Myocardial Ischaemia National Audit Project (MINAP)

How the NHS manages heart attacks

Eighth Public Report 2009

Prepared on behalf of the
MINAP Steering Group
June 2009

Myocardial Ischaemia National Audit Project (MINAP)

This report is written for the public to show the performance of hospitals, ambulance services and Cardiac Networks in England and Wales against national standards and targets for the care of heart attack patients in 2008/9.

Report prepared by

Lynne Walker, Programme Manager MINAP

Dr John Birkhead, Clinical Director MINAP

Dr Clive Weston, Associate Director MINAP

Professor Tom Quinn, MINAP Steering Group member

Dr Mark de Belder, President British Cardiovascular Intervention Society

Ronald van Leeven, Project co-ordinator MINAP

Acknowledgements

The MINAP team would like to thank all the hospitals and ambulance services that have collected data.

This report was completed in close collaboration with the Central Cardiac Audit Database (CCAD), http://www.ic.nhs.uk/services/national-clinical-audit-support-programme-ncasp/heart-disease which performed data management and analysis. Sue Manuel has again been especially involved.

We congratulate David Geldard, one of our patient representatives, on his award of an MBE this year for voluntary service to people with coronary heart disease.

The MINAP Steering Group is proud that Dr John Birkhead, the Clinical Director of this project since its inception, was recently awarded the MacKenzie Medal by the British Cardiovascular Society in recognition of his outstanding contribution to British Cardiology.

MINAP is commissioned and funded by the Healthcare Quality Improvement Partnership (HQIP). For more information, please visit www.hqip.org.uk.

MINAP is based at the National Institute for Clinical Outcomes Research which is part of the Division of Surgical and Interventional Science at University College London. MINAP was previously based in the Clinical Effectiveness and Evaluation Unit of the Royal College of Physicians (RCP) until 2006 and continues to maintain a close collaboration with the RCP.

For further information about this report, contact:

Myocardial Ischaemia National Audit Project
National Institute for Clinical Outcomes Research
Suite 501
The Heart Hospital
Westmoreland Street
London W1G 8PH
Tel: 0207 504 8958
Email: minap@uclh.nhs.uk
http://www.rcplondon.ac.uk/clinical-standards/organisation/partnership/Pages/MINAP-.aspx

Royal College of Physicians (media enquiries)
PR Manager Linda Cuthbertson Tel: 020 7935 1174 ext.254
Email: Linda.Cuthbertson@rcplondon.ac.uk

Department of Health
Enquiries to the Department should be directed to the Customer Service Centre
Tel: 0207 210 4850 (line open from 9.00am to 17.00pm Monday to Friday).
Textphone for hard of hearing: 0207 210 5025.
Email at dhmail@dh.gsi.gov.uk

In writing to the Minister of State for Health Services at:
The Department of Health
Richmond House
79 Whitehall
London SW1A 2NS

Welsh Assembly Government
Ms Cathy White
Tel: 029 20826108
Email: cathy.white@wales.gsi.gov.uk

Community Primary Care & Health Services Policy Directorate
Health and Social Care Department
Welsh Assembly Government
Cathays Park
Cardiff CF10 3NQ

Hospital or ambulance service data
If you require further information on your local hospital's or ambulance service's performance please contact the relevant hospital or ambulance service, details of which are available at NHS Choices http://www.nhs.uk/Pages/HomePage.aspx

Contents

Foreword

The eighth public report from MINAP, like all its predecessors, shows continued improvements in the way that the NHS manages people who have suffered a heart attack. This remarkable database, now the envy of the world, is the direct result of hard work in every hospital in England and Wales, in the Cardiac Networks and in the headquarters of the programme, the National Institute for Clinical Outcomes Research (NICOR).

It is a great pleasure to note that Dr John Birkhead, the driving force behind MINAP since its inception, was awarded the Mackenzie Medal at the recent annual meeting of the British Cardiovascular Society in recognition of his enormous contribution to British cardiology. This is the highest award that the Society makes.

The remarkable body of evidence contained within MINAP describing some 700,000 anonymised episodes of care is also the substrate for research. Under the leadership of Professor Adam Timmis researchers have been successful in obtaining over £5 million in terms of programme and other research grants. There are also plans to explore international collaboration in both Europe and the United States.

Professor Roger Boyle CBE

National Director for Heart Disease and Stroke

June 2009

MINAP Steering Group

Chairman	Dr Clive Weston Associate Director MINAP
	Dr John Birkhead Clinical Director MINAP
Department of Health	Professor Roger Boyle CBE National Director for Heart Disease and Stroke
National Clinical Audit Support Programme, Health and Social Care Information Centre	Dr David Cunningham Senior Heart Disease Manager
Royal College of Physicians	Dr Jonathan Potter Director, Clinical Effectiveness and Evaluation Unit
British Heart Foundation	Professor Peter Weissberg Medical Director
College of Emergency Medicine	Dr Katherine Henderson Accident & Emergency Consultant
Ambulance Services	Mr Paul Phillips Clinical Effectiveness Lead
Welsh Assembly Government	Dr Phillip Thomas Lead Cardiac Clinician
National Clinical Audit Support Programme, Health and Social Care Information Centre	Mr Martin Old Programme Manager
Joint Royal Colleges Ambulance Liaison Committee	Dr Howard Swanton Consultant Cardiologist
British Cardiovascular Society	Dr Nicholas Boon President

Royal College of Nursing	Professor Tom Quinn University of Surrey
MINAP Patient/ Carer Group	Mr Iain Thomas South West London Cardiac and Stroke Network Patient Carer Group
MINAP Patient/ Carer Group	Mr David Geldard MBE Past President, Heart Care Partnership (UK)
MINAP Hospital User	Ms Fiona Dudley Lead Nurse for Cardiology, Mid Yorkshire Hospitals NHS Trust
Department of Health	Ms Sue Dodd Emergency & Acute Care Manager, Vascular Programme
MINAP Academic Group	Professor Adam Timmis Chairman
NHS Improvement	Dr Mark Dancy National Clinical Chair
British Cardiovascular Intervention Society	Dr Mark de Belder President

Executive Summary

This is the Eighth Public Report from the Myocardial Ischaemia National Audit Project (MINAP) on the treatment of heart attack patients. It presents analyses from all hospitals and ambulance services in England and Wales that provided care for patients with suspected heart attack from April 2008 to March 2009 (2008/9), and compares these with the previous year (2007/8). The analyses are based on data available at 5 June 2009.

Heart attack, or myocardial infarction, is part of the spectrum of conditions that cardiologists refer to as acute coronary syndrome (ACS). The term ACS covers both heart attacks for which emergency reperfusion treatment with thrombolytic drugs or primary angioplasty is used (ST elevation infarction) and those commonly referred to as non-ST segment elevation myocardial infarctions, for whom different treatment is used. Non-ST segment elevation infarction represents the majority of heart attacks. In previous years this report has tended to focus only on the group that receive reperfusion treatment, but this year, and in future, we also analyse care for non-ST segment elevation infarction.

High quality care for ST segment elevation myocardial infarction (STEMI) includes early diagnosis and rapid treatment to re-open the blocked coronary artery responsible for the heart attack. This has until recently been achieved mainly with clot dissolving drugs (thrombolytic treatment) followed by the prescription of drugs that reduce the risk of further heart attack (secondary prevention medication). National and international guidelines recommend primary angioplasty as the preferred treatment where it can be provided promptly and increasing numbers of patients now benefit from this treatment. During 2009 the use of primary angioplasty will exceed that of thrombolytic treatment for the first time in England and Wales.

As the number of patients having primary angioplasty increases, the number having thrombolytic treatment will fall. However this report shows a continuing improvement in the percentage of patients receiving thrombolytic treatment within 60 minutes of a call for help. The number having treatment before reaching hospital has fallen in line with the overall decrease in use of thrombolytic treatment.

More patients are treated by primary angioplasty

The use of primary angioplasty continues to increase rapidly as more hospitals are able to provide this procedure. In 2008/9 more than 40% patients having reperfusion treatment for a heart attack had a primary angioplasty.

While primary angioplasty has advantages over thrombolytic treatment, especially where the interval between onset of symptoms and treatment is prolonged for whatever reason, it will be some time before this procedure will be available routinely and comprehensively across the country. In the interim thrombolytic treatment continues to be given very effectively in areas where primary angioplasty is not yet available, and is proven to reduce mortality rates following heart attack.

- This year, 66 hospitals in England have performed primary angioplasty compared with 54 in 2007/8, although 14 of these hospitals performed less than 10 cases. In Wales 2 hospitals perform primary angioplasty.
- In England in 2008/9 7351 patients were treated with primary angioplasty compared with 4035 in 2007/8, an increase of 82%.
- In Wales in 2008/9 118 patients were treated with primary angioplasty compared to

42 in 2007/8, an increase of 181%.

- Only 3/28 English Cardiac Networks now have restricted access to primary angioplasty services compared with 7/30 in 2007/8 (where restricted means less than 10 cases performed in the year).
- In England the median door to balloon time was 50 minutes (Interquartile range (IQR) 32, 75) compared with 56 minutes (IQR 34, 84) in 2007/8. In Wales this was 57 minutes (IQR 37, 85) compared with 75minutes (IQR 56, 113) in 2007/8.

Patients continue to receive thrombolytic treatment rapidly

At a time when there is a major organisational shift from one form of treatment to another it is important that there should not be any increase in delays before providing thrombolytic treatment when primary angioplasty is not yet available. The evidence suggests that performance in England is broadly unchanged, whilst in Wales there has been improvement in the speed of treatment upon arrival at hospital.

- 82% of hospitals in England provided thrombolytic treatment to 75% of eligible patients within 30 minutes of arrival at hospital compared to 90% in 2007/8. In Wales 50% of hospitals provided thrombolytic treatment to 75% of eligible patients within 30 minutes of arrival at hospital compared to 42% in 2007/8.

- 72% of patients received thrombolytic treatment within 60 minutes of calling for professional help in England compared with 71% in 2007/8. In Wales the figure was 48% compared to 49% in 2007/8.
- In 2008/9, 71% of English hospitals with their associated ambulance services reached or exceeded the English national target (68%) for the delivery of thrombolytic treatment within 60 minutes of patients calling for professional help, compared with 66% in 2007/8. No Welsh hospital achieved their national target of 70%.

Treatment given by paramedics before the patient reaches hospital

Ambulance services collaborate closely with their receiving hospitals and networks to improve heart attack care. For many, the focus has recently shifted from provision of early thrombolytic treatment outside hospital to identifying those patients with a heart attack who might benefit from primary angioplasty, and transferring them rapidly to an appropriate hospital. This means that, for many ambulance services, the number of patients receiving pre-hospital thrombolytic treatment has declined.

- In 2008/9, 2766 patients received pre-hospital thrombolytic treatment in England and Wales, compared with 3095 patients in 2007/8, a decrease of 11%.

- 93% of patients receiving pre-hospital thrombolytic treatment received this within 60 minutes of calling for help, compared with 94% in 2007/8. In Wales the percentage was similar 91% in 2007/8 and 92% in 2008/9.

Prescription of secondary prevention medication continues to exceed national standards

Initial emergency treatment (primary angioplasty or thrombolytic treatment) is only one aspect of modern heart attack care. Use of secondary prevention drugs after the acute event is proven to improve outcomes for patients and remains a priority. The proportion of heart attack patients in England and Wales prescribed secondary prevention

medication on discharge from hospital continues to exceed the standards.

- In England prescription of aspirin following heart attack remains at 98% and of beta blockers increased from 92% to 93%. The use of statins 97% compares with 96% in 2007/8.
- In Wales prescription of aspirin was 98%, beta blockers, 96% and prescription of statins was 96% (97% in 2007/8).
- Clopidogrel was prescribed on discharge to 94 % of eligible patients in England and to 94% in Wales. ACE inhibitors were prescribed to 92% of eligible patients in England and 93% in Wales. It should be noted that as there are no national standards for the prescription of ACE inhibitors and clopidogrel, and some hospitals do not collect these data routinely.

Falling mortality for heart attack patients

The percentage of patients with ST elevation myocardial infarction who die within 30 days of admission to hospital continues to fall. (Section 10 Figure 6).

Potential to improve patient care

Many patients have benefited from the significant reductions in delays to treatment within hospital shown in previous MINAP Public Reports. Further significant reductions in the delay before thrombolytic treatment within hospital are unlikely to be achieved without compromising patient safety. Efforts continue to be directed at increasing access to primary angioplasty for patients both in England and Wales. In Wales, where there are long journey times, and difficult access to primary angioplasty, there may still be a role for expanded use of pre-hospital thrombolytic treatment.

The increasing use of primary angioplasty requires effective communication between referring hospitals, ambulance services, hospitals where primary angioplasty takes place and primary care. There have been significant reductions in hospital stay made possible by use of primary angioplasty, with average inpatient stays of less than 4 days compared to 5-6 days with thrombolytic treatment. It is important for Cardiac Networks to ensure that effective cardiac rehabilitation is provided for patients who have such short hospital stays. It follows that effective communications with community based cardiac rehabilitation services are required to ensure that rehabilitation started in hospital is continued in the community.

part 1

Introduction

The Myocardial Ischaemia National Audit Project (MINAP) was established in 1999 to allow hospitals to measure their performance against national standards and targets for the care of heart attack patients, using common definitions.

The numbers of patients having heart attacks suitable for reperfusion treatment (ST elevation infarction) is falling for reasons that are not entirely clear, whilst numbers of other heart attacks (non-ST elevation infarctions) remains substantial. As the medium and long term outcome of patients with non-ST elevation infarction is similar to, if not worse than, that of patients who are eligible for reperfusion treatment, it is important that this group should receive the high standards of care presently given to heart attacks requiring reperfusion treatment. To this end the National Institute for Health and Clinical Excellence (NICE) are developing new national guidelines for the care of these patients in England and Wales, supported by analyses of MINAP data. These will be published in autumn 2009.

In recognition that MINAP covers the complete spectrum of acute coronary syndromes (ACS) the project changed its name last year from the Myocardial *Infarction* National Audit Project to the Myocardial *Ischaemia* National Audit Project.

MINAP uses a highly secure electronic system of data entry, transmission and analysis developed by the Central Cardiac Audit Database (CCAD). The system uses encryption of patient identifiers to allow secure transfer of data between hospitals and central servers and allows linkage with the Office of National Statistics for mortality tracking. http://www.ic.nhs.uk/services/national-clinical-audit-support-programme-ncasp/heart-disease.

The continuous collection and publication of data enables comparison of performance across the NHS and monitors the care of people who have suffered a heart attack. Measuring performance identifies areas where care can be improved. MINAP provides quarterly reports to Strategic Health Authorities who are responsible for monitoring performance within their areas. In addition, MINAP provides data to Cardiac Networks to support local service improvement. MINAP also provides data to ambulance services, recognising the important role of pre-hospital care in improving outcomes for cardiac patients.

MINAP data are not only used to measure the performance of hospitals and ambulance services against national standards and targets. Analyses of national data have also made important contributions to the evidence-base for care of patients by means of publications in peer reviewed journals, see Appendix 1.

MINAP has now established an Academic Group to encourage research use of the data to improve the care of patients with all acute coronary syndromes. Members of the group have been successful in attracting large research grants with which to carry out research. See http://www.rcplondon.ac.uk/clinical-standards/organisation/partnership/Pages/MINAP-.aspx.

MINAP, through its Steering Group, continues to collaborate with a wide range of professional, academic, governmental, charitable and patient organisations. These groups are represented on the Steering Group. Members of the MINAP project team have been invited to support a number of other related activities, for example working with the British Heart Foundation in their “Doubt Kills” campaign and providing advice to the Department of Health with respect to cardiac care.

This Eighth Public Report reports the time taken to provide thrombolytic treatment (clot dissolving drugs) and primary angioplasty to eligible patients and the use of drugs to reduce the risk of another heart attack (secondary prevention). We also provide some analyses concerning care for patients having non-ST elevation myocardial infarction, and intend to expand this section in future years.

For more information on what happens when you have a heart attack, see Appendix 2.

Reperfusion treatment

This is the term used for treatments that re-open a blocked coronary artery responsible for the heart attack in an attempt to limit the degree of heart damage. Two forms of treatment exist; thrombolytic treatment, where the clot is dissolved by a drug, and primary angioplasty, where the artery is re-opened mechanically using a balloon catheter inserted into the blocked artery. Thrombolytic drugs are given by intravenous injection and can therefore be delivered rapidly, either on or before arrival at hospital. While the drug can be given quickly its effect on the blood clot are not immediate and vary from person to person – in some people failing to re-open the artery at all. Primary angioplasty requires specialised equipment and highly trained clinical staff within the hospital. Patients tend to wait longer for primary angioplasty than they would for thrombolytic treatment, but the final results are more reliable in terms of complete restoration of coronary blood flow.

1. Primary angioplasty

Since Professor Boyle, National Clinical Director for Heart Disease and Stroke set out the clinical case for moving to a primary angioplasty service for treatment of heart attack in December 2006, there has been a significant increase in the number of hospitals routinely offering this technique[1].

Primary angioplasty has been shown to be more effective than thrombolysis as long as it can be delivered in a timely fashion. The Department of Health together with the British Cardiovascular Society (BCS) and the British Cardiovascular Intervention Society (BCIS) performed the National Infarct Angioplasty Pilot Project (NIAP) between 2005 and 2008, and its final report in October 2008 [2] suggested that primary angioplasty should be the preferred form of reperfusion therapy except for those patients who lived a long way from a hospital capable of providing emergency angioplasty. For these patients thrombolytic treatment, preferably given pre-hospital, remains the preferred initial treatment. Further support for this method of managing heart attacks is found in Lord Darzi's report 'High Quality Care for All' published in 2008 [3].

The challenge is to convert from what has been a first-class thrombolysis service to a national delivery of primary angioplasty, concentrating on minimising delays and ensuring that patients subsequently receive optimum secondary preventive therapy and cardiac rehabilitation.

A continuously available primary angioplasty service does not yet exist in all hospitals offering this treatment. This requires provision of the service 24 hours a day with a cardiologist, nurses and cardiac technicians, and access to advanced radiological facilities. Only larger well staffed

[1] http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_063282

[2] http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_089455

[3] http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085825

hospitals are able to provide this. Where two adjacent hospitals provide this service arrangements can be made for joint working practices in order to ensure 24 hour cover. London hospitals, together with the London Ambulance Service, have been at the forefront of developing such a 24 hour service in England, helped by the presence of many specialised angioplasty centres across the capital and the support of Primary Care Trusts commissioning services. Similar excellent services have also been developed in a number of conurbations across England over the last 2 years.

In some hospitals a combined approach to reperfusion treatment has been adopted for the time being depending on the time of presentation, and eligibility for thrombolytic treatment. Where thrombolytic treatment is given this is routinely followed by an angiogram within the next day or two, and where necessary, angioplasty can then be performed. This approach may avoid excessive out of hours catheter laboratory use, and may be appropriate where full 24 hour cover is logistically difficult. See the Case study from Dr Orr in part 3. Such hybrid systems need to be closely audited to prevent confusion and delays, and in many cases are a 'stepping stone' to full angioplasty services.

When pre-hospital thrombolysis was introduced, the Department of Health provided support for training of ambulance paramedical staff to take appropriate histories and interpret electrocardiograms. This training has ensured an ideal starting point for delivery of a primary angioplasty service. Once a patient is recognised as having a heart attack, instead of taking the patient to the nearest cardiac care unit or Accident and Emergency (A&E) department, the ambulance staff can contact a local hospital coordinator and take the patient directly to the catheter laboratory of the nearest heart attack centre. Whilst the patient is being transported, the coordinator contacts the team responsible for delivering the primary angioplasty treatment. This system has to work around the clock to be most effective.

For patients who self-present to A&E departments, new systems of care must be set up to liaise with the local primary angioplasty coordinator who can activate the team in exactly the same way as if the patient had called for an ambulance.

It follows that the early care of patients with heart attacks requiring reperfusion treatment is becoming concentrated in a relatively small number of hospitals, leaving other (local) hospitals to receive patients from the angioplasty centres after the initial angioplasty in order to continue monitoring and begin rehabilitation before discharge home and also to continue to admit those without ST elevation.

An interim 'good practice' standard of 90 minutes from arrival at an interventional hospital to the time when the blocked artery is reopened (door to balloon time) has been agreed for provision of primary angioplasty, based on international guidelines [4] [5] [6]. There are good reasons why

---

[4] Guidelines for Percutaneous Interventions. Silber, Albertsson et al. *European Heart Journal 2005*; 8: 804-847.

[5] American College of Cardiology/American Heart Association clinical performance measures for adults with ST elevation and non-ST elevation myocardial infarction. Krumholz, Anderson, Brooks et al. *Circulation* 2006;113:732-761.

[6] Euopean Society of Cardiology. Management of acute myocardial infarction in patients presenting with persistent ST segment elevation. Van de Werf, Bax, Betriu et al. *European Heart Journal* 2008;29:2909-2945.

provision of primary angioplasty cannot always be immediate, such as the need to bring the on-call team in at night, or making space in the catheter laboratory. In practice the majority of cases are treated within this time frame (see page 19).

2. Thrombolytic treatment

Not all patients having a heart attack are suitable for thrombolytic treatment. Patients are eligible for thrombolytic treatment if:

- they have definite signs of a heart attack including typical evidence on the electrocardiogram (ECG) (known as ST segment elevation)
- there is no reason why thrombolytic treatment might be harmful to them, and
- there is no good reason to delay giving thrombolytic treatment.

The Government's National Service Framework (NSF) for Coronary Heart Disease (see Appendix 3) set standards for treatment of heart attack in England. Wales has its own equivalent of the Coronary Heart Disease NSF, *Tackling CHD in Wales: implementing through evidence* (see Appendix 3).

Thrombolytic treatment within 30 minutes of arrival at hospital

In the use of thrombolytic treatment speed is of the essence. One of the early priorities in the NSF was that 75% of eligible heart attack patients should receive thrombolytic drugs within 30 minutes of arriving at hospital. This reflects the performance of hospitals in providing treatment.

Thrombolytic treatment within 60 minutes of calling for professional help

This standard reflects the combined performance of the ambulance service, GPs and hospitals and is the most relevant overall indicator of care of heart attack patients. It encourages collaborative working across all relevant NHS organisations, particularly between ambulance services and hospitals to reduce delays to thrombolytic treatment. The call for professional help will usually be direct to the ambulance service but may be to a GP or NHS Direct.

The Department of Health set NHS organisations in England the target of delivering a ten percentage point improvement each year from 2003/4 to 2005/6 in the proportion of patients suffering from heart attack who receive thrombolytic treatment within 60 minutes of calling for professional help. This started from a baseline of 38% which was set in December 2002. The national target was to reach 68% from 2005/2006 onwards. Hospitals that did not make a ten percentage point improvement in these years were expected to make up any deficit in 2007/8 if their main provision for heart attack was a thrombolysis service.

Pre-hospital thrombolytic treatment

Achieving further significant reductions in the delay before thrombolytic treatment within hospital is unlikely without compromising patient safety. Efforts have been directed to increase the number of patients who receive pre-hospital thrombolytic treatment particularly in areas without access to primary angioplasty. Although overall numbers of patients having pre-hospital treatment are falling, there is potential to increase numbers having pre-hospital treatment in areas where primary angioplasty is not yet accessible. In 2007/8 one third of patients having in-hospital thrombolytic treatment took 45 minutes or longer to reach hospital after a call for help. For Ambulance Trusts serving rural populations the proportion taking more than 45 minutes is much higher, with greater opportunities for pre-hospital treatment.

Paramedics have been able to administer thrombolytic drugs to patients since publication of the NHS Plan in 2000 and subsequent regulatory changes, supported by national guidelines published by the Joint Royal Colleges Ambulance Liaison Committee. While paramedics are able to interpret the ECG in most cases and make treatment decisions, several Ambulance Trusts successfully use telemetry to transmit ECGs for a 'second opinion' from senior clinicians e.g. in ambulance control or hospitals. Ensuring patients with symptoms suggestive of a heart attack are attended rapidly by a suitably trained paramedic is a key challenge for ambulance services.

To date more than 14,000 patients have received pre-hospital thrombolytic treatment from paramedics. Pre-hospital treatment saves 30-35 minutes on average compared with similar patients who are treated in hospital. Research has shown that saving this time at an early stage following the onset of a heart attack reduces mortality.

In those parts of the country where there has been a rapid increase in access to primary angioplasty, pre-hospital thrombolysis is now rarely given. However the ambulance service still serves an important role. The need for rapid transfer from home to interventional centre or from local admitting hospital to interventional centre puts additional strains on ambulance services, as journey distances may be longer and ambulance crews may be occupied with single patients for longer periods. This has knock-on effects on other emergency work.

3. Use of secondary prevention medication on discharge

After initial emergency treatment aimed at minimising the extent of heart muscle damage the emphasis of management shifts to treatments that reduce the likelihood of future heart attacks. Anything that might achieve this is regarded as secondary prevention treatment. Such treatment appears to be effective whether the heart attack was initially accompanied by ST elevation on ECG (and managed by reperfusion therapy) or was a non-ST elevation infarction.

Secondary prevention may include life style changes, including cessation of cigarette smoking and eating a healthy diet rich in fruit, vegetables and fish oils, educational initiatives and cardiac rehabilitation that promotes regular physical activity, as well as drug treatments.

Of the available secondary preventive drugs, MINAP has previously reported the prescription of aspirin, beta blockers and statin drugs in all patients discharged from hospital following heart attack. This audit of drug prescription was based upon standards of care outlined in the National Service Framework for Coronary Heart Disease in 2000.

The National Institute for Health and Clinical Excellence published updated guidelines in 2007 for the longer term treatment of people who have had a heart attack [7]. They have also published a Technology Appraisal on the use of clopidogrel in the treatment of non-ST segment elevation acute coronary syndromes [8].

These most recent national guidelines recommend that all patients who have had an acute heart attack should be offered long term treatment with a combination of the following drugs

- Angiotensin converting enzyme (ACE) inhibitor
- aspirin
- beta blocker
- statins

[7] http://guidance.nice.org.uk/CG48
[8] www.nice.org.uk/TA080

provided each drug is tolerated by the patient, and that the patient has no medical reason to avoid the drug.

In addition those patients who have received clopidogrel in combination with low dose aspirin during the acute phase of their heart attack should continue to take the combination (aspirin/clopidogrel) for 4 weeks in those presenting with ST segment elevation during the acute event and up to 12 months in the rest.

So, this MINAP report now includes information of the discharge prescription of the following drugs:

- ACE inhibitors/or angiotensin receptor blockers
- aspirin
- beta blockers
- clopidogrel
- statins

For more information see Appendix 2.

4. Cardiac Networks

Most Cardiac Networks (also known as 'heart and stroke networks' since they also now facilitate improvements in stroke care) are local NHS organisations made up of clinicians, managers, commissioners and patients who work together to improve patient care. They link clinicians involved in every aspect of patient care through the in primary, ambulance, secondary and tertiary care. These networks of care are intended to deliver a uniform standard of high quality care to all patients.

Cardiac Networks have immense potential to improve the way that services are planned and delivered for both staff and patients. Bringing together clinicians, managers and commissioners they can see the cardiac pathway as a whole and provide a powerful voice in the local health economy to enable frontline staff to secure the changes they need to deliver for their patients. They also provide a forum through which the public can influence their services. Some Cardiac Networks have patient carer representatives providing a voice, among the professionals, for the delivery of high quality care. See the NHS Improvement website for more detail on Cardiac Networks; http://www.improvement.nhs.uk.

5. Data quality

MINAP relies on hospitals and ambulance services providing high quality data. The information published in this report is an analysis of data provided by hospitals and ambulance services. MINAP continuously monitors the completeness of 20 key data fields. In 2008/9 data completeness of the 20 key fields was 97% nationally. All hospitals are required to undertake an annual data validation study in order to check the accuracy of data entry. This year all hospitals in Wales participated and 97% of hospitals in England participated.

part 2

Results

All hospitals in England and all hospitals in Wales that treat heart attack patients submit data to MINAP. The 210 hospitals in England and 18 hospitals in Wales are listed alphabetically in Tables 1-3, 5, 6, 8 and 9 with the location of the hospital alongside its name.

Low numbers Analyses are not meaningful if a hospital has less than 20 cases for analysis for the year and no percentages are shown in the results table. The number of records is shown in the tables as n. There are several reasons why hospitals may have less than 20 patients in the analyses.

- In hospitals providing a primary angioplasty service, most patients receive primary angioplasty rather than thrombolytic treatment. The delay before primary angioplasty is not directly comparable with that before thrombolytic treatment, and the delays before the two treatments cannot be combined for these analyses.
- Hospitals that do not provide primary angioplasty may send their patients to a primary angioplasty centre. Few if any will receive thrombolytic treatment.
- About 18% patients now make their own way to hospital without involving either the ambulance service or their GP, see Figure 1. These patients are excluded from analyses of call to needle time and may account for small numbers in some hospitals.
- Smaller hospitals report low numbers of heart attack patients.
- The number of patients having ST segment elevation heart attacks is falling.
- Hospitals may have only recently started a primary angioplasty service in 2008/9 or have performed primary angioplasty on an opportunistic basis when a catheter laboratory was available.

1. Hospitals using thrombolytic treatment

The standard for thrombolytic treatment to be given within 60 minutes of calling for professional help (call to needle time) is a joint responsibility of hospitals and ambulance services. The target of 68% treated within 60 minutes in England and 70% within 60 minutes in Wales has not altered from 2007/8.

Tables 1 and 2 show hospital thrombolytic treatment data for April 2007 to March 2008, and April 2008 to March 2009. Ambulance service data for 2007/8 and 2008/9 are shown in Table 4. Data for Cardiac Networks are shown in Table 7.

1.1 Hospital performance in relation to the national standard for thrombolytic treatment given within 60 minutes of calling for help

The percentages in bold indicate that a hospital reached or was above the national target of 68% for England (Table 1) and 70% for Wales (Table 2) in 2008/9. It is not expected that each individual hospital will achieve 68% but that they will deliver a 10% point improvement each year

to contribute towards the national standard level. In 2008/9 in England many hospitals have exceeded the national target level previously set at 68%.

- In 2008/9, 71% of English hospitals with their associated ambulance services, reached or exceeded the English national target of 68% for the delivery of thrombolytic treatment within 60 minutes of patients calling for professional help, compared to 66% in 2007/8 *.
- No Welsh hospitals achieved the national target of 70%.

The change in percentage of eligible patients in England and Wales treated with thrombolytic treatment within 60 minutes of calling for help between 2003 and 2008 is shown in Figure 2.

1.2 Hospital performance in relation to the national standard for thrombolytic treatment given within 30 minutes of hospital arrival

In Tables 1 and 2, the percentages in bold type indicate that the hospital met or exceeded 75% of patients receiving thrombolytic treatment within 30 minutes of hospital arrival.

- 83% of eligible patients in England received thrombolytic treatment within 30 minutes of arrival at hospital compared to 84% in 2007/8.
- In Wales 73% of eligible patients received thrombolytic treatment within 30 minutes of arrival at hospital compared to 67% in 2007/8.
- 82% of hospitals in England provided thrombolytic treatment to 75% of eligible patients within 30 minutes of arrival at hospital, compared to 90% in 2007/8. *
- In Wales 50% of hospitals provided thrombolytic treatment to 75% of eligible patients within 30 minutes of arrival at hospital, compared to 42% in 2007/8.

2. Hospitals that perform primary angioplasty

The use of primary angioplasty continues to increase rapidly as more hospitals are able to provide this procedure. In England, 66 hospitals performed primary angioplasty compared to 54 in 2007/8, although 14 of these hospitals performed less than 10 cases in 2008/9. These hospitals may have just started a primary angioplasty service. In Wales 2 hospitals perform primary angioplasty.

The hospitals performing primary angioplasty may provide this for their own patients only or may do so for groups of other hospitals. The ambulance service will take suitable patients directly to angioplasty centres, bypassing the local hospital completely. Patients who are taken to a local hospital and then transferred for angioplasty at another hospital contributed less than 15% of all primary angioplasties in 2008/9.

In 2008/9 more than 47% patients having immediate reperfusion treatment for a heart attack received primary angioplasty. The change in reperfusion strategies since 2003 is shown in Figure 4. By the end of 2009 it is estimated that more that 50% patients having reperfusion treatment for heart attack will have a primary angioplasty.

As mentioned above, in interventional hospitals the number of patients that receive thrombolytic treatment is often too small to enable meaningful analysis of the thrombolytic treatment standard.

In England in 2008/9, 7351 patients were treated with primary angioplasty, compared with 4035

* the denominator does not include hospitals having less than 20 cases.

in 2007/8, an increase of 82%. These figures relate to patients that had unequivocal symptoms and ECG changes for heart attack on admission to hospital and do not include patients whose symptoms and ECG changes developed subsequently. In Wales 118 patients were treated with primary angioplasty compared with 42 in 2007/8, an increase of 181%. During the year 2008/9 a full 24-hour primary angioplasty service became available in one of the interventional centres in Wales.

Coupled with a substantial increase in numbers of primary angioplasties performed there has been a continuing improvement in the median interval from arrival in hospital and angioplasty; in England this time was 50 minutes (IQR 32, 75), implying that for a quarter of patients the angioplasty procedure had begun within 32 minutes of arrival, within 50 minutes for half and within 75 minutes for three quarters. The corresponding result in 2007/8 was 56 minutes (IQR 34, 84). In Wales this was 57 minutes (IQR 37, 85) compared with 75 minutes (IQR 56, 113) in 2007/8.

The interval from arrival at the interventional centre is only one part of the patient journey from onset of symptoms to treatment, and effective care also involves the response of the ambulance service, and where relevant, the non interventional hospital to which the patient may be brought in the first instance. In England 84% of patients were treated by primary angioplasty within 90 minutes of arrival compared with 79% in 2007/8. In Wales 74% of patients had treatment within 90 minutes of arrival compared with 57% in 2007/8.

In 2008/9 the median interval from the onset of symptoms to angioplasty, a figure that takes into account the delay before a patient calls for help, the time taken to reach hospital, and the time from arrival to treatment was 180 minutes (IQR 132, 283). This is measured for patients who use the emergency service and excludes patients that self present to hospital.

3. Ambulance service performance in relation to the national standard for thrombolytic treatment given within 60 minutes of calling for help

This is a shared standard between hospitals and ambulance services and so the ambulance service performance includes the performance of their associated hospitals. There are 12 ambulance services in England and one in Wales.

In Table 4, the percentages in bold type indicate that an ambulance service in England reached or was above the national target of 68% for the 60 minute target for 2008/9. The national target in Wales is 70%. The number of eligible patients that received pre-hospital thrombolysis and primary angioplasty are also shown for each ambulance service.

- 11 of the 12 ambulance services in England and the Welsh ambulance service give thrombolytic treatment to patients before they reach hospital (pre-hospital thrombolysis). The London Ambulance Service is the exception and takes all eligible patients directly to primary angioplasty hospitals rather than give pre-hospital thrombolytic treatment.
- In 2008/9, 2766 patients received pre-hospital thrombolytic treatment in England and Wales, compared with 3095 patients in 2007/8, a decrease of 11%. This fall is in step with the overall fall in use of thrombolytic treatment and increase in use of primary angioplasty.
- In 2008/9, 93% of patients in England that received pre-hospital thrombolytic treatment received it within 60 minutes of calling for help, compared with 94% in 2007/8. In Wales the percentage of patients that received pre-hospital thrombolytic treatment within 60 minutes of calling for help was 92% in 2008/9 and 91% in 2007/8.

- 24% of all thrombolytic treatment was given before arrival in hospital compared to 22% in 2007/8, see Figure 4.
- 7/11 (64%) of ambulance services in England reached or exceeded the national target of 68% for 2008/9 for delivering thrombolytic treatment within 60 minutes of patients calling for professional help, the same as in 2007/8. In the remaining 4 ambulance services, between 60% and 65% of patients received thrombolytic treatment within 60 minutes of calling for professional help.
- The Welsh Ambulance Service did not achieve any significant change in the proportion (47%) of patients receiving thrombolytic treatment within 60 minutes of calling for help, which remains below the national target of 70%.

4. Use of secondary prevention medication on discharge

The proportion of heart attack patients in England and Wales prescribed secondary prevention medication on discharge from hospital continues to exceed the standards for aspirin, beta blockers and statins, (Tables 5 and 6). All patients having heart attack who survive to leave hospital are included here, but patients transferred to another hospital are excluded. The changing use of aspirin, beta blockers, statins, ACE inhibitors and clopidogrel since 2003 is shown in Figure 5.

- In England prescription of aspirin following heart attack remains at 98% and beta blockers increased from 92% to 93%. The use of statins was 97% (2007/8 96%).
- In Wales prescription of aspirin was 98%, beta blockers, 96% and prescription of statins 96% (97% in 2007/8).

There are no national standards for the prescription of ACE inhibitors or clopidogrel. Hospitals are able to benchmark their use against the national data but some hospitals do not collect these data routinely.

Clopidogrel was prescribed on discharge to 94% of eligible patients in England and to 94% in Wales. ACE inhibitors were prescribed to 92% of eligible patients in England and 93% in Wales.

The results presented in the report are for patients discharged following both ST elevation and non-ST elevation myocardial infarction because these drugs are effective in both types of heart attack.

5. Results by Cardiac Network

We show analyses by Cardiac Networks Table 7. Following mergers there were 28 Cardiac Networks In England in 2008/9 (2007/8, 30). The percentages in bold type indicate that a Cardiac Network reached or was above the national target of 68% for the 60 minute standard. All networks exceeded 80% for the use of aspirin, beta blockers, and statins. Use of ACE inhibitors and clopidogrel also exceeded 80%, although there is no standard set for use of these drugs. Data are available on request. Results from the 3 Cardiac Networks in Wales are aggregated.

- 18/23 (78%) of the English Cardiac Networks achieved the English national target (68%) for the delivery of thrombolytic treatment with 60 minutes of patients calling for professional help. In a further 3 networks between 60-67% of patients received

thrombolytic treatment within 60 minutes of calling for professional help. *

- 3/28 (11%) of English Cardiac Networks have restricted access to primary angioplasty services (less than 10 cases in 2008/9).

6. Care for patients with non-ST segment elevation infarction

For some years the focus of heart attack management has been upon the early provision of reperfusion treatment to those patients presenting with ST elevation on their ECG (ST elevation infarction). In fact, as is apparent from the results presented in this report, some hospitals have chosen to collect data only, or mainly, with respect to this type of heart attack. However, non-ST segment elevation infarctions represent the majority of heart attacks, and outnumber ST segment elevation infarctions by about three to one. They are less severe in the sense that the early death rate – the first few days – is certainly lower for non-ST elevation infarction, but taken over a longer time span (2-3 months) the risk of death is equal or higher. Because non-ST elevation infarctions have a lower early risk of death, and perhaps because they do not require very rapid emergency treatment (reperfusion therapy), they are not always admitted to cardiac care units, and are not always cared for by cardiologists.

However, specialist involvement is important, and it is recognised that performance of angiography and coronary intervention within the first 2-3 days is an important facet of treatment for the majority of patients. In previous years access to angiography and coronary intervention was limited by capacity constraints. The development of 72 new catheter laboratories in hospitals in England and Wales since 2001 has had a major impact on access to this important routine procedure.

Care for non-ST elevation infarction has become more complex, and the treatment options greater. This is a condition that requires access to specialist involvement, so that even if a patient with a non-ST elevation infarction is admitted under a physician who is not primarily a cardiologist, he or she should have access to cardiological advice.
Ideally admission should be to a cardiac facility where nursing staff have a cardiac nursing background, and there is easy access to cardiological expertise. In England only 46% patients with non-ST infarction were admitted to a cardiac ward in 2008/9 and in Wales this was 59%. However, regardless of where a patient was admitted, cardiological involvement in care during the admission was high; 80% of patients in England saw a member of a cardiology team during the admission, and 72% in Wales.

In future we intend to provide information on the use of angiography and coronary interventions for this large group of patients and will encourage all hospitals to confirm the importance placed on the care of these patients by collecting appropriate data.

7. Change in mortality for heart attack patients

Mortality data are obtained from the Office of National Statistics by CCAD. The percentage of patients having ST elevation myocardial infarction who die within 30 days of admission to hospital has fallen annually from 2003-2008. The data are for all patients and all age groups, see Figure 6.

* The denominator does not include Cardiac Networks having less than 20 cases

8. Results by hospitals, ambulance services and cardiac networks

Table 1 Thrombolytic treatment in hospitals in England

	Thrombolytic treatment within 30 mins of hospital arrival				Thrombolytic treatment within 60 mins of calling for help			
Year	**2007-08**		**2008-09**		**2007-08**		**2008-09**	
Target	**75%**				**68%**			
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**
England national average	**84%**	**5824**	**83%**	**4391**	**71%**	**7303**	**72%**	**5470**
Hospital								
Addenbrookes Hospital, Cambridge	**79%**	39		11	**89%**	75	**87%**	38
Airedale General Hospital, Steeton		12		2		11		4
Arrowe Park Hospital, Wirral	**90%**	71	**84%**	74	**80%**	81	**79%**	62
Barnet General Hospital, Barnet		0		0		0		0
Barnsley District General Hospital, Barnsley	**80%**	69	**82%**	51	**69%**	55	61%	46
Barts & the London, London		0		1		0		1
Basildon Hospital, Basildon	**81%**	37	**86%**	56	**89%**	57	**87%**	90
Bassetlaw District General Hospital, Nottingham	**100%**	30	**100%**	29	**87%**	30	**96%**	26
Bedford Hospital, Bedford	**81%**	47	**89%**	36	57%	42	**68%**	37
Birmingham Heartlands Hospital, Birmingham		5		5		5		4
Bishop Auckland General Hospital, Bishop Auckland	**97%**	30		3	**88%**	33		2
Bradford Royal Infirmary, Bradford		17		14		12		17
Bridlington & District Hospital, Bridlington	**91%**	22		4	50%	22		5
Bristol Royal Infirmary, Bristol		0		2		10		13
Broomfield Hospital, Chelmsford	**81%**	36	**82%**	28	**73%**	56	**84%**	76
Calderdale Royal Hospital, Halifax	**92%**	25		4		18		5
Castle Hill Hospital, Hull		0		8		0		18
Central Middlesex Hospital, London		0		0		0		0
Charing Cross Hospital, London		1		1		1		0
Chase Farm Hospital, Enfield		0		0		0		0
Chelsea & Westminster Hospital, London		3		2		1		1
Cheltenham General Hospital, Cheltenham	**93%**	28	**85%**	26	62%	39	48%	31
Chesterfield Royal, Chesterfield	**93%**	54	**89%**	37	**71%**	86	**81%**	83

Table 1 Thrombolytic treatment in hospitals in England

	Thrombolytic treatment within 30 mins of hospital arrival				Thrombolytic treatment within 60 mins of calling for help			
	2007-08		2008-09		2007-08		2008-09	
Year	75%				68%			
Target	%	n	%	n	%	n	%	n
England national average	**84%**	**5824**	**83%**	**4391**	**71%**	**7303**	**72%**	**5470**
Chorley Hospital, Chorley	**81%**	21	**79%**	28	**71%**	24	**83%**	24
City Hospital, Birmingham		2		0		3		0
Colchester General Hospital, Colchester	**98%**	40	**85%**	20	**74%**	65	**85%**	60
Conquest Hospital, St Leonards on Sea	**88%**	42	**96%**	26	**73%**	51	**83%**	30
Countess of Chester Hospital, Chester	**83%**	54	**83%**	47	**76%**	50	**85%**	53
County Hospital Hereford, Hereford	**87%**	23		19	**73%**	41	**76%**	33
County Hospital Louth, Louth		11		11		14		14
Cumberland Infirmary, Carlisle	71%	59	63%	54	54%	78	58%	65
Darent Valley Hospital, Dartford	**89%**	27	**81%**	37	**86%**	21	**71%**	21
Darlington Memorial Hospital, Darlington	**90%**	20		1	**79%**	24		2
Derby Royal Infirmary, Derby	**90%**	52	**92%**	53	**78%**	85	**80%**	92
Derriford Hospital, Plymouth	**78%**	46	60%	47	**68%**	100	63%	86
Dewsbury District Hospital, Dewsbury		8		2		5		1
Diana, Princess of Wales Hospital, Grimsby	**84%**	31	**89%**	27	**72%**	50	**80%**	50
Doncaster Royal Infirmary, Doncaster	**96%**	107	**95%**	82	**80%**	86	**87%**	69
Dorset County Hospital, Dorchester	73%	26		15	**68%**	57	**69%**	32
Ealing Hospital, Southall		0		0		0		0
East Surrey Hospital, Redhill	**81%**	43	**85%**	33	**79%**	63	**76%**	25
Eastbourne DGH, Eastbourne	**91%**	34	**87%**	31	**69%**	26	**90%**	30
Epsom Hospital, Epsom		18	**87%**	23		18	**75%**	20
Fairfield General Hospital, Bury	74%	39	**78%**	37	60%	30	67%	27
Freeman Hospital, Newcastle		0		0		0		0
Frenchay Hospital, Bristol	**80%**	35	68%	22	**74%**	42	**74%**	39
Friarage Hospital, Northallerton		0		0		0		0
Frimley Park Hospital, Frimley	**85%**	53	74%	31	**78%**	50	**85%**	34
Furness General, Barrow-in-Furness	**100%**	25		13	**78%**	27		16
George Elliot Hospital, Nuneaton	**88%**	41	**90%**	21	64%	53	**82%**	28

Glenfield Hospital, Leicester	**97%**	38	**100%**	32	**74%**	72	**77%**	100
Gloucestershire Royal Hospital, Gloucester	**95%**	38	**95%**	41	50%	46	41%	49
Good Hope General Hospital, Sutton Coldfield	**93%**	41	**92%**	37	**81%**	47	**82%**	34
Grantham & District General, Grantham	**85%**	20		12	57%	23	60%	20
Hammersmith Hospital, London		0		0		0		0
Harefield Hospital, Middlesex		0		0		0		0
Harrogate District Hospital, Harrogate	**93%**	28		5	**91%**	22		5
Heatherwood Hospital, Ascot		7		4		14		8
Hemel Hempstead General, Hemel Hempstead		1		0		0		0
Hexham General Hospital, Hexham		7		2		3		3
Hillingdon Hospital, Uxbridge		0		1		0		1
Hinchingbrooke Hospital, Huntingdon		15		7	**80%**	41		16
Homerton Hospital, London		0		0		0		0
Hope Hospital, Manchester	**80%**	20	67%	30		15	**68%**	22
Horton General Hospital, Banbury		11		5		11		7
Huddersfield Royal Infirmary, Huddersfield	**83%**	29		3	**73%**	26		2
Hull Royal Infirmary, Hull	72%	78	**85%**	82	49%	80	56%	90
James Cook University Hospital, Middlesbrough		0		0		0		1
James Paget Hospital, Great Yarmouth	**95%**	21		17	**86%**	79	**96%**	67
John Radcliffe Hospital, Oxford		12		1	35%	20		1
Kent & Sussex Hospital, Tunbridge Wells	**78%**	23	73%	33	50%	30	60%	20
Kent & Canterbury Hospital, Canterbury	**100%**	22	**90%**	21	**74%**	43	**88%**	24
Kettering General Hospital, Kettering	**92%**	25	**87%**	31	**89%**	45	**78%**	40
King George Hospital, Goodmayes		0		0		0		0
King's College Hospital, London		0		3		0		3
Kings Mill Hospital, Nottingham	**87%**	62	**84%**	69	**78%**	72	60%	86
Kingston Hospital, Kingston-upon-Thames		0		0		0		0
Leeds General Infirmary, Leeds		6		19		7		14
Leicester Royal Infirmary, Leicester	**79%**	94	69%	39	47%	91	30%	27
Leighton Hospital, Crewe	**82%**	51	**76%**	55	63%	49	**70%**	57
Lincoln County Hospital, Lincoln	**97%**	35	69%	29	**79%**	56	**69%**	45
Lister Hospital, Stevenage	**84%**	32	**92%**	24	36%	28	47%	32
Liverpool Heart and Chest Hospital, Liverpool		0		1		0		0
Luton & Dunstable Hospital, Luton	**82%**	44	**83%**	42	**76%**	34	**84%**	45
Macclesfield District General, Macclesfield	**78%**	23		18	**71%**	24		17
Maidstone General Hospital, Maidstone	69%	32	**78%**	23	**70%**	33		13

Table 1 Thrombolytic treatment in hospitals in England

	Thrombolytic treatment within 30 mins of hospital arrival				Thrombolytic treatment within 60 mins of calling for help			
Year	**2007-08**		**2008-09**		**2007-08**		**2008-09**	
Target	**75%**				**68%**			
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**
England national average	**84%**	**5824**	**83%**	**4391**	**71%**	**7303**	**72%**	**5470**
Manchester Royal Infirmary, Manchester	71%	38		2	**68%**	28		
Manor Hospital, Walsall		0		0		1		0
Mayday University Hospital, Croydon		0		0		0		0
Medway Maritime Hospital, Gillingham	**86%**	42	**88%**	40	**69%**	67	**81%**	43
Milton Keynes General Hospital, Milton Keynes	**80%**	49	**88%**	40	66%	41	54%	35
Montagu Hospital, Mexborough		14		3		11		3
New Cross Hospital, Wolverhampton		0		2		2		2
Newark Hospital, Newark	**100%**	21		17		11		10
Newham General Hospital, London		0		0		0		0
Norfolk & Norwich Hospital, Norwich	**100%**	39	**95%**	22	**74%**	152	**81%**	143
North Devon District Hospital, Barnstable	**91%**	23	**96%**	28	67%	46	**74%**	35
North Hampshire Hospital, Basingstoke		10		7		14		8
North Manchester General Hospital, Manchester	**88%**	42	**78%**	23	**85%**	34		19
North Middlesex Hospital, London		1		1		0		1
North Tyneside General Hospital, North Shields	**89%**	44		6	**81%**	42		7
Northampton General Hospital, Northampton	**96%**	49	**95%**	43	**71%**	63	**84%**	57
Northern General Hospital, Sheffield	**90%**	21		2		15		0
Northwick Park Hospital, Harrow		3		0		2		0
Nottingham City Hospital, Nottingham	**85%**	20		3	**71%**	34		7
Papworth Hospital, Cambridge		0		0		0		0
Peterborough District Hospital, Peterborough	**92%**	26		11	**78%**	72	**74%**	47
Pilgrim Hospital, Boston	**83%**	46	74%	31	60%	73	62%	61
Pinderfields General Hospital, Wakefield		12		3		8		1
Pontefract General Infirmary, Pontefract		6		2		10		2
Poole Hospital, Poole	**77%**	26	**86%**	22	**72%**	32	**92%**	26
Princess Alexandra Hospital, Harlow	**82%**	55	74%	35	66%	62	**69%**	45
Princess Royal Hospital, Haywards Heath	**92%**	24		16	**74%**	23		13

Princess Royal Hospital, Telford	**77%**	26		15	66%	32	**83%**	29
Princess Royal University Hospital, Orpington		0		0		0		0
Queen Alexandra Hospital, Portsmouth	**88%**	80	**79%**	72	**80%**	116	51%	86
Queen Elizabeth Hospital, King's Lynn	**80%**	20		9	59%	69	**80%**	41
Queen Elizabeth Hospital, Birmingham		0		0		0		0
Queen Elizabeth Hospital, Gateshead		19		2	**95%**	39		3
Queen Elizabeth Hospital, Woolwich		1		0		1		0
Queen Elizabeth II Hospital, Welwyn Garden City	**85%**	26		12		17		11
Queen Elizabeth the Queen Mother, Margate	**95%**	22	**86%**	36	**77%**	31	**93%**	29
Queen Mary's Hospital, Sidcup		11		2		7		1
Queen's Hospital, Romford		0		0		0		0
Queen's Hospital, Burton-upon-Trent	**86%**	43	**77%**	22	64%	55	**70%**	33
Rochdale Infirmary, Rochdale	69%	52	**94%**	54	**69%**	36	**91%**	32
Rotherham General Hospital, Rotherham	**89%**	66	**93%**	42	**77%**	52	**69%**	35
Royal Albert Edward Infirmary, Wigan	**97%**	71	**96%**	110	**85%**	65	**87%**	89
Royal Berkshire Hospital, Reading	**81%**	37	**94%**	48	**75%**	76	**78%**	74
Royal Blackburn Hospital, Blackburn	**81%**	75	**88%**	113	66%	83	**81%**	129
Royal Bolton Hospital, Bolton	**87%**	78	**85%**	79	**77%**	70	**78%**	64
Royal Bournemouth General Hospital, Bournemouth	**76%**	33	**94%**	36	**78%**	58	**68%**	44
Royal Cornwall Hospital, Truro	**76%**	41	68%	34	60%	94	**70%**	101
Royal Devon & Exeter Hospital, Exeter		5		0		5		0
Royal Free Hospital, London		2		0		2		0
Royal Hallamshire Hospital, Sheffield	**79%**	47		4	65%	40		4
Royal Hampshire County Hospital, Winchester	**89%**	37	**91%**	32	59%	27	55%	22
Royal Lancaster Infirmary, Lancaster	**93%**	29	73%	45	48%	33	39%	41
Royal Liverpool University Hospital, Liverpool	**89%**	62	**89%**	63	**74%**	46	**83%**	46
Royal London Hospital, London		0		0		0		0
Royal Oldham Hospital, Oldham	**82%**	66	**85%**	75	**78%**	50	**91%**	45
Royal Preston Hospital, Preston	**89%**	37	**94%**	48	**79%**	38	**73%**	37
Royal Shrewsbury Hospital, Shrewsbury	**80%**	20		19	**75%**	32	63%	24
Royal Surrey County Hospital, Guildford	**91%**	32	68%	22	**74%**	31	**78%**	23
Royal Sussex County Hospital, Brighton	**90%**	52	**84%**	31	**70%**	50	**85%**	33
Royal United Hospital Bath, Bath	**85%**	54	**76%**	21	45%	98	66%	82
Royal Victoria Infirmary, Newcastle	**85%**	46		3	**72%**	61		3
Russells Hall Hospital, Dudley		4		2		3		1

Table 1 Thrombolytic treatment in hospitals in England

	Thrombolytic treatment within 30 mins of hospital arrival				Thrombolytic treatment within 60 mins of calling for help			
Year	**2007-08**		**2008-09**		**2007-08**		**2008-09**	
Target	**75%**				**68%**			
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**
England national average	**84%**	**5824**	**83%**	**4391**	**71%**	**7303**	**72%**	**5470**
Salisbury District Hospital, Salisbury	**84%**	38	**91%**	33	51%	43	45%	33
Sandwell District Hospital, West Bromwich		0		2		1		2
Scarborough General Hospital, Scarborough	**88%**	42	**91%**	23	41%	39	**72%**	32
Scunthorpe General Hospital, Scunthorpe	**89%**	27	**90%**	40	**71%**	56	61%	46
Selly Oak Hospital, Birmingham	**80%**	46	**90%**	30	**73%**	44	**75%**	24
Skegness District Hospital, Skegness		9		9		1		1
Solihull General Hospital, Birmingham		7		2		1		0
South Tyneside District Hospital, South Shields	**86%**	37		1	**87%**	47		2
Southampton General Hospital, Southampton	**77%**	65		7	63%	97		19
Southend Hospital, Westcliffe on Sea	**91%**	46	**81%**	31	**82%**	88	**85%**	93
Southmead Hospital, Bristol		19		5	60%	30		8
Southport & Formby District General, Southport	**98%**	45	**100%**	22	**79%**	39	**89%**	27
St George's Hospital, London		1		1		1		1
St Helier Hospital, Carshalton		0		1		0		1
St Mary's Hospital, Newport	**81%**	37	**81%**	26	59%	51	**68%**	31
St Mary's Hospital, London		1		0		1		0
St Peter's Hospital, Chertsey	**97%**	30	**95%**	38	**70%**	43	**94%**	31
St Richard's Hospital, Chichester	**83%**	46	**76%**	37	52%	42	**91%**	32
St Thomas Hospital, London		1		1		1		1
Staffordshire General Hospital, Stafford	**78%**	23		16	**73%**	45	50%	20
Stepping Hill Hospital, Stockport	**95%**	40	**87%**	46	**85%**	33	62%	45
Stoke Mandeville Hospital, Aylesbury	**82%**	28	**80%**	20	**68%**	22		13
Sunderland Royal Hospital, Sunderland	**86%**	28		3	**89%**	37		2
Tameside General Hospital, Ashton under Lyme		14	**82%**	39		12	61%	33
Taunton & Somerset Hospital, Taunton		15		13	**88%**	33	**94%**	36
The Alexandra Hospital, Redditch	**88%**	34	**89%**	35	63%	48	36%	33
The Great Western Hospital, Swindon	**97%**	67	**98%**	44	59%	81	**74%**	58

The Ipswich Hospital, Ipswich	65%	37	**79%**	33	66%	93	**72%**	96
Torbay Hospital, Torquay	**90%**	42	68%	22	**78%**	85	61%	28
Trafford General Hospital, Manchester		16		5		14		4
University College Hospital Gower Street, London		0		0		0		0
University College Hospital, London		1		0		1		0
University Hospital Aintree, Liverpool	**96%**	70	**90%**	49	**80%**	65	60%	43
University Hospital Lewisham, London		0		0		0		0
University Hospital of Hartlepool, Hartlepool	**83%**	24		0	**74%**	27		0
University Hospital of North Durham, Durham	**100%**	36		4	**69%**	71		6
University Hospital of North Staffordshire, Stoke-on-Trent	**80%**	50		17	**85%**	119	**88%**	58
University Hospital of North Tees, Stockton on Tees	69%	29		1	62%	29		0
University Hospital Queens Medical, Nottingham	**88%**	58	**86%**	37	67%	81	**75%**	52
Victoria Hospital, Blackpool	**90%**	70	**86%**	63	**84%**	75	**83%**	58
Walsgrave Hospital, Coventry	**91%**	35		19	**73%**	48	**79%**	24
Wansbeck General Hospital, Ashington	**77%**	31		7	**88%**	43		9
Warrington District General Hospital, Warrington	**81%**	47	**78%**	40	**69%**	61	**83%**	42
Warwick Hospital, Warwick	**78%**	32		9	63%	35		11
Watford General Hospital, Watford		1		0		0		0
West Cornwall Hospital, Penzance		3		3		2		1
West Cumberland Hospital, Whitehaven	64%	36	**91%**	43	38%	37	51%	41
West Middlesex University Hospital, Isleworth		0		0		0		0
West Suffolk Hospital, Bury St Edmunds		16	52%	25	**78%**	83	65%	80
Westmoreland General Hospital, Kendal		13		4		13		4
Weston General Hospital, Weston-super- Mare		17		11		13		13
Wexham Park Hospital, Slough	70%	30	**80%**	25	**82%**	33	**77%**	31
Whipps Cross Hospital, London		0		0		1		3
Whiston Hospital, Prescott	**88%**	60	**81%**	81	**74%**	65	**70%**	73
Whittington Hospital, London		0		0		0		0
William Harvey Hospital, Ashford	**82%**	49	**82%**	33	**94%**	32	**96%**	24
Worcester Royal Infirmary, Worcester	62%	45	68%	57	56%	59	40%	42
Worthing Hospital, Worthing	49%	35	**81%**	26	67%	33	**89%**	27
Wycombe General Hospital, High Wycombe	**76%**	66	**84%**	50	42%	38	47%	43
Wythenshawe Hospital, Manchester	**87%**	38		3	**79%**	29		3
Yeovil District Hospital, Yeovil		14	**82%**	22	**81%**	36	**74%**	35
York District Hospital, York	**91%**	44		7	64%	45		7

Table 2 Thrombolytic treatment in hospitals in Wales

	Thrombolytic treatment within 30 mins of hospital arrival				Thrombolytic treatment within 60 mins of calling for help			
Year	**2007-08**		**2008-09**		**2007-08**		**2008-09**	
Target	**75%**				**70%**			
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**
Wales national average	**67%**	**472**	**73%**	**460**	**49%**	**522**	**48%**	**570**
Hospital								
Bronglais General Hospital, Aberystwyth		13		9		12		12
Glan Clwyd DGH Trust, Bodelwyddan	**84%**	38	**91%**	35	58%	43	48%	48
Llandough Hospital, Llandough	**75%**	20	63%	24	48%	29	49%	39
Llandudno General Hospital, Llandudno		14		7		9		5
Maelor Hospital, Wrexham	64%	39	68%	41	45%	31	52%	46
Morriston Hospital, Swansea	30%	23	**76%**	25	53%	30	64%	36
Neath Port Talbot Hospital, Neath		12		10		14		10
Nevill Hall Hospital, Abergavenny	**77%**	43	71%	35	41%	49	41%	41
Prince Charles Hospital, Merthyr Tydfil	53%	38	**86%**	35	52%	46	57%	49
Prince Philip Hospital, Llanelli		12		17		11		13
Princess of Wales Hospital, Bridgend	**93%**	27	**96%**	24	41%	22		19
Royal Glamorgan, Llantrisant	**86%**	21	**79%**	28	33%	21	38%	29
Royal Gwent Hospital, Newport	66%	44	50%	66	53%	58	41%	82
Singleton Hospital, Swansea		18		7		15		1
University Hospital of Wales, Cardiff	68%	38	65%	31	67%	55	65%	54
West Wales General, Camarthen		18	**88%**	24		18	57%	23
Withybush General Hospital, Haverfordwest	70%	30	69%	26	23%	22	44%	27
Ysbyty Gwynedd , Bangor	67%	24		16	46%	37	47%	36

Table 3 Primary angioplasty in England and Wales

	Patients receiving primary angioplasty*				Primary angioplasty within 90 mins of arrival at interventional centre				Primary angioplasty within 150 mins of calling for help	
Year	**2007-08**		**2008-09**		**2007-08**		**2008-09**		**2008-09**	
Target									**75%**	
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**
England national average	**27%**	**4035**	**47%**	**7351**	**79%**	**3907**	**84%**	**7144**	**79%**	**5994**
Barts & the London, London		3	100%	476		3	83%	442	58%	416
Basildon Hospital, Basildon		0		1						
Birmingham Heartlands Hospital, Birmingham	84%	106	91%	125	47%	106	69%	124	**84%**	109
Bradford Royal Infirmary, Bradford		5		1						
Bristol Royal Infirmary, Bristol	86%	63	92%	159	45%	60	64%	159	63%	123
Castle Hill Hospital, Hull		0		12				12		9
Cheltenham General Hospital, Cheltenham		0	35%	21				19		12
City Hospital, Birmingham	96%	67	98%	62	63%	65	58%	59	**75%**	53
Conquest Hospital, St Leonards on Sea		3	31%	23		3	65%	23		16
Darent Valley Hospital, Dartford		0		1				1		1
Derby Royal Infirmary, Derby		0		17				17		16
Dorset County Hospital, Dorchester		1		10				9		8
East Surrey Hospital, Redhill		3	34%	29		3	46%	28	56%	25
Eastbourne DGH, Eastbourne		7		11		6		11		11
Freeman Hospital, Newcastle	100%	46	100%	755	91%	46	98%	736	**83%**	678
Frenchay Hospital, Bristol		0		10				10		9
Frimley Park Hospital, Frimley		0		15				15		12
Glenfield Hospital, Leicester	47%	70	51%	116	74%	69	69%	115	**75%**	102
Hammersmith Hospital, London	100%	210	100%	219	92%	203	92%	209	**83%**	164
Harefield Hospital, Middlesex	100%	300	100%	363	100%	297	99%	348	**92%**	246
Hemel Hempstead General, Hemel Hempstead	95%	20		13		19		12		7
Hull Royal Infirmary, Hull	15%	23	13%	20	40%	20		18		17
James Cook University Hospital, Middlesborough	100%	252	100%	578	92%	251	94%	576	**86%**	463
John Radcliffe Hospital, Oxford	78%	93	98%	177	79%	91	89%	176	**89%**	160
Kettering General Hospital, Kettering		0		11				11		9
King's College Hospital, London	100%	175	98%	135	86%	159	69%	124	64%	87
Leeds General Infirmary, Leeds	98%	635	98%	936	81%	626	85%	923	**76%**	867
Lister Hospital, Stevenage		17	46%	31		16	90%	30	**96%**	23

Liverpool Heart and Chest Hospital, Liverpool		3	97%	60		3	95%	60	73%	59
Manchester Royal Infirmary, Manchester	59%	68	98%	190	45%	62	75%	179	74%	78
Mayday University Hospital, Croydon		3		4		1		2		1
New Cross Hospital, Wolverhampton	99%	428	99%	417	83%	421	82%	415	**77%**	291
Norfolk & Norwich Hospital, Norwich		0		5				5		5
North Hampshire Hospital, Basingstoke	51%	23		18	68%	22		17		14
Northern General Hospital, Sheffield	62%	61	92%	119	54%	48	75%	115	**88%**	98
Northwick Park Hospital, Harrow		0		1				1		1
Papworth Hospital, Cambridge		0	99%	91			99%	90	**87%**	86
Queen Alexandra Hospital, Portsmouth	23%	50	28%	44	52%	50	95%	44	**98%**	40
Queen Elizabeth Hospital, Birmingham		0	100%	58			98%	58	73%	52
Royal Berkshire Hospital, Reading		5	30%	39		5	82%	38	**83%**	35
Royal Bournemouth General Hospital, Bournemouth	47%	63	49%	60	79%	63	83%	60	**88%**	57
Royal Cornwall Hospital, Truro		10		11		10		11		9
Royal Devon & Exeter Hospital, Exeter	94%	148	98%	177	77%	146	85%	172	**85%**	123
Royal Free Hospital, London	96%	119	99%	164	90%	106	94%	157	**87%**	138
Royal Sussex County Hospital, Brighton	29%	31	42%	42	67%	30	43%	42	55%	38
Royal United Hospital Bath, Bath		0	19%	22			68%	22		18
Sandwell District Hospital, West Bromwich	98%	91	98%	117	63%	88	78%	108	**88%**	93
Solihull General Hospital, Birmingham		0		1				1		1
Southampton General Hospital, Southampton	38%	73	88%	143	84%	73	77%	141	**80%**	115
St George's Hospital, London	99%	131	99%	275	83%	127	79%	274	**84%**	255
St Mary's Hospital, London	98%	129	100%	50	79%	128	80%	50	68%	25
St Peter's Hospital, Chertsey		0		2						
St Thomas Hospital, London	98%	80	99%	111	53%	79	61%	110	69%	96
Sunderland Royal Hospital, Sunderland		3		6		3				
Taunton & Somerset Hospital, Taunton		0		8				8		7
The Great Western Hospital, Swindon		0		4				4		2
Torbay Hospital, Torquay		15	60%	70		14	83%	69	**78%**	60
University College Hospital, London	99%	143	100%	172	92%	142	93%	172	53%	129
University Hospital of North Staffordshire, Stoke-on-Trent	14%	23	59%	119	67%	21	82%	100	**89%**	93
Victoria Hospital, Blackpool	26%	37	43%	58	81%	36	87%	53	**91%**	43
Walsgrave Hospital, Coventry	56%	84	85%	189	85%	82	82%	184	**87%**	149
Watford General Hospital, Watford		0		3				1		
William Harvey Hospital, Ashford		3		1		3		1		1
Worthing Hospital, Worthing		10		9		10		9		7

Wycombe General Hospital, High Wycombe		6	31%	28		6	89%	28	**88%**	24
Wythenshawe Hospital, Manchester	66%	83	98%	136	67%	76	65%	135	**83%**	107
Wales national average	**5%**	**42**	**12%**	**118**	**57%**	**42**	**74%**	**116**	**77%**	**96**
Morriston Hospital, Swansea	33%	28	64%	98	54%	28	69%	97	**75%**	83
University Hospital of Wales, Cardiff	16%	14	23%	20	64%	14	100%	19	**92%**	13

* The percentage of patients having any reperfusion treatment that had primary angioplasty.

Table 4 Ambulance services in England and Wales

	Patients having thrombolytic treatment within 60 mins of calling for help				Patients having pre-hospital thrombolysis	Patients having primary angioplasty
Year	**2007-8**		**2008-9**		**2008-9**	**2008-9**
Target	**68%**					
	%	**n**	**%**	**n**	**n**	**n**
England national average	**70%**	**6960**	**72%**	5358	**2516**	**5743**
Ambulance service						
East Midlands	**69%**	908	**71%**	861	467	156
East of England	**74%**	1070	**79%**	984	752	272
Great Western	56%	375	64%	296	165	136
Isle of Wight	58%	50	**70%**	33	13	2
London		17		9	1	1358
North East	**77%**	375	65%	37	17	1198
North West	**72%**	1247	**73%**	1150	187	345
South Central	67%	503	60%	350	103	396
South East Coast	**72%**	667	**86%**	461	268	115
South Western	**70%**	555	**71%**	449	311	306
West Midlands	**71%**	646	**70%**	376	173	907
Yorkshire	66%	547	64%	352	59	552

Year	**2007-8**		**2008-9**		**2008-9**	**2008-9**
Target	**70%**					
	%	**n**	**%**	**n**	**n**	**n**
Wales	49%	530	47%	597	250	118

Data are only allocated to an ambulance service if an ambulance service code has been entered. This is the reason for any discrepancies between the number of pre-hospital thrombolysis cases recorded here and in Table 7.

Table 5 Secondary prevention medication in hospitals in England

Patients discharged on secondary prevention medication

	Aspirin		Beta blocker		Statins		ACE inhibitor		Clopidogrel	
Year 2008-9					2008-9					
Target			80%							
	%	n	%	n	%	n	%	n	%	n
England national average	**98%**	**45314**	**93%**	**40036**	**97%**	**46089**	**92%**	**42641**	**94%**	**42086**
Hospital										
Addenbrookes Hospital, Cambridge	**99%**	255	**98%**	230	**98%**	256	95%	224	97%	232
Airedale General Hospital, Steeton	**95%**	183	**83%**	169	**94%**	190	88%	173	88%	175
Arrowe Park Hospital, Wirral	**97%**	423	**88%**	343	**89%**	461	72%	402	88%	400
Barnet General Hospital, Barnet	**94%**	98	70%	97	**88%**	98	82%	97	78%	98
Barnsley District General Hospital, Barnsley	**100%**	67	**100%**	56	**100%**	68	100%	63	100%	67
Barts and the London, London	**99%**	538	**97%**	527	**99%**	539	97%	571	97%	566
Basildon Hospital, Basildon	**97%**	270	**97%**	258	**99%**	271	99%	266	98%	268
Bassetlaw District General Hospital, Nottingham	**100%**	237	**100%**	229	**97%**	247	99%	236	89%	232
Bedford Hospital, Bedford	**97%**	185	**95%**	168	**97%**	189	95%	183	95%	184
Birmingham Heartlands Hospital, Birmingham	**100%**	328	**98%**	276	**100%**	325	97%	318	99%	317
Bishop Auckland General Hospital, Bishop Auckland	**100%**	102	**99%**	94	**95%**	111	98%	86	92%	86
Bradford Royal Infirmary, Bradford	**100%**	395	**100%**	358	**100%**	395	100%	376	100%	371
Bridlington & District Hospital, Bridlington	**100%**	31	**92%**	25	**100%**	31	93%	29	100%	31
Bristol Royal Infirmary, Bristol	**97%**	423	**80%**	415	**94%**	423	83%	422	91%	422
Broomfield Hospital, Chelmsford	**99%**	347	**89%**	248	**97%**	349	91%	285	98%	303
Calderdale Royal Hospital, Halifax	**100%**	320	**99%**	270	**97%**	331	97%	299	99%	325
Castle Hill Hospital, Hull	**98%**	40	77%	39	**98%**	40	93%	40	95%	40
Central Middlesex Hospital, London	**100%**	94	**100%**	82	**99%**	99	92%	90	95%	95
Charing Cross Hospital, London	**100%**	51	**88%**	42	**100%**	51	94%	47	95%	42
Chase Farm Hospital, Enfield	**99%**	83	**90%**	83	**96%**	83	84%	82	81%	80
Chelsea & Westminster Hospital, London	**100%**	23		19	**88%**	25	78%	23	91%	22
Cheltenham General Hospital, Cheltenham	**100%**	120	**99%**	105	**100%**	118	100%	109	100%	109
Chesterfield Royal, Chesterfield	**97%**	346	**96%**	311	**97%**	361	85%	324	89%	352
Chorley Hospital, Chorley	**98%**	41	**88%**	40	**93%**	43	98%	41	95%	40
City Hospital, Birmingham	**100%**	259	**100%**	228	**100%**	257	100%	249	100%	242

Colchester General Hospital, Colchester	**100%**	483	**99%**	449	**99%**	477	97%	447	100%	456
Conquest Hospital, St Leonards on Sea	**100%**	196	**99%**	143	**98%**	205	97%	181	99%	186
Countess of Chester Hospital, Chester	**94%**	230	**87%**	204	**91%**	245	75%	234	83%	209
County Hospital Hereford, Hereford	**92%**	26	**88%**	25	**93%**	28	89%	28	83%	24
County Hospital Louth, Louth	**98%**	57	74%	57	**92%**	62	90%	60	83%	54
Cumberland Infirmary, Carlisle	**94%**	274	**86%**	218	**86%**	272	76%	271	84%	265
Darent Valley Hospital, Dartford	**95%**	202	**97%**	170	**97%**	202	91%	181	93%	193
Darlington Memorial Hospital, Darlington	**98%**	121	**92%**	116	**93%**	121	89%	121	89%	114
Derby Royal Infirmary, Derby	**98%**	585	**92%**	555	**97%**	594	88%	544	97%	571
Derriford Hospital, Plymouth	**97%**	202	**93%**	201	**96%**	199	70%	64		11
Dewsbury District Hospital, Dewsbury	**100%**	127	**99%**	110	**100%**	130	96%	123	100%	131
Diana, Princess of Wales Hospital, Grimsby	**98%**	259	**94%**	233	**97%**	277	89%	253	97%	247
Doncaster Royal Infirmary, Doncaster	**88%**	339	**95%**	301	**95%**	359	91%	341	79%	349
Dorset County Hospital, Dorchester	**100%**	247	**96%**	212	**97%**	231	97%	221	99%	242
Ealing Hospital, Southall		19	**85%**	20	**100%**	20	70%	20		14
East Surrey Hospital, Redhill	**98%**	256	**83%**	232	**92%**	262	85%	259	89%	264
Eastbourne DGH, Eastbourne	**100%**	223	**98%**	170	**100%**	228	98%	190	98%	185
Epsom Hospital, Epsom	**94%**	36	74%	27	**87%**	38	81%	32	91%	32
Fairfield General Hospital, Bury	**97%**	142	**94%**	131	**99%**	142	94%	139	98%	142
Freeman Hospital, Newcastle	**100%**	986	**97%**	923	**100%**	979	98%	929	99%	699
Frenchay Hospital, Bristol	**99%**	118	**98%**	114	**96%**	119	98%	113	90%	115
Friarage Hospital, Northallerton	**100%**	39	**100%**	34	**100%**	38	100%	31	97%	33
Frimley Park Hospital, Frimley	**100%**	337	**98%**	227	**100%**	334	99%	302	100%	327
Furness General, Barrow-in-Furness	**100%**	31	**89%**	37	**100%**	41	92%	36	94%	35
George Elliot Hospital, Nuneaton	**100%**	175	**98%**	165	**98%**	177	98%	172	98%	169
Glenfield Hospital, Leicester	**100%**	436	**100%**	397	**100%**	434	100%	376	100%	389
Gloucestershire Royal Hospital, Gloucester	**100%**	128	**100%**	99	**100%**	125	100%	108	100%	120
Good Hope General Hospital, Sutton Coldfield	**100%**	98	**100%**	74	**99%**	102	100%	103	99%	91
Grantham & District General, Grantham	**97%**	221	**92%**	168	**89%**	241	90%	192	86%	200
Hammersmith Hospital, London	**99%**	172	**92%**	142	**99%**	177	97%	171	98%	166
Harefield Hospital, Middlesex	**96%**	388	**88%**	381	**96%**	388	90%	383	93%	377
Harrogate District Hospital, Harrogate	**99%**	278	**98%**	227	**98%**	287	98%	253	97%	206
Heatherwood Hospital, Ascot		12		12		12		12		12
Hemel Hempstead General, Hemel Hempstead	**99%**	84	**97%**	75	**98%**	84	97%	79	99%	83
Hexham General Hospital, Hexham	**94%**	48	**91%**	43	**90%**	49	84%	44	84%	31
	100%	244	**99%**	165	**97%**	240	98%	205	99%	205

Hillingdon Hospital, Uxbridge											
Hinchingbrooke Hospital, Huntingdon	**95%**	43	**93%**	41	**98%**	43		76%	38	95%	40
Homerton Hospital, London	74%	23		1	**83%**	23		70%	23	63%	24
Hope Hospital, Manchester	**99%**	285	**96%**	245	**95%**	296		96%	267	95%	164
Horton General Hospital, Banbury	**100%**	108	**100%**	83	**97%**	115		93%	88	97%	109
Huddersfield Royal Infirmary, Huddersfield	**100%**	281	**95%**	232	**97%**	279		95%	233	96%	279
Hull Royal Infirmary, Hull	**94%**	406	**89%**	392	**94%**	410		81%	400	90%	401
James Cook University Hospital, Middlesbrough	**100%**	842	**99%**	759	**99%**	839		98%	813	98%	778
James Paget Hospital, Great Yarmouth	**100%**	20		16	**95%**	22		95%	21		13
John Radcliffe Hospital, Oxford	**98%**	583	**94%**	479	**97%**	578		95%	548	95%	556
Kent & Canterbury Hospital, Canterbury	**94%**	285	**90%**	247	**92%**	290		89%	260	81%	278
Kent & Sussex Hospital, Tunbridge Wells	**99%**	125	**97%**	119	**100%**	126		94%	124	99%	123
Kettering General Hospital, Kettering	**96%**	183	**89%**	169	**93%**	183		88%	164	92%	179
King George Hospital, Goodmayes	**96%**	162	**85%**	140	**97%**	165		91%	152	88%	153
King's College Hospital, London	**100%**	262	**97%**	246	**100%**	244		80%	247	99%	269
Kings Mill Hospital, Nottingham	**98%**	303	**93%**	283	**95%**	304		83%	295	95%	295
Kingston Hospital, Kingston-upon-Thames	**96%**	25	48%	25	**92%**	26		63%	24	84%	25
Leeds General Infirmary, Leeds	**98%**	438	**90%**	429	**99%**	441		85%	435	94%	429
Leicester Royal Infirmary, Leicester	**100%**	149	**100%**	151	**100%**	158		100%	146	100%	89
Leighton Hospital, Crewe	**98%**	288	**97%**	241	**97%**	302		99%	285	93%	287
Lincoln County Hospital, Lincoln	**96%**	312	**88%**	289	**97%**	319		83%	290	88%	217
Lister Hospital, Stevenage	**99%**	369	**93%**	328	**98%**	361		91%	349	98%	362
Liverpool Heart and Chest Hospital, Liverpool	**100%**	73	**100%**	70	**100%**	74		100%	72	100%	55
Luton & Dunstable Hospital, Luton	**99%**	176	**97%**	116	**99%**	182		97%	156	99%	136
Macclesfield District General, Macclesfield	**95%**	296	79%	297	**91%**	313		81%	314	70%	284
Maidstone General Hospital, Maidstone	**97%**	66	**89%**	63	**97%**	64		90%	63	100%	36
Manchester Royal Infirmary, Manchester	**98%**	269	**94%**	250	**97%**	277		88%	266	87%	257
Manor Hospital, Walsall	**87%**	113	68%	114	**92%**	118		72%	113	79%	68
Mayday University Hospital, Croydon	**99%**	137	**96%**	114	**99%**	137		92%	118	97%	116
Medway Maritime Hospital, Gillingham	**100%**	409	**98%**	380	**100%**	416		99%	400	99%	399
Milton Keynes General Hospital, Milton Keynes	**99%**	97	**96%**	96	**99%**	98		92%	98	96%	94
Montagu Hospital, Mexborough	**87%**	30		18	**87%**	31		74%	27	81%	31
New Cross Hospital, Wolverhampton	**100%**	710	**98%**	608	**99%**	725		90%	650	99%	575
Newark Hospital, Newark	**95%**	60	79%	68	**94%**	68		90%	69	82%	67
Newham General Hospital, London	**92%**	73	77%	71	**92%**	76		74%	72	69%	72
Norfolk & Norwich Hospital, Norwich	**100%**	670	**100%**	561	**100%**	677		100%	608	99%	660

North Devon District Hospital, Barnstable	**100%**	194	**99%**	98	**99%**	187	99%	128	100%	123
North Hampshire Hospital, Basingstoke	**100%**	82	**86%**	58	**100%**	84	96%	82	87%	75
North Manchester General Hospital, Manchester	**100%**	180	**98%**	156	**100%**	186	99%	178	100%	177
North Middlesex Hospital, London	**96%**	101	**83%**	95	**98%**	102	83%	101	89%	102
North Tyneside General Hospital, North Shields	**97%**	156	**99%**	140	**95%**	157	94%	140	98%	149
Northampton General Hospital, Northampton	**100%**	276	**100%**	211	**98%**	248	99%	217	99%	250
Northern General Hospital, Sheffield	**99%**	758	**99%**	624	**99%**	769	99%	600	100%	699
Northwick Park Hospital, Harrow	**100%**	434	**98%**	346	**97%**	439	98%	395	98%	405
Nottingham City Hospital, Nottingham		0		0		4		0		0
Papworth Hospital, Cambridge	**99%**	105	**85%**	102	**99%**	106	95%	105	99%	104
Peterborough District Hospital, Peterborough	**100%**	266	**100%**	188	**100%**	273	100%	231	100%	265
Pilgrim Hospital, Boston	**91%**	361	**81%**	360	**86%**	391	77%	379	87%	372
Pinderfields General Hospital, Wakefield	**97%**	209	**99%**	188	**100%**	225	96%	212	93%	211
Pontefract General Infirmary, Pontefract	**98%**	194	**99%**	183	**99%**	199	96%	179	94%	186
Poole Hospital, Poole	**97%**	29	**86%**	29	**100%**	28	90%	29	96%	28
Princess Alexandra Hospital, Harlow	**100%**	142	**99%**	129	**97%**	148	98%	134	99%	144
Princess Royal Hospital, Haywards Heath	**98%**	61	**100%**	48	**98%**	60	100%	50	93%	54
Princess Royal Hospital, Telford	**97%**	71	**88%**	65	**93%**	71	89%	70	94%	70
Princess Royal University Hospital, Orpington	78%	144	74%	143	77%	144	58%	143	75%	142
Queen Alexandra Hospital, Portsmouth	**99%**	579	**99%**	559	**98%**	566	95%	505	96%	535
Queen Elizabeth Hospital, Birmingham	**100%**	50	**100%**	42	**100%**	51	100%	49	100%	50
Queen Elizabeth Hospital, Gateshead	**95%**	206	**93%**	180	**95%**	206	90%	163	84%	201
Queen Elizabeth Hospital, King's Lynn	**98%**	286	**94%**	247	**94%**	296	95%	249	95%	258
Queen Elizabeth Hospital, Woolwich, London	**97%**	150	**92%**	127	**93%**	146	88%	142	96%	134
Queen Elizabeth II Hospital, Welwyn Garden City	**97%**	77	**88%**	68	**98%**	82	86%	66	99%	68
Queen Elizabeth the Queen Mother, Margate	**93%**	177	**86%**	170	**88%**	185	84%	161	79%	179
Queen Mary's Hospital, Sidcup	**99%**	75	**91%**	65	**95%**	83	92%	79	99%	80
Queen's Hospital Romford, Romford	**100%**	248	**100%**	212	**99%**	253	100%	252	83%	226
Queen's Hospital, Burton-upon-Trent	**99%**	177	**100%**	143	**99%**	176	99%	152	99%	162
Rochdale Infirmary, Rochdale	**99%**	207	**99%**	163	**98%**	210	98%	202	97%	196
Rotherham General Hospital, Rotherham	**99%**	281	**100%**	212	**99%**	300	98%	260	98%	287
Royal Albert Edward Infirmary, Wigan	**98%**	241	**96%**	235	**99%**	246	90%	242	97%	243
Royal Berkshire Hospital, Reading	**97%**	367	**94%**	354	**99%**	368	93%	360	97%	340
Royal Blackburn Hospital, Blackburn	**98%**	398	**93%**	355	**95%**	414	93%	386	91%	394
Royal Bolton Hospital, Bolton	**98%**	428	**92%**	395	**97%**	430	87%	409	96%	375
Royal Bournemouth General Hospital, Bournemouth	**100%**	169	**93%**	158	**99%**	169	99%	166	100%	125

Royal Cornwall Hospital, Truro	**100%**	590	**100%**	434	**100%**	545	98%	402	100%	551
Royal Devon & Exeter Hospital, Exeter	**99%**	594	**96%**	486	**93%**	607	95%	562	94%	527
Royal Free Hospital, London	**100%**	275	**98%**	212	**97%**	268	97%	239	98%	272
Royal Hallamshire Hospital, Sheffield	**100%**	79	**99%**	69	**98%**	82	98%	61	97%	70
Royal Hampshire County Hospital, Winchester	**100%**	208	**100%**	144	**99%**	209	99%	180	98%	171
Royal Lancaster Infirmary, Lancaster	**98%**	116	**98%**	113	**97%**	126	99%	122	93%	107
Royal Liverpool University Hospital, Liverpool	**100%**	179	**98%**	170	**98%**	181	96%	176	99%	152
Royal London Hospital, London		0		0		0		0		0
Royal Oldham Hospital, Oldham	**99%**	294	**95%**	256	**99%**	301	92%	294	96%	285
Royal Preston Hospital, Preston	**95%**	44	**82%**	44	**100%**	44	89%	44	88%	41
Royal Shrewsbury Hospital, Shrewsbury	**97%**	98	**87%**	90	**98%**	98	86%	92	93%	96
Royal Surrey County Hospital, Guildford	**98%**	41	**95%**	41	**95%**	41	95%	42	95%	42
Royal Sussex County Hospital, Brighton	**100%**	156	**92%**	139	**99%**	152	91%	151	94%	141
Royal United Hospital Bath, Bath	**99%**	216	**98%**	198	**99%**	222	99%	203	96%	196
Royal Victoria Infirmary, Newcastle	**100%**	301	**97%**	278	**98%**	306	98%	294	98%	296
Russells Hall Hospital, Dudley	**92%**	131	**83%**	134	**91%**	136	81%	134	85%	123
Salisbury District Hospital, Salisbury	**97%**	77	**97%**	67	**95%**	76	96%	72	89%	73
Sandwell District Hospital, West Bromwich	**100%**	303	**98%**	256	**99%**	311	98%	305	99%	305
Scarborough General Hospital, Scarborough	**98%**	115	**93%**	109	**99%**	120	92%	118	91%	116
Scunthorpe General Hospital, Scunthorpe	**85%**	371	71%	391	**90%**	391	70%	391	85%	378
Selly Oak Hospital, Birmingham	**100%**	110	**100%**	80	**100%**	106	100%	89	100%	99
Skegness District Hospital, Skegness		0		0		0		0		0
Solihull General Hospital, Birmingham	**100%**	46	**100%**	47	**100%**	50	100%	46	100%	50
South Tyneside District Hospital, South Shields	**96%**	205	**97%**	146	**95%**	207	90%	184	83%	187
Southampton General Hospital, Southampton	**100%**	603	**94%**	565	**99%**	600	96%	594	91%	577
Southend Hospital, Westcliffe on Sea	**90%**	315	**80%**	267	**92%**	308	79%	265	75%	312
Southmead Hospital, Bristol	**99%**	70	**91%**	66	**99%**	70	79%	67	97%	66
Southport & Formby District General, Southport	**100%**	143	**96%**	113	**97%**	143	99%	144	92%	101
St George's Hospital, London	**99%**	392	**92%**	391	**97%**	392	96%	392	98%	392
St Helier Hospital, Carshalton		8		8		7		6		7
St Mary's Hospital, London	**100%**	73	**92%**	73	**95%**	73	85%	73	85%	72
St Mary's Hospital, Newport	**100%**	107	**100%**	76	**100%**	88	100%	78	100%	78
St Peter's Hospital, Chertsey	**100%**	225	**100%**	203	**100%**	227	100%	209	100%	217
St Richard's Hospital, Chichester	**91%**	119	**85%**	118	**84%**	129	73%	120	83%	109
St Thomas Hospital, London	**100%**	230	**95%**	210	**99%**	229	96%	224	98%	216
Staffordshire General Hospital, Stafford	**97%**	143	**93%**	144	**93%**	162	91%	154	84%	124

Stepping Hill Hospital, Stockport	**97%**	515	**95%**	515	**94%**	612	94%	553	92%	551
Stoke Mandeville Hospital, Aylesbury	**99%**	73	**97%**	69	**94%**	72	93%	68	99%	69
Sunderland Royal Hospital, Sunderland	**99%**	160	**92%**	152	**94%**	157	87%	156		0
Tameside General Hospital, Ashton under Lyme	**96%**	225	75%	221	**96%**	226	87%	224	89%	225
Taunton & Somerset Hospital, Taunton	**98%**	205	**89%**	200	**90%**	207	86%	208	90%	189
The Alexandra Hospital, Redditch	**94%**	102	**90%**	96	**94%**	101	82%	100	90%	101
The Great Western Hospital, Swindon	**100%**	444	**98%**	349	**99%**	456	96%	396	96%	404
The Ipswich Hospital, Ipswich	**98%**	449	**90%**	363	**91%**	487	86%	415	90%	387
Torbay Hospital, Torquay	**100%**	410	**83%**	337	**94%**	418	83%	378	93%	403
Trafford General Hospital, Manchester	**100%**	21	**100%**	21	**100%**	21	100%	21	86%	21
University College Hospital Gower Street, London	**100%**	24		19	**100%**	23	95%	21	83%	23
University College Hospital, London	**100%**	137	**99%**	123	**100%**	140	99%	138	93%	138
University Hospital Aintree, Liverpool	**99%**	67	**97%**	60	**99%**	69	92%	75	96%	72
University Hospital Lewisham, London	**94%**	35	**97%**	34	**91%**	35	89%	35	89%	35
University Hospital of Hartlepool, Hartlepool	**100%**	97	**100%**	65	**99%**	84	100%	92	100%	81
University Hospital of North Durham, Durham	**98%**	130	**89%**	122	**85%**	134	75%	130	81%	133
University Hospital of North Staffordshire, Stoke-on-Trent	**97%**	918	**88%**	812	**94%**	932	80%	932	87%	932
University Hospital of North Tees, Stockton on Tees	**100%**	53	**100%**	41	**100%**	57	98%	44	89%	45
University Hospital Queens Medical, Nottingham	**94%**	32	**90%**	30	**97%**	32	97%	32	72%	32
Victoria Hospital, Blackpool	**99%**	556	**96%**	549	**98%**	567	92%	553	95%	533
Walsgrave Hospital, Coventry	**99%**	291	**96%**	254	**98%**	297	98%	287	97%	200
Wansbeck General Hospital, Ashington	**94%**	153	**92%**	140	**88%**	162	87%	149	85%	148
Warrington District General Hospital, Warrington	**100%**	292	**100%**	245	**100%**	321	99%	277	99%	276
Warwick Hospital, Warwick	**100%**	56	**94%**	47	**98%**	57	96%	56	96%	56
Watford General Hospital, Watford	**95%**	133	**88%**	99	**84%**	141	89%	114	83%	135
West Cornwall Hospital, Penzance		5		4		4		2		4
West Cumberland Hospital, Whitehaven	**96%**	139	**96%**	119	**97%**	142	93%	139	95%	121
West Middlesex University Hospital, Isleworth	**100%**	165	**93%**	161	**98%**	165	96%	164	97%	165
West Suffolk Hospital, Bury St Edmunds	**98%**	212	**96%**	185	**94%**	232	95%	215	94%	208
Westmoreland General Hospital, Kendal	**95%**	20	**83%**	23	**96%**	26	84%	25		19
Weston General Hospital, Weston-super-Mare	**91%**	263	73%	271	**83%**	282	70%	276	81%	281
Wexham Park Hospital, Slough	**97%**	100	**86%**	98	**98%**	100	87%	100	92%	98
Whipps Cross Hospital, London	**99%**	86	**99%**	73	**99%**	89	97%	78	100%	86
Whiston Hospital, Prescott	**100%**	491	**100%**	381	**100%**	505	100%	425	99%	449
Whittington Hospital, London	**99%**	71	**90%**	71	**96%**	71	97%	71	61%	71

William Harvey Hospital, Ashford	**95%**	237	**83%**	203	**92%**	241	79%	212	94%	216
Worcester Royal Infirmary, Worcester	**100%**	92	**100%**	71	**99%**	81	100%	73	97%	64
Worthing Hospital, Worthing	**98%**	192	**93%**	175	**96%**	192	95%	183	95%	167
Wycombe General Hospital, High Wycombe	**100%**	233	**99%**	225	**99%**	234	99%	232	99%	230
Wythenshawe Hospital, Manchester	**99%**	341	**89%**	332	**97%**	341	84%	326	93%	329
Yeovil District Hospital, Yeovil	**96%**	170	79%	143	**87%**	183	76%	172	92%	171
York District Hospital, York	**100%**	314	**99%**	242	**100%**	324	99%	270	100%	294

Table 6 Secondary prevention medication in hospitals in Wales

	Patients discharged from hospital on secondary prevention medication									
	Aspirin		**Beta Blockers**		**Statins**		**ACE inhibitor**		**Clopidogrel**	
Year	**2008-9**									
Target	**80%**									
	%	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**
Wales national average	**98%**	**1471**	**96%**	**1321**	**96%**	**1538**	**93%**	**1414**	**94%**	**1314**
Hospital										
Bronglais General Hospital, Aberystwyth	**85%**	27	**81%**	31	76%	29	74%	31	64%	28
Glan Clwyd DGH Trust, Bodelwyddan	**95%**	99	**95%**	93	**95%**	105	89%	97	62%	86
Llandough Hospital, Llandough		10		8		10		10		8
Llandudno General Hospital, Llandudno	**98%**	47	**96%**	47	**96%**	52	94%	51	88%	41
Maelor Hospital, Wrexham	**99%**	302	**99%**	271	**94%**	326	98%	246	99%	211
Morriston Hospital, Swansea	**100%**	155	**99%**	130	**100%**	153	95%	144	100%	144
Neath Port Talbot Hospital, Neath	**100%**	38	**100%**	34	**100%**	41	100%	38	100%	35
Nevill Hall Hospital, Abergavenny	**99%**	152	**99%**	147	**98%**	162	97%	155	99%	153
Prince Charles Hospital, Merthyr Tydfil	**96%**	25	**95%**	21	**92%**	26	96%	27	87%	23
Prince Philip Hospital, Llanelli	**100%**	50	**91%**	35	**94%**	50	92%	49	98%	46
Princess of Wales Hospital, Bridgend	**100%**	31	**100%**	27	**100%**	30	100%	32	100%	30
Royal Glamorgan, Llantrisant	**92%**	89	**82%**	83	**96%**	91	79%	89	90%	88
Royal Gwent Hospital, Newport	**100%**	140	**100%**	124	**98%**	145	99%	141	99%	132
Singleton Hospital, Swansea	**95%**	42	**87%**	38	**90%**	42	79%	39	90%	41
University Hospital of Wales, Cardiff	**100%**	118	**98%**	110	**100%**	125	93%	120	98%	114
West Wales General, Camarthen	**100%**	21	**100%**	21	**96%**	26	85%	20	92%	24
Withybush General Hospital, Haverfordwest	**100%**	71	**100%**	49	**99%**	71	92%	72	96%	56
Ysbyty Gwynedd, Bangor	**100%**	54	**96%**	52	**96%**	54	92%	53	100%	54

Table 7 Cardiac Networks in England and Wales

	Patients having thrombolytic treatment		Patients having primary angioplasty		Patients with a discharge diagnosis of STEMI that received							
	Thrombolytic treatment within 60 mins of calling for help		Primary angioplasty within 150 mins of calling for help		Pre-hospital lysis		In-hospital lysis		Primary angioplasty		No reperfusion treatment	
Year	**2008-09**											
Target		**68%**		**75%**								
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
England national average	**5387**	**72%**	**6044**	**78%**	**2515**	**10%**	**7533**	**31%**	**7919**	**33%**	**6126**	**25%**
Cardiac network												
Anglia	528	**78%**	98	**86%**	487	39%	352	28%	117	9%	302	24%
Avon Gloucestershire Wiltshire & Somerset	369	**68%**	172	65%	236	20%	393	33%	247	21%	327	27%
Bedfordshire & Hertfordshire	125	**70%**	30	**97%**	33	8%	188	46%	60	15%	132	32%
Birmingham Sandwell and Solihull	64	**73%**	256	**84%**	8	1%	144	22%	368	57%	122	19%
Black Country	3		291	**77%**	3	1%	12	2%	436	75%	132	23%
Cheshire & Merseyside	347	**78%**	59	**73%**	63	5%	636	52%	64	5%	458	38%
Coventry & Warwickshire	63	**79%**	167	**87%**	24	6%	79	21%	227	60%	49	13%
Dorset	101	**75%**	66	**86%**	47	16%	127	43%	77	26%	42	14%
East Midlands	612	**69%**	127	**76%**	300	20%	655	44%	133	9%	385	26%
Essex	364	**83%**	0		265	34%	348	45%	3	0%	157	20%
Greater Manchester & Cheshire	461	**75%**	186	**80%**	32	2%	835	50%	341	20%	457	27%
Herefordshire & Worcestershire	108	50%	0		51	15%	199	58%	0	0%	95	28%
Kent	174	**84%**	3		104	13%	455	58%	3	0%	220	28%
Lancashire & South Cumbria	310	**74%**	43	**91%**	74	9%	445	56%	81	10%	189	24%
North Central London	1		267	**71%**	1	0%	4	1%	356	80%	85	19%
North East London	4		425	58%	5	1%	4	1%	485	77%	134	21%
North of England	146	60%	1142	**84%**	54	2%	222	10%	1372	59%	686	29%
North Trent	267	**78%**	99	**87%**	76	8%	430	45%	143	15%	314	33%
North West London	2		443	**86%**	0	0%	15	2%	662	82%	131	16%

North & East Yorkshire and Northern Lincs	157	62%	28	54%	54	11%	260	54%	41	8%	130	27%
Peninsula	251	**69%**	193	**80%**	177	18%	243	24%	313	31%	275	27%
Shropshire & Staffordshire	164	**75%**	93	**89%**	98	15%	222	33%	148	22%	201	30%
South Central	445	64%	391	**86%**	165	9%	685	36%	552	29%	488	26%
South East London	5		206	67%	0	0%	11	3%	326	74%	102	23%
South West London	22	**68%**	257	**84%**	9	2%	39	10%	280	71%	69	17%
Surrey	113	**84%**	37	68%	67	16%	214	51%	52	12%	88	21%
Sussex	133	**88%**	72	57%	67	13%	246	47%	96	18%	115	22%
West Yorkshire	48	23%	893	**76%**	15	1%	70	6%	936	74%	241	19%
Wales national average	**570**	**48%**	**96**	**77%**	**241**	**17%**	**779**	**54%**	**120**	**8%**	**297**	**21%**

Note analyses for the proportion of patients that received any reperfusion treatment are based on patients with a discharge diagnosis of definite myocardial infarction (STEMI) and there a small discrepancies between Tables 3 and 4 where the analyses are based on patients with an admission diagnosis of definite myocardial infarction.

Table 8 Care of patients with non-ST segment elevation infarction (nSTEMI) in England

Year	nSTEMI patients admitted to a cardiac unit or ward		nSTEMI patients seen by a cardiologist or member of team	
	2008-9			
	n	%	n	%
England national average	**19392**	**46%**	**33867**	**80%**
Hospital				
Addenbrookes Hospital, Cambridge	190	62%	304	99%
Airedale General Hospital, Steeton	84	43%	138	71%
Arrowe Park Hospital, Wirral	254	50%	384	76%
Barnet General Hospital, Barnet	59	47%	124	98%
Barnsley District General Hospital, Barnsley	213	100%	213	100%
Barts & the London, London	88	89%	71	72%
Basildon Hospital, Basildon	162	85%	189	99%
Bassetlaw District General Hospital, Nottingham	185	80%	216	94%
Bedford Hospital, Bedford	41	26%	141	89%
Birmingham Heartlands Hospital, Birmingham	79	66%	118	98%
Bishop Auckland General Hospital, Bishop Auckland	114	60%	171	90%
Bradford Royal Infirmary, Bradford	76	31%	241	99%
Bridlington & District Hospital, Bridlington	14		7	
Bristol Royal Infirmary, Bristol	93	40%	221	96%
Broomfield Hospital, Chelmsford	98	22%	344	78%
Calderdale Royal Hospital, Halifax	113	35%	247	76%
Castle Hill Hospital, Hull	3		4	
Central Middlesex Hospital, London	63	57%	98	88%
Charing Cross Hospital, London	20	39%	51	100%
Chase Farm Hospital, Enfield	102	100%	102	100%
Chelsea & Westminster Hospital, London	44	62%	69	97%
Cheltenham General Hospital, Cheltenham	39	42%	81	87%
Chesterfield Royal, Chesterfield	65	26%	194	76%
Chorley Hospital, Chorley	17		3	
City Hospital, Birmingham	50	24%	212	100%

Colchester General Hospital, Colchester	348	55%	464	74%
Conquest Hospital, St Leonards on Sea	150	91%	165	100%
Countess of Chester Hospital, Chester	135	47%	277	96%
County Hospital Hereford, Hereford	54	33%	120	72%
County Hospital Louth , Louth	74	90%	61	74%
Cumberland Infirmary, Carlisle	99	31%	269	85%
Darent Valley Hospital, Dartford	206	73%	267	94%
Darlington Memorial Hospital, Darlington	68	36%	168	88%
Derby Royal Infirmary, Derby	258	53%	484	99%
Derriford Hospital, Plymouth	20	16%	4	
Dewsbury District Hospital, Dewsbury	117	81%	99	69%
Diana, Princess of Wales Hospital, Grimsby	128	43%	249	84%
Doncaster Royal Infirmary, Doncaster	59	17%	245	71%
Dorset County Hospital, Dorchester	90	42%	200	94%
Ealing Hospital, Southall	6		20	87%
East Surrey Hospital, Redhill	129	53%	0	
Eastbourne DGH, Eastbourne	163	73%	185	83%
Epsom Hospital, Epsom	38	78%	49	100%
Fairfield General Hospital, Bury	28	28%	90	90%
Freeman Hospital, Newcastle	335	68%	495	100%
Frenchay Hospital, Bristol	20	67%	28	93%
Friarage Hospital, Northallerton	106	100%	106	100%
Frimley Park Hospital, Frimley	154	43%	342	96%
Furness General, Barrow-in-Furness	25	56%	12	
George Elliot Hospital, Nuneaton	89	51%	157	90%
Glenfield Hospital, Leicester	155	76%	204	100%
Gloucestershire Royal Hospital, Gloucester	77	74%	97	93%
Good Hope General Hospital, Sutton Coldfield	109	58%	187	100%
Grantham & District General, Grantham	100	33%	286	95%
Hammersmith Hospital, London	28	50%	55	98%
Harefield Hospital, Middlesex	158	95%	165	99%
Harrogate District Hospital, Harrogate	256	85%	243	81%
Heatherwood Hospital, Ascot	3		17	
Hemel Hempstead General, Hemel Hempstead	65	75%	82	94%
Hexham General Hospital, Hexham	55	75%	6	
Hillingdon Hospital, Uxbridge	395	83%	409	86%

Hinchingbrooke Hospital, Huntingdon	44	37%	111	94%
Homerton Hospital, London	0		0	
Hope Hospital, Manchester	90	27%	231	69%
Horton General Hospital, Banbury	12		0	
Huddersfield Royal Infirmary, Huddersfield	124	38%	284	87%
Hull Royal Infirmary, Hull	20	9%	214	93%
James Cook University Hospital, Middlesbrough	198	95%	207	100%
James Paget Hospital, Great Yarmouth	3		2	
John Radcliffe Hospital, Oxford	120	30%	0	
Kent & Canterbury Hospital, Canterbury	118	44%	187	69%
Kent & Sussex Hospital, Tunbridge Wells	28	27%	102	98%
Kettering General Hospital, Kettering	84	59%	127	89%
King George Hospital, Goodmayes	145	68%	0	
King's College Hospital, London	14		69	82%
Kings Mill Hospital, Nottingham	83	24%	343	98%
Kingston Hospital, Kingston-upon-Thames	5		56	98%
Leeds General Infirmary, Leeds	149	72%	204	98%
Leicester Royal Infirmary, Leicester	81	52%	154	98%
Leighton Hospital, Crewe	223	64%	342	98%
Lincoln County Hospital, Lincoln	122	36%	313	93%
Lister Hospital, Stevenage	109	31%	251	72%
Liverpool Heart and Chest Hospital, Liverpool	10		10	
Luton & Dunstable Hospital, Luton	80	19%	388	94%
Macclesfield District General, Macclesfield	67	18%	354	93%
Maidstone General Hospital, Maidstone	35	41%	80	94%
Manchester Royal Infirmary, Manchester	19		0	
Manor Hospital, Walsall	99	36%	1	
Mayday University Hospital, Croydon	123	88%	135	96%
Medway Maritime Hospital, Gillingham	76	17%	325	72%
Milton Keynes General Hospital, Milton Keynes	103	80%	129	100%
Montagu Hospital, Mexborough	0		29	74%
New Cross Hospital, Wolverhampton	56	23%	235	96%
Newark Hospital, Newark	0		38	67%
Newham General Hospital, London	88	99%	86	97%
Norfolk & Norwich Hospital, Norwich	242	41%	585	100%
North Devon District Hospital, Barnstable	51	16%	280	87%

North Hampshire Hospital, Basingstoke	53	64%	0	
North Manchester General Hospital, Manchester	20	15%	132	98%
North Middlesex Hospital, London	55	54%	96	95%
North Tyneside General Hospital, North Shields	105	45%	193	83%
Northampton General Hospital, Northampton	230	66%	315	90%
Northern General Hospital, Sheffield	235	37%	390	61%
Northwick Park Hospital, Harrow	76	15%	464	91%
Nottingham City Hospital, Nottingham	0		0	
Papworth Hospital, Cambridge	0		4	
Peterborough District Hospital, Peterborough	115	39%	259	87%
Pilgrim Hospital, Boston	134	32%	354	86%
Pinderfields General Hospital, Wakefield	42	17%	0	
Pontefract General Infirmary, Pontefract	35	17%	0	
Poole Hospital, Poole	63	59%	57	53%
Princess Alexandra Hospital, Harlow	131	54%	172	71%
Princess Royal Hospital, Haywards Heath	55	92%	47	78%
Princess Royal Hospital, Telford	3		44	98%
Princess Royal University Hospital, Orpington	48	36%	117	87%
Queen Alexandra Hospital, Portsmouth	233	48%	487	100%
Queen Elizabeth Hospital, Birmingham	4		1	
Queen Elizabeth Hospital, Gateshead	201	66%	214	71%
Queen Elizabeth Hospital, King's Lynn	14		106	24%
Queen Elizabeth Hospital, Woolwich, London	85	45%	161	85%
Queen Elizabeth II Hospital, Welwyn Garden City	108	60%	127	71%
Queen Elizabeth the Queen Mother, Margate	28	17%	93	57%
Queen Mary's Hospital, Sidcup	98	92%	104	97%
Queen's Hospital Romford, Romford	74	20%	0	
Queen's Hospital, Burton-upon-Trent	168	67%	212	84%
Rochdale Infirmary, Rochdale	68	40%	156	93%
Rotherham General Hospital, Rotherham	50	19%	162	62%
Royal Albert Edward Infirmary, Wigan	103	71%	132	91%
Royal Berkshire Hospital, Reading	207	93%	220	99%
Royal Blackburn Hospital, Blackburn	181	38%	445	93%
Royal Bolton Hospital, Bolton	103	32%	314	98%
Royal Bournemouth General Hospital, Bournemouth	33	94%	33	94%
Royal Cornwall Hospital, Truro	282	48%	430	73%

Royal Devon & Exeter Hospital, Exeter	187	35%	474	88%
Royal Free Hospital, London	71	72%	94	96%
Royal Hallamshire Hospital, Sheffield	31	23%	107	79%
Royal Hampshire County Hospital, Winchester	41	10%	367	91%
Royal Lancaster Infirmary, Lancaster	57	73%	66	85%
Royal Liverpool University Hospital, Liverpool	133	69%	62	32%
Royal London Hospital, London	0		0	
Royal Oldham Hospital, Oldham	35	15%	223	94%
Royal Preston Hospital, Preston	1		1	
Royal Shrewsbury Hospital, Shrewsbury	45	56%	69	85%
Royal Surrey County Hospital, Guildford	4		34	100%
Royal Sussex County Hospital, Brighton	36	71%	49	96%
Royal United Hospital Bath, Bath	72	57%	100	79%
Royal Victoria Infirmary, Newcastle	6		210	97%
Russells Hall Hospital, Dudley	230	100%	228	99%
Salisbury District Hospital, Salisbury	74	49%	147	97%
Sandwell District Hospital, West Bromwich	62	29%	213	100%
Scarborough General Hospital, Scarborough	86	75%	91	79%
Scunthorpe General Hospital, Scunthorpe	60	17%	194	53%
Selly Oak Hospital, Birmingham	66	81%	49	60%
Skegness District Hospital, Skegness	0		0	
Solihull General Hospital, Birmingham	53	83%	63	98%
South Tyneside District Hospital, South Shields	85	29%	242	83%
Southampton General Hospital, Southampton	289	81%	347	97%
Southend Hospital, Westcliffe on Sea	283	78%	0	
Southmead Hospital, Bristol	16		26	87%
Southport & Formby District General, Southport	39	35%	104	94%
St George's Hospital, London	58	65%	84	94%
St Helier Hospital, Carshalton	35	65%	53	98%
St Mary's Hospital, London	19		19	
St Mary's Hospital, Newport	157	80%	195	99%
St Peter's Hospital, Chertsey	170	98%	171	99%
St Richard's Hospital, Chichester	41	20%	199	98%
St Thomas Hospital, London	36	37%	92	94%
Staffordshire General Hospital, Stafford	59	33%	57	32%
Stepping Hill Hospital, Stockport	317	45%	514	72%

Stoke Mandeville Hospital, Aylesbury	14		60	90%
Sunderland Royal Hospital, Sunderland	0		0	
Tameside General Hospital, Ashton Under Lyme	18		211	99%
Taunton & Somerset Hospital, Taunton	79	52%	151	99%
The Alexandra Hospital, Redditch	34	30%	114	99%
The Great Western Hospital, Swindon	129	27%	397	84%
The Ipswich Hospital, Ipswich	423	72%	504	86%
Torbay Hospital, Torquay	212	68%	278	90%
Trafford General Hospital, Manchester	3		7	
University College Hospital Gower Street, London	0		23	100%
University College Hospital, London	22	92%	23	96%
University Hospital Aintree, Liverpool	3		3	
University Hospital Lewisham, London	19		35	95%
University Hospital of Hartlepool, Hartlepool	135	65%	114	55%
University Hospital of North Durham, Durham	174	69%	247	98%
University Hospital of North Staffordshire, Stoke-on-Trent	504	93%	472	87%
University Hospital of North Tees, Stockton on Tees	98	55%	171	96%
University Hospital Queens Medical, Nottingham	0		0	
Victoria Hospital, Blackpool	78	22%	268	76%
Walsgrave Hospital, Coventry	48	96%	50	100%
Wansbeck General Hospital, Ashington	74	26%	222	79%
Warrington District General Hospital, Warrington	91	29%	302	96%
Warwick Hospital, Warwick	10		43	100%
Watford General Hospital, Watford	90	36%	212	84%
West Cornwall Hospital, Penzance	9		1	
West Cumberland Hospital, Whitehaven	95	71%	120	90%
West Middlesex University Hospital, Isleworth	73	57%	109	85%
West Suffolk Hospital, Bury St Edmunds	79	29%	232	84%
Westmoreland General Hospital, Kendal	10		13	
Weston General Hospital, Weston-super-Mare	154	48%	204	63%
Wexham Park Hospital, Slough	10		44	98%
Whipps Cross Hospital, London	14		101	95%
Whiston Hospital, Prescott	161	27%	530	87%
Whittington Hospital, London	57	66%	75	86%
William Harvey Hospital, Ashford	117	52%	214	96%
Worcester Royal Infirmary, Worcester	91	47%	181	93%

Worthing Hospital, Worthing	98	92%	104	97%
Wycombe General Hospital, High Wycombe	146	90%	155	96%
Wythenshawe Hospital, Manchester	66	24%	246	90%
Yeovil District Hospital, Yeovil	83	35%	216	91%
York District Hospital, York	90	25%	308	85%

9. Difference in performance in England and Wales

In last year's report we commented on differences in performance between Wales and England, and recognised that, to a degree, the largely rural nature of Wales contributed to difficulties in providing care for heart attack. These differences have narrowed in some areas, reflecting improvement in performance in Wales. The proportion of patients receiving thrombolytic treatment within 30 minutes of arrival at hospital has increased to 73%. The provision of primary angioplasty has increased almost 3 times (42 to 118) and the speed of delivery of this technology has improved (half of such patients treated within 57 minutes of arrival at hospital, compared to 75 minutes) since the last report. However, numbers receiving primary angioplasty are still small, approximately 10% of all reperfusion treatment, compared with about 47% having primary angioplasty in England.

Although the use of pre-hospital thrombolytic treatment in Wales is now 24% of all thrombolytic treatment, and similar to England (25%), the percentage of patients having thrombolytic treatment within 60 minutes of a call for help has not improved and is unchanged from 2007/8 (48% against 49% in 2007/8).

There is no difference in the prescription of secondary preventive drugs at the time of discharge from hospital between England and Wales; both have very high rates of use.

The 'health community' in Wales, including representatives of the Welsh Assembly Government, continues to work to improve the speed with which reperfusion treatment is provided, and in particular to increase the use of primary angioplasty. Examples of such work can be found in cases studies in Part 3.

10. Trends in the management of heart attack patients since 2003

The following graphs show changes in performance and outcome by financial year.

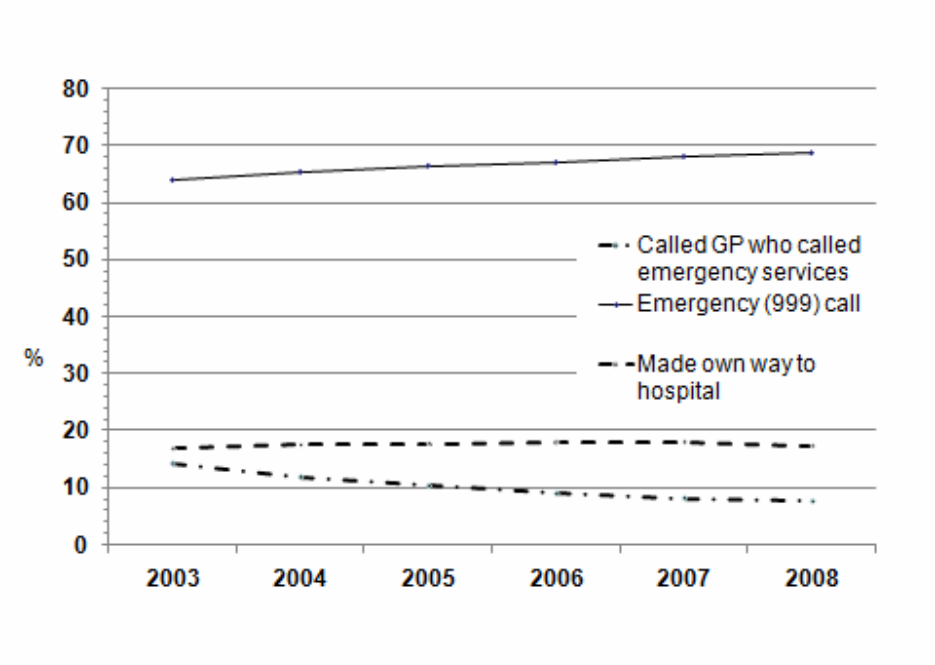


Fig 1. The route by which patients with heart attack come to hospital. Patients with heart attack increasingly use the emergency services, and seek advice from a general practitioner less frequently.

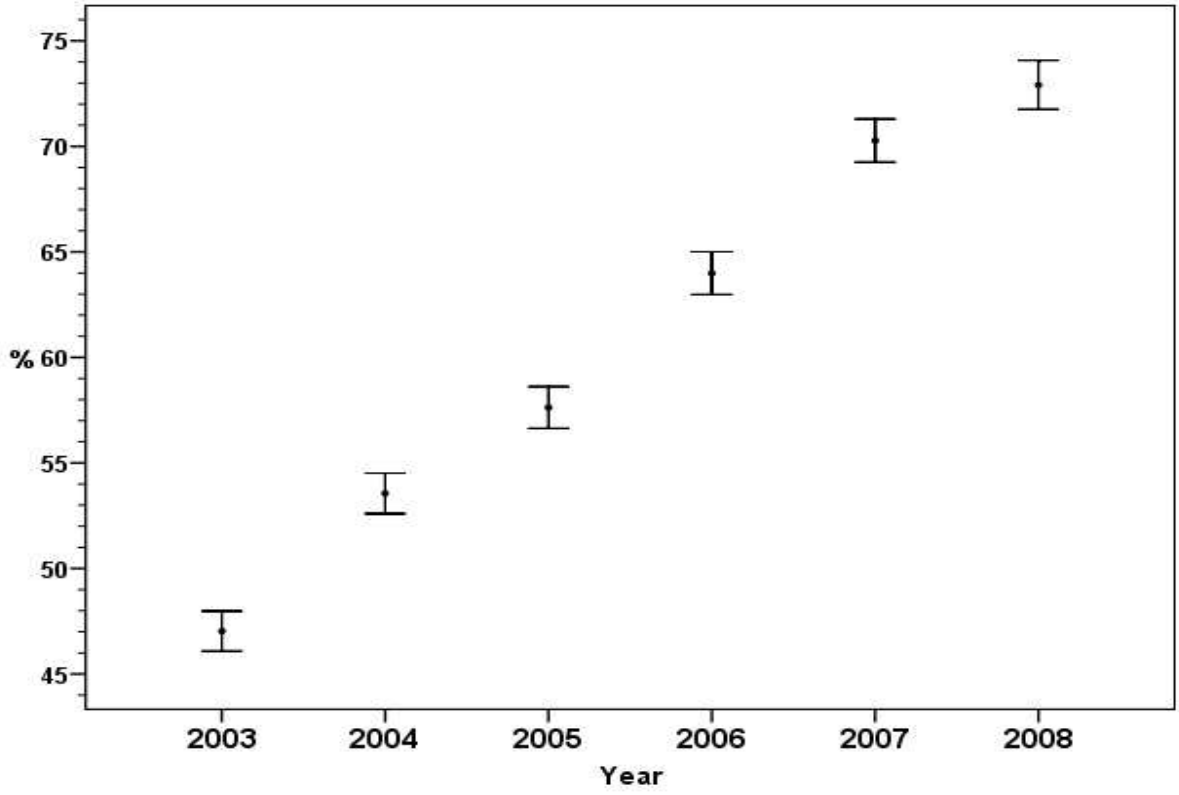


Fig 2. Percentage of eligible patients having thrombolytic treatment within 60 minutes of calling for help. (Bars are 95% confidence limits).

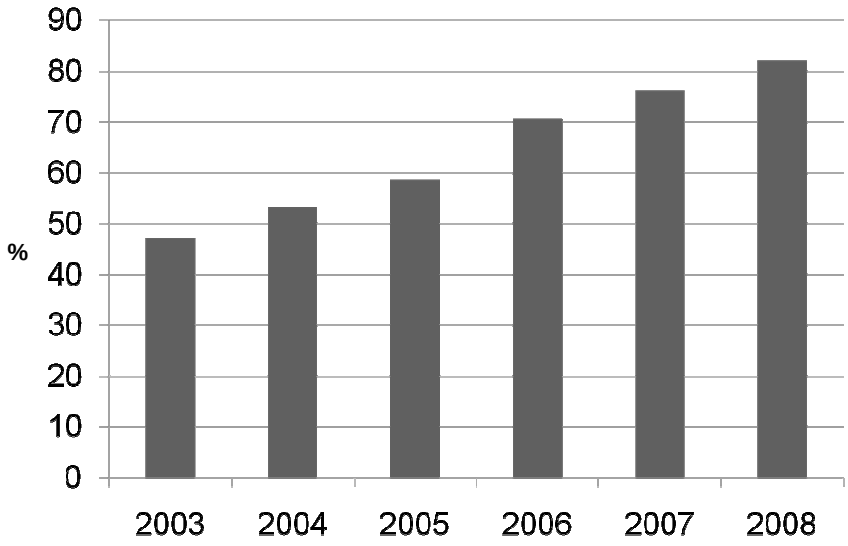


Fig 3. Percentage of eligible patients treated by primary angioplasty within 90 minutes of arrival at interventional centres. The improvement reflects better organisation within the interventional centre, such as direct patient transfer from ambulance to the catheter laboratory, and early warning systems advising staff of impending arrival.

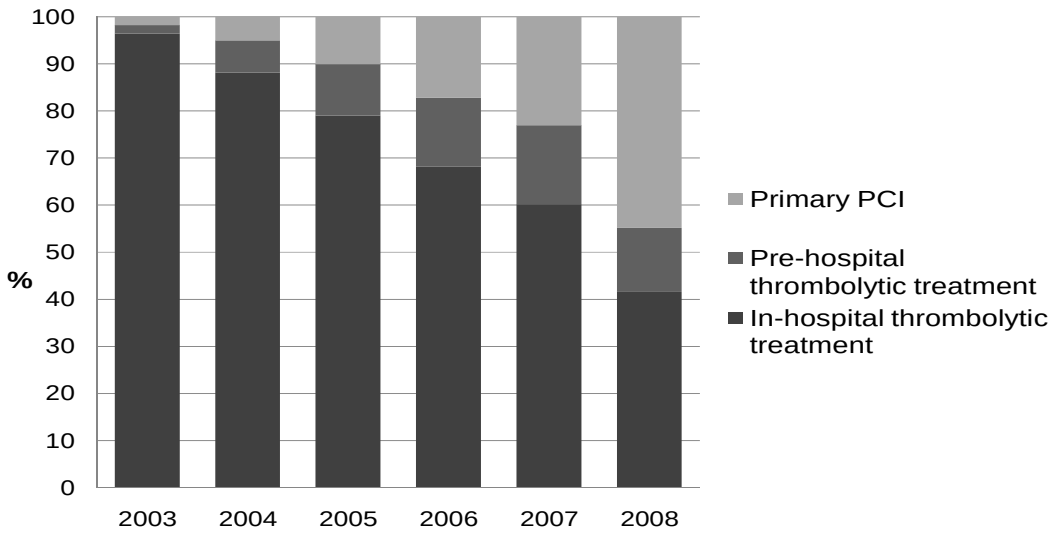


Fig 4. Changing reperfusion treatment for ST segment elevation infarction 2003 – 2008.

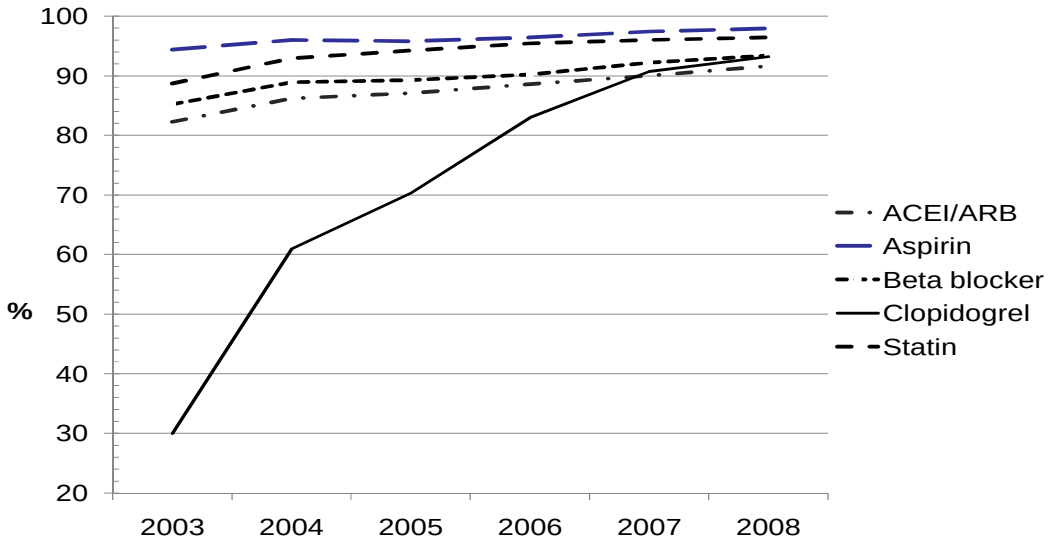


Fig 5. Use of secondary prevention medication; patients prescribed aspirin, beta blocker, statin, ACE inhibitor and clopidogrel on discharge from hospital.

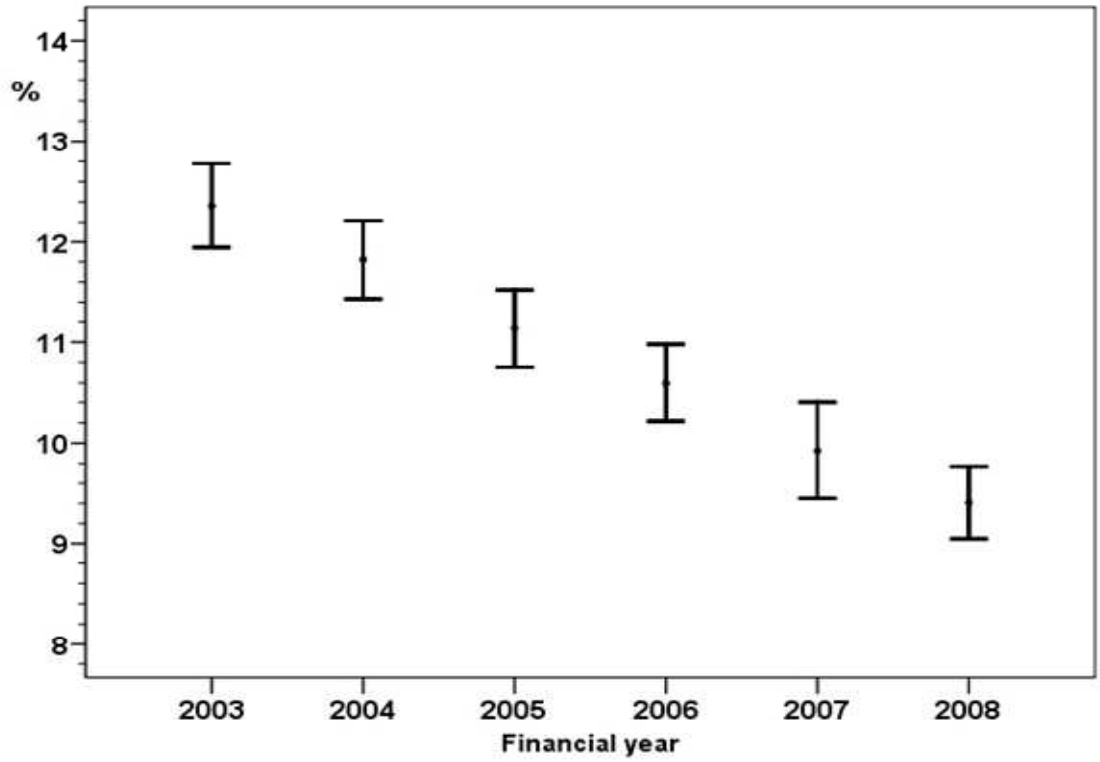


Figure 6. 30 day mortality for patients having ST elevation myocardial infarction. Data points represent mean mortality (with 95% confidence limits) from all hospitals in England and Wales. The continuing fall cannot be attributed to any one single reason, but may include, amongst other factors, improved treatment, both primary reperfusion treatment and better use of secondary prevention medication.

part 3

Case studies: how hospitals, ambulance services and Cardiac Networks have used MINAP data to improve patient care

MINAP at the Heart Hospital - a mechanism for continuous quality improvement

Dr Clare M Dollery, Lead Physician for MINAP and Acting Clinical Director, The Heart Hospital

Stuart Cross, Cardiology Audit Manager

Meredith Taylor, Audit Nurse

Miles Curtis, Clinical Information Nurse

Clinical quality has been defined as doing the right thing at the right time in the right way for the right person and having good outcomes. For patients accessing a primary PCI (angioplasty) pathway the MINAP dataset can define the quality of care.

When our interventional cardiologists proposed a primary PCI program it was a welcome innovation. It very rapidly became clear that many of the same issues applied to primary PCI patients as to thrombolysis. A huge amount of planning and team work would be required to keep door to balloon times down. It is our personal belief that good quality information such as the MINAP data set is essential in working to establish and improve the quality of a new service. It can be used to highlight rather than hide problems and to heap praise on those who find solutions. It informs direction and motivates the team.

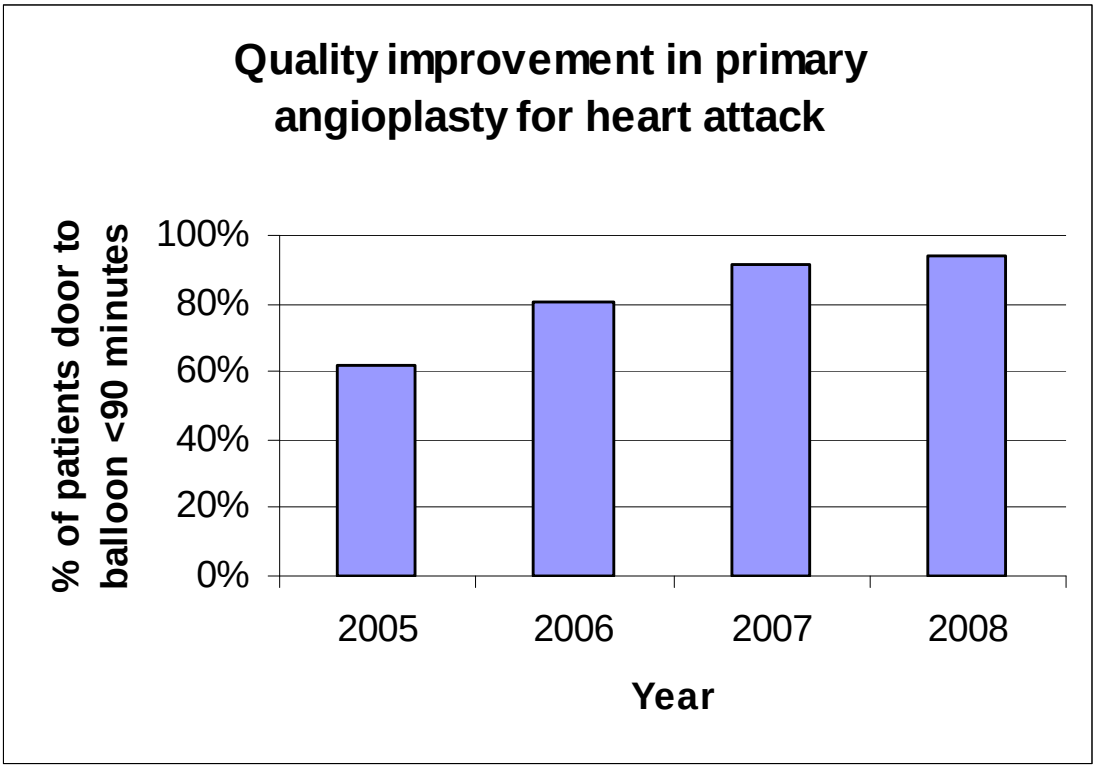
Team work and true stakeholder involvement were essential. We took advantage of the wave of enthusiasm from a new service to establish MINAP meetings which included interventional and general cardiologists (consultant and juniors), accident and emergency nurses and doctors, cath lab nurse and physiologists, nurses who have site cover responsibilities at night, service managers, switchboard operators, bed managers, general managers, the North Central London Cardiac Network and most importantly London Ambulance Service. An inclusive multi disciplinary team was essential to learn most from those who view problems differently because of their diverse professional backgrounds.

To begin with every case was discussed, now we focus on problems where intervention site door to balloon time is more than 90 minutes or call to balloon time exceeds 180 minutes. Case stories with ECGs became a standard part of our induction teaching and ultimately this project led to our hospital writing the teaching material for 12 lead ECGs for the London Ambulance Service which will shortly also be available free on the web.

We removed prolonged clinical discussions from the pathways, activated the cath labs as soon as we knew a patient was inbound, and allocated roles to the team to ensure we reduced delays. We introduced measures such as ‘realtime’ weekly feedback on PCI door to balloon times into our handover meetings to keep the profile of primary PCI high. We have also taken advantage of

the depth of information in the MINAP dataset to feedback on cholesterol and glucose measurement to improve our detection to familial hypercholesterolaemia and fully manage patient's risk factors. Our physiologist has developed a notice board in the cath lab control room including media items on the service but most importantly we have a run chart showing graphically the door to balloon time of every patient in the last 12 months. This is updated weekly so that our staff and ambulance crews bringing patients to the labs can see our MINAP data every day.

The most important aspects of this service have been the team's belief in the goal for their patients, utilising the information we collect for MINAP on a day to day basis and of course never accepting that we have achieved all we can. The graph below shows what has been achieved so far.



The MINAP database: how it will help in providing primary angioplasty

Ranju Gopal, Cardiology Audit Nurse

Dr William McCrea, Dr Ed Barnes, Dr Tom Hyde, Consultant Cardiologists

Chris Keen, Chest Pain Specialist Nurse

Jon Taylor, ACS Specialist Nurse

The Great Western Hospital NHS Foundation Trust, Swindon

The treatment of ACS has changed greatly over the past decade and the MINAP database has been the key instrument for analysing, planning, implementing and shaping our service improvement. This has facilitated delivery of high quality care to our local community.

The latest statistics show that our service level is at unprecedented high level.

- 97% of suitable patients with a blocked coronary artery receive clot busting drugs within 30 minutes of arriving at the hospital. Our Emergency Department plays an enormous part in sustaining this target.
- 74% of eligible cases obtain the drugs within 60 minutes of calling for an ambulance. Close liaison with Great Western Ambulance Services is the key in maintaining and continuing with delivery of this high quality performance.
- An exceptionally high numbers of cases are discharged on secondary prevention medications. This reflects the Trust's compliance to national guidelines.
- The MINAP database is invaluable in showing how new services are improving here. It was clear that people were waiting too long for in- patient coronary angiography. We introduced an ACS specialist nurse service to bridge gaps between Acute Assessment Unit and the Cardiology unit. Now more than 90% of angiograms are referred on the first day of admission and MINAP data has confirmed an overall reduction in length of stay.

Our next challenge is the introduction of primary angioplasty locally as a treatment for acute heart attack sufferers. Live reports generated from MINAP will enable us to monitor, support and rapidly establish a first class primary angioplasty service.

So it is quite evident that MINAP is the nerve centre behind ACS care delivery. Regular updates help provide all contributors with information about the end results of their hard work in improving the speed and quality of care for Acute Coronary Syndromes.

Using MINAP in primary care

Alison Turner, MINAP/CTN Improvement Facilitator, Mid and South West Wales Cardiac Network

Marc Thomas, Network Support Manager, Mid and South West Wales Cardiac Network

Colin Elding, Chest Pain Programme Manager, British Heart Foundation

Martin Lane, Cardiac Network Manager, Mid & South West Wales Cardiac Network.

MINAP produced a comparison report at the request of the Welsh Assembly Government examining delays to thrombolysis in Wales and England (Birkhead 2007), using 2005-6 data (n=22519). The evidence showed that longer delays to treatment occurred where patients called their GP and this was more common in Wales.

Mid and South West Wales Cardiac Network are working in partnership with the British Heart Foundation, as part of their Chest Pain Awareness Campaign to streamline this process and improve 'call-to-needle' times for this cohort of patients.

Two flow-charts have been devised, one for clinical and one for non-clinical staff for use in Primary Care settings. We have also jointly produced posters and hand-held concertina booklets for patients to recognise the common signs and symptoms of an acute MI.

6 pilot sites are currently participating in the project, with a view to rolling out the programme across the region served by our Network. Educational sessions were held on-site, and follow-up of anonymised cases will be followed up through MINAP and a local cardiologist.

Informal feedback so far has been positive, particularly from the non-clinical staff, who have appreciated having an evidence-based structured approach to dealing with chest pain calls to their surgeries.

Addressing CTN times

Alison Turner, MINAP Lead, Withybush General Hospital

Bryn Hazelden, Paramedic/Clinical Tutor, Welsh Ambulance Service Trust

Following the last MINAP Public Report, it was necessary to address local Call-to-Needle times. There was no forum in place for all involved in the patient journey to meet collaboratively to address issues relating to unjustified delays to treatment. We formed a call-to-needle group. Membership consists of Ambulance Trust Clinical Tutor; A&E Consultant; A&E Sister; Consultant Cardiologist; CCU Sister; Bed Manager; Patient Services Manager & MINAP lead, with open invitations to all hands-on staff from A&E, CCU and Ambulance Service to attend. All cases receiving thrombolysis are discussed, in open forum, with the aim of raising issues and addressing situations, always respecting a 'no-blame' ethos. By discussing all cases, both those that met the CTN target and those that did not, learning is achieved by both positive reinforcement and addressing emerging issues. Emerging from case discussions we have initiated other processes that have helped streamline care such as issuing laminated discharge ECGs for patient held records.

Once established, attendance at meetings has been good, with a demonstrable improvement in this year's call-to-needle times, which we expect to improve further in this coming year. This has been attributed to the group having a true collaborative approach to improving care. The forum has enhanced communication between team members and improved confidence in decision-making.

Aggressive pharmacoinvasive therapy for STEMI may deliver comparable outcomes to primary PCI

Dr William Orr, Cardiology

Royal Berkshire Hospital, Reading

The treatment of STEMI in the UK is changing rapidly and the National Infarct Audit Project (NIAP) in October 2008 supported a move towards primary PCI (PPCI) for all. Many trials have shown outcome benefit for PPCI over thrombolysis-based strategies but no randomised trials truly compare modern PPCI with rapid thrombolysis combined with immediate angioplasty in cases where thrombolysis is felt to be ineffective and later in hospital angioplasty in the remainder.

Until a recent change to 24/7 PPCI, we maintained a thrombolysis-based service with 24/7 cath-lab back-up: mandatory 'rescue angioplasty' was available if thrombolysis was judged ineffective at 60 mins after drug administration, primary PCI was available for patients ineligible for thrombolysis, and early subsequent angiography with PCI was recommended to all appropriate cases. We have worked hard at improving all parts of the patient-pathway by

- using the local media to increase public awareness of the need to call for help early
- issuing information cards to patients with every GTN pump (angina spray)
- holding regular meetings with paramedics to encourage maximum delivery of pre-hospital thrombolysis
- attaining direct admission to the cardiac care unit (CCU) for >80% of patients with STEMI
- achieving year-on-year improvements in call- & door-to-needle times, with more than 70% CTD times <60 mins despite a relatively large catchment area
- providing rescue PCI performed for failure-to-reperfuse (or reinfarction) with a very rapid

median thrombolysis-to-balloon time of 103 minutes

- managing all patients with STEMI on the CCU for the duration of their admission where they are seen daily by a consultant cardiologist
- ensuring that 92% of patients are discharged on all 4 major drugs recommended for secondary prevention.

We have a monthly multi-disciplinary MINAP audit meeting (including senior paramedics) which scrutinise every case to ensure accurate MINAP data reporting. This has also been a vital tool in improving the STEMI-pathway at every stage. The table below summarises our outcomes:

STEMI	2005-6	2006-7	2007-08
number	126	138	124
pre-hospital thrombolysis	12%	20%	36%
rescue & primary PCI	11%	25%	29%
in-hospital revascularisation	24%	45%	77%
in-hospital mortality	5.6%	3.6%	3.2%

These figures do not show a statistically significant improvement over time, but certainly suggest consistently good outcomes with this mode of treatment. A pharmacoinvasive strategy such as ours with back-up PCI available on-site 24/7 may provide, particularly away from major cities, at least equivalent outcomes compared with transfer for primary PCI. Optimal outcomes in STEMI remain dependant on rapid reperfusion, irrespective of treatment modality, and as we move to 24/7 PPCI, we will need to deliver Call-to-Balloon times consistently below 120 mins to see further improvements in mortality.

Teamwork continues for STEMI patients at York

Anne Barfoot, CCU/Cardiac Outreach team

Jacqui Crossley Yorkshire Ambulance Service

Steve Crane Consultant, ED

Nigel Durham Consultant, Cardiology

York Hospital / Yorkshire Ambulance Service

Teamwork and collaboration continues at York between Yorkshire Ambulance Service (YAS), the Emergency Department (ED) & Cardiology Staff. Since mid June 2008 patients have been referred for primary angioplasty at Leeds. As with thrombolysis this has been a challenge in such a rural area. All notes & ECG' (both for those patients referred for PPCI and those given thrombolysis) are validated by a cardiology consultant and chest pain nurse prior to the monthly link meeting held in ED. The patient's journey from call for help, whether this is to the emergency services or ED front door is examined. At the link meeting decision-making, performance and case studies are discussed, positive feedback given and areas for improvement highlighted. Ambulance paramedics who refer directly for PPCI or who give thrombolysis are sent a feedback letter. Staff from YAS, ED and Cardiology are all welcome to attend the link meetings, and benefit from discussing case studies and feedback from regional meetings.

part 4

Conclusions

- The Myocardial Ischaemia National Audit Project (MINAP) has collected data for nine years (2000–2009), and since it started has accumulated data on nearly 700,000 admissions. It receives data from all hospitals that admit heart attack patients in England and Wales.
- Increased survival from heart attacks has occurred against a background of faster thrombolytic treatment in hospital, the introduction of pre-hospital thrombolysis and rapidly increasing use of primary angioplasty.
- The pattern of reperfusion treatment of heart attack patients is changing rapidly with primary angioplasty performed in an increasing number of hospitals. During 2009 the use of primary angioplasty will exceed that of thrombolytic treatment.
- There are considerable organisational challenges to be overcome in extending this treatment throughout England and Wales.
- There will continue to be a role for rapid thrombolytic treatment in areas where primary angioplasty is not yet available**,** ideally provided before arrival in hospital.
- While there was variation between hospitals, most patients with heart attack were treated sooner after calling for professional help than in 2007/8.
- The use of secondary prevention medication has continued to exceed the national standards.
- The early feedback provided by MINAP to hospitals and ambulance services encourages improvement in performance.

Key messages to patients

The longest delay in the treatment of heart attack patients is usually not the delay in the arrival of the ambulance or giving thrombolytic treatment, but the delay in calling for professional help. The earlier the treatment can be given the better the outcomes for patients.

- Patients should ring 999 for help immediately if the symptoms of a heart attack last more than 15 minutes and are not relieved by resting or using nitrate tablets or spray, if prescribed.
- Ambulance crews are trained to recognise the symptoms of a heart attack and treat cardiac arrest and thus patients who call 999 can be treated more quickly than those who make their own way to hospital.
- Most hospitals and ambulance services in England will have a Patient Advice and Liaison Service that should be able to give advice on your hospital's and ambulance service's performance.
- The National Institute for Health and Clinical Excellence recent guidelines for the longer term treatment of people who have had a heart attack [9] includes several recommendations for cardiac rehabilitation and lifestyle actions. These include giving up

[9] http://guidance.nice.org.uk/CG48

smoking, being physically active for 20 to 30 minutes each day and eating a Mediterranean-style diet with more bread, fruit and vegetables and less meat.

Part 5

Appendices

APPENDIX 1: MINAP publications

Birkhead JS, Norris RM, Quinn T et al.
Acute myocardial infarction: a core dataset. Royal College of Physicians 1999.

Birkhead JS, Pearson M, Norris RM et al.
Measurement of Clinical Performance. Practical approaches in acute myocardial infarction. Eds Robert West and Robin Norris. Royal College of Physicians 2001.

Birkhead JS
The National Audit of Myocardial Infarction: A new development in the audit process.
Journal of Clinical Excellence 2002; 4: 379-85.

RM Norris, Derek Lowe and JS Birkhead
Can successful treatment of cardiac arrest be a performance indicator for hospitals?
Resuscitation 2004; 60: 263-269.

John Birkhead and Lynne Walker.
MINAP, a project in evolution.
Hospital medicine 2004; 452-53.

Birkhead J, Walker L, Pearson M, Weston C, Cunningham AD, Rickards AF.
Improving care for patients with acute coronary syndromes; initial results from the National Audit of Myocardial Infarction (MINAP).
Heart 2004; 90 :1004-9.

Quinn T, Weston C, Birkhead J, Walker L, Norris R, and on behalf of MINAP Steering Group.
Redefining the coronary care unit: an observational study of patients admitted to hospital in England and Wales in 2003- 2005.
Quarterly Journal of Medicine 2005; 98 (11): 797-802.

John Birkhead, Clive Weston, Derek Lowe on behalf of 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.

Birkhead J, Pearson J and Walker L on behalf of the MINAP Steering Group.
Management of acute coronary syndromes in England and Wales: a survey of facilities in 2006.
Royal College of Physicians, London 2007. ISBN 978-1-86016-314-2.

C Weston, L Walker and J Birkhead.
Early impact of insulin treatment on mortality for hyperglycaemic patients without known diabetes who present with an acute coronary syndrome
Heart 2007; 93: 542-1546.

Simon Horne, Clive Weston, Tom Quinn, Anne Hicks, Lynne Walker, Ruoling Chen and John Birkhead.
The impact of pre-hospital thrombolytic treatment on re-infarction rates: analysis of the Myocardial Infarction National Audit Project (MINAP).
Heart 2009; 95: 221-227.

Weston C.
Performance indicators in acute myocardial infarction: a proposal for future assessment of good quality care.
Heart 2008; 94:139-1401.

Gale CP, Manda SOM Batin PD, Weston CF, Birkhead JS, Hall AS.
Predictors of in-hospital mortality for patients admitted with ST-elevation myocardial infarction: a real-world study using the Myocardial Infarction National Audit Project (MINAP) database.
Heart 2008; 94:1407-1412.

Christopher P. Gale, Samuel O.M. Manda, Clive F. Weston, John S. Birkhead, Phil D. Batin and Alistair S Hall.
Evaluation of risk scores for risk stratification of acute coronary syndromes in the Myocardial Infarction National Audit Project (MINAP) Database.
Heart 2009; 95: 221-227.

Birkhead J, Weston C and Chen R.
Determinants and outcomes of coronary angiography after non-ST-segment elevation myocardial infarction. A cohort study of the myocardial ischaemia National Audit Project (MINAP)
Published Online First: Heart 8 June 2009. doi :10: 1136/hrt.2008.164426.

APPENDIX 2: Glossary

ACE inhibitors A class of drug with powerful vasodilating effects on arteries. Used – in the context of heart attack - for the treatment and prevention of heart failure. Also used widely for treatment of high blood pressure. **Angiotensin receptor blockers** (ARBs) have broadly similar effects.

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.

Angina Symptoms of chest pain that occur when narrowing of the coronary arteries prevent enough oxygen containing blood reaching the heart muscle when its demands are high, such as during exercise.

Angiogram An X-ray investigation performed under a local anaesthetic that produces images of the flow of blood within an artery (in this case the coronary artery). Narrowings and complete blockages within the arteries can be identified during the angiogram and this allows decisions to

be made regarding treatment. Often an angiogram is a precursor to an angioplasty and stent implantation or to coronary artery bypass grafting.

Anti-platelet drugs Drugs including aspirin that prevent blood clotting. Anti-platelet drugs act by reducing the 'stickiness' of the small blood cells that can clump together to form a clot.

Aspirin An anti-platelet drug used to help prevent blood clots forming.

Beta blockers Beta blockers are drugs that block the actions of the hormone adrenaline that makes the heart beat faster and more vigorously. They are used to help prevent attacks of angina, to lower blood pressure, to help control abnormal heart rhythms and to reduce the risk of further heart attack in people who have already had one. They may also be used in small doses in heart failure.

Cholesterol A fatty substance mainly made by the liver. It plays a vital role in the functioning of every cell wall throughout the body. The body also uses cholesterol to make other vital chemicals. However, too much cholesterol in the blood increases the risk of coronary heart disease and heart attacks.

Clopidogrel An anti-platelet drug that has been shown to have added benefit when given with aspirin during an acute coronary syndrome.

Clot dissolving drugs Drugs used to dissolve the thrombus within a heart artery which is the underlying cause of heart attack, see 'thrombolytic treatment'.

Electrocardiogram Also known as 'ECG'. A test to record the rhythm and electrical activity of the heart. The ECG can often show if a person has had a heart attack, either recently or some time ago. It can also tell if reperfusion therapy is appropriate and if it has been effective.

Heart attack 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.

Heart failure Heart failure occurs when a damaged heart becomes less efficient at pumping blood round the body. This may result from damage to the heart muscle caused by a heart attack. There are typically symptoms of breathlessness with exertion and, later, swelling (oedema) of lower limbs.

Median The number falling in the middle of a ranked series of numbers. IQR. Interquartile range; the value at 25% and 75% of an ordered set of values.

Myocardial infarction A heart attack.

Non-ST elevation myocardial infarction (nSTEMI) A heart attack that occurs in the absence of ST segment elevation on the ECG. In these patients urgent admission to hospital is mandated but immediate reperfusion therapy is not required.

Pre-hospital thrombolysis Thrombolytic treatment given before arrival in hospital, usually in the ambulance by paramedics. This saves time in providing treatment and is used with longer journey times.

Primary angioplasty 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.

For more information see the British Heart Foundation publication *Coronary angioplasty and coronary bypass surgery*, available on their website [10].

Re-infarction The development of evidence of re-occlusion (further blockage) of, or development of blood clot within, the coronary artery that was responsible for the original heart attack. This would normally occur after the original blockage had been successfully treated.

Reperfusion treatment The term used to cover both techniques, thrombolytic treatment and primary angioplasty, for 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.

Secondary prevention treatment Medication that reduces the risk of further heart attack, or the risk of complications such as heart failure. See aspirin, beta blockers, ACE inhibitors and ARBs, clopidogrel and statins. These medications are usually initially prescribed to all patients who can tolerate them.

Statins Drugs used to reduce cholesterol levels in the blood.

ST elevation myocardial infarction A heart attack characterized by a specific abnormal apearance on the ECG (ST segment elevation) thought to be indicative of complete occlusion of a coronary artery. Reperfusion therapy with thrombolysis or angioplasty has been shown to do more good than harm in these cases.

Thrombolytic treatment The outcome for certain types of heart attack can be improved by using clot-dissolving (thrombolytic) drugs. Thrombolytic treatment is effective up to about 12 hours after the onset of symptoms but is most effective when given very early after the symptoms started. Thrombolytic drugs are not given unless there are typical changes on the electrocardiogram (ECG). As these drugs are designed to dissolve clots, they may be unsuitable for some patients who are at risk of internal bleeding. Patients at significant risk of bleeding may not be given this treatment where the risk of bleeding is greater than any potential benefit. Where this risk exists primary angioplasty may be an effective alternative.

Thrombus A blood clot.

APPENDIX 3: National Service Framework for Coronary Heart Disease

The NSF for coronary heart disease is a 10-year programme published by the Department of Health in March 2000. It sets standards of care for patients with coronary heart disease (CHD) in

[10] http://www.bhf.org.uk/publications.aspx

England. [11]

The NSF helps the NHS to plan and deliver the service changes needed to raise standards of care, to improve clinical outcomes and to monitor progress. In addition it promotes equal care for all people with coronary heart disease. In order to make this happen, the NSF has set 12 standards covering areas from prevention to rehabilitation. Chapter 8 of the NSF was published in March 2005, specifically covering arrhythmias and sudden cardiac death.[12]

A report The Coronary Heart Disease National Service Framework: Building on excellence, maintaining progress - Progress report for 2008 [13] was published in March 2009. The report details the progress which has been made in implementing the Coronary Heart Disease National Service Framework in the eight years since its publication.

Wales has its own equivalent of the CHD NSF, *Tackling CHD in Wales: implementing through evidence* [14]. Welsh hospitals report against the 30 minute door to needle standard as used in MINAP. The performance target for Wales for call to needle is that 70% of patients should receive thrombolytic treatment within 60 minutes of calling for help.

For more information on what these targets mean for you, see the British Heart Foundation publication: *Good Service? The National Service Framework for coronary heart disease. A guide for members of heart support groups, consumer groups and individuals interested in how services for coronary heart disease in England are developed*. [15] The British Heart Foundation free magazine, Heart Health, provides further information about heart conditions.

APPENDIX 4: Contacts for information on heart conditions

American Heart Association http://www.americanheart.org/hearthub/index.htm

Blood Pressure Association http://www.bpassoc.org.uk/Home

British Cardiac Patients Association http://www.bpca.co.uk/

British Cardiovascular Society http://www.bcs.com/pages/default.asp

British Heart Foundation http://www.bhf.org.uk/

NB: The British Heart Foundation runs a heart information line that provides information about heart conditions and their management. It cannot respond to questions about services in individual hospitals. Tel: 08450 70 80 70

Diabetes UK http://www.diabetes.org.uk/

Department of Health website http://www.dh.gov.uk/en/Home

HEART UK http://www.heartuk.org.uk/

NHS Evidence – cardiovascular http://www.library.nhs.uk/cardiovascular/

NHS Choices http://www.nhs.uk/Pages/HomePage.aspx

NHS Direct Tel: 0845 4647

11 http://www.dh.gov.uk/en/Healthcare/Coronaryheartdisease/Nationalserviceframework/index.htm

12 http://www.dh.gov.uk/en/Healthcare/Coronaryheartdisease/DH_4117048

13 http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_096555

14 www.wales.nhs.uk/publications/coronary-heart-disease-e.pdf.

15 http://www.bhf.org.uk/publications.aspx

APPENDIX 5: Other cardiac audits

Cardiac audit data is managed on central servers run by CCAD and MINAP is working closely with CCAD and several of the audits to allow patient outcomes to be tracked from their initial heart attack, through subsequent intervention and rehabilitation. It is planned to develop linkage across all the cardiac audits at NICOR to allow the measurement of event free survival as an outcome.

Adult cardiac intervention http://www.bcis.org.uk/

Adult cardiac surgery http://www.scts.org/

Cardiac rehabilitation
http://www.york.ac.uk/healthsciences/gsp/themes/cardiacrehab/BHFcare&edrg.htm

Cardiac rhythm management http://www.hruk.org.uk/

Heart failure http://www.bsh.org.uk/