

COMMENTARY ON THE 2006 SURVEY OF FACILITIES FOR ACUTE CORONARY SYNDROME PATIENTS

1 Introduction

This summary is based on the findings of a survey of care provided for patients admitted to hospitals in England and Wales with acute coronary syndromes which was performed during 2006. The term acute coronary syndrome covers all parts of the spectrum of the clinical condition that develops as a result of partial or total blockage of a coronary (heart) artery, and which is often referred to as a heart attack. Additional information from the National Audit of Myocardial Infarction database (MINAP) database was also used where required.

Acute coronary syndromes are not all the same, and different types are managed differently. Although symptoms may be broadly similar, treatment depends on the results of the electrocardiograph – usually now performed by highly trained paramedical staff in an ambulance – and on the results of blood tests (troponin assay) that allow an accurate estimate of the degree of cardiac damage.

Treatment for heart attack has developed remarkably over the last 25 years, and has moved from a ‘wait and see’ approach to one that is much more active, and interventional. Decisions on management require skill and experience. The involvement of trained cardiologists in the care of patients with acute coronary syndromes is a logical sequel.

The survey was performed to establish – as a snapshot in a rapidly developing field – the facilities and staff 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 in England and Wales that responded to an on-line survey developed by the Central Cardiac Audit Database group. The census date was 1st July 2006. Data were collected on-line by the Central Cardiac Audit Database during summer 2006, and hospitals were given preliminary analyses of their data in early 2007 for correction of any errors. The full report of the Survey is available at http://www.rcplondon.ac.uk/college/ceeu/ceeu_ami_home.htm

The summary that follows does not follow the order of the survey, and does not refer to every section, but picks out and links the important findings and developments since 2000, and attempts to put these into context.

2 Hospital characteristics [section 1]

The great majority of hospitals in England and Wales that deal with acute coronary syndromes are, regardless of size or catchment population, ‘general’ hospitals in the sense that they accept acute unselected emergencies that arise within their area. They may be teaching hospitals or hospitals with specialised services, such as the provision of specialist cardiac imaging and interventional services, or they might be smaller hospitals without specialised services. Of 228 hospitals that responded to the survey, four were hospitals without accident and emergency departments, and which did not accept acute unselected admissions. Thus the majority of this report concerns the provision of care for acute coronary syndromes in a typical ‘general hospital’ regardless of size, complexity in terms of specialist services, or geographical location.

3 Access to facilities [sections 2, 10, 11]

More widely applicable treatment options require easy access to facilities for investigation. These facilities have increased considerably since 2000. Diagnostic angiography facilities, commonly available without additional interventional facilities, and are now available in 75 English hospitals, compared with 49 in 2000. Hospitals also having interventional facilities have increased from 35 in 2000 to 62, with another 11 hospitals with angiographic expected to provide interventional facilities shortly. It is not realistic to expect every hospital to provide angiographic or interventional services, but it is important that access to such facilities is equitable.

4 Population served [section 4]

The median catchment population of acute hospitals in England – those taking unselected emergencies including heart attack – is just over 200,000, with 25% having fewer than 161000 patients and 25% more than 269000. The number of cardiologists employed increases from an average of 2.9 in hospitals in the smallest group of hospitals to 5.7 in the largest. In terms of the size of the population per cardiologist, smaller hospitals generally

have more cardiologists, but this is complicated by the need for more cardiologists in hospitals offering angiography and interventional facilities. However, in every type and size of hospital there has been a significant increase in numbers of cardiologists since 2000.

5 Consultant and other staff numbers [section 3]

When this survey was first performed in 2000 England and Wales had almost the lowest number of consultant cardiologists in Europe¹. As a result much acute care for patients with ACS was provided by consultants who did not necessarily have any special interest or training in cardiology – general physicians. When dealing with the increasingly complex management opportunities for ACS the generalist approach has limitations. It follows that cardiologists find it increasingly difficult to combine the role of general physician and deal with the investigative and interventional aspects of the role for which they have been trained.

In the last six years there has been a notable expansion in numbers of consultants, cardiologists in training, and in nursing staff working in specialist roles within cardiology. All comparisons between 2000 and 2006 are limited to data on England as the original survey did not include Wales, but there is no reason to think that the recent expansion has not included Wales. The number of cardiologists who practice cardiology only, without any commitment to acute general medicine, has increased by 157 %, while there has been a much smaller increase, about 8% in those who also do some on-call general medicine. The number of hospitals in which cardiologists continue to do general medical duties has not changed significantly between 2000 and 2006, but the number of hospitals in England where *all* cardiologists have a commitment to general medical duties has fallen from 65% to 41%.

Despite the increase in consultant numbers, not all consultant posts are filled. While it is inevitable that some posts are easier to fill than others, it is surprising that 25% of English hospitals and 35% of hospitals in Wales reported an unfilled post. While it is not unusual (although not easily explained) for posts to be empty for up to 3 months at the time of a retirement, many of the posts which remained empty had been so for longer periods.

5.1 Non consultant medical staff There has been a substantial increase in the number of specialist registrars – cardiologists in training – since 2000 numbers have increased by 125%,

¹ Block P, Weber H, Kearney P, Cardiology Section of the European Union of Medical Specialists. Manpower in cardiology II in western and central Europe (1999-2000). *Eur Heart J* 2003;24: 299-310

and this appears at present barely enough to meet demand by hospitals with consultant posts to fill. There have also been smaller increases in other grades, such as the staff grade cardiologist, associate specialists, and clinical assistants, all of whom provide a vital service within cardiology.

5.2 Specialist nursing staff Only 5 hospitals in England and Wales said that they did not have any specialist nursing staff in 2006. This reflects a remarkable development in harnessing the skills and talent of nurses to take on complex roles within cardiology. Nurses now act independently or semi-autonomously in many areas, such as providing thrombolytic (clot dissolving) treatment in the early stages of heart attack, in rapid access chest pain clinics, post discharge follow up clinics, treating heart failure in the community, and also have a major role in providing rehabilitation services.

6 Cardiological facilities [section 5]

25 years ago the term in-patient cardiological facilities would, for the great majority of hospitals, amount simply to a cardiac care unit (CCU) of 4-8 beds. The structure and function of the cardiac care unit has changed very little since then. However, the rapid development of new treatments and appropriate use of new investigative techniques has altered care for acute coronary syndromes considerably, and the role of the traditional cardiac care unit has to be put into this new context.

When CCUs developed more than 40 years ago their purpose was to recognise and treat cardiac arrest, which had (in the early 1960s) been shown to be the commonest early cause of death following myocardial infarction. CCUs had typically 4-8 beds, and were well equipped and staffed to deal with cardiac arrest. Typically almost all patients with ST segment elevation infarction, those most likely to have a cardiac arrest, were admitted to CCU, and all other heart attacks, if recognised, were admitted to a general medical ward, as there were many more of these than could all be accommodated in a CCU of 4-8 beds. Newer and very sensitive blood tests for cardiac damage (troponin assays) have been developed which has substantially increased the numbers of patients in whom minor degrees of cardiac damage are now recognised. Research has shown that minor degrees of heart damage, something that used to be described as 'a warning' was exactly that, and far from benign. Research has also shown that careful assessment with early angiography followed by angioplasty for a large

proportion is an important way to reduce the risk of further cardiac damage in the near future. The traditional CCU is not large enough in the majority of hospitals to care for all these patients – nor is high dependency care needed for the majority. The most effective way to ensure that all patients with heart attack – of all degrees of severity – are well and consistently managed is for them all to be cared for in the same place by nursing staff with cardiac skills and expertise.

In this regard we found that 75% hospitals now had at least some cardiac beds in addition to CCU, and most hospitals reported having between 10 and 30 beds of this type. However some hospitals without additional beds had CCUs with 10 or more beds which might have been adequate. Those with larger numbers tended to be larger hospitals with busy investigational units.

6.1 Facilities for angiography and intervention Facilities for investigation and treatment of coronary disease should include equitable access to angiography and interventional facilities. (see appendix for details) There has been a substantial increase since 2000 in the number of hospitals where coronary angiography is available. 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. Another 11 hospitals have advanced plans to install equipment for interventional work.

7 Assessment and treatment of patients with heart attack [sections 7, 8]

The electrocardiograph (ECG) is the most important investigation performed on anyone with symptoms suggestive of heart attack. The ECG provides the information which allows clinicians to distinguish two important subdivisions of heart attack; those with features described as ST segment elevation infarction, and those which, while abnormal in other ways, do not show ST segment elevation. (see appendix)

7.1 Where is assessment, including the ECG performed? It is important that an ECG is performed as quickly as possible after symptoms begin in order to make the important distinction about the type of heart attack. In 2000 about one half of patients were assessed in the CCU, often after initial admission to the accident and emergency department. This led to

delays in assessment and treatment except in those few hospitals where the CCU could easily and quickly be accessed by ambulance crews.

Patients assessed in the emergency department are treated more quickly, and thrombolytic treatment is now given to 75% patients in England (56% in Wales) in the Emergency Department. This has resulted in a remarkable improvement in the speed with which thrombolytic treatment is given; in 2000 about 40% of patients could expect treatment within 30 minutes of arrival in hospital. This figure is now 83%. The largest part of this improvement comes from better organisation within Emergency Departments, and willingness to provide treatment within the department rather than after transfer to the CCU.

The performance of ECGs in the ambulance by ambulance paramedics for patients with symptoms of heart attack is an important recent development. This not only speeds up the process of assessment in hospital – as the ECG does not normally need to be repeated – and in some parts of the country, such as the area covered by the London Ambulance Service (LAS) patients with ST segment elevation infarction diagnosed in the ambulance are taken directly to interventional centres for consideration of primary angioplasty.

7.2 Pre-hospital thrombolytic treatment The provision of thrombolytic treatment by highly trained paramedic ambulance staff has developed rapidly over the last three years. All ambulance services except one (LAS, see above) now provide pre-hospital thrombolytic treatment. Evidence from MINAP shows that this saves, on average, 30-35 minutes before treatment is given. This is an important saving. Slightly under 3000 (15%) of all thrombolytic treatment was given by ambulance crews in 2006, compared with almost none in 2000. MINAP data indicate that there is opportunity for more patients to benefit from pre-hospital treatment.

7.3 Primary angioplasty [section 10] Primary angioplasty is presently available for patients in one third of hospitals in England and Wales on a routine basis, although only 50% of all centres offer a 24 hour service. About 15% patients suitable for reperfusion treatment had primary angioplasty in 2006. 20 English hospitals now offer a primary angioplasty service to at least one other hospital, compared with 11 in 2000.

7.4 Care after admission to hospital [section 8] There is evidence that if patients with heart attack are cared for by cardiologists the outcome is better.² Since 2000 patients are increasingly admitted directly under a cardiologist, or are transferred to the care of a cardiologist within the next 12-24 hours. 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, based as closely as possible on the same criteria, this figure was 124/204 (61%).

Where it was not possible to have inpatient care with a cardiologist, it becomes more important that outpatient follow up should be with a cardiologist. Since 2000 the percentage of hospitals where patients with ST elevation infarction received follow up from a cardiologist has increased from 35 to 82%.

7.5 Care for non-ST segment elevation infarction [section 9]

Until about 10 years ago the longer term complications of non-ST elevation infarction were underestimated, and this was particularly true of events where there was limited cardiac damage. The survey showed that patients with non-ST segment elevation infarction are less likely to be cared for by cardiologists. Patients with non ST elevation infarction were also less likely to be admitted to CCU. Those who are not admitted to CCU were very unlikely, only about 1 in 8, to be cared for by a cardiologist or seen by a cardiologist during the admission.

While this is redressed to some extent in 62% of hospitals by follow up being arranged with a cardiologist, this is a smaller number than for ST elevation infarction.

This is not ideal, as present recommendations are that patients with non ST elevation infarction should be considered for angiography, and where needed, an intervention, *during* the admission. Without contact with a cardiologist this will not happen.

7.6 Access to angiography and intervention during admission [section 10]

Angiography following assessment by a cardiologist should be a routine investigation for the majority of patients for whom it is thought to be indicated. This should be available without

² John S Birkhead, consultant cardiologist, Clive Weston, consultant cardiologist, Derek Lowe, statistician, for the National Audit of Myocardial Infarction Project (MINAP) Steering Group. Impact of specialty of admitting physician and type of hospital on care and outcome for myocardial infarction in England and Wales during 2004-5: observational study. *BMJ* 2006;332:1306-1311

delay which unnecessarily prolongs a stay in hospital. Ideally it is recommended that this investigation be performed within 48 hours of an admission. Not all hospitals can be expected to have angiography facilities but in practice just under 2/3 hospitals have this equipment.

Access to angiography and intervention remains unsatisfactory for many. In more than one third of hospitals patients were likely to wait for more than 72 hours for angiography. The best service was given by those hospitals that had interventional facilities on site, where 17% of hospitals reported a delay of more than 72 hours compared to 44% in hospitals without interventional facilities. Where there were no interventional facilities on site it has been shown by others that delays in transferring patients for investigation and treatment remains a serious problem.³

The use of angiography has increased very substantially since 2000 when only 7% hospitals reported that they performed angiography as a routine following heart attack. In 2006 this investigation was routine for the majority for 37% of ST elevation infarctions and 48% of non ST elevation infarctions.

8 Appendix

Acute coronary syndrome This term covers all cardiac episodes that result from sudden and spontaneous blockage or near blockage of a coronary artery, and which results in some degree of cardiac damage. The underlying cause of the clot is rupture of the fine lining of a heart artery (plaque rupture), which allows blood to come in contact with the tissues of the wall of the artery, promoting the development of clot. The degree of damage and the type of syndrome (heart attack) that results from the blockage depends on the size and position of the artery and the amount of clot that develops within the artery. Not all acute coronary syndromes are suitable for treatment with primary angioplasty or thrombolytic drugs, and the decision is mainly guided by the appearances of the ECG.

Angiography Coronary angiography is a diagnostic procedure which allows visualisation of the coronary vessels. It is the essential investigation prior to any procedure, either surgery, or angioplasty. It may be performed both on patients with stable symptoms – angina – or urgently within a day or two after a heart attack. Where hospitals have only angiography this is commonly used only for routine investigations, and not necessarily for inpatients [though see section 10c].

Coronary arteriography (synonym coronary angiography) A radiographic (x ray) technique for visualisation of the coronary arteries. Requires less complex x ray equipment, and less highly trained staff than percutaneous coronary intervention

³ http://www.heart.nhs.uk/CHD/5453/28116/IHT_presentations_BCS_april_web.pdf. Accessed 29/05/07

Coronary interventional facilities. Coronary angioplasty (synonym percutaneous intervention, PCI) is a very highly skilled procedure. Success depends on practice, and it is mandatory that each operator should perform a minimum number of procedures per year. It follows that availability of interventional centres should be more limited. Where interventional centres support the requirements of other hospitals problems may arise with the provision of an equitable service. Delays before transfer to interventional centres, although improving, remain longer than desirable. The procedure involves the insertion, under local anaesthesia, of a small balloon tipped catheter into a coronary artery, using x ray guidance. The narrowing is identified, the balloon placed across the narrowing, and expanded under pressure. A metal stent is usually deployed across the site to prevent further obstruction.

Heart attack (synonym myocardial infarction) The term applied to the symptoms, usually but not always involving chest pain, which develop when a clot (thrombus) develops within a heart artery as a result of spontaneous damage to the inner lining of the artery (plaque rupture). The heart muscle supplied by the blocked artery suffers permanent damage if the blood supply is not restored quickly. The damage to heart muscle carries a risk of sudden death, and heart failure in people who survive.

Interventional facilities X ray and other technical facilities needed to perform coronary angioplasty. The shorthand 'interventional hospital' is used in this context.

Primary angioplasty (synonym primary PCI) A technique to re-open the blocked coronary artery responsible for the heart attack. A fine catheter (tube) is passed, under local anaesthetic, from an artery in the leg or arm into the blocked heart artery. A small inflatable balloon is then passed through the catheter and across the blockage, allowing the artery to be re-opened by temporary inflation of the balloon. This technique is called angioplasty and when used as the initial treatment for heart attack it is referred to as 'primary angioplasty'. Following opening of the artery, this is normally kept open by a small expandable metal tube (stent) which is passed into the artery with the angioplasty balloon. The umbrella term that encompasses both balloon dilatation (angioplasty) and stent insertion (stenting) is 'percutaneous coronary intervention' (PCI) and primary PCI is increasingly used to describe what in this report we refer to simply as primary angioplasty.

Reperfusion treatment. The term used to cover the techniques, thrombolytic treatment and primary angioplasty, used to reopening a coronary artery as an emergency. These treatments are suitable only for certain types of heart attack characterised by typical electrocardiographic appearances described as ST segment elevation

ST elevation and non ST elevation infarction. Treatment for heart attack depends on a crucial distinction which is made on the electrocardiograph (ECG). The great majority of heart attacks produce characteristic changes on the electrocardiograph. Clinicians divide up these changes into two broad groupings, those with so called ST segment and non ST segment elevation appearances. This is important because treatment for the two groups differs. Reperfusion treatment, either primary angioplasty or thrombolytic treatment, is only used for ST segment elevation infarction, because these treatments have only been shown to be of value for this group. Non ST segment elevation infarction is treated with anticoagulant drugs.