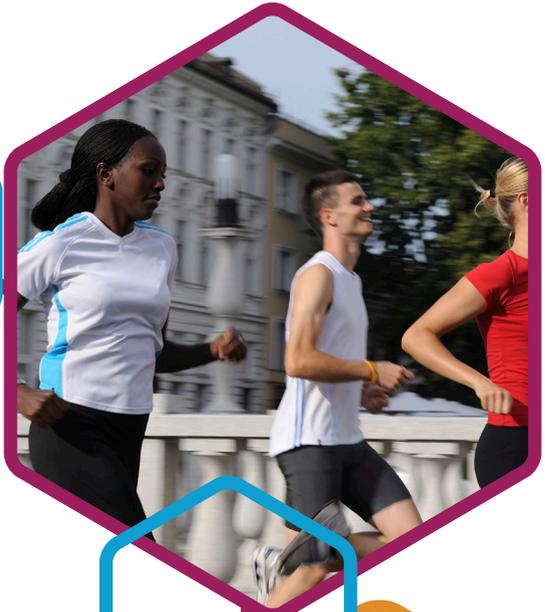


London cardiovascular services: Proposed model of care

Summary



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Foreword

Improving outcomes for patients is at the core of these proposals to improve cardiovascular treatment and care in London. Many lives will be saved and strategies will be put in place to meet the growing demand of an ageing population.

The model of care has been developed following a comprehensive assessment of how services are currently provided in the capital, a robust review of clinical evidence and a review of national and international best practice. Whilst this project focuses on care in hospitals, other important patient issues are also addressed in the patient perspective paper.

Key to the proposals were the recommendations of the patient panel. We have direct experience of being treated in London hospitals for varying types of cardiovascular disease. We were able to shape the project recommendations and in partnership with the clinical groups, ensure that the project recommendations would improve the experience for patients and families.

In addition to chairing the patient group, we also attended all of the clinical expert panel meetings. There were three multi-professional clinical expert panels each focusing on a specific area of work – vascular services, cardiac surgery and cardiology. This truly meant that recommendations came out of partnership working between clinicians and patients.

We want this document to be used by London's commissioners to commission the world-class cardiovascular services all Londoners deserve. In practice, this means achieving better outcomes for patients including:

- Saving more patients' lives
- Increasing the speed and equity of services
- Improving patient access

- Reducing the length of time spent in hospital
- Meeting unmet needs
- Improving the use of new technology and research
- Making the best use of NHS resources and saving public money.

We believe that this work addresses these issues and sets out a blueprint for providing the highest quality services for all Londoners.

Martin Saunders and Jeremy Gold
Co-chairs of the cardiovascular project patient panel

Reviewing London's cardiovascular services

Patients undergoing cardiovascular surgery in London deserve the best service in the world. While pockets of excellence exist, evidence shows that there is much that needs to be done to improve outcomes and patient experience across the capital.

Commissioning Support for London was tasked with reviewing London's acute and specialist cardiovascular services in July 2009. The project has developed two main documents: a case for change and a proposed model of care. The case for change is a thorough review of the current provision of acute and specialist cardiovascular services in London and a review of the clinical evidence. The model of care proposes how London should change in light of this evidence to improve care.

The full documents are both available online at www.csl.nhs.uk.

How the project worked

The project was clinically led by Prof Matt Thompson, Vascular Surgeon, St Georges Healthcare Trust, and was supported by Caroline Taylor, Chief Executive, NHS Croydon, as the Senior Responsible Officer. The project was divided into three clinical areas and had a clinical lead nominated to develop that area of work:

- Vascular surgery, led by Prof Nick Cheshire, Vascular Surgeon, Imperial College Healthcare NHS Trust, London.
- Cardiac surgery, led by Mr Steve Livesey, Cardiac Surgeon, Southampton University Hospital.
- Cardiology, led by Dr Huon Gray, Cardiologist, Southampton University Hospital.

Led by the respective clinical lead, each area of work had an associated clinical expert panel. The panel was made up largely of hospital doctors and other hospital-based healthcare professionals from trusts across the capital.

The project was also advised by a patient panel. The panel was made up of members of the public who had first-hand experience of being treated for cardiovascular disease. Both co-chairs of the patient panel also sat on the clinical expert panels to ensure that the patient voice was consistently incorporated into the work as it was developing.

Work supporting the proposed model of care

During the project, it became apparent that some services would need to move around between different hospitals to align with the model of care. To help commissioners with this process, the clinical expert panels produced a “co-dependencies” framework that depicts the relationships and dependencies between hospital services. This paper is summarised in section 4.

The patient panel were also asked to produce a specific document – The Patient Perspective – which is summarised in section 5. This outlines the issues that are most important to patients and that will need to be addressed to achieve a truly patient-focused service.

The project has also assessed its recommendations from a financial perspective. The purpose of this is to reassure commissioners that the project recommendations are affordable and in some cases, could save the NHS money, which could then be reinvested into other frontline services.

Engagement

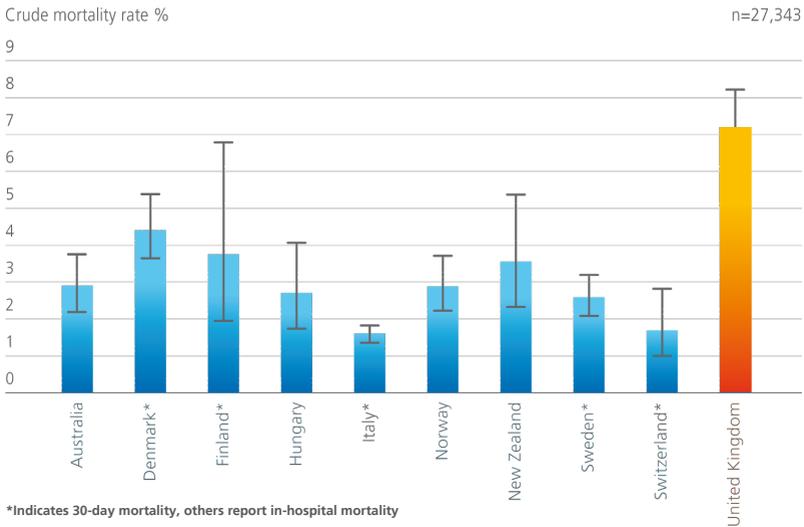
An engagement event was held in November 2009 to seek feedback on the draft case for change and emerging model of care. The event was attended by over 80 people, including patients, clinicians and third sector organisations. The feedback received from the event was documented and fed into the development of the project documents.

This document is a summary of the review, encompassing the case for change, proposed model of care and supporting documents. It outlines an ambitious, evidence-based, patient-focused way to improve London's cardiovascular services.

Vascular surgery

The UK has the worst mortality rates following arterial vascular surgery in the developed world. While some nations are able to achieve mortality rates as low as around 2%, the UK is almost four times that figure at nearly 8%. In London each year, around 3,000 people in London undergo this type of surgery.

Figure 1: Crude mortality rates displayed by country for elective abdominal aortic aneurysm repair



Clinical evidence in vascular surgery highlights the following four factors that influence outcomes following arterial vascular surgery.

1. Vascular surgery should be undertaken by a specialist vascular surgeon

Experienced vascular specialists have significantly improved mortality outcomes of around 2-4% when compared to a general surgeon doing vascular surgery. In some London hospitals, vascular surgery is still undertaken by a general surgeon.

2. Modern surgical technologies

Some vascular procedures can be done using a modern, minimally invasive surgical method called endovascular surgery. Evidence shows that this type of surgery reduces length of hospital stay, reduces the risk of acquiring a hospital infection and most significantly, reduces surgical mortality by around 3% compared to traditional surgical methods.

In London, there is a significant variance in the uptake of minimally invasive vascular surgery. This means that the hospital where the patient has their surgery is a bigger determining factor in deciding the type of surgery they will have rather than their clinical need.

3. Individual surgeons should maintain high volumes of surgery

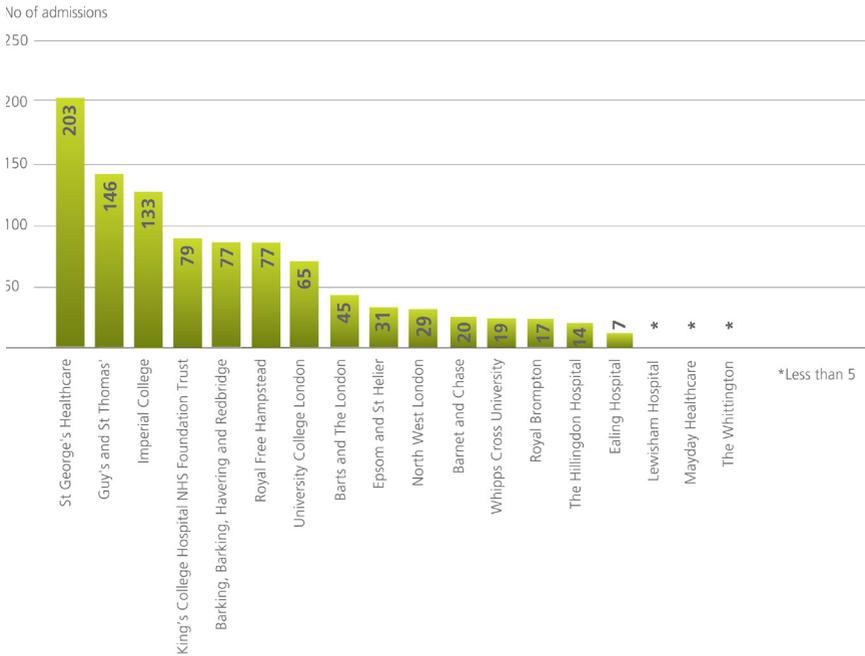
Surgeons that maintain high volumes of vascular surgery achieve mortality rates 2-4% lower than surgeons that perform low volumes of vascular surgery each year.

4. Institutions should perform high volumes of vascular surgery

Hospitals performing high volumes of vascular surgery achieve significantly lower mortality than hospitals performing low volumes. Recently published data demonstrated mortality at one low volume London hospital to be 8.5%, compared to the high volume London hospitals which had mortality rates in the region of 2%. Evidence also shows that this is an increasing trend – as the volume of surgery continues to increase, the mortality rates continue to decrease.

NHS activity data from 2007/08 for London hospitals demonstrated that about 75% of surgery took place in six hospitals and the other 25% is spread across the remaining 13 hospitals. This wide distribution of surgery is not conducive to achieving the best outcomes for patients.

Figure 2: Trusts in London performing abdominal aortic aneurysm surgery and associated volumes of cases for 2008/9



A new way of working

To meet the challenges set out by the clinical evidence, hospitals providing vascular surgery should work together in a network of local and central sites to ensure that all patients receive consistent, high quality care.

Local sites will continue to provide a quality local vascular service, including outpatients, diagnostics and day surgery for venous procedures.

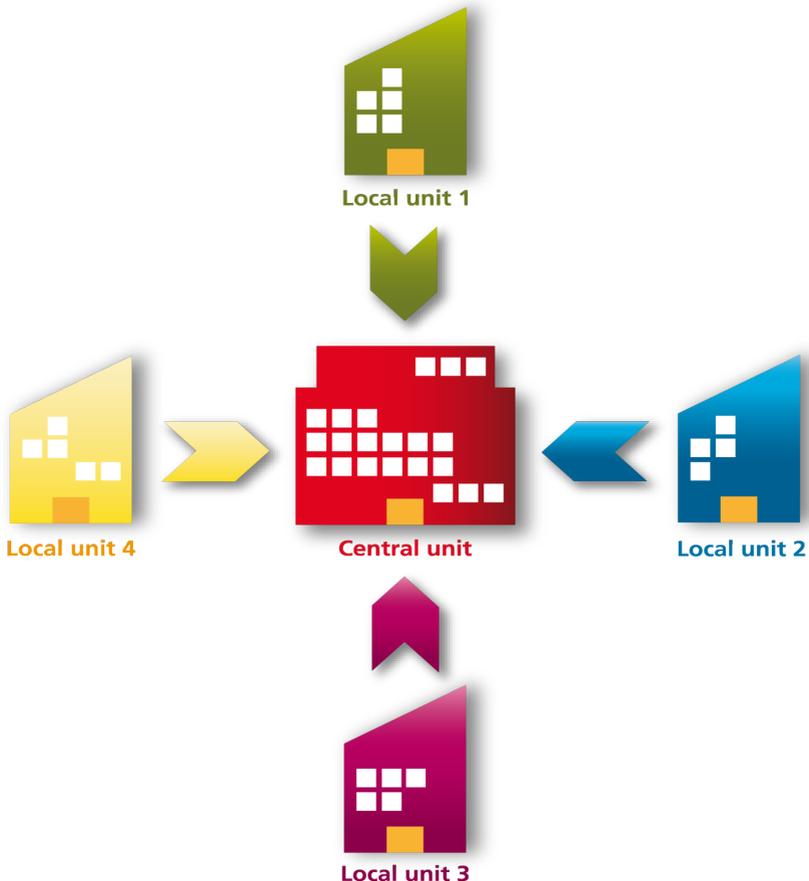
Emergency and elective arterial vascular surgery should only be performed at one central site in each network to ensure that:

- Patients have more access to specialist vascular surgeons
- The rates of endovascular surgery increase

- Individual surgeon volumes can be monitored
- Institutions providing arterial surgery will achieve high volumes
- Mortality outcomes will improve.

Based on data in Figure 2, clinical evidence, the need for a stable surgical rota and the need to provide an equitable service, the clinical expert panel recommended that there should be five central sites in London, each working with their associated network of local hospitals.

Figure 3: Proposed structure of vascular network



Questions

1. Do you agree that the clinical evidence provides a compelling case for change for vascular surgery?
2. Do you agree that arterial vascular surgery should be centralised onto five sites across London?
3. Which components of vascular surgery do you think should be delivered locally?

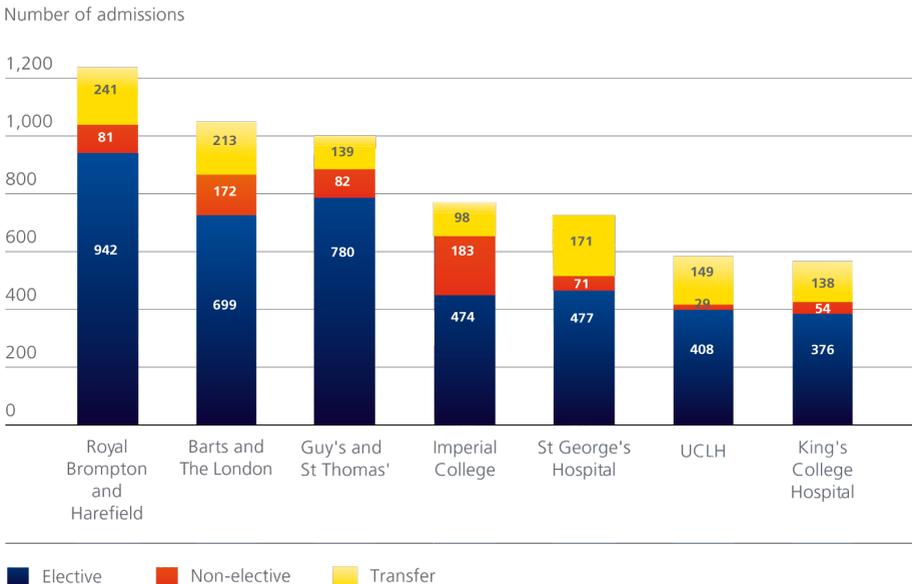
Cardiac surgery

Non-elective cardiac surgery pathways in some areas of London have a total pathway length of over 50 days. The UK average is 20-25 days and the US average is just 14 days. Evidence shows that patients have an increased risk of mortality the longer they wait. For patients suffering an aortic dissection, mortality rates in the capital are over 20%.

Over 24,000 people had cardiac surgery in London between 2004 and 2007. Although mortality rates are low, the Society for Cardiothoracic Surgery's 2008 report stated: "counting deaths after surgery is no longer a useful measure of quality-of-care". The clinical panel noted three areas where cardiac surgery services in London should improve.

1. Improving non-elective cardiac surgery

Figure 4: Admission method for patients undergoing coronary artery bypass grafting surgery in London in 2008/9

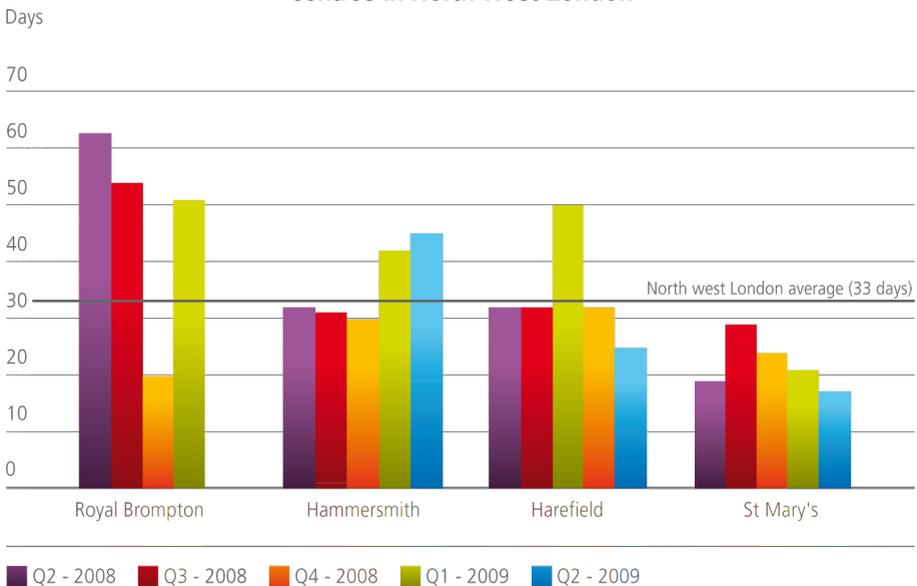


The proportion of cardiac surgery conducted on an urgent or non-elective basis is increasing. As seen in Figure 4, about a third of all cardiac surgery is performed on this basis in London.

Non-elective cardiac surgery is not subject to national waiting times monitoring. This means that patients requiring urgent surgery often wait longer than they should. Clinical evidence shows that the risk of death increases month on month the longer a patient waits for surgery.

Most non-elective patients are transferred from their local hospital to a specialist cardiac surgical hospital for surgery. This process of transferring and receiving the patient in a specialist hospital is the major cause of delay. In some areas of London, this process is taking in excess of 50 days. The UK average is 20-25 days and in the US, the average total pathway length is 14 days.

Figure 5: Total pathway length, displayed by quarter across cardiac surgery centres in North West London



To address these issues, the clinical expert panel recommended the following for patients requiring non-elective cardiac surgery:

- Mandatory use of an electronic referral system
- Agreed evidence-based clinical protocols to establish the need for surgery
- Patients should be risk-stratified to determine priority for surgery
- At receiving units, referrals should be managed by case managers and reviewed by the surgical team on the day of referral
- The panel also proposed that waiting times at receiving units are monitored via an electronic referral system.

Waits should not exceed the following standards for 90% of patients:

- The total pathway length should not exceed 21 days
- The time between admission to the local hospital and referral to a surgical unit should not exceed five days
- Time between referral and transfer should not exceed five days
- Length of stay at the surgical centre should be 11 days or less.

2. Mitral valve surgery

The mitral valve controls the flow of blood into the heart. When this valve becomes diseased, one treatment option is surgery. There are two ways in which surgery can be undertaken on the mitral valve, either it can be repaired or it can be replaced with a prosthetic valve.

The clinical evidence in this area shows that for patients having surgery for degenerative mitral valve disease, better outcomes are achieved when the valve is repaired, rather than replaced.

There is also an increasing trend internationally to sub-specialise mitral valve surgery. This would mean that mitral valve surgery

should only be conducted by individuals who perform high volumes of this procedure, rather than by individuals who perform low volumes of a variety of different cardiac surgery procedures. By sub-specialising mitral valve surgery, only teams of experienced, specialist surgeons would undertake the procedure, improving outcomes for patients.

3. Cardiothoracic aortic disease

Aortic dissection is an emergency life threatening condition which occurs in the upper regions of the aorta in the chest cavity. Data indicates that the mortality for the 100 or so patients suffering from this condition per year in London is 20%.

At present, the emergency care for these patients is disorganised. Aortic dissection procedures are invariably undertaken by an on-call surgeon. This surgeon may, or may not, be a cardiac or vascular surgeon with experience in aortic disease, meaning that this may be the only aortic dissection case they undertake in a year. Patients are receiving their surgery based on where beds are available rather than where the expertise is.

To reduce the surgical mortality rate:

- Patients should have prompt assessment and treatment by a Specialist experienced surgeon
- Treatment should take place at a specialist site – patients presenting at a non-specialist site should be immediately transferred
- Specialist sites must have the support of other co-dependent specialties available on-site (e.g. vascular surgery).

Questions

1. Do you agree that services to patients requiring non-elective cardiac surgery should be improved?
2. Do you agree that the use of an electronic referral system, coupled with case managers in the receiving centres, is the

best method to reduce delays for non-elective surgery?

3. Do you agree that mitral valve surgery should only be conducted by specialist teams?
4. Do you agree that patients requiring surgery for aortic dissection should only be treated at specialist centres by specialist surgeons?

Cardiology

Death from heart disease remains the biggest killer in the UK and London. After one year, patients with serious coronary artery disease have the same likelihood of death as patients who have suffered a full heart attack. Treatment practices for these patients needs to change to reduce mortality.

The work of the clinical expert panel focused on two areas – services for patients with coronary artery disease and those with heart rhythm defects.

1. Services for patients with coronary artery disease

Coronary artery disease is the progressive narrowing or blocking of the arteries that provide the heart's blood supply. When these arteries become completely blocked, a so-called "STEMI" heart attack occurs. In London, ambulance paramedics detect this on an ECG machine, and then transfer the patient immediately to a hospital where they can receive emergency, evidence-based treatment, 24 hours a day, seven days a week.

Some patients experience severe chest pain when the coronary arteries become only partially blocked. Clinical evidence shows that after 12 months, some of these patients have the same mortality rate as patients who have had a full STEMI heart attack. For the purposes of this work, these patients are referred to as NSTEMACS patients.

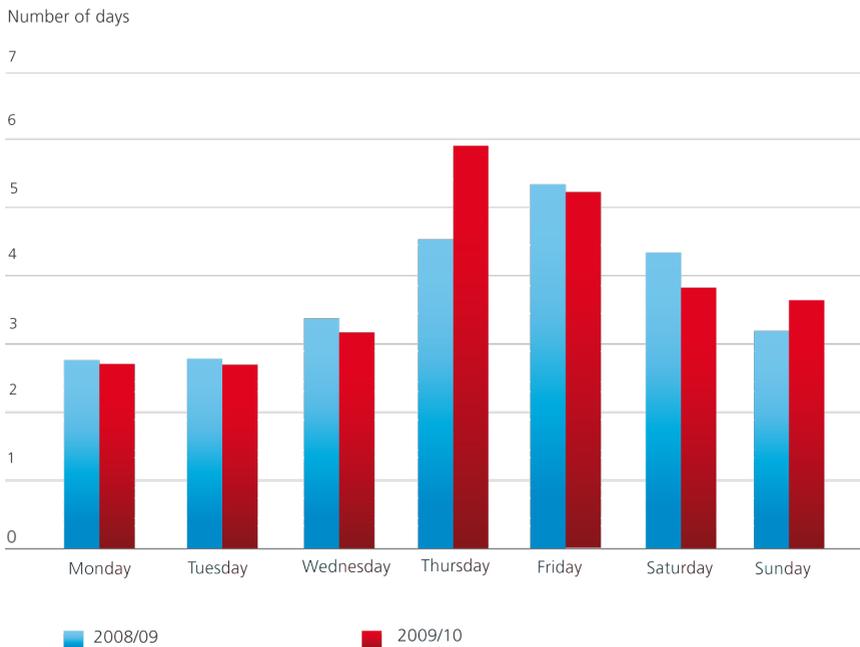
Recent NICE guidance and clinical evidence states that following risk stratification, "high risk" NSTEMACS patients that have early access (24 to 72 hours) to diagnostic angiography have improved long-term mortality outcomes.

It is not possible to see an NSTEMACS event clearly on an ECG machine. This means that patients in London are routinely taken to the nearest hospital. If it is subsequently decided that

the patient should have angiography, there are more delays – particularly associated with what day of the week a patient is admitted.

Patients admitted on a Monday, Tuesday or Wednesday are usually treated within two days. Those admitted on a Thursday or Friday have to wait over the weekend for their angiogram due to no weekend working. This is depicted in Figure 6.

Figure 6: Number of days waiting for an inpatient angiogram displayed by days of the week at one London hospital

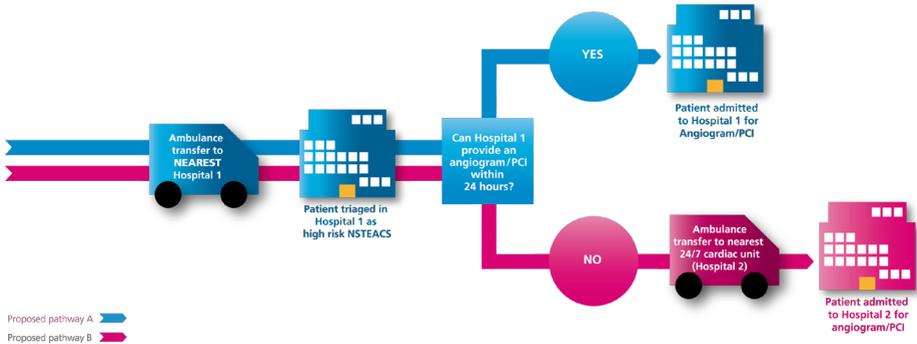


The proposed model of care recommends improvements to streamline the current patient pathway. The new pathway will:

- Diagnose and risk stratify patients early
- Manage patients according to their risk level through the use of an agreed evidence-based risk stratification tool
- Ensure that “high risk” patients are offered angiography within 24 hours of admission.

If the patient is triaged in a hospital that cannot provide angiography within 24 hours, then the patient should be transferred to a unit that can. Units wishing to provide this service should ensure that they are able to offer angiography on a seven day basis and provide commissioners with evidence of weekend working as required.

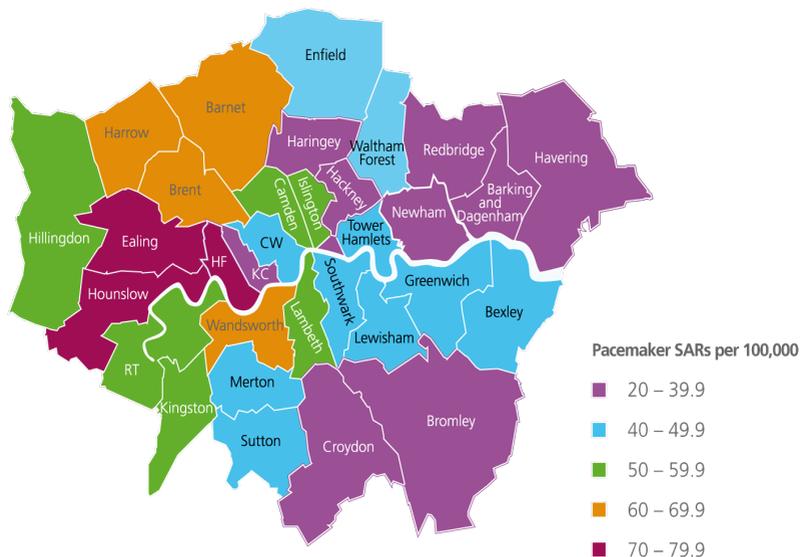
Figure 7: Proposed new pathway for high risk NSTEMI/ACS patients



2. Services for patients with heart rhythm defects

Evidence in this area shows that patients with uncorrected heart rhythm defects have a higher risk of heart failure and death. In the UK, we implant fewer corrective devices (such as pacemakers) per million population when compared to other western European nations. In addition, London data shows that the rates of device implantation vary hugely from area to area. This is depicted in Figure 8.

Figure 8: Per million pacemaker implantation rates across London 2008/9



In order to achieve the best outcomes, the NHS in London needs to ensure more patients with heart rhythm defects are identified for these corrective procedures. It is clear that among the factors responsible for the low rates of intervention in the UK is poor access to the relevant expertise.

The clinical expert panel developed several recommendations around how a new model of care could address this:

- Hospitals should work in networks to deliver these services, working closely to provide a coordinated service, with more cross-unit working of staff.
- Complex electrophysiological procedures should be delivered at central units within networks.
- Clinical expertise should be available in every hospital in the network to ensure patients receive the highest levels of care.
- Activity should be audited – performance and outcomes of services should be a mandatory for all units.

Central units should also be encouraged to offer specialist expertise to their referring hospitals. They should:

- Provide clinical support 24 hours a day, seven days a week so that urgent and emergency arrhythmia cases are managed promptly and appropriately by a specialist
- Offer to undertake clinics in referring local units.

Questions

1. Do you believe that services should change for “high risk” NSTEMI patients?
2. Do you believe the model of care proposed for high risk NSTEMI patients is the right one?
3. Do you think that hospitals should come together as networks to treat patients with heart rhythm defects?

Cardiovascular co-dependencies framework

To support the implementation of the recommendations in the proposed model of care, a framework of co-dependencies between different cardiovascular services was developed by the clinical expert panels.

The framework is intended to provide commissioners with a set of recommendations to inform the provision of future services. It can also be used by commissioners and trusts as a benchmarking tool against current service provision.

The relationship between each cardiovascular service and other services was given a colour rating. These ratings were then mapped into a colour-coded grid.

The completed framework suggests a high level of dependency between acute and complex cardiovascular procedures, including cardiac surgery and complex vascular surgery. Further detail on the service relationships is available in the co-dependencies paper.

The patient perspective

As part of the work to develop a proposed cardiovascular model of care, the project patient panel produced a paper on the things that matter most to patients having treatment for cardiovascular disease. This paper is entitled “The Patient Perspective”.

The Patient Perspective sets out a series of recommendations to providers of cardiovascular services that the patient panel felt were instrumental to improve the patient experience.

As far as practicable, there should be continuity of care with the same medical team for a patient’s stay in any one hospital. Each patient should have a named nurse on each shift to whom they can address queries. Nursing staff are a critical part of care, especially on the ward. The rotation and use of agency nursing should be kept to an absolute minimum.

Consultants should clearly demonstrate their interest in all aspects of their patient’s situation such as bed comfort, feeding, cleanliness and hygiene and quickly take up any shortcomings with those responsible.

When a patient is first admitted to hospital, a consultant inpatient appointment should be offered at a time suitable for carers and relatives to attend to support the patient and to ensure that everyone fully understands the situation.

As the patient’s stay continues, they would welcome the presence of a carer or relative to help them remember and understand what they are told by their consultant, and to ask questions on their behalf. We recommend that hospitals facilitate this by publishing details of consultants’ ward rounds so carers or relatives can visit while they are in progress.

Without having to be asked, staff should offer explanations

of any medical terms and explain the purpose of all medications and treatments. Verbal information about medical conditions, procedures and future lifestyle advice should be supplemented by easy availability of written information.

Where patients' condition permits, staff should encourage them to talk to each other about their condition and treatment. Sharing information can be mutually supportive.

The prospect of any invasive treatment can be frightening, and the facility to discuss fears with a former cardiovascular patient is valuable, and should be available at all hospitals seven days a week. Although there may be some provision of counselling and psychological assessment in hospital prior to a procedure, this is an issue of simple reassurance from someone who has had personal experience of a similar condition. The aim would be to have a list of former patients willing to visit patients on request or speak with them on the phone.

When leaving hospital patients should be encouraged to keep a patient passport or similar wallet with them at all times, containing up-to-date medical information including discharge letters, latest medication, details of GP and consultants, ECG and echo results, ICD settings, any later hospital admissions or appointments, and any other papers the patient would like to have readily available in an emergency. This material would be useful for paramedics or other professionals in the event of future emergencies. In the longer term, the wallet should include a copy of a properly structured patient care plan.

Patients should be discharged to their GP and upon discharge, all patients should have a clear care plan which includes the name of a hospital contact. Any ongoing care that a patient needs should be decided on the basis of medical need and not the ability to pay.

Financial analysis of the proposed models of care

As part of the development of the model of care for cardiovascular services in London, the cost implications of the model for each area of work – vascular services, cardiac surgery and cardiology – have been evaluated. The evaluation involved a detailed analysis based on the recommendations proposed in each model.

For the purposes of this section, the financial implications for commissioners and providers are assessed separately. Where a commissioner will continue to pay the standard HRG tariff cost, resulting in a saving for providers through changes in the ways of working, this is stated as a saving only to providers. Where there will be a change to the number or type of HRG commissioners are paying, then this is stated as a saving to commissioners.

Vascular surgery

For vascular surgery, the analysis showed that the model of care was likely to cost London commissioners an additional £464,000 per year. This was largely due to the higher use of endovascular surgery, which due to the equipment used, is more expensive to perform when compared to open surgery.

Providers are likely to make an overall saving in the region of £700,000. This was largely down to reduced length of stay in the hospital, especially on the intensive care ward.

Cardiac surgery

Analysis of the cardiac surgery model of care indicated a cost saving for both commissioners and providers. For commissioners, the saving was likely to represent around £620,000 per year. This was mainly made up of savings from reductions in bed days and savings related to the increased

uptake of mitral valve repair, rather than replacement.

The savings for providers were likely to be very significant. Made up of length of stay reductions, providers for cardiac surgery will save in the region of £5.1m a year.

Cardiology

Changes in the finances related to the cardiology model of care are more difficult to model. This is because it is more difficult to be precise about the exact number of NSTEMI and electrophysiology patients that will be affected by the proposed model of care.

However, the most significant savings are likely to be for commissioners. As high risk NSTEMI patients will be transferred immediately to a centre that can provide an angiogram within 24 hours, commissioners no longer need to pay for two hospital admissions. This will save commissioners between £1.0m and £4.0m across London per year.

The electrophysiology aspect of the model of care will impact on commissioners. Again, as the exact increase in the uptake of devices is not known, the financial analysis provided a range of costs to commissioners of between £2.0m and £4.1m.

Conclusion of financial analysis

Although different parts of the project have different costs associated with them, it is important to note that these recommendations should be taken in the round, to improve the entire service to patients. The project patient panel felt strongly that recommendations should not be chosen for implementation based only on a cost analysis.

Conclusion

The cardiovascular case for change highlighted considerable scope for improving cardiovascular services in London. It found the NHS in London could improve outcomes, quality and equity of access, as well as enhancing patients' experience.

The proposed model of care makes a number of recommendations to address the issues raised in the case for change and sets out a blueprint for the highest quality services possible to be available to Londoners.

Key proposals include centralising services where this would improve outcomes; reduce hospital stays; improve patient pathways; and have a greater sub-specialisation of surgeons delivering complex procedures and improvements in the way providers work together to deliver services.

The recommendations outlined in the model of care are designed to help and support commissioners in London to develop a world-class service for cardiovascular patients.

Full implementation should see a major improvement in the treatment, care and outcome of London's cardiovascular patients over the coming years, as well as reducing costs for the NHS. This is particularly important as the requirement for services grows, while NHS funding becomes tighter.

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- Martin Saunders (Co-Chair) – Patient and Public Advisory Group
- Christian Clark – North Central London Cardiac Network
- Iain Thomas – South West London Cardiac Network
- Sirkka Thomas – Patient Carer, South West London
- Lyn Wheeler – South East London Cardiac Network
- Barry Silverman – Patient and Public Advisory Group
- Michael English – Patient and Public Advisory Group
- Dilmohan Bhasin – Patient and Public Advisory Group
- Susan Jackson – Patient and Public Advisory Group

Vascular surgery

- Prof Nick Cheshire (Chair), Professor in Vascular Surgery, Imperial College Healthcare NHS Trust
- Ms Debra Lake, Nurse Consultant in Diabetes, Chelsea & Westminster NHS Foundation Trust
- Mr Gabriel Sayer, Director for Trauma and Consultant Vascular Surgeon, Barking Havering and Redbridge Hospitals NHS Trust
- Mr Constantinos Kyriakides, Consultant Vascular Surgeon, Barts and The London NHS Trust
- Mr Peter Taylor, Consultant Vascular & Endovascular Surgeon, Guy's & St Thomas' NHS Foundation Trust
- Dr David Evans, Consultant Interventional Radiologist, King's College Hospital NHS Foundation Trust
- Dr Colin Todd, Consultant Interventional Radiologist, Kingston

Hospital NHS Trust

- Ms Sophie Renton, Consultant Vascular Surgeon, North West London Hospitals NHS Trust
- Prof George Hamilton, Professor in Vascular Surgery and Consultant Vascular Surgeon, Royal Free Hampstead NHS Trust
- Dr Peter Holt, Vascular Fellow, St Georges Healthcare NHS Trust
- Prof Ross Naylor, Professor in Vascular Surgery and Consultant Vascular Surgeon, University of Leicester Hospitals NHS Trust
- Jeremy Gold (Co-Chair) – North Central London Cardiac Network
- Martin Saunders (Co-Chair) – Patient and Public Advisory Group

Cardiac surgery

- Mr Steve Livesey (Chair), Consultant Cardiothoracic Surgeon, Southampton University Hospitals NHS Trust
- Mr Rakesh Uppal, Consultant Cardiothoracic Surgeon, Barts and The London NHS Trust
- Ms Carol McCoskery, Head of Nursing for Cardiovascular Services, Guy's & St Thomas' NHS Foundation Trust
- Mr Christopher Young, Consultant Cardiothoracic Surgeon, Guy's & St Thomas' NHS Foundation Trust
- Dr Iqbal Malik, Consultant Cardiologist, Imperial College Healthcare NHS Trust
- Mr Andrew Chukwuemeka, Consultant Cardiothoracic Surgeon, Imperial College Healthcare NHS Trust
- Mr Olaf Wendler, Clinical Director for Cardiology and Cardiothoracic Surgery and Consultant Cardiothoracic Surgeon, King's College Hospital NHS Foundation Trust
- Mr Darryl Shore, Consultant Cardiothoracic Surgeon, Royal Brompton & Harefield NHS Foundation Trust
- Ms Marjan Jahangiri, Professor of Cardiac Surgery and Consultant Cardiothoracic Surgeon, St George's Healthcare

NHS Trust

- Mr Peter Smith, Consultant Cardiothoracic Surgeon and Medical Director North West London Cardiac Network, Imperial College Healthcare NHS Trust
- Prof Chris McGregor, Consultant Cardiothoracic Surgeon, University College London Hospitals NHS Foundation Trust
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- Martin Saunders (Co-Chair) – Patient and Public Advisory Group

Cardiology

- Dr Huon Gray (Chair), Consultant Cardiologist, Southampton University Hospitals NHS Trust
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- Dr Martyn Thomas, Clinical Director for Cardiovascular and Consultant Cardiologist, Guy's & St Thomas' NHS Foundation Trust
- Ms Glain Jones, Head of Nursing/Service Manager – Cardiac Division, King's College Hospital NHS Foundation Trust
- Dr Sanjay Sharma, Consultant Cardiologist and Honorary Senior Lecturer, King's College Hospital NHS Foundation Trust

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- Dr Kim Fox, Consultant Cardiologist, Royal Brompton & Harefield NHS Foundation Trust
- Dr Gerry Coghlan, Consultant Cardiologist and Medical Director for North Central London Cardiac Network, Royal Free Hampstead NHS Trust
- Dr Nick Bunce, Consultant Cardiologist and Medical Director for South West London Cardiac Network, St George's Healthcare NHS Trust
- Dr John Deanfield, Consultant Cardiologist, University College London Hospitals NHS Trust and Great Ormond Street
- Ms Lucy Grothier, Cardiac Network Director, South West and South East Stroke and Cardiac Networks
- Dr Conrad De Sousa, Clinical Director for South East London Cardiac Network, NHS Lewisham
- Dr Jamil Mayet, Consultant Cardiologist and Chief of Cardiology, Imperial College Healthcare NHS Trust
- Dr Edward Rowland, Consultant Cardiac Electrophysiologist, The Heart Hospital, University College London Hospitals NHS Trust
- Jeremy Gold (Co-Chair) – North Central London Cardiac Network
- Martin Saunders (Co-Chair) – Patient and Public Advisory Group

Glossary

Abdominal aortic aneurysm - an aneurysm occurs when a weakened section of the artery is stretched and balloons out, increasing to many times its normal size. The wall of the artery becomes thin and as the aneurysm grows and the artery becomes more likely to burst

Angiography / angiogram - is an interventional diagnostic procedure used to detect the level of coronary artery disease around the heart

Aortic dissection - this is a tear in the wall of the aorta that causes blood to flow between the layers of the wall of the aorta and forcing them apart

Arterial vascular surgery - is the term used to describe a group of vascular surgical procedures on the arteries. This includes surgery for an abdominal aortic aneurysm, carotid endarterectomy and lower limb artery bypass procedures

Coronary artery bypass graft - bypassing narrowed segments of the arteries, which supply the heart muscle with blood, using veins and arteries taken from behind the breast bone, the leg or the arm

Coronary artery disease - the progressive narrowing of the arteries around the heart. This starves the heart of the oxygenated blood that it needs to function properly

ECG - stands for “electro cardiogram” and is a machine used to trace the electrical activity in the heart

Elective - this is the term for routine scheduled surgery

Endovascular surgery - uses a percutaneous technique to access

the artery, which is less invasive than open repair. During the procedure, an incision is made in the groin and a stent graft (an artificial, metal reinforced, fabric tube) is fed to the site of the aneurysm and deployed

Heart rhythm defects - the medical term for this is an “arrhythmia”. This term is used to describe a heart that is not beating in the normal sequence

HRG - stands for “Healthcare Resource Group” and is a code or group of codes given to healthcare procedures which have a price associated with them. Hospitals are paid this price for each procedure they undertake

Mitral valve - the mitral valve is the main inlet valve of the heart. The most common condition affecting this valve is called “regurgitation” due to degenerative mitral valve disease

Non-elective - this is the term for surgery that was not scheduled to take place – it usually happens on an urgent or emergency basis

NSTEMI - stands for “non ST-elevation acute coronary syndrome” and is a term used to encompass patients who have either unstable angina (chest pain) or are having a less severe heart attack that cannot be seen on an ECG machine

Pacemaker - is a small device, implanted under the collar bone which is connected to the heart to help it to beat in the correct rhythm

STEMI - stands for “ST-elevation myocardial infarct” and is a type of severe heart attack



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