NICOR

MINAP
Myocardial Ischaemia National Audit Project

Myocardial Ischaemia National Audit Project

How the NHS cares for patients with heart attack

Annual Public Report April 2013 - March 2014

This report is written for the public to show the performance of hospitals, ambulance services, Cardiac Networks in Wales and Local Area Teams in England national standards for the care of patients with heart attack in 2013/14.

Report prepared by
Dr Clive Weston, MINAP Clinical Lead
Lucia Gavalova, PCI Project Manager
Tracy Whittaker, MINAP Project Manager
Ronald Van Leeven, MINAP project Co-coordinator

With assistance from:
Members of the MINAP Academic and Steering Groups
Jacqui Crossley, Yorkshire Ambulance Service
Catrin Hanks, North Wales Cardiac Network
Nicola Manning & Emma Gendall North Bristol NHS Trust
Sue Manuel, NICOR Senior Software Developer
Dr Jennifer Quint, London School of Hygiene and Tropical Medicine
Martin Riddington, East Sussex Healthcare NHS Trust
Alun Roebuck, The Lincolnshire Heart Centre

Dr Claire C Sharpe, Kings College London
Dr Catriona Shaw, UK Renal Registry and Kings College London
Sharon Sinha, United Lincolnshire Hospitals NHS Trust
Dr Justin Zaman, University of East Anglia, Norwich, UK

Electronic copies of this report can be found at:
http://www.ucl.ac.uk/nicor/audits/minap/publicreports

For further information about this report, contact:
Myocardial Ischaemia National Audit Project
National Institute for Cardiovascular Outcomes Research
University College London
3rd Floor, 170 Tottenham Court Road
London W1T 7HA

Tel: 0203 108 3926
Email: minap-nicor@ucl.ac.uk

Acknowledgements

MINAP is managed by the National Institute for Cardiovascular Outcomes Research (NICOR), which is part of the National Centre for Cardiovascular Prevention and Outcomes, based at University College London. The audit is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP).

The MINAP team would especially like to thank the contribution of all Hospitals and Ambulance Services who collect data and participate in the audit. Without this input the audit could not continue to produce credible analysis, or to effectively monitor and assess the quality of cardiac care.

For more information, please visit www.hqip.org.uk.

This report was published on **19th December 2014.**

British Cardiovascular Society

The British Cardiovascular Society is the voice for those working in cardiovascular health, science and disease management in the UK; we aim to promote and support both the healthcare professionals who work in cardiology and the patients for whom we want to encourage the best possible treatment. Our members are healthcare professionals, working in the field of cardiovascular health.

NICOR

NICOR (National Institute for Cardiovascular Outcomes Research) is a partnership of clinicians, IT experts, statisticians, academics and managers which manages six cardiovascular clinical audits and a growing portfolio of new health technology registries, including the UK TAVI registry. NICOR analyses and disseminates information about clinical practice in order to drive up the quality of care and outcomes for patients.

HQIP
Healthcare Quality Improvement Partnership

MINAP is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as one of the Clinical Outcome Review Programmes. HQIP's aim is to promote quality improvement and is led by a consortium of the Academy of Medical Royal Colleges, the Royal College of Nursing and National Voices. The Clinical Outcome Review Programmes, which encompasses confidential enquiries, are designed to help assess the quality of healthcare, and stimulate improvement in safety and effectiveness by systematically enabling clinicians, managers and policy makers to learn from adverse events and other relevant data. MINAP is funded by NHS England.

UCL

Founded in 1826, UCL was the first English university established after Oxford and Cambridge, the first to admit students regardless of race, class, religion or gender, and the first to provide systematic teaching of law, architecture and medicine. We are among the world's top universities, as reflected by performance in a range of international rankings and tables. UCL currently has almost 29,000 students from 150 countries and in the region of 10,000 employees. Our annual income is more than £900 million.

Designed and published by: padcreative | www.padcreative.co.uk

Myocardial Ischaemia National Audit Project

How the NHS cares for patients with heart attack

Annual Public Report | April 2013 - March 2014

Contents

Foreword 5

By the President, British Cardiovascular Society

Executive Summary 6

Part One: Introduction 10

1. Background to heart attacks 10
- 1.1 STEMI and nSTEMI 10
- 1.2 Patient outcomes following a heart attack 11

2. Background to MINAP 12
- 2.1 Principles 12
- 2.2 Organization of MINAP 12
- 2.3 How the data are collected 13
- 2.4 Security and patient confidentiality 13
- 2.5 Case ascertainment 14
- 2.6 Data Completeness and Data Quality 14
- 2.7 Improving analysis 14

3. Improving quality, improving outcome 14
- 3.1 NICE guidelines 14
- 3.2 Use of primary PCI 15
- 3.3 nSTEMI and access to angiography 16

4. Patient perspective 17
- Patient perspective – Alan Keys, President of the Cardiovascular Care Partnership 17
- Patient perspective – Martin Riddington 18

Part Two: Analyses 19

1. Characteristics of patients with heart attack in 2013/2014 19

2. Hospitals that perform primary PCI 21
- 2.1. Door to balloon time 21
- 2.2. Call to balloon time 22

3. Thrombolytic treatment 23
- 3.1. Door to needle time 23
- 3.2. Call to needle time 23
- 3.3. Future of thrombolysis and its use in the rural areas 23
- 3.4. PCI after thrombolysis 23

4. Patients that receive no reperfusion 24

5. Ambulance service performance 25

6. Use of secondary prevention medication 25

7. Care for patients with nSTEMI 26
- 7.1. Admission to cardiac unit/ward 26
- 7.2. Cardiological care during admission 26
- 7.3. Angiography in nSTEMI 26

8. Access to primary PCI 27

9. Length of stay 28

10. Patient outcomes following a heart attack 29

11. 30 day unadjusted mortality rates for STEMI patients admitted to hospital between 2011-14 31

12. Difference in performance between nations 35
- 12.1 Management of STEMI 35
- 12.2 Management of nSTEMI 35

13. Results by hospitals, ambulance services and Local Area Teams/Welsh Cardiac Networks 36
- **Table 1** Reperfusion treatment of patients with STEMI 36
- **Table 2** Primary PCI in hospitals in England, Wales and Belfast 42
- **Table 3** Thrombolytic treatment in hospitals in England, Wales and Belfast 50
- **Table 4** Ambulance services in England, Wales and Belfast 54
- **Table 5** Local Area Teams in England and Cardiac Networks in Wales 56
- **Table 6** Secondary prevention medication by eligibility in England, Wales and Belfast 60
- **Table 7** Care of patients with nSTEMI in England, Wales and Belfast 84

Part Three: Case Studies 106

- **1** Improving access to Primary PCI: Networked minds plan for Primary PCI (PPCI) for North Wales Cardiac Patients 106
- **2** NSTEMI Effective Data Collection United Lincolnshire Hospitals Trust 106
- **3** How the Yorkshire Ambulance Service has used MINAP data to improving patient care pathways 107
- **4** The Linconshire Heart Centre 107
- **5** Improving access to cardiology for all ACS patients 108

Part Four: MINAP and research 109

- **1** Inpatient Coronary Angiography and Revascularisation following Non-ST-Elevation Acute Coronary Syndrome in Patients with kidney impairment 109
- **2** Prognostic value of troponins in acute coronary syndrome depends upon patient age 110
- **3** Effect of β blockers on mortality after myocardial infarction in adults with COPD: population based cohort study of UK electronic healthcare records 110
- **4** International comparisons 111

Part Five: Conclusions/Recommendations 112

Part Six: Appendices 113

Appendix 1: MINAP Steering Group Membership 113
Appendix 2: MINAP Academic Group Membership 113
Appendix 3: Glossary 114
Appendix 4: MINAP Publications 116
Appendix 5: Contacts for information on heart and heart related conditions 117

Foreword

The Myocardial Ischaemia National Audit Project (MINAP) is one of the major success stories of how robust, transparent and clinically relevant data collection can serve to effect significant system changes and result in real quality improvement for patients. With over 1.3 million records, combined with impressive national coverage and remarkable data completeness, MINAP has proved to be a uniquely valuable resource.

This is the 13th Annual Report and represents yet another iteration of the MINAP evolution. Having, several years ago, promoted the inclusion of patients across the spectrum of Acute Coronary Syndromes (ACS), this is now the first report to present institutional outcome data in addition to the more traditional MINAP process measures, which have already resulted in significant improvements in quality of care.

We must realise the considerable challenges of reporting outcome data. MINAP is to be congratulated for embracing this, in the spirit of transparency, whilst emphasising the numerous factors that can influence outcomes. Many of these are unrelated to performance of teams or institutions and the report rightly urges caution and points to the dangers of comparing institutions, potentially akin to comparing apples with oranges, and the pitfalls of over interpreting available data. But it is a start, and an important one, allowing us to begin to analyse those pathways of care that ensure best outcomes, and so inform more evidence based commissioning of future services. With subsequent MINAP reports, as outcome data becomes more robust, more sophisticated and better risk-adjusted, this will likely lead to yet further improvement in an already high quality national service for patients, across the spectrum of Acute Coronary Syndromes.

One of the continued successes of MINAP is the ability to drive up quality through the sharing of excellent practice, as illustrated in the numerous case studies within the Annual Report. Another is the importance MINAP places on patient engagement and representation within the audit, recognising that it has not only professional responsibilities but also responsibilities of patients, public and the media. As such, the integration of Patient Related Outcome Measures (PROMS) and Patient Related Experience Measures (PREMS) with clinical process and outcome measures is very much a future MINAP ambition. MINAP is also a highly valuable and immensely successful resource for cardiovascular research, as illustrated by the substantial number of high quality publications listed in the Appendix. The links between research and quality improvement are crucial for future advances in cardiovascular care.

We face many challenges to providing high quality care for patients who are rightly keen to have reliable, accurate and accessible information in an understandable format. Congratulations to MINAP for another Annual Report which fulfils these values. Special thanks should go to all the clinical and audit staff in cardiac centres around the country without whom none of this would be possible.

Finally, it is important to recognise the need to invest in national audit projects such as MINAP. They deliver real improvements in the quality of care, which is cost effective and best for patients.

Dr Iain A Simpson
President, British Cardiovascular Society

Executive Summary

The Myocardial Ischaemia National Audit Project (MINAP) is a national clinical audit of the management of heart attack. It supplies participating hospitals and ambulance services with a record of their management and compares this with nationally and internationally agreed standards. MINAP provides comparative data to help clinicians and managers monitor and improve the quality and outcomes of their local services. Its findings are made public through an annual report. Researchers work with the MINAP dataset to further understand the presentation, treatment and prognosis of this type of heart disease.

This is the thirteenth annual MINAP Public Report. It contains analyses from all hospitals and ambulance services in England, Wales and Belfast that provided care for patients with suspected heart attack between April 2013 and March 2014 (2013/14), as well as data from previous years for comparative purposes. For the first time, the report presents a preliminary analysis of hospital-specific 30-day death rates for patients with one particular type of heart attack. The primary aim is to inform the public, clinicians and the commissioners about the quality of local care.

Heart attack is common and remains a major cause of death and ill health. Prompt appropriate treatment reduces the likelihood of death and recurrent heart attack. Specialist treatment, combined with cardiac rehabilitation, leads to better outcomes and optimal quality of life. Heart attack, or myocardial infarction, is part of the spectrum of conditions known as acute coronary syndromes (ACS). This term includes both ST-elevation myocardial infarction (STEMI), for which emergency reperfusion treatment, with primary percutaneous coronary intervention (primary PCI) or thrombolytic drugs, is beneficial, and non-ST-elevation myocardial infarction (nSTEMI), which represents the majority, and for which a different approach is required.

Initial treatment of patients with STEMI

High quality care for STEMI includes early diagnosis and rapid treatment to re-open the blocked coronary artery responsible for the heart attack. The majority of patients receive primary PCI, during which the artery is re-opened mechanically, using a balloon catheter inflated at the site of the blockage and a stent, deployed within the artery. Thrombolytic treatment, a drug given to dissolve the clot by ambulance or hospital staff, is also available in some areas. Delay to providing either treatment is associated with poorer outcomes.

Patients who received primary PCI for STEMI

Primary PCI is the preferred treatment for STEMI if it can be provided promptly. Most patients who are recognised as having a heart attack characterised by ST-elevation are taken by ambulance directly to the catheter laboratory of the nearest Heart Attack Centre, often bypassing smaller hospitals and the Accident and Emergency (A&E) department of the receiving hospital.

- This year, in England, 98.5% out of 20,044 eligible patients who received any reperfusion treatment received primary PCI compared to 97% in 2012/13. In Wales, there has been a further increase in the proportion of patients receiving primary PCI compared to thrombolytic treatment, from 71% out of 1052 in 2012/13 to 79.5% in 2013/14. In the Belfast hospitals 99% of the 391patients eligible for reperfusion treatment received primary PCI.
- Of those treated with primary PCI, 92% of 17,991eligible patients in England, 87% of 491 patients in Wales and 95% of 358 patients in Belfast received it within 90 minutes of arrival at hospital.
- Of those treated with primary PCI, 82% of eligible patients in England, 75% in Wales and 85% in Belfast were treated with primary PCI within 150 minutes of calling for professional help. The proportion achieving the more stringent call-to-balloon time, of treatment within 120 minutes of the call for help, was: in England 59%, in Wales 52% and in Belfast 69%.
- The proportion receiving primary PCI within 150 minutes of calling for help was 87.5% for those transported directly to Heart Attack Centres in England (compared with 57% for those who were transferred to the Heart Attack Centre following initial assessment in another hospital). The equivalent value in Wales was 81% for those directly transported and 23% for those transferred from other hospitals and in Belfast was 93% for those directly transported and 54% for those transferred from other hospitals.

- Considering the provision of reperfusion treatment at the English Local Area Team level, the percentage of patients that received primary PCI ranged between 91% and 100%. There was a significant difference between the two Welsh cardiac networks: 8% of patients in the North Wales Cardiac Network and 95% in the South Wales Cardiac Network received primary PCI.
- 19% of patients that were treated with primary PCI in Heart Attack Centres in England had been assessed at another hospital and then required an inter-hospital transfer. The equivalent figure was 17% in Wales and 28% in Belfast.

Patients who received thrombolytic treatment for STEMI

The number of patients having thrombolytic treatment, either before, or on, arrival at hospital, is now relatively small reaching. About 2% overall in 2013/14.

- 32% of eligible patients received thrombolytic treatment within 60 minutes of calling for professional help in England (median delay: 83 minutes); 58% in Wales (median delay: 54.5 minutes). Thrombolytic treatment was used in only 3 patients in the Belfast hospitals.
- 71% of patients who received thrombolytic treatment or had no reperfusion treatment had, or were later referred for, coronary angiography in England; 89% in Wales and the small proportion of patients who did not have any reperfusion all received angiography in the Belfast hospitals.
- 35 patients received pre-hospital thrombolytic treatment in England in 2013/14 compared to 144 in 2012/13. In Wales, 64 patients received pre-hospital thrombolytic treatment compared to 85 in 2012/13. Pre-hospital thrombolytic treatment is not used in Belfast but a small number of patients in more rural parts of Northern Ireland received thrombolysis before arrival at hospital.

Patients that received no reperfusion treatment

Some patients arriving at hospital with evidence of STEMI receive neither primary PCI nor thrombolytic treatment – no reperfusion therapy is provided – often because they present to hospital too late to benefit from such treatments, or, during emergency coronary angiography they are found to have coronary arteries that do not require intervention.

- The proportion of patients with STEMI that received no reperfusion therapy was 27% in England (compared with 29% in 2012/13), 27% in Wales (compared with 24% in 2012/13) and 17% in Belfast.

Care of patients with nSTEMI

Patients with nSTEMI have a smaller risk of death within the first month after their heart attack, but appear to be at similar or even greater long-term risk than patients with STEMI. They are not always admitted to cardiac care units and are not always cared for by cardiologists. However, specialist involvement has been shown to lead to better outcomes. The performance of angiography and coronary intervention soon, and within the first 2-4 days, is an important facet of treatment for the majority of these patients. Ideally, admission should be to a cardiac facility where nursing staff have cardiac nursing expertise and there is easy access to cardiological advice. This year:

- 56% of 45, 910 nSTEMI patients reported to MINAP were admitted to a cardiac unit or ward in England, 66% of 2,225 patients in Wales and 95% of 407 nSTEMI patients in Belfast.
- 94% of nSTEMI patients were seen by a cardiologist or member of their team in England, 85% in Wales and 99% in Belfast.
- 80% of nSTEMI patients were referred for or had angiography in both England and in Wales and 95% in Belfast.
- 18% of nSTEMI patients undergoing angiography in England do so within 24 hours of admission, yet 33% do so more than 96 hours after admission. In Wales 11% receive angiography with 24 hours and 41% after 96 hours. In Belfast 32% receive angiography with 24 hours and 15% after 96 hours. (These analyses exclude those transferred between hospitals, who may have an even longer delay from first hospital admission to angiography).

Prescription of secondary prevention medication

Taking secondary prevention drugs after the acute event reduces the risk of death and further heart attack following discharge from hospital. Currently there are five secondary prevention drugs or drug classes that are commonly prescribed at discharge, however not every patient is eligible to receive all five drugs.

- The proportion of patients who survived to be discharged and who received all the drugs for which they were eligible was 88% in England, 73% in Wales and 94% in Belfast.

Outcomes

Length of stay

The median length of stay for patients with STEMI was three days (interquartile range (IQR) 2-5 days), with 75% of patients leaving hospital by day 5. For nSTEMI, the median length of stay was five (IQR 3-10) days, with a quarter of patients remaining in hospital until at least day 10. The length of hospital stay for nSTEMI patients is likely to be longer than currently reported as only direct admissions (not inter-hospital transfers) were taken into account in this calculation.

30-day mortality rates*

The 30-day mortality rate for patients admitted to hospital with an initial diagnosis of STEMI during the three year period 2011-2014 was 8.1%. The characteristics of patients admitted directly to interventional centres for primary PCI are likely to be very different to those of patients admitted to non-interventional hospitals. This is may account for the difference in outcome (a doubling of mortality rate) between patients admitted to the two types of hospital – 7.2% of 63,408 patients admitted to interventional centres; 14.3% of 9,261patients admitted to non-interventional centres.

The national figure of 8.1% is one third lower than the equivalent figure in 2003-04 (12.4%). This substantial improvement in outcome over the last 10 years suggests that for every twenty-five patients with STEMI treated in hospitals in England, Wales and Northern Ireland, contemporary management prevents one extra death. As the total number of cases of STEMI reported in MINAP during 2013-14 was 31,653, the improved outcome is equivalent to approximately 110 fewer deaths each month compared with 2003/04.

These are 'unadjusted' rates. Unfortunately reliable risk-adjustment modelling, that would allow comparison between hospitals, and identification of unexpectedly good or poor outcomes, could not be performed with confidence because many hospitals had provided inadequate data regarding those patient characteristics that influence survival.

*These are preliminary analyses. In the future, as case and risk adjustment becomes more sophisticated, these figures may be recalculated.

Key conclusions and recommendations

- **1. Improved outcomes following heart attack**
  Over the past 10 years there have been significant developments in the care provided to patients admitted to hospital following heart attack. The most obvious of these changes have been the move to primary PCI for patients with STEMI and early angiography with, where appropriate, follow-on PCI for patients with nSTEMI. Unadjusted 30-day mortality for STEMI has fallen by a third during this time: equivalent to 110 fewer deaths each month for this particular type of heart attack. At the same time there has been a reduction in the length of stay for patients with STEMI such that half of all patients are discharged home after 3 days and 75% after 5 days.

- **2. Better data completeness for risk-adjusted outcomes**
  Until now MINAP has largely reported on 'process measures' of care, such as the timeliness of reperfusion and the provision of secondary prevention medication at the time of discharge from hospital. Such measures of performance are not usually subjected to sophisticated adjustment to take into account the inherent risk of individual patients. The move to reporting outcomes of care, in particular the reporting this year of hospital-specific mortality rates following STEMI, has exposed important deficiencies in data collection in a number of participating hospitals. The extent of missing information on patient characteristics that might reasonably be expected to affect outcome, and the uneven distribution of this 'missingness', rendered risk-adjustment of the mortality rates unreliable, even with mathematical manipulation to 'impute' missing values.

  This issue of data quality is being addressed through implementation of new minimum data standards, close working with colleagues in participating hospitals and the introduction of systems of regular feedback to hospitals on data completeness of key datafields.

■ **3. Continued investment in clinical audit**

Some perceive clinical audit as a burden upon already busy NHS staff, the collection and submission of data being divorced from the compassionate, effective, care of patients. During times of financial constraint there is a temptation to reduce investment in such exercises, Conversely, we would argue that such conditions – a working environment characterised by cost containment and efficiency – increase, rather than decrease, the need for reliable contemporary knowledge of hospital performance. Such information, when used wisely, can be used to inform local improvements, reassure patients, providers, commissioners and the public that the quality of care provided to individuals is not being sacrificed as services are reconfigured.

The quality of contemporary data is extremely important if a true picture is to emerge. MINAP data is quite complex and its collection, often needing extraction from medical notes, requires experience – it becomes more manageable over time. We recommend that each hospital/Trust has a designated individual responsible for clinical audit data, supported by a local cardiologist. In our experience, clinical involvement results in higher quality data. High turnover and reduction in the number of staff in clinical audit departments is in no one's interest. The fact that some hospitals can achieve excellent data completeness shows that this is feasible, when there is commitment of time, personnel and funds.

■ **4. Timeliness of angiography following nSTEMI**

Patients presenting with, rather than without, ST-elevation are easier to identify and their immediate management lends itself to audit – through reporting reperfusion rates and delays to reperfusion (e.g. Door-to-balloon). However, as this report shows, most patients with ACS have nSTEMI.

The optimum timing of angiography (and follow-on PCI) after admission remains unclear; Groups developing guidelines have interpreted differently the results of trials comparing medical treatment (drugs) and PCI with medical treatment alone, suggesting maximum acceptable delays of anything from 24 to 96 hours. The most recent NICE Quality Standard suggests treatment within 72 hours.

Many patients are not yet receiving this standard of care. For those admitted directly to a hospital capable of performing an angiogram almost half do not achieve it. It is likely that those admitted to a non-interventional hospital experience even longer delays because of factors associated with transfer between hospitals. Even if there is no direct relationship between earlier angiography and outcome (judged by mortality and further heart attack), those who do receive earlier angiography are more likely to be discharged home sooner and avoid prolonged hospitalisation. Hospitals need to streamline the management of these patients.

Part One: Introduction

1. Background to heart attacks

Heart attack, or more precisely, Acute Coronary Syndrome (ACS) usually occurs after a slowly progressive build-up of fibro-fatty material (atheroma) within the wall of a coronary artery, followed by sudden disruption of the inner lining of the artery wall. This causes blood to clot within the artery – a coronary thrombosis – which interrupts the flow of oxygen-rich blood into the heart muscle – the myocardium. Initially this leads to a potentially reversible state of ischaemia and then, if adequate blood flow is not restored, to infarction.

Ischaemia is suggested by characteristic symptoms (for example central chest discomfort, sweating, breathlessness) and abrupt changes in blood pressure, heart rate and heart rhythm (sometimes leading to collapse or sudden death). It often can be detected indirectly as electrical alterations recorded on the electrocardiogram (ECG). When symptoms start, it is uncertain whether ischaemia will be transient and of no long-term consequence, or prolonged, with progression to infarction and consequent failure of the heart to pump strongly. Myocardial Infarction is confirmed by blood testing, though it may take some hours for characteristic blood abnormalities to appear. To be most effective, treatment must start before the results of such tests are available; Rather than waiting, all patients require urgent treatment to reverse ischaemia and prevent, or limit, infarction.

More information concerning the causes of atheroma and of acute coronary syndrome can be found at http://www.bhf.org.uk/heart-health/conditions/cardiovascular-disease.aspx

1.1 STEMI and nSTEMI

Based upon the ECG (Figure 1), patients with typical symptoms are categorised into those with, and those without, ST segment elevation – leading to the final diagnosis, once elevated levels of cardiac enzymes confirm myocardial infarction, of ST-elevation myocardial infarction (STEMI) or non-ST-elevation myocardial infarction (nSTEMI). ST-elevation usually indicates complete blockage of a coronary artery by a coronary thrombosis and, in most cases, warrants immediate treatment to re-open the artery – see Use of Primary PCI below. The absence of ST-elevation usually indicates that any coronary thrombosis is only partially occluding the artery.

Although patients with STEMI are at greater early risk, the medium to long-term outcome (in terms of recurrent heart attack or death) is similar, if not worse, for those with nSTEMI. Each year MINAP reports more patients with nSTEMI than STEMI. Many patients with nSTEMI benefit from an early referral for coronary angiography and interventions to restore efficient blood supply to the heart – revascularisation.

Over the past years the National Institute for Health and Care Excellence (NICE) has published a series of formal guidelines, pathways of care and technology appraisals that are relevant to the management of patients with STEMI and nSTEMI, as well as the supporting evidence upon which the guidelines are based. These can be found at: http://www.nice.org.uk/GuidanceMenu/Conditions-and-diseases#/Guidance/Conditions-and-diseases/Cardiovascular-conditions/Acute-coronary-syndromes

Aims of management

The aims of management of ACS are presented in Figure 2, which also contains examples of some beneficial interventions. Certain interventions are unsuitable – contraindicated – or inappropriate in some patients. Therefore, clinicians do not blindly follow protocols of treatment but use their clinical judgement to advise when particular treatments should be offered, and when best avoided.

For patients with symptoms of ACS presenting without ST-elevation there is an important spectrum of risk. Risk can be predicted by considering such factors as the patient's age, their blood pressure and heart rate on admission to hospital and certain aspects of their ECG and blood analyses. The NICE guideline supports the use of risk scoring in nSTEMI and the MINAP dataset contains data fields to facilitate and record this risk stratification. This allows the identification of patients who would benefit most from a more interventional approach – in particular an early coronary angiogram.

Figure 1. ECG Image of ST elevation

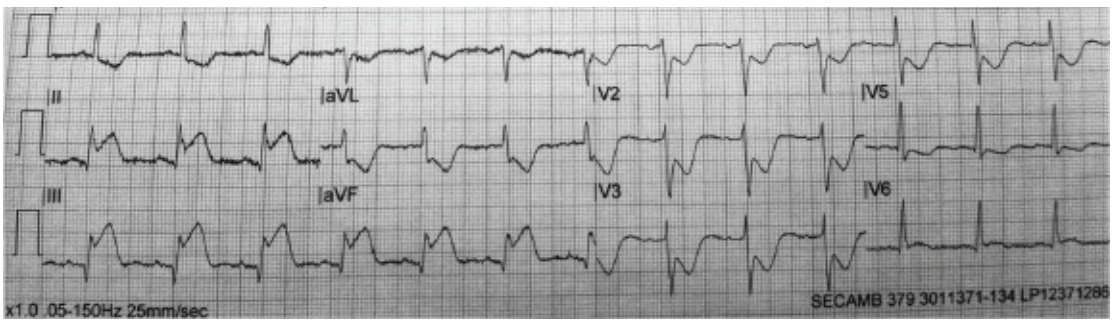


Figure 2. Key stages in the management of ACS:

Aims	Examples of interventions
Prompt recognition of symptoms	Public education Education of professionals
Provision of heart monitoring & resuscitation	Ambulance '999' response Hospital Cardiac Care Units
Restoration of coronary blood flow	Reperfusion treatment > Primary percutaneous coronary intervention (PCI) > Thrombolytic therapy Nitrates Elective PCI/Coronary Artery Bypass Grafting (CABG)
Prevention of further coronary thrombosis	Anticoagulants Antiplatelet agents
Reduction & reversal of ischaemia	Reperfusion treatment Anti-anginal drugs e.g. beta blockers, nitrates
Stabilisation of coronary artery	Statins
Optimise healing	ACE inhibitors
Prevention of future myocardial infarction	Secondary prevention drugs Lifestyle changes
Education & support, promotion of healthy lifestyles	Hospital cardiac nurse specialists Community heart failure services Cardiac Rehabilitation classes Patient support groups Public Health Initiatives

1.2 Patient outcomes following a heart attack

MINAP has largely presented information on the process of care – what and how particular aspects of care are provided to patients. Process measures describe what a patient might expect to receive if they suffer heart attack. However representing hospital or clinician performance through measurement of process is only valid if there is a clear link between process and *outcome*, that is, if improving the provision of a process measure leads to more patients achieving the desired consequences of treatment. Good quality care can be defined through the processes presented in this report because they represent interventions that have been subject to rigorous assessments of effectiveness and/or appear in influential clinical guidelines. They are linked to better outcomes[1].

In the case of heart attack the most important and obvious outcome is survival (expressed its converse – case fatality or mortality rate). In previous years the MINAP public report has included national *unadjusted* 30-day mortality rates for both England and Wales. Yet even for this apparently straightforward outcome there are complexities.

First, there is no 'standard' or 'acceptable' death rate against which to audit. Second, in order to make reasonable and fair comparisons between hospitals it is necessary to take into account (*adjust* for) those characteristics of patients which influence survival, yet are beyond the control of the admitting hospital – such as age, co-existing medical conditions, admission heart rate and blood pressure. Choosing which factors to include in the mathematical adjustment, and how to address missing data, is a matter of judgement. Third, when the care of a patient with heart attack involves transfer between two hospitals, it becomes difficult to represent the performance of just one of those hospitals in the mortality statistic. Fourth, hospitals that manage relatively few patients per year are likely to report large differences in death rate each year. Other national cardiac audits, such as the National Audits of Adult Cardiac Surgery and PCI, report rates over the previous 3 years to 'smooth out such differences. Finally, it is unclear how long survival should be monitored. Evidently, it matters more to a patient that they survive 5 years after a heart attack rather than just 30 days, yet can hospitals be held accountable for the survival of patients long after discharge?

Other outcomes matter to patients: length of stay in hospital; readmission following discharge; adverse effects of interventions; symptoms after discharge; return to reasonable levels of physical activity and confidence; quality of life. Defining and collecting information on those outcomes that occur after hospital discharge is challenging[2] and may require electronic data-linkage. Some only can be appreciated by asking patients 'directly' through use of Patient Reported Outcome Measures (PROMs).

This year we present length of stay for STEMI and nSTEMI and hospital-specific unadjusted 3-yr rolling 30-day mortality rates for STEMI.

1. Simms AD, Baxter PD, Cattle BA, et al. Do composite measures of hospital performance predict mortality in survivors of acute myocardial infarction? Analysis of individual hospital performance and outcome for the National Institute for Cardiovascular Outcomes Research (NICOR). Eur Heart J:ACC 2012;2:9-18.

2. http://www.ichom.org/project/coronary-artery-disease/

2. Background to MINAP

2.1 Principles

The Myocardial Ischaemia National Audit Project (MINAP) was established in 1999. It was founded on the following propositions:

- The audit should be a complete record of care rather than a snapshot – all (rather than a sample of) patients being included
- The audit should be prospective – information being collected as soon after treatment as possible,
- Participating hospitals should agree both common definitions of clinically important variables and common standards of good quality care against which to audit their practice
- Standards of care should be chosen that have a proven link to improved outcome – i.e. those aspects of care being audited, whilst capable of being expressed as measures of process or performance, should link directly to better patient outcomes
- The practices of individual hospitals should be aggregated into a national figure – a hospital could audit against agreed standards and compare against the national aggregate
- Sufficient data should be recorded to allow for case-mix adjustment and other techniques for investigating differences in outcomes between hospitals,
- The dataset should be revised periodically to account for the introduction of newer treatments
- The audit should maintain its credibility and validity by being guided and supported by relevant professional bodies and patient groups and be managed by a small project team
- A publicly accessible report should be published annually.

Latterly, the British Cardiovascular Society has been challenged to show clinical leadership in "pushing for public access to performance data of individual clinical teams"[3]. The Francis report into failings at the Mid Staffordshire NHS Foundation Trust recommended "openness, transparency and candour throughout the system" and the development of "ever improving means of measuring and understanding the performance of individual professional teams, units and provider organisations"[4]. MINAP was one of the first audits to have data available on the data.gov.uk website as part of the Transparency Agenda[5]. Data from MINAP was also included by Professor Sir Bruce Keogh in the 'data packs' that informed his review of 14 hospital Trusts with persistently high mortality rates, and that he recommended to the new Chief Inspector of Hospitals[6]. His intention is that provider and commissioning organisations, patients and the public will have "rapid access to accurate, insightful and easy to use data about quality at service line level".

2.2 Organization of MINAP

MINAP is one of a portfolio of national cardiac clinical audits that are managed by the National Institute for Cardiovascular Outcomes Research (NICOR), which is part of the Institute for Cardiovascular Science at University College London (UCL).

The National Institute for Cardiovascular Outcomes Research (NICOR) is led by Professor John Deanfield at University College London (UCL). NICOR's mission is to provide accurate data on cardiovascular outcomes for the public, healthcare providers and the medical profession. NICOR manages six national cardiovascular audits, including the Myocardial Ischaemia National Audit Project (MINAP) which is commissioned by the Healthcare Quality Improvement Partnership (HQIP) as part of the National Clinical Audit and Patient Outcomes Programme (NCAPOP).

MINAP is overseen by a Steering Group of key stakeholders, including national government and patient representatives (Appendix 1). The British Cardiovascular Society is the 'parent' professional body for MINAP, providing clinical direction and support. Additionally, in order to more closely align national cardiac audits, the Clinical Lead for the British Cardiovascular Intervention audit for PCI is a member of the MINAP Steering Group.

3. Godlee F. Publish your team's performance. BMJ 2012;344:e4590

4. The Mid Staffordshire NHS Foundation Trust Public Inquiry (2013). Executive Summary. Available at: www.midstaffspublicinquiry.com

5. http://data.gov.uk/dataset/minap-analyses-2013

6. Keogh B. (2013) Review into the quality of care and treatment provided by 14 hospital trusts in England: overview report. Accessed at www.nhs.uk_NHSEngland_bruce-keogh-review_Documents_outcomes_keogh-review-final-report.pdf

2.3 How the data are collected

The current dataset, version 10.3.1, contains 130 fields. It is revised every two years (the latest version being introduced during the period covered by this report) to allow both continuing monitoring of established practices and information about newly introduced treatments. It is designed to capture the entire 'patient pathway' – from the time the patient calls for professional help to the point of discharge, including patient demographics, medical history and clinical assessment, investigations, interventions, drug therapy prior to admission, during hospital stay and at discharge. The most recent versions of the MINAP dataset are available on the MINAP web pages[7].

Participating hospitals are requested to enter all patients with suspected myocardial infarction. Approximately 90,000 records are uploaded annually and the database now contains over 1.25 million records, making it the largest database of its kind in the world.

Data are collected by nurses and clinical audit staff (many with support from a local cardiologist) and entered in a dedicated data application (either Lotus Notes or web-based). Alternatively hospital personnel may collect data using 3rd party software, which is often linked to their local clinical information system. The project uses a highly secure electronic system of data entry, transmission and analysis developed by the NICOR Technical Team.

The audit has been running continuously since 2000 and all hospitals in England, Wales and Belfast that admit patients with ACS contribute data (except Scarborough General Hospital which is intending to re-engage with the national audit during the coming year, having stopped submitting data in 2011). During the financial year covered by this report there was a phased roll out of MINAP to other hospital Trusts in Northern Ireland. However, a number of these hospitals do not have complete year-long data and the Regional Steering Group has decided to postpone publication of hospital-specific performance data outside Belfast until next year, by which time there should be sufficient data to allow reliable audit.

2.4 Security and patient confidentiality

All data uploaded by hospitals are encrypted on transmission and stored encrypted on NICOR servers. NICOR manages access control to the servers via user IDs and passwords. All patient identifiable data are pseudonymised by the NICOR technical team before release to the project management team via a secure drop box on the NICOR server. Patient-identifiable data are only available for the purpose of record linkage. Data held within NICOR are managed within a secure storage and processing environment within the UCL network and in accordance with the UCL information governance and security policy.

7. http://www.ucl.ac.uk/nicor/audits/minap/dataset

NICOR is registered under the Data Protection Act by the Information Commissioner's Office. Additionally, NICOR – of which MINAP is a part - has support under section 251 of the National Health Service (NHS) Act 2006 (Ref: NIGB: ECC 1-06 (d)/2011).

NICOR staff recognise that confidentiality is an obligation and regularly undergo information governance training to ensure understanding of the duty of confidentiality and how it relates to patient information.

2.5 Case ascertainment

MINAP records the great majority of patients having STEMI in England, Wales and Belfast. Evidence for this is that the number of STEMI patients receiving primary PCI in MINAP is similar to the number of primary PCI cases in the Adult Coronary Intervention Audit. However case ascertainment for nSTEMI is incomplete, and varies significantly between hospitals[8]. Under-reporting of nSTEMI appears to correlate with resources allocated to data collection. nSTEMI is therefore under-represented in MINAP. The true number is difficult to establish, as it is not possible reliably to compare MINAP data with Hospital Episode Statistics (HES) in England or the Patient Episode Database for Wales (PEDW), the only available comparators. HES/PEDW do not distinguish the clinical categories (STEMI/nSTEMI) used within MINAP and attempts to compare between these sources of data identify some patients in both, but some in just one[9].

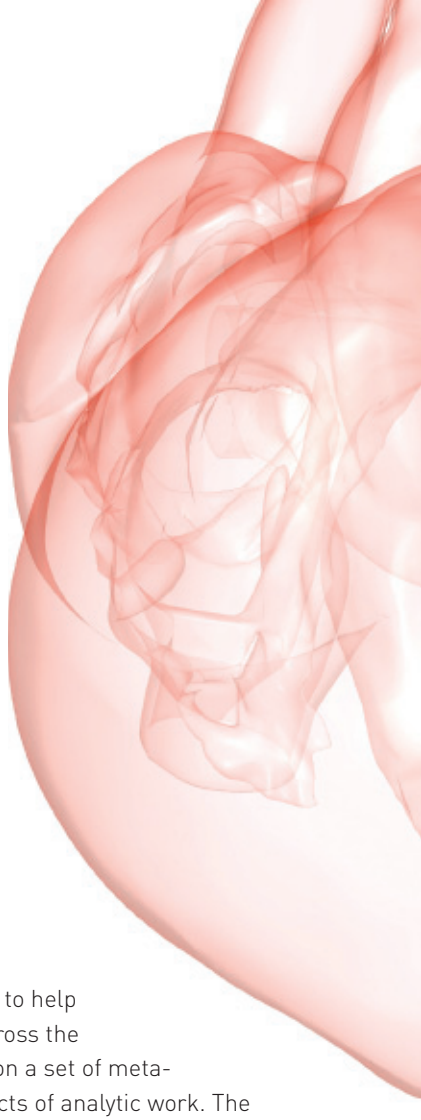
2.6 Data Completeness and Data Quality

Assessment of data completeness is presently based on patients with nSTEMI. The completeness of 20 key fields is continually monitored and is available to hospitals in an online view that is refreshed daily. Currently these fields continue to be 99% complete.

MINAP also performs an annual data validation study to assess the agreement of data held on the NICOR servers. Hospitals are required to re-enter data from case notes in 20 key fields for 20 randomly selected nSTEMI records via an online data validation tool. Agreement between the original and re-entered data is assessed for each variable and each record. Reports showing the agreement of each variable compared to national aggregate data are sent to hospitals to allow them to identify areas of improvement.

The MINAP data application contains error-checking routines, including range and consistency checks, designed to minimise common errors. There are a number of checks on imported data where 3rd party software is used, that highlight issues resulting from an import, whilst records with more serious problems get rejected.

MINAP provides detailed guidance and a variety of clinical scenarios to aid data entry. A dedicated helpdesk advises colleagues who experience problems.



2.7 Improving analysis

NICOR's Analysis Team use the R statistical programming language to help standardise processing of data across the HQIP audits. Their programs run on a set of meta-data tables that define many aspects of analytic work. The amount of meta-data required to define one MINAP analysis is quite large. For example, the meta-data for recoding categorical variables in the MINAP data currently consists of 3608 records. These meta-data are regularly curated by the Team and reviewed by the audit leads to ensure that analyses are properly specified, transparent and reproducible.

Modules for the cleaning of categorical variables and template reporting have been developed. Hospitals and ambulance services receive and review, in advance of publication of the annual report, draft unit-specific reports that are generated using the same template of calculations as are later used to compute annual MINAP statistics. By leveraging the group review process in this way NICOR seeks to guarantee that all published statistics will be well-vetted and reliable.

3. Improving quality, improving outcome

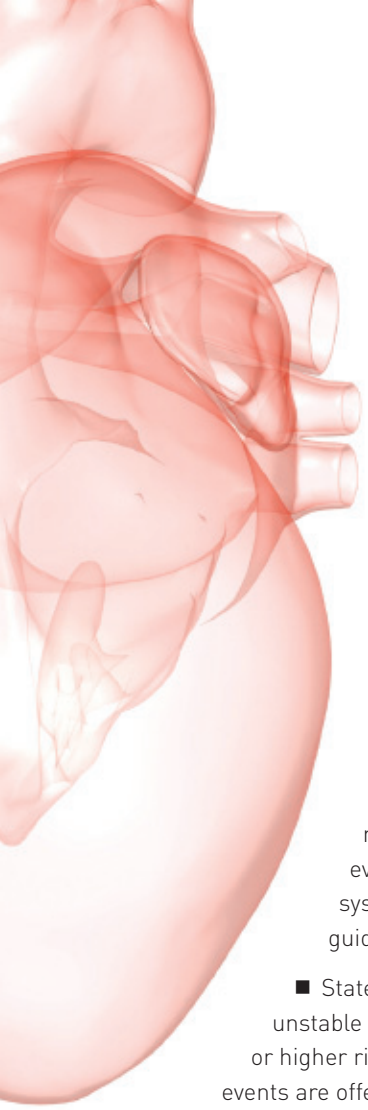
3.1 NICE guidelines

Over the past years the National Institute for Health and Care Excellence (NICE) has published a series of formal guidelines, pathways of care and technology appraisals that are relevant to the management of patients with STEMI and nSTEMI, as well as the supporting evidence upon which the guidelines are based. These can be found at: http://www.nice.org.uk/GuidanceMenu/Conditions-and-diseases#/Guidance/Conditions-and-diseases/Cardiovascular-conditions/Acute-coronary-syndromes

In September NICE published a document that contains quality standards, expressed through six statements, for the

8. Brophy S, Mannan S, John A, et al. Risk of further acute vascular events (RAVE review): Final report for Myocardial Infarction – Published by Dept of Transport. RSR Research Review No 65. 2006

9. Herrett E, Shah AD, Boggon R, et al. Completeness and diagnostic validity of recording acute myocardial infarction events in primary care, hospital care, disease registry, and national mortality records: cohort study. BMJ. 2013;346:f2350.



management of patients with ACS[10]. These, it is hoped, will influence the commissioning and provision of high quality coordinated care for patients with heart attack. The Quality Statements are:

- Statement 1. Adults with a suspected acute coronary syndrome are assessed for acute myocardial infarction using the criteria in the universal definition of myocardial infarction.
- Statement 2. Adults with nSTEMI or unstable angina are assessed for their risk of future adverse cardiovascular events using an established risk scoring system that predicts 6-month mortality to guide clinical management.
- Statement 3. Adults with nSTEMI or unstable angina who have an intermediate or higher risk of future adverse cardiovascular events are offered coronary angiography (with follow-on PCI if indicated) within 72 hours of first admission to hospital.
- Statement 4. Adults with NSTEMI or unstable angina who are clinically unstable have coronary angiography (with follow-on PCI if indicated) as soon as possible, but within 24 hours of becoming clinically unstable.
- Statement 5. Adults who are unconscious after cardiac arrest caused by suspected acute STEMI are not excluded from having coronary angiography (with follow–on primary PCI if indicated).
- Statement 6. Adults with acute STEMI who present within 12 hours of onset of symptoms have primary PCI, as the preferred coronary reperfusion strategy, as soon as possible but within 120 minutes of the time when fibrinolysis could have been given.

The MINAP dataset is under review and the updated dataset will reflect revised NICE guidelines, technology appraisals and allow collection of data to assess care against these quality standards.

3.2 Use of primary PCI

In STEMI, reperfusion, the re-opening of the blocked coronary artery, must happen as quickly as possible if significant benefit is to accrue. If patients delay too long after the start of their symptoms, or if medical services are too slow in responding or in offering treatment, reperfusion therapy may be of no value.

Over the last 10 years, MINAP has reported and informed a major change in practice, from reperfusion based on thrombolytic drug administration to one based on immediate (primary) PCI. While patients tend to wait longer to receive primary PCI than they would to receive thrombolytic treatment, the final results are more reliable in terms of complete restoration of coronary blood flow. Primary PCI is therefore the reperfusion treatment of choice, with thrombolytic therapy being reserved for cases where rapid access to primary PCI is impossible.

This transition has been driven by local clinical leaders and professional networks, and promoted by members of the British Cardiovascular Intervention Society in response to a Government challenge to 'roll-out' a primary PCI service. The final NHS report on the 'roll-out' project was published in 2012[11] .

There has been a resultant reorganisation of cardiac services. Substantial numbers of district general hospitals no longer routinely admit patients with STEMI. Rather, such patients are taken directly to a smaller number of 'high-volume' Heart Attack Centres, serving large populations and a network of smaller feeder hospitals. In some networks patients are 'repatriated' from the Heart Attack Centre to their local hospital following primary PCI, but often patients are discharged directly home after a stay in hospital of as little as 3 days.

Newer performance measures have been introduced. National and international guidance[12 13] recommend that primary PCI should be performed as soon as possible: within 90 minutes of arrival at hospital (door-to-balloon time) and within 150 minutes of a patient's call for help (call-to-balloon time). Results in MINAP are presented against these best practice standards, and against a more stringent ('aspirational') call-to-balloon target of 120 minutes.

The call to balloon time reflects the interval from a call for professional help to the time that the primary PCI procedure is performed. To reliably achieve this within 120 minutes, or even 150 minutes, requires significant coordination between ambulance and hospital services. Ideally, ambulance crews make an accurate diagnosis, through expert assessment of the patient and interpretation of an ECG, before taking the patient directly to the nearest Heart Attack Centre At the hospital the provision of timely primary PCI is complex and involves close collaboration between ambulance, portering, nursing, medical,

10. NICE (September 2014) Quality Standard 68. Acute Coronary Syndromes (including myocardial infarction). http://www.nice.org.uk/guidance/qs68/resources/guidance-acute-coronary-syndromes-including-myocardial-infarction-pdf

11. NHS Improvement. Growth of primary PCI for the treatment of heart attack patients in England 2008-2011: the role of NHS Improvement and the Cardiac Networks. January 2012. Available at: http://www.improvement.nhs.uk/LinkClick.aspx?fileticket=PWttejHG45M%3D&tabid=63 (accessed 6 Aug 2012)

12. The Task Force on the Management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology, (2012) ESC guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. Eur Heart J doi:10.1093/eurheartj/ehs215

13. Antman EM, Hand M, Armstrong PW et al. (2008) 2007 focused update of the ACC/AHA 2004 Guidelines for the Management of Patients With ST-Elevation Myocardial Infarction. J Am Coll Cardiol 2008; 51: 210–247.

and radiographic teams. This is particularly important during 'out of hours' working. Direct transfer of the patient from the ambulance to the cardiac catheter laboratory, without involvement of other hospitals, departments or wards has reduced delays.

Some hospitals that are not designated 'Heart Attack Centres' provide diagnostic angiography and interventional cardiac services, including elective PCI – for example to patients with stable angina or those with nSTEMI. Often the cardiologists working in such hospitals also provide out-of-hours primary PCI services at neighbouring Heart Attack centres. When a patient 'self-presents' with, or develops, STEMI at these hospitals it is possible, and would seem sensible, to provide primary PCI on-site, if it is *immediately* available. However it is unwise directly to compare the call-to-balloon times, rates of provision of reperfusion and mortality rates of such interventional (non-Heart Attack Centre) hospitals with those of Heart Attack centres. The characteristics of patients and routes of admission differ widely between the two types of hospital. For example the interventional (non-Heart Attack Centre) hospitals are likely to receive a disproportionate number of patients who self-present or who are judged by ambulance personnel to present difficulties in diagnosis and decision making with respect to suitability for primary PCI.

However, it remains the case that an initial assessment at a local non-interventional hospital before transfer to an interventional hospital is associated with added delay and prolonged call-to-balloon times. In some areas a new metric has been introduced to record this added delay and promote the shortest possible safe assessment and stabilisation period in the initial receiving local hospital – the Door-In-Door-Out interval (DIDO).

A number of patients do not receive reperfusion treatment. They are a mixed group, including such situations as:

- Delayed presentation – patients presenting to hospital so long after the onset of symptoms as to make reperfusion therapy valueless
- Contraindication – patients with contraindications to treatment (e.g. increased risk of bleeding)
- Inappropriateness – patients whose heart attack occurs in the presence of other terminal illnesses
- Spontaneous improvement – patients whose ST-segment elevation shown on an initial ECG (for example an ECG recorded in the ambulance) normalises before reperfusion therapy is given
- Coronary intervention not required – patients whose emergency coronary angiogram shows that primary PCI is not required

Among patients in this last category are those with Takotsubo syndrome[14]. This condition, presenting as an ACS with typical chest discomfort, ECG changes and evidence of heart muscle damage – often in post-menopausal women and following an extremely stressful event such as a bereavement – appears not to be related to coronary artery occlusion at all. Rather, heart damage, from which a full recovery is possible, is caused by the effects of excessive catecholamine (adrenaline and adrenaline-like chemical) stimulation.

3.3 nSTEMI and access to angiography

In the absence of ST-elevation on the presenting ECG immediate reperfusion therapy, such as primary PCI, is not essential. Often the event can be managed with a combination of drug treatments.

However, some patients with nSTEMI either continue to suffer ischaemic pain or initially appear to stabilise but soon afterwards experience further problems. Rather than waiting for this to happen, and then reacting, patients can be assessed within hours of admission to hospital using a variety of validated risk scores[15].

The NICE Guideline suggests that patients at moderate risk (above 3% risk of further heart attack or death during the next 6 months), and those in whom it is possible to demonstrate

14. Lyon AR, Rees PS, Prasad S, et al. Stress (Takotsubo) cardiomyopathy – a novel pathophysiological hypothesis to explain catecholamine-induced acute myocardial stunning. Nat Clin Pract Cardiovasc Med 2008;5:22-9.

15. Gale CP, Manda SO, Weston CF, et al. Evaluation of risk scores for risk stratification of acute coronary syndromes in the Myocardial Infarction National Audit Project (MINAP) database. Heart. 2009;95:221-7.

residual ischaemia on testing after the acute event, should be advised to have a coronary angiogram within 96 hours of admission[16]. Other international guidelines have encouraged even earlier angiography. The proportion of patients with a final diagnosis of nSTEMI (broadly reflecting the NICE classification of moderate severity) who have angiography during their admission has increased from about 35% in 2003 to about 75% in 2013/14. This reflects as significant a change in management for nSTEMI as does the development of primary PCI for STEMI.

However, angiography is not appropriate for all patients with nSTEMI and those at the very highest risk were not included in trials that demonstrated the benefit of routine angiography. Clinical judgement (as well as patient choice) needs to be exercised in such cases.

4. Patient perspective

One of the characteristics of good professional practice is a commitment to assuring and improving quality of care. Increasingly, professionalism also requires an honest sharing (and interpretation) of data with other clinicians and with the public. Through this public report, MINAP offers patients and the public information on their local health services, allowing comparisons with other local hospitals and against overall national performance figures.

Patients are empowered not simply through access to this public report, but by direct involvement in MINAP via the Steering Group. In order to reach out to more patients and the public, MINAP published its first patient friendly version of the main report in January 2013. A Patient version of MINAP annual report will be also available on the NICOR website towards the end of 2014[17].

In this section Alan Keys, a patient representative, who is also member on the MINAP Steering Group, considers patient engagement with the provision of high quality health services, and points to the sorts of questions that arise from access to local and national MINAP data.

Patient perspective – Alan Keys, President of the Cardiovascular Care Partnership

"Advances in the treatment of heart attacks over recent years have been remarkable. Nowadays STEMI patients are sometimes treated and ready for discharge so quickly that it is a challenge for cardiac rehabilitation teams to catch up with them before they go home. Indeed, it is all so efficient and effective that some patients need to be convinced of the seriousness of the event and the wisdom of attending rehabilitation.

Throughout this dramatic progress MINAP has been recording and reporting comparative performance, initially concerning treatment with thrombolysis but now predominantly with respect to the constituent parts of the primary PCI process from initial telephone call to balloon. The data in the Annual Report has been largely accessed by health professionals but last year the first Patients' Report was published and with the MINAP Report available on line it is much easier for lay people to compare local performance.

Accessing and using the evidence of NHS data has not been a conspicuous part of patient and public engagement. Even now it is difficult to sift dense sets of figures, so I shall offer a few suggestions based on what I see in my area; it will be different elsewhere.

A reduction in the percentage of patients treated within 150 minutes of the initial call in a number of local hospitals may point to slower response times by the ambulance service, especially in rural areas. Is there any connection with ambulances being delayed outside A&E departments? How can this situation be reversed, given the damage caused to STEMI patients by every minute's delay? Are ambulances being deployed to meet regional targets rather than to provide equity of care? Is this issue being addressed by the commissioners?

Is the 150 minute call-to-balloon target still appropriate or should it be replaced by 120 minutes, as many believe? The major Pinto study concluded that 120 minutes was the crossover point between thrombolysis and pPCI and a number of our hospitals are performing relatively well at 120 minutes. In order to get closer to such a target there needs to be more consistency in door-to-balloon times, which are usually the differentiating measure between the best hospitals and those who lag behind. Would such improvement reduce the number of heart failure patients following STEMI, thus improving quality of life and saving money for the NHS? I am not qualified to answer but it seems reasonable to pose the question.

Increasingly, we shall see MINAP data used by the Care Quality Commission to assess hospital performance but I hope I have given simple examples of how patients can use the data as a basis for constructive dialogue with commissioners and providers."

16. http://www.nice.org.uk/guidance/CG94/chapter/introduction
17. http://www.ucl.ac.uk/nicor

Patient perspective – Martin Riddington

I had my first heart attack last November at the age of 46 years old. I can't say there weren't warning signs, there were, but due to a sprain in my shoulder that had caused me considerable discomfort, I put them down to this. I also can't say it didn't cross my mind that the 'warnings' weren't something more sinister either. In fact, I did look up on the web to see if there were any indicators that it could be my heart. My signs were an indigestion pain in my upper chest, kind of similar to when you've drunk lots of cola but can't burp. The other was a horrible weakness in my right arm. This felt like the time I was a child and had touched an electric fence. My arm felt so heavy you just wanted to let it hang by your side. According to the web, it was mostly the left arm that is the problem, and there were other prevalent symptoms too that threw me off the scent.

That I should have had a scent at all was due to my Father, who had his first heart attack at 46! I remember being told as a young man that as my Father suffered with heart problems, there was a chance I would too. Back then in Dad's day, treatment was far different, but despite two quadruple bypasses, he lived to 82 years old, a testament to living a long life against all the odds.

Saturday 23rd November 2013 began like most Saturdays for me with a lie in, followed by breakfast and then a brisk walk up the seafront for a couple of miles (I like to walk as much as possible to keep fit) The plan had been at that time to stroll down to my local football club and watch the game before spending the evening in. I had felt pretty tired this particular day and that had been the main factor in me changing my mind about going football. Around 2.15pm my warning signs returned while I was working round the house. I stopped what I was doing and lied down but I was getting more and more uncomfortable. I got up, moved around, sat down, but nothing was working to alleviate this pain. My wife came home and phoned her sister who is a district nurse to ask for advice.

Immediately after she called the on call doctor's surgery and while going through my symptoms, I got pins and needles firstly in my right hand, followed by my left, and then both feet – this was when I knew what was happening and I got very worried right then. Luckily, the despatched paramedic was on his way and arrived a few minutes later. He tried to calm me down but it was nigh on impossible, I was in so much pain. He gave me aspirin and almost immediately the pain went from 10 to 1 and I was able to talk to him for a short while. By this time an ambulance arrived and I was given a spray under my tongue and taken immediately to hospital. In CCU I was asked to sign a consent form for an angiogram which I did and minutes later was undergoing this.

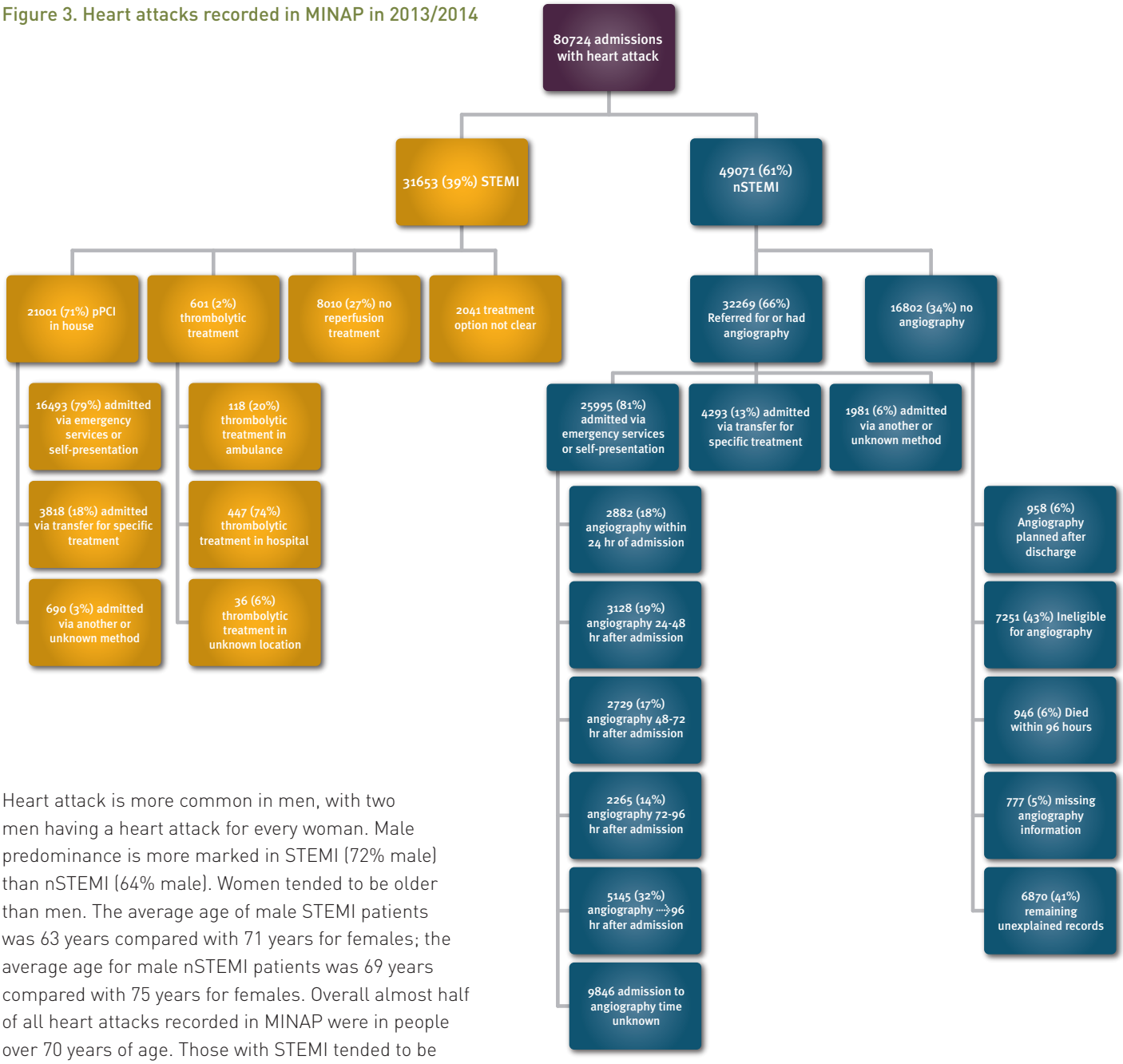
Nearly two hours later I was taken back to the ward with three stents helping open two arteries. The surgeon told me I was very lucky and that it was a close call, timing had been everything. It turns out I'm producing too much cholesterol and over the years this had built up round my system. The two arteries now stented had been the most blocked ones, 97% and 99% respectively. I'm on drugs for life now, but thanks to all concerned I have a life to which I'm grateful.

Part Two: Analyses

1. Characteristics of patients with heart attack in 2013/2014

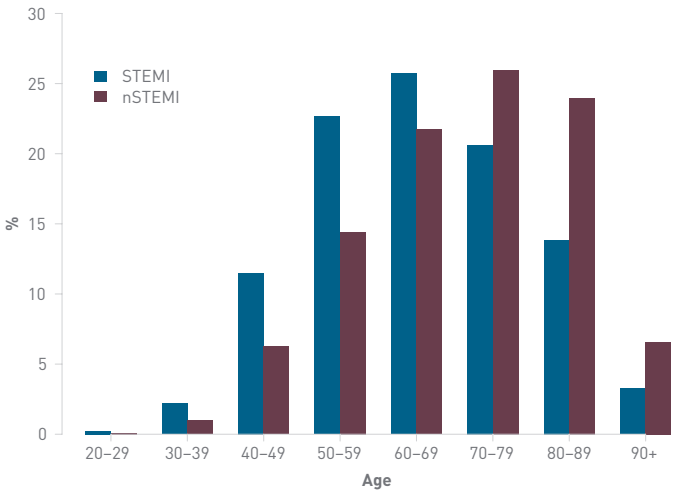
In 2013/14, 89,856 records were submitted to the MINAP database and 80,724 were records of patients with a final diagnosis of myocardial infarction. There were 56,018 patients experiencing heart attack for the first time, while the remaining records related to patients with previous episodes. Overall, some 39% had STEMI [Figure 3]. MINAP recognises that not all patients having nSTEMI are entered into the database and we believe that the true ratio for nSTEMI to STEMI should be at least 3:1.

Figure 3. Heart attacks recorded in MINAP in 2013/2014



Heart attack is more common in men, with two men having a heart attack for every woman. Male predominance is more marked in STEMI (72% male) than nSTEMI (64% male). Women tended to be older than men. The average age of male STEMI patients was 63 years compared with 71 years for females; the average age for male nSTEMI patients was 69 years compared with 75 years for females. Overall almost half of all heart attacks recorded in MINAP were in people over 70 years of age. Those with STEMI tended to be younger (average age 65 years) than those with nSTEMI (average age 71 years). Half of STEMI patients were 65 years or younger; half of nSTEMI patients were 72 years or older (Figure 4).

Figure 4. Frequency distribution of STEMI and nSTEMI in 2013/14



Among those admitted with a first heart attack there has been a levelling off in the prevalence of previously diagnosed hypertension for both men (approx. 44%) and women (approx. 54%) [Figure 5]. A similar levelling off has occurred in the prevalence (approx. 31% in men and 30% in women) of recognised and treated hyperlipidaemia - predominantly cholesterol management with statin treatment (Figure 6).

Figure 5. Hypertension in patients having first heart attack

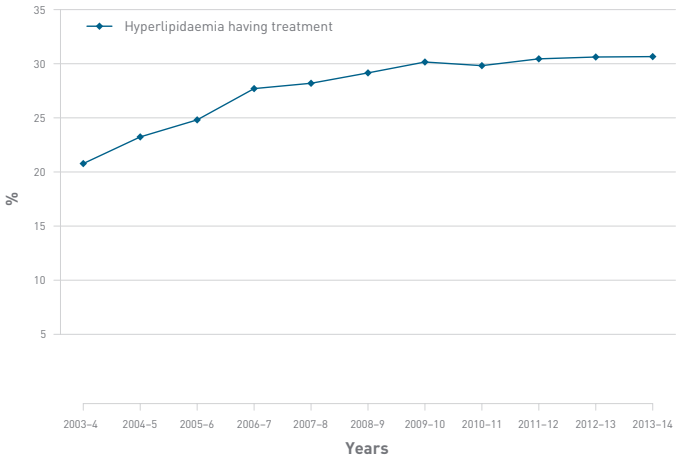
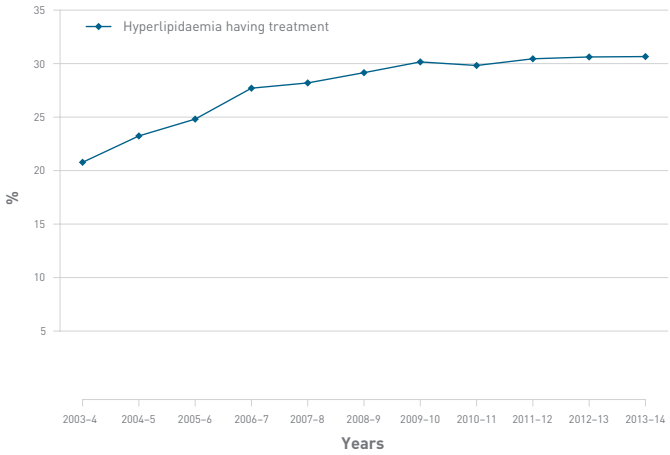
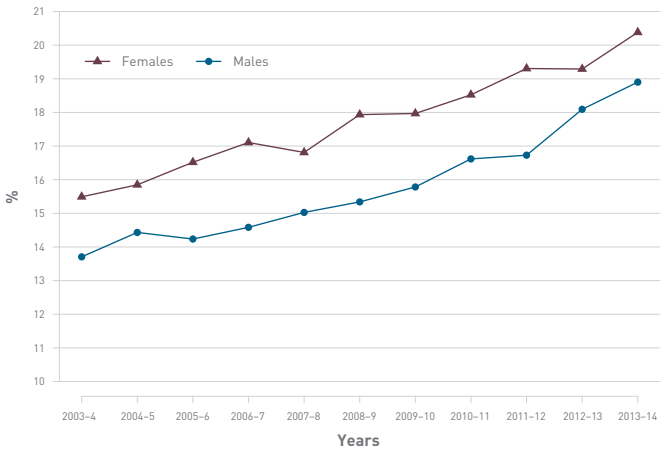


Figure 6. Patients admitted with the first heart attack already receiving treatment for hyperlipidaemia at admission



An increase over the years in the frequency of diabetes continues, with the prevalence being slightly greater in females (approx. 20%) than males (approx. 19%), and being substantially greater than the prevalence of diabetes in the general population. Further analysis shows that the increase is limited to those having type 2 diabetes (Figure 7). It is not clear to what extent this represents a real increase, or whether in part this reflects improved recognition of type 2 diabetes in primary care.

Figure 7. Frequency of diabetes in patients having first heart attack



2. Hospitals that perform primary PCI

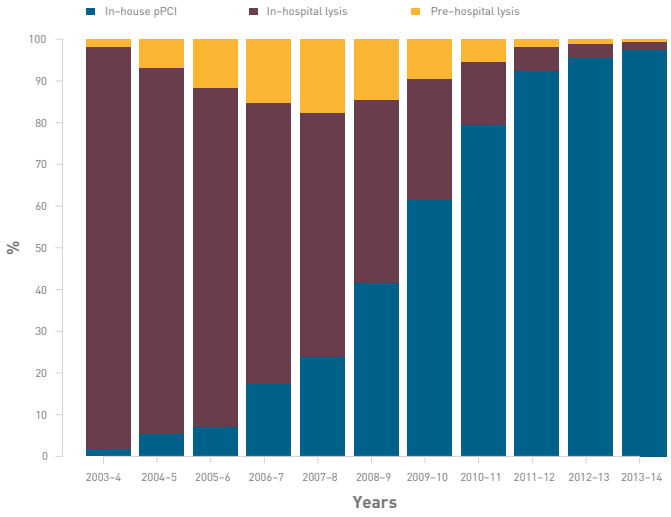
National and international guidance[18] recommend that in the emergency treatment of patients with STEMI, primary PCI should be performed within 90 minutes of arrival at the primary PCI centre (door-to-balloon time) and within 150 minutes of a patient's call for help (call-to-balloon time). Results are presented against these best practice standards in Table 1. The sooner a patient receives this treatment, the better the outcome. The results in this table show that most of the hospitals are now achieving the call-to-balloon-time (CTB) within 150 minutes. European guidelines propose a CTB within 120 minutes[19] and this is also presented in the Table 1.

The use of primary PCI continued to increase in 2013/14 (Figure 8). This year in England, 98.5% of patients were so treated compared to 96.6% in 2012/13. In Wales 79.5% patients had primary PCI compared to 72% in 2012/13. In Belfast all patients recorded in MINAP received primary PCI. The overall median time from arrival at hospital to primary PCI was, as in the previous year, 40 minutes. This was slightly shorter (37 minutes) for those patients transferred to a Heart Attack Centre following assessment at a non-interventional hospital than for those brought directly to the Heart Attack centre (41 minutes). This suggests that the staff at the Heart Attack centre have more time to prepare for the arrival of those patients assessed elsewhere as they are en route.

The percentage of patients with an admission diagnosis of STEMI who receive primary PCI within 90 minutes of arrival at a Heart Attack Centre has increased from 52% in 2004/5 to 92% in 2013/14 and is a reflection of close collaboration between ambulance services, emergency departments and admitting hospitals (Figure 9). In particular, direct transfer of the patient by ambulance from the community to the catheter lab without involvement of other departments or wards has reduced delays. In the last year there was an increase in direct admissions from 15,371 in 2012/13 to 15,854 in England. In Wales there was an increase in direct admissions from 457 in 2012/13 to 663 in 2013/14. There was also an increase in direct admissions in Belfast from 105 in 2012/13 to 147 in 2013/14.

In reporting on the use of primary PCI in the management of patients with STEMI, increasingly there is alignment of definitions and analyses of hospital performance between MINAP and the British Cardiovascular Intervention Society national audit for PCI.

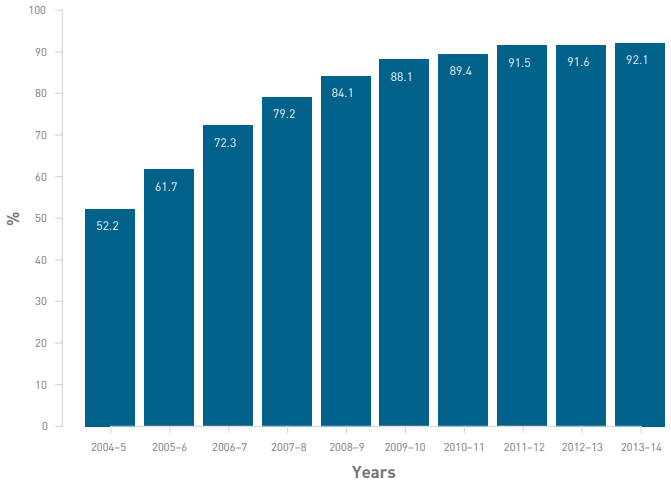
Figure 8. Use of reperfusion treatment for patients with a final diagnosis of STEMI



2.1. Door to balloon time

The proportion of patients receiving primary PCI within the 90 minute continues to rise (Figure 9). In England this year, 92% of 17,996 eligible patients were treated with primary PCI within 90 minutes of arrival at the heart attack centre: a similar proportion as in 2012/13. In Wales 87% of 491 eligible patients were treated within 90 minutes compared to 85% in 2012/13. In Belfast 95% of 358 eligible patients were treated within 90 minutes compared to 89% of 137 in 2012/13.

Figure 9. Percentage of patients with an admission diagnosis of STEMI having primary PCI within 90 minutes of arrival at the heart attack centre in England, Wales and Belfast.



18. http://www.improvement.nhs.uk/heart/?TabId=66

19. The Task Force on the Management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology, (2012) ESC guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. Eur Heart J doi:10.1093/eurheartj/ehs215

The median time is 40 minutes; for 29% the interval is less than 30 minutes and for 77% the interval is less than 60 minutes.

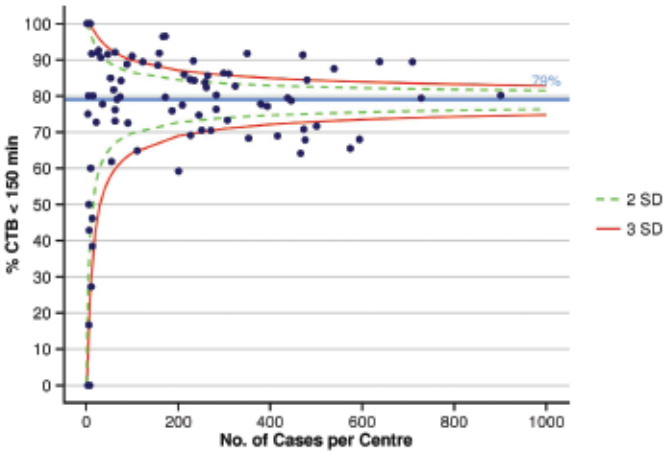
2.2. Call to balloon time

As explained above, the call-to-balloon time is the interval from a call for professional help to the time that the primary PCI procedure is performed. It is largely a shared responsibility of the relevant ambulance service and the admitting hospital. Usually all patients with a diagnosis of STEMI confirmed by a paramedic crew are taken directly to a Heart Attack Centre. This however is not always possible, particularly where there is diagnostic uncertainty, or in remoter parts of the country.

In England, 82% out of 16930 eligible patients were treated within 150 minutes (and 59% within 120 minutes) of calling for professional help: the same as last year. In Wales 75% out of 424 eligible patients were treated within 150 minutes (and 52% within 120 minutes) compared to 70% in 2012/13. In Belfast 89% of 313 eligible patients were treated within 150 minutes (and 80% within 120 minutes) which remains the same as in 2012/13. Individual performance with respect to this standard is presented in Table 1.

For comparison, Figure 10 demonstrates similar results derived from BCIS audit for PCI [NB: the reporting period in slightly different between the two audits and is likely account for the small difference in overall rate of call-to-balloon within 150 minutes.

Figure 10. Distribution of percentage of patients with call-to-balloon time less than 150 minutes in Heart Attack Centres (data provided by Dr Peter Ludman, Clinical Lead for BCIS audit for PCI January – December 2013)[20]



In England, 87% of 14,167 eligible patients taken directly to the Heart Attack Centre were treated with primary PCI within 150 minutes, and 63% within 120 minutes, of calling for professional help. This compares with 57% of 2,778 eligible patients within 150 minutes and 36% within 120 minutes for patients taken first to a local hospital and then transferred to a Heart Attack Centre.

The equivalent figures for Wales were 81% (out of 381 eligible patients) within 150 minutes and 57% within 120 minutes for direct admissions and 24% within 150 minutes and 14% within 120 minutes for transfers.

The equivalent figures for Belfast were 93% (out of 246 eligible patients) within 150 minutes and 69% within 120 minutes for direct admissions , compared to 54% within 150 minutes of patients were transferred to the Heart Attack Centre after prior assessment.

The proportion of patients admitted directly to a Heart Attack Centre who received primary PCI within 150 minutes of a call for professional appears to have reached a plateau. (Figure 12. There is a limit to how rapidly ambulance services can assess patients and transfer them safely to hospital. The scope for further improvement in this interval may be limited.

Figure 11. Call to balloon distributions for direct admission by ambulance service compared with median call-to-balloon time

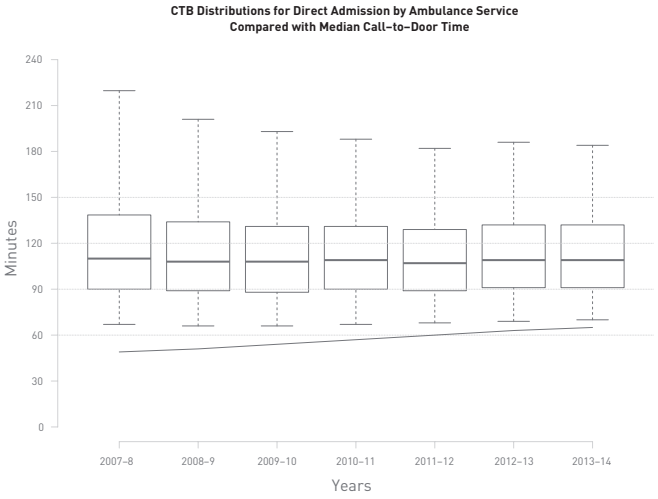
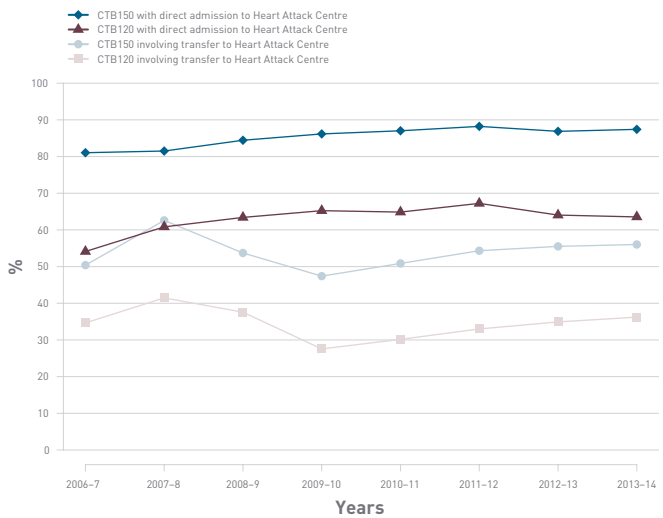


Figure 12. Percentage of patients with an admission diagnosis of STEMI having primary PCI within either 120 (CTB120) or 150 (CTB150) minutes from the time of calling for professional help and admitted directly or transferred to a Heart Attack Centre.



20.https://www.ucl.ac.uk/nicor/audits/adultcardiacintervention

3. Thrombolytic treatment

The use of thrombolytic treatment in the management of heart attack has been declining over a number of years. At present, only 2% (n=601) of patients with STEMI (Figure 3) receive thrombolytic treatment. This occurs mainly in those few areas where timely access to primary PCI in a Heart Attack Centre is not available. While thrombolysis has become the gold standard treatment for acute stroke, its use in heart attack has diminished.

When it was part of routine management, the agreed national standard for thrombolytic treatment was that it should be given within 60 minutes of a call for professional help – the call-to-needle time. This is a joint responsibility of acute hospital trusts and ambulance services. While this remains an aspiration, it is questionable whether such a target should be expected of the particularly select and small group of patients who now receive thrombolytic treatment.

Tables 1 and 2 show hospital thrombolytic treatment analyses for 2012/13 and 2013/14 for England and Wales respectively. The Belfast hospitals did not report use of any thrombolytic treatment in 2013/14.

3.1. Door to needle time

In England, 45% of eligible patients received thrombolytic treatment within 30 minutes of arrival at hospital compared to 56% in 2012/13. In Wales 53% of eligible patients received treatment with 30 minutes compared to 49% in 2012/13. The median door-to-needle time was 32 minutes in 2013/14.

3.2. Call to needle time

In England, 31% of eligible patients receiving thrombolytic treatment did so within 60 minutes of calling for professional help compared to 48% in 2012/13. In Wales 58% of eligible patients received thrombolytic treatment within 60 minutes of calling for professional help compared to 45% in 2012/13. Median call to needle time is 67 minutes.

3.3. Future of thrombolysis and its use in the rural areas

The apparent reduction in performance with respect to the delivery of thrombolysis, in England at least, largely reflects the shift in emphasis from thrombolysis to primary PCI. Those few remaining patients receiving thrombolysis are likely to be those in whom there is diagnostic uncertainty, those who present when the local Heart Attack Centre is busy performing primary PCI for another patient, and those who live in more rural areas where there is no ready access to primary PCI.

While air ambulance helicopters have been used to transport patients from remote areas to Heart Attack Centres (see the case study from Lincoln Heart Centre in Appendices), their use is limited, and there are circumstances in which such flights are not feasible (e.g. adverse weather and night flying restrictions). There is still a place for thrombolysis treatment in rural areas. However, there are particular challenges to maintaining a rapid, efficient and safe response to a small number of patients – if a treatment is not delivered frequently it is likely to be delivered with extra caution and therefore more slowly. The delivery of this treatment before arrival at hospital – pre-hospital thrombolysis – is one way of trying to reduce delay and contributed 20% of all cases of thrombolysis in 2013/14.

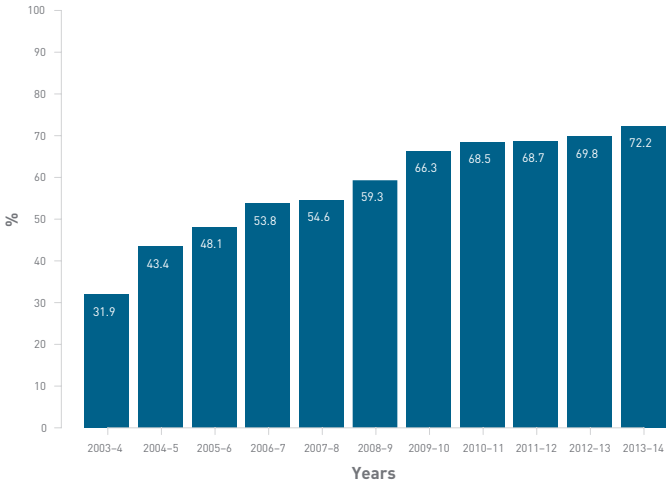
Even after thrombolytic treatment is given there is a need to be ready to transfer patients to a Heart Attack Centre (often many miles away), for emergency 'rescue PCI' in cases where thrombolysis proves ineffective, or for semi-urgent elective angiography and PCI – the recommended management following successful thrombolysis. Such transfers require a significant amount of planning by ambulance services, and may divert an ambulance from other emergency duties for prolonged periods.

3.4. PCI after thrombolysis

All patients with STEMI receiving primary PCI will necessarily undergo coronary angiography. Images of the coronary arteries are required to identify the 'culprit' artery responsible for the heart attack; the target for the PCI. Angiography, with a view to performing PCI (or coronary artery bypass grafting) is also recommended in those patients who have received thrombolysis, and in those patients who have presented with evidence of STEMI yet for various reasons (often because they present too late to benefit) do not receive immediate reperfusion therapy.

The use of angiography for patients with STEMI who did not receive primary PCI, but instead received thrombolytic treatment, or who had no reperfusion treatment, has risen, from approximately 32% in 2003/4 to approximately 72% in 2013/14, possibly reaching a plateau over the last four years (figure 13)

Figure 13. Use of angiography for patients having STEMI who do not receive primary PCI, but instead received thrombolytic treatment or had no reperfusion treatment.



4. Patients that receive no reperfusion

While there has been a major shift in the preferred reperfusion therapy – from thrombolysis to primary PCI – there remains a substantial proportion of patients with a final diagnosis of STEMI who do not receive reperfusion therapy at all; in 2013/14 27%, which appears to be similar to previous years (figure 14).

Figure 14. Proportion of STEMI patients by reperfusion treatment, including those that did not receive any form of reperfusion

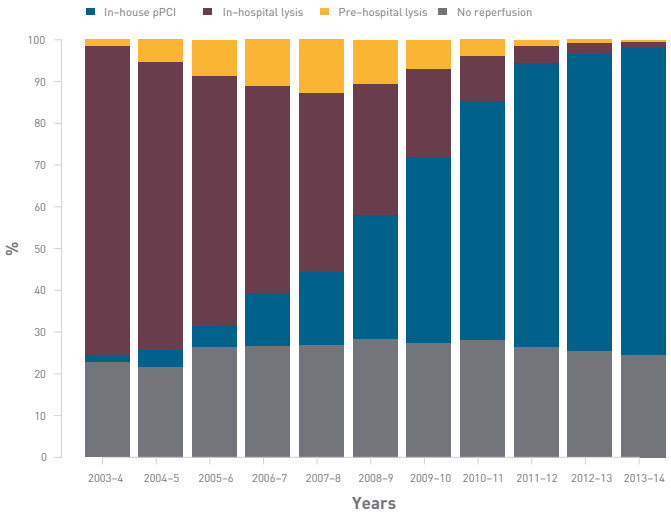


Figure 15. Reasons for no reperfusion in patients with a final diagnosis of STEMI

Reason for no reperfusion	Total	Percent
Angiographically normal coronaries / mild disease / Infarct Related Vessel unclear	581	12.5
Coded not applicable	1081	23.2
Complication before PCI could be performed	43	0.9
Other	218	4.7
Patient died	65	1.4
Patient refused	34	0.7
PCI felt to be inappropriate	328	7
Surgical disease	251	5.4
Technical failure	29	0.6

The commonest reason why no reperfusion treatment is given is that it is not applicable (of no benefit) to the patient who presents too late after the onset of symptoms, typically more than 12 hours after onset. In a small number of cases severe co-morbidity, such as advanced malignancy or severe dementia, may make reperfusion treatment inappropriate. In some cases the perceived risk of bleeding induced by thrombolysis, or by some of the medication given during PCI, is judged too high to allow such treatment (Figure 15). Largely these are matters for clinical judgement by individual clinicians when they first assess the patient

However, the performance of angiography with an intention directly to proceed with primary PCI may demonstrate features that indicate that PCI is not required (for example in cases of Takotsubo syndrome), is not feasible, or should be aborted in favour of open heart surgery. This can only be determined by angiography. Thus, angiography allows treatment to be offered only to those for whom benefit can be expected, and enables clinicians to exclude those where benefit is not anticipated. That being said, those who undergo timely emergency angiography in readiness for primary PCI, yet who do not proceed to PCI will appear as 'no reperfusion' in the annual report.

5. Ambulance service performance

Ambulance services collaborate closely with receiving hospitals and networks to improve care. Generally, the focus has shifted from provision of pre-hospital thrombolytic treatment to identifying those patients with heart attack who might benefit from primary PCI, and transferring them rapidly to a Heart Attack Centre. Ambulance personnel continue to provide the essential earliest phase of cardiac care for patients with heart attack including resuscitation from sudden cardiac arrest, pain relief, (and only when appropriate) oxygen therapy, drugs such as aspirin and clopidogrel, performance of ECG and continuing cardiac monitoring. They are largely responsible for the early recognition of an ACS, its initial diagnosis and decisions as to which receiving hospital to alert. Their role in providing professional reassurance to patients and their relatives should not be underestimated.

Table 4 shows ambulance service performance in England and Wales. In England in 2013/14, 38 patients received pre-hospital thrombolytic treatment compared to 149 in 2012/13. In Wales 67 patients received pre-hospital thrombolytic treatment compared to 89 in 2012/13.

Because the response of the ambulance service influences the call-to-balloon time of patients receiving primary PCI, table 4 also contains information on call to balloon time for each ambulance Trust.

6. Use of secondary prevention medication

Use of secondary prevention medication after the acute event is proven to improve outcomes for patients after either STEMI or nSTEMI. Historically, MINAP has reported the prescription on discharge of ACE inhibitors, aspirin, beta blockers, clopidogrel and statins.

NICE guidance[21] and technology appraisals support the use of combinations of the following drugs in all eligible patients who have had an acute heart attack:

- ACE inhibitor
- aldosterone antagonists
- angiotensin receptor blockers
- aspirin
- beta blocker
- clopidogrel or prasugrel
- ticagrelor
- statin.

MINAP allows collection of data on all these drugs. This year use of angiotensin receptor blockers are included with use of ACE inhibitors, use of prasugrel is combined with use of clopidogrel. Use of aldosterone antagonists and ticagrelor will be reported next year.

MINAP allows collection of data on all these drugs. This year use of angiotensin receptor blockers are included with use of ACE inhibitors, use of prasugrel is combined with use of clopidogrel. Use of aldosterone antagonists and ticagrelor will be reported next year.

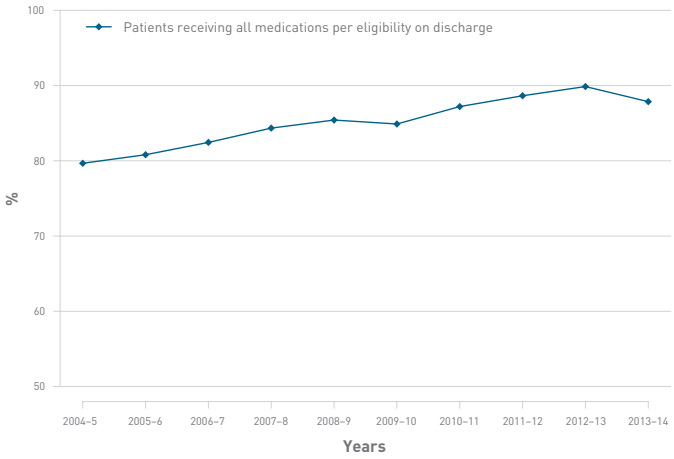
Table 6 shows the percentage of patients prescribed secondary prevention medication on discharge by hospital in England and Wales in 2013/14. Importantly, for each hospital those patients surviving to be discharged home from that hospital are included but not those transferred to another hospital and those patients in whom such drugs were contraindicated. Historically, we have used the National Service Framework audit standard of 80% for aspirin, beta blockers and statins treatment.

There is good evidence that composite measures of hospital performance correlate with outcomes.[22] In other words, patients gain more if they receive all, rather than just some, aspects of care, in a timely manner. We therefore have presented the use of secondary prevention medicines within a bundle of care. That is, rather than only reporting the percentage use of each individual drug in the group of patients who were eligible for and willing to receive it, we also report the proportion of patients discharged from hospital who received all drugs (from the possible combination of aspirin, beta blockers, statins ACE inhibitors/angiotensin receptor blockers and Clopidogrel/thienopyridine inhibitors) for which they were eligible (figure 16). The proportion of patients who survived to be discharged and who received all the drugs for which they were eligible was 84% in England, 76% in Wales and 98% in Belfast.

21. http://guidance.nice.org.uk/CG48/QuickRefGuide/pdf/English

22. Simms AD, Baxter PD, Cattle BA, et al. An assessment of composite measures of hospital performance and associated mortality for patients with acute myocardial infarction. Analysis of individual hospital performance and outcome for the National Institute for Cardiovascular Outcomes Research (NICOR) Eur Heart J: Acute Cardiovascular Care 2013; 2: 9-18

Figure 16: Use of secondary prevention medication for all heart attacks, (transfers, deaths, contraindicated and patient refused are all excluded).



7. Care for patients with nSTEMI

The earliest MINAP reports focussed upon the early provision of reperfusion treatment to those patients presenting with STEMI. Compared with STEMI, patients with nSTEMI have a lower early risk of death, usually do not require very rapid emergency reperfusion treatment and often present more diagnostic difficulties. For these reasons they are not always admitted to cardiac care units, nor always cared for by cardiologists. However, specialist involvement is important in determining the likelihood of them receiving 'evidence-based' treatments such as coronary angiography and revascularisation[23]. It is recognised that performance of angiography and coronary intervention is an important facet of treatment for most patients (see below). Ideally admission should be to a cardiac facility (where nursing staff have expertise in cardiac nursing and there is easy access to cardiological advice).

As mentioned above the numbers of nSTEMI reported in MINAP are incomplete, and in particular it is likely that patients who are not admitted to a cardiac care unit are, in many cases, omitted. The quality of care for patients not entered into MINAP remains unknown. In addition the variable nature of recording nSTEMI between hospitals may distort some analyses.

7.1. Admission to cardiac unit/ward

Table 7 shows the percentage of nSTEMI patients that were admitted to a cardiac unit or ward and the percentage of nSTEMI patients seen by a cardiologist or member of their team, by hospital, in 2012/13 and 2013/14. Similar analyses for hospitals in Wales and Belfast are shown in Table 7. In England in 2013/14, 55% of 45, 910 nSTEMI patients were admitted to a cardiac care unit or ward compared with 53% in 2012/13. In Wales, 65% of 2,225 nSTEMI patients were admitted to a cardiac unit or ward compared to 60% in 2012/13. In the Belfast hospitals, 91% of 407 patients were admitted to a cardiac unit or ward compared to 90% in 2012/13.

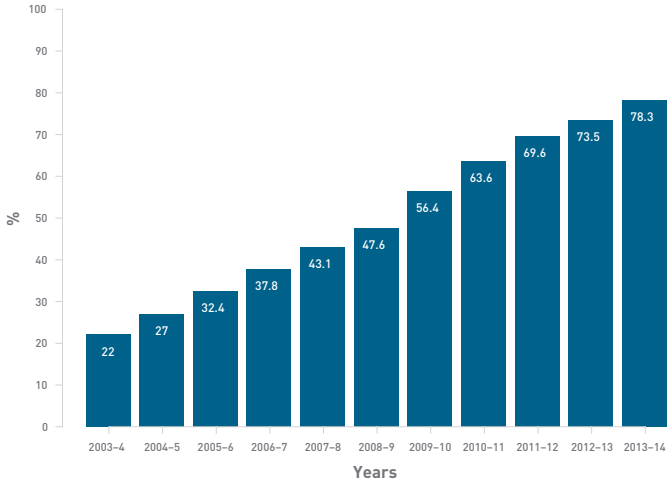
7.2. Cardiological care during admission

In England in 2013/14, 94% of nSTEMI patients were seen by a cardiologist, or member of the cardiologist's team, as in 2012/13. In Wales 85% of nSTEMI patients were seen by a cardiologist or member of their team compared to 83% in 2012/13. In the Belfast hospitals 99% of nSTEMI patients were seen by a cardiologist or member of their team compared to 100% in 2012/13.

7.3. Angiography in nSTEMI

The frequency with which patients are referred for angiography for nSTEMI also has increased over the last 10 years – from about a quarter (27%) in 2004/5 to about three quarters (78%) in 2013/14 (figure 17). Table 7 show the percentage of nSTEMI that were referred for angiography by hospital in 2012/13 and 2013/14. In 2013/14, 78% of nSTEMI patients in England were referred for angiography after nSTEMI compared to 73% in 2012/13. In Wales 80% were referred in 2013/14, as in 2012/13. In Belfast 93% were referred in 2013/14 and 88% in 2012/13. In a small number of cases, patients are discharged with arrangements to return for angiography later.

Figure 17: Use of angiography for patients with diagnosis of nSTEMI

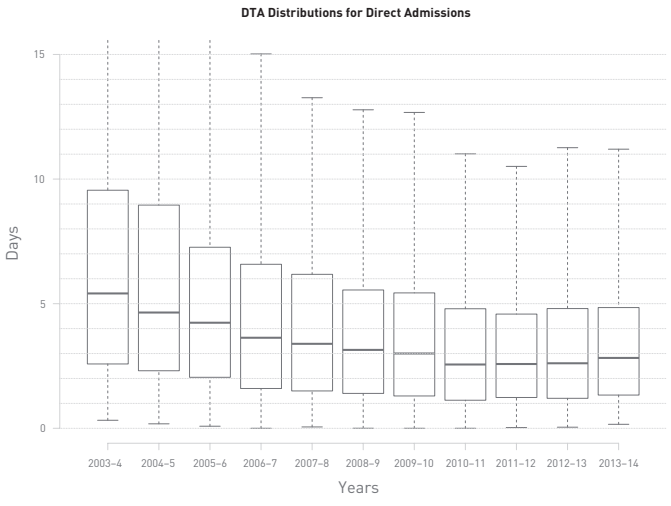


23. Birkhead JS, Weston C, Lowe D on behalf of the MINAP Steering Group. Impact of specialty of admitting physician and type of hospital on care and outcome for myocardial infarction in England and Wales 2004-2005. BMJ 2006;332:1306-8

This year we continue to report on the interval between admission and performance of angiography. While immediate angiography is not warranted in the vast majority of patients with nSTEMI, early angiography is recommended for those at moderate to high risk. The maximum acceptable delay from admission to angiogram has been variously defined. So, for example the European Society of Cardiology suggests a 72 hour maximum, while NICE suggests a 96 hour maximum in the relevant clinical guideline. Latterly (September 2014), the NICE Quality Standard document for ACS has suggested that high quality care is characterised by angiography within 72 hours of first admission to hospital. It is important to note that the analyses presented here have been restricted to those patients who are directly admitted to the hospital where angiography is performed. Many other patients are transferred from non-angiography-capable hospitals to have angiography, following variable degrees of delay. We do not presently have the sophistication to capture the entire care pathway of such transferred patients through data linkage. It is possible that the overall interval from admission to angiography for patients transferred between hospitals is longer than for those admitted directly.

There has been a slight worsening of performance with respect to those patients with nSTEMI admitted directly to a hospital with angiography capability (figure 18).

Figure 18: Time to angiography from arrival at hospital for patients with a diagnosis of nSTEMI



Between 2012/13 and 2013/14 the proportion of patients receiving angiography within 24 hours of admission has fallen to 18% from 21%; to 53% from 55% within 72 hours and to 67% from 68% within 96 hours. Therefore a third of patients with nSTEMI who receive an angiogram do so after the maximum recommended time interval.

8. Access to primary PCI

It is now generally agreed (e.g. NICE clinical guideline 167)[24] that patients with ST segment elevation on their ECG in the early stage of heart attack (STEMI) should be offered specific treatment to restore blood flow in the occluded coronary artery and, most importantly, that this happens very quickly. Previous national and international guidelines have recommended a delay to treatment of no more than 150 minutes from the time of call for professional help. More recent guidelines have defined even more ambitious thresholds, such as an overall delay from symptom onset to angioplasty balloon deployment of 180 minutes or less and an interval from first medical contact (i.e. the first ECG) to angioplasty wire passage into the blocked coronary artery of no more than 90 minutes (or even 60 minutes in those patients presenting early with potentially large infarctions)[25].

Although the majority of the population of England and Wales now have access to primary PCI, there remains limited access to this treatment for patients in some regions, particularly those within rural areas. For these there may still be a role for thrombolytic treatment given by paramedics in the attending ambulance[26].

Unlike many planned (elective) interventions, in the emergency treatment of heart attack, a patient is normally unable to exercise choice as to the admitting hospital. The attending ambulance will convey the patient with suspected heart attack to the nearest hospital admitting this type of patient. However, wherever a patient is – whether a place of residence, work, visiting – they should have an equal opportunity to receive the best treatment.

Considering the provision of primary PCI at the Local Area Team level in England the percentage of patients that received primary PCI ranged between 95% and 100%. In the two Welsh cardiac networks 8% (North Wales Cardiac Network) and 95% (South Wales Cardiac Network) of their patients received primary PCI. See Figures 19 and 20. The darker the shade, the higher rate (in cases per million population) of primary PCIs performed in the region.

24. NICE. Myocardial infarction with ST-segment-elevation. NICE Clinical Guideline 167. July 2013 http://www.nice.org.uk/nicemedia/live/14208/64410/64410.pdf

25. Steg PG, James SK, Atar D, et al. European Society of Cardiology Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. Eur Heart J 2012;33:2569-619.

26. Gershlick AH, Banning AP, Myat A, et al. Reperfusion therapy for STEMI: is there still a role for thrombolysis in the era of primary percutaneous coronary intervention? Lancet 2013;382:624-32.

Figure 19 provision of primary PCI by Local Area Team in 2013/14

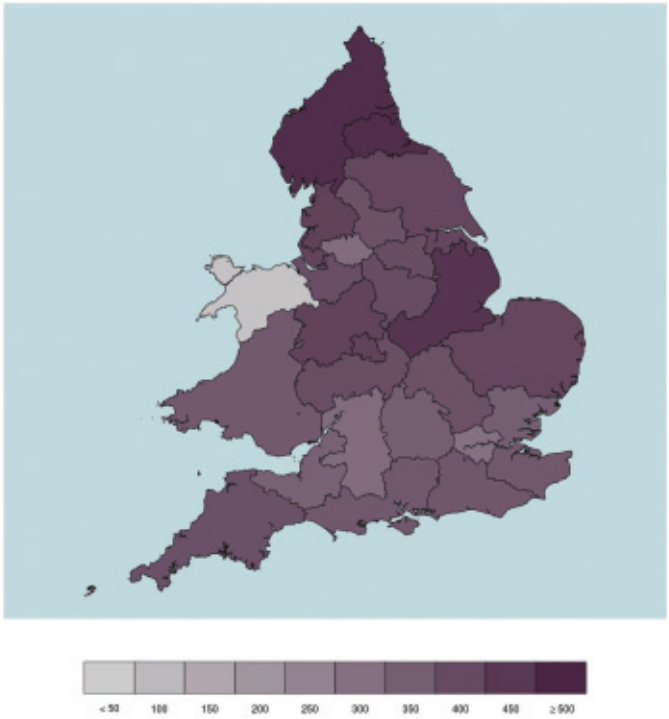
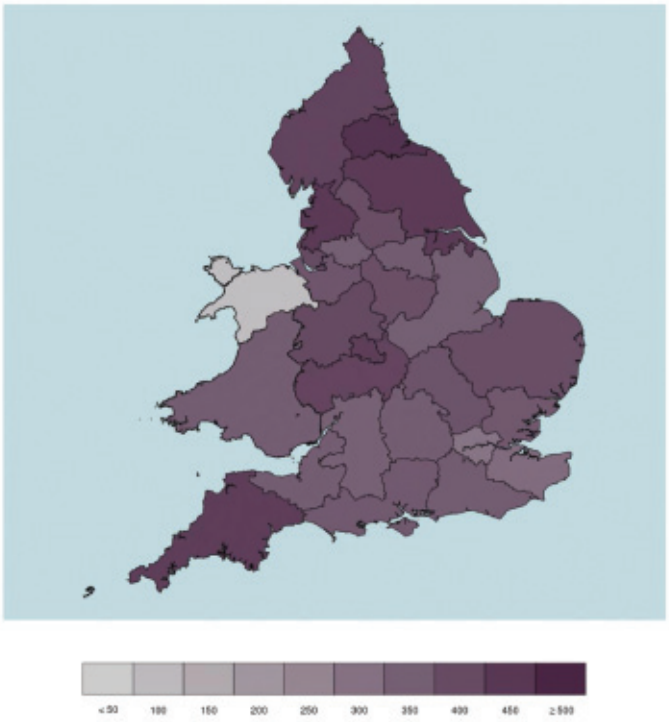


Figure 20: provision of primary PCI by Local Area Team in 2012/13



Primary PCI requires a skilled clinician. In common with other technical skills, expertise develops with increasing experience, and with plentiful opportunities to practise the technique. There has been much debate as to the number of procedures that should be performed in order to maintain this expertise. Some have pointed out that a larger secondary care (District General hospital) centre with an active elective coronary intervention programme can provide primary PCI facilities for its local population and deliver as good results as a larger Heart Attack Centre[27]. Others have argued for centralised services, pointing to the need for continuous availability of primary PCI. In any case, since the implementation of primary PCI in 2005/06, the number of hospitals performing this life saving procedure has risen.

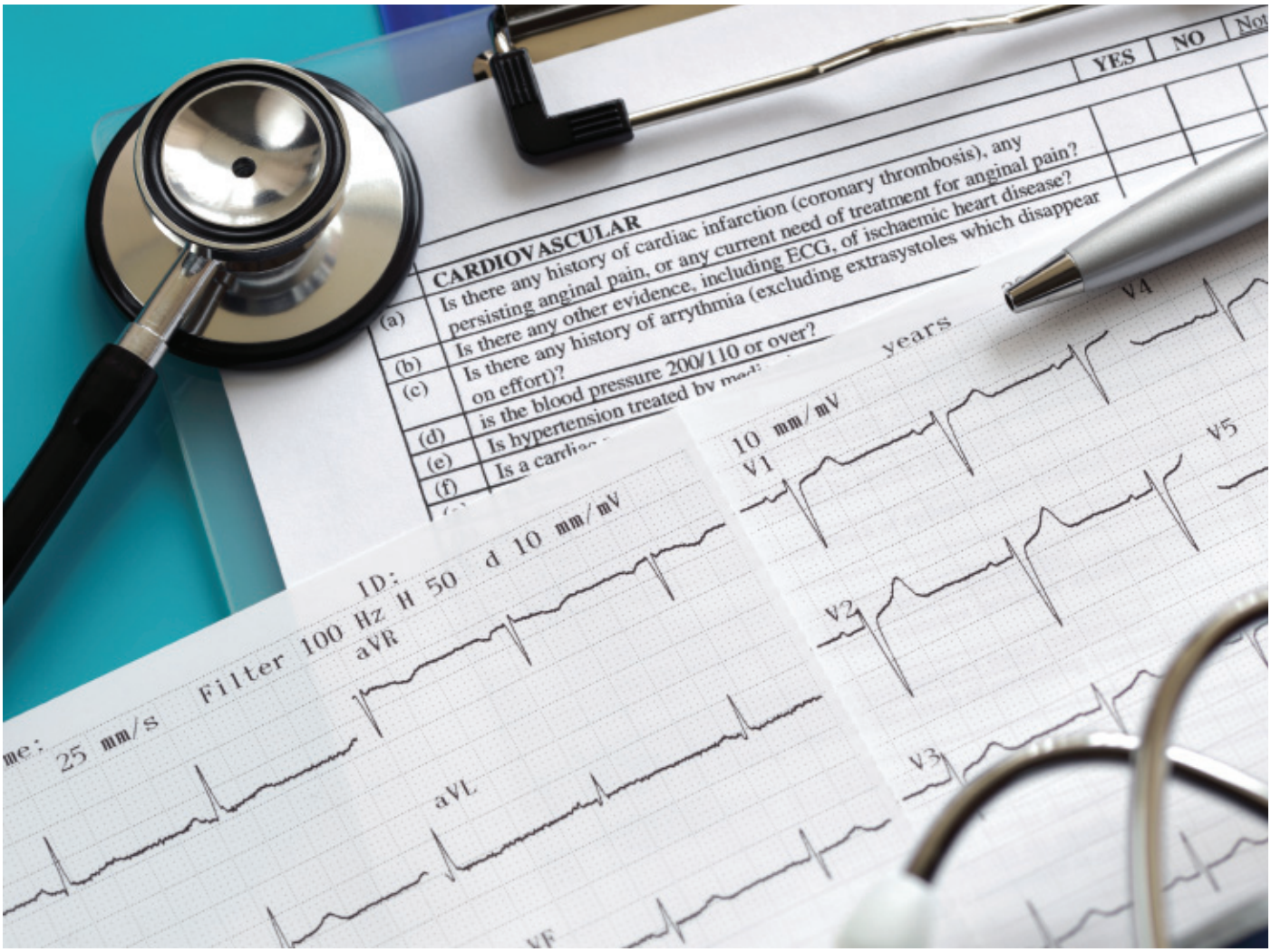
9. Length of stay

The length of time that a patient stays in hospital following a heart attack is influenced by various factors. One such is the type of heart attack (STEMI or nSTEMI). Another is the need, or otherwise, for transfer between hospitals during the course of care. It is likely that those transferred between hospitals have a longer length of stay than those managed in one place. This analysis only considers patients with direct admissions (whether at the local district hospital or heart attack centre).

A patient with nSTEMI is likely to spend significantly longer in hospital than a patient with STEMI. This may partly reflect the urgency with which primary PCI is provided in STEMI compared with the (generally) slower provision of angiography in nSTEMI, but also reflects the characteristic of the patients. Those presenting with nSTEMI tend to be older and are more likely to have associated health issues that might delay discharge home.

In 2013/14 median length of stay for patients with nSTEMI in England was five days (Inter Quartile Range (IQR) 3-9 days); in Wales was five days (IQR 3-10 days); in Belfast was 4 days (IQR 3-9 days). For those with STEMI the median length of hospital stay was three days (IQR 2-5 days); in Wales three days (IQR 1-5 days); in Belfast 2 days (IQR 1-4 days).

27. http://bjcardio.co.uk/2013/03/primary-angioplasty-for-acute-stemi-in-secondary-care-feasibility-outcomes-and-potential-advantages/



10. Patient outcomes following a heart attack

This is in line with the Government's Transparency Agenda introduced in 2012. As part of this agenda, national audits are required to report patient clinical outcomes for individual operators. For MINAP, outcomes for each participating hospital (hospital level reporting of outcome) is more appropriate at this stage. [Further information on the Consultant Outcomes Programme, including patient outcome data at individual PCI Operator level is available at:http://www.nhs.uk/service-search/performance/Consultants#view-the-data].

Care has been taken to ensure that those patients who are transferred between hospitals during the management of a heart attack do not appear as duplicate cases. Even when the care of a patient has been shared by two hospitals, wherever possible, if such a patient dies their death has been assigned to a single hospital – the hospital to which they were first admitted.

Patients whose heart attacks began whilst they were already a hospital inpatient, and who therefore are likely to have other important co-morbidities (or conditions) that justified a hospital admission, are excluded from this analysis.

Because patients transported directly to a Heart Attack Centre with the intention of receiving immediate primary PCI for STEMI are likely to be so unlike those taken electively to a non-interventional centre – the latter likely to be at greater pre-treatment risk – we have reported outcomes for interventional and non-interventional centres separately.

For this analysis, our intention was to designate as a 'primary PCI interventional centre' those hospitals that participate in the National Audit of Percutaneous Coronary Interventional Procedures and that provide, for at least part of the week, a service for primary PCI for STEMI. Where primary PCI is not available or only available as an opportunistic procedure the hospital is designated a 'primary PCI non-interventional

centre'. Given changes in status during the three year period the final allocation of hospitals into the 'primary PCI interventional centre' group was based on:

- participation in the National Audit of Percutaneous Coronary Interventional Procedures
- more than 150 records submitted during 3 years
- more than 50% of cases of STEMI managed with primary PCI

To be clear, the figures presented in the report are the 'unadjusted' or actual 30 day mortality over 3 years and have not been subjected to statistical methods that might adjust for, or take into account, some of the patient characteristics (over which the admitting hospital has no control) that are known to affect the risk of dying following heart attack.

During the preparation of the report we tested a number of different models to assess the most appropriate one to apply so as to reliably adjust for such factors, and thus aid meaningful comparison between hospitals. All models have limitations and need to be used with caution. The results are not only dependent on the precise model but also on the accuracy and completeness of data entry, in particular data relating to patients' risk factors. Importantly, the degree of 'missingness' of such risk factors correlates with outcome. Those patients with missing data tend to have poorer outcomes than those with complete data, even at high levels of data completeness (even, for example at 90% completeness).

It became apparent that while some hospitals had very good levels of data completeness there were others that had not, during the 'three year mortality period', collected data of sufficiently high quality to allow them to be included in a reliable risk-adjusted comparison. For example, using a (relatively simple) model that allowed adjustment for age, systolic blood pressure and heart rate on admission, and setting a standard of 92% or greater data completeness, only 131 hospitals were judged suitable for risk adjustment. After much discussion, the MINAP Steering Group determined that it would be inappropriate to present risk-adjusted mortality just on the group of hospitals with good data completeness, rather it would be best to present unadjusted mortality for all hospitals and then to focus on improving the quality of data entry for all – so as to present 1-year adjusted mortality next year.

The outcomes table A therefore presents, for each hospital:

- the unadjusted proportion of those patients linked to ONS who died within 30 days of admission over the three year period of study (2011-14);
- the denominator based on all ONS matches;
- the proportion of available MINAP records for which there was ONS matching;
- the proportion of patients reported by each hospital who underwent primary PCI;
- a marker of data completeness based on the three risk factors: age, systolic blood pressure and heart rate on admission, where green suggests 95% data completeness, amber suggests 90-94.9% data completeness and red suggests less than 90% data completeness

Minimum quality standards for data completeness have been introduced to maximise completeness of those datafields that might be required for future risk adjustment.

The overall (unadjusted) 30-day mortality over the three years 2011-2014 was 8.1% of 72,688 patients - being 7.2% for those 63,408 patients admitted directly to 'primary PCI interventional centre' and 14.3% for the 9,261 patients admitted to 'primary PCI non-interventional centre'.

The national figure of 8.1% is one third lower than the equivalent figure in 2003-04 (12.4%). This substantial improvement in outcome over the last 10 years suggests that for every twenty-five patients with STEMI treated in hospitals in England, Wales and Northern Ireland, contemporary management prevents one extra death. As the total number of cases of STEMI reported in MINAP during 2013-14 was 31,653, the improved outcome is equivalent to approximately 110 fewer deaths each month compared with 2003/04.

International comparisons of outcomes, while presently receiving much attention, are particularly difficult to perform, not least because of inherent differences in methods of data collection, data-field definitions and patient characteristics. Indirect comparison is also hampered by the use of different denominators in published outcomes from similar European disease registries. Some have restricted analysis to those younger than 80 yr, some to those receiving primary PCI. In this MINAP report we consider the 30-day mortality of all patients with STEMI, irrespective of age, and including those who received no reperfusion therapy at all. However, mortality reported here is in agreement with that seen in clinical trials internationally, which suggests a very good standard of treatment for this type of heart attack in Britain.

11. 30 day unadjusted mortality rates for STEMI patients admitted to hospital between 2011-14

	DTM30 (%)	Out of (N)	Mortality Linkage (%)	Overall In-House PCI (%)	% Data completeness	Out of (N)
All Reporting Hospitals	**8.1**	**72688**	**96.6**	**74**	**81.2**	**75244**
Primary PCI capable Centres	**7.2**	**63408**	**97.8**	**84.1**	**80.1**	**64810**
Basildon Hospital, Basildon	7.1	2571	99.4	70.7	99.7	2587
Basingstoke and North Hampshire Hospital, Basingstoke	7.5	267	99.6	88.8	93.7	268
Birmingham City Hospital, Birmingham	7.5	305	94.7	91	99.4	322
Birmingham Heartlands Hospital, Birmingham	8	850	98.2	93.2	9.8	866
Blackpool Victoria Hospital, Blackpool	7.9	2154	96.3	74.7	95.9	2236
Bristol Royal Infirmary, Bristol	7.7	1980	99.2	85.2	69.1	1995
Castle Hill Hospital, Cottingham	7.3	1717	99.4	84.1	93.5	1728
Cheltenham General Hospital, Cheltenham	7	214	97.7	93.6	41.1	219
Conquest Hospital, St Leonards on Sea	14.3	328	99.1	72.2	99.7	331
Derriford Hospital, Plymouth	5.4	483	98.8	93	0	489
Dorset County Hospital, Dorchester	3.4	174	99.4	71.4	96.6	175
Eastbourne District General Hospital, Eastbourne	14.1	291	100	71.1	97.3	291
Freeman Hospital, Newcastle	5.3	2741	99.5	90.5	96.8	2755
Frimley Park Hospital, Frimley	9.4	903	98.7	88.1	99.9	915
Glenfield Hospital, Leicester	7.8	1338	98.2	82.9	99.5	1362
Great Western Hospital, Swindon	9.4	265	98.5	63.2	96.3	269
Hammersmith Hospital, London	7.5	1022	95.5	90	92.9	1070
Harefield Hospital, Harefield	7.1	2869	94.8	72.6	50.5	3026
James Cook University Hospital, Middlesborough	6.7	1893	99.3	81.6	99.2	1906
John Radcliffe Hospital, Oxford	5	1072	98.5	92.6	99.9	1088
Kettering General Hospital, Kettering	6.3	885	98.4	83.2	95.8	899
King's College Hospital, London	7.1	1108	97.5	85.2	64.1	1136
Leeds General Infirmary, Leeds	7.5	2401	99.3	93	96.9	2417
Lincoln County Hospital, Lincoln	5.7	770	99.5	67.7	84.5	774
Lister Hospital, Stevenage	7.3	286	98.3	86.3	73.2	291
Liverpool Heart and Chest Hospital, Liverpool	5.4	2312	99.2	92.9	93.7	2331
London Chest Hospital, London	9.8	2381	92	62.2	96.5	2587
Manchester Royal Infirmary, Manchester	4.5	1332	94.9	99.2	100	1403
Morriston Hospital, Swansea	5.8	1297	98.7	91.1	80.2	1314
Musgrove Park Hospital, Taunton	7.7	597	98.5	83.2	97.5	606
New Cross Hospital, Wolverhampton	7.1	1583	99.3	96.2	0	1594
Norfolk and Norwich University Hospital, Norwich	6.9	1504	99.5	81.9	62.8	1512
Northern General Hospital, Sheffield	5.8	1471	99.3	93.3	0.5	1482
Nottingham City Hospital, Nottingham	7.1	1064	98.8	84	91.3	1077
Papworth Hospital, Cambridge	6.3	1569	99.2	86.5	86.1	1581
Queen Alexandra Hospital, Portsmouth	7.2	1109	98.7	93.4	88.5	1124
Queen Elizabeth Hospital (Birmingham), Birmingham	6.4	760	99	86.3	4.2	768
Royal Berkshire Hospital, Reading	6.2	643	97.7	81	99.2	658
Royal Bournemouth General Hospital, Bournemouth	5.8	745	99.5	77.3	98.9	749
Royal Cornwall Hospital, Truro	10.5	751	99.2	77.3	99.2	757
Royal Derby Hospital, Derby	5.5	723	98.9	92.7	8.3	731
Royal Devon & Exeter Hospital, Exeter	9.4	895	99.2	85.1	42	902
Royal Free Hospital, London	7.8	889	94.3	58	93.1	943
Royal Sussex County Hospital, Brighton	9.5	970	98.2	84.7	97.1	988
Royal United Hospital Bath, Bath	8	264	97.1	60.3	41.5	272
Sandwell General Hospital, West Bromwich	8.2	353	99.2	92.4	99.7	356
Southampton General Hospital, Southampton	7.8	786	98.9	84.2	100	795
St George's Hospital, Greater London	9.2	1530	97.8	94.8	91	1564
St Thomas' Hospital, London	11.1	422	93.6	70.7	98	451
Torbay Hospital, Torquay	10.2	488	97.8	87.4	96.2	499
University College Hospital [Heart Hospital], London	8.9	549	91.7	65.1	89.1	599
University Hospital Coventry, Coventry	6.4	1202	98.2	99.1	98.3	1224
University Hospital of North Staffordshire, Stoke-on-Trent	6.6	1360	94.1	81.9	92.2	1446
University Hospital of Wales, Cardiff	6.6	959	97.4	90.3	84.3	985

	DTM30 (%)	Out of (N)	Mortality Linkage (%)	Overall In-House PCI (%)	% Data completeness	Out of (N)
Watford General Hospital, Watford	10.4	193	94.1	73.7	81	205
William Harvey Hospital, Ashford	8	1658	97.5	89.9	99.4	1700
Worcestershire Royal Hospital, Worcester	5.5	523	98.1	87.8	21.2	533
Wycombe Hospital, High Wycombe	10.2	196	99	82.3	99	198
Wythenshawe Hospital, Manchester	4.3	1173	98.7	96.1	73.1	1188
Non-primary PCI capable Centres	**14.3**	**9261**	**89**	**11.6**	**87.8**	**10400**
Addenbrooke's Hospital, Cambridge	24.4	45	95.7	0	87.2	47
Airedale General Hospital, Keighley	19	21	95.5	0	100	22
Alexandra Hospital, Redditch	5.9	51	100	0	92.2	51
Altnagelvin Area Hospital, Londonderry		0	0	42.9	96.4	28
Antrim Area Hospital, Antrim		0	0	0	100	9
Arrowe Park Hospital, Wirral	17	206	99	0	86.5	208
Barnet General Hospital, Greater London	15.4	13	100	0	30.8	13
Barnsley Hospital, Barnsley	10.2	88	96.7	0	84.6	91
Bassetlaw Hospital, Worksop	28.1	57	100	0	87.7	57
Bedford Hospital, Bedford	14.3	42	100	2.4	97.6	42
Belfast City Hospital, Belfast	Not available	0	0	47.8	82.6	23
Bradford Royal Infirmary, Bradford	12.5	104	99	5.7	99	105
Bronglais General Hospital, Aberystwyth	6.7	30	96.8	0	90.3	31
Broomfield Hospital, Chelmsford	19.4	72	98.6	0	97.3	73
Calderdale Royal Hospital, Halifax	9.4	96	98	4.1	74.5	98
Central Middlesex Hospital, Greater London	20	5	100	0	100	5
Charing Cross Hospital, London	12.9	31	91.2	0	50	34
Chase Farm Hospital, Greater London	100	1	100	0	0	1
Chesterfield Royal Hospital, Chesterfield	8	411	99.5	1	98.5	413
Chorley and South Ribble Hospital, Chorley	20	10	100	0	100	10
Colchester General Hospital, Colchester	27	37	100	0	97.3	37
Countess of Chester Hospital, Chester	10.4	183	98.4	0	94.6	186
County Hospital Hereford, Hereford	18.9	122	99.2	0	0	123
Craigavon Area Hospital, Portadown		0	0	31.6	89.5	19
Croydon University Hospital, Greater London	0	62	95.4	1.5	81.5	65
Cumberland Infirmary, Carlisle	6.5	323	93.6	40.6	90.4	345
Darent Valley Hospital, Dartford	10.7	56	98.2	42.1	98.2	57
Darlington Memorial Hospital, Darlington	13.2	38	100	0	94.7	38
Dewsbury District Hospital, Deswbury	12	75	100	0	98.7	75
Diana, Princess of Wales Hospital, Grimsby	30.8	39	100	0	100	39
Doncaster Royal Infirmary, Doncaster	25	44	100	0	93.2	44
Ealing Hospital, Greater London	0	8	100	0	100	8
East Surrey Hospital, Redhill	14.3	56	100	23.2	85.7	56
Epsom Hospital, Greater London	0	10	90.9	0	90.9	11
Fairfield General Hospital, Bury	18.2	99	97.1	0	50	102
Frenchay Hospital, Bristol	52	25	96.2	7.7	100	26
Furness General Hospital, Barrow-in-Furness	4.3	46	97.9	0	93.6	47
George Eliot Hospital, Nuneaton	38.7	31	100	0	80.6	31
Glan Clwyd Hospital, Rhyl	8.8	341	96.3	20.9	93.2	354
Glangwili General Hospital, Carmarthen	12.5	8	100	0	87.5	8
Gloucestershire Royal Hospital, Gloucester	37.5	8	100	0	87.5	8
Good Hope Hospital, Sutton Coldfield	11.1	18	100	0	50	18
Grantham and District Hospital, Grantham	13	46	97.9	2.1	97.9	47
Harrogate District Hospital, Harrogate	18.6	59	100	0	81.4	59
Hexham General Hospital, Hexham	25	4	100	0	100	4
Hillingdon Hospital, Greater London	17.4	23	95.8	0	100	24
Hinchingbrooke Hospital, Huntingdon	23.4	47	100	0	95.7	47
Homerton University Hospital, London	0	1	100	0	100	1
Horton General Hospital, Banbury	10.5	38	100	0	100	38

	DTM30 (%)	Out of (N)	Mortality Linkage (%)	Overall In-House PCI (%)	% Data completeness	Out of (N)
Huddersfield Royal Infirmary, Huddersfield	22.1	86	97.7	1.1	85.2	88
Hull Royal Infirmary, Hull	83.3	6	85.7	0	100	7
Ipswich Hospital, Ipswich	29.5	44	100	0	97.7	44
James Paget University Hospital, Great Yarmouth	0	2	100	0	50	2
Jersey General Hospital, St Helier		0	0	0	100	14
Kent and Canterbury Hospital, Canterbury	16.7	30	100	0	100	30
King George Hospital, Greater London	1.1	87	87.9	0	33.3	99
King's Mill Hospital, Sutton-in-Ashfield	40	10	100	10	100	10
Kingston Hospital, Greater London	0	4	100	0	100	4
Leighton Hospital, Crewe	15.9	69	98.6	0	91.4	70
Llandough Hospital, Llandough	22.6	31	100	0	96.8	31
Luton & Dunstable Hospital, Luton	16.9	65	94.2	0	98.6	69
Macclesfield District General Hospital, Macclesfield	23.3	30	96.8	0	90.3	31
Maidstone Hospital, Maidstone	13.2	38	100	0	100	38
Manor Hospital, Walsall	23.1	13	81.2	0	0	16
Mater Infirmorum Hospital, Belfast		0	0	0	96.3	108
Medway Maritime Hospital, Gillingham	18.8	96	96	33	94	100
Milton Keynes General Hospital, Milton Keynes	4.2	48	94.1	0	94.1	51
Neath Port Talbot Hospital, Port Talbot	0	3	100	0	100	3
Nevill Hall Hospital, Abergavenny	14.5	124	98.4	0	89.7	126
Noble's Hospital, Isle of Man	28.6	7	23.3	0	93.3	30
Northampton General Hospital, Northampton	19.4	186	99.5	29.9	97.9	187
North Devon District Hospital, Barnstaple	46.9	32	100	0	96.9	32
North Manchester General Hospital, Manchester	28.6	35	97.2	0	91.7	36
North Middlesex Hospital, Greater London	36.8	19	95	0	95	20
North Tyneside General Hospital, North Shields	30.2	43	100	0	97.7	43
Northwick Park Hospital, Greater London	0	7	77.8	88.9	100	9
Peterborough City Hospital, Peterborough	24.6	69	100	0	100	69
Pilgrim Hospital, Boston	13.7	263	98.5	0	98.9	267
Pinderfields General Hospital, Wakefield	8.3	133	100	0.8	85	133
Poole Hospital, Poole	7	86	100	0	98.8	86
Prince Charles Hospital, Merthyr Tydfil	10.8	93	98.9	0	96.8	94
Prince Philip Hospital, Llanelli	2.9	34	94.4	0	94.4	36
Princess Alexandra Hospital, Harlow	9	100	97.1	0	97.1	103
Princess of Wales Hospital, Bridgend	12.1	33	100	3	100	33
Princess Royal Hospital (Haywards Heath), Haywards Heath	22.9	48	100	2.1	97.9	48
Princess Royal Hospital (Telford), Telford	30.4	69	100	0	88.4	69
Princess Royal University Hospital, Orpington	0	12	100	0	100	12
Queen Elizabeth Hospital (Gateshead), Gateshead	14.7	34	75.6	0	91.1	45
Queen Elizabeth Hospital (King's Lynn), King's Lynn	34.6	78	100	0	96.2	78
Queen Elizabeth Hospital (Woolwich), Greater London	26.7	15	100	20	100	15
Queen Elizabeth The Queen Mother Hospital, Margate	28.6	21	100	0	100	21
Queen's Hospital (Burton), Burton-on-Trent	6.6	166	99.4	0	98.2	167
Queen's Hospital (Romford), Greater London	7.1	168	88.9	0	29.6	189
Rotherham Hospital, Rotherham	16	94	100	0	97.9	94
Royal Albert Edward Infirmary, Wigan	18.3	93	98.9	3.2	100	94
Royal Blackburn Hospital, Blackburn	20.6	170	100	16.5	65.9	170
Royal Bolton Hospital, Bolton	9.9	91	100	0	95.6	91
Royal Brompton Hospital, London	5.6	72	98.6	47.9	49.3	73
Royal Glamorgan Hospital, Llantrisant	6.7	30	100	0	96.7	30
Royal Gwent Hospital, Newport	12	183	98.9	17.8	88.1	185
Royal Hampshire County Hospital, Winchester	18.2	22	95.7	0	100	23
Royal Lancaster Infirmary, Lancaster	4.5	44	100	0	100	44
Royal Liverpool University Hospital, Liverpool	25	44	97.8	0	91.1	45
Royal London Hospital, London	0	3	75	0	100	4

	DTM30 (%)	Out of (N)	Mortality Linkage (%)	Overall In-House PCI (%)	% Data completeness	Out of (N)
Royal Oldham Hospital, Oldham	20	65	100	0	70.8	65
Royal Preston Hospital, Preston	0	8	100	0	100	8
Royal Shrewsbury Hospital, Shrewsbury	27.4	73	98.6	0	89.2	74
Royal Surrey County Hospital, Guildford	5	20	100	0	95	20
Royal Victoria Hospital, Belfast		0	0	89.2	93.6	692
Royal Victoria Infirmary, Newcastle	29.7	37	100	0	97.3	37
Russells Hall Hospital, Dudley	0	15	100	0	86.7	15
Salford Royal Hospital, Salford	15.5	58	100	0	98.3	58
Salisbury District Hospital, Salisbury	2.8	36	92.3	33.3	100	39
Scunthorpe General Hospital, Scunthorpe	7.1	14	100	0	85.7	14
Skegness District Hospital, Skegness	0	3	100	0	100	3
Solihull Hospital, Solihull	0	1	100	0	100	1
Southend University Hospital, Westcliffe-on-Sea	13.6	44	97.8	0	100	45
Southmead Hospital, Bristol	12.5	8	100	0	100	8
Southport and Formby District General, Southport	14.7	34	100	0	97.1	34
South Tyneside District Hospital, South Shields	25.3	99	100	0	76.8	99
Stafford Hospital, Stafford	5.6	18	100	0	100	18
Stepping Hill Hospital, Stockport	28.6	35	97.2	0	80.6	36
St Helier Hospital, Greater London	0	10	90.9	0	90.9	11
St Mary's Hospital (Newport), Newport	10.8	111	98.2	0.9	0	113
St Mary's Hospital (Paddington), London	7.1	56	84.8	0	63.6	66
Stoke Mandeville Hospital, Aylesbury	6.9	58	100	0	93.1	58
St Peter's Hospital, Chertsey	7.8	51	100	64.7	70.6	51
St Richard's Hospital, Chichester	16.2	37	97.4	0	92.1	38
Sunderland Royal Hospital, Sunderland	0	35	100	48.6	97.1	35
Tameside General Hospital, Ashton Under Lyne	26	77	100	0	98.7	77
Trafford General Hospital, Manchester	0	9	100	0	88.9	9
Tunbridge Wells Hospital, Tunbridge Wells	10.2	49	100	30.6	95.9	49
University College Hospital, London	16.7	6	85.7	0	71.4	7
University Hospital Aintree, Liverpool	14	50	98	0	52.9	51
University Hospital Lewisham, London	0	6	100	0	100	6
University Hospital of Hartlepool, Hartlepool	5.6	18	100	0	100	18
University Hospital of North Durham, Durham	22.1	145	99.3	0	97.9	146
University Hospital of North Tees, Stockton-on-Tees	12	133	99.3	0	98.5	134
University Hospital Queen's Medical Centre, Nottingham	19.8	131	99.2	0.8	93.9	132
Wansbeck General Hospital, Ashington	25	32	100	0	100	32
Warrington Hospital, Warrington	14.3	28	93.3	0	100	30
Warwick Hospital, Warwick	50	4	100	0	100	4
West Cumberland Hospital, Whitehaven	10.3	117	96.7	1.7	98.3	121
West Middlesex University Hospital, Greater London	0	35	97.2	0	63.9	36
Weston General Hospital, Weston-super-Mare	44.4	9	100	0	100	9
West Suffolk Hospital, Bury St Edmunds	10.9	46	100	0	97.8	46
West Wales General Hospital	5	40	100	0	97.5	40
Wexham Park Hospital, Slough	5.6	126	98.4	79.7	41.4	128
Whipps Cross Hospital, Greater London	28.6	21	100	0	100	21
Whiston Hospital, Prescot	22.2	189	99.5	0	92.6	190
Whittington Hospital, London	8.3	12	92.3	0	100	13
Withybush General Hospital, Haverfordwest	7	71	97.3	0	93.2	73
Worthing Hospital, Worthing	17.4	144	99.3	27.6	91.7	145
Wrexham Maelor Hospital, Wrexham	9.2	303	99	0	97.7	306
Yeovil District Hospital, Yeovil	11.8	17	100	0	0	17
York District Hospital, York	13.6	59	98.3	1.7	98.3	60
Ysbyty Gwynedd, Bangor	12.1	214	98.2	0	98.6	218
Non-MINAP Hospitals, Various Locations	**5.3**	**19**	**55.9**	**2.9**	**58.8**	**34**

12. Difference in performance between nations

As responsibility for the provision of healthcare has been devolved to the various nations of the United Kingdom it remains important to apply the same definitions and standards of care when engaged in clinical audit. This allows meaningful comparisons not only between hospitals but also between nations.

Hospitals in Scotland participate in their own national audit programme, though eventually we hope to perform some high level comparisons with MINAP.

Whilst we have previously included data from Belfast in MINAP public reports, there has been phased roll out of MINAP data collection in all Trusts in Northern Ireland. Although almost 1,700 records have been entered into MINAP from hospitals in Northern Ireland, some of the Trusts do not yet have a complete year of data. The Regional Cardiology Steering Group has encouraged Trusts to review their existing data at local audit meetings and share performance data with the Health and Social Care Board. Full year data from Northern Ireland is expected to published in next year's Public Report.

The remainder of this section will concern comparisons between England and Wales.

Historically there have been differences in the combined performance of hospitals in Wales and England, especially with regard to the type and timeliness of reperfusion therapy. To a degree this has been influenced by the largely rural nature of Wales, the distribution of relatively small district general hospitals across the country and challenges associated with accessing two large 'Heart Attack Centres' in the South – with patients in the north being served by English centres. This is being addressed through collaborative working, coordinated and guided by Cardiac Networks, and reconfiguration of services (see case report from North Wales Cardiac Network).

Overall the number of cases reported to MINAP by Welsh hospitals increased from 3,958 in 2012/13 to 4264 in 2013/14, with 3662 having a final diagnosis of heart attack. Of these, 72% were cases of first heart attack – a little higher than the 69% of cases of documented first heart attack in England. There was also a slightly greater proportion of patients admitted with STEMI (40% in Wales compared with 39% in England) and of those who 'self-presented' to hospital with their symptoms of heart attack (17% in Wales compared with 13% in England).

The proportion of patients presenting with their first heart attack with prior diagnosis of hypertension was greater in Wales (54% male; 58% female) than in England (44% male; 54% England), as was the proportion being prescribed lipid lowering therapy (39% male; 34% female compared with 31% male; 29% female). The proportion with a diagnosis of diabetes was almost identical.

12.1 Management of STEMI

The proportion of patients with STEMI that do not receive any form of reperfusion therapy (27%) is the same in England and Wales. For those receiving reperfusion therapy there has been an increase in the proportion undergoing primary PCI in Wales: from 50% in 2011/12 to 79% in 2013/14. [This is still substantially fewer than in England, where a little over 98% receive primary PCI.] This proportion is unlikely to increase much further until the primary PCI service for the North of Wales is established (see Case Studies).

In Wales 87% of patients that receive primary PCI do so within 90 minutes of arrival at hospital compared with 85% in 2012/13; 75% within 150 minutes of calling for help compared with 70% in 2012/13, and 52% within 120 minutes of calling for help compared with 48% in 2012/13. In this regard the performance of the two Welsh Heart Attack Centres and the Welsh Ambulance Service compares well with centres in England. Certainly, the performance of the Welsh Heart Attack Centres judged by door-to-balloon time has improved, with a median delay for those directly admitted for primary PCI falling from 49 minutes to 47 minutes in 2013/14.

The proportion of patients receiving thrombolytic treatment remains significantly higher than in England, with Wales contributing about 40% of all patients treated with thrombolytic drugs (37% of all pre-hospital thrombolysis) in the MINAP dataset this year. The absolute number has fallen from 331 to 215 patients. 58% of patients received thrombolysis within 60 minutes of calling for help compared with 45% in 2012/13.

12.2 Management of nSTEMI

For those with a final diagnosis of nSTEMI, there has been a slight increase in the proportion initially admitted to a cardiac ward/ facility (from 61% to 66% - compared with 56% in England 2013/14) and an increase in those seen by a cardiologist (from 83% to 85% - compared with 94% in England 2013/14).

80% of eligible patients had been sent for angiography during hospitalisation, as in 2012/13 (compared with 78% in England 2013/14).

The median length of stay for nSTEMI has fallen from 6 days (IQR 3-12 days) last year to 5 days (IQR 3-10 days) in 2013/14, and is now the same as England (median 5 days; IQR 3-9 days). The median length of stay following STEMI (3 days) is also now the same as in English. These calculations exclude patients who are transferred from hospitals that do not perform angiography to those that do, and so for nSTEMI is likely to underestimate the overall length of stay.

The use of secondary prevention therapies, which continue to be prescribed to the majority of eligible patients, is very similar to last year's figures, except for the use of ACE inhibitors which has fallen from 89% to 81%. However, using the newer composite measure, only 73% of patients received all secondary prevention medication for which they are eligible in 2013/14 (88% in England).

13. Results by hospitals, ambulance services and Local Area Teams/Welsh Cardiac Networks

The following notes should be read before attempting to interpret the data in this section:

Denominators are represented by the notation 'N'. Numerators are represented by the notation 'n'.
Statistics are not presented for units with fewer than 20 records eligible for a specific analysis.
Median call-to-needle, door-to-needle, call-to-balloon and door-to-balloon statistics are not reported for units with fewer than three records eligible for the specific analysis.
Each table includes a statement of the inclusion and exclusion criteria used in presentation as well as an explanation of the table's contents.

Table 1: Reperfusion treatment of patients with STEMI

The following table gives, for all patients with discharge diagnosis of STEMI who received reperfusion therapy, the proportion treated with primary PCI compared with thrombolytic treatment .
Statistical Disclosure Control: The total number of records for hospitals with fewer than 20 records has been replaced with the notation '<20'. Statistics (%) for such hospitals are not presented.
Hospitals with fewer than 20 records in both years are excluded from this table.

	Proportion of patients with STEMI that received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or primary PCI		Proportion of patients with STEMI that received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI
Year	2011/12			2012/13	
	%	N (out of)		%	N (out of)
England & Wales	**95.3**	**21817**		**97.6**	**21096**
England	**96.7**	**20646**		**98.5**	**20044**
Basildon Hospital, Basildon	99.8	623		99.2	594
Basingstoke and North Hampshire Hospital, Basingstoke	100	128		100	54
Birmingham City Hospital, Birmingham	100	118		100	118
Birmingham Heartlands Hospital, Birmingham	99.5	365		100	348
Blackpool Victoria Hospital, Blackpool	99.2	648		98.9	646
Bristol Royal Infirmary, Bristol	99.4	625		99.8	508

Castle Hill Hospital, Cottingham	99.1	552		99.6	463
Cheltenham General Hospital, Cheltenham	100	75		100	71
Conquest Hospital, St Leonards on Sea	95.8	71		96.4	111
County Hospital Hereford, Hereford	0	30			<20
Cumberland Infirmary, Carlisle	9.4	85		86.2	174
Derriford Hospital, Plymouth	99.1	110		99.5	190
Dorset County Hospital, Dorchester	67.3	52		100	37
Eastbourne District General Hospital, Eastbourne	94.8	96		100	80
Freeman Hospital, Newcastle	99.8	834		100	793
Frimley Park Hospital, Frimley	100	305		99.7	292
Glenfield Hospital, Leicester	99.5	393		99.2	371
Great Western Hospital, Swindon	98.5	66		100	52
Hammersmith Hospital, London	100	378		100	370
Harefield Hospital, Harefield	99.7	777		99.9	722
James Cook University Hospital, Middlesbrough	100	558		100	545
John Radcliffe Hospital, Oxford	97.3	368		99.7	379
Kettering General Hospital, Kettering	99.6	274		99.6	265
King's College Hospital, London	100	361		100	330
Leeds General Infirmary, Leeds	99	1042		98.8	994
Lincoln County Hospital, Lincoln	59.8	209		98.7	390
Lister Hospital, Stevenage	98.8	86		98.9	93
Liverpool Heart and Chest Hospital, Liverpool	99.8	845		100	897

	Proportion of patients with STEMI that received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI		Proportion of patients with STEMI that received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI
Year	2012/13			2013/14	
	pPCI vs Lysis (%)	Out of (N)		pPCI vs Lysis (%)	Out of (N)
London Chest Hospital, London	99.5	609		99.4	633
Manchester Royal Infirmary, Manchester	100	580		99.3	572
Medway Maritime Hospital, Gillingham		<20		75	20
Musgrove Park Hospital, Taunton	100	189		99.5	185
New Cross Hospital, Wolverhampton	99.6	545		100	529
Norfolk and Norwich University Hospital, Norwich	100	460		99.8	422
Northampton General Hospital, Northampton	96.4	28		91.3	23
Northern General Hospital, Sheffield	99.4	623		99.7	674
Nottingham City Hospital, Nottingham	99.5	394		97.9	381
Papworth Hospital, Cambridge	99.5	616		99.8	657
Pilgrim Hospital, Boston	0	51			<20
Poole Hospital, Poole	4.5	22			<20
Queen Alexandra Hospital, Portsmouth	100	372		100	329
Queen Elizabeth Hospital, Birmingham	96.3	297		100	197
Royal Berkshire Hospital, Reading	99	206		99.4	176
Royal Bournemouth General Hospital, Bournemouth	82.7	260		99.7	328
Royal Brompton Hospital, London		<20		100	21
Royal Cornwall Hospital, Truro	99.5	207		100	224

Royal Derby Hospital, Derby	99.7	289		99.6	268
Royal Devon & Exeter Hospital, Exeter	99.3	293		98.9	272
Royal Free Hospital, London	99.5	212		100	196
Royal Sussex County Hospital, Brighton	99.3	303		99.7	302
Royal United Hospital Bath, Bath	93.3	60		100	73
Sandwell General Hospital, West Bromwich	100	132		99.1	117
Southampton General Hospital, Southampton	100	262		99.6	249
St George's Hospital, Greater London	99.8	509		100	522
St Mary's Hospital, Newport	0	21		0	26
St Peter's Hospital, Chertsey		<20		100	21
St Thomas' Hospital, London	100	120		98.6	140
Torbay Hospital, Torquay	100	169		99.3	151
University College Hospital [Heart Hospital], London	99.3	136		99.3	147
University Hospital Coventry, Coventry	99.3	448		99.5	387
University Hospital of North Staffordshire, Stoke-on-Trent	99.6	534		100	495
Watford General Hospital, Watford	100	49		98.1	53
West Cumberland Hospital, Whitehaven	0	50			<20
Wexham Park Hospital, Slough	100	44			<20
William Harvey Hospital, Ashford	97.6	506		98.9	571
Worcestershire Royal Hospital, Worcester	90.1	192		98.6	222
Wycombe Hospital, High Wycombe	100	69		100	62
Wythenshawe Hospital, Manchester	99.6	455		99.3	278

	Proportion of patients with STEMI that received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI		Proportion of patients with STEMI that received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI
Year	2012/13			2013/14	
	pPCI vs Lysis (%)	Out of (N)		pPCI vs Lysis (%)	Out of (N)
Wales	**70.8**	**1171**		**79.5**	**1052**
Glan Clwyd Hospital, Rhyl	28.4	102		29.6	54
Morriston Hospital, Swansea	98.3	406		98.5	406
Nevill Hall Hospital, Abergavenny	0	20			<20
Royal Gwent Hospital, Newport	26.8	56		65.5	29
University Hospital of Wales, Cardiff	100	386		99.8	402
Wrexham Maelor Hospital, Wrexham	0	98		0	76
Ysbyty Gwynedd, Bangor	0	81		0	62
Belfast	**100**	**222**		**99.2**	**391**
Royal Victoria Hospital, Belfast	100	219		99.7	383

"The identification of nSTEMI (and therefore the collection of data about these patients) is not always easy but it is not an impossible task, and should, we believe, be the aspiration of all admitting hospitals that are interested in assuring and improving the quality of care provided to this group. Although there has been an improvement in nSTEMI data collection, there are still a number of hospitals that are submitting limited, and in some cases no, data."

Dr Clive Weston
Clinical Director of MINAP

Table 2: Primary PCI in hospitals in England, Wales and Belfast

Primary PCI within 90 minutes of arrival reflects the ability of hospitals to provide timely treatment. Primary PCI within 150 minutes of calling for help reflects the combined performance of hospitals and the emergency services in identifying STEMI patients and taking them to a Heart Attack Centre. Hospitals are listed in this table only if they have provided time to reperfusion data on at least 10 primary PCI cases during the 2012/13 and 2013/14 financial year. Not all patients are taken directly to a Heart Attack Centre, especially when their diagnosis is uncertain. The triage process inevitably delays provision of primary PCI in some cases. Analyses of time delays now include data from patients who 'self-present' to either a Heart Attack Centre or to a non-interventional hospital. Because such patients were previously excluded from analysis. There may be some differences in the results presented here when compared with the previous annual report for similar periods.

Statistical Disclosure Control: Medians are not reported where there are fewer than 3 records eligible for analysis. When the total number of records for analyses is less than 20 the absolute number has been replaced with the notation '<20'. Proportions (%) for such are not presented.

	Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)		Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre		Median of call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre		pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre		Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre		Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)		Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre		Median call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre		pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre		Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre
Year	2012/13													2013/14											
	DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)		DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)
England & Wales	**91.7**	**19345**	**40**	**81.6**	**17958**	**113**	**86.8**	**15007**	**55.1**	**2953**	**59.1**	**80.8**		**92.1**	**18482**	**40**	**82.3**	**17354**	**112**	**87.3**	**14548**	**56.1**	**2821**	**58.9**	**81.4**
England	**92**	**18537**	**40**	**82.1**	**17270**	**112**	**87.3**	**14381**	**55.9**	**2891**	**59.5**	**80.8**		**92.2**	**17991**	**40**	**82.4**	**16930**	**112**	**87.5**	**14167**	**56.6**	**2778**	**59.1**	**81.4**
Basildon Hospital, Basildon	96.4	640	30	82	633	118	84.9	477	73.1	156	51.7	74.6		97.7	611	35	83.2	596	119	86.3	467	72.1	129	52.7	76.9
Basingstoke and North Hampshire Hospital, Basingstoke	99.1	106	29	96.7	60	85.5	96.3	54		<20	76.7	84.9		97.7	43	32	93.5	31	82	93.5	31		<20	80.6	88.6
Birmingham City Hospital, Birmingham	79.1	91	68	91.9	74	109	91.9	74		<20	67.6	100		74	100	74.5	82.4	85	122	81.7	82		<20	49.4	97

Birmingham Heartlands Hospital, Birmingham	81.4	279	66	80.3	264	125	85.3	232	43.8	32	45.8	88.5	89.6	269	61	87	247	119	90	211	69.4	36	51.8	86.6
Blackpool Victoria Hospital, Blackpool	92.2	579	47	81.5	518	122	85.9	448	52.9	70	49.4	79	91	532	47	80	485	123	83.7	418	56.7	67	46.8	80.7
Bristol Royal Infirmary, Bristol	91.4	608	38	71.1	599	124	82.3	457	35.7	143	46.4	75.2	90.4	501	39	66.5	495	127	79.8	372	26	123	41.6	74.3
Castle Hill Hospital, Cottingham	91.7	531	32	78.8	499	111	88.1	437	12.9	62	61.1	84	93.2	441	32	81.5	417	108	88.5	382	5.7	35	65.5	89.1
Cheltenham General Hospital, Cheltenham	79.2	72	50	70.8	65	116	71.9	64		<20	52.3	98.6	92.1	63	40	84.7	59	108	84.7	59		<20	69.5	100
Conquest Hospital, St Leonards on Sea	87.9	58	52	76	50	104.5	78.3	46		<20	60	88.5	85.1	94	49	76.6	77	122	86.8	68		<20	46.8	84.2
Cumberland Infirmary, Carlisle		<20	124		<20	195.5		<20		<20		100	84.8	125	47	81.6	114	115	81.6	114		<20	55.3	100
Darent Valley Hospital, Dartford		<20	108		<20	156		<20		<20		100		<20	137		<20			<20		<20		100
Derriford Hospital, Plymouth	77.6	98	58.5	76.3	97	120	76.3	97		<20	50.5	100	78.7	183	52	70.5	183	126	70.9	182		<20	45.9	99.5
Dorset County Hospital, Dorchester	96.7	30	31.5	96.6	29	94	96.6	29		<20	86.2	100	94.1	34	23.5	94.1	34	87.5	94.1	34		<20	82.4	100
Eastbourne District General Hospital, Eastbourne	92.9	84	45	90.9	77	105	90	70		<20	74	91.7	97.2	71	43	92.8	69	104	92.4	66		<20	76.8	95.8
Freeman Hospital, Newcastle	99	819	22	87.5	766	87.5	96.2	600	56	166	79.2	73.4	98.4	790	24	89.2	714	90	98.4	548	59	166	80.4	69.9
Frimley Park Hospital, Frimley	96.3	267	34	90.6	234	104	94.2	206	64.3	28	75.2	83.1	95.3	256	33	87.3	228	103	93.6	202	38.5	26	74.6	85.3
Glenfield Hospital, Leicester	83.7	386	47	86.5	349	109	86.5	349		<20	65.6	97.9	83.2	352	55	86.5	319	110	86.5	319		<20	62.1	99.7
Great Western Hospital, Swindon	100	59	27	100	57	80	100	57		<20	93	100	91.7	48	35.5	95.2	42	95.5	95.2	42		<20	76.2	100
Hammersmith Hospital, London	91	368	44.5	80.7	362	109	87.6	275	58.6	87	62.7	75.3	86.7	368	46	78.2	367	109	82.5	275	65.2	92	59.4	74.5

	Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)	Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre	Median of call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre		Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)	Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre	Median call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre
Year	2012/13									2013/14							
	DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)	DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)
Harefield Hospital, Harefield	96.9	769	27	89.3	768	104	96.8	556	69.8	212	68.2	72	97.7	692	28	91.6	670	106	96.5	536	75	148	67.3	77.7
James Cook University Hospital, Middlesbrough	95.4	548	33	91.2	535	97	92.1	444	86.8	91	75.7	82.9	93.7	522	34	91.9	507	94	92.9	436	85.9	71	77.1	84.9
John Radcliffe Hospital, Oxford	93.6	343	24	78.5	339	107	87.6	283	32.1	56	66.1	83.7	96.7	362	25	80.7	357	105	90.6	297	31.7	60	63.6	82.6
Kettering General Hospital, Kettering	95.2	250	35	92.3	222	101	92.2	219		<20	76.6	92.9	94.5	253	36	93.2	234	100	94.2	225		<20	76.5	92.7
King's College Hospital, London	86.4	330	57	77.1	306	129	80	290		<20	40.2	90.1	89.2	297	50	75.6	275	126	80	250	32	25	47.6	90.6
Leeds General Infirmary, Leeds	88.8	1073	48	67.5	1071	130	82.8	744	32.7	327	37.8	69.4	90.3	995	47	70.5	972	127	86.5	682	32.8	290	42.9	68.5
Lincoln County Hospital, Lincoln	96.6	119	32	78.6	112	107	79.2	106		<20	61.6	95	98.5	335	27	87.9	321	111	91.4	268	69.8	53	62	83.6
Lister Hospital, Stevenage	90.7	75	30	88.4	69	93	88.1	67		<20	82.6	97.4	92.6	81	35	92.9	70	92.5	92.8	69		<20	80	96.3
Liverpool Heart and Chest Hospital, Liverpool	98.2	841	31	83.5	788	101.5	98.3	473	61.3	315	68.3	56.6	98.5	850	33	80.8	804	100	98	512	50.9	293	67.3	57.9
London Chest Hospital, London	97.1	591	44	77.5	569	114	94.2	394	40	175	57.1	66.9	98.5	611	41	87.3	600	108	95.5	443	64.3	157	65.5	72.4

Manchester Royal Infirmary, Manchester	90	560	48.5	70.5	492	123.5	86	342	35.3	150	44.3	63	90.6	545	48	71.2	541	124	88.3	342	41.7	199	45.5	61.7
Medway Maritime Hospital, Gillingham		<20	80		<20	131		<20		<20		100		<20	79		<20	129		<20		<20		100
Musgrove Park Hospital, Taunton	98.8	169	25	95.1	163	98	95.8	142	90.5	21	82.2	87	97.5	159	24	94.9	156	95	94.4	143		<20	80.8	91.9
New Cross Hospital, Wolverhampton	90	459	47	79.8	372	115	86.4	337	17.1	35	58.1	81.4	93.3	466	44	80.8	381	113	88.1	344	13.5	37	58	79.5
Norfolk and Norwich University Hospital, Norwich	94.1	407	35	82.7	394	121	85.2	366	50	28	48.7	92.2	96	373	34	87.6	370	117	88.8	357		<20	54.9	96.5
Northampton General Hospital, Northampton		<20	45		<20	108.5		<20		<20		100		<20	59		<20	121.5		<20		<20		100
Northern General Hospital, Sheffield	87.1	591	48	79	424	124	84	369	45.5	55	44.3	70.9	82.5	629	55	73.7	509	130	75.1	422	66.7	87	38.5	71.9
Nottingham City Hospital, Nottingham	91	367	39	84.8	343	106	88.2	306	57.9	38	66.8	86.4	81.6	196	41	83.5	176	101	88.1	160		<20	67.6	89.8
Papworth Hospital, Cambridge	93.8	450	35	78	446	120	77.8	365	79	81	50.2	81.2	93.6	472	37	79.5	469	123	78.6	364	82.9	105	47.8	77.2
Queen Alexandra Hospital, Portsmouth	90.4	366	40.5	89.2	342	105	92	299	69.8	43	68.4	88.3	92.5	321	38	85.7	315	105	88.4	285	60	30	67.3	90.3
Queen Elizabeth Hospital, Birmingham	91.4	257	38	88.2	237	102	88.9	234		<20	71.7	98.1	93.9	179	37	92.1	165	89	92.1	165		<20	81.2	100
Royal Berkshire Hospital, Reading	96.8	186	32	98.9	174	89	98.9	174		<20	90.2	100	97.3	150	27	99.3	137	83	99.3	137		<20	94.2	99.3
Royal Blackburn Hospital, Blackburn		<20	173.5		<20			<20		<20		100		<20	158.5		<20			<20		<20		100
Royal Bournemouth General Hospital, Bournemouth	86.7	196	45	82.5	177	108	82.9	164		<20	58.8	90.4	88.3	273	44	79.2	250	115	82.7	231		<20	56	90
Royal Brompton Hospital, London		<20	90		<20	418.5		<20		<20		9.1		<20	50.5		<20	152.5		<20		<20		0

	Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)	Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre	Median of call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre		Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)	Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre	Median call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre
Year	2012/13									2013/14							
	DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)	DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)
Royal Cornwall Hospital, Truro	86.9	176	51	81	168	123.5	80.5	164		<20	48.2	97.2	89.6	193	47	77.9	190	125.5	77.9	190		<20	40	100
Royal Derby Hospital, Derby	93.1	232	39	94.1	220	95	94.1	220		<20	79.5	100	95.9	219	42	93.5	216	100.5	93.9	214		<20	80.1	99.1
Royal Devon & Exeter Hospital, Exeter	88	249	43	76	246	121.5	76	246		<20	49.2	98.8	89.7	224	36	76.9	221	119	77.1	218		<20	51.6	97.8
Royal Free Hospital, London	96.6	208	49.5	99.5	202	108.5	99.4	169	100	33	72.8	84.1	96.7	181	47	96.6	177	104	97.4	151	92.3	26	70.1	85.6
Royal Sussex County Hospital, Brighton	88.5	296	40.5	83.2	291	110	84.5	265	69.2	26	62.5	89.6	89.6	297	40	85.5	296	113.5	85.4	261	85.7	35	59.8	88.2
Royal United Hospital Bath, Bath	88.6	44	43	80.5	41	112	80.5	41		<20	61	100	90.3	62	42.5	84.7	59	115	84.7	59		<20	54.2	100
Salisbury District Hospital, Salisbury		<20	200		<20			<20		<20		100		<20	106		<20	204		<20		<20		100
Sandwell General Hospital, West Bromwich	92.4	119	64	93.9	99	110	93.8	97		<20	62.6	98.3	89.2	111	64	93.5	92	114.5	93.2	88		<20	56.5	96.4
Southampton General Hospital, Southampton	96	150	46	95.7	141	104	96.4	137		<20	74.5	92.7	94.8	192	47	86.5	192	108.5	88.8	179		<20	66.7	93.2
St George's Hospital, Greater London	91.5	496	42	90.8	476	106	90.3	393	92.8	83	71.4	83.1	89.1	512	45.5	85.6	492	110	85.2	426	87.9	66	61.6	86.3

St Peter's Hospital, Chertsey		<20	58.5		<20	76.5		<20		<20		100		<20	60		<20	82.5		<20		<20		93.8
St Thomas' Hospital, London	94.4	89	56	77.5	80	116	93	57	39.1	23	57.5	69.7	91	111	55	77.6	98	112	86.2	80		<20	59.2	80
Sunderland Royal Hospital, Sunderland		<20	57		<20	119		<20		<20		100												
Torbay Hospital, Torquay	83.1	148	48	83.6	134	104	83.6	134		<20	65.7	100	89.8	128	50.5	89.2	111	105	89.2	111		<20	63.1	100
Tunbridge Wells Hospital, Tunbridge Wells		<20	60		<20			<20		<20		100		<20	83.5		<20			<20		<20		100
University College Hospital [Heart Hospital], London	96.2	157	44	87.9	99	113	95.3	86		<20	60.6	56.7	92.5	146	53.5	80.2	91	118	94.7	75		<20	54.9	52.1
University Hospital Coventry, Coventry	92.4	422	37	93	401	94	93.5	340	90.2	61	75.8	84.3	93.9	377	35	91	365	95	93.8	308	75.4	57	77.3	83
University Hospital of North Staffordshire, Stoke-on-Trent	87.8	433	55	71.7	392	128.5	79.2	332	30	60	42.1	77.6	89.8	394	50.5	77.8	388	124	84.9	299	53.9	89	45.4	76.2
Watford General Hospital, Watford	97.9	48	31.5	100	46	98.5	100	46		<20	84.8	100	100	49	35	93.9	49	104	93.9	49		<20	73.5	100
Wexham Park Hospital, Slough	92.9	42	26	97.6	41	82	97.6	41		<20	82.9	100		<20	60		<20	109		<20		<20		100
William Harvey Hospital, Ashford	90.6	479	43	80.5	466	123	76.8	341	90.4	125	46.8	73	88.9	522	44	76.4	504	128.5	73.9	398	85.8	106	39.5	79.1
Worcestershire Royal Hospital, Worcester	82	133	48	69.6	115	122	72.6	106		<20	47	90.2	88.5	200	48	77.2	184	124	77.9	172		<20	46.7	92.2
Worthing Hospital, Worthing		<20	82.5		<20	120.5		<20		<20		100		<20	96		<20	155		<20		<20		100
Wycombe Hospital, High Wycombe	98.5	65	33	93.8	48	88.5	93.6	47		<20	83.3	92.3	96.6	58	26	90	50	95	88.9	45		<20	82	91.7
Wythenshawe Hospital, Manchester	93.8	435	44	70.5	424	126	71.3	418		<20	44.8	97.9	94	265	43	78.3	240	113.5	78.5	237		<20	60	97.8

	Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)		Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre		Median of call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre		pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre		Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre		Eligible patients who received pPCI within 90 minutes of arrival at Heart Attack Centre (door-to-balloon)		Median of door-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly or transferred to Heart Attack Centre		Median call-to-balloon	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre		pPCI within 150 minutes of calling for help for patients transferred to Heart Attack Centre		Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) with direct admission to Heart Attack Centre	Proportion of patients with direct admission to Heart Attack Centre
Year	2012/13													2013/14											
	DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)		DTB90 (%)	Out of (N)	DTB Median (minutes)	CTB150 All (%)	Out of (N)	CTB Median (minutes)	CTB150 Direct (%)	Out of (N)	CTB150 Transfer (%)	Out of (N)	CTB120 All (%)	Direct Admission (%)
Wales	**84.7**	**808**	**47**	**70.3**	**688**	**122.5**	**75.6**	**626**	**17.7**	**62**	**47.5**	**8 1.7**		**86.8**	**491**	**46**	**75**	**424**	**119**	**80.8**	**381**	**23.3**	**43**	**52.1**	**83.3**
Glan Clwyd Hospital, Rhyl	51.7	29	89	53.8	26	145.5	53.8	26		<20	15.4	100			<20	81.5		<20	124		<20		<20		100
Morriston Hospital, Swansea	84.5	399	48	57.7	317	139	65.8	263	18.5	54	35.3	70.4		82.1	95	51	61.8	89	132	63.2	76		<20	39.3	82.8
Royal Gwent Hospital, Newport		<20	120		<20	167		<20		<20		100			<20	94		<20	162		<20		<20		100
University Hospital of Wales, Cardiff	89.9	367	44	85.6	334	112	87.4	326		<20	63.2	92.4		90.8	371	43	80.5	318	116	87.8	288	10	30	57.2	81.9
Belfast	**84.9**	**199**	**38**	**89.4**	**151**	**87**	**90**	**130**	**85.7**	**21**	**79.5**	**80**		**95**	**358**	**36**	**84.7**	**313**	**99**	**93.1**	**246**	**53.7**	**67**	**69**	**71.7**
Belfast City Hospital, Belfast		<20	57		<20	89		<20		<20		66.7			<20	52.5		<20	104		<20		<20		85.7
Royal Victoria Hospital, Belfast	85.2	196	38	89.9	148	87	89.8	128	90	20	79.7	80.2		95.2	352	35	84.4	308	99	92.9	241	53.7	67	69.2	71.4

"The Francis Report and Keogh Review have highlighted shortcomings and failure to care properly for patients in some areas of the NHS. Budgetary restraint raises concerns that such troubles may not be behind us in a minority of hospitals. Therefore, vigilance remains essential."

Alan Keys
Patient representative for MINAP

Table 3: Thrombolytic treatment in hospitals in England, Wales and Belfast

Thrombolytic treatment within 30 minutes of arrival reflects the ability of hospitals to provide timely treatment. Thrombolytic treatment within 60 minutes of calling for help reflects the combined performance of hospitals and the emergency services in identifying STEMI patients and providing for their treatment. Thrombolytic treatment is not used in Belfast.

Statistical Disclosure Control: Medians are not reported where there are fewer than 3 records eligible for analysis. When the total number of records for analyses is less than 20 the absolute number has been replaced with the notation '<20'. Proportions (%) for such are not presented. Hospitals with fewer than 20 records in both years are excluded from this table.

	Thrombolytic treatment within 30 mins of hospital arrival (door-to-needle)		Median door-to-needle	Thrombolytic treatment within 60 mins of calling for help (call-to-needle)		Median call-to-needle		Thrombolytic treatment within 30 mins of hospital arrival (door-to-needle)		Median door-to-needle	Thrombolytic treatment within 60 mins of calling for help (call-to-needle)		Median call-to-needle
Year	2012/13							2013/14					
	DTN30 (%)	Out of (N)	DTN Median (minutes)	CTN60 (%)	Out of (N)	CTN Median (minutes)		DTN30 (%)	Out of (N)	DTN Median (minutes)	CTN60 (%)	Out of (N)	CTN Median (minutes)
England & Wales	**53.4**	**442**	**28**	**46.2**	**533**	**66**		**49.1**	**212**	**31**	**45.3**	**245**	**67**
England	**56**	**282**	**27**	**47**	**336**	**64**		**45.2**	**115**	**39**	**31.6**	**117**	**83**
Basildon Hospital, Basildon		<20			<20				<20	20		<20	110
Blackpool Victoria Hospital, Blackpool		<20	64.5		<20	139.5			<20	52.5		<20	122
Bradford Royal Infirmary, Bradford		<20	22		<20	113.5			<20			<20	
Bristol Royal Infirmary, Bristol		<20	54		<20	90			<20			<20	
Chesterfield Royal Hospital, Chesterfield		<20			<20				<20	58		<20	
Conquest Hospital, St Leonards on Sea		<20			<20				<20	147		<20	194
Countess of Chester Hospital, Chester		<20			<20	35			<20			<20	43.5
County Hospital Hereford, Hereford		<20	34		<20	46.5			<20			<20	
Cumberland Infirmary, Carlisle	71.4	28	22.5	68.8	48	49.5			<20	19		<20	45

Dorset County Hospital, Dorchester		<20	19		<20	56			<20			<20	
Eastbourne District General Hospital, Eastbourne		<20	30		<20	79			<20			<20	
Glenfield Hospital, Leicester		<20			<20				<20	23		<20	81
Grantham and District Hospital, Grantham		<20	20		<20	70.5			<20			<20	
Huddersfield Royal Infirmary, Huddersfield		<20			<20				<20	118		<20	182
Leeds General Infirmary, Leeds		<20	36		<20	85			<20	30.5		<20	105.5
Lincoln County Hospital, Lincoln	73.8	42	18.5	60.4	53	58			<20	28		<20	108
Manchester Royal Infirmary, Manchester		<20			<20				<20	55		<20	115
Pilgrim Hospital, Boston	54.2	24	27	52.9	34	59.5			<20			<20	
Poole Hospital, Poole		<20	13		<20	59			<20			<20	
Royal Bournemouth General Hospital, Bournemouth		<20	28.5	58.6	29	50			<20			<20	
Salford Royal Hospital, Salford		<20	81		<20	137			<20			<20	
St Mary's Hospital (Newport), Newport		<20	32.5		<20	39			<20	30		<20	68
University Hospital Coventry, Coventry		<20	34		<20	60			<20			<20	
University Hospital of North Durham, Durham		<20			<20				<20	7		<20	111
West Cumberland Hospital, Whitehaven	87	23	20	69	29	52			<20	23		<20	52.5
William Harvey Hospital, Ashford		<20	47.5		<20	158			<20			<20	59
Worcestershire Royal Hospital, Worcester		<20	41		<20	88			<20			<20	
Wales	**48.8**	**160**	**32**	**44.7**	**197**	**67**		**53.6**	**97**	**28**	**57.8**	**128**	**54.5**
Glan Clwyd Hospital, Rhyl	66.7	27	26	62.5	48	55.5			<20	29	76.7	30	43.5
Morriston Hospital, Swansea		<20			<20	103			<20			<20	

	Thrombolytic treatment within 30 mins of hospital arrival (door-to-needle)		Median door-to-needle	Thrombolytic treatment within 60 mins of calling for help (call-to-needle)		Median call-to-needle		Thrombolytic treatment within 30 mins of hospital arrival (door-to-needle)		Median door-to-needle	Thrombolytic treatment within 60 mins of calling for help (call-to-needle)		Median call-to-needle
Year	2012/13							2013/14					
	DTN30 (%)	Out of (N)	DTN Median (minutes)	CTN60 (%)	Out of (N)	CTN Median (minutes)		DTN30 (%)	Out of (N)	DTN Median (minutes)	CTN60 (%)	Out of (N)	CTN Median (minutes)
Nevill Hall Hospital, Abergavenny		<20	28		<20	105			<20	72.5		<20	
Prince Charles Hospital, Merthyr Tydfil		<20	58		<20	141.5			<20	34		<20	132
Royal Glamorgan Hospital, Llantrisant		<20	28		<20				<20			<20	
Royal Gwent Hospital, Newport	23.1	26	59.5		<20	118.5			<20	38		<20	114
Wrexham Maelor Hospital, Wrexham	61.2	49	27	51.6	64	57.5		69.4	36	23	59.6	47	54
Ysbyty Gwynedd, Bangor	44.8	29	35	46.8	47	78		43.2	37	32	50	42	61.5

"We have participated in MINAP from its inception. By so doing we believe that we have been forced to look critically at our practice to ensure we meet nationally agreed targets and optimise the outcomes for our patients."

Amelia Hilton - Clinical Audit Co-ordinator (Pathology, Imaging and Medicine)
Sandwell West Birmingham Hospitals NHS Trust

Table 4: Ambulance services in England, Wales and Belfast

The following table characterises the provision of reperfusion treatment for those patients taken to hospital by ambulance. Provided are the absolute number of patients receiving reperfusion, the relative proportion of patients receiving primary PCI, and the proportion of patients receiving thrombolytic treatment before arrival at hospital (pre-hospital thrombolysis).

Statistical Disclosure Control: Medians are not reported where there are fewer than 3 records eligible for analysis. When the total number of records for analyses is less than 20 the absolute number has been replaced with the notation '<20'. Proportions (%) for such are not presented.

NB: Analyses for the Great Western Ambulance Service NHS Trust are based on data up to 31 January 2013, when it became part of the South Western Ambulance Service NHS Foundation Trust. Analyses for the South Western Ambulance Service NHS Foundation Trust include Great Western Ambulance Service NHS Trust data from 1 February 2013 onwards.

	Proportion of patients with STEMI who received pPCI compared to thrombolytic treatment	Number of STEMI patients who received either thrombolytic treatment or pPCI	Proportion of patients with STEMI who received pre-hospital thrombolysis compared to in-hospital thrombolytic treatment	Number of STEMI patients that received thrombolytic treatment before arrival to and in hospital	Thrombolytic treatment within 60 minutes of calling for help (call-to-needle)	Median call-to-needle	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly to Heart Attack Centre)	Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) including those admitted directly to Heart Attack Centre)	Number of all patients with STEMI who received pPCI	Median call-to-balloon		Proportion of patients with STEMI who received pPCI compared to thrombolytic treatment	Number of STEMI patients who received either thrombolytic treatment or pPCI	Proportion of patients with STEMI who received pre-hospital thrombolysis compared to in-hospital thrombolytic treatment	Number of STEMI patients that received thrombolytic treatment before arrival to and in hospital	Thrombolytic treatment within 60 minutes of calling for help (call-to-needle)	Median call-to-needle	Eligible patients who received pPCI within 150 minutes of calling for help (call-to-balloon) including those admitted directly to Heart Attack Centre)	Eligible patients who received pPCI within 120 minutes of calling for help (call-to-balloon) including those admitted directly to Heart Attack Centre)	Number of all patients with STEMI who received pPCI	Median call-to-balloon
Year	2012/13											2013/14									
	pPCI vs Lysis (%)	Out of (N)	Ambulance vs Hospital Lysis (%)	Out of (N)	CTN60 (%)	Out of (N)	CTN Median (minutes)	CTB150 All (%)	CTB120 All (%)	Out of (N)	CTB Median (minutes)	pPCI vs Lysis (%)	Out of (N)	Ambulance vs Hospital Lysis (%)	Out of (N)	CTN60 (%)	Out of (N)	CTN Median (minutes)	CTB150 All (%)	CTB120 All (%)	Out of (N)	CTB Median (minutes)
Ambulance Service Records	95.5	18725	27.2	813	46.2	520	66	82.7	60.1	16386	112	97.6	18455	26.3	426	45.7	258	67	83.1	59.7	16154	112
East Midlands Ambulance Service NHS Trust	91	1668	32.2	146	53.1	98	59.5	85.5	67.3	1404	106	98.2	1724	0	29		<20	96.5	86.8	67.2	1443	106
East of England Ambulance Service NHS Trust	98.8	1851	5	20		<20		83.2	54	1637	117	99	1818		<20		<20		84.5	53.7	1577	118
Great Western Ambulance Service NHS Trust*	99.1	695		<20		<20		74.4	52.2	628	118											

London Ambulance Service NHS Trust	99.7	1976		<20		<20		87.1	65	1874	110		99.7	1987		<20		<20		87.1	65	1832	108
North East Ambulance Service NHS Foundation Trust	99.8	1237		<20		<20		90.2	80.9	1175	89		99.5	1208		<20		<20		91.1	81.4	1110	90
Northern Ireland Ambulance Service Health and Social Care Trust	100	191				<20		89.4	79.5	151	87		94.3	405	53.8	26		<20	54	83.7	67.7	325	100
North West Ambulance Service NHS Trust	93.5	2356	25.5	145	58.9	90	53	78.4	54.1	2045	116		96.5	2262	30.1	73	54.5	44	55	80.1	57.6	1962	114
South Central Ambulance Service NHS Foundation Trust	99.5	1126		<20		<20		91.6	76.1	993	100		99.8	1088		<20		<20		90	74.4	981	99
South East Coast Ambulance Service NHS Foundation Trust	97.8	1412	6.9	29		<20	144	85.1	60.3	1286	113		98.5	1503	9.1	22		<20	134	82.2	53.9	1377	118
South Western Ambulance Service NHS Foundation Trust**	93.9	1342	32.9	82	52.8	53	56	80.9	57	1115	114		99.5	1951		<20		<20		77.2	52.2	1763	119
Welsh Ambulance Services NHS Trust	68.1	844	34.2	266	46.5	198	66.5	73.1	50.2	546	120		73.8	676	38.5	174	58	131	54	76.1	52.8	381	119
West Midlands Ambulance Service NHS Foundation Trust	97.8	2142	10.6	47	20	20	89.5	83.6	60.1	1733	113		99.4	1990		<20		<20		85.4	60	1660	112
Yorkshire Ambulance Service NHS Trust	97.8	1859	2.4	41		<20	110	74.3	45.2	1791	125		98.4	1811	0	30		<20	111	74.5	45.8	1735	125

* data up to January 2013
** includes data from former Great Western Ambulance from February 2013

Table 5: Local Area Teams in England and Cardiac Networks in Wales

The following table gives information about the provision of reperfusion treatment overall. Provided are the absolute number of patients receiving reperfusion, the relative proportion of patients receiving primary PCI, and the proportion of patients receiving thrombolytic treatment before arrival at hospital (pre-hospital thrombolysis).

Statistical Disclosure Control: Medians are not reported where there are fewer than 3 records eligible for analysis. When the total number of records for analyses is less than 20 the absolute number has been replaced with the notation '<20'. Proportions (%) for such Local Area Teams are not presented.

	Proportion of patients with STEMI who received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI	Proportion of patients with STEMI whoreceived pre-hospital thrombolysis compared to in-hospital thrombolysis	Number of STEMI patients who received thrombolytic treatment before arrival to and in hospital	Number of patients who received thrombolytic treatment within 60 min of call for help (call-to-needle)	Median call-to-needle	Eligible patients who received pPCI within 150 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Number of all patients with STEMI who received pPCI	Median call-to-balloon		Proportion of patients with STEMI who received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI	Proportion of patients with STEMI whoreceived pre-hospital thrombolysis compared to in-hospital thrombolysis	Number of STEMI patients who received thrombolytic treatment before arrival to and in hospital	Number of patients who received thrombolytic treatment within 60 min of call for help (call-to-needle)	Median call-to-needle	Eligible patients who received pPCI within 150 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Number of all patients with STEMI who received pPCI	Median call-to-balloon
Year	2011/12											2012/13									
	pPCI vs Lysis (%)	Out of (N)	Ambulance vs Hospital Lysis (%)	Out of (N)	CTN60 (%)	Out of (N)	CTN Median (minutes)	CTB150 All (%)	CTB120 All (%)	Out of (N)	CTB Median (minutes)	pPCI vs Lysis (%)	Out of (N)	Ambulance vs Hospital Lysis (%)	Out of (N)	CTN60 (%)	Out of (N)	CTN Median (minutes)	CTB150 All (%)	CTB120 All (%)	Out of (N)	CTB Median (minutes)
England																						
Arden, Herefordshire and Worcestershire Area Team	92.4	738	11.3	53		<20	72	87.9	69.1	570	103	97.9	625		<20		<20		86.9	68.5	543	103
Bath, Gloucestershire, Swindon and Wiltshire Area Team	99	492		<20		<20		72.5	45	422	125	99.1	429		<20		<20		71.1	41.6	377	126
Birmingham and the Black Country Area Team	99.3	1068		<20		<20		85.5	60.6	754	112	99.7	998		<20		<20		88.1	62.2	754	110
Bristol, North Somerset, Somerset and South Gloucestershire Area Team	98.6	513		<20		<20		81.1	65.3	470	106	100	459				<20		79	61.9	423	109

Cheshire, Warrington and Wirral Area Team	95	464	9.1	22		<20		80	57.2	390	112.5		96.9	477		<20		<20		80.9	64.2	413	107
Cumbria, Northumberland, Tyne and Wear Area Team	87	929	28.6	119	66.7	75	52	83.4	72.6	718	90		95.7	947	42.1	38	69.6	23	47	84.8	71.7	781	94
Derbyshire and Nottinghamshire Area Team	97.5	789		<20		<20	120.5	87	67.3	614	106		97.8	771		<20		<20		85.6	65.9	466	106
Devon, Cornwall and Isles of Scilly Area Team	99.9	727		<20		<20		79.8	53.7	605	117		99	624		<20		<20		79	50	504	120.5
Durham, Darlington and Tees Area Team	99.5	568		<20		<20		93.6	81	543	94		98.4	564		<20		<20		93.8	81.2	515	93
East Anglia Area Team	99.2	977		<20		<20		79.3	47.9	769	122		98.9	983		<20		<20		83.3	51.6	761	119
Essex Area Area Team	98.7	622		<20		<20		82.6	53.8	619	117		98.6	576		<20		<20		83.4	52.7	567	119
Greater Manchester Area Team	97.3	957	10	20		<20	137	71.3	45.8	821	123		98.4	795		<20		<20		73.1	50.1	720	120
Hertfordshire and the South Midlands Area Team	98.5	1001		<20		<20		87.4	67.7	870	106		99.2	986		<20		<20		87.7	64.1	859	108
Kent and Medway Area Team	95.3	556	8.3	24		<20	146.5	80.2	46.1	475	123		97.1	620		<20		<20		77.2	42.1	518	126
Lancashire Area Team	98.3	658		<20		<20		83.4	53.1	529	118		98.1	618		<20		<20		84.3	53	460	119
Leicestershire and Lincolnshire Area Team	81.5	726	34.6	133	58.1	86	58	81.5	60.3	534	111		98.5	796		<20		<20		85.2	60.4	661	112
London Area Team	99.5	2265		<20		<20		84.5	62.1	2050	111		99.6	2274		<20		<20		84.9	62.4	2048	109
Merseyside Area Team	98	493		<20		<20		85.1	71.1	450	95		97.2	492		<20		<20		83.5	69.9	442	94.5
North Yorkshire and Humber Area Team	98.5	742		<20		<20		76.4	54.7	696	118		99.1	671		<20		<20		78.2	58.1	611	113
Shropshire and Staffordshire Area Team	98.6	635		<20		<20		75.4	49	471	121		98.6	147		<20		<20		80	60.9	115	105

	Proportion of patients with STEMI who received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI	Proportion of patients with STEMI whoreceived pre-hospital thrombolysis compared to in-hospital thrombolysis	Number of STEMI patients who received thrombolytic treatment before arrival to and in hospital	Number of patients who received thrombolytic treatment within 60 min of call for help (call-to-needle)	Median call-to-needle	Eligible patients who received pPCI within 150 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Number of all patients with STEMI who received pPCI	Median call-to-balloon		Proportion of patients with STEMI who received pPCI compared to thrombolytic treatment	Number of STEMI patients that received either thrombolytic treatment or pPCI	Proportion of patients with STEMI whoreceived pre-hospital thrombolysis compared to in-hospital thrombolysis	Number of STEMI patients who received thrombolytic treatment before arrival to and in hospital	Number of patients who received thrombolytic treatment within 60 min of call for help (call-to-needle)	Median call-to-needle	Eligible patients who received pPCI within 150 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Eligible patients who received pPCI within 120 min of calling for help(call-to-balloon) incl those admitted directly or transferred to Heart Attack Centre	Number of all patients with STEMI who received pPCI	Median call-to-balloon
Year	2011/12											2012/13									
	pPCI vs Lysis (%)	Out of (N)	Ambulance vs Hospital Lysis (%)	Out of (N)	CTN60 (%)	Out of (N)	CTN Median (minutes)	CTB150 All (%)	CTB120 All (%)	Out of (N)	CTB Median (minutes)	pPCI vs Lysis (%)	Out of (N)	Ambulance vs Hospital Lysis (%)	Out of (N)	CTN60 (%)	Out of (N)	CTN Median (minutes)	CTB150 All (%)	CTB120 All (%)	Out of (N)	CTB Median (minutes)
South Yorkshire and Bassetlaw Area Team	96.8	530		<20		<20		79.1	45	369	123	99.7	648		<20		<20		79.3	49	484	122
Surrey and Sussex Area Team	98.6	923		<20		<20		86.8	66.3	813	108	98.1	565		<20		<20		73.9	40	440	130
Thames Valley Area Team	99.4	714		<20		<20		89.5	77.2	636	98	99.2	942		<20		<20		85	60.9	836	111
Wessex Area Team	91	1059	31.6	95	59.3	54	53	89.2	69.6	711	102	99.6	668		<20		<20		92	75.6	578	97
West Yorkshire Area Team	96.9	907	7.1	28		<20	102	68.4	40.2	907	129	97.5	957	20.8	24		<20	70.5	84.3	66	751	105
Wales																						
North Wales Cardiac Network	10.3	281	33.9	248	53.5	159	58	53.8	15.4	26	145.5	8.3	192	36.6	172	60.5	119	53			<20	
South Wales Cardiac Network	89.9	890	4.5	89	7.9	38	117.5	71	48.8	662	121.5	95.3	860	2.9	35		<20		75.1	52.3	417	119

"Participation in MINAP has helped to strengthen the partnerships East Midlands Ambulance Service has with local hospital trusts. This has benefited our cardiac patients as working together with the hospitals has helped us to identify areas of care which could be improved."

Deborah Shaw – Clinical Audit and Research Manager
East Midlands Ambulance Service

Table 6: Secondary prevention medication by eligibility in England, Wales and Belfast

These analyses are based on all patients discharged from hospital with a diagnosis of acute coronary syndrome. Patients are excluded from analysis of the use of secondary prevention medication if they did not survive to discharge, if they were transferred to another hospital prior to discharge (even though secondary prevention medication is often started soon after initial admission), if they were in any way ineligible to receive a particular medication, or if they declined to take the medication prescribed. Thus, the numbers of patient records eligible for analysis are specific to each medication and these numbers may be substantially lower than the total number of heart attack patients seen or treated.

In the following table, the first column contains the percentage of patients who are recorded to be ineligible for **any** secondary prevention medications. The columns named 1 through 5 contain the percentage of patients who were deemed eligible for and received the corresponding number of secondary prevention medications. Cells are left blank if no patients were eligible for a particular number of secondary prevention medications. The 'All' column gives the overall percentage of patients receiving the medications for which they were eligible, excluding patients who received no secondary prevention medication whatsoever because of ineligibility. The final column provides the total number of patients for whom eligibility across all medications could be determined.

Statistical Disclosure Control: The total number of records for hospitals with fewer than 50 records has been replaced with the notation '<50'.

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
England & Wales	**1.1**	**10.2**	**55.7**	**68**	**78**	**84.2**	**81.2**	**60012**		**2.7**	**68.5**	**86.2**	**85.4**	**88.5**	**88.2**	**87.9**	**59368**
England	**1.1**	**10.2**	**56.2**	**68.3**	**78.6**	**84.4**	**81.5**	**57959**		**2.1**	**67.9**	**87.2**	**85.6**	**88.7**	**88.6**	**88.3**	**57301**
Addenbrooke's Hospital, Cambridge	0.4	0	27.3	77.8	73.3	82.3	73.4	268		2.4	100	78.6	93.3	89.3	77.8	83	247
Airedale General Hospital, Keighley	0	100	85.7	72.2	91.7	91.4	89.3	197		1.4		100	81.8	97.1	97.8	96.5	143

Alexandra Hospital, Redditch	3				79.2	71.5	72.7	166	8.5			0	40	68.5	66.9	142
Arrowe Park Hospital, Wirral	0.8	0	28.6	58.8	54.3	64.2	58.8	252	3.7	0	57.1	56.5	68	67.7	65.5	214
Barnet General Hospital, Greater London	0.5	33.3	50	50	66.7	57.8	58.9	220	0.4		100	87.5	89.8	76.9	80.6	228
Barnsley Hospital, Barnsley	1.3				77.8	65.2	66.7	76	1.6	0		100	75	59.5	60.8	127
Basildon Hospital, Basildon	1.2	0	0	91.7	90.5	92.9	90.7	815	4.4	0		73.3	92.1	95.7	93.8	841
Basingstoke and North Hampshire Hospital, Basingstoke	1		100	33.3	100	99.4	98.5	198	2.7			100	93.3	95.7	95.5	113
Bassetlaw Hospital, Worksop	0	0	0	66.7	90.6	90.7	87.4	143	2.9	100	100	100	94.9	98.8	97.8	139
Bedford Hospital, Bedford	0			50	90	98.6	96.5	86	13.6			0	71.4	91.8	86.8	88
Birmingham City Hospital, Birmingham	0		100	93.3	88.5	96.2	93.7	303	1	100	100	100	100	99.5	99.7	292
Birmingham Heartlands Hospital, Birmingham	0.1	0	100	100	88.2	92.8	90.8	697	2	0	100	93.8	93.5	90.6	90.5	763
Blackpool Victoria Hospital, Blackpool	0.4	12.5	50	50	71.3	89.9	84.9	1333	0.7	100	94.4	96.2	87.4	96.8	95.3	1334
Bradford Royal Infirmary, Bradford	0	0	71.4	85	91.1	96	93.5	565	0.3	100	100	100	99.1	97.6	98.1	629

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Bristol Royal Infirmary, Bristol	0	0	0		100	80.4	80.3	889		0.1			100	70	77.1	77.1	713
Broomfield Hospital, Chelmsford	1.8	50	33.3	68.2	77.1	83.9	80.3	336		3.5	66.7	100	93.8	94.4	92.8	93.5	287
Calderdale Royal Hospital, Halifax	0.7	11.1	66.7	48.6	64.5	71.1	66.3	430		3.2	66.7	40	86.7	95.4	93.8	92.8	444
Castle Hill Hospital, Cottingham	0.2				57.6	77.2	76.5	1012		0.1		100	85.7	73.8	77.4	77.3	1005
Central Middlesex Hospital, Greater London	0	0			75	62.8	60	50		9.1	0		100	100	51.4	52.5	<50
Charing Cross Hospital, London								<20									
Chase Farm Hospital, Greater London	0			0	42.9	77	72.5	69		0			0		85.7	75	<20
Chelsea and Westminster Hospital, London	0	0			80	100	83.3	<20		0		100	50	80	85.7	80	<20

Cheltenham General Hospital, Cheltenham	11.2	0	66.7	50	91.7	96.5	92.6	152	15.5	0	100	75	84.6	90.4	88.2	110
Chesterfield Royal Hospital, Chesterfield	0.2	0	85.7	80	82.1	93.7	89.5	457	0.2	25	100	85.2	86.8	91.8	89.8	470
Chorley and South Ribble Hospital, Chorley	1.8				16.7	83.3	75.9	55	1.5			100	50	80.7	78.1	65
Colchester General Hospital, Colchester	1.5	0	33.3	54.5	86.5	86.1	83.9	341	2.9	0	33.3	92.3	82.1	85.4	84.2	280
Conquest Hospital, St Leonards on Sea	0.4	0	50	72.7	83.3	94.4	88.6	256	1.5	75	88.9	89.7	96.5	98.8	96.6	270
Countess of Chester Hospital, Chester	0	0	37.5	31.8	64.4	76.8	65.7	175	1.3	100	100	93.9	85.4	91.4	91	158
County Hospital Hereford, Hereford	0	0		100	87.5	93.6	91.2	57	10	100		100	100	47.4	84.1	70
Croydon University Hospital, Greater London	0			45.5	70.7	77.9	74.5	188	3.2		50	57.1	81.5	81.4	80.1	187
Cumberland Infirmary, Carlisle	0.3	0	16.7	47.4	60.6	83.5	74.5	370	1.6	100	50	58.3	78	80.1	78.4	498
Darent Valley Hospital, Dartford	0	0	50	60	73.1	83.5	76.7	292	5.8	75	83.3	83.3	90.7	88.4	88.1	311
Darlington Memorial Hospital, Darlington	1.7			100	75	75.5	75.9	59	4.9	0	100	66.7	85.7	94.1	89.6	81

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Derriford Hospital, Plymouth	3.1				90.6		90.6	131		2	100	90		90.5	25	89.5	204
Dewsbury District Hospital, Deswbury	2.3	0	40	50	31.2	16.6	19.2	436		3.1	50	100	85.7	78.7	70.8	72.7	389
Diana, Princess of Wales Hospital, Grimsby	1.7		0	71.4	75	66.7	68.6	120		1.1			75	69.2	70	70.2	95
Doncaster Royal Infirmary, Doncaster	0	50		57.1	82.1	90.1	86.8	304		1.9		100	56.2	83	92.6	88.8	265
Dorset County Hospital, Dorchester	1.4		100	100	79.3	86.8	86.3	208		1		100	91.7	89.1	93.5	92.5	202
Ealing Hospital, Greater London	0.7	0		60	54.5	49.1	48.9	136		1.7		50	33.3	46.7	76.6	71.1	116
Eastbourne District General Hospital, Eastbourne	1.4	0	20	79.2	74.6	94.7	86.6	295		0	16.7	100	55	86.2	92.8	85.4	274
East Surrey Hospital, Redhill	0	0	100	55.6	48.9	78.1	70.3	195		1.8	75	100	78.9	95.9	89.2	89.7	217

Epsom Hospital, Greater London	2.8		100	100	100	75	85.7	<50	17.6	100		0	66.7	16.7	21.4	51
Fairfield General Hospital, Bury	0.2	0	33.3	68.8	85.5	94.5	90.5	410	2.2	100	100	88	97.8	97.4	97	449
Freeman Hospital, Newcastle	0.1	0	100	100	96.1	99.1	98.4	1588	0.2		100	100	100	100	100	1643
Frenchay Hospital, Bristol	0.3	0	60	66.7	71.6	83.4	78.8	364	2.2	100	83.3	81	83.9	90.9	88.3	272
Frimley Park Hospital, Frimley	0	0	70	63.6	87.1	90.4	86.7	601	0.5	0	28.6	76.6	91	94.3	90.6	641
Furness General Hospital, Barrow-in-Furness	52.4	0		0	66.7	60	50	<50	80					100	100	<20
George Eliot Hospital, Nuneaton	2.1	0		50	77.8	87.7	83.2	97	6.4		100	100	100	89.2	90.9	<50
Glenfield Hospital, Leicester	0	0	50	72.2	78.7	94.2	90.2	859	0.1	100	77.8	86.4	95.2	97.9	96.9	765
Gloucestershire Royal Hospital, Gloucester	4.6	0		66.7	69.2	75	72.3	87	3.7	100		100	100	79.1	82.7	54
Good Hope Hospital, Sutton Coldfield	0	0		80	91.5	94.2	84.7	176	10.1		0	73.3	95.6	98.3	95	199
Grantham and District Hospital, Grantham	0	50	20	60	74.1	92.9	77.9	86	2.2		100	90.9	100	100	97.8	<50
Great Western Hospital, Swindon	1.9	20	0	68.2	71.3	84	75.8	371	1.5	100	100	83.3	89.6	89.6	89.6	392

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Hammersmith Hospital, London	0.2	0	100	76.2	96.1	95.4	94.8	632		0		75	96.6	97.3	98.7	98.2	739
Harefield Hospital, Harefield	5.5	50	100	100	63	80.2	79.6	1258		0	33.3		50	94.1	84.7	84.7	1064
Harrogate District Hospital, Harrogate	0	50	0	73.3	74.3	93.5	85.4	247		1.3	100	100	100	94.7	98.8	98.3	234
Hexham General Hospital, Hexham	0		100	40	50	100	61.5	<20		0	0		0	100	75	44.4	<20
Hillingdon Hospital, Greater London	0	14.3	42.1	61.8	76.6	89.2	73.2	198		5.2	100	100	96.4	93.9	97.9	96.3	173
Hinchingbrooke Hospital, Huntingdon	4.5	66.7	100	0	100	46.2	52.4	<50		20.8			0	100	42.9	52.6	<50
Homerton University Hospital, London	3.1			0	66.7	62.5	61.3	<50		4.5		0			0	0	<50
Horton General Hospital, Banbury	0	50	50	90	87.5	87.5	85.2	54		1.7			87.5	82.4	87.5	86	58

Huddersfield Royal Infirmary, Huddersfield	0.6	0	50	65.4	79.5	76.3	72.9	334	8.8	83.3	44.4	90	88.1	90.3	88.1	295
Hull Royal Infirmary, Hull	0				0	20.7	20	60	2.7			0	50	29.2	29.6	73
Ipswich Hospital, Ipswich	0.4	22.2	43.8	52.4	58.8	53.8	53.4	254	2.2	85.7	88.9	85.3	82.2	77.6	82.3	185
James Cook University Hospital, Middlesbrough	0	0	50	60	84.9	95.4	92.7	764	0.4	100	75	100	95.2	98.3	97.8	1356
James Paget University Hospital, Great Yarmouth	0	0	66.7	83.3	85.7	77.1	78.8	66	1.3	100	100	100	100	100	100	76
John Radcliffe Hospital, Oxford	0	0	71.4	74.2	86.8	95.3	92	696	0.1	100	100	72.7	85.7	88.1	87.1	705
Kent and Canterbury Hospital, Canterbury	0			75	67.6	79.7	75.8	128	0			54.5	77.3	90.7	81.6	76
Kettering General Hospital, Kettering	0	50	100	91.7	93.2	96.9	95.7	529	1.4	100	93.3	100	99.1	98.4	98.5	486
King George Hospital, Greater London	1	0	0	0	88.9	81.7	79.6	104	3.1	0		0	88.9	83.3	81	65
King's College Hospital, London	1.1	33.3	100	100	90	90.1	89.9	619	1.8	80	100	0	29	72.9	68.7	624
King's Mill Hospital, Sutton-in-Ashfield	0			82.6	88.3	96.6	93.5	262	0.5			100	91.7	92.4	92.6	217
Kingston Hospital, Greater London	2.5	0		50	60	25.2	26.9	122	4.6	100	92.3	80	82.4	66.7	76.6	130

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Leeds General Infirmary, Leeds	0.7	0	60	41.2	36.9	16.1	20.5	952		0.6	100	90.9	95	82.5	79.3	80.8	1020
Leighton Hospital, Crewe	0.5		50	53.3	80	91.9	85.4	213		5.1	100	80	42.9	66.7	91.9	84.6	198
Lincoln County Hospital, Lincoln	0	0	100	73.9	93.3	94.6	93	470		0.6	0	100	100	97.4	97.3	97.3	908
Lister Hospital, Stevenage	5.9	50	50	0	63.2	93.8	90.9	407		11.7	100	100	60	76.2	88.1	87.1	411
Liverpool Heart and Chest Hospital, Liverpool	0	0	50	88	97.3	99	98.1	927		0.7	100	87.5	100	95.5	98.2	97.9	1038
London Chest Hospital, London	0.1	0	100		75	84.3	84	784		0	0	66.7	75	79.4	89.2	86.9	871
Luton & Dunstable Hospital, Luton	0.6	33.3	56.2	80	85	88.7	84	321		5.7	87.5	78.6	82.1	87.3	89.2	86.9	300
Macclesfield District General Hospital, Macclesfield	1.5	0	0	81.8	60.8	78.2	72.4	202		4.9	0		77.8	85	87.9	84.5	102
Maidstone Hospital, Maidstone	0	0				60	59.5	126		1.8				66.7	55.8	56.1	109

Manchester Royal Infirmary, Manchester	1.8	0	0	100	80.6	83.4	82.1	387	1.4	100	100	100	87.1	83.7	84.2	354
Manor Hospital, Walsall	0		25	60	68.6	59	60.7	122	6.5		33.3	60	61.1	50.6	52.6	124
Medway Maritime Hospital, Gillingham	0.3	0	20	75	62	90.9	83.4	309	1	0		62.5	65.2	86.3	81.4	309
Milton Keynes General Hospital, Milton Keynes	18.6	0		100		68.8	65.7	<50	32.7	50	0		100	66.7	64.9	55
Musgrove Park Hospital, Taunton	0.2	0	0	83.3	70.6	75.8	74.7	420	1.3	0	100	60	71.8	86.4	84.3	374
New Cross Hospital, Wolverhampton	0	0	75	77.2	87.4	89.1	87	884	0.8	60	100	98.7	97.9	99.3	98.7	914
Newham University Hospital, Greater London	0	0	0	62.5	86	80	77.9	149	3.8				0	51	50.3	157
Norfolk and Norwich University Hospital, Norwich	0	7.1	80	71.9	85.4	94.4	91.2	1177	0.3	100	100	94.9	99.2	99.6	99.3	1192
Northampton General Hospital, Northampton	0	0	73.7	70.6	87.7	93.1	86.3	454	0.9	100	100	96.8	100	99.5	99.3	443
North Devon District Hospital, Barnstaple	0	25	45.5	75.8	68.9	81.6	67.8	146	1.6	60	83.3	87.5	85.4	86.2	84.9	128
Northern General Hospital, Sheffield	3	10.6	91.7	96	91.2	96.8	84.8	788	4.5	88.2	92.6	100	97.4	97.2	97.1	872

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
North Manchester General Hospital, Manchester	0	0	100	77.8	82.5	95.3	90.6	181		2	100	100	100	100	97.7	98.5	199
North Middlesex Hospital, Greater London	5		0	100	0	46.7	42.1	<50		1	0			36.4	47.1	46.2	201
North Tyneside General Hospital, North Shields	1.1	0	0	75	86.2	87.8	77	88		6.7	25	100	80	84.2	61.1	66.3	89
Northwick Park Hospital, Greater London	0	5.9	0	33.3	59	57	53.8	314		5.2	100			33.3	55.7	55.5	270
Nottingham City Hospital, Nottingham	0.7		100	0	95	91.3	91.3	441		1			50	0	83.5	83.1	418
Papworth Hospital, Cambridge	0.4	100	75	81.2	88.4	85.5	85.7	686		0	16.7	75	83.3	87.9	91.7	90.2	687
Peterborough City Hospital, Peterborough	0	0	76.9	91.9	88.4	95.5	89.2	332		0.9	0	41.2	76.5	92.9	97.1	89.1	343
Pilgrim Hospital, Boston	3.3	0	0	75	69.6	66.3	65	121		7.1	100	100	92.3	100	79.2	88.6	113

Pinderfields General Hospital, Wakefield	12	0	25	54.5	53.2	46.7	47.9	482	8.1	0	75	85.7	79.5	82.7	81.7	445
Poole Hospital, Poole	0			100	100	66.7	75	<20	0		100		0	100	92.9	<20
Princess Alexandra Hospital, Harlow	3.3	0	50	91.7	85.2	93.8	89.2	210	6.8	0		0	66.7	61.6	59.8	88
Princess Royal Hospital, Haywards Heath	0	0		50	85.2	84.6	80.5	118	0		0	50	44.4	81.4	67.4	95
Princess Royal Hospital, Telford	0	0	55.6	71.4	87.3	89.5	82.2	191	4.5	100	95.2	96.9	96.2	93.5	95.3	200
Princess Royal University Hospital, Orpington	0				66.7	86.4	85.1	<50	0	0			40	73.1	65.6	<50
Queen Alexandra Hospital, Portsmouth	0.6	66.7	100	100	94.4	88.3	88.8	694	1.5	100	100	85.7	85.9	92.8	92	610
Queen Elizabeth Hospital, Birmingham	0		0	72.7	92.1	95.1	93.9	441	0.3	0		100	89.4	92.8	92	328
Queen Elizabeth Hospital, Gateshead	0.3		80	60	45.9	46.4	47.4	330	0		100	71.4	96.4	94.9	93.7	95
Queen Elizabeth Hospital, King's Lynn	0.4	16.7	50	56.8	79.2	72.9	70.3	240	5.2	83.3	100	100	92.9	85.9	91	211
Queen Elizabeth Hospital, Greater London	0	0	0	100	75	97.8	93.4	106	3.6	100	100	100	90	98.1	97	138

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Queen Elizabeth The Queen Mother Hospital, Margate	0	0	0	22.2	41	76.8	57.5	106		0		100	33.3	43.8	61.1	55.7	61
Queen's Hospital, Burton-on-Trent	2.9	0	85.7	50	73.1	71.4	68.7	69		3.9	75	100	93.3	90.5	84	89.8	102
Queen's Hospital, Greater London	0	0		0	65.5	88	80.3	142		2.1	0		44.4	70.8	81.9	76.8	189
Rotherham Hospital, Rotherham	0	0	75	75	84.5	97.4	92.2	283		0.7	100	100	95.7	96.8	98.4	97.9	285
Royal Albert Edward Infirmary, Wigan	0	0	50	44.4	81.6	92.5	88.4	439		0	100	100	84.6	98.4	99.6	98.9	350
Royal Berkshire Hospital, Reading	0	33.3	37.5	87.5	91.7	97.3	94.9	526		0.9	0	50	81	89.1	95.5	93.3	450
Royal Blackburn Hospital, Blackburn	0	0	77.8	56.7	75.5	81.3	78.2	692		1.5	100	88.2	94.4	83.9	88.6	88	600

Royal Bolton Hospital, Bolton	0	0	100	76.9	86.4	92.6	88.9	407	4.6	0	100	93.8	90.3	98.1	95.5	303
Royal Bournemouth General Hospital, Bournemouth	0		60	93.1	89.4	87.6	88.1	503	0	0	100	85.7	92.3	93	92.5	668
Royal Brompton Hospital, London	0.6			75	66.7	72	72	169	0				100	68.7	69	184
Royal Cornwall Hospital, Truro	1.2	28.6	75	77.4	91.4	95	91.4	720	1.2	80	85.7	81.8	89.4	86.9	87	769
Royal Derby Hospital, Derby	20.5		50	100	100	92.9	92.9	302	13.7			100	100	90.6	91	453
Royal Devon & Exeter Hospital, Exeter	0.2	33.3	50	100	83.1	96	93.8	449	0	100	50	92.9	98.7	93.4	94.1	408
Royal Free Hospital, London	0.2	0			0	67	66.1	437	1.9	100	100	98.3	100	98.8	99.1	462
Royal Hampshire County Hospital, Winchester	1.1	0	33.3	92.3	81.8	78.1	76.7	87	4.8	100	100	90	100	100	98.3	63
Royal Lancaster Infirmary, Lancaster	0.8			100	100	87.6	89.1	120	7.8		100		83.3	92.7	91.6	103
Royal Liverpool University Hospital, Liverpool	0	0		28.6	36.2	45.9	40	150	4.2	100	100	92.3	76.3	85.4	84.1	144
Royal London Hospital, London	0	0					0	<20	No data							

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Royal Oldham Hospital, Oldham	0	66.7	50	60.9	83.7	94.1	86.9	429		0.7	71.4	94.4	79.4	94.2	96.6	94.2	431
Royal Preston Hospital, Preston	0				75	69.5	70	90		3.6				50	72	70.4	56
Royal Shrewsbury Hospital, Shrewsbury	0	16.7	72.2	56.8	69.9	88.1	73.4	282		3.8	100	96.7	93.2	96.5	98.2	96.8	292
Royal Surrey County Hospital, Guildford	0			100	75	71	73.2	<50		8.5		0	33.3	87.5	77.4	74.4	<50
Royal Sussex County Hospital, Brighton	0	0	66.7	68.8	81	88.1	85.6	478		0	100	37.5	57.1	70.5	93.2	86.8	500
Royal United Hospital Bath, Bath	40.8	100	0	75	61.5	65.3	64.9	284		12.6	100	100	75	81.6	80.2	80.7	350
Royal Victoria Infirmary, Newcastle	0		100	100	84.2	81.8	84.2	57		3.7	100	66.7	81.8	100	97.7	94.9	81
Russells Hall Hospital, Dudley	0.7	0	0	41.7	68.3	73.3	67.8	147		2.3	100	83.3	90.5	94.1	92.2	92.1	129

Salford Royal Hospital, Salford	0	9.1	66.7	59.3	75.8	82.1	76.3	372	1	75	75	95.2	89.3	97.4	94.3	301
Salisbury District Hospital, Salisbury	0		75	75	94.2	97	95.1	288	1.8	100	100	100	98.4	99	98.9	280
Sandwell General Hospital, West Bromwich	0	0	50	84.6	95.2	98.9	96.5	259	0.3	100	100	100	100	99.6	99.7	334
Scarborough General Hospital, Scarborough	This hospital did not provide any data since 2011/2012								No data since 2011/12							
Scunthorpe General Hospital, Scunthorpe	0.9	0			0	58.4	57.4	116								3.6
Solihull Hospital, Solihull	0	0		100	75	91.2	88.9	63	1.6				100	84.3	87.1	63
Southampton General Hospital, Southampton	0.3	0	100	76.9	69	85	82.6	690	0.6	33.3	100	73.1	86.6	88.6	87.5	691
Southend University Hospital, Westcliffe-on-Sea	0	14.3	45.5	47.5	78.1	84.2	75.8	368	0	0	35.7	54.2	78.8	88.1	74.1	355
Southmead Hospital, Bristol	0	50	50	53.6	70.9	76.2	70.7	225	1.6	33.3	100	94.7	91.8	94.7	93	190
Southport and Formby District General Hospital, Southport	0	20	100	66.7	93.3	95.2	84.4	<50	8.1			100	84.6	84.2	85.3	<50

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
South Tyneside District Hospital, South Shields	1.8	50	40	52.4	80.9	85.9	76.6	170		3.3	66.7	100	91.7	84.6	86	86.3	121
Stafford Hospital, Stafford	0			100	77.8	67.7	70.7	82		1.4			100	57.1	53.4	54.8	74
Stepping Hill Hospital, Stockport	0.5	8.3	41.2	47.7	55.9	70.9	63.5	763		4.2	60	57.9	74.3	80.4	81.2	79.3	672
St George's Hospital, Greater London	1.4					84.6	84.6	501		1	100		100	93.5	99.6	99	515
St Helier Hospital, Greater London	5.1	100	100	100	88.9	92.1	92.9	59		21.5	0	100	100	75	50.9	54.8	79
St Mary's Hospital (Newport), Newport	0	0	100	46.7	91.7	77.8	73.3	60		0	100	88.9	96.3	100	93.3	95.9	74
St Mary's Hospital (Paddington), London	0					40	40	<20									<20
Stoke Mandeville Hospital, Aylesbury	87.5			100			100	<20		50					33.3	33.3	<20

St Peter's Hospital, Chertsey	0		16.7	64.3	88.2	96.2	91.9	310	0			100	100	99.4	99.5	212
St Richard's Hospital, Chichester	1		0	25	47.4	45.9	44.9	99	0.9	0	0	50	54.5	57.3	55.2	117
St Thomas' Hospital, London	0	0	100	90	94.4	96.3	94.9	313	0	100	100	93.3	97.1	99.2	98.5	342
Sunderland Royal Hospital, Sunderland	0			25	82.2	93.1	89.5	209	3.4	33.3	83.3	77.4	78.5		77.8	205
Tameside General Hospital, Ashton Under Lyne	1.4	0	100	63.2	73.9	81	77	348	3.7	100	100	90.5	84.4	83.6	84.6	296
Torbay Hospital, Torquay	0		50	88.2	88.6	90.4	89.6	442	0.7	100	100	84	83.7	93.2	90.7	435
Trafford General Hospital, Manchester	0					64.7	64.7	<20	0				100	100	100	<50
Tunbridge Wells Hospital, Tunbridge Wells	0	0	0	50	60	48.9	49.7	155	2.4	100	50	33.3	52.9	57.2	56.4	167
University College Hospital, London	1.5	0	0	50	33.3	71.7	59.4	65	4	0	50		93.8	96.3	87.5	50
University College Hospital [Heart Hospital], London	0	0	100	66.7	82.1	93.8	89.4	216	1.5	0	0	83.3	80.6	88	85.3	262
University Hospital Aintree, Liverpool	0	20	50	46.5	65.4	88.3	71.1	280	4.2	100	100	94.7	94	93.7	94.6	213

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
University Hospital Coventry, Coventry	0.7	0	100	100	90	94	93.6	457		3.1			100	84.6	86.8	86.9	425
University Hospital Lewisham, London	0	0	100	100	80	84.3	82.3	96		2.6	100		100	96.6	90.9	92.9	116
University Hospital of Hartlepool, Hartlepool	0	0	0	62.5	68	76.2	67.2	64		5		100	100	100	87.5	94.7	<50
University Hospital of North Durham, Durham	0	0	0	45.5	56.9	57.8	56.1	180		0.6	100	80	76.7	71.4	81.9	77.9	164
University Hospital of North Staffordshire, Stoke-on-Trent	0	0	100	50	73.4	79.1	77.9	1130		0.3	0	100		75.2	75.8	75.6	1055
University Hospital of North Tees, Stockton-on-Tees	0	0	0	38.5	82.6	72.5	66.2	80		3.2	100	100	94.4	87.5	92.9	92.5	124
University Hospital Queen's Medical Centre, Nottingham	0		100	100	71.4	70	75	<50		0	100		0	87.5	90.9	87	<50

Wansbeck General Hospital, Ashington	0	0		60	82.6	98.4	90.2	92	9.2	0	33.3	100	84	93.3	87	76
Warrington Hospital, Warrington	0.5	0	100	77.3	79.4	82.3	80.1	187	0	100	100	95.8	98.5	95	96.6	207
Warwick Hospital, Warwick	0			33.3	100	70.6	69.6	<50	NO DATA							
Watford General Hospital, Watford	0.9	0	0	50	71	85.8	80	323	3.3	100	100	93.8	84.1	84.8	85.6	366
West Cumberland Hospital, Whitehaven	0	0	0	33.3	83.3	68.8	66	50	7.5		100	66.7	86.7	44.4	64.9	<50
West Middlesex University Hospital, Greater London	1.2			50	76.9	62.1	64.2	82	0			100	90	78.9	80.5	87
Weston General Hospital, Weston-super-Mare	0		100	72.7	96.7	95.8	93.9	115	0		100	85.7	92.3	86.2	87.9	99
West Suffolk Hospital, Bury St Edmunds	0.9	0	0	44.4	66.7	50.9	52.3	108	7.6		100	88.2	79.5	75	79.8	118
Wexham Park Hospital, Slough	0		100	57.1	91.2	87.7	87.4	261	0				33.3	57.4	56.3	142
Whipps Cross Hospital, Greater London	3.1	0	75	85.7	77.3	92.8	86	162	0		50	80	77.8	74.5	75.6	86
Whiston Hospital, Prescot	0	0	0	86.4	83.3	83.9	79.7	237	6.1	50	100	95.8	93.2	92.1	92.3	179
Whittington Hospital, London	0		100	100	37.5	89	84.5	84	10	100			75	84.7	84	90

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
William Harvey Hospital, Ashford	0	0	0	81.6	87.7	93.3	90.8	729		1	0	71.4	78.4	89.3	91.2	89.6	779
Worcestershire Royal Hospital, Worcester	1.1		100	100	100	98.7	98.9	180		8.7	0	50	80	84	98.3	95.8	287
Worthing Hospital, Worthing	1.5	0	33.3	65.2	82.5	88.3	82.6	198		3	100	96.7	93.3	94.6	90.3	92.9	232
Wycombe Hospital, High Wycombe	0.5	50		66.7	93.1	91.7	91.2	216		3.4	0	66.7	40	87.5	95.5	92.5	208
Wythenshawe Hospital, Manchester	0	0	0	80	64.1	91.4	88.7	547		2.5		0	75	100	97.9	97.5	366
Yeovil District Hospital, Yeovil	0	100	60	84	72.9	56.7	65.3	176		0.8			0	20	31.5	29.4	127
York District Hospital, York	0.2	50	85.7	84.6	84.7	94.2	90.8	438		0.2	100	96.3	86.5	86	86.8	87.4	413
Wales	**1.8**	**9.1**	**33.3**	**61.1**	**61.4**	**77.9**	**72.6**	**2053**		**20.9**	**86.7**	**62.8**	**81.2**	**80.3**	**70.1**	**73.2**	**2067**
Bronglais General Hospital, Aberystwyth	7.7		0		25	57.1	41.7	<20		NO DATA							

Glan Clwyd Hospital, Rhyl	0.9	0	0	0	42.4	65.6	62.5	328	4.1		100	80	82.6	75.2	76.5	169
Glangwili General Hospital, Carmarthen	23.8			0	33.3	35.7	34.4	<50	42.1			0	33.3	42.9	36.4	<20
Llandough Hospital, Llandough	0	0		25	51.6	57.1	49.2	61	5.4	100	0	70	63.6	81.8	71.4	<50
Morriston Hospital, Swansea	3.4	25		100	81.8	91.2	88.8	267	61.5	60	18.2	82.6	79.5	1.4	26.5	597
Nevill Hall Hospital, Abergavenny	0	25	33.3	40	57.7	76.6	64.7	85	6.5	100	100	80	62.5	82	76.5	123
Prince Charles Hospital, Merthyr Tydfil	12.9	0		0	75	71.4	66.7	<50	10.6				83.3	61.1	64.3	<50
Prince Philip Hospital, Llanelli	29.6				0	27.8	26.3	<50	20			0		28.6	25	<20
Princess of Wales Hospital, Bridgend	0	0			50	82.9	78.3	<50	3.4			0	100	84.6	82.1	<50
Royal Glamorgan Hospital, Llantrisant	0				57.1	84.2	76.9	<50	25					66.7	66.7	<20
Royal Gwent Hospital, Newport	0	0	75	77.4	70.8	92.6	83.6	353	3.2	100	100	89.7	92.4	90.8	91.6	343
Singleton Hospital, Swansea	0				100	100	100	<20	0				0	100	50	<20
University Hospital of Wales, Cardiff	0.2	0	0	66.7	69.1	81.1	77.8	582	1	100	71.4	85.2	76.4	82.3	81.1	518

	Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication		Proportion of all patients who were **not** eligible to receive any secondary prevention medication	Proportion of patients who were eligible for **one** secondary prevention medication who received it	Proportion of patients who were eligible for **two** secondary prevention medications who received them	Proportion of patients who were eligible for **three** secondary prevention medications who received them	Proportion of patients who were eligible for **four** secondary prevention medications who received them	Proportion of patients who were eligible for **five** secondary prevention medications who received them	Proportion of patients who received **all** secondary prevention medications for which they were eligible	Number of all patients eligible to receive secondary prevention medication
Year	2012/13									2013/14							
	None	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)	All (%)	N		None	1	2	3	4	5	All	N
Withybush General Hospital, Haverfordwest	0	0		53.8	63.6	70.6	62.3	53		13.3	100	40	100	90	78.6	82.1	<50
Wrexham Maelor Hospital, Wrexham	0	0	25	69.2	45.9	54.4	50.4	127		6.4	100	75	72.2	89.7	83.3	83	94
Ysbyty Gwynedd, Bangor	12.5				50	60	57.1	<20		7.7					54.2	54.2	<50
Belfast	**0.2**	**0**	**40**	**72.7**	**80.9**	**95.6**	**90.9**	**528**		**4.4**	**100**	**100**	**98.1**	**91.8**	**94**	**94**	**544**
Belfast City Hospital, Belfast	0			100	90.3	94.8	93.6	94		0.8	100	100	100	93.1	93.1	94.5	128
Mater Infirmorum Hospital, Belfast	1		100	66.7	64.3	92.5	87.8	99		0.8			80	64.7	93	88.5	123
Royal Victoria Hospital, Belfast	0	0	25	64.3	80	96.8	91	335		7.5	100	100	100	98.4	94.9	96.3	293

"MINAP has been a major driving force in improving services for people who have suffered heart attacks across the country...it reflects a professional approach to practice that goes beyond the immediate care of an individual patient, to include a readiness to describe and understand variations in care between hospitals... and promotes best and improved practice."

Professor Huon Gray
National Clinical Director (Cardiac),
NHS England and Consultant Cardiologist,
Southampton University Hospital

Table 7: Care of patients with nSTEMI in England, Wales and Belfast

It is known that not all nSTEMI patients are entered into the MINAP database. A number of hospitals report that they lack resources to enter data on nSTEMI patients. More generally, patients not admitted to a cardiac unit are less likely to be reported to MINAP. Thus, the percentages reported in the following table do not, in every case, reliably capture the total number of nSTEMI patients admitted to a hospital, but only reflect those records entered into the MINAP database.

Many patients undergo angiography during the index admission (i.e., before discharge). Others are discharged with a plan that they be readmitted later for angiography. Moreover, not all patients with nSTEMI are suitable, or eligible, for angiography. In presenting the proportion who have angiography, the denominator includes only patients who are judged to be eligible and who agree to undergo the procedure.

Statistical Disclosure Control: The total number of records for analyses with fewer than 20 eligible records has been replaced with the notation '<20'. Statistics for such hospitals are not presented. Hospitals with fewer than 20 records in both years are excluded from this table.

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
England & Wales	**93.2**	**48082**	**53**	**48082**	**72.9**	**41107**	**75.5**	**41107**		**93.8**	**48135**	**56**	**48135**	**78**	**40417**	**80.3**	**40417**
England	**93.7**	**45938**	**52.6**	**45938**	**72.6**	**39499**	**75.3**	**39499**		**94.3**	**45910**	**55.6**	**45910**	**77.9**	**38676**	**80.3**	**38676**
Addenbrooke's Hospital, Cambridge	70.2	369	60.4	369	50.2	327	58.7	327		86.1	373	55.2	373	50.5	303	59.4	303
Airedale General Hospital, Keighley	99.5	212	39.6	212	53.6	211	69.2	211		99.2	131	38.2	131	61.8	131	71	131

Alexandra Hospital, Redditch	98.3	178	23	178	76.6	175	80	175	99.3	147	12.2	147	73.2	138	77.5	138
Arrowe Park Hospital, Wirral	93.5	338	73.1	338	72.7	238	73.9	238	95.5	309	78	309	65.5	284	65.8	284
Barnet General Hospital, Greater London	96.2	264	71.6	264	64.3	255	67.1	255	95.9	270	77.8	270	72.3	264	74.6	264
Barnsley Hospital, Barnsley	100	88	98.9	88	64.1	78	69.2	78	100	180	59.4	180	56.7	157	61.1	157
Basildon Hospital, Basildon	99.6	284	82	284	60.3	252	61.1	252	99.6	276	77.9	276	66	253	66.8	253
Basingstoke and North Hampshire Hospital, Basingstoke	98.6	73	93.2	73	85.9	71	85.9	71	100	60	93.3	60	62.5	56	62.5	56
Bassetlaw Hospital, Worksop	76.6	158	59.5	158	89.3	75	98.7	75	84.1	170	61.2	170	84.5	116	90.5	116
Bedford Hospital, Bedford	98.9	93	94.6	93	97.5	80	98.8	80	97.8	90	83.3	90	91.4	81	91.4	81
Birmingham City Hospital, Birmingham	100	202	56.9	202	95	181	96.7	181	99.6	226	82.7	226	99	203	99.5	203
Birmingham Heartlands Hospital, Birmingham	98.8	493	76.7	493	97.8	492	97.8	492	99.4	527	79.9	527	97.5	521	97.5	521
Blackpool Victoria Hospital, Blackpool	88.9	578	25.8	578	63	557	64.3	557	93.1	609	29.2	609	66	586	66.2	586
Bradford Royal Infirmary, Bradford	97.9	375	56.5	375	68.9	312	74.7	312	90.5	462	46.5	462	72.4	380	75.3	380
Bristol Royal Infirmary, Bristol	94.1	205	46.3	205	86.2	174	86.8	174	99.4	168	58.9	168	92.6	149	94	149

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Broomfield Hospital, Chelmsford	94.6	408	12	408	68.7	348	69.5	348		94	364	16.5	364	69.4	317	70.7	317
Calderdale Royal Hospital, Halifax	91.4	348	38.8	348	96.8	221	96.8	221		96.9	292	42.5	292	98.6	211	99.1	211
Castle Hill Hospital, Cottingham	97.9	419	91.4	419	98.7	318	98.7	318		97.9	514	91.6	514	95.7	414	96.6	414
Central Middlesex Hospital, Greater London	100	49	2	49	62.5	48	62.5	48		100	45	53.3	45	62.8	43	62.8	43
Charing Cross Hospital, London	96.3	27	59.3	27	88.9	27	88.9	27		100	35	94.3	35	100	35	100	35
Chelsea and Westminster Hospital, London	100	55	0	55	86.5	52	88.5	52		98.3	59	0	59	83.3	54	88.9	54
Cheltenham General Hospital, Cheltenham	81.2	101	40.6	101	95.2	63	95.2	63		76.9	39	38.5	39	93.3	30	93.3	30
Chesterfield Royal Hospital, Chesterfield	96.9	356	31.5	356	7.9	342	39.5	342		98.9	378	30.7	378	11.6	293	53.9	293

Chorley and South Ribble Hospital, Chorley	91.3	69	26.1	69	61.2	49	81.6	49	91.1	90	31.1	90	50.7	69	69.6	69
Colchester General Hospital, Colchester	91	354	78.8	354	98.1	216	99.1	216	96.1	306	72.2	306	98.5	198	99	198
Conquest Hospital, St Leonards on Sea	96	200	72.5	200	59.7	191	62.8	191	95	180	49.4	180	63	173	63.6	173
Countess of Chester Hospital, Chester	96	302	30.1	302	93.9	179	95.5	179	96.3	270	23.7	270	90.4	156	92.9	156
County Hospital Hereford, Hereford	92.1	101	32.7	101	79.6	98	79.6	98	97.2	107	50.5	107	76.7	103	76.7	103
Croydon University Hospital, Greater London	100	174	100	174	87.7	162	88.9	162	100	175	100	175	88.5	174	89.1	174
Cumberland Infirmary, Carlisle	85.2	317	29.3	317	90.2	204	91.7	204	89.7	350	28.3	350	96.3	243	98.4	243
Darent Valley Hospital, Dartford	98.5	332	63.9	332	66.8	319	67.7	319	97.3	331	54.1	331	66.4	330	66.4	330
Darlington Memorial Hospital, Darlington	97.3	110	46.4	110	98.7	75	98.7	75	97.7	174	43.1	174	87.1	140	88.6	140
Derriford Hospital, Plymouth	91.3	23	8.7	23	87	23	87	23	4.2	24	0	24	91.7	24	91.7	24
Dewsbury District Hospital, Deswbury	82.1	279	38.7	279	54.1	268	54.9	268	85.5	248	35.9	248	56.7	238	57.6	238
Diana, Princess of Wales Hospital, Grimsby	98.9	183	42.1	183	59.1	181	60.2	181	100	193	50.3	193	75.5	192	78.6	192

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Doncaster Royal Infirmary, Doncaster	84.2	265	33.2	265	97.5	121	100	121		83.5	255	36.5	255	98	148	99.3	148
Dorset County Hospital, Dorchester	98.7	158	32.9	158	89.3	149	89.9	149		94.3	174	56.9	174	94.3	158	96.2	158
Ealing Hospital, Greater London	98.7	152	57.2	152	91.4	128	96.9	128		100	144	90.3	144	81.5	130	90	130
Eastbourne District General Hospital, Eastbourne	95.7	208	89.4	208	28.5	200	29	200		84.1	195	76.9	195	16.8	190	18.9	190
East Surrey Hospital, Redhill	91.7	230	25.7	230	97.3	150	98	150		97.8	232	47.8	232	97.5	160	99.4	160
Epsom Hospital, Greater London	100	93	72	93	63.7	91	63.7	91		93.9	114	47.4	114	59.6	89	78.7	89
Fairfield General Hospital, Bury	93.2	336	14.3	336	64.4	312	64.7	312		93.5	401	16.7	401	77	317	77.3	317
Freeman Hospital, Newcastle	100	774	97.9	774	99.9	771	99.9	771		100	848	97.3	848	100	845	100	845

Frenchay Hospital, Bristol	86.2	412	25	412	80.9	188	81.4	188	92.1	330	30.9	330	95.1	143	95.1	143
Frimley Park Hospital, Frimley	96.1	406	29.1	406	85.1	315	87.9	315	98	403	44.4	403	91.8	328	93.3	328
Furness General Hospital, Barrow-in-Furness	64.6	65	35.4	65	47.5	61	49.2	61	67.9	81	46.9	81	82.2	73	86.3	73
George Eliot Hospital, Nuneaton	96.5	115	40	115	84.3	70	88.6	70	100	46	34.8	46	100	41	100	41
Glenfield Hospital, Leicester	99.8	430	69.8	430	85.6	403	85.9	403	99.7	399	49.1	399	83.4	373	83.6	373
Gloucestershire Royal Hospital, Gloucester	84.7	111	67.6	111	81.7	82	81.7	82	97	67	67.2	67	85.7	49	85.7	49
Good Hope Hospital, Sutton Coldfield	100	236	22.9	236	98	197	98.5	197	100	281	47.3	281	100	225	100	225
Grantham and District Hospital, Grantham	99.5	210	64.3	210	86.2	145	86.9	145	98.4	123	63.4	123	93.8	81	93.8	81
Great Western Hospital, Swindon	88.2	400	37	400	70.5	349	70.8	349	87.4	404	33.4	404	94.3	261	94.6	261
Hammersmith Hospital, London	100	302	84.8	302	99.7	301	99.7	301	100	381	100	381	100	381	100	381
Harefield Hospital, Harefield	92.1	368	93.8	368	93.8	354	93.8	354	93.2	279	98.2	279	93.6	233	94	233
Harrogate District Hospital, Harrogate	93.9	214	92.5	214	64.5	121	97.5	121	91.4	210	89.5	210	83.3	114	99.1	114
Hexham General Hospital, Hexham	38.8	49	2	49	97.1	35	97.1	35	43.2	37	0	37	100	29	100	29

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Hillingdon Hospital, Greater London	91.6	369	68.3	369	49.4	362	57.5	362		89.5	324	61.7	324	70.7	287	74.9	287
Hinchingbrooke Hospital, Huntingdon	97.9	48	81.2	48	68.2	44	70.5	44		96.6	59	44.1	59	72	50	78	50
Homerton University Hospital, London	97.1	35	68.6	35	62.5	32	68.8	32		84	25	20	25	79.2	24	91.7	24
Horton General Hospital, Banbury	59.8	87	12.6	87	55.2	87	55.2	87		81.2	96	11.5	96	63.5	96	63.5	96
Huddersfield Royal Infirmary, Huddersfield	92.4	291	21.3	291	96.6	178	98.9	178		91.9	283	24.7	283	96.3	162	98.1	162
Hull Royal Infirmary, Hull	77.1	70	10	70		<20		<20		75.5	102	10.8	102		<20		<20
Ipswich Hospital, Ipswich	93.3	550	64	550	66.4	408	72.5	408		97.7	440	60.7	440	61.2	387	64.9	387
James Cook University Hospital, Middlesbrough	100	149	90.6	149	86	143	86	143		99.6	720	94.3	720	93.3	717	93.3	717

James Paget University Hospital, Great Yarmouth	100	218	87.6	218	74	204	76.5	204	99.5	219	83.1	219	94.3	158	98.1	158
John Radcliffe Hospital, Oxford	87.8	312	30.8	312	65.8	310	65.8	310	88.6	324	28.1	324	63.6	324	63.6	324
Kent and Canterbury Hospital, Canterbury	79.3	169	75.1	169	23.7	169	53.8	169	90.3	103	79.6	103	3.9	103	58.3	103
Kettering General Hospital, Kettering	98.8	246	79.7	246	95.4	195	97.9	195	99.5	214	79.9	214	98.8	163	99.4	163
King George Hospital, Greater London	97.8	134	94.8	134	74.4	133	74.4	133	79.1	86	75.6	86	82.1	84	82.1	84
King's College Hospital, London	96.3	269	42	269	90.2	204	91.2	204	91.4	338	52.4	338	97.9	233	97.9	233
King's Mill Hospital, Sutton-in-Ashfield	99.6	263	12.2	263	90.8	261	90.8	261	100	244	11.5	244	95.5	243	95.9	243
Kingston Hospital, Greater London	86.1	151	1.3	151	39.7	121	43	121	88.4	155	1.3	155	71.4	98	75.5	98
Leeds General Infirmary, Leeds	99.4	660	96.5	660	77.2	637	77.6	637	100	747	96.7	747	79.5	723	79.7	723
Leighton Hospital, Crewe	87.2	297	48.5	297	67.1	283	67.5	283	93.6	264	53.4	264	75.3	235	75.3	235
Lincoln County Hospital, Lincoln	98.2	277	41.9	277	80.2	243	81.9	243	96.6	506	58.1	506	89.1	457	89.3	457
Lister Hospital, Stevenage	95.1	366	71.3	366	66.9	357	67.5	357	96.4	362	70.2	362	66	350	67.4	350
Liverpool Heart and Chest Hospital, Liverpool		<20		<20		<20		<20	99.4	160	79.4	160	94.2	156	94.2	156

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
London Chest Hospital, London	100	189	100	189	62	150	63.3	150		100	279	94.6	279	53.3	227	54.2	227
Luton & Dunstable Hospital, Luton	98.9	644	8.2	644	50.2	632	51.7	632		99.6	472	9.3	472	90.3	259	92.3	259
Macclesfield District General Hospital, Macclesfield	93.9	231	32.9	231	90.8	119	93.3	119		92.4	119	40.3	119	76	100	76	100
Maidstone Hospital, Maidstone	99.2	130	42.3	130	65.6	122	65.6	122		97.4	116	41.4	116	68.7	115	70.4	115
Manchester Royal Infirmary, Manchester	100	155	5.2	155	82.4	142	84.5	142		100	104	27.9	104	89.4	94	89.4	94
Manor Hospital, Walsall	95.3	211	50.7	211	77	152	80.3	152		92.7	179	52.5	179	73.5	117	82.9	117
Medway Maritime Hospital, Gillingham	88.9	333	19.8	333	77.2	197	85.8	197		87.9	307	33.2	307	79.1	187	88.2	187
Milton Keynes General Hospital, Milton Keynes	93.5	31	71	31	61.5	26	61.5	26		98.1	52	67.3	52	74.4	43	79.1	43

Musgrove Park Hospital, Taunton	93.1	231	81.4	231	52.9	223	54.3	223	95.2	207	78.7	207	71.6	176	71.6	176
New Cross Hospital, Wolverhampton	100	283	23	283	81.9	281	82.2	281	100	306	22.5	306	89	300	89	300
Newham University Hospital, Greater London	99.4	162	99.4	162	95.7	116	99.1	116	98.4	191	97.4	191	62.6	182	64.8	182
Norfolk and Norwich University Hospital, Norwich	100	695	73.1	695	81	695	81	695	100	767	58.3	767	79	767	79	767
Northampton General Hospital, Northampton	94.2	499	70.7	499	55.4	484	55.8	484	94.4	501	74.9	501	62.3	486	62.8	486
North Devon District Hospital, Barnstaple	87.7	334	58.4	334	79	248	83.1	248	98	295	60.7	295	81	221	85.5	221
Northern General Hospital, Sheffield	98.9	440	71.8	440	66.5	439	66.5	439	93.5	527	60.7	527	63.3	523	63.3	523
North Manchester General Hospital, Manchester	98.3	173	28.3	173	94.7	132	94.7	132	97.5	200	29.5	200	92.3	156	92.3	156
North Middlesex Hospital, Greater London	77.3	22	0	22		<20		<20	95.1	243	2.5	243	66.7	198	70.2	198
North Tyneside General Hospital, North Shields	84.7	235	33.6	235	71.2	198	71.2	198	92.2	243	27.6	243	90.5	168	92.9	168
Northwick Park Hospital, Greater London	100	305	1	305	77.2	302	77.5	302	98.2	278	67.6	278	73.6	273	74	273
Nottingham City Hospital, Nottingham		<20		<20		<20		<20								<20?

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Papworth Hospital, Cambridge		<20		<20		<20		<20									<20?
Peterborough City Hospital, Peterborough	94.2	411	63	411	26.4	394	60.2	394		93.9	461	58.1	461	33.7	457	58.2	457
Pilgrim Hospital, Boston	95.8	353	40.8	353	75.3	271	76.8	271		92.4	291	43	291	74.6	228	76.3	228
Pinderfields General Hospital, Wakefield	86.4	435	17.5	435	58.9	419	58.9	419		77.9	430	15.3	430	60.4	409	60.4	409
Poole Hospital, Poole	98.2	112	97.3	112	92.1	101	92.1	101		99.4	160	94.4	160	96	149	96.6	149
Princess Alexandra Hospital, Harlow	96	253	13.4	253	68.6	239	71.5	239		83.7	92	39.1	92	85.7	56	87.5	56
Princess Royal Hospital, Haywards Heath	93.7	95	88.4	95	72.8	92	73.9	92		91	78	91	78	66.7	78	66.7	78
Princess Royal Hospital, Telford	88.5	296	22	296	59.2	277	61	277		88.2	280	40.4	280	92.7	177	93.8	177

Princess Royal University Hospital, Orpington	98.3	60	30	60	81	58	89.7	58	100	36	36.1	36	81.2	32	93.8	32
Queen Alexandra Hospital, Portsmouth	100	307	18.6	307	81.8	307	81.8	307	99.6	237	64.1	237	82.7	237	82.7	237
Queen Elizabeth Hospital, Birmingham	100	152	62.5	152	87.6	129	87.6	129	97	135	57.8	135	80.3	127	80.3	127
Queen Elizabeth Hospital, Gateshead	100	327	75.5	327	44.4	322	44.4	322	98.6	222	64.4	222	84.2	221	84.2	221
Queen Elizabeth Hospital, King's Lynn	84.5	503	4.4	503	89.4	255	96.9	255	86.3	476	4.4	476	83.1	290	88.3	290
Queen Elizabeth Hospital, Greater London	94.7	113	10.6	113	90.2	102	90.2	102	86.6	157	21.7	157	79.4	131	79.4	131
Queen Elizabeth The Queen Mother Hospital, Margate	75.7	169	56.8	169	49.1	169	58.6	169	79.7	123	73.2	123	31.7	123	72.4	123
Queen's Hospital, Burton-on-Trent	94.6	184	87.5	184	93.3	120	100	120	95.5	177	94.4	177	96.6	116	99.1	116
Queen's Hospital, Greater London	97.9	188	87.8	188	79.4	180	80	180	92	251	51.4	251	76.8	237	76.8	237
Rotherham Hospital, Rotherham	97.3	223	89.2	223	79.8	124	100	124	99.6	243	96.3	243	89.4	142	100	142
Royal Albert Edward Infirmary, Wigan	99.8	437	88.8	437	54.8	396	57.6	396	99.7	356	85.7	356	53.5	344	56.4	344
Royal Berkshire Hospital, Reading	98.2	327	68.2	327	73.8	302	74.2	302	96.6	294	64.3	294	75.6	270	76.7	270

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Royal Blackburn Hospital, Blackburn	85.1	752	50.3	752	61	735	62.3	735		88.1	649	55.3	649	66.5	618	67.2	618
Royal Bolton Hospital, Bolton	99	309	31.4	309	80.7	207	84.1	207		100	253	64.8	253	94.1	185	96.2	185
Royal Bournemouth General Hospital, Bournemouth	98.8	242	97.5	242	90.1	212	90.1	212		96.5	347	98	347	93.8	321	93.8	321
Royal Brompton Hospital, London	90.6	159	57.2	159	99.3	146	99.3	146		95	161	83.2	161	100	155	100	155
Royal Cornwall Hospital, Truro	85.2	588	31.5	588	93.6	388	94.1	388		87.9	710	27.5	710	93.3	493	94.5	493
Royal Derby Hospital, Derby		<20		<20		<20		<20		96.7	181	92.3	181	99.4	181	99.4	181
Royal Devon & Exeter Hospital, Exeter	95.7	187	35.8	187	97	164	97.6	164		97.5	161	37.3	161	97.9	141	97.9	141
Royal Free Hospital, London	99.4	315	53	315	100	259	100	259		99.4	310	66.8	310	100	287	100	287

Royal Hampshire County Hospital, Winchester	97.7	172	1.2	172	47	168	48.2	168	95.7	117	0	117	54	113	56.6	113
Royal Lancaster Infirmary, Lancaster	99.4	164	42.7	164	80.6	144	84	144	100	197	42.1	197	94	167	94.6	167
Royal Liverpool University Hospital, Liverpool	96.9	261	73.6	261	65.7	245	70.2	245	97	268	67.9	268	63.3	259	65.3	259
Royal London Hospital, London		<20		<20		<20		<20	No data							
Royal Oldham Hospital, Oldham	95.4	392	11.2	392	50.9	352	51.7	352	97.7	397	9.6	397	45	318	46.2	318
Royal Preston Hospital, Preston	89.5	105	18.1	105	61.1	72	93.1	72	85.9	78	24.4	78	51.7	60	75	60
Royal Shrewsbury Hospital, Shrewsbury	85.2	433	24.9	433	44.1	395	46.1	395	88.1	394	46.4	394	92.2	204	93.1	204
Royal Surrey County Hospital, Guildford	98.8	81	55.6	81	68.8	77	72.7	77	94.3	70	25.7	70	64.1	64	68.8	64
Royal Sussex County Hospital, Brighton	97.4	151	44.4	151	73.6	144	75	144	94.8	153	51.6	153	65.5	148	67.6	148
Royal United Hospital Bath, Bath	64.1	231	42.9	231	57.8	206	58.3	206	69.1	269	24.5	269	67.9	193	67.9	193
Royal Victoria Infirmary, Newcastle	98.8	247	22.3	247	86.8	235	87.2	235	99.3	292	91.1	292	92.1	242	93	242
Russells Hall Hospital, Dudley	100	239	98.3	239	60.1	233	63.1	233	100	212	94.8	212	56.6	205	58.5	205
Salford Royal Hospital, Salford	94	364	63.7	364	94.8	193	99.5	193	89.8	304	55.3	304	95.6	182	97.3	182

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Salisbury District Hospital, Salisbury	100	293	96.6	293	72.8	276	73.6	276		100	259	96.5	259	79.8	247	81.4	247
Sandwell General Hospital, West Bromwich	100	163	59.5	163	97.9	141	97.9	141		99.6	231	89.2	231	99.5	210	100	210
Scarborough General Hospital, Scarborough	No data									No data							
Scunthorpe General Hospital, Scunthorpe	98.3	116	12.9	116	78.8	113	79.6	113		89.1	138	15.9	138	38.3	115	43.5	115
Solihull Hospital, Solihull	100	119	58	119	92.4	119	92.4	119		98.6	143	60.8	143	90.1	142	90.1	142
Southampton General Hospital, Southampton	99.5	414	85.7	414	77.5	414	78	414		99.5	430	86.3	430	72.6	430	72.8	430
Southend University Hospital, Westcliffe-on-Sea	95.9	367	82	367	54	363	55.1	363		92.4	367	71.4	367	98.9	177	100	177

Southmead Hospital, Bristol	73.8	263	19.8	263	55.4	184	58.2	184	89.1	221	21.7	221	95.9	97	99	97
Southport and Formby District General Hospital, Southport	96.2	160	26.2	160	77.8	158	77.8	158	96.2	182	34.6	182	89.1	174	89.7	174
South Tyneside District Hospital, South Shields	96.9	261	36.4	261	74.3	187	87.2	187	99	194	53.6	194	88.7	133	97	133
Stafford Hospital, Stafford	96.8	93	57	93	76.5	81	77.8	81	98.7	78	59	78	63.5	74	63.5	74
Stepping Hill Hospital, Stockport	83.3	831	30.9	831	31.7	788	33.2	788	84	732	31	732	35.5	662	36.9	662
St George's Hospital, Greater London	100	31	71	31	72.4	29	75.9	29	100	26	96.2	26	96.2	26	96.2	26
St Helier Hospital, Greater London	98.3	115	28.7	115	51.3	113	54	113	75.5	163	22.1	163	57.9	140	66.4	140
St Mary's Hospital, Newport	100	158	85.4	158	69.2	156	69.2	156	99.3	151	84.8	151	58.7	150	58.7	150
St Mary's Hospital, London	97.7	43	79.1	43	100	43	100	43	100	69	97.1	69	100	69	100	69
Stoke Mandeville Hospital, Aylesbury	34	47	31.9	47	43.5	46	45.7	46	42.9	42	42.9	42	66.7	36	66.7	36
St Peter's Hospital, Chertsey	100	328	94.5	328	87.7	318	89	318	100	193	95.3	193	99	193	99	193
St Richard's Hospital, Chichester	96.3	162	65.4	162	81	126	84.1	126	97.3	222	24.3	222	83.7	172	85.5	172
St Thomas' Hospital, London	99.4	178	68	178	89	172	89	172	100	201	73.1	201	98.3	179	98.9	179

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Sunderland Royal Hospital, Sunderland	99.1	230	95.2	230	87.2	227	88.5	227		99	205	92.7	205	89.8	196	90.3	196
Tameside General Hospital, Ashton Under Lyne	94.9	391	6.1	391	42.9	373	45	373		84.4	302	7.3	302	49.1	267	49.8	267
Torbay Hospital, Torquay	97.7	304	50.7	304	87.2	266	87.6	266		95.6	294	59.9	294	83.5	255	83.9	255
Trafford General Hospital, Manchester		<20		<20		<20		<20		100	20	0	20		<20		<20
Tunbridge Wells Hospital, Tunbridge Wells	92.7	165	52.7	165	71.7	159	72.3	159		97.7	177	49.7	177	75.4	171	77.2	171
University College Hospital, London	95.2	63	15.9	63	71.4	63	71.4	63		94.2	52	11.5	52	34	50	34	50
University College Hospital [Heart Hospital], London	98.9	94	92.6	94	94.7	94	94.7	94		98.3	116	95.7	116	88.8	116	88.8	116

University Hospital Aintree, Liverpool	97.5	442	57	442	94.7	265	100	265	97.3	373	82	373	97.5	242	99.6	242
University Hospital Coventry, Coventry	97.5	40	100	40	88.9	36	88.9	36	100	50	98	50	91.8	49	91.8	49
University Hospital Lewisham, London	92	87	28.7	87	91.7	60	93.3	60	95.5	133	47.4	133	96.5	86	100	86
University Hospital of Hartlepool, Hartlepool	80.8	172	40.7	172	99	105	100	105	82.3	79	34.2	79	100	57	100	57
University Hospital of North Durham, Durham	84.7	393	45.8	393	47.2	392	48	392	85.8	437	35.2	437	58.7	436	58.9	436
University Hospital of North Staffordshire, Stoke-on-Trent	96.2	494	86.4	494	86.1	483	86.1	483	97	499	87	499	80.3	487	80.5	487
University Hospital of North Tees, Stockton-on-Tees	92.2	217	82.9	217	94.1	136	99.3	136	87.5	368	50.5	368	95.6	225	97.8	225
University Hospital Queen's Medical Centre, Nottingham	73.5	234	64.5	234	88.7	204	89.7	204	83	289	59.9	289	88	234	88.5	234
Wansbeck General Hospital, Ashington	96.2	238	36.6	238	95.6	159	95.6	159	93.8	258	27.1	258	97.8	183	97.8	183
Warrington Hospital, Warrington	98.7	374	67.4	374	87.9	256	93	256	97.8	361	64	361	91.3	241	97.1	241
Warwick Hospital, Warwick	95.8	24	25	24	70.8	24	70.8	24		No data						

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Watford General Hospital, Watford	97.6	333	60.1	333	97.5	243	99.2	243		98.3	361	27.1	361	96.7	270	97.4	270
West Cumberland Hospital, Whitehaven	92.5	214	75.7	214	79.8	188	80.3	188		94.2	171	69	171	77.6	152	77.6	152
West Middlesex University Hospital, Greater London	71.4	63	63.5	63	66	53	67.9	53		87.7	73	87.7	73	91.3	69	91.3	69
Weston General Hospital, Weston-super-Mare	87.6	137	0.7	137	78.1	128	81.2	128		92	125	0	125	86.4	118	87.3	118
West Suffolk Hospital, Bury St Edmunds	90.8	284	22.2	284	80.6	211	90	211		94.2	294	16.7	294	84.1	214	93.9	214
Wexham Park Hospital, Slough	97.7	219	97.7	219	91.9	210	92.9	210		94.2	121	81.8	121	86	100	87	100
Whipps Cross Hospital, Greater London	90.4	230	11.7	230	56.2	219	61.2	219		92.9	112	10.7	112	60.2	103	64.1	103
Whiston Hospital, Prescot	98.9	441	50.8	441	65.7	361	66.2	361		98.3	363	65.3	363	89.5	219	92.7	219

Whittington Hospital, London	98.9	88	63.6	88	51.2	86	52.3	86	100	101	76.2	101	56.1	98	61.2	98
William Harvey Hospital, Ashford	89.2	269	61	269	61.9	265	64.9	265	85.6	250	60.4	250	62.2	246	65.4	246
Worcestershire Royal Hospital, Worcester	95.2	21	76.2	21		<20		<20	100	69	94.2	69	97.1	69	97.1	69
Worthing Hospital, Worthing	97.3	187	78.1	187	99.2	133	99.2	133	96.2	235	76.6	235	93.3	163	97.5	163
Wycombe Hospital, High Wycombe	98.8	173	98.3	173	77.2	171	78.4	171	98.8	166	96.4	166	79.5	161	80.7	161
Wythenshawe Hospital, Manchester	98.9	174	38.5	174	71.9	171	71.9	171	96	100	26	100	80.5	82	80.5	82
Yeovil District Hospital, Yeovil	96.8	217	37.3	217	42.6	216	42.6	216	97.8	184	52.7	184	55.4	177	55.4	177
York District Hospital, York	97.4	348	22.4	348	99.2	241	99.6	241	97.9	341	25.5	341	100	230	100	230
Wales	**83.1**	**2144**	**60.5**	**2144**	**80.2**	**1608**	**82.2**	**1608**	**85.3**	**2225**	**66.1**	**2225**	**79.7**	**1741**	**80.4**	**1741**
Bronglais General Hospital, Aberystwyth	90	20	85	20		<20		<20		No data						
Glan Clwyd Hospital, Rhyl	92.7	219	38.8	219	84.4	154	85.7	154	90.5	105	73.3	105	88.1	67	91	67
Glangwili General Hospital, Carmarthen	89.8	118	64.4	118	59.8	107	62.6	107	96	99	92.9	99	0	97	1	97
Llandough Hospital, Llandough	32.9	155	29.7	155	74.5	94	74.5	94	25.7	152	1.3	152	78.8	118	79.7	118
Morriston Hospital, Swansea	93.9	33	51.5	33		<20		<20	98.9	187	96.3	187	98.1	154	98.1	154

	Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography		Proportion of nSTEMI patients seen by a cardiologist or a member of team	Number of all nSTEMI patients	Proportion of nSTEMI patients admitted to cardiac unit or ward	Number of all nSTEMI patients	Proportion of nSTEMI patients who were referred for or had angiography during admission	Number of all nSTEMI patients eligible for angiography	Proportion of nSTEMI patients who were referred for or had angiography during admission including angiography planned after discharge	Number of all nSTEMI patients eligible for angiography
Year	2012/13									2013/14							
	Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)		Seen By Cardiologist (%)	Out of (N)	Admitted To Cardiac Ward (%)	Out of (N)	Had Angiography Before Discharge (%)	Out of (N)	Had Angiography At Any Time (%)	Out of (N)
Nevill Hall Hospital, Abergavenny	93.8	176	81.8	176	92.5	120	93.3	120		92.1	227	77.5	227	92.9	127	92.9	127
Prince Charles Hospital, Merthyr Tydfil	97.8	89	77.5	89	75	84	76.2	84		99.3	144	86.1	144	65.3	144	66	144
Prince Philip Hospital, Llanelli	77.1	48	62.5	48	18.2	44	20.5	44		69.2	26	92.3	26	0	22	0	22
Princess of Wales Hospital, Bridgend	97.7	133	47.4	133	71.2	132	72	132		98.5	132	51.5	132	88.5	122	88.5	122
Royal Glamorgan Hospital, Llantrisant	92.5	53	94.3	53	48.9	47	51.1	47		98.2	55	72.7	55	49.1	53	49.1	53
Royal Gwent Hospital, Newport	97	331	49.5	331	97.1	241	97.5	241		92	364	55.2	364	98.8	251	99.2	251
Singleton Hospital, Swansea	96.6	29	3.4	29	93.1	29	96.6	29		96.8	31	6.5	31	87.1	31	87.1	31
University Hospital of Wales, Cardiff	89.8	246	71.5	246	80	200	80.5	200		92.1	241	69.7	241	74.4	227	74.4	227
Withybush General Hospital, Haverfordwest	42	188	61.2	188	82.9	158	85.4	158		50	160	54.4	160	79.4	131	83.2	131

Wrexham Maelor Hospital, Wrexham	83.3	306	79.7	306	90.5	169	97.6	169	86.4	258	84.5	258	98.2	165	99.4	165
Ysbyty Gwynedd, Bangor		<20		<20		<20		<20	90.9	44	25	44	87.5	32	87.5	32
Belfast	**99**	**403**	**92.8**	**403**	**93.1**	**332**	**94.6**	**332**	**99.8**	**407**	**95.1**	**407**	**92.7**	**341**	**94.1**	**341**
Belfast City Hospital, Belfast	98.8	82	95.1	82	87.5	72	90.3	72	100	111	100	111	89.3	103	91.3	103
Mater Infirmorum Hospital, Belfast	99.3	151	91.4	151	97.4	114	100	114	100	140	92.1	140	92.3	104	95.2	104
Royal Victoria Hospital, Belfast	98.8	170	92.9	170	92.5	146	92.5	146	99.4	156	94.2	156	95.5	134	95.5	134

Part Three: Case Studies

1. Improving access to Primary PCI: Networked minds plan for Primary PCI (PPCI) for North Wales Cardiac Patients

Catrin Hanks, Network Manager, North Wales Cardiac Network

The North Wales Cardiac Network is helping breathe life into a new addition to services through planning for a 24/7 Primary PCI service at Glan Clwyd Hospital for North Wales patients from early 2015. The Cardiac Network is a partnership of representatives from primary, secondary and tertiary care who work together to plan and deliver safe and quality cardiac services for patients in the region. Integrated with Betsi Cadwaladr University Health Board, the North Wales Cardiac Network works side-by-side with health board staff to plan and develop services.

National guidance recommends that Primary PCI is the emergency treatment of STEMI patients and until 2014, the infrastructure to deliver this service equitably for North Wales patients has not been in place. A new second cardiac catheter laboratory, sited alongside the current single laboratory at Glan Clwyd Hospital has now been constructed. This additional capacity has meant that Welsh patients are offered a local diagnostic angiography and PCI service, supporting the Health Board's repatriation plans to provide local services where clinically appropriate. With this new infrastructure in place, a Primary PCI business case was presented to the Health Board and MINAP data was used to improve patient care by showing the lack of a PPCI service in North Wales.

Plans are now underway for a 24/7 PPCI service from early 2015. PPCI should be performed within 90 minutes of arrival at the primary PCI centre (door-to-balloon time (DTB)) and 150 minutes of a patient's call for help (call-to-balloon time (CTB)). Nearly the entire population of North Wales is within 90 minutes road travel of the centrally based facility which will be well placed to meet the recommended DTB and CTB time target for patients.

The success of the Network and this development is made possible by the commitment and leadership of many health professionals, clinicians and managers who work together and are dedicated to improving cardiac services for patients across North Wales.

2. NSTEMI Effective Data Collection United Lincolnshire Hospitals Trust

Sharon Sinha, Clinical Governance Co-ordinator, Lincoln County Hospital, United Lincolnshire Hospitals NHS Trust

Review of data collection process for nSTEMI; ensure robust systems in place to capture all cases to improve data submissions. Review quarterly reporting to include outcome data for nSTEMI to improve clinical engagement and use the data effectively.

MINAP data collection training is delivered to coronary care staff to ensure staff are aware of what data is required and why it's necessary to collect the data. MINAP form is started by coronary care nursing staff or cardiac nurse practitioner on admission, before discharge or transfer from coronary care. MINAP form completed and additional final check by cardiac nurse practitioners to ensure there is no missing data. If there is missing data, case notes are checked and form completed. Monthly patient information lists are pulled from the patient information system using ICD10 coding to check that there is a MINAP form for all cases (by the Clinical Governance Development Unit). Case notes are pulled for any missing cases by the Clinical Governance team for the cardiac nurse practitioner to complete. All completed forms are entered into the MINAP national database.

Quarterly data validation by Clinical Governance Development Unit staff: number of cases submitted, number of coded cases, completeness of data. Report produced with graphical representation of data, which includes secondary prevention prescribing at discharge, and mortality rates. Case reviews to evaluate best practice and learning, compliance with secondary prevention prescribing improved significantly with a simple patient sticker for case notes (listing all secondary prevention medications with a reminder about recording contraindications if applicable).

Clinical audit participation is a requirement of the acute Trust Quality Account. MINAP data submission is reported each year via case ascertainment - using our MINAP data and data held for hospital episodes statistics.

Quarterly reports are circulated widely across the Trust and form part of the Trust quality schedule with local Commissioners. Presentations of data at local clinical audit meetings take place to up-date staff on progress with improvement, and where necessary areas requiring review. It is an on-going project that will require processes of data collection to be up-dated as we develop new ways of working in the future.

3. How the Yorkshire Ambulance Service has used MINAP data to improving patient care pathways

Jacqui Crossley, Head of Clinical Effectiveness, Yorkshire Ambulance Service

Ambulance services report a number of clinical performance indicators, one of which relates to STEMI 'call to balloon times'. These performance criteria aim to drive up cooperation between organisations involved in the assessment and treatment of patients with this type of heart attack and make for efficient pathways of care. The national Ambulance Clinical Quality Indicators (ACQI) data is taken from MINAP and is therefore in ambulance trusts best interests in ensuring the submitted information is accurate. However, ambulance trusts are unable to submit data directly to NICOR and as a result the Yorkshire Ambulance Service decided to undertake a focused review of all YAS cases entered into NICOR with the aim of improving data accuracy.

For the last two years the clinical audit team have reviewed all YAS coded PPCI cases in MINAP. This process involves a clinical audit assistant and a senior clinician reviewing the data from MINAP monthly and in tandem reviewing the ambulance clinical records. From this review any discrepancies are highlighted to the acute trusts and amendments to the data base are requested. This process highlights any service delays or other pathway issues that allow the clinical team to make improvements. For example issues have been highlighted when patients have been declined by a centre and this results in a delay their procedure, this has been fed-back and used to facilitate an 'accept all' policy at the Leeds Heart centre.

This validation process has highlighted the number of cases where the first ambulance ECG was not diagnostic of STEMI yet the patients some hours later developed this type of heart attack. Now changes within the MINAP has made reference to whither the first diagnostic ECG occurred in the ambulance. This has resulted in clearer reflection of when patient's first became diagnostic and no longer assume this was at contact with the ambulance clinicians.

This focused work has helped with audit and governance providing assurance and guidance as to the improvements that can be made through understanding pathways and why and where delays can and do occur. Over the next twelve months YAS aim to work with NICOR to develop further reports from the MINAP data set to help further improve the care we deliver to patients.

4. The Linconshire Heart Centre

Alun Roebuck NFESC - Consultant Nurse in Cardiology/ Associate Chief Nurse

The Lincolnshire Heart Centre (LHC) was developed following a strategic review undertaken by the East Midlands Heart and Stroke Network on how Primary Percutaneous Coronary Angioplasty (PCI) should/ could be delivered in the East Midlands. At that time fewer that 5% of patients were receiving primary PCI for ST elevation myocardial infarction (STEMI).

Detailed modelling of travel isochrones (journey times) to existing angioplasty centres in the East Midlands was undertaken. While a small proportion of the population of Lincolnshire may have been able to travel to existing centres within a reasonable timeframe, the status quo would have resulted in more than a quarter of a million people on the East Coast of England not having access to healthcare considered 'standard' in the rest of the country. The LHC began taking primary PCI patients in April 2012 on a 'limited hours' basis and became a '24/7' provider (providing emergency PCI at any time of day or night) in April 2013. All patients now have access to primary PCI.

During the first year of continuous availability there were 464 'activations' for patients thought to be having STEMI. 55% of activations were out of hours and 83% were taken directly to the Cardiac Catheter Laboratory (cath lab). 98% of patients had a 'door to balloon' time of less than 90 minutes, with the median time being 27-minutes (9 minutes shorter than when the LCH was a limited hours provider). 87% of patients had a 'call to balloon' time of less than 150 minutes, with a median time of 115 minutes. This is an outstanding achievement in what is England's second largest county with a predominantly rural population and poor road infrastructure. Length of stay for STEMI had reduced from 9.8-days to 3-days (2 days for uncomplicated patients) and prescription of secondary prevention medication in STEMI is now 100% for beta blockers, aspirin, ACE and statins in eligible patients.

How has the LCH achieved this? By promoting integrated working with the East Midlands Ambulance Service (EMAS) and other clinical specialities in the Trust for example, nephology and critical care. The adoption a total quality management (TQM) strategy ensures that the record of every patient who did not achieve the national targets is reviewed for areas where the team could improve. As an example of this strategy, it was noted that if an Acute Care Practitioner (ACP) met the air ambulance at the helipad, as opposed to waiting for the patient to arrive at the cath lab, (an ambulance transfer is required to bring the patient from the helipad to the hospital) then two handovers could be reduced to one, and 'door to balloon' time was reduced by 11 minutes. ACP's are a team of advanced nurse practitioners who are trained to

'medical registrar equivalent' clinical skills. Training includes non-medical prescribing, advanced life support, history and examination skills and a Master's degree in clinical cardiology. ACP's meet all patients on arrival to the LHC. This may be in A&E, in the ambulance or on the heli pad. They assess the patients suitability for primary PCI and if suitable take the patient to the cath lab. There they stay with the patient and act as a circulating nurse. The ACP will then undertake the medical 'clerking' to admit the patient to the hospital, prescribe their pharmacotherapy and escort the patient to the Coronary Care Unit after their procedure. PROMS (patient recorded outcome measures) show that patients particularly like this approach as they form a relationship with the individual, only have to answer one set of questions rather than having to repeat themselves to numerous doctors and nurses, and are reassured by having the presence of an expert practitioner throughout the most acute phase of their 'journey' when they feel most vulnerable.

5. Improving access to cardiology for all ACS patients

Nicola Manning & Emma Gendall (Cardiology Audit Nurses North Bristol NHS Trust (NBT)

North Bristol NHS Trust (NBT) has always been committed to collecting accurate and robust MINAP data. Following review of our data at a regional level during 2012 we secured a six month pilot of an Acute Coronary Syndrome (ACS) Nurse Specialist. The main aims of the post were to improve access to cardiology care for all ACS patients regardless of their admission ward.

The MINAP data has been instrumental in continually tracking progress and five months after the post commenced MINAP data was reviewed. The data indicated improvements in three key areas; the main findings when compared to the same quarter the previous year were as follows:

- 6% increase in cardiological care during admission figures
- 10% increase in patients receiving angiography within 96 hours of admission
- Median length of stay in patients reviewed by the ACS nurse was up to 3 days shorter

As a result of the improvements the ACS nurse role became a permanent post in early 2014 with a second ACS nurse also recruited on a temporary basis.

Alongside the improvements to the MINAP data the ACS nurse role has aided the audit nurses in identifying appropriate MINAP patients. Like many other centres MINAP patients

are identified from lists of those with raised Troponin T (TNT) levels sent directly from biochemistry. The ACS nurses communicate daily with the audit nurses to identify and exclude appropriate patients from these lists. This has led to an improvement in the timeliness of our MINAP data entry enabling more contemporary data analysis and reporting. This process also led us to identify other areas where we felt improvements were necessary.

One such area is the increasing number of TnT tests being performed within the trust. Anecdotally the overuse of TnT testing is widely reported with concerns that staff may unselectively include TnT tests as part of their routine assessment (Nallet et al., 2011). This evidence led the audit and ACS nurses to address the problem across the specialities that it primarily affects; cardiology, emergency dept and acute medical admissions. Representatives from each speciality met to discuss the issue and collaboratively developed a system to try and reduce inappropriate requesting. This is an ongoing project with the results expected shortly.

This type of project shows the broad spectrum of the cardiology audit nurse role in improving cardiology service provision which is ultimately the essence of MINAP.

Nallet, O., Arbaoui, S., Grenier, A., Michaud, P., Safrano, G. & Sergent, J. (2011). 324 troponin in emergency department: An overused test for patient screening without clinical suspicion of acute coronary syndrome? Archives of Cardiovascular Diseases Supplements, 3(1), 109.

Part Four: MINAP and research

NICOR Research Board and its research strategy

Dr Chris Gale, Co-Chair NICOR Research Executive

The National Institute for Cardiovascular Outcomes Research (NICOR) is an umbrella organisation for a number of the national cardiovascular registries, including MINAP, and is based at University College London. Whilst its principle aim is to manage these audits, regularly report clinically validated outcomes to the public, participating organisations and regional and international health authorities, it has a key role in facilitating research.

The NICOR Research Board, Chaired by Professor John Deanfield and Dr Chris Gale is a relatively new development. Since its inception it has brought together national opinion leaders, researchers and experts in the use of routinely collected data for research. NICOR supports the notion that the cardiovascular registries are used to the full for service evaluation, research and policy. Indeed, MINAP is an example of how observational data, essential for audit, may be used as a resource for internationally competitive and clinically relevant research. MINAP data have been used to report improvements in care,1 quantify potential associations between environmental factors and heart attacks2 and compare the effects of treatments for heart attacks between countries.

Looking to the future, NICOR has aspirations that the cardiovascular registries will be used to i) identify participating providers and recruit patients into investigator-led or commercially funded randomised controlled trials, and ii) identify major adverse cardiovascular and cerebrovascular events (MACCE) in observational studies and randomised trials. For example, a randomised controlled trial of the use of the GRACE risk score, whereby MINAP may be used as the 'point of entry' and 'outcome' measure is being designed. In another planned study, data from MINAP and the other cardiovascular registries' will be used for the quantification of the late effects of the treatment of young adults with cancer. NICOR has gained favourable ethical approval for the cardiovascular registries to be pooled and be linked to Hospital Episode Statistics (HES) data. This and their anticipated linkage to primary care data will create one of the largest registries of the full journey of cardiovascular disease from 'phenotype-negative' to 'living with a long-term condition'.

NICOR welcomes applications to the Research Board for use-of-data and where possible will endeavour to support researchers. We are, however, mindful that the data are very complex and that their use requires analysts experienced in the handling of such data. The academic success of MINAP has been instrumental in the development of the research agendas of the other cardiovascular registries. It has led the way in the reporting of the quality of cardiovascular care in England and Wales and has huge potential for high impact research which will directly affect patient care. The future of this national resource is excellent, but is only through the dedicated support of healthcare professionals, administrators and local hospitals that MINAP will continue its success - NICOR sincerely thanks all who contribute to MINAP.

1. Inpatient Coronary Angiography and Revascularisation following Non-ST-Elevation Acute Coronary Syndrome in Patients with kidney impairment

Dr Catriona Shaw- UK Renal Registry and Kings College London

Dr Claire C Sharpe- Kings College London

After suffering a partial heart attack (called a non-ST elevation myocardial infarction), clinical trials have shown that those patients who are considered to be at high risk of dying or suffering from another heart attack do better if they have a procedure to open up the blood vessels which supply the heart, within the first few days of admission to hospital. This first entails having an imaging test to look at the heart blood vessels called a coronary angiogram, followed by either a keyhole procedure through the skin (percutaneous intervention (PCI)) or surgery (coronary artery bypass grafting (CABG)) if a treatable blockage in the coronary arteries has been identified.

Kidney disease is common- affecting 8-10% of the adult population in the UK. People with kidney disease are at higher risk of having, and dying from, a heart attack, than people with normal kidney function. However, evidence from different countries suggests that people with kidney disease are less likely to undergo coronary angiograms or PCI or CABG after a heart attack than people with normal kidney function.

Although almost half of the patients who have a partial heart attack have abnormal kidney function at the time of admission, there has never been a clinical trial specifically asking 'what is the best treatment for patients with kidney disease?' Although we think it is likely that people with kidney disease will benefit from a routine invasive approach (with an angiogram and then PCI or CABG if appropriate), in the same way that patients with normal kidney function do, we cannot be sure. In addition people with kidney disease are possibly at higher risk of other problems related to an invasive approach- for example the contrast dye used in the angiogram can cause a deterioration in their kidney function, albeit often a temporary one. Therefore, making a decision about whether a patient with kidney disease who has suffered a partial heart attack should have invasive treatment or management with medicines alone can be difficult for both doctors and patients alike.

Using data from MINAP we looked at over 35,000 people who were admitted to hospital with a partial heart attack between 2008 and 2010. We grouped people by whether they had normal or impaired kidney function at the time of admission to hospital with the heart attack. We found that kidney impairment was common, affecting about 40% of those in the study. People with impaired kidney function were less likely to have an angiogram during that hospital admission than people with normal kidney function. Our study also suggested that patients with impaired kidney function that did have an angiogram compared with people with impaired kidney function that did not, were more likely to be alive at one year after their heart attack.

We need to understand more about why these differences in care exist so that we can ensure there aren't people who could benefit from a treatment who are being disadvantaged. Importantly we need to know if a routine invasive approach after a partial heart attack in people with different severities of kidney disease does improve survival and it maybe that a clinical trial is needed to help answer this question definitively.

Shaw C, Nitsch D, Steenkamp R, et al., Inpatient Coronary Angiography and Revascularisation following Non-ST-Elevation Acute Coronary Syndrome in Patients with Renal Impairment: A Cohort Study Using the Myocardial Ischaemia National Audit Project. PLoS ONE, 2014. 9(6): p. e99925

2. Prognostic value of troponins in acute coronary syndrome depends upon patient age

Dr Justin Zaman, University of East Anglia, Norwich, UK

When a patient has a heart attack, the heart releases a protein called troponin. This can be detected and measured with a blood test taken in the hours after the onset of symptoms – the troponin concentration rises to a peak before steadily falling. Usually, the higher the recorded peak concentration the worse the outcome for the patient. Using data from 322,617 patients from four years of MINAP records (2006-2010), colleagues from Aberdeen Norwich and Manchester were interested in finding out whether this test was as useful in elderly patients as it was in younger patients at predicting future risk after a heart attack.1

Our results showed that in any age group, higher troponin levels were associated with increasing risk of death (over 695,334 person-years of follow up). However, we also found that the predictive power of troponins reduces with older age. We also found substantially higher death rates in older heart attack patients than in younger ones, even at the lowest troponin values. This may be due to a very high risk in all older patients, and thus prediction of survival after heart attack in older heart attack patient is harder than in a younger patient. Doctors should therefore be aware that troponin values in isolation do not provide a reliable indicator of the whole outlook of the older patient and should take this into account when discussing prognosis with such patients and their relatives as they recover from heart attack.

Myint PK, Kwok CS, Bachmann MO, Stirling, S, Shepstne, L. Zaman , J. Prognostic value of troponins in acute coronary syndrome depends upon patient age. Heart 2014 doi: 10.1136/heartjnl-2014-305533

3. Effect of β blockers on mortality after myocardial infarction in adults with COPD: population based cohort study of UK electronic healthcare records

Dr Jennifer Quint, London School of Hygiene and Tropical Medicine

Chronic obstructive pulmonary disease (COPD) is a common lung condition most often caused by smoking. Individuals with COPD are at increased risk of having a heart attack compared to the general population. People with COPD also have shorter survival after a heart attack compared to the general population. However, it is not entirely clear why this is the case.

We know that some medications are very good for you after a heart attack. They help to prevent people having future heart attacks and decrease the risk of death after a heart attack. One example of such medication is beta blockers. In the past there has been some concern over the safety of beta blockers in people with COPD. However, there is more and more evidence that they are safe and that they may be beneficial even beyond reducing death after a heart attack and preventing future heart attacks. Nonetheless, we suspected they are not prescribed as much as they should be in people with COPD.

Using MINAP data linked to electronic health records from the GP, we were able to investigate the use of beta blockers in COPD patients after a heart attack. This work enabled us to look at differences in the prescribing of beta blockers after a heart attack to see if people with COPD were less likely to receive them and if by not receiving them that meant they had an increased risk of dying.

We found that people with COPD were less likely to receive a beta blocker after a heart attack and that giving people with COPD beta blockers after a heart attack reduces their risk of dying. This is really important as it has provided more evidence that beta blockers should be more widely used in people with COPD who have had a heart attack.

Quint, J, Herrett, E, Bhaskaran, K, Timmis, A, Wedzicha, JA and Smeeth, L. Effect of β blockers on mortality after myocardial infarction in adults with COPD: population based cohort study of UK electronic healthcare records. BMJ 2013;347:f6650 (Published 22 November 2013).

4. International comparisons

Dr Spiros Denaxas, Research Fellow in Health Informatics
Dr Sheng-Chia Chung, Research Associate
Farr Institute of Health Informatics Research at UCL & UCL Institute of Health Informatics

International comparisons using national clinical registries may address the 'second translational gap' – putting into practice real-world evidence on prevention and treatment and so improving quality of care and population outcomes.To date, most international comparisons of cardiovascular disease (CVD) have been based on selected samples of hospitals participating in voluntary registries, on one-off surveys or on selected patients from clinical trials. While these studies generate important findings, they have limitations. They tend to have incomplete population coverage so that findings may not be representative of the whole population and comparisons are often restricted only to care or only to outcome.

Benefit Compared to conventional consented studies, national clinical registries provide comprehensive coverage of patients so allowing accurate inferences to be drawn. For example, MINAP contains data from all acute hospitals in England and Wales, on many hundreds of thousands of patients with acute coronary syndrome. Similarly, RIKS-HIA/SWEDEHEART in Sweden contain data on over 400.000 ACS admissions from all national secondary healthcare providers. The large amounts of deep phenotypic information recorded, such as demographics, clinical history, treatment, complications and survival outcomes, enable researchers to investigate important questions on quality of care, use of evidence-based treatments, care strategy features and their outcomes.

Challenge There has been little concerted effort to make national clinical registry data and electronic health record data discoverable, shareable or accessible to the international research community. Metadata have not been systematically used to enable harmonization of definitions. Even simple questions, e.g. the availability of primary care data for research, or meaningful data on smoking, blood pressure and cholesterol, cannot readily be answered, hindering the scaling of international research. The comparability of data between-country is affected not only by the availability and definition of variables, data collection practises, quality and validity, but also by the context of the healthcare system and socioeconomic state of participant countries.

Future research while advances in drug treatment and revascularization have shortened the acute hospital treatment phase there is a growing emphasis on primary prevention of CVD in primary care and recovery after acute care. Linking primary and secondary care electronic health records to clinical registry data will provide a unique opportunity for international comparisons of care and outcome in both primary prevention among initially healthy populations without diagnosed CVD, and secondary prevention among patients during post-acute phase. Centralized repositories of international data and metadata on CVD must be created to enable and facilitate this kind of research.

Part Five: Conclusions/Recommendations

1. Improved outcomes following heart attack

Over the past 10 years there have been significant developments in the care provided to patients admitted to hospital following heart attack. The most obvious of these changes have been the move to primary PCI for patients with STEMI and early angiography with, where appropriate, follow-on PCI for patients with nSTEMI. Unadjusted 30-day mortality for STEMI has fallen by a third during this time: equivalent to 110 fewer deaths each month for this particular type of heart attack. At the same time there has been a reduction in the length of stay for patients with STEMI such that half of all patients are discharged home after 3 days and 75% after 5 days.

2. Better data completeness for risk-adjusted outcomes (currently missing)

Until now MINAP has largely reported on 'process measures' of care, such as the timeliness of reperfusion and the provision of secondary prevention medication at the time of discharge from hospital. Such measures of performance are not usually subjected to sophisticated adjustment to take into account the inherent risk of individual patients. The move to reporting outcomes of care, in particular the reporting this year of hospital-specific mortality rates following STEMI, has exposed important deficiencies in data collection in a number of participating hospitals. The extent of missing information on patient characteristics that might reasonably be expected to affect outcome, and the uneven distribution of this 'missingness', rendered risk-adjustment of the mortality rates unreliable, even with mathematical manipulation to 'impute' missing values.

This issue of data quality is being addressed through implementation of new minimum data standards, close working with colleagues in participating hospitals and the introduction of systems of regular feedback to hospitals on data completeness of key datafields.

3. Continued investment in clinical audit

Some perceive clinical audit as a burden upon already busy NHS staff, the collection and submission of data being divorced from the compassionate, effective, care of patients. During times of financial constraint there is a temptation to reduce investment in such exercises. Conversely, we would argue that such conditions – a working environment characterised by cost containment and efficiency – increase, rather than decrease, the need for reliable contemporary knowledge of hospital performance. Such information, when used wisely, can be used to inform local improvements, reassure patients, providers, commissioners and the public that the quality of care provided to individuals is not being sacrificed as services are reconfigured.

The quality of contemporary data is extremely important if a true picture is to emerge. MINAP data is quite complex and its collection, often needing extraction from medical notes, requires experience – it becomes more manageable over time. We recommend that each hospital/Trust has a designated individual responsible for clinical audit data, supported by a local cardiologist. In our experience, clinical involvement results in higher quality data. High turnover and reduction in the number of staff in clinical audit departments is in no one's interest. The fact that some hospitals can achieve excellent data completeness shows that this is feasible, when there is commitment of time, personnel and funds.

4. Timeliness of angiography following nSTEMI

Patients presenting with, rather than without, ST-elevation are easier to identify and their immediate management lends itself to audit – through reporting reperfusion rates and delays to reperfusion (e.g. Door-to-balloon). However, as this report shows, most patients with ACS have nSTEMI.

The optimum timing of angiography (and follow-on PCI) after admission remains unclear; Groups developing guidelines have interpreted differently the results of trials comparing medical treatment (drugs) and PCI with medical treatment alone, suggesting maximum acceptable delays of anything from 24 to 96 hours. The most recent NICE Quality Standard suggests treatment within 72 hours.

Many patients are not yet receiving this standard of care. For those admitted directly to a hospital capable of performing an angiogram almost half do not achieve it. It is likely that those admitted to a non-interventional hospital experience even longer delays because of factors associated with transfer between hospitals. Even if there is no direct relationship between earlier angiography and outcome (judged by mortality and further heart attack), those who do receive earlier angiography are more likely to be discharged home sooner and avoid prolonged hospitalisation. Hospitals need to streamline the management of these patients.

Part Six: Appendices

Appendix 1: MINAP Steering Group Membership

Name	Job title and organisation
Dr Clive Weston	Chairman; MINAP Clinical Lead
Dr Mark de Belder	Interventional Cardiologist, James Cook University Hospital
Dr Iain Simpson	President of British Cardiovascular Society
Dr Mike Knappton on behalf of Prof Peter Weissberg	Associate Medical Director, British Heart Foundation
Prof Tom Quinn	Associate Dean for Health & Medical Strategy, University of Surrey
Fiona Dudley	Lead Nurse for Cardiology from MINAP participating hospital, Mid Yorkshire Hospitals NHS Trust
Chris Gummer	Database Co-ordinator from MINAP participating hospital, Bristol Heart Institute
Prof Adam Timmis	Chairman of MINAP Academic Group
Dr Peter Ludman	Clinical Lead for the BCIS Audit for PCI
Dr Chris Gale	NIHR Clinician Scientist Award Associate Professor of Cardiovascular Health Research, University of Leeds, Honorary Reader, UCL and Honorary Consultant Cardiologist, York Teaching Hospital
Dr Gethin Ellis	Consultant Cardiologist, South Wales Cardiac Network
Dr Fiona Moore	NASMED Medical Director
Dr John Riddell	Consultant Cardiologist, Northern Ireland
Sue Manuel	MINAP Senior Developer, NICOR
Alan Keys	MINAP Patient/Carer Group Representative
Iain Thomas	MINAP Patient/Carer Group Representative
Julie Sanders	NICOR Chief Operating Officer
Dr Kevin Stewart	Clinical Director of the Clinical Effectiveness & Evaluation Unit, Royal College of Physicians
Lucia Gavalova	Project manager of Audit for PCI Procedures
Tracy Whittaker	MINAP Project Manager
Ronald van Leeven	MINAP Project Coordinator

Appendix 2: MINAP Academic Group Membership

Prof Adam Timmis	Chair, Deputy Director NIHR Cardiovascular Biomedical Research Unit, Professor of Clinical Cardiology Barts and the London NHS Trust	Queen Mary & Westfield College, University of London, School of Medicine and Dentistry
Dr Clive Weston	MINAP Clinical Lead, Consultant Cardiologist	Singleton Hospital, Swansea University
Dr Mark de Belder	Interventional Cardiologist	South Tees Hospitals NHS Foundation Trust
Dr Chris Gale	NICOR Research Committee Co-chair; NIHR Clinician Scientist Award Associate Professor of Cardiovascular Health Research , Honorary Reader of UCL and Honorary Consultant Cardiologist	University of Leeds, York Teaching Hospital
Dr Iain Squire	Professor of Cardiovascular Medicine	University of Leicester
Prof Harry Hemingway	Professor of Clinical Epidemiology	University College London
Dr Paul Wilkinson	Reader in Environmental Epidemiology	London School of Hygiene & Tropical Medicine
Dr Spiros Denaxas	CALIBER Data Manager	University College London
Emmanuel Lazarides	NICOR Senior Analyst	NICOR, University College London
Prof Tom Quinn	Associate Dean - Health and Medical Strategy and Clinical Lead, NICE Evidence Resources	University of Surrey
Dr Owen Nicholas	NICOR Senior Analyst	NICOR, University College London
Tracy Whittaker	MINAP Project Manager	NICOR, University College London

Appendix 3: 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 (ACS) - This term covers all cardiac episodes that result from sudden and spontaneous blockage or near blockage of a coronary artery, often resulting 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 an immediate precursor to an angioplasty and stent implantation or to coronary artery bypass grafting.

Anti-platelet drugs - Drugs including aspirin, clopidogrel, prasugrel and ticagrelor 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.

Apical - At the apex or tip of the heart.

Arrhythmia - A group of conditions in which there is abnormal electrical activity in the heart. The heartbeat may be too fast or too slow, and may be regular or irregular.

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.

Call-to-balloon (CTB) time – The interval between the patient alerting the health services that they have symptoms of a heart attack and the performance of primary angioplasty.

Call-to-needle (CTN) time - The interval between the patient alerting the health services that they have symptoms of a heart attack and the administration of thrombolytic therapy.

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.

Cardiac arrest - When the heart stops pumping blood around the body. The most common cause of a cardiac arrest is a life threatening abnormal heart rhythm.

Cardiac enzymes - Cardiac enzyme tests (including troponin tests) help to show if heart muscle has been damaged.

Cardiac rupture - A laceration or tearing of the walls of the heart most commonly seen as a serious complication of a heart attack.

Cardiogenic shock - An inadequate circulation of blood caused by the failure of the heart to pump effectively. It can be due to damage to the heart muscle, most often from a large myocardial infarction.

Cardiomyopathy - A disease of the heart muscle that leads to generalised deterioration of the muscle and its pumping ability.

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'.

Coronary thrombosis - The formation of a blood clot one of the arteries carrying blood to the heart muscle.

Contractile dysfunction/Hypocontractility - A decline in pumping action of the heart where contraction is inefficient and unable to adequately supply oxygen and nutrients to body organs.

Contractile function - The ability of the heart to pump blood.

Door-to-balloon (DTB) time – The interval between the ambulance arriving at a hospital and the performance of primary angioplasty.

Door-to-needle (DTN) time - The interval between the ambulance arriving at a hospital and the administration of thrombolytic therapy.

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 Attack Centre - A hospital that provides a primary PCI service to patients with ST elevation myocardial infarction

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.

Left ventricle - The left lower chamber of the heart that receives oxygenated blood from the left atrium and pumps it out under high pressure through the aorta to the body.

Myocardial infarction - A heart attack in which heart muscle damage is confirmed by blood testing.

Necrosis – A form of cell injury that results in the death of cells in living tissue.

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.

Pericarditis - Inflammation of the outer sac that surrounds the heart. When pericarditis occurs, the amount of fluid between the two layers of the pericardium increases. This increased fluid presses on the heart and restricts its pumping action.

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 percutaneous coronary intervention (PCI) - A technique to re-open the blocked coronary artery responsible for the heart attack. A fine catheter (tube) is passed, under local anaesthetic, from an artery in the leg or arm into the blocked heart artery. A small inflatable balloon is then passed through the catheter and across the blockage, allowing the artery to be re-opened by temporary inflation of the balloon. This part of the technique is called angioplasty and when used as the initial treatment for heart attack can be 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).

Pulmonary oedema - An abnormal buildup of fluid in the air sacs of the lungs, which leads to shortness of breath.

QT interval - A measure of the time between the start of the Q wave and the end of the T wave in the heart's electrical cycle.

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 PCI, 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.

Revascularisation - Interventions that improve the blood supply to the heart, including PCI or coronary artery bypass grafting

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 appearance 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.

Thienopyridine inhibitors - Antiplatelet agents, of which clopidogrel and prasugrel are presently licensed for use.

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 PCI may be an effective alternative.

Thrombus - A blood clot, the development of which is known a thrombosis.

Appendix 4: MINAP Publications

(1) **Chung SC, Gedeborg R, Nicholas O, et al.** *Acute myocardial infarction: a comparison of short-term survival in national outcome registries in Sweden and the UK.* Lancet 2014 April 12;383:1305-12.

(2) **Eagle KA, Goodman SG, Avezum A, et al.** *Practice variation and missed opportunities for reperfusion in ST-segment-elevation myocardial infarction: findings from the Global Registry of Acute Coronary Events (GRACE).* Lancet 2002 February 2;359:373-7.

(3) **Yusuf S, Flather M, Pogue J, et al.** *Variations between countries in invasive cardiac procedures and outcomes in patients with suspected unstable angina or myocardial infarction without initial ST elevation. OASIS (Organisation to Assess Strategies for Ischaemic Syndromes) Registry Investigators.* Lancet 1998 August 15;352:507-14.

(4) **Widimsky P, Wijns W, Fajadet J, et al.** *Reperfusion therapy for ST elevation acute myocardial infarction in Europe: description of the current situation in 30 countries.* Eur Heart J 2010;31:943-57.

(5) **Kociol RD, Lopes RD, Clare R, et al.** *International variation in and factors associated with hospital readmission after myocardial infarction.* JAMA 2012;307:66-74.

(6) **Terkelsen CJ, Lassen JF, Norgaard BL, et al.** *Mortality rates in patients with ST-elevation vs. non-ST-elevation acute myocardial infarction: observations from an unselected cohort.* Eur Heart J 2005;26:18-26.

(7) **Abildstrom SZ, Rasmussen S, Rosen M, Madsen M.** *Trends in incidence and case fatality rates of acute myocardial infarction in Denmark and Sweden.* Heart 2003;89:507-11.

(8) **Herrett E, Smeeth L, Walker L, Weston C.** *The Myocardial Ischaemia National Audit Project (MINAP).* Heart 2010;96:1264-7.

(9) **Jernberg T, Attebring MF, Hambraeus K, et al.** *The Swedish Web-system for enhancement and development of evidence-based care in heart disease evaluated according to recommended therapies (SWEDEHEART).* Heart 2010;96:1617-21.

(10) **Karthikesalingam A, Holt PJ, Vidal-Diez A, et al.** *Mortality from ruptured abdominal aortic aneurysms: clinical lessons from a comparison of outcomes in England and the USA.* Lancet 2014;383:963-9.

(11) **McNamara RL, Chung SC, Jernberg T, et al.** *International comparisons of the management of patients with non-ST segment elevation acute myocardial infarction in the United Kingdom, Sweden, and the United States: The MINAP/NICOR, SWEDEHEART/RIKS-HIA, and ACTION Registry-GWTG/NCDR registries.* Int J Cardiol 2014;175:240-7.

(12) **Frieden TR, Berwick DM.** *The "Million Hearts" initiative--preventing heart attacks and strokes.* N Engl J Med 2011;365:e27.

(13) **Mechanic R.** *Post-acute care - the next frontier for controlling Medicare spending.* N Engl J Med 2014;370:692-4.

(14) **Denaxas SC, George J, Herrett E, et al.** *Data resource profile: cardiovascular disease research using linked bespoke studies and electronic health records (CALIBER).* Int J Epidemiol 2012;41:1625-38.

(15) **Gale CP, Cattle BA, Baxter PD, Greenwood DC, Simms AD, Deanfield J, Fox KAA, Hall AS, West RM.** *Age and sex-dependent improvements in care and early mortality of 478,242 patients with acute myocardial infarction in the Myocardial Ischaemia National Audit Project (MINAP) 2004–2009: National Institute for Cardiovascular Outcomes Research (NICOR).* International Journal of Cardiology, Volume 168, Issue 2, 30 September 2013, 881-887.

(16) **Wilkinson, P.** *MINAP – the first decade. Cardiology News.* Volume 15, number 3. Feb/March 2012

(17) **Herrett E, George J, Denaxas S, et al.** *Type and timing of heralding in ST-elevation and non-ST-elevation myocardial infarction: an analysis of prospectively collected electronic healthcare records linked to the national registry of acute coronary syndromes.* European Heart Journal: Acute Cardiovascular Care, September 2013; 2, 3: 235-245.

(18) **Zaman MJ, Philipson P, Chen R, et al.** *South Asians and coronary disease: is there discordance between effects on incidence and prognosis?* Heart. 2013; 99(10): 729-36.

(19) **Noman A, Zaman A, Schechter C, et al.** *Early discharge after primary percutaneous coronary intervention for ST-elevation myocardial infarction.* European Heart Journal: Acute Cardiovascular Care, September 2013; 2, 3: 262-269.

(20) **Boggon R, Timmis A, Hemingway H, et al.** *Smoking cessation interventions following acute coronary syndrome: a missed opportunity?* Eur J Prev Cardiol, 2013 Jan 10.

(21) **Crowe F, Appleby PN, Travis RC at al.** *Risk of hospitalization or death from ischemic heart disease among British vegetarians and nonvegetarians: results from the EPIC-Oxford cohort study.* Eur Heart J 2013 34: 1527-1531.

(22) **Simms AD, Baxter PD, Cattle BA, et al.** *An assessment of composite measures of hospital performance and associated mortality for patients with acute myocardial infarction.* Analysis of individual hospital performance and outcome for the National Institute for Cardiovascular Outcomes Research (NICOR) European Heart Journal: Acute Cardiovascular Care, March 2013; 2, 1: 9-18.

(23) **Laut KG, Gale CP, Lash TL, et al.** *Determinants and patterns of utilization of primary percutaneous coronary intervention across 12 European countries: 2003-2008.* Int J Cardiol. April 2013.

(24) **Laut KG, Gale CP, Pedersen AB, Fox AA, Lash TL, Kristensen SD.** *Persistent geographical disparities in use of primary percutaneous coronary intervention in 120 European Regions: Exploring the variation.* EuroIntervention: 2013; 9: 469-476.

(25) **Puymirat E, Battler A, Birkhead J, et al.** *Euro Heart Survey 2009 Snapshot: regional variations in presentation and management of patients with AMI in 47 countries. European Heart Journal: Acute Cardiovascular Care.* 2013 Dec; 2 (4): 359-370.

(26) **1. Simms AD, Batin PD, Weston CW, Fox KAA, Timmis A, Long WR, Hall AS, Gale CP.** *Composite quality scores for care of acute myocardial infarction patients at discharge from hospital: a study of 136,392 patients from the Myocardial Ischaemia National Audit Project (MINAP).* International Journal of Cardiology. 2013, 170 (1), 81-87.

Appendix 5: Contacts for information on heart and heart related conditions

American Heart Association
http://www.heart.org/HEARTORG/Conditions/Conditions_UCM_001087_SubHomePage.jsp

Patient.co.uk
http://www.patient.co.uk/doctor/epidemiology-of-coronary-heart-disease

Blood Pressure Association
http://www.bloodpressureuk.org/Home

British Cardiac Patients Association
http://www.bcpa.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: 0300 330 3311 (similar cost to 01 or 02 numbers). Lines are usually open 9am-5pm Monday to Friday.

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

National Obesity Forum
http://www.nationalobesityforum.org.uk/

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

HEART UK
http://www.heartuk.org.uk/
Heart UK advice helpline 08454 505988

NHS Evidence – key words: cardiovascular disease
http://www.evidence.nhs.uk/search?q=Cardiovascular+Diseases

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

NHS Direct
Tel: 0845 46 47

Healthwatch
http://www.healthwatch.co.uk/

PALS
Information on how to contact your local PALs can be found here: http://www.nhs.uk/chq/Pages/1082.aspx?CategoryID=68&SubCategoryID=153

Heart attacks recorded in MINAP in 2013/14