

CANCER

DIAGNOSTICS

HEART

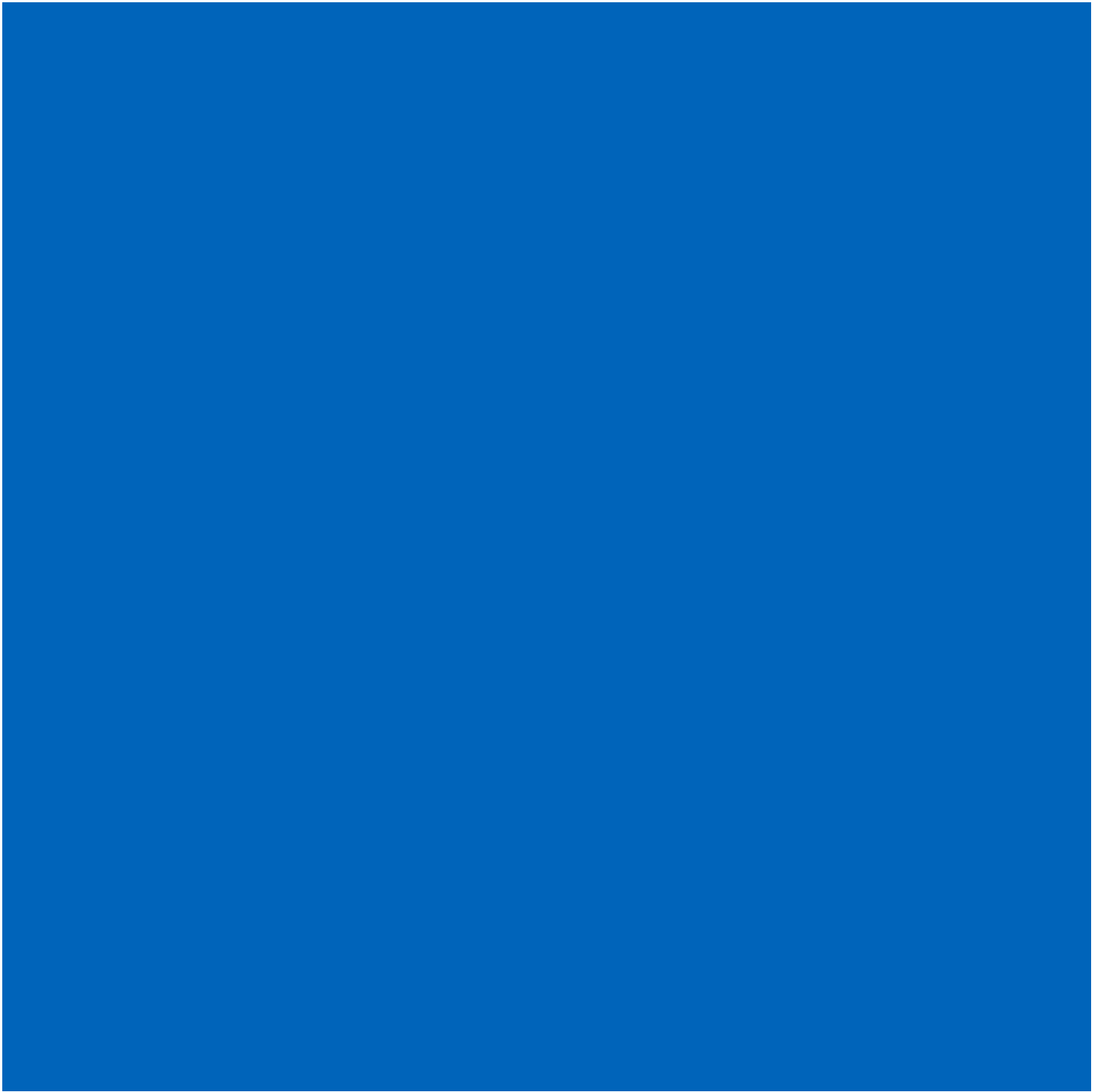
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STROKE

NHS Improvement - Diagnostics and Stroke

A guide to achieving changes in imaging services to support new stroke pathways





# Introduction

## Purpose

In 2010, NHS Improvement produced a document entitled *“Why treat stroke and transient ischaemic attacks (TIA’s) as emergencies”*<sup>1</sup>. This continuation document demonstrates how clinical teams have achieved changes in implementing new stroke pathways, utilising multidisciplinary team working in partnership with both the emergency department and stroke team. These examples are by no means comprehensive and additional case studies can be found at:

[www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)

## Understanding the current situation

In 2010, NHS Improvement conducted a series of site visits to assess progress against the imaging requirements of the National Stroke Strategy (2008)<sup>5</sup> to capture good practice and understand the challenges facing clinical teams.

A number of recommendations were made and endorsed by Professor Roger Boyle, National Heart Director, and Dr. Erika Denton, National Director for Imaging, these include:

## Engagement, leadership and planning

- More engagement and strategic direction from commissioners, stroke network directors and SHA leads in the development of services and managed networks in appropriate locations
- Trusts should address radiology department staffing levels, skill mix, training and job planning issues to achieve a timely and appropriate stroke and TIA imaging service
- Every radiology department needs a clearly defined plan of how to address, deliver and sustain the standards required in the Stroke Imaging Strategy, signed off by the trust executive lead for stroke services
- Provide/increase MRI capacity
- Undertake proactive replacement of old CT/MRI scanners
- Improve teleradiology/telemedicine facilities.



## Service process changes

- Extended working day and/or seven day CT and MRI services should be introduced to meet capacity and timeliness requirements. This will also benefit patients with other conditions and lead to reductions in length of stay
- Federation of Carotid Doppler Ultrasound (CDUS) services between hospitals should be considered where staffing levels impact upon the ability to provide a timely service
- Provide training for other non imaging staff to provide CDUS.

### Putting the patient at the heart of the service

The Department of Health publication *Equity and excellence: Liberating the NHS* (2010)<sup>2</sup> stated that: "Too often, patients are expected to fit around services, rather than services around patients."

The NHS is admired for the equity in access to healthcare it achieves; but not for the consistency of excellence to which we aspire. Our intention is to secure excellence as well as equity".

It is important when designing services to ensure the patient is placed at the heart of the service. Services that have successfully achieved the best standards are able to offer stroke patients a better experience but more importantly improved survival and quality of life. There is no better reward than to know that the service you deliver has contributed to improved patient outcomes.

### PATIENT STORY

Andrea had a stroke at home on a Friday afternoon, her mobility was affected, she couldn't speak and she only had peripheral vision. She was taken by blue light ambulance to Accident and Emergency where immediately she had a CT scan and thrombolysis treatment. While being cared for on an acute stroke unit her speech, vision and mobility returned. The following Tuesday she had a follow up scan by the same radiographer who was amazed at her recovery.

Andrea has since been able to return to work as a staff nurse for 16 hours a week. Without thrombolysis treatment she would have been left with significant disability. She is grateful that she was fortunate enough to receive the best treatment and hopes that soon all stroke patients will have access to timely CT scanning 24 hours a day seven days a week.

### Multidisciplinary team working

Multidisciplinary teams working in partnership are key to delivering effective pathways of care. Radiology departments cannot work in isolation and need to engage with everyone involved in stroke pathways to improve patient outcomes and experience.

Process mapping plays an important role in reviewing existing pathways and identifying areas where changes need to and can be made. Greater benefit is achieved by mapping services across departments and by multidisciplinary teams identifying and implementing improvements together.

### Improving outcomes<sup>4</sup>

Evidence indicates that immediate brain imaging for stroke is cost effective and essential for optimal management of stroke and TIA. Early intervention such as thrombolysis, specialist care, physiotherapy and speech therapy has led to the development of stroke units which:

- Reduce mortality
- Reduce length of stay
- Improve functional recovery and minimise residual disability
- Increase the chance of a return to an independent life again.

Rapid access to diagnostic tests is key to achieving this and can significantly improve outcomes for patients

### Best Practice Tariff (BPT)

To support redesign of services changes in the tariff have been made. A best practice tariff (BPT) is a national tariff that has been structured and priced to provide incentives and reimburse trusts that provide high quality and cost effective care.

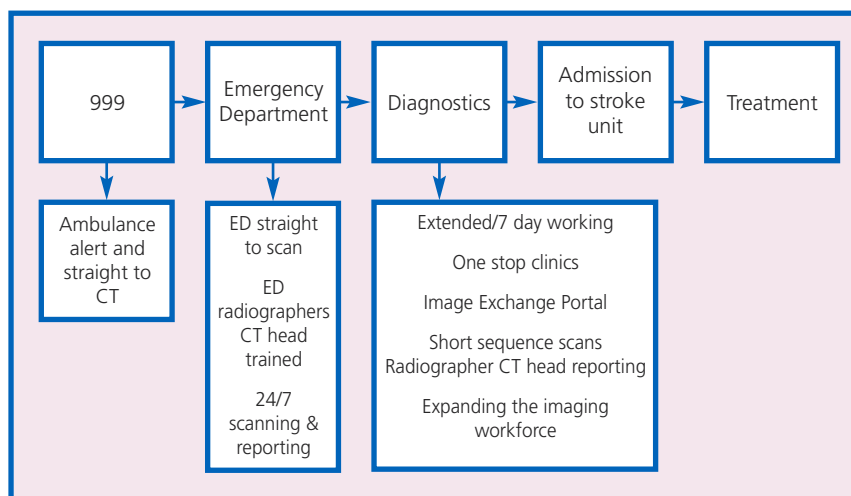
The stroke BPT is designed to generate improvements in clinical quality in the acute part of the patient pathway. Changes to this mean there is now a greater differential between the base tariff and BPT.

In 2011/12, a new BPT is being introduced for TIA<sup>3</sup>. This tariff relates to timely and effective outpatient systems for treating patients with TIA and complements the current BPT for stroke. It incorporates the following elements:

1. Base tariff price of £450 (for providers meeting minimum best practice criteria)
2. Additional payment of £92 for treatment of high risk patients within 24 hours
3. Additional payment of £92 for use of MRI<sup>3</sup>.

### Opportunities for change

The diagram below demonstrates the five high level steps in the stroke pathway and opportunities for implementing change.



## Accelerating stroke improvement

### Measuring the quality of care

Nine key measures have been developed<sup>6</sup> to enable a baseline assessment for each stroke community and indicate whether or not they are on a trajectory that will deliver high quality care consistently across England. These measures are challenging but reflect the ambition to go further and faster this year in accelerating improvements in stroke services. All these measures came into force in April 2010 with the aspiration to be achieved by April 2011 and will continue for 2011/12.

**Of the nine measures 4a, 4b and 5 have a direct impact on radiology and the way we deliver our service.**

### Accelerating Stroke Improvement Measures

1. **60% of patients presenting with stroke to have received AF anticoagulation discharge.**
2. **90% of patients to be admitted to an acute stroke unit within four hours of admission.**
3. **80% of patients to spend 90% of their stay on a stroke ward.**
- 4a. **50% of patients to have received brain imaging within one hour of arrival.**
- 4b. **100% of patients to have received brain imaging within 24 hours of arrival.**
5. **60% of high risk TIA patients investigated and treated within 24 hours of first contact with a health professional.**
6. **40% of patients to have received psychological support for mood, behaviour or cognitive disturbance by six months following a stroke.**
7. **85% of patients and carers to have received joint care plans on discharge from hospital.**
8. **95% of patients to be reviewed within six months of leaving hospital.**
9. **Presence of a stroke skilled early supported discharge team of which 40% of patients are supported by.**

# Radiology improvements and case studies

## Measure 4a - Access to brain imaging

### Acute stroke

50% of patients to have received brain imaging within one hour of arrival.

### Rationale

Brain imaging should be performed immediately for defined groups of people with acute stroke.

50% of patients presenting with stroke symptoms are estimated to need an urgent scan based on National Institute for Clinical Excellence (NICE) criteria<sup>4</sup>:

- >10% of stroke patients should be thrombolysed, and would require immediate scanning
- 10% of stroke patients have haemorrhages, and are likely to have a depressed level of consciousness and/or be on warfarin
- 10% of patients will have unexplained or fluctuating symptoms.

### CASE STUDY

#### Rapid access to CT via paramedic ambulance staff

Royal Bournemouth and Christchurch Hospitals NHS Foundation Trust

#### Summary

The pathway for patient's requiring thrombolysis has been streamlined, improving patient experience and outcomes. Patients are assessed by paramedics. If they meet the clinical criteria for thrombolysis they are taken directly to the CT scanner.

#### How the changes were implemented

- Paramedics pre-screen patients using FAST/ROSIER
- If the patient is suitable for thrombolysis, paramedic calls emergency department BAT phone (emergency department phone for ambulance crew to alert hospital)
- Stroke crash call implemented
- Paramedics take patient directly to CT (unless unstable)
- Stroke team meets the patient at CT suite and writes a request form
- CT undertaken in next available slot and immediately reported by radiologist.

#### What is the evidence that it has made a difference

- Reduced patient pathway time leading to quicker thrombolysis and therefore better prognosis
- Reduced inpatient stay
- Reduced dependency on healthcare system and care packages
- Impact on patient outcome.

**This has reduced the time from emergency department door to CT scanner to an average of eight minutes.**

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>

### The challenge

The main challenge is providing these services out of hours and at weekends.

Teams have experienced particular issues in the following areas:

- Pathways to CT scanner
- Numbers of radiographers who can scan out of hours
- Reporting of out of hours scans.

### Improving pathways to the CT scanner

Rapid access to the CT scanner is key in achieving the one hour target. It is important that changes are implemented in partnership with the emergency department, ambulance service and stroke team.

### Providing a seven day 24/7 CT service

#### CASE STUDY

#### 24 hour CT imaging for suspected stroke patients

Chesterfield Royal Hospital NHS Foundation Trust

##### Summary

Patients with suspected stroke had two admission paths either through A&E (for self referrals) or direct to a ward (for GP referrals). Patients often had to wait overnight for CT meaning they did not receive their scan within 24 hours.

##### How the changes were implemented

- A single trust wide stroke strategy was introduced
- All patients admitted through emergency department for assessment
- Immediate slots are built into the CT schedule
- Patients not requiring immediate scanning have an appointment booked through the stroke unit.

##### What is the evidence that it has made a difference

- Patients with stroke symptoms receive timely imaging in line with the National Stroke Strategy guidelines
- Access to CT imaging has been improved
- Two one-stop clinics per week have been introduced for TIA patients where patients receive CT imaging and/or Carotid Doppler scans
- The above changes also benefited staff, as they all now follow one protocol when caring for suspected stroke patients.

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>



There are several examples of how other departments have successfully implemented 24/7 services including:

- Countess of Chester Hospital NHS Foundation Trust
- Hull and East Yorkshire NHS Trust
- South Devon Healthcare NHS Foundation Trust
- Salford Royal Hospital NHS Foundation Trust.

### **Training emergency department radiographers to undertake CT head scans**

This is an area which has advanced over recent years with a large number of trusts investing time and money to train staff to undertake CT head scans and provide a 24/7 service.

## **CASE STUDY**

### **Increasing the number of radiographers trained to provide 24/7 CT service**

Great Western Hospitals NHS Foundation Trust, Swindon

#### **Summary**

The department was not providing a 24/7 Stroke CT service for thrombolysis and urgent CT scans. The department has contracted night staff that were not trained to use the CT scanner. CT heads were done by the CT on call radiographer. Due to the time taken for the radiographer to travel to the hospital and switch on the equipment, urgent CT scans could not be performed within 30 minutes.

#### **How the changes were implemented**

- Introducing a training programme
- The radiographers were trained to perform CT heads by a senior radiographer
- The training was backed up by a detailed step by step guide on how to perform a CT head including instructions on the use of the equipment and software
- On average it took four sessions to complete the training to ensure radiographers were competent
- The approximate cost to train four radiographers was £1,200.

#### **What is the evidence that it has made a difference**

- Decreased response time for head scans, all scans now performed within 30 minutes of patient arriving in emergency department
- The patient pathway and care is improved
- The patient is admitted to the stroke unit in a more timely fashion and transferred directly following CT scan
- The rapid diagnosis results in the patient receiving appropriate treatment quicker
- Financial savings are achieved as the on call CT radiographer is not called (average of £50 per patient)
- Out of hours CT scanning is incorporated into 'routine' night work.

For full case study see [www.improvement.nhs.uk/diagnostics7](http://www.improvement.nhs.uk/diagnostics7)

There are several examples of how other departments have successfully implemented CT head scans training programs to provide 24/7 services including:

- St Helens and Knowsley Teaching Hospitals NHS Trust
- Salford Royal NHS Foundation Trust.

### Reporting of out of hours scans

There are a number of different options to achieve 24/7 reporting:

- Training radiographers/physicians to undertake reporting of CT head scans for stroke
- Network with other trusts within the stroke region utilising electronic transfer systems
- Teleradiology reporting from home
- Outsource to independent provider
- Image transfer for all forms of teleradiology is supported by the Image Exchange Portal.

## CASE STUDY

### CT head reporting by radiographers

Kingston Hospital NHS Trust

#### Summary

To achieve a quicker CT response time for stroke patients.

#### How the changes were implemented

- The decision was made to give contrast for CT head scans by CT head reporting radiographer without radiologist input
- Reporting radiographers are allowed to vet all CT head requests and out patients body/head requests under protocol
- CT reporting radiographer provides image interpretation lectures to emergency department doctors and medical students.

#### What is the evidence it has made a difference

- In four years, the CT radiographer has reported 30.25% of all the adult CT head scans (4,500 scans out of a total of 14,750)
- Hot reporting of A&E head scans including thrombolysis scans
- Quicker turnaround of stroke patients scans.

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>

There are several examples of how other departments have successfully trained radiographers to provide a comprehensive reporting service for CT head reporting including Stockport NHS Foundation Trust.

## Measure 4b: Access to brain imaging

100% of patients to have received brain imaging within 24 hours of arrival.

The easiest method to improve admission to scan time is by reviewing the existing pathway and simplifying the process.

Booking appointments for stroke patients once they have been admitted to the ward wastes staff time, creates delay and can have a detrimental effect on the patient's experience and outcome. Many departments now ensure patients are scanned en route from the emergency department to the ward or stroke unit.

### CASE STUDY

#### Fast track CT scanning and reporting for thrombolysis patients

Medway NHS Foundation Trust

##### Summary

The provision of fast track CT scanning and reporting driven by CT radiographers and CT head reporting radiographers for thrombolysis patients 24/7.

##### How the changes were implemented

- The care pathway was reviewed
- Direct referral to CT head reporting radiographer implemented
- CT radiographers treat cases as an emergency and are able to scan within 15 minutes of call – next slot on scanner
- Negotiated CT radiographers to stay on site, rather than on-call from home, during the week the hospital is 'on take' for thrombolysis
- CT head reporting radiographers report all thrombolysis cases straight after the scan either in the department or by teleradiology
- Adopted 30 minute standard from call for scan to final report being published on PACS.

##### What is the evidence it has made a difference

- In 2009/10, 28 patients were thrombolysed (100%) in time frame
- CT reporting radiographers reporting on 90% of all CT head referrals, not only stroke but A&E, inpatient and outpatient referrals including on call at night via tele-radiology
- Direct referral to the CT radiographer has streamlined the service
- CT head reporting radiographer available 24/7 to report immediately
- Thrombolisation takes place within one hour of referral.

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>

### Image Exchange Portal

Image Exchange Portal (IEP) is a web based solution that enables the transfer of digital images between NHS organisations and independent health providers. It improves the ability to share patient's diagnostic information. It has been deployed across the UK since January 2010

Since departments have converted to digital imaging, there have been a number of methods of transferring images between Trusts. In the earlier days, burning images onto CDs was the most common method, and is still frequently used today. There are other methods of transferring images via networks which do have the advantages over CDs. However, this often still involves the manual process of telephoning a department for the images and a manual documentation procedure monitoring the status of the request. Also, the report commonly cannot be linked with the images.

IEP has the advantage of networking images with an automated process. This streamlines the whole process, with reduced risk of lost requests and images. These tasks are often carried out by radiographers. By using the IEP system, this frees up their professional time to focus on clinical tasks.

### Advantages of IEP

- Securely transfers patient images
- The report can be sent with the images
- Eliminates the costly production of CDs
- Streamlines radiology reporting
- Provides speedier access to images and reports for MDT meetings
- Improves patient experience due to the streamlined exchange of diagnostic results
- Ensures efficient use of staff time.

### Benefits of IEP

- Provides timely transport of images to support rapid clinical decision making leading to improved outcomes for patients
- Reduces risk of losing CDs between hospitals
- Reduces CD and postage costs
- Reduces staff time producing and despatching CDs
- Provides a report and images together (report cannot be burned onto the CD).

### Impact on patient outcome

The safe and streamlined transfer of images and reports is key to ensure rapid diagnosis and treatment of patients. The impact of a rapid transfer includes:

- Rapid access for a secondary radiologist opinion from speciality centres
- Images are readily available for MDT meetings at tertiary centres
- Urgent transfer of images and report for emergency care for patients e.g multi trauma

- Transfer of images to accompany transfer of patient care e.g. cancer/stroke patients
- Transfer of images back to patient's local hospital for follow up care.

#### Transfer facts and figures

- Daily number of studies transferred average = 3,000
- Weekend and Bank Holiday transfer average = 1,000
- Studies transferred in 2010 = 235,000 (45 million images)
- Studies transferred in January 2011 = 46,000 (9 million images).

For further information about IEP the website is [www.image-exchange.co.uk](http://www.image-exchange.co.uk) and [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)

## Measure 5: Management of high risk TIA

60% High risk TIA patients investigated and treated within 24 hours of first contact with a health professional.

Trusts are providing this in many ways depending on the resources available:

- CT Angiography
- MR Angiography
- Carotid Doppler Ultrasound.

Rapid imaging for TIA patients is needed to ensure appropriate treatment that will prevent subsequent stroke and to ensure carotid intervention is used where appropriate.

This may represent a more significant challenge than the urgent response to stroke, in terms of changes to service provision, particularly out of hours. Staffing models and current capacity need to be investigated in order to provide innovative solutions.

### The challenge

The challenge is largely due to:

- Capacity and demand issues in MRI scanning
- Numbers of skilled staff
- Out of hours provision.

Consideration should be given to:

1. Short sequence fast MR scans
2. Understanding capacity and demand
3. Extended day/seven day services
4. Expanding the skilled workforce.

### Short sequence fast MRI scans

Many NHS trusts are now using the fast MRI scan protocol for brain imaging for TIAs. This can reduce the scan time down to five minutes. This is particularly helpful as many sites have MRI capacity issues. By decreasing the timing of the scan, it increases the capacity on the scanner, and it also easier to 'slot in' the urgent scans.

## CASE STUDY

### Short sequence MRI brain scans for high risk TIA

Central Manchester NHS Trust

#### Summary

Implementation of a new pathway for high risk TIA patients and short sequence MRI scanning.

#### How the changes were implemented

- The care pathway was reviewed and changed
- Fast MRI protocol was implemented in line with NICE guidelines
- A phone referral system was implemented
- Patient consent obtained prior to arrival in department
- A system established to access the neurological team was implemented.

#### What is the evidence it has made a difference

- **Total scan time reduced to three minutes**
- Audit revealed that:
  - 225 patients **scanned within two hours** (82% of total)
  - 256 patients **scanned within six hours** (93% of total).

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>

A number of other sites have adopted this including:

- Royal United Hospital Bath NHS Trust
- South Devon Healthcare NHS Foundation Trust
- Royal Hampshire County Hospital.

#### Understanding capacity and demand

It is important to understand the daily capacity required to meet the current demand. Capacity includes equipment and staff skills available to operate the equipment.

See *Modernising Radiology Services Toolkit: a practical guide to redesign*<sup>8</sup> for detailed information.

For further information go to: [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)

**CASE STUDY****Rapid access to Carotid Doppler Imaging for patients with Transient Ischaemic Attack's (TIA's)**

University Hospitals of Leicester NHS Trust

**Summary**

Patients suffering from a possible Transient Ischaemic Attack could only access hospital services through the outpatients department. This could take up to three weeks. National stroke guidance advised that high risk TIA patients should be seen within 24 hours.

**How the changes were implemented**

- A specialised TIA service was set up
- All possible TIA's are referred to this clinic
- Open seven days a week
- Carotid Doppler scanning provided seven mornings a week by a vascular scientist
- Access to five MRI slots each weekday plus additional weekend imaging.

**What is the evidence it has made a difference**

- 450 patients seen in first four months of opening
- 77% of high risk TIA patients seen within 24 hours
- Reduced risk of patient's suffering a stroke
- Extremely good patient feedback.

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>

### Expanding the imaging workforce

In order to provide effective scanning services we have to be more innovative and look at other staffing groups that can be trained to be competent to undertake diagnostic tests.

- Sonographers
- Vascular technicians
- Combination of both
- Nurse practitioners
- Trained stroke doctors.

### CASE STUDY

#### Improving access to services for patients with Transient Ischaemic Attack's

Royal Devon and Exeter NHS Foundation Trust.

#### Summary

Average referral to assessment remained at two days. The main reason for this was that referrals received on a Friday, Saturday or Sunday could not be assessed until the next working day.

#### How the changes were implemented

- Stroke nurse practitioners trained to undertake carotid screening
- Competent to locate and identify the common carotid artery (CCA) and the carotid branches
- Competent to record velocities and assess velocity shifts using a spectral Doppler, and produce B-mode colour images
- Period of dual scanning undertaken.

#### What is the evidence it has made a difference

- All patients presenting during weekend and bank holiday periods will have a carotid ultrasound screening investigation
- Significant reduction in waiting times for Carotid Doppler scans
- Audit demonstrated that 44% of admissions could have been avoided utilising the nurse practitioner screening service.

For full case study see [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)<sup>7</sup>



## Conclusion

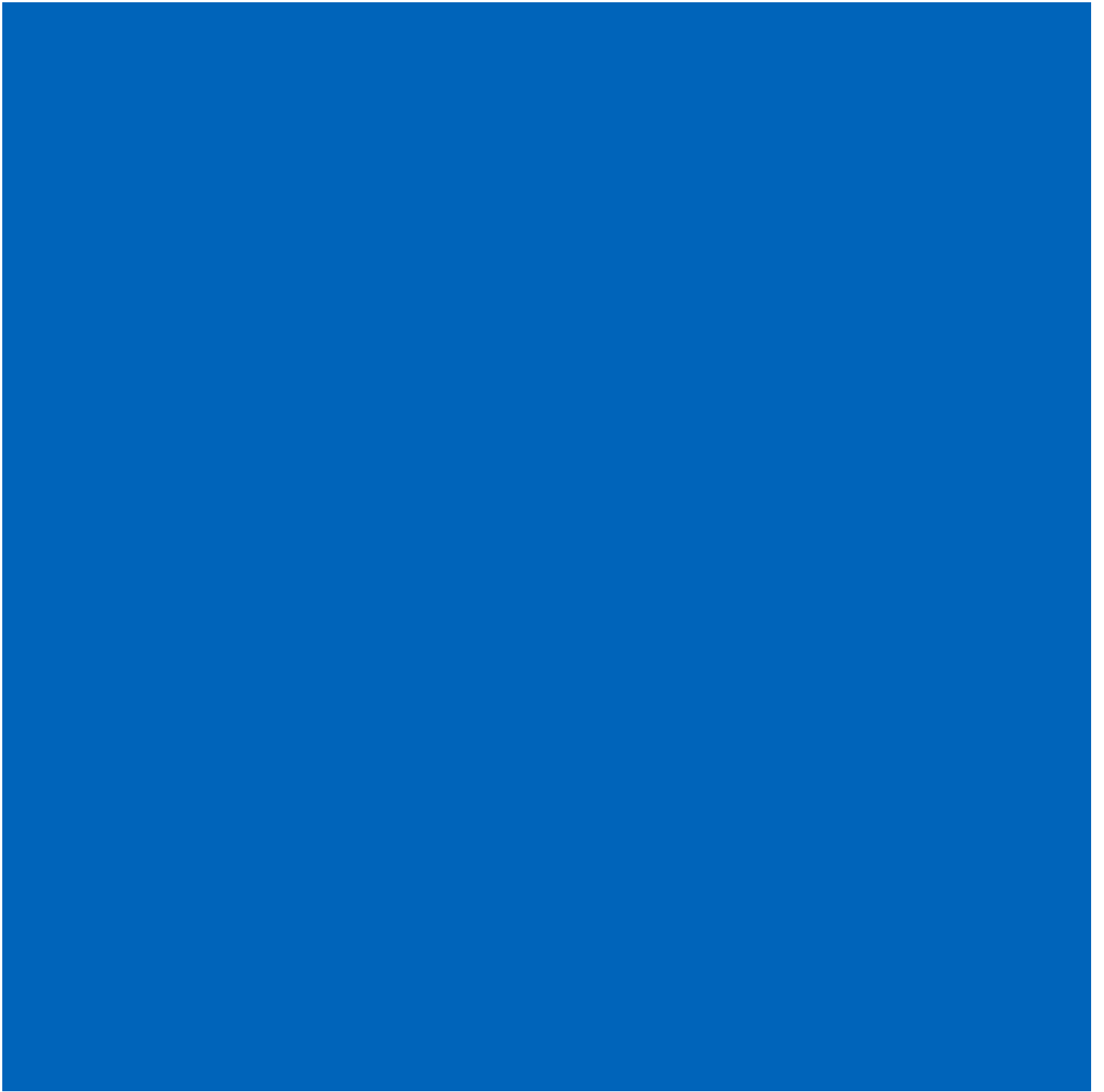
Improving outcomes for stroke and TIA patients is an area where timely radiology services can make a huge difference to both individual patients and the population as a whole. The potential benefit is based on very good evidence and although making these changes can be challenging the outcome far outweighs any logistical difficulties.

The recovery potential of the brain is amazing. By implementing what can be minor changes we can maximise salvage of brain tissue improving quality of life, regaining function and independence.

For further details please go to [www.improvement.nhs.uk/diagnostics](http://www.improvement.nhs.uk/diagnostics)

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## NHS Improvement

NHS Improvement has over 10 years improvement experience. With our practical knowledge and 'how to' approach we help improve the quality and productivity of services through using innovative approaches as well as tried and tested improvement methodology.

Over the last 12 months we have tested, implemented, sustained and spread improvements with over 250 sites to assist in improving services in cancer, diagnostics, heart, lung and stroke. Working closely with the Department of Health, trusts, clinical networks, other health organisations and charities we have helped deliver key strategies and policies to improve the delivery and implementation of improved services for clinical teams and their patients across the NHS.

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