The Role of the Radiographer in Stroke Management

This is a second edition of the advice and guidance document which was originally issued on 1 September 2007. The document now takes account of **Implementing the National Stroke Strategy – an imaging guide** published 2 June 2008 by Department of Health (England) which is available from:

http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_085146

Introduction

Radiographers are a vital part of the specialist stroke care team. Patients with acute brain attack require rapid access to high quality and appropriate imaging in order to diagnose the type of stroke[1,2].

Patients who suffer a Transient Ischaemic Attack (TIA) have been shown to be at high risk of suffering an ischaemic stroke and also require urgent imaging after appropriate assessment in order to ensure reduced morbidity.

These patients also require follow up imaging, either by Computed Tomography (CT) or Magnetic Resonance (MR) in order to assess the efficacy, and/or options for further treatment.

Early intervention

Radiographers undertaking this work not only have highly specialist skills in imaging modalities, but are experienced in the care and techniques required for scanning acutely ill patients who require urgent assessment during a critical period of the care pathway. Additionally, they may also have the advanced practitioner skills to review and report the images obtained to help facilitate rapid access to thrombolytic therapy by the stroke care team, or neurosurgical review, within the short timescale required. They may also able to undertake the further imaging techniques such at CT Angiography and CT perfusion imaging. There will also be a need for MR scanning, specifically for TIA including Diffusion Weighted Imaging (DWI), MR perfusion, also Magnetic Resonance Angiography (MRA) and Contrast Enhanced MRA (CEMRA) if appropriate, and depending on local protocols.

Definitions

Transient Ischaemic Attack – sometimes defined as a minor stroke, in which the blood supply to the brain is temporarily disturbed, leading to stroke like symptoms, but where the symptoms resolve within 24 hours. The cause of TIA is the same as the cause of ischaemic stroke (see below)

Stroke- caused by a disturbance in the blood supply to the brain and there are two main types:

1. Ischaemic Stroke - triggered by a clot narrowing or blocking a blood vessel to the brain causing the area of brain supplied by that vessel to be starved of oxygen, leading to the death of brain cells.

2. Haemorrhagic Stroke (or Primary Intracerebral Haemorrhage) triggered by the bursting of blood vessels leading to bleeding into the brain which causes damage.

There are other unusual, and relatively rare, types of stroke and conditions which mimic the symptoms of stroke. Examples may include: Cerebellar haematoma, or large vessel dissection.

Imaging is vital in helping to identify the causes of acute stroke. Definitive diagnosis between these brain assaults is normally undertaken initially by CT brain scanning, and effective treatment, which is very different, depending on the type of stroke diagnosed, cannot be commenced until imaging and interpretation of these scans has taken place. The importance of the radiography workforce, therefore, cannot be overestimated.

The Role of the Radiographer

The Institute for Innovation and Improvement undertook a review in October 2006 [3] and concluded that rapid thrombolysis in infarction of the brain reduced long term disability outcomes by 30%. Implementation of this treatment in the UK has been limited and the Organisation of Economic Co-operation and Development[4] (OECD) in 2006, showed that the UK lags behind Europe, North America and Australia in stroke treatment. However, the Department of Health has embarked on a programme of Improving Stroke Services and is pressing for early diagnosis and intervention in service delivery. Likewise, the National Institute for Health and Clinical Excellence (NICE) is currently developing guidance on 'Stroke: The diagnosis and Acute Management of Stroke and Transient Ischaemic Attacks, which is due to be issued in July 2008.

Thrombolytic therapy with recombinant tissue plasminogen activator (rt-PA) is licensed to be used within 3 hours of acute ischaemic stroke, thus delays in neuro-imaging must be minimised[5]. A rigorous thrombolytic pathway, with rapid access to CT scanning and reporting, will need to be introduced. The patient will also need to be admitted into the care of the stroke team as part of this pathway.

Imaging overview

The Department of Health document Implementing the National Stroke Strategy – an imaging guide[6] advises that imaging Services Managers will need to be able to provide the following services:-

TIA

- MRI/MRA brain for those patients requiring it to be available seven days per week. Scanners will be required to have appropriate software for gradient echo and diffusion weighted imaging. There should also be provision for Contrast Enhanced MRA (CEMRA) for first line carotid imaging with facilities for pump injection.

- Carotid imaging seven days a week, which will ideally include CEMRA and duplex ultrasound, and CT angiography, although this would depend on local protocol. The DH Stroke Policy Team recognises that this will be difficult to deliver and if MR is available patient may have CEMRA at the same time. However, if MR is not available, but carotid Doppler is, then that should be the pathway. The DH Stroke Policy Team is not prescriptive and a patient should only need one type.

Stroke

- 24 hour access to CT with patients who may be suitable for thrombolysis being scanned within as short a timescale as possible, but in next (appropriately triaged) slot in hours and within 60 minutes out of hours,

- Rapidly accessible MRI, with the features described above for those patients who require it;

and

- Ability to undertake more complex imaging examinations for stroke subtypes as described.

Within the UK there are examples of Clinical Imaging Departments operating systems which allow for rapid access to CT, under NICE guidelines for Head Injury Head injury[7]: This allows for rapid access CT scanning of patients 24 hours a day 7 days per week, and could be utilised for the imaging of stroke patients. Interpretation of the images needs to be both rapid and accurate. This may be achieved using a variety of options involving neuroradiologists, appropriately skilled stroke physicians or the use of teleradiology. A more elegant solution may be a suitably trained, competent and authorised specialist radiographer to provide both imaging and reporting. It should be noted that post graduate courses in interpretation of head CT images have existed for some years[8] and CT head reporting by radiographers is considered normal practice in many imaging departments.

Those patients who are either unsuitable for thrombolysis therapy, or who do not show a positive response, will need other types of imaging such as chest X Rays, either at the bedside, or in the department. They may also have associated pathology which has predisposed them to cerebral infarction, such as peripheral vascular disease or a history of mobility problems, requiring radiological investigation. The Royal College of Speech and Language Therapy has demonstrated the value of early assessment of dysphagia (swallowing difficulties) which has the potential to cause long term problems[9].

Video fluoroscopy can be useful in the assessment and appraisal of damage; this is undertaken by Speech and Language Therapists in conjunction with Radiographers.

Stroke survivors who suffer deficit following a stroke will also suffer ongoing medical problems. These may include pneumonia, urinary tract infections, and thromboembolic events and they may also have sustained other injuries at the time of the stroke. In both cases they will be frequent visitors to radiology departments and will require sensitive support, particularly if they have cognitive impairment, in order to explain and enable them to co-operate with the imaging modality.

Impact on imaging departments

Projected Workload – A large DGH will have a catchment of 500,000 population.

TIA: Each year for a population of 500,000 around 500 patients will suffer a TIA.

Stroke: Per 500,000 population

- 25 patients per week if everyone is referred/attends hospital – most will present between 06.00 hrs and 23.00 hrs.
- Virtually all will require brain imaging – more than half urgently (in next scan slot or within 1 hour)
- 10-20 per cent of urgent cases will require further brain imaging such as MRI within 24 hours
- Anticipated imaging during week = 15-17 CT brain and 3-4 MRI brain
- Anticipated imaging during weekend = 7-9 per week, 1-2 per month requiring further brain imaging

Most of these patients are already being imaged but the proportion examined as a matter of urgency will increase, and the proportion undergoing MR as well as CT will increase.

Workforce issues

Existing imaging staffing numbers and skill mix profiles in many areas are insufficient to deliver the required input in TIA and stroke care pathways. The workforce required to deliver effective imaging in TIA and stroke includes staff with skill in image acquisition and interpretation, together with more specialised neuroradiological expertise when required. Clerical, nursing and portering staff in imaging departments also need to be considered.

The Society and College of Radiographers would expect all newly qualified radiographers to be competent to undertake emergency unenhanced CT imaging of the brain, following appropriate induction, and preceptorship in departments. However, additional skills will be required to undertake more advanced techniques such as CTA. There will need to be consideration of how appropriately trained MR radiographers deliver the TIA and stroke service both in and out of hours.

The workforce carrying out carotid ultrasound investigations come from a wide variety of backgrounds. As duplex ultrasound is operator dependent, ensuring the correct competences are held by this group is essential, and regular audit should be undertaken by departments.

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Responsible Officers: Kate Garas and Christina Freeman

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