therapy - agents used

The majority of hospitals use one or two agents, 12 hospitals use 3 agents and 1 hospital reported using all 4 available agents. Streptokinase is used in 124 hospitals along with a clot specific agent. Only 1 hospital used Streptokinase alone [4.03]. Of the clot specific agents Tenecteplase was used most widely, in 141 hospitals, and was used in 66 hospitals as the single agent. In 42/224 (19%) hospitals the choice of lytic agent was limited by cost.

#### 9.2.1 Comparison with 2000

In 2000 Streptokinase was used for 169/207 (82%) of first infarctions, and 124/209 (59%) reported that the choice of agent was limited by cost, compared with 19% in 2006.

### 9.3 Reperfusion treatment using primary angioplasty

#### 9.3.1 Access to primary angioplasty

Hospitals were asked ‘Is primary angioplasty routinely available for patients with ST elevation infarction?’ [5.01] Explanatory notes stated that this implied that a referring clinician would expect to achieve immediate transfer of patients with ST elevation infarction during times of the day when this service was provided by the interventional centre.

**Table 36 Access to primary angioplasty for ST elevation infarction, as defined in text**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Not available</b>	134	64	15	83	149	66.5
<b>Available on site</b>	35*	16.5	2	11	37	16
<b>Transfer to interventional centre</b>	41	19.5	1	6	42	18.5
<b>Total</b>	210	100	18	100	228	100

\*Including 4 tertiary hospitals

#### 9.3.2 Availability of primary angioplasty

Hospitals that had access to a routine primary angioplasty service, as opposed to an occasional service were asked about any limitations of access to the service provided. The census date for these data was 1<sup>st</sup> July 2006. By the time of publication more primary angioplasty capacity will have come on stream [5.03].

**Table 37 Access to primary angioplasty**

	24 hour service	Normal lab hours	Extended lab hours	Limited service	Total
<b>On-site</b>	18	10	5	1	34
<b>By transfer</b>	31	7	2	1	41
<b>Total</b>	48	17	7	2	75

Four hospitals did not respond

In 18 of 36, (50%) interventional centres a primary angioplasty service was only available during weekdays.

#### 9.3.3 Distance to the interventional centre

For 38 hospitals sending patients to an interventional centre the median distance was 8 miles (IQR 4.5, 16.25 miles). A small number of hospitals were significantly further from their interventional centre; 25, 30, 40, and 100 miles. Four hospitals did not respond.

### 9.4 Care for patients with ST elevation infarction who do not have primary angioplasty

#### 9.4.1 Care immediately after admission

After assessment and stabilisation (predominantly in A&E, see table 35), on-call physicians had immediate care for patients with ST elevation infarction in the majority of hospitals. Cardiologists are less likely to take over the immediate care of patients with ST elevation infarction in Wales. However, overall more than 1/3 are transferred to, or are admitted directly under the care of cardiologists [5.08]. Two hospitals performing primary angioplasty almost exclusively did not respond.

**Table 38 Immediate care for patients with ST elevation infarction not having primary angioplasty**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Admitting physician</b>	109	53	14	78	123	55
<b>Routine transfer to a cardiologist</b>	78	38	2	11	80	36
<b>Transfer for some patients</b>	17	9	2	11	19	9
<b>Total</b>	204	100	18	100	222	100

#### 9.4.2 Arrangements for transfer of patients to cardiology

In many hospitals there is a policy of transfer of patients to cardiologists during the first 24 h after admission. Hospitals where immediate care was under the admitting physician were asked 'Is care subsequently (after 24 h or a post take ward round) transferred to a cardiologist?' [5.09] For those 123 hospitals (see table 38), table 40 examines how many patients were subsequently transferred to a cardiologist at the time of the post on-take ward round or within 24 h of admission.

**Table 39 Transfer of patients with STE infarction to cardiology within first 24 h of admission**

	England		Wales		Total	
	n	%	n	%	n	%
<b>None</b>	20	18.5	5	36	27	20
<b>All</b>	46	42	7	50	53	43
<b>Some</b>	43	39	2	8	43	37
<b>Total</b>	109	100	14	100	123	100

In addition to 80 hospitals where patients are admitted directly under a cardiologist (table 38), patients in another 53 hospitals are transferred during the first 24 h. Thus in 133/222 (60%) hospitals patients with ST elevation infarction come under the care of a cardiologist at some stage during the admission, while in 27/223 (12%) hospitals care remains with the admitting physician. For the remaining 62 (28%) hospitals, there is a mixed pattern with transfer restricted to a proportion of patients. In 11 (9%) English and Welsh hospitals care was transferred back to the admitting physician from a cardiologist after transfer out of CCU.

#### 9.4.3 Comparison with 2000

In 2000 care for infarction was provided by a cardiologist, either immediately or during the first 24 h, in 86/210 (41%) of hospitals. In 2006, based as closely as possible on the same criteria, this figure was 124/204 (61%).

### 9.5 Follow up arrangements for patients with ST elevation infarction

#### 9.5.1 Patients not having primary angioplasty [5.17]

In 26 hospitals where patients remained under the care of a non cardiologist throughout, 17/26 (65%) follow up was with the admitting physician, and 8/26 (31%) follow up care was with a cardiologist. In 4 hospitals (2%) it was reported that no follow up occurred. Data were missing for 2 hospitals.

**Table 40 Follow up arrangements for patients with ST elevation infarction not having primary angioplasty**

	England		Wales		Total	
	n	%	n	%	n	%
<b>No follow up</b>	4	2	-	-	4	2
<b>FU with admitting physician</b>	32	16	9	50	41	18
<b>FU with cardiologist</b>	169	82	9	50	177	80
<b>Total</b>	205	100	18	100	223	100

### 9.5.2 Comparison with 2000

In 2000 all care for patients with ST elevation myocardial infarction, both as an inpatient and at follow up, remained with the non cardiologist in 34/210 (16%) hospitals. In 2006 this had fallen to 17/205 (8%). In 2000 routine follow up by a cardiologist was arranged in 73/210, (35%) hospitals, and in 2006, for patients not having primary angioplasty this now occurs in 169/205, (82%) hospitals.

### 9.5.3 Patients having primary angioplasty [5.19]

The arrangements for follow up of patients having primary angioplasty was examined for all hospitals who responded (n=211). This number of hospitals is greater than the number having a 'routine' angioplasty service (75), and thus reflects the follow up arrangements for the occasional primary angioplasty as well as the established services.

**Table 41 Follow up for patients having primary angioplasty**

	England		Wales		Total	
	n	%	n	%	n	%
<b>No follow up</b>	2	1	-	-	2	1
<b>Local non cardiologist</b>	4	2	1	8	5	2.5
<b>Local cardiologist</b>	148	76.5	10	62.5	158	75
<b>Interventional cardiologist</b>	40	20.5	5	31	45	21.5
<b>Total</b>	194	100	16	100	210	100

The place of follow up will reflect to some degree the distance between the local hospital and the interventional centre.

## 10. Care for patients with non ST elevation infarction

Hospitals were asked about the care of non ST elevation infarction separately from ST elevation infarction. In 2000 no distinction was made. Tertiary hospitals were excluded.

While the majority of patients with ST elevation infarction are cared for on a CCU, less than 50% patients with non ST elevation infarction are cared for on CCU or in a cardiac ward (MINAP data). In view of the different level of care that may exist between a specialised cardiac ward or CCU, and a general medical facility, the questions about care for non ST elevation infarction were divided into care on CCU and care elsewhere.

### 10.1. Care for non ST elevation infarction on CCU

Hospitals were asked ‘Who has care for patients with non ST elevation infarction if admitted to CCU?’ [5.11]

**Table 42 Care for patients with non ST elevation infarction admitted to CCU**

	England		Wales		Total	
	n	%	n	%	n	%
Admitting physician	97	47	11	61	106	48
Admitting cardiologist	68	33	3	17	69	32
Routine transfer to cardiologist	28	13.5	2	11	29	13.5
Transfer for some	13	6.5	2	11	19	6.5
<b>Total</b>	<b>206</b>	<b>100</b>	<b>18</b>	<b>100</b>	<b>224</b>	<b>100</b>

### 10.2 Care for non ST elevation infarction when not admitted to CCU

Hospitals were asked ‘Who has care after admission if **not** admitted to CCU?’ [5.12] Three hospitals did not respond.

**Table 43 Care for patients with non ST elevation infarction not admitted to a CCU**

	England		Wales		Total	
	n	%	n	%	n	%
Admitting physician	137	67	14	82.5	151	68
Admitting cardiologist	10	5	-	-	10	5
Routine transfer to cardiologist	15	7.5	-	-	15	7
Transfer for some	42	21	3	20	45	20
<b>Total</b>	<b>206</b>	<b>100</b>	<b>17</b>	<b>100</b>	<b>221</b>	<b>100</b>

It is clear that patients admitted to CCU were also more likely to be cared for by a cardiologist. Where care was given in a CCU 45.5% routinely came under the care of a cardiologist, while if care was not given on a CCU only 12% were routinely cared for by a cardiologist.

### 10.3 Contact with cardiologists for patients not admitted to CCU

Hospitals were asked, [5.14] for patients not admitted to CCU who had an acute coronary syndrome, if they would be seen by a cardiologist (of any seniority) if not specifically requested.

The data (table 44) indicate that where a patient was admitted, and remained, under the care of a non cardiologist, the majority 128/151 (85%) did not have any cardiac review during the admission.

**Table 44 Expectation of patients with non ST elevation infarction (not already under the care of a cardiologist) seeing a cardiologist**

	England		Wales		Total	
	n	%	n	%	n	%
Expectation for patients with non STEMI, not on CCU, to be seen by a cardiology team member	22/137	16	1/14	7	23/151	15

#### **10.4 Follow up arrangements for patients with non ST elevation infarction**

In the majority of hospitals patients with non ST elevation infarction were followed up by cardiologists.

**Table 45 Follow up arrangements for non ST elevation infarction [5.18]**

	England		Wales		Total	
	n	%	n	%	n	%
No follow up	2	1	-	-	2	1
FU with admitting physician	71	34.5	10	62.5	81	37
FU with cardiologist	132	64.5	8	37.5	140	62
<b>Total</b>	205	100	18	100	223	100

## 11. Access to angiography and intervention following myocardial infarction

### 11.1 Availability of facilities

Hospitals were asked about availability of on-site angiographic and coronary interventional facilities [6.01-2].

**Table 2 (copy) Availability of angiographic and cardiac interventional facilities**

	England		Wales		Total	
	n	%	n	%	n	%
Angiography alone	75	35.5	7	39	82	36
Coronary intervention	62	29.5	2	11	64	28
Neither	73	35	98	50	82	36
<b>Total</b>	212	100	16	100	228	100

### 11.2 Delay to angiography for non ST elevation infarctions

Hospitals accepting emergency admissions were asked to estimate ‘Of patients admitted with non ST elevation infarction for whom angiography and intervention was considered appropriate, what percentage of patients would receive that procedure within 72 h of admission?’ [7.05]. Four hospitals did not respond.

**Table 46 Timing of access to angiography following non ST elevation infarction**

	England		Wales		Total	
	n	%	n	%	n	%
More than 75%	39	19	4	23.5	43	19.5
50 – 75%	30	15	-	-	3	13.5
25 – 49%	45	22	-	-	45	20.5
Less than 25%	72	35.5	9	53	81	37
Not known	17	8.5	4	23.5	21	9.5
<b>Total</b>	203	100	17	100	220	100

Angiography as a means of determining the site and severity of coronary vascular lesions is recommended for patients with non ST elevation infarctions<sup>3</sup>. In only about 1/3 hospitals more than 50% patients with non ST elevation infarction can expect to have angiography within 72 h of admission (table 46). This varies with the type of hospital, (table 47).

**Table 47 Timing of access to angiography and intervention in relation to availability of facilities**

	None		Angiography only		Interventional facilities		Total	
	n	%	n	%	n	%	n	%
More than 75%	8	10	16	20	19	33	43	19.5
50 – 75%	7	8.5	7	8.5	16	27.5	30	13.5
25 – 49%	21	26	15	18.5	9	15.5	45	20.5
Less than 25%	37	46	34	42	10	17	81	37
Not stated	8	10	9	11	4	7	21	9.5
<b>Total</b>	81	100	81	100	62	100	219	100

<sup>3</sup> The task force on the management of Acute Coronary Syndromes of the European Society of Cardiology. Management of Acute Coronary Syndromes in patients presenting without persistent ST-segment elevation. European Heart Journal 2002;23:1809-1840.

It is clear that admission to a hospital with interventional facilities confers an advantage. 35/62 (60%) of hospitals with interventional facilities reported that they were able to perform angiography and intervention within 72 h for more than 50% of eligible patients, compared with 15/81 (18 %) where there were no angiographic facilities, and 23/81 (28 %) where angiographic facilities existed, (table 47). Delays to transferring patients for angiography and intervention from hospitals without on-site facilities are well recognised. A recent (2006) audit of delays has, however, demonstrated some improvement in delay from a median of 9 days in 2004 to 6 days in 2005. The authors stressed the need for further improvement<sup>4</sup>.

### 11.3 Use of angiographic facilities following acute coronary syndromes

Hospitals without interventional facilities were asked whether diagnostic angiography was performed on patients admitted with acute coronary syndromes [6.03]. The question was specifically intended to establish if a policy of local angiography was being used as a means of filtering out patients who would not require an intervention performed in another hospital, and was not intended as a more general question about angiographic policy after acute coronary syndrome. However it was answered by all hospitals with angiography facilities, and by 80/82 of hospitals without angiography facilities. In addition 29/64 interventional hospitals responded (who were requested to ignore this question). The extent to which angiography is performed by hospitals is clearly related to the facilities available.

**Table 48 Angiography following acute coronary syndromes**

	Facilities on site							
	Angiography		Interventional facilities		None		Total	
	n	%	n	%	n	%		%
<b>No angiography</b>	10	12	-	-	43	54	53	27.5
<b>Routine angiography</b>	40	49	25	86	15	19	80	42
<b>Angiography for some</b>	32	39	4	14	22	27	58	30.5
<b>Total</b>	82	100	29	100	80	100	191	100

Although a policy of angiography in a hospital with angiographic facilities followed by intervention elsewhere may appear inefficient, this may be preferable to patients waiting for transfer for lengthy periods in non-interventional hospitals, and was adopted by about one half of the hospitals. Routine angiography implies a policy to perform angiography on all (eligible) patients admitted with troponin positive ACS before referral for intervention. The extent to which the policy was achieved in practice is not known.

### 11.4 Interventional work performed by consultants in hospitals other than their own

Consultants in hospitals that only have angiographic facilities may also perform coronary interventional work in other hospitals. The interventional hospitals may or may not be part of the Trust in which the consultant works. In 45/80, (56%) hospitals with angiographic facilities cardiologists had interventional sessions in another hospital. Two hospitals did not respond.

### 11.5 Provision of coronary interventional services to other hospitals

Hospitals where interventional work was done were asked whether they provided coronary interventional services for other hospitals. These might be within, or outside of the hospital Trust [6.05].

<sup>4</sup> [http://www.heart.nhs.uk/scripts/default.asp?site\\_id=23&id=28116](http://www.heart.nhs.uk/scripts/default.asp?site_id=23&id=28116). Accessed 16/05/2007

**Table 49 Provision of interventional services to other hospitals**

	England		Wales		Total	
	n	%	n	%	n	%
Hospitals providing interventional services for other hospitals	38	62	2	100	40	63
Hospitals not providing a service to other hospitals	23	38	-	-	23	37
<b>Total</b>	61	100	2	100	63	100

One hospital did not respond.

Forty hospitals (2 Welsh) reported that they provided coronary interventional services for a total of 218 other hospitals. The median number of hospitals for which a service was provided was 5 (IQR 3, 8). Two hospitals in Wales provided services to 3 and 7 hospitals. In addition there were 23 hospitals with interventional facilities that did not provide services for other hospitals. The total number (40 + 218) exceeds the total number of hospitals. It is accepted that some hospitals with interventional facilities may also rely on support from more established interventional hospitals, and some hospitals may rely on more than one provider of interventional services.

### 11.6 Provision of primary angioplasty

Hospitals were asked ‘For how many hospitals do you provide primary angioplasty?’ [6.08]. It was stressed in the accompanying advice that the reply should be restricted to provision of a regular service. However, of 37 hospitals performing primary angioplasty 17 only offered an in-house service, while 20 reported providing a service for 67 hospitals, a greater number than the 42 hospitals who reported that they had access to a regular primary angioplasty service. It is likely that some interventional hospitals included all hospitals for which they provided any primary angioplasty service, even if this was on an occasional basis.

### 11.7 Number of doctors covering the primary angioplasty service

Provision of a 24 hour angioplasty service is demanding for all staff involved. Services range from fully mature services providing a 24 hour primary angioplasty service for large numbers to the infrequent or occasional opportunistic service. The overall picture is changing rapidly, and this analysis, based on a census date of 1 July 2006, may already be out of date. Interventional hospitals were asked how many doctors performed primary angioplasty. Thirty-four hospitals had a median of 6 doctors, (IQR 5, 6), range 2 – 22, providing the primary angioplasty rota. Two hospitals did not respond. Nine hospitals reported using a total of 54 doctors from other hospitals who supported the rota. No contemporary data are available on volumes of procedures from this analysis.

### 11.8 Comparison with 2000

In 2000 35 hospitals in England were performing some coronary interventional work compared with 62 in 2006, with another 11 in the planning stage of development. Primary angioplasty was performed in 24 of 35 interventional hospitals in 2000, but of this number only 11 made the service available to other hospitals. A routine primary angioplasty service was provided, at the time of the census by 20 English hospitals.

## 12. Angiographic and interventional policies

### 12.1 Angiographic policy for ST elevation infarction

Hospitals were asked if there was a policy agreed between clinicians for angiography following ST elevation infarction [7.01 & 7.02]. The advice in the questionnaire stressed that by reporting that where there was no policy it was understood that each clinician, whether cardiologist or not, made clinical decisions on a need for angiography on an *ad hoc* basis.

Responses were categorised into routine angiography for the majority, angiography after formal assessment of risk, angiography only for continuing symptoms, and no agreed policy [7.02]. Six hospitals performing routine primary angioplasty and 4 tertiary hospitals were excluded.

**Table 50 Policy for angiography and intervention following ST elevation infarction**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Routine for the majority</b>	75	37	2	13	77	35
<b>After formal assessment of risk</b>	65	32.5	9	53	74	34
<b>For continuing symptoms*</b>	39	19.5	4	20	43	20
<b>No policy</b>	22	11	2	13	24	11
<b>Total</b>	201	100	17	100	218	100

\* and for evidence of failure of reperfusion

### 12.2 Angiographic policy for non ST elevation infarction

Hospitals were asking if there was a policy agreed between clinicians for angiography following non-ST elevation infarction [7.04]. Formal assessment of risk implied the use of a risk score such as TIMI or GRACE.

**Table 51 Policy for angiography and intervention following non STE MI**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Routine for the majority</b>	98	48	4	23.5	102	46
<b>After formal assessment of risk</b>	78	38.5	11	64.5	91	41
<b>For continuing symptoms</b>	11	5	-	-	11	5
<b>No policy</b>	16	8.5	2	12	18	8
<b>Total</b>	205	100	15	100	220	100

193/220 (87%) hospitals reported that angiography following non ST elevation infarction was either routine or followed formal risk score assessment. It was not possible to determine what proportion of patients having non ST elevation infarction had angiography in practice.

#### 12.2.1 Comparison with 2000

In 2000 we did not distinguish between ST elevation and non ST elevation infarction in asking if angiography was performed as a clinical policy following infarction. Only 7.3% hospitals performed angiography as a policy in 2000.

### 13. Use of exercise stress testing and measurement of left ventricular function after infarction

#### 13.1 Use of exercise testing after myocardial infarction

Hospitals were asked ‘Is exercise testing a routine part of the evaluation post myocardial infarction?’ [5.15] With the increase in use of angiography and percutaneous intervention following acute coronary syndromes, and the use of scoring systems such as TIMI, GRACE in the evaluation of risk following an acute coronary syndrome, the additional prognostic information provided by exercise testing is limited. The finding that exercise testing is least often performed in hospitals where interventional facilities are available supports this. Hospitals only having angiographic facilities do not necessarily perform angiography on patients admitted with ACS, and are usually more likely to transfer these patients to hospitals with interventional facilities. It is not surprising that these hospitals have a similar use of exercise testing to hospitals without angiography facilities.

**Table 52 Use of exercise testing after infarction in England and Wales**

	England		Wales		Total	
	n	%	n	%	n	%
<b>Exercise testing performed</b>	153/203	75	16/18	89	167/221	76

**Table 53 Use of exercise testing following myocardial infarction**

	Angiography only		Interventional facilities		None		Total	
	n	%	n	%	n	%	n	%
<b>Exercise testing performed</b>	71/82	87	34/59	57.6	64/80	80	169/221	76

#### 13.1.1 Comparison with 2000

In 2000 200/212 (94%) hospitals reported that exercise testing, either before or after discharge, was routine following myocardial infarction, compared with the present figure for English hospitals of 153/203 (75%).

#### 13.2 Assessment of left ventricular function after myocardial infarction

Hospitals were asked if assessment of left ventricular function was performed as a routine following ST elevation infarction [5.16]. It was specified that this might be by any technique, including angiography.

**Table 54 Assessment of left ventricular function (by any technique)**

Facilities on site	Angiography only		Interventional facilities		None		Total	
	n	%	n	%	n	%	n	%
<b>Assessment of LV function performed</b>	69/82	84	49/60	78	61/81	75	177/223	79

**Table 55 Assessment of left ventricular function after infarction in England and Wales**

	England		Wales		Total	
	n	%	n	%	n	%
Assessment of LV function performed	160/205	78	17/18	94	177/223	79

### 13.2.1 Comparison with 2000

In 2000 hospitals were asked if there was routine inpatient assessment of left ventricular function *using echocardiography* and in a separate question there were asked about use of radionuclide imaging for the same purpose. In total 76/210 (36%) reported that assessment of LV function was performed by one or the other technique. In 2006 we did not specify individual techniques, accepting that while echocardiography might remain the commonest, radionuclide, and magnetic resonance techniques were also available. Overall 160/205, (78%) English hospitals reported that left ventricular function was assessed before discharge, a twofold increase. One hospital did not respond.

## 14. Rehabilitation services

Two hospitals reported that rehabilitation was entirely community based and that they did not have any staff within the hospital, although it was not clear if this implied that the initial stages of rehabilitation were not provided from within the hospital. In practice ward nursing staff, and others such as acute coronary syndromes nurses, none of whom are counted as rehabilitation staff, may in practice start the rehabilitation process before discharge. In addition rehabilitation is increasingly shared between the community and the hospital, with the implication that rehabilitation services are more extensive than is indicated here. Rehabilitation services now cover a wider spectrum of patients including patients having elective cardiac surgery, and percutaneous interventions, and the workload, no longer limited to patients having acute coronary syndromes, is accordingly greater.

The median number of rehabilitation staff was 3 (IQR 2, 5) and there were a total of 659 posts.

### 14.1 Numbers of rehabilitation staff

**Table 56 Distribution of rehabilitation staff numbers in hospitals in England and Wales**

Number of staff	England		Wales		Total	
	n	%	n	%	n	%
< 1	16	8	-	-	16	7
1 – 1.99	53	26	3	17	56	25.5
2 – 2.99	49	24	4	22	53	24
3 – 3.99	37	18	3	17	40	18
4 – 4.99	23	11	2	11	25	11.5
5 or more	25	12	6	33	31	14
	203	100	18	100	221	100

Three hospitals did not respond

The numbers of rehabilitation staff were generally greater in Welsh hospitals. One third of Welsh hospitals had 5 or more members of staff, compared with 12% of English hospitals.

### 14.2. Funding for rehabilitation

Thirty-two hospitals reported that some staff were paid for with soft money, and for the 27 who reported the source, or part source of the funding, this came from local charities or other local sources of support for 9, the British Heart Foundation for 15 and the pharmaceutical industry for 3.

Where the value of external funding was indicated in relation to the total cost of the rehabilitation programme, this was less than 20% for 10/26 (38%), and between 20 and 40% for 10/26 (38%). For 3 (11%) the funding was between 40 – 60%, and for 3 (11%) it was greater than 60%.

### 14.3 Other staff disciplines supporting the rehabilitation service

All hospitals were asked if their rehabilitation service had access to the categories of staff listed in table 57 in addition to the rehabilitation staff recorded above. Responses were received from 221 hospitals. Hospitals reported 110 different combinations of staffing arrangements, in addition to the nursing staff already recorded, of which a combination of physiotherapist and dietician in 12 (5%),

and physiotherapist, dietician, social worker, doctor and occupational therapy in 10 (4%) were commonest.

Hospitals were asked if the rehabilitation team saw all patients with acute coronary syndromes before discharge. This occurred in 105/219 (48%) hospitals. Five hospitals did not respond.

**Table 57 Frequency of types of staff involved in cardiac rehabilitation**

	n	%
Dietician	180	78
Physiotherapist	157	68
Doctor	131	57
Cardiac liaison nurse	97	42
Social worker	78	33
Exercise physiologist	77	33
Clinical psychologist	72	31
Counsellor	46	20
Occupational therapist	46	20

The percentage is the percentage of hospitals having access to each group for rehabilitation.

### 14.3.1 Comparison with 2000

**Table 58 Numbers of rehabilitation staff in 2000 and 2006**

Number of staff	2000		2006	
	n	%	n	%
Nil	24	11.5	1	.5
< 1	22	11	14	7
1 – 1.9	92	44	55	27
2 – 2.9	39	19	48	24
3 – 3.9	16	7.5	37	18.5
> 4	14	7	47	23
	207	100	202	100

In English hospitals (not tertiary) the number of whole time equivalents (WTE) of rehabilitation staff has increased by 69% from 343 to 572 WTE. The numbers funded on soft money has fallen from 52.5 in 2000 to 26.5 in 2006. Staff from several other disciplines that collaborate in the rehabilitation process can be compared, but the numbers of whole time equivalents used was not assessed in 2006. The change in absolute numbers, with an increase in numbers of exercise physiologists and a substantial fall in numbers of occupational therapists involved in the process probably reflects changing priorities in rehabilitation, and has to be considered in the context of the very substantial increase on overall numbers of nursing staff involved in the process.

Hospitals were asked if links had been established between hospital and community based leisure facilities to support coronary rehabilitation. 209/219 (95%) had established such links compared to 153/208, (74%) in 2000.

**Table 59 Changes in numbers of specialist staff 2000 - 2006**

	2000	2006	Change %
Physiotherapy	163	141	- 12%
Dietician	152	165	+ 9%
Clinical psychology	56	68	+21%
Exercise physiologist	40	74	+ 87%
Clinical liaison nurse	95	88	- 7%
Occupational therapy	80	40	- 49%

## 15. Survey questionnaire

### Section 1 Your hospital

1.01 Name of cardiology main contact:

1.02 Email address:

1.03 Hospital:

1.04 Trust:

1.05 Cardiac network

#### Hospital type

1.06 Type of hospital:

1. Hospital with 24 h A&E taking acute unselected emergencies
2. Hospital with A&E department open less than 24 h. day
3. Hospital without A&E department receiving patients with ACS from emergency service, GPs or from other hospitals
4. Hospital only receiving emergency patients from another hospital

If 4. complete Section 2 (staffing) and questions 6.05 - 6.11

#### Hospital catchment population

1.07 Catchment population for acute admissions (not tertiary referrals) for Jan - Dec 2005: If you do not have an accurate figure we will find this for you.

1.08 If your hospital is part of a trust, do other hospitals within the trust also accept acute unselected admissions? Ignore if you are a single hospital trust.

0. No
1. Yes

1.09 If answer to 1.08 is yes, please list the hospitals This implies that acute coronary syndromes are admitted as emergencies to all sites.

### Section 2 Medical staffing

2.01 What is your complement of consultant cardiologists? Cardiologist is defined as an individual with specific training and having specific cardiological responsibilities within the hospital. This includes full time cardiologists and "physicians with an interest". Means having the number agreed and funded by your Trust at 01/07/2006. Include academics if involved in on-call rotas.

2.02 Are any funded posts unfilled? ie. empty or filled by locums.

0. No
1. Yes

2.03 How long have you not had a full complement of consultant staff? In months. If none, enter 0. Posts must be funded.

2.04 Is there a consultant cardiology rota?

0. No rota - an on-call rota for acute cardiac conditions (may include the pPCI rota).
1. 24/7 cover
2. Less than 24/7 - where cardiologist is on call for less than 24 hours, with non cardiologists covering rest of time.

2.05 What is the frequency of the rota?

- 1 in x

2.06 How many cardiologists cover this rota? - number of consultant cardiologists, including academics making up the rota.

2.07 Do any cardiologists do acute general medical on-call?

0. No
1. Yes

2.08 How many cardiologists do acute general medical on-call? If none enter 0.No.

2.09 Do any cardiologists take part in both rotas? If none enter 0.  
0. No  
1. Yes

2.10 How many do this?

2.11 How many cardiology SpRs do you have? Give number of registrars working in your hospital at any one time. If less than full time, give proportion of time with you, eg 0.25. If the number varies through the year please give mean.

2.12 Do you have any other medical staff dedicated to cardiology?  
Associate specialist            number and number of sessions  
Staff grade                        number and number of sessions  
Clinical assistant                number and number of sessions

### Section 3 In patient facilities

We would like to know about all inpatient beds primarily dedicated to use by patients with acute coronary syndromes. We recognise that there may be occasions when dedicated beds are used for other patients. Do not include daycase beds.

3.01 How many cardiology beds, apart from CCU beds, do you have? Beds designated for use for cardiological patients. Exclude day case beds. Only include beds open and in use.

3.02 How any cardiology day case beds do you have? Only include beds (cardiology specific) open and in use.

3.03 How often are any of the in patient beds occupied by non cardiology patients? Typically because of medical beds being full elsewhere, or CCU beds used as a quasi HDU.

- 0. Never
- 1. Rarely - less than 8 days per month
- 2. Commonly - 8-21 days per month
- 3. Most of the time - more than 21 days per month

3.04 Can you estimate what percentage of your capacity is occupied by non cardiac patients in a typical month? Leave blank if not possible to estimate.

#### The CCU

CCU is defined as a clinical area having beds which can be monitored from a central console used primarily for patients having acute coronary syndromes.

3.05 What best describes your CCU?

- 1. Stand alone unit - a physically separate unit, not part of a larger ward unit
- 2. Beds shared with intensive care unit
- 3. Beds shared with high dependency unit
- 4. Monitored area which is part of a cardiology ward
- 5. Monitored area part of a general medical ward
- 6. Other, please explain

3.06 How many beds does your CCU have? Where a shared facility give the number of beds typically available for cardiac patients.

3.07 Are there difficulties in staffing your CCU adequately without resorting to bank / locum / agency nurses? Give an estimate for how many days there is need for such staffing in a typical month.

- 0. Never
- 1. Infrequently - less than 8 days per month
- 2. Commonly - 8-21 days per month
- 3. Most of the time - more than 21 days per month

3.08 Do you experience periods when CCU admission is delayed because of lack of beds?

- 0. Never
- 1. Infrequently - less than 8 days per month
- 2. Commonly - 8-21 days per month
- 3. Most of the time - more than 21 days per month

3.09 Is there immediate access to radiographic screening facilities on CCU (or dedicated facility immediately and conveniently adjacent)?

- 0. No
- 1. Yes

3.10 Are there facilities for telemetry on CCU or in other cardiac beds?

- 0. No
- 1. Yes

3.11 Are pressure monitoring facilities immediately available on CCU (Swan Ganz or arterial pressure monitoring).

- 0. No
- 1. Yes

3.12 Is there an official age related policy for admission to your CCU?

- 0. No
- 1. Yes

3.13 If yes, please age state cut off

3.14 Does a cardiologist, cardiology staff grade physician, associate specialist or cardiology specialist registrar do a regular (ie. daily) ward round on the coronary care unit (CCU) to help with management?

- 0. No
- 1. Yes

3.15 Does this ward round occur at weekends?

- 0. No
- 1. Yes

## **Section 4 Admission arrangements**

4.01 Where are patients arriving at hospital with suspected infarction normally seen and assessed?

- 1. A&E
- 2. CCU - implies direct admission to CCU with no clinical assessment in hospital before arrival.
- 3. Both A&E and CCU - where both may be used
- 4. Medical assessment unit
- 5. Chest pain assessment - a unit specifically used for triage of chest pain

4.02 Where is thrombolytic treatment given for the majority of patients? It is recognised that some hospitals now rarely use this treatment either because of use of PPCI or pre-hospital lysis. Answer for the rare cases!

- 1. A&E department
- 2. CCU
- 3. Medical assessment unit
- 4. Medical ward
- 5. Chest pain assessment unit

4.03 Which thrombolytic agents do you use?

- 1. Streptokinase
- 2. Tenecteplase
- 3. Reteplase
- 4. Actilyse

4.04 Is choice of thrombolytic treatment limited by cost in your hospital?

- 0. No - implies recombinant drugs are freely available to all age groups
- 1. Yes

4.05 If you are part of a pPCI network does the local ambulance service take patients from your area directly to an interventional centre? (Non interventional trusts only)

- 1. Yes - bypassing you completely
- 2. Only after assessment here

4.06 Does your local ambulance service provide pre-hospital thrombolytic treatment?

- 0. No
- 1. Yes - regardless of numbers treated. If you are served by two or more ambulance services and only one provides pre-hospital lysis, answer yes.

## **Section 5 Care of patients with ACS**

We are interested in the care of all patients with ACS regardless of where they are admitted to or under whose care they are admitted, or whether ST elevation or non ST infarction.

There are 3 sections. These deal with

a) process of care of STE MI having pPCI - Where pPCI is the predominant treatment for STEMI

b) process of care of STE MI with thrombolytic treatment

c) care of non STE syndromes. Some of a) or b) may apply to your hospital, and all of c).

If your hospital sends some but not all patients for pPCI, or performs both pPCI and thrombolysis, please complete both the pPCI and thrombolysis sections.

5.01 Is primary angioplasty routinely available for your patients with STEMI?

0. No - routinely implies that you can expect to achieve immediate transfer of patients with STEMI during the times of day when your interventional centre provides the service. If 0. No go to question 5.08.

1. Yes on site - includes facilities within your trust

2. Yes by transfer to interventional centre - includes any hospital outside your own trust to whom you may send patients for primary angioplasty. If 2. Yes, go to question 5.03.

5.02 When a patient with STEMI presents, who makes the assessment concerning suitability for pPCI? (Non interventional trusts only).

1. Admitting team - who having assessed the patient will then approach the interventional centre

2. A cardiologist

3. A&E clinician

5.03 When is pPCI available?

1. 24/7

2. Normal lab hours only - 08.30 - 17.00

3. Extended lab hours - longer than 08.30 - 17.00

4. Limited part time service - opportunistic service when lab not occupied.

5.04 Is availability of pPCI limited to Monday - Friday only?

0. No

1. Yes

5.05 After the procedure, what usually happens to the patient? (Interventional centres only).

1. Patient remains until discharge from interventional centre

2. Patient transferred to another hospital when stable

5.06 How far away is your interventional centre? (Non interventional trusts only)

miles

5.07 Do ambulances bypass your hospital en route to an interventional centre with STEMI patients? (Non interventional trusts only).

0. No - implies all or most patients come to you for assessment (in A&E or remaining in an ambulance) before onward transfer for PCI

1. Yes - implies some patients bypass you, but perhaps not all of them

#### **b Patients with STEMI who do not have pPCI**

5.08 Who has care of patient immediately after admission?

1. Admitting physician - this refers to usual daytime practice following assessment in A&E, or wherever assessment is done in your hospital. Physician might be a cardiologist where cardiologists take part in acute on take rota. There is opportunity at 5.20 to comment on any age related arrangements you may have.

2. Immediate transfer to cardiologist as routine - immediate transfer from (non cardiological) admitting team, or direct from A&E clinician to cardiology for most if not all patients. Immediate is within the first 24 hours but before the post take round.

3. Transfer to cardiology for some patients - usually for complex patients or those needing immediate specialist involvement.

5.09 Is care subsequently (after 24 h. or after post take round) transferred to cardiology?

0. No - patient remains under admitting physician

1. All transferred to cardiologist - as departmental policy

2. For some - complex or needing specialist involvement

5.10 After transfer out of CCU who then cares for the patient?

1. Admitting physician - clinician who admitted patient to hospital

2. Admitting cardiologist - cardiologist who admitted or took over care of patient
3. Transferred from cardiology back to a non cardiologist - transferred from cardiology - in some hospitals all patients on CCU are under care of a cardiologist, and are handed on to a non cardiologist for the rest of the admission.

**c Patients with non STE acute coronary syndromes whether troponin positive or negative**

Who has care immediately after admission?

5.11 a) if admitted to CCU

1. Admitting physician
2. Admitting cardiologist - where there is an on call cardiology rota
3. Immediate transfer to cardiology team as routine
4. Transfer to cardiology for some patients - usually complex patients or needing immediate intervention

5.12 b) if not admitted to CCU

1. Admitting physician
2. Admitting cardiologist - where there is an on call cardiology rota
3. Immediate transfer to cardiology team
4. Transfer to cardiology for some patients - usually complex patients or needing immediate intervention.

5.13 Is care subsequently (after 24 h. or after post take round) transferred to cardiology?

0. No - patient remains under admitting physician
1. All transferred to cardiology
2. For some patients

5.14 Where a patient with non STEMI / troponin -ve ACS is not admitted to CCU, will they be seen by a cardiologist (of any seniority) if not specifically requested?

0. No - where not already under a cardiologist
1. Yes

**Post MI assessment**

5.15 Is exercise stress testing a routine part of the evaluation of your patients following AMI?

0. No - where not contraindicated by co-morbidity. Include investigations booked after discharge. This applies to all infarctions.
1. Yes

5.16 Is assessment of LV function performed as a routine following STEMI?

0. No - include investigations booked after discharge
1. Yes - this may be by echo, isotope study or angio

**Discharge follow up arrangements**

This section examines whether discharged patients receive specialist follow-up.

5.17 Who follows up patients with STEMI

0. No follow up
1. Admitting physician
2. Follow up with cardiologist - Where admitting physician was a cardiologist

5.18 Who follows up patients with non STEMI and troponin -ve ACS?

0. No follow up
1. Admitting physician
2. Follow up with cardiologist - Where admitting physician was a cardiologist

5.19 Who performs follow up if the patient has had pPCI? This question seeks to determine what follow up arrangements are made either at the interventional centre or at the local hospital.

0. No follow up
1. Admitting physician at local hospital - where patient was first seen at a local hospital before transfer.
2. Follow up with cardiologist at interventional centre
3. Follow up with cardiologist at local hospital

**Care for older patients**

5.20 Does your hospital have separate on take arrangements for older patients with ACS?

0. No
1. Yes

5.21 What is the age cut off for patients admitted under physicians for care of the elderly?  
years

5.22 Are they admitted to existing cardiac facilities such as CCU or other cardiac beds?

- 0. No - implies they are admitted to elderly beds
- 1. Yes

5.23 Are elderly patients followed up by non cardiologists as a local policy?

- 0. No - implies all are followed by cardiology
- 1. Yes

5.24 What is the age cut off?

Years

### **Specialist nursing staff**

5.25 How many specialist nurses do you have?

None

Other Nurse (number)

Thrombolysis nurses - includes A&E nurses who might have other additional roles

ACS nurses number

Heart Failure nurses number

Rapid Access Chest Pain nurses number

Rehabilitation nurses number

## **Section 6 Angiographic and interventional facilities**

This section covers all trusts admitting or treating ACS. Use 1 July 2006 as the census date.

6.01 Does your trust have angiographic facilities on site?

- 0. No - implies patients sent to another trust for angiography / intervention
- 1. Shared angiographic facility - shared in X ray with vascular work
- 2. Dedicated facilities
- 3. Visiting truck

6.02 Is coronary interventional work performed in your trust?

- 0. No
- 1. Yes
- 2. No but in planning stage - implies your have at least outline business case approval

6.03 Are diagnostic angios performed on patients admitted with ACS? (Non interventional trusts only).

- 0. No - trusts without interventional facilities to answer
- 1. Yes, routinely - implies routine policy before referral for definitive procedure
- 2. Yes, but not routine - implies occasional performance

6.04 Do any of your cardiologists have interventional sessions at another trust? (Non interventional trusts only).

- 0. No
- 1. Yes
- 2. Yes including a PPCI rota - answer only if consultant is part of a formal pPCI rota

### **6.05 - 6.11 For trusts with interventional facilities**

6.05 Does your trust perform interventional work for other trusts? Any interventional work for transferred in-patients with ACS.

- 0. No
- 1. Yes

6.06 How many hospitals routinely send you cases for PCI? Any interventional work for transferred in-patients with ACS.

6.07 Number of pPCIs performed in Jan - Dec 2005

6.08 For how many trusts (include your own) do you provide pPCI? Count trusts to whom you give a regular rather than "one-off" service.

6.09 How many interventionalists perform pPCI? Number on a rota

6.10 Are they all based in your trust?

- 0. No - implies some on the rota are from other trusts

1. Yes - all based here

6.11 Number performing pPCI who are from other trusts Cardiologists outside your own trust

## Section 7 Angiographic and interventional policy

7.01 Is there an agreed policy for angiography following STEMI? A policy agreed between clinicians, but not necessarily a formal hospital policy. Include both inpatient and early outpatient angiography where booked before discharge.

0. No
1. Yes

7.02 What is the policy for angiography for patients with STEMI?

1. Routine for the majority - patients with severe comorbidity etc., might not be considered
2. Based on formal assessment of future risk
3. For continuing symptoms or evidence of failure of reperfusion
4. No fixed policy - implies each clinician, whether cardiologist or not, makes decision ad hoc

7.03 Is there an agreed policy for angiography following non STEMI?

0. No
1. Yes

7.04 What is the policy for angiography for patients with non STEMI?

1. Routine for the majority
2. Based on formal assessment of future risk (eg. TIMI score or equivalent)
3. For continuing symptoms
4. No fixed policy - implies each clinician, whether cardiologist or not, makes decision ad hoc

7.05 Of patients admitted directly to your hospital with non STEMI in whom angio/intervention is considered appropriate, what percentage have angiography +/- intervention within 72 hours of admission? Non interventional hospitals should count the interval from arrival with you to transfer. Interventional hospitals should consider only their own admissions and exclude transfers from other hospitals. The denominator is the number of patients for whom angio/intervention is indicated, and not the total number of non STEMI admitted.

1. Almost all (> 75% of those eligible)
2. Most (50-75%)
3. Some (25-49%)
4. A minority (<25%)
5. Not known; data are not available

## Section 8 Use of biomarkers

8.01 What biomarkers are used to assess myocardial necrosis? Tick all that apply

1. Troponin T near patient
2. Troponin T (Lab assay)
3. Troponin I near patient
4. Troponin I (Lab assay)
5. CK
6. CK\_MB
7. CK\_MB mass
8. Other, please state

8.02 Is the laboratory measurement of troponin available 24/7?

0. No
1. Yes

8.03 Is the measurement of troponin restricted for STEMI? Some hospitals have moved to pPCI. Please answer nevertheless

0. No - some laboratories will not perform troponin assays for patients with STEMI
1. Yes

## Section 9 Rehabilitation

9.01 How many WTE of dedicated coronary rehabilitation staff are there? WTE = whole time equivalents. Measure in decimals, 0.1 etc.

9.02 How many, if any, are funded on soft money (state WTE)

9.03 What is / are the sources? Tick as appropriate

1. Local charity
2. Local donations
3. Other local fundraising
4. BHF
5. Pharmaceutical industry

9.04 Please estimate the approximate percentage of the total cost of the programme covered by these other sources

1. 0-20%
2. 21-40%
3. 41-60%
4. More than 60%

9.05 Does the rehabilitation process have access to any of the staff listed after discharge (in addition to the rehabilitation staff you have quoted above)? Tick as appropriate.

1. Physiotherapist
2. Dietician
3. Clinical psychologist
4. Exercise physiologist
5. Cardiac liaison - defined loosely as a post having duties in the community, as well as in the hospital, and perhaps covering secondary prevention and training.
6. Social worker
7. Doctor
8. Counsellor
9. Occupational therapist

9.06 Does the rehabilitation team see all patients with ACS before discharge from hospital?

0. No
1. Yes - where appropriate (no severe comorbidity or poor prognosis)

9.07 Has your hospital developed links with community leisure facilities to support coronary rehabilitation?

0. No
1. Yes