


**Stroke and TIA management in adults:**  
guidelines for the first 72 hours  
of symptom- onset

University Hospitals of Leicester   
NHS Trust

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## 1. Introduction and Who Guideline applies to

Guidelines and principal related documents for the medical and allied health professional (AHP) management of adults presenting to UHL with suspected or confirmed acute stroke and/or transient ischaemic attack (TIA) within the first 72 hours of symptom-onset. The document is the single source of guidelines for UHL covering the first 72 hour pathway for which the emergency, general medical, radiology and stroke medical and AHP (therapy) departments have responsibility. Some management guidelines beyond the 72 hour period are included where relevant to the acute management pathway. Clear service evaluation criteria are detailed, linked to the Stroke Sentinel National Audit Programme (SSNAP).

This guideline is applicable to staff who have responsibility for the management of people with acute stroke or TIA across the University Hospitals of Leicester NHS Trust.

Prior and current versions have been circulated widely to senior clinicians and stakeholders, including the wider multi-disciplinary team.

## 2. **Guideline Standards and Procedures**

Starts on next page

# Stroke & TIA management in adults

## UHL Guideline

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## 2 Key messages

- **Acute stroke is a treatable condition**

Clinical outcomes can be improved significantly great difference can be made to the patient if the correct actions are taken quickly. If you think 'stroke' is a possibility: engage the stroke assessment processes promptly, work quickly, do not allow therapeutic nihilism to prevail. Do not over-estimate the risk of thrombolysis. The NHS Long Term Plan aims for 20% of people with a stroke to have received intravenous thrombolysis, and 10% mechanical thrombectomy.

- **Approximately 80% of strokes are preventable**

Play your part: use prompt antiplatelet agents in TIA and minor stroke, prevent a stroke by anti-coagulating people in atrial fibrillation and ensuring appropriate treatment for blood pressure and cholesterol. Promote a healthy lifestyle.

## 3 General management of acute stroke and TIA

### 3.1 Definition

Overall, acute stroke is divided into two main types:

- **Ischaemic stroke** occurs when a blood clot blocks an artery that carries blood to the brain. Deprived of oxygen, brain cells die at a rate of two million cells per minute, increasing the risk of permanent brain damage, disability, or death.
- **Primary intra-cerebral haemorrhage (PICH)** is defined as non-traumatic spontaneous bleeding into the brain tissue.

It is preferable to **avoid the term "haemorrhagic stroke"** as it can cause confusion with haemorrhagic transformation of ischaemic stroke, and intracranial extracerebral haemorrhage, which influence future risk and antithrombotic management.

A transient ischaemic attack (TIA) is due to the above pathologies (mostly ischaemia), but the neurological deficit lasts for typically one hour or less. Where irreversible tissue damage is demonstrated in a clinical TIA on brain imaging, the diagnosis should be considered a stroke.

Extracerebral (subdural, extradural, subarachnoid) and trauma-induced intra-cerebral bleeding, hypoxic-

ischaemic encephalopathy, cerebral trauma, and diffuse axonal injury are all excluded from this definition. There is no specific requirement for these conditions to be managed by Stroke Medicine over and above any other medical or surgical specialty.

## 3.2 Diagnosis

### 3.2.1 Pre-diagnostic indicators

#### 3.2.1.1 Onset

Acute stroke and TIA are typically characterized by the sudden onset of a focal neurologic deficit, though some people have a stepwise or gradual progression of symptoms. Symptoms tend to occur in all affected body areas at the same time and resolve gradually.

#### 3.2.1.2 Neurological deficits

Common deficits include: sudden weakness or numbness of the face, arm or leg, especially on one side of the body; sudden confusion, trouble speaking or understanding; sudden trouble seeing in one (transient monocular blindness affecting whole of one eye) or both eyes (a homonymous field deficit, as opposed to global binocular); sudden trouble walking, dizziness, loss of balance or coordination. Consciousness is generally normal but may become impaired.

**The symptoms and signs reflect an acute loss of focal cerebral function.**

- **Negative symptoms**

Symptoms are principally **negative**. Negative symptoms indicate an absence or loss of function, such as loss of vision, hearing, feeling, or ability to move a part of the body. Where stroke causes **positive** symptoms, such symptoms are almost always have been preceded by **negative** symptoms.

- **Positive symptoms**

Positive symptoms indicate active discharge from central nervous system neurons. Typical positive symptoms can be:

- visual (e.g., bright lines, shapes, objects),
- auditory (e.g. tinnitus, noises, music),
- somatosensory (e.g. burning, pain, paraesthesias), or
- motor (e.g. jerking or repetitive rhythmic movements).

Migraine and seizures are by far the commonest explanation for positive symptoms.



### 3.2.1.3 Risk factors

Commonly the person has risk factors for a stroke or TIA, such as a history of previous stroke or TIA, hypertension, diabetes, smoking and atrial fibrillation. People on anticoagulant drugs have a slightly higher risk of intra-cerebral haemorrhage. People with a first degree relative with a history of ischaemic heart disease, stroke or dementia occurring at age < 60 years are also at increased risk.

**Absence of risk factors does not rule out stroke and must be interpreted considering the overall diagnostic formulation.**

## 3.2.2 Diagnostic indicators

### 3.2.2.1 Clinical

- The FAST test

Test for facial weakness: Can the person smile? Has their mouth or eye drooped? Test for arm weakness: Can the person raise both arms? Test for speech problems: Can the person speak clearly and understand what you say? If a person fails any one of these tests, an acute stroke is likely. The FAST test has a sensitivity of 81% and specificity of 39% for acute stroke. FAST is easier to comprehend for lay people, however for clinical purposes has been superseded by BEFAST.

- The ROSIER scale

The ROSIER scale detects a history of seizure or syncope which are common stroke mimics and, if present, make a diagnosis of acute stroke much less likely (see section 10.4.1). Then the person is examined. If **new, acute and asymmetrical** face, arm and/or leg weakness is detected, or a speech disturbance or visual field deficit is present these components are scored. Stroke is likely if the total score is > 0. ROSIER has a sensitivity of 83% and specificity of 44% for acute stroke.

- The BEFAST test

Consequently, addition of gait and visual abnormalities to the FAST test led to the development of BEFAST (befast.org), which includes Balance, Eyes, Face, Arm, Speech and Time (see section 10.4.2). This was developed because the FAST test fails to identify up to 38% of posterior circulation strokes. A systematic review concluded a sensitivity of 68%, and specificity of 85% for acute stroke. Use of BEFAST is reported to reduce of false negatives from 14% to 4.4%. BEFAST is now the preferred test for acute stroke for pre-hospital use.

Stroke Scale	Sensitivity (% of final stroke diagnoses that are correctly identified as positive)	Specificity (% of final non-stroke diagnoses that are correctly identified as negative)
FAST	81%	39%
ROSIER	83%	44%
BEFAST	68%	85%

Table 1. Sensitivity and specificity of Stroke assessment scales

- **The National Institutes of Health Stroke Scale (NIHSS)**

The NIHSS is a structured neurological assessment scale for use specifically in the setting of stroke. Neurological deficit is quantified into an ordinal scale from 0 to 42 points. An increasing score indicates higher severity of deficit. There is good inter-rater reliability between trained users and a score change of 4 or more points indicates a significant change. The NIHSS is possible to score in all patients and must be recorded for all patients with suspected stroke. A demonstration can be seen in the virtual simulation course (VIRSIM) on HELM (<https://uhlhelm.com/course-catalogue/7143/9526/>).

<b>NIHSS Score</b>	<b>Neurological deficit category</b>
0-3	Mild
4-14	Moderate
15-24	Severe
>24	Very severe

*Table 2. Proposed categorisation of severity of neurological deficit by NIHSS score*

It is important to note that the NIHSS is not a comprehensive ‘neurological’ examination. Where other differentials are being considered, please ensure a full neurological examination e.g. dermatomal sensory assessment, reflexes etc.

### **3.2.2.2 Radiological**

- **Ischaemic**

Within the first few hours of acute ischaemic stroke, a computed tomography (CT) head scan is usually normal. Early signs of ischaemia include:

1. ocular gaze deviation
2. the presence of a hyper-dense cerebral artery
3. loss of definition of sub-cortical nuclei and grey-white matter borders and
4. sulcal effacement.

Loss of grey-white differentiation can be analysed in a structured fashion using the ASPECT score for the anterior circulation, and the PC-ASPECT score for the posterior circulation. An online training resource is available with courses for CT imaging in hyperacute stroke and CT simulation with e-ASPECTS.

Plain or non-contrast CT head is not sensitive for large vessel occlusion (LVO) – only about 1 in 5 will have a hyper-dense artery sign on CT head. Consequently, CT angiography should be performed to diagnose LVO as a step to Mechanical Thrombectomy.

Magnetic resonance imaging (MRI) usually demonstrates tissue infarction from onset, but there are occasional exceptions (e.g. in brainstem infarction). Practical difficulties of organising an MR examination in the hyper-acute phase of stroke usually preclude its use in this setting.

A CT head should **not** be performed for suspected TIA unless there is clinical suspicion of an alternative diagnosis that CT could detect for example, intra-cerebral haemorrhage or mass lesion. People who have had a suspected TIA who need brain imaging (that is, those in whom vascular territory or pathology is uncertain) should undergo diffusion-weighted MRI. If MRI is contraindicated, CT (computed tomography) scanning may be considered.

- **Intracerebral haemorrhage**

Acute haemorrhage on CT head scan is usually obvious as an area of focal hyperdensity. Hydrocephalus and blood in the ventricular system may also be present.

CT angiography to detect an underlying lesion should be considered acutely at the point of presentation where neurological deterioration suggests the potential for early intervention. In general, CTA and contrast imaging to look for underlying abnormalities (e.g. aneurysm, AVM, tumour) can be deferred until stroke consultant review within working hours.

MRI shows signal drop out, enhanced on T2\* gradient-weighted echo sequences, or on susceptibility-weighted imaging but is arguably less useful than a CT examination in the acute phase.

### 3.2.3 Protocol for Stroke Medicine assuming care

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#### *SSNAP Metric 4.1*

*Proportion of patients assessed by a stroke specialist consultant physician within 24h of clock start*

#### *SSNAP Metric 4.3*

*Proportion of patients who were assessed by a nurse trained in stroke management within 24h of clock start*

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#### *3.2.3.1 Presentations in the Emergency Department*

- **BEFAST test positive**

Stroke Medicine will automatically assume management responsibility for people identified and documented before arrival as BEFAST test positive by the ambulance service. Where the ambulance crew have communicated one or more 'brain at risk' criteria in advance of their arrival, a 2222 'RAP' call will be placed via switchboard. The ambulance crew

For these people, the stroke nurse will become directly involved with and lead clinical management supported by other members of the stroke team regardless of time of symptom-onset, or pre-morbid dependency.

For people fulfilling one or more 'brain at risk' criteria and not yet receiving care from Stroke Medicine, a 2222 'RAP' call should be placed immediately via switchboard. Within LRI, the Stroke team will attend to the patient as an emergency. Where needed, the Stroke Consultant oncall can be contacted on their mobile phone (via MediRota or via switchboard) if advice is required.

- **Other people with suspected stroke**

People suspected as having a stroke but not fulfilling the criteria above must be managed by ED according to the LRI Emergency Department 'Management of Suspected Stroke and TIA' document (see section 10.1). Adherence to the pathway increases the likelihood of a correct diagnosis and directs appropriate management decisions. Where a senior opinion is recommended, if a registrar is not always available or does not have stroke-specialist experience, then a stroke consultant is available for advice round-the-clock.

- **Transient ischaemic attack**

People with uncomplicated TIA can be discharged according to the LRI Emergency Department 'Management of Suspected Stroke and TIA' document (see section 10.1) and provided with an appointment for the TIA clinic on 'PLEXiAS' (<http://uhlstrokeweb01>).

### *3.2.3.2 Presentations in other parts of the hospital*

- **Stroke suspected as the underlying reason for original presentation**

Acute stroke is a clinical diagnosis, and not necessarily made on serendipitous imaging reports. The stroke nurse will not become involved in the management of this group of people until reviewed and accepted by a senior stroke physician. If the imaging findings unequivocally demonstrate an acute stroke or the principal clinical diagnosis is acute stroke the person should be transferred immediately to the stroke unit.

People under neurology with stroke conditions requiring a period of in-patient care can be transferred to a stroke bed at the discretion of a senior neurology physician without the need for prior discussion with the stroke service, although it is good practice to notify a senior doctor on the stroke team.

- **Stroke or TIA occurring as an inpatient**

A 2222 'RAP' call should be placed immediately via switchboard stating the nature and location of the emergency. In the case of acute stroke occurring at the Leicester General or Glenfield Hospital communication with the on-call stroke consultant or registrar on an urgent basis is required.

- If hyper-acute interventions may be feasible
  - o Do not wait for a brain scan before alerting the stroke team.
  - o In LGH and GH, a 999 blue light call must be made for immediate transfer to LRI for life-saving interventions, by access to rapid imaging and hyper-acute stroke team review.
- If acute stroke is detected too late for any hyper-acute intervention to be of benefit
  - o The clinical details should be discussed with the on-call stroke consultant.

o Out-of-area patients (e.g. patient has a stroke after cardiac surgery provided as tertiary service to a Lincoln patient) should not be transferred to the LRI stroke unit, but to the person's base hospital stroke unit.

### **3.2.4 Documentation of care**

All decision-making, metric collection and drug-prescribing can be recorded using the Stroke Blue Sheet (see section 9.1), and referrals must be made in accordance with the LRI Emergency Department 'Management of Suspected Stroke' document (see section 2). These documents ensure assessment is focused and targeted on providing hyper-acute stroke therapy with rapid delivery of the patient to the stroke unit. The more comprehensive stroke clerking document should be reserved for use once the patient is receiving care on the stroke unit. The key documentation and admission record documents are listed below.

#### ***3.2.4.1 Stroke Blue Sheet – for stroke team assessment in ED***

The Stroke Blue Sheet is intended to aid a rapid targeted assessment in the setting of suspected stroke, leading to urgent brain imaging and hyperacute intervention, as indicated.

All elements must be completed as this is monitored as part of the national SSNAP audit.

#### ***3.2.4.2 Nervecentre ED Clinician Specialty Review – summary of specialist review in ED***

With the move to paper-free working in ED, it is important to add a brief comment under ED Clinician Specialty Review about diagnosis and plan. This is particularly important in the setting of a non-acute stroke diagnosis where care may be handed over to another team.

#### ***3.2.4.3 Stroke clerking booklet – clerking upon arrival in Stroke Unit***

This is a bespoke clerking document for the Stroke Unit, which should be completed as soon as possible upon arrival to the Stroke Unit. This is the primary responsibility of the trainee covering the Hyper Acute Stroke Unit.

#### ***3.2.4.4 Nervecentre eMeds***

It is important to start the Nervecentre eMeds record as early as possible, including allergies & VTE risk assessment. Ideally, this should be started in ED to ensure that essential medications are not missed, and then ensure review, completion and verification in the Stroke Unit. Please refer to the primary care tab where pre-admission medications will be recorded.

### 3.3 Assessment

The initial ABCDE approach to safety should not be neglected. However, this should be undertaken rapidly to avoid any delay to time-sensitive interventions.

#### 3.3.1 Stabilisation

Ensure the person has a clear airway, is breathing and has a stable circulation. Treat with 24-35% oxygen via facemask if oxygen saturation is <94% (beware of suppressing hypoxic ventilation-drive in some people with chronic obstructive pulmonary disease). Refer to glycaemia management guidance (see section 5.2). Place an intravenous cannula in the antecubital fossa.

#### 3.3.2 Assessment of clinical history

Obtain clinical details from affected person, relatives, paramedics (where present) and nursing staff. Determine time of onset. Where necessary, use electronic systems to access previous clinical documents and investigations and telephone the person's usual doctor and/or relatives and carers for additional information. Enquire about recent trauma, bleeding or surgery. Obtain a full drug and allergy history.

#### 3.3.3 Assessment of neurological deficit

Assess alertness using the Glasgow Coma Scale (see section 10.4.3), and neurological deficit using the NIH Stroke Score (see section 10.4.4).

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#### *SSNAP Metric 4.5*

#### *Proportion of applicable patients who were given a swallow screen within 4h of clock start*

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A dysphagia screen should be carried out by a suitably qualified person.

#### 3.3.4 Assessment of cardiovascular and other systems

Perform cardiovascular, respiratory and abdominal examination. Assess for associated infection, e.g. aspiration pneumonia, endocarditis. Particular medical conditions which may need urgent treatment include: infections, fast atrial fibrillation, heart failure and hypotension.

### 3.3.5 Neuroradiological study

#### 3.3.5.1 'Brain at risk' criteria and interval standard

Most people require an immediate 'next-on-the-table' head CT scan:

- New onset neurological deficit as part of hyperacute assessment
- Indication for thrombolysis/thrombectomy or early anticoagulation treatment
- On anticoagulant medication (e.g. Vitamin K antagonist, direct oral anticoagulant or heparin)
- Drowsiness GCS < 13 and/or NIHSS 1a ≥ 1
- Known bleeding diathesis (e.g. von Willebrand's disease)
- Unexplained progressive / fluctuating symptoms after onset
- Severe headache at onset
- Papilloedema, neck stiffness or fever

This is facilitated by the Stroke RAP team. Please follow the updated pathway within the Stroke service.

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#### SSNAP Metric 1.1

##### *Proportion of patients scanned within 1 hour of clock start*

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#### 3.3.5.2 Procedure for obtaining a scan

People accepted by Stroke Medicine with a history of acute stroke should:

- Have a 'CT for Stroke' or 'CTA for Stroke' request completed on NerveCentre (NC) by an approved member of the stroke team (defaults to 'next-on-table' urgency)
- Have their details phoned through to the ED CT scanning room prior to transfer on extension 10131 or 10124.
- Be transferred by members of the stroke team to the scanner (engage ED porters as long as this does not contribute to delay).
- Be facilitated on and off the scanning table by the stroke team in concert with radiology staff
- If receiving intravenous thrombolysis, receive a bolus dose in the scanning suite

Refer to the hyperacute imaging pathway being iteratively developed in line with evidence, regional policy and availability of mechanical thrombectomy.

#### 3.3.5.3 Other investigations

The NC Stroke Path order set titled 'First/Initial Stroke Presentation (GEN MED)' should be requested. This minimum set consists of full blood count, INR, urea and electrolytes, glucose, liver function test, bone profile, creatine kinase, C reactive protein, lipids, thyroid function test, magnesium, HbA1c and ED BBV screen. Do not wait for these results before providing acute stroke therapies (including thrombolysis) unless specific indication.

A 12-lead ECG is required for all patients. Request a chest x-ray **if** an indication is present. Secondary investigations will be guided by consultant review.

#### *3.3.5.4 People taking anticoagulant medication*

An urgent INR is required on a person known to be taking Warfarin, a full citrated blood sample must be delivered to the 'hot-lab' in ED. Please see urgent management of coagulopathy for acute cerebral haemorrhage in section 4.2.2.2.

If the person is known to be taking a direct oral anticoagulant, factor Xa assays can be requested, if necessary, at all times of the day via the on-call haematology MLSO. Two full citrated blood samples require hand delivery to the lab.

A normal thrombin time (TT) in a person taking Dabigatran rules out presence of any significant amount of plasma Dabigatran.

### **3.4 Management pathway**

#### **3.4.1 Location of care**

##### *3.4.1.1 People with acute disabling stroke*

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#### *SSNAP Metric 4.1*

*Proportion of patients assessed by a stroke specialist consultant physician within 24h of clock start*

#### *SSNAP Metric 4.3*

*Proportion of patients who were assessed by a nurse trained in stroke management within 24h of clock start*

*('clock start' is equivalent to hospital admission time, or time of stroke if occurring as an in-patient)*

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##### *3.4.1.2 With a stable cardio-respiratory system*

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#### *SSNAP Metric 2.1*

*Proportion of patients directly admitted to a stroke unit within 4 hours of clock start*

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Transfer to the Hyper-Acute Stroke Unit (HASU) should occur as soon as practicable and certainly within 4



hours of admission to hospital. This includes people with acute stroke who are undergoing palliative care. People with a stroke should not be out-lying to a non-stroke specialist ward, except in specific circumstances and only with the consent of a senior-level clinician.

#### *3.4.1.3 With an unstable cardio-respiratory system*

Identification and initial management should be undertaken by Stroke Medicine with involvement of the intensive care service as appropriate. Where the clinical situation can be managed by Stroke Medicine, transfer to HASU should occur. HASU is equipped to manage medically unstable people to Level 1 with critical care outreach.

An exception is the management of people requiring non-invasive positive pressure ventilation which should occur on the acute care bay.

#### *3.4.1.4 Requiring urgent neurosurgical assessment*

A person pending transfer to the neurosurgery service should ideally be **transferred directly from ED** to minimise delay. Any delays should be escalated to the ED floor coordinator. If the Glasgow Coma Score is currently or likely to fall to 8 or below, and/or there is cardio-respiratory instability, an anaesthetic assessment prior to transfer is required. See local guidelines on inter-hospital adult patient transfer and escort.

#### *3.4.1.5 People with non-stroke conditions*

- **Identified before transfer to stroke unit**

People seen by the stroke team and confirmed to have a secure non-stroke diagnosis should have an initial management plan put in train by the stroke team. Ordinarily, the stroke team should refer the person to the appropriate specialty (e.g. subdural haemorrhage/tumour/sepsis to acute medicine, seizure to neurology or medicine, trauma to emergency department).

At times of high admission pressure to acute medicine and where there are more than 3 HASU 'hot-beds' available on the stroke unit, the person confirmed to have a secure non-stroke diagnosis may be transferred to the stroke unit. This will be facilitated by the RAP nurse, who will be responsible for appropriate patient selection.

- **Identified after transfer to stroke unit**

People confirmed to have a secure non-stroke diagnosis may only remain in the Stroke Unit if there are no stroke patients waiting. In such circumstances, all efforts must be made to facilitate transfer to an alternative location of care.

People with neurological conditions requiring a period of in-patient care can be transferred to a neurology bed at the discretion of a stroke consultant without the need for prior discussion with the neurology service,

although it is good practice to notify a senior doctor on the neurology team.

### 3.4.2 Monitoring and treatment of physiological disturbance

During the first 24 hours of admission to the stroke unit, people should undergo continuous cardiac monitoring and oxygen saturation with blood pressure, neurological status observation, temperature and finger-prick glucose being performed every 4 hours. Fluid balance monitoring should occur. Sources of pyrexia should be fully investigated (including blood cultures) and treated with targeted antimicrobial therapy where appropriate and regular paracetamol for the first 72 hours. For specific blood pressure management guidelines see section 5.1. For specific glycaemia management guidelines see section 5.2. Uncontrolled ventricular rate in atrial fibrillation should be managed according to UHL Guidelines for Atrial Fibrillation.

#### 3.4.2.1 Hydration and nutrition

People with acute stroke should be *nil-by-mouth* until assessed by a person trained in dysphagia management. If the person fails the dysphagia test, or has evidence of or is at risk of fluid depletion, intravenous fluids (2 to 3 litres per 24 hours - 0.9% saline, **avoid glucose**) should be given. Prompt nasogastric tube placement for administration of drugs and nutrition should be considered, especially where there is evidence of malnourishment. Urinary catheterisation should be avoided wherever possible as this carries a high risk of sepsis and long-term incontinence. Urinary retention ( $\geq 400$ mls) in the acute phase of stroke should usually be treated with a single in-out catheter, with regular monitoring of bladder volume and clinical status.

### 3.4.3 Prevention of venous thrombo-embolism

Avoid anticoagulation including prophylactic low molecular weight heparin because this harms as many people as it benefits. Thromboembolism deterrent (TED) stockings are contraindicated. If the person is not able to get up from a chair / out of bed and walk to the toilet without the help of another person, prescribe a sequential compression device (intermittent pneumatic compression) for the first 30 days (search 'IPC' on eMeds). IPC is prescribed by default for all patients as part of the Stroke Admissions Bundle (on NerveCentre eMeds). This is indicated for all patients:

- a) Who are not on treatment-dose anticoagulation
- b) With an indication (unable to get up and walk to the toilet independently), and
- c) Without contraindications (skin break or at risk; significant oedema; absent foot pulses).

The prescription is pragmatically implemented by the Stroke nurses and must be stopped if the above criteria are not met. Where IPC is not feasible, a consultant opinion regarding LMWH should be sought at the next senior review.

### 3.4.4 Comprehensive nursing care

In addition to the measures above, a comprehensive nursing care assessment should include positioning and mobilisation needs, pressure area care and assessment of pressure ulcer risk, oral hygiene, bladder control and continence management, cognitive and language capacity, hearing and visual needs and family/carer needs. A comprehensive training resource in these aspects of care is provided at [STARS – Stroke Training and Awareness Resources](#).

### 3.4.5 Education and caregiver support

Education should be provided for stroke survivors and their caregivers/family. Caregiver support should be provided for those overseeing the needs of stroke survivors, including provision of accurate information about stroke, emotional and practical support, and identification of important community resources and agencies such as the [Stroke Association](#), [Different Strokes](#), and [Headway](#).

### 3.4.6 Palliative care

Where a palliative approach is being taken, the local guidance should be followed including identification of person-centred goals and commencement of relevant discussions with the person and caregivers/family. Do not make a Nil-by-Mouth order: food and fluid should be offered by mouth for comfort as desired and tolerated.

### 3.4.7 Previous medication

See section 4.1 for the continuation of hypertensive drugs. Continue other drugs for the heart but withhold anticoagulant drugs unless person is at very high risk of thrombo-embolism (e.g. mechanical mitral valve), in which case senior advice should be sought. Steroid doses (equivalent to Prednisolone 5mg daily or above) should be doubled to avoid Addisonian crisis.

Continued next page.

### 3.4.8 Stroke rehabilitation

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#### *SSNAP Metric 4.6*

*Proportion of applicable patients who were given a formal swallow assessment within 72h of clock start*

#### *SSNAP Metric 8.1*

*Proportion of applicable patients who were assessed by an occupational therapist within 72h of clock start*

#### *SSNAP Metric 8.3*

*Proportion of applicable patients who were assessed by a physiotherapist within 72h of clock start*

#### *SSNAP Metric 8.8*

*Proportion of applicable patients who are assessed by a nurse within 24h AND at least one therapist within 24h AND all relevant therapists within 72h AND have rehab goals agreed within 5 days*

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All people *on the stroke unit* receiving a diagnosis of acute stroke are automatically referred to the Stroke Physiotherapy and Occupational Therapy teams. Those without a diagnosis of acute stroke require medical and nursing review including mobility assessment, and subsequent referral to therapy where indicated. Further details on stroke rehabilitation are in Section 6.

**Continued next page.**

## 4 Specific management of Stroke and Transient Ischaemic Attack

### 4.1 Stroke

#### 4.1.1 Minor ischaemic stroke

##### 4.1.1.1 Definition

A minor ischaemic stroke is defined (for the purposes of these guidelines) as acute cerebral arterial occlusion/embolism causing a NIH score of  $\leq 3$ , **without aphasia, without binocular visual field deficit, without swallowing deficit and the person is independent with walking and self-care**. Minor ischaemic stroke is a high-risk condition for major disabling ischaemic stroke.

##### 4.1.1.2 Treatment

- **Standard Treatment**

Aspirin 300 mg oral loading dose AND Clopidogrel 600mg oral loading dose (An aspirin-allergic person should receive Clopidogrel 600mg loading dose alone) if presenting within 48 hours of onset of symptoms **likely** to be due to a TIA. An example of induction therapy is:

#### Antiplatelets

- Immediate: Aspirin 300mg and Clopidogrel 600mg stat
- Day 2 to 21: Aspirin 75mg daily and Clopidogrel 75mg daily
- After day 21: Clopidogrel 75mg daily
- Other alternative to Clopidogrel is Ticagrelor 180mg stat followed up by 90mg bd long-term
- All patients with dual antiplatelets and those with risk factors for GI bleeding must be given PPI cover for at least the duration of aspirin therapy.

#### Risk factor management

- Total cholesterol should be treated to a target of 4.0 mmol/L or lower, LDL 1.8 mmol/L or lower, or a 25% reduction (whichever is greater). A stricter LDL target of 1.4 mmol/L or lower is recommended in the setting of atherosclerotic disease – refer to LLR Lipid Pathway.
- Blood pressure should be treated to an optimal target of 130/80 mmHg or lower.
- Lifestyle advice including smoking cessation, moderating alcohol intake, regular exercise, salt intake and diet should be provided.

Risk factors	Initial target (and longer-term target for frail individuals)	Optimal target (longer-term, for non-frail individuals)
High blood pressure	<140/90	<130/80 (home BP <125/75)
High cholesterol	LDL <1.8 Total cholesterol <4.0	LDL <1.4

Table 3. Standard risk factor targets for prevention of recurrent stroke

- **50 to 99% symptomatic carotid stenosis**

When carotid atheroma results in a significant stenosis (>50% by the NASCET method), the surgical threshold is reached. If the significant stenosis is symptomatic (i.e. causes acute neurological symptoms), carotid endarterectomy should be offered. Please consult the responsible Stroke Consultant (or oncall Consultant) urgently and if deemed appropriate, a referral to vascular surgery should be made promptly within standard working hours to minimise event to treatment time.

- **Atrial fibrillation**

Anticoagulation risk-benefit assessment should be undertaken, and anticoagulation therapy initiated promptly in discussion with the Stroke Consultant. Treatment with a direct oral anticoagulant is preferred, unless contraindicated – please refer to the [UHL Guidelines for Atrial Fibrillation](#).

The timing of anticoagulation initiation following a stroke remains the subject of ongoing research studies, and it is not clear presently whether early or delayed initiation has any benefits. A pragmatic approach in discussion with the responsible stroke consultant is recommended. An expert consensus guideline is available ([EHRA practical guide](#)).

- **Location of care**

If the above criteria for minor, non-disabling stroke are met; in the absence of haemorrhage on head CT scan; and providing there is cardiovascular and neurological stability, the person should not require admission to the stroke unit and may be discharged.

The UHL TIA and minor stroke clinic can assess people quickly and efficiently, identifying and managing minor rehabilitation issues. Urgent referral to the daily one-stop TIA and minor stroke clinic should be made online on 'PLEXiAS' at <http://uhlstrokeweb01>. The importance of this appointment should be stressed to the person and a full-day appointment should be expected. The person should be discharged but advised to return to hospital immediately should a worsening of symptoms occur.

Drivers must be advised not to drive until further assessment in the TIA clinic according to the DVLA regulations. A minimum 1 month driving ban is required after a TIA or stroke.

## 4.1.2 Major ischaemic stroke

### 4.1.2.1 Definition

A major ischaemic stroke is defined (for the purposes of these guidelines) as acute cerebral arterial occlusion/embolism causing one or more of an NIHSS score  $\geq 4$ , aphasia, binocular visual field deficit, a swallowing deficit, being unable to walk or self-care independently. Major ischaemic stroke is a high-risk condition for further major disabling ischaemic stroke.

### 4.1.2.2 Hyper-acute Management

- Medical management

## Intravenous thrombolysis

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### SSNAP Metric 3.1

#### *Proportion of all stroke patients given thrombolysis (all stroke types)*

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Patients with acute ischaemic stroke, regardless of age or stroke severity, in whom treatment can be started within 4.5 hours of known onset, should be considered for intravenous thrombolysis with Tenecteplase (or alteplase). Please refer to the IVT management pathway for details (see section 5.3).

## Antiplatelet therapy

Where thrombolysis is contra-indicated, following treatment regimen should be used.

**Day 1 to 14:** Aspirin 300mg od. (For patients who are allergic to Aspirin, other alternatives are Clopidogrel 600mg stat followed up by 75mg daily long-term or Ticagleror 180mg stat followed up 90mg bd long-term).

**After day 14:** Clopidogrel 75mg daily (if intolerance to Clopidogrel, consider Aspirin 75mg od or Ticagleror 90mg bd)

## Antihypertensive therapy

See management guidelines in section 0.

- [Surgical management](#)

### **Mechanical thrombectomy**

Queens Medical Centre in Nottingham offer a regional mechanical thrombectomy (MT) service for large vessel occlusion (LVO) in acute ischaemic stroke accepting referrals between 0800 and 1800 Monday to Friday and 0800 and 1200 on weekends and bank holidays.

(This window is expected to expand to 24-7 in 2025 and interim updates will be circulated widely)

### **Anterior circulation stroke**

- Within 4.5 hours – IVT should be given (unless contraindicated). In addition, CT Angiography for possible MT should be considered if: independent (mRS 0-2) and NIHSS score of 6 or more.
- 4.5 to **12 hours** – CT Angiography for possible MT should be considered if: independent (mRS 0-2), NIHSS score of 6 or more, and ASPECT score of 3 or more
- 12 to 24 hours – It is likely that window for hyperacute interventions will be extended to 24 hours once CT perfusion is available. The guideline will be updated at that point.

### **Posterior circulation stroke**

- Within 4.5 hours – IVT should be given (unless contraindicated). In addition, CT Angiography for possible MT should be considered if independent (mRS 0-2), and NIHSS score of 10 or more.
- 4.5 to **9 hours** – IVT should be considered in individual circumstances (unless contraindicated). In addition, CT Angiography for possible MT should be considered if independent (mRS 0-2), and NIHSS score of 10 or more. CT Perfusion where available may enable individualised decision-making.
- 9 to 24 hours – CT Angiography for MT should be considered if independent (mRS 0-2), and NIHSS score of 10 or more. CT Perfusion where available may enable individualised decision-making.

If LVO is demonstrated on CTA, an immediate referral to the INR hotline (07812 270086) must be undertaken immediately (during MT availability hours) or first thing in the morning. The Stroke Consultant oncall must be made aware prior to any referrals.



## Decompressive hemicraniectomy

Decompressive hemicraniectomy is a neurosurgical option in major stroke (which should be performed within 48 hours of symptom onset), for those people presenting with acute lobar infarction (e.g. middle cerebral artery, hemi-cerebellum). These people at risk should:

- Receive management on HASU for a minimum of 48 hours after the onset of stroke-symptoms.
- Undergo repeated neurological observations (every 4 hours for the first 48 hours, and until an alternative management plan is established).

Repeated neurological observations include:

- NIHSS score
- Glasgow Coma Score
- Pupillary size and reaction

a) Any indication of neurological worsening (**NIH 1a  $\geq 1$ , NIH score increase  $\geq 4$  points, GCS decrease 1 point, or asymmetrical pupil response**) should prompt an urgent CT head and a direct call to the duty stroke consultant.

b) Where NIH  $\geq 10$ , consider a repeat CT or MRI brain scan at 20-24 hours after symptom onset to assist in the identification of a person at risk. Where a significant infarct is demonstrated (CT: infarct of at least 50% of the middle cerebral artery territory, or DW MRI: infarct volume greater than 145 cm<sup>3</sup>), an urgent discussion must be undertaken with the responsible consultant (or oncall Stroke consultant).

- In case of a) and/or b), the duty stroke consultant should ensure prompt assessment of the person (personally, via telemedicine, or by delegation to the oncall registrar for stroke).
- Where appropriate, the consultant or appointed delegate should counsel the person and family about the appropriateness of referral for further neurological monitoring with consideration of decompression. The risks and benefits of decompressive hemicraniectomy should be discussed with the person or their family members or carers as appropriate, considering their **pre-stroke** functional status, and their wishes and preferences. The following is an example of a narrative that can be used in discussions:

*“Decompressive hemicraniectomy significantly reduces mortality, while most of the survivors have significant neurological impairment and disability which limits their functional ability. Many people will need ongoing and costly long-term nursing care. The clear mortality benefit of decompressive hemicraniectomy is important to many people with stroke, their families, and carers, irrespective of the poor functional outcomes of surgery.”*

In addition, a [NICE patient decision aid](#) is available online and can be printed to give to patient / advocates.

- If a referral is deemed appropriate and agreed by family or carers, this should be made by the senior responsible clinician (during working hours, this would be the stroke consultant, and out-of-hours, the registrar should consult the oncall stroke consultant). If the neurosurgical registrar is unavailable or gives advice at odds with perceived wisdom, the neurosurgical consultant should be contacted directly, after approval by the Stroke Consultant on call.

**Continued next page.**

## 4.2 Primary Intra-cerebral Haemorrhage

### 4.2.1 Definition

Primary Intra-cerebral Haemorrhage (PICH) is defined as non-traumatic spontaneous acute bleeding into the brain tissue.

### 4.2.2 Hyper-acute management

#### 4.2.2.1 Bundled care

Implementing a goal-directed care ABC bundle in ICH (ensuring timely reversal of anticoagulation, blood pressure lowering to target and early identification for surgery/escalated care) lowers mortality (Parry-Jones et al, 2023 and 2023b). In addition, randomised data supporting additional factors including maintaining glycaemia (CBG <12) and preventing pyrexia (temperature <37.5 degrees Celsius) are important elements of acute ICH care.

The ABC pathway must be implemented like the thrombolysis pathway as a hyperacute intervention within the first hour of hospital presentation – see section 10.3.

#### 4.2.2.2 Medical management

- Reversal of anticoagulation

Coagulation parameters must be checked urgently in people suspected of having a coagulopathy (drug-induced, or related to disease). Clotting levels in people with a PICH who are receiving anticoagulation with a vitamin K antagonist (e.g. warfarin) before their stroke, should be returned to a normal international normalised ratio (INR) as soon as possible, by reversing the effects of the warfarin/vitamin K antagonist treatment using a combination of prothrombin complex concentrate and intravenous vitamin K. This treatment should be provided within the first hour of arrival to hospital ideally within the emergency department (see local guidelines on rapid reversal of anticoagulation). For the management of bleeding for people on direct oral anticoagulants refer to the local guidelines). The reversal agent for Dabigatran, Idarucizumab, is available in the emergency department. The reversal agent for Apixaban and Rivaroxaban, Andexanet, is not currently supported by NICE for ICH. Edoxaban does not have a licensed reversal agent currently.

Where there is no reversal available, PCC is usually used pragmatically under Haematology guidance.

**There is no role for Vitamin K in DOAC-associated bleeding, irrespective of the INR result.**

- **Blood pressure**

**Rapid initial blood pressure lowering** (SBP <140 mmHg) is advised for people with acute intra-cerebral haemorrhage (Ma et al, 2023) who

- a) present within 6 hours of symptom onset and
- b) have a systolic blood pressure between 150 and 200 mmHg.

**Controlled blood pressure lowering** should be offered (e.g. SBP <160 mmHg) to people who

- a) present beyond 6 hours of symptom onset or
- b) have an initial systolic blood pressure of more than 200 mmHg.

See management guidelines in section 5.1.3.

- **Previous drugs**

Discontinue antiplatelet and anticoagulant medication. Discontinue NSAIDs and SSRIs.

#### **4.2.2.3 Surgical management**

People with the following characteristics do not require surgical intervention:

- Small deep haemorrhages (deep white matter, basal ganglia, thalamus, brainstem)
- Lobar (or superficial) haemorrhage with Glasgow Coma Score >12
- Lobar haemorrhage with Glasgow Coma Score < 9, unless this is because of hydrocephalus
- A large haemorrhage and significant prior co-morbidities before the stroke

People with the following characteristics should be discussed initially with the on-call consultant stroke physician and then the neurosurgical service as advised:

- Haemorrhage with hydrocephalus
- Lobar haemorrhage with Glasgow Coma Score between 9 and 12
- Cerebellar haemorrhage

If a person is accepted for transfer by the neurosurgical service, the on-call consultant stroke physician should be notified. Where there is a risk of neurological deterioration during hospital transfer an anaesthetic opinion should be obtained. See local guidelines on [inter-hospital adult patient transfer and escort](#).

People with lobar haemorrhage that do not fulfil the criteria for surgical referral or are directed to undergo initial treatment locally (and in whom active management is still being considered) should:

- Receive management on the stroke assessment bay for a minimum of 24 hours after the onset of stroke-symptoms.
- Undergo repeated neurological observations (every 1 hour for the first 4 hours, with step down to every 4 hours if neurologically stable for a minimum of 24 hours, and thereafter until an alternative

management plan is established). If there are ongoing concerns, 1 hourly monitoring should continue, with medical escalation.

Repeated neurological observations include:

- NIHSS score
- Glasgow Coma Score
- Pupillary size and reaction

a) Any indication of neurological worsening (**NIH 1a  $\geq 1$ , NIH score increase  $\geq 4$  points, GCS decrease 1 point, or asymmetrical pupil response**) should prompt an urgent CT head and a direct call to the duty stroke consultant.

- In case of neurological worsening, the duty stroke consultant should ensure prompt assessment of the person (personally, via telemedicine, or by delegation to duty registrar).
- Where appropriate, the consultant or appointed delegate should counsel the person and family about the appropriateness of referral for further neurological monitoring with consideration of surgery.
- If a referral is deemed appropriate and agreed by family or carers, this should be made by the senior responsible clinician (during working hours, this would be the responsible stroke consultant, and out-of-hours, the registrar should consult the oncall stroke consultant). If the neurosurgical registrar is unavailable or gives advice at odds with perceived wisdom, the neurosurgical consultant should be contacted directly, after approval by the Stroke Consultant on call.

In patients with spontaneous ICH who do not have a pre-existing documented DNAR order or wish to avoid aggressive care, postpone decisions around RESPECT / cardio-pulmonary resuscitation / withdrawal of medical support for at least 24 hours (as early decisions to limit treatment are associated with reduced mortality and improved functional outcome) (Minhas et al, 2021). This considered approach does not lead to more cardiac arrests.

## 4.3 Transient Ischaemic Attack

### 4.3.1 Definition

A transient ischaemic attack (TIA) is usually defined as a sudden, focal neurological deficit that lasts for less than 24 hours, is presumed to be of vascular origin confined to an area of brain or eye perfused by a specific artery. However, a tissue-based definition is being increasingly adopted: where there is symptom duration > 60 mins, a history of motor weakness or aphasia, atrial fibrillation or  $\geq 50\%$  ipsilateral carotid stenosis, tissue infarction is more likely to be detected on MRI and may be re-classified as stroke.

### 4.3.2 Hyper-acute Management

#### 4.3.2.1 Investigation

Do not offer CT brain scanning to people with a suspected TIA unless there is clinical suspicion of an alternative diagnosis that CT could detect (for example, intra-cerebral haemorrhage or mass lesion).

#### 4.3.2.2 Treatment

- Aspirin 300 mg oral loading dose AND Clopidogrel 600mg oral loading dose (An aspirin- allergic person should receive Clopidogrel 600mg loading dose alone) if presenting within 48 hours of symptoms onset deemed to be a likely TIA).
- For specific blood pressure management guidelines see section 0.

#### 4.3.2.3 Stroke risk stratification

- Higher risk people

Symptoms within the previous week

Atrial fibrillation

On anticoagulant therapy

- Lower risk people

Person presenting more than 7 days after their last symptom resolved

**Note: Risk stratification is used to establish urgency of TIA clinic appointment for review.**

#### 4.3.2.4 Location of care

Providing there is cardiovascular and neurological stability, people with TIA should not require admission to the stroke unit. Where stroke risk is deemed to be very high (e.g. multiple events in the last 24 hours) and those who do not have supervision at home, HASU admission and neurological observation is appropriate (looking for signs of stroke repeated every hour for a minimum of 24 hours). This is intended to identify stroke early for repeat imaging and provide hyperacute intervention – and must be clearly stated to the patient.

The UHL TIA and minor stroke clinic can assess people quickly and efficiently. Urgent referral to the daily one-stop TIA and minor stroke clinic should be made online at <http://uhlstrokeweb01> (or via the TIA clinic link on NC-Clinical Tab, or on UHLConnect). The referral generates an appointment, and the letter must be printed and given to the patient. The importance of this appointment should be stressed to the person and a full-day appointment should be expected. Do not promise an MRI or other imaging that the TIA clinic clinician will consider. The FAST test should be explained (see 9.4) and the person advised to return to hospital immediately (via 999) should further symptoms occur. Drivers must be advised not to drive until further assessed according to the DVLA regulations.

### 4.3.3 Further management

#### 4.3.3.1 Brain imaging

People who have had a suspected TIA who need brain imaging (that is, those in whom vascular territory or pathology is uncertain) should undergo diffusion-weighted MRI except where contraindicated, in which case CT (computed tomography) scanning should be used.

#### 4.3.3.2 Extracranial vascular imaging

Carotid stenotic disease should be assessed using the North American Symptomatic Carotid Endarterectomy Trial (NASCET) criteria on a carotid Doppler study. A CT or MR angiogram is an alternative, though quantification of degree of stenosis can be variable.

#### 4.3.3.3 Treatment

- **Standard Treatment**

Aspirin 300 mg oral loading dose AND Clopidogrel 600mg oral loading dose (An aspirin-allergic person should receive Clopidogrel 600mg loading dose alone). An example of induction therapy is:

**Immediate:** Aspirin 300mg and Clopidogrel 600mg stat

**Day 2 to 21:** Aspirin 75mg daily and Clopidogrel 75mg daily

**After day 21:** Clopidogrel 75mg daily

After a minimum of 21 days of dual antiplatelet therapy or at the physician's discretion, monotherapy with Clopidogrel 75mg once-daily is the preferred long term strategy.

**Gastro-protection** (e.g. PPI or H2RA) must be offered for the duration of dual antiplatelet therapy, or for the duration of high-dose Aspirin therapy as this is believed to reduce the risk of significant gastrointestinal haemorrhage.

Total cholesterol should be treated to a target of 4.0 mmol/L or lower, LDL 1.8 mmol/L or lower, or a 25%

reduction (whichever is greater). A stricter LDL target of 1.4 mmol/L or lower is recommended in the setting of atherosclerotic disease. Blood pressure should be treated to a target of 130/80 mmHg or lower, with close monitoring for postural symptoms/hypotension in more frail people, and consideration of a more relaxed target of <140/90. Lifestyle advice including smoking cessation, moderating alcohol intake, regular exercise, salt intake and diet should be provided.

- **50 to 99% symptomatic carotid stenosis**

When carotid atheroma results in a significant stenosis (>50% by the NASCET method), the surgical threshold is reached. If the significant stenosis is symptomatic (i.e. causes acute neurological symptoms), urgent carotid endarterectomy should be offered, keeping in mind co-morbidities and frailty status.

Please consult the responsible Stroke Consultant (or oncall Consultant) urgently and if deemed appropriate, a referral to vascular surgery should be made promptly within standard working hours earlier than 14:00 hours to minimise event to treatment time.

- **Atrial fibrillation**

Consideration should be given to the provision of early anticoagulant therapy. Treatment with a direct oral anticoagulant is preferred, unless contraindicated – please refer to the [UHL Guidelines for atrial fibrillation](#). Anticoagulation risk-benefit assessment should be undertaken and documented, and anticoagulation therapy initiated in discussion with the Stroke Consultant. Where enteral administration is not feasible, treatment dose low molecular weight heparin may be considered.

The timing of anticoagulation initiation following a stroke remains the subject of ongoing research studies, and it is not clear presently whether early or delayed initiation has any benefits. A pragmatic approach in discussion with the responsible stroke consultant, based on expert consensus is available ([EHRA practical guide](#)).

#### **4.3.3.4 Follow-up**

People with acute cerebrovascular conditions should be offered a nurse-led follow-up appointment at a one-month interval, for the purposes of reviewing

- Lifestyle risk factors
- Medication compliance and side effects
- Observations: blood pressure and
- Recurrent neurological symptoms, and
- Complications such as effects on mood, memory, continence and independent functioning.

Review of medical investigations or further specialist management should be reserved for a subsequent consultant-led out-patient or virtual clinic.



## 4.4 Cerebral Venous Thrombosis

### 4.4.1 Definition

A cerebral venous thrombosis (CVT) may cause a stroke syndrome through the thrombosis of any part of the cerebral venous drainage system.

### 4.4.2 Diagnosis

#### 4.4.2.1 *Pre-diagnostic indicators*

Clinical suspicion of CVT should be present where stroke occurs in the context of a pro-thrombotic state e.g. pregnancy or the peri-partum period, severe dehydration, malignancy, cranial infection or trauma, chronic alcoholism, oral contraceptive use, or other thrombophilia or hypercoagulable state.

Headache and seizures may predominate in the days to weeks around the diagnosis of stroke and the neurological deficit may be of gradual rather than sudden onset.

#### 4.4.2.2 *Diagnostic indicators*

Non-contrast CT head may show dense venous sinuses and cortical veins or parenchymal changes suggestive of “venous ischaemia”. The latter is suggested by areas of low attenuation consistent with oedema with or without haemorrhage and typically not in an arterial territory configuration. CT or MR venography will confirm or exclude the diagnosis. The choice of technique will depend on personal (pregnancy, renal impairment) or logistical (ready availability of CT) factors.

### 4.4.3 Hyper-acute management

#### 4.4.3.1 *Monitoring and treatment of physiological disturbance*

In addition to standard stroke monitoring, awareness is required of the potential for early pulmonary embolism, seizures and raised intra-cranial pressure. Provision of adequate intravenous hydration is especially important.

#### 4.4.3.2 *Anticoagulation*

All people (including those with haemorrhage on CT) should be started on a therapeutic (treatment) dose of low molecular weight heparin (LMWH).

Options for ongoing anticoagulation include:

- Warfarin (aiming for a therapeutic INR 2 – 3) should be commenced once the person is clinically stable and continued for a minimum of 6 months.
- LMWH should be the anticoagulation strategy of choice in pregnant and breastfeeding women; and in the setting of active cancer-associated thrombosis.
- A stroke consultant may consider off-license DOAC therapy in individual circumstances.

#### 4.4.3.3 Management of complications

Seizures should be managed along local guidelines. Intractable seizures or neurological instability due to raised intra-cranial pressure may necessitate neurology and/or intensive care advice.

Worsening intra-cerebral haemorrhage is rarely a complication of heparin per se - decompressive hemicraniectomy should be considered early for people with severe mass effect and/or likely trans-tentorial herniation. A senior opinion should be sought at these stages.

## 5 Supporting procedural documents

### 5.1 Management of hypertension in acute stroke

#### 5.1.1 Consideration of contributory factors

The presence of pain and anxiety should be elucidated, and the underlying cause treated. For example, it is common for men to develop painful urinary retention in acute stroke where catheterisation may resolve hypertension. Whilst the presence of a relative can be reassuring, where there are too many relatives, the blood pressure of both person and treating staff can increase.

#### 5.1.2 People taking antihypertensive therapy on admission

Antihypertensive therapy should be restarted after at least 24 hours, and when the swallow is regained, and when the person is neurologically stable, unless a specific contraindication to restarting treatment is known.

#### 5.1.3 People with primary intra-cerebral haemorrhage

In acute intra-cerebral haemorrhage within 6 hours of onset, intensive blood pressure (BP) reduction (systolic BP target <140mmHg in <1 hour) is safe and superior to a systolic BP target <180mmHg. No specific agent is recommended, though first line for the UHL Stroke Service is labetalol (by intravenous bolus and/or infusion; see section 4.1.6). More recent data suggests that large BP drops may be associated with worse outcome. Consequently, where baseline BP is very high (SBP>200), a target SBP of <160 is advised.

- Early nasogastric tube insertion should be encouraged to facilitate transition to enteral anti-hypertensive medication.
- The initial blood pressure target should be maintained for at least 7 days.
- Subsequently, BP should be treated as per secondary prevention of stroke when the person is medically stable (see section 0).

### 5.1.4 People with ischaemic stroke or transient ischaemic attack

There are no data from randomized controlled trials to indicate that lowering BP in the acute period following acute ischaemic stroke is efficacious, but modest BP reductions do not appear harmful. However, it is reasonable to start antihypertensive therapy for secondary prevention when medically stable. A longer term target BP of <130/80 is recommended with first line therapy of a long-acting dihydropyridine calcium channel blocker in people aged 55 or over and African or Caribbean ethnicity, and an angiotensin-converting enzyme inhibitor or angiotensin-II receptor blocker in other groups.

### 5.1.5 People receiving intravenous thrombolysis

Intravenous thrombolysis should not be initiated until **systolic BP <185 and diastolic BP <110mmHg**. In addition, BP should be monitored and maintained below target values (SBP<180 and DBP <105mmHg) for a 24- hour period post-thrombolysis. No specific agent is recommended, though first line for the UHL Stroke Service is labetalol (by intravenous bolus and/ or infusion; see next section).

Intravenous thrombolysis is contraindicated if systolic BP >185 or diastolic BP >110mmHg, or aggressive management (recurrent intravenous boluses) is required to reduce BP to these limits.

### 5.1.6 Intravenous protocols

#### 5.1.6.1 Labetalol

- **Repeated intravenous injection**

Initial dose: 20 mg (0.25 mg/kg) labetalol by slow IV injection over a 2-minute period.

Additional injections of 40 to 80 mg labetalol can be given at 10-minute intervals until a desired supine blood pressure is achieved or a total of 300 mg of labetalol per 24 hours has been injected. The maximum effect usually occurs within 5 minutes of each injection, and the effect lasts for 3-4 hours, at which time further treatment is likely to be required.

- **Slow continuous intravenous infusion**

Consider a labetalol infusion if multiple bolus doses are required and/or BP remains above target. Add 40 mL (200mg) of labetalol Injection to 160 mL of a commonly used IV fluid such that the resultant 200 mL of solution contains 200 mg of labetalol (concentration 1 mg/mL). The diluted solution should be administered at a rate of 2 mL/min labetalol to deliver 2 mg/min labetalol.

- **Caution**

Labetalol use is limited by bradycardia, reversible obstructive airway disease, and peripheral arterial disease. In such cases, intravenous nicardipine as the second line agent must be considered.

### 5.1.6.2 Nicardipine

- By continuous intravenous infusion

Initially 1–5 mg/hour for 15 minutes, increased in steps of 0.5–1 mg every 15 minutes, adjusted according to response, maximum rate 15 mg/hour. Reduce dose gradually when target blood pressure achieved, to a usual maintenance rate of 2–4 mg/hour.

In older patients (age >80 years) or in the presence of renal or hepatic impairment, a lower starting dose, and smaller increments (e.g. start at 1mg/hour and adjust in steps of 0.5mg/hour) are recommended.

- Side effects

The most frequent side effects are headache, dizziness, peripheral oedema, palpitations, and flushing. Overdose with nicardipine hydrochloride can potentially result in marked hypotension, bradycardia, palpitations, flushing, drowsiness, collapse, peripheral oedema, confusion, slurred speech and hyperglycaemia, and rate should be reduced if SBP <120mmHg.

### 5.1.6.3 Glyceryl Trinitrate (GTN)

- Slow continuous intravenous injection

Add 50mg (10ml) of GTN solution to 40ml saline such that the resultant 50mls of solution contains 50mg of glyceryl trinitrate, 1mg/ml. The diluted solution should be administered at a rate of 1 ml/hour to deliver 1mg/hour GTN and titrated every 15 minutes to the desired blood pressure.

- Caution

GTN is associated with significant variability in blood pressure control and is therefore considered a third-line agent. Do not use GTN patches for acute blood pressure control.

## 5.2 Management of diabetes in acute stroke

### 5.2.1 Extremes of glycaemia as a stroke mimic

Both hypoglycaemia and hyperglycaemia can mimic a stroke. Ensure capillary blood glucose is >3.5 and <22 mmol/L, correcting as appropriate according to local guidelines ([hypoglycaemia](#), [hyperglycaemia](#)).

### 5.2.2 Management of glycaemic state in acute stroke

A variable rate intravenous insulin infusion (VRIII) should be initiated where glucose > 11 mmol/L during the first 24 hours treating to a target of 6 and 10 mmol/L. For information about VRIII see [local guideline](#). People undergoing an established naso-gastric tube feeding protocol requiring insulin may be switched to a long-acting insulin analogue, or biphasic insulin. Advice should be sought from the diabetes team.

Those with type 1 diabetes mellitus must have basal insulin continued to avoid hyperglycaemic complications.

### 5.2.3 Referral criteria

Please refer the following patients with diabetes to the Diabetes Specialist Nurse Team:

- Polyvascular disease – i.e. vascular disease in other territories in addition to the stroke (e.g. ischaemic heart disease, chronic kidney disease (CKD $\geq$ 3)/peripheral arterial disease).
- Metabolic syndrome
- HbA1c  $>10\%$
- Complex insulin regimes

## 5.3 Intravenous thrombolysis management protocol

### 5.3.1 Inclusion criteria

- Clinical diagnosis of acute ischaemic stroke causing one or more of an NIH score  $\geq 4$ , aphasia, binocular visual field deficit, a swallowing deficit, being unable to walk or self-care independently.
- Imaging appearances consistent with ischaemic stroke
- Symptom-onset within 4.5 hours prior to initiation of thrombolysis treatment
- Risks and benefits explained to person and/or relative.

### 5.3.2 Exclusion criteria

#### 5.3.2.1 Absolute

- Blood pressure  $> 185/110$  mmHg after 2 attempts to reduce levels (see section 4.1.5)
- Surgery or trauma within the last 14 days
- Stroke within the last 14 days
- Active internal bleeding
- Severe haematology abnormalities
  - o INR $>1.7$  or APTT $>40$
  - o On dabigatran with abnormal APTT or thrombin time  $>100$ seconds
  - o On rivaroxaban / apixaban / edoxaban with abnormal prothrombin time
  - o On high-dose low molecular weight heparin
  - o Platelet count  $<50 \times 10^9/L$
- Arterial puncture at a non-compressible site or LP in last 7days
- Symptoms suggestive of subarachnoid haemorrhage, even if brain imaging normal
- Infective endocarditis, pericarditis or presence of ventricular aneurysm related to recent MI
- Childbirth within the previous 4 weeks

- Acute pancreatitis
- Severe liver disease, including hepatic failure, cirrhosis, portal hypertension, oesophageal varices and active hepatitis.

#### 5.3.2.2 *Relative*

- Pre-treatment scan showing
  - o evidence of infarction >4.5h (e.g. hypo-density on CT)
  - o mass effect / oedema.
  - o tumour, AVM, or aneurysm
  - o evidence of large infarct core on MR-DWI or CTA
- Intra-cranial or intra-spinal surgery within last 2months
- Any non-neurosurgery (including minor surgery) within last 6 weeks
- Stroke or head injury in last 6 weeks.
- History of GI or urinary tract bleed in last 6 weeks.
- Previous CNS bleeding, e.g. subdural haemorrhage.
- Glucose <2.7 or >22 mmol/L – treat promptly, recheck CBG and review
- On a direct oral anticoagulant even with normal clotting studies
- Seizure at stroke onset
- Possibility of pregnancy
- Obstetric delivery within 10 days
- Greater than 90-minute delay post scan
- Symptoms that start during sleep
- Severe pre-morbid dependency

#### 5.3.3 Delivery of thrombolysis

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#### *SSNAP Metric - 3.3 Proportion of patients who were thrombolysed within 1 hour of clock start*

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Intravenous thrombolysis should be commenced as soon as inclusion and exclusion criteria are confirmed with the Stroke Consultant oncall (ideally within 30 minutes of hospital arrival). Avoid non-essential steps such as 12-lead ECG, undressing the patient, waiting for blood results (unless clinical reason) and prolonged consent. Make use of relatives or carers by telephone if the history is unclear. The stroke team should transport the patient to the CT scanner and not wait for porters. Do not delay thrombolysis due to early neurological improvement (this is usually temporary). Give the thrombolysis bolus in the scanning room.

### 5.3.3.1 Tenecteplase – first line thrombolytic agent

Tenecteplase is the preferred agent, due to ease of use and single bolus dose (2024 update). The evidence indicates equivalent efficacy as compared to Alteplase. However, due to paucity of data in lower weight categories, Alteplase is recommended where weight is <50kg. Note: Only 5000 unit vials are available (10000 unit vials are not to be used).

Body weight (kg)	Tenecteplase dose (units)
<50 kg	Alteplase preferred as 1 <sup>st</sup> line 3000 (if alteplase not feasible)
50 to <60 kg	3000
60 to <70 kg	3500
70 - <80 kg	4000
80 - <90 kg	4500
>=90 kg	5000

Table. Tenecteplase weight-based dosing

- **Tenecteplase preparation instructions**

Reconstitute the 5000 unit vial (25 mg) by adding 5 mL of sterile water for injections using a needle and syringe (not provided in the package). Resulting solution = 1000 units/ml (5 mg/ml).

1. Remove the crimp cap from the vial.
2. Fill a syringe with 5 mL of sterile water for injection and penetrate the vial stopper in the middle with the needle.
3. Add the full 5mL of the sterile water for injection into the vial by pushing the syringe plunger down slowly to avoid foaming.
4. Keep the syringe attached to the vial and reconstitute by swirling gently\*.
5. Directly before the solution is administered, invert the vial with the syringe still attached, so that the syringe is below the vial.
7. Transfer the appropriate volume of Tenecteplase reconstituted solution into the syringe, based on the patient's weight.

Administer as a single intravenous bolus over approximately 5 to 10 seconds.

Flush with NaCl 0.9% only to ensure the full dose is received; do not mix or flush with other diluents or medicines.

Caution: The mixture should only be agitated gently until completely dissolved. Slight foaming may occur; however, the bubbles will dissipate after standing for several minutes. To prevent foam formation, avoid vigorous/excessive agitation and shaking. The reconstituted solution is a clear and colourless to slightly yellow solution. Do not use if cloudy or if particles are present.

### 5.3.3.2 Alteplase – second-line agent; preferred agent where weight <50kg

Alteplase (r-tPA) is given intravenously at a dose of 0.9mg/Kg over one hour, with 10% being initially provided as a bolus over 1-2 minutes. For people arriving via the emergency department, weight should be measured on the weigh-bridge at arrival. In the absence of this information, an estimation of weight should guide the bolus dose. Prompt transport to HASU should then occur, with accurate weighing guiding the remaining dose of the infusion.

### 5.3.4 General management

In addition to the general management guideline for stroke (see section 3.4), the following additional measures should be taken: blood pressure, pulse, Glasgow Coma Scale and pupillary responses every 15 minutes for the first 2 hours, every 30 minutes for the next 6 hours then hourly for the next 16 hours; avoid unnecessary handling of the person to decrease the chance of bruising; avoid central venous access, arterial puncture, naso-gastric tube insertion and injections in the first 24 hours; avoid placement of indwelling urinary catheter during infusion and 30 minutes after the end of the infusion; check all secretions and excretions for blood.

### 5.3.5 Further management

A CT head examination should be considered at approximately 24 hours after thrombolysis treatment by the responsible Consultant. If no acute haemorrhage is present, Aspirin 300 mg oral or rectal loading dose stat and daily should be given (An aspirin-allergic person should receive oral or NG Clopidogrel 300mg loading dose followed by Clopidogrel 75mg daily).

### 5.3.6 Complications

#### 5.3.6.1 Detecting complications

Medical staff should be notified if:

- systolic BP <120 or >180mmHg or, diastolic BP <70 or >105 for two readings 5 - 10 minutes apart,
- any change in neurological status (deteriorating conscious level or new/worsening motor weakness, speech disturbance),
- bleeding (e.g. this could be bruising, haematuria or bleeding from a venepuncture site) or
- anaphylaxis symptoms.

**Note: If there is doubt about the importance of any changes or management of the clinical scenario, the on-call stroke consultant should be contacted immediately.**



### 5.3.6.2 Management of complications

- **Symptomatic intra-cerebral haemorrhage**

Symptomatic intra-cerebral Haemorrhage (SICH) should be suspected if the person has increased somnolence, headache, neurological deterioration or new-onset vomiting. People with a pre-treatment NIH score of 20 or more have a 17% risk of SICH compared with 3% risk with score less than 10.

Stop alteplase and arrange an immediate non-contrast CT head.

If SICH is confirmed:

1. give 1g tranexamic acid iv over 15 minutes;
2. take blood for urgent FBC, fibrinogen, INR, APTT and d-dimer;
3. discuss with haematology - give further tranexamic acid, FFP and/or cryoprecipitate and/or platelets depending on results of clotting screen and haematology advice;
4. discuss case with on-call stroke consultant.
5. control the blood pressure aggressively to SBP <140
6. consider the possibility of neurosurgical intervention and discuss with Consultant as needed.

- **Significant extracranial bleeding**

If bleeding is local and minor, sustained local pressure should be applied. Should major bleeding be suspected: i.e. there is low blood pressure, a thread pulse, obvious bleeding – haematuria, melaena etc, ensure thrombolytic infusion is stopped and provide resuscitation as appropriate.

1. Give 1g tranexamic acid iv over 15 minutes; take blood for urgent FBC, fibrinogen, INR, APTT and d-dimer; discuss with haematology.
2. Give further tranexamic acid, FFP and/or cryoprecipitate and/or platelets depending on results of clotting screen and haematology advice; discuss case with on-call stroke consultant.

Consider the possibility of surgical intervention for persisting bleeding.

- **Anaphylaxis and angio-oedema**

Oro-lingual angio-oedema affects about 5% of people and is associated with the use of angiotensin converting-enzyme inhibitors. Signs of a significant allergic reaction include: urticaria, facial swelling, rash, difficulty breathing, low blood pressure, a thread pulse. Frank anaphylaxis is rare (0.02%): stop alteplase infusion, resuscitate person as appropriate using usual anaphylaxis management protocol.

- **Hypertension**

Consideration should be given to intracerebral haemorrhage and other causes of raised intracranial pressure. Refer to hypertension management guideline (see section 5.1).

- **Hypotension**

Consideration should be given to extracranial bleeding and drug-related hypotension. Give immediate intravenous fluid boluses aiming for SBP > 120 mmHg.

## 5.4 CT angiography protocol

### 5.4.1 Rationale

There is high quality evidence that reducing time to effective treatment for people with acute stroke improves patient outcomes. Every step should be taken to minimise time to diagnosis, to help reduce time to treatment. This protocol applies in the following scenarios:

- A patient with clinical stroke where proximal large vessel occlusion (LVO) is suspected and a thrombectomy procedure will be requested if LVO is proven on CTA. Where feasible, plan and administer thrombolysis prior to CT Angiography to minimize door-to-needle time.
- A patient with clinical stroke with a contraindication to thrombolysis where proximal large vessel occlusion (LVO) is suspected and a thrombectomy procedure will be requested if LVO is proven on CTA.
- Suspicion of basilar artery thrombosis.
- Clinical presentation with stroke and suspicion of neck vessel dissection

A CTA (always arch to circle of Willis) will then be acquired without delay providing the following necessary steps are agreed to and complied with:

- NC request for 'CTA Stroke' will be made without delay (the request must be completed prior to processing the study)
- Any disagreement or concern is logged as an event in the comments section on CRIS

This protocol currently applies from 0730 to 1600 Monday to Friday (and 0730 to 1200 on weekends/bank holidays) – timings will be updated in accordance with availability of MT at Nottingham.

## 5.4.2 Bi-phasic technique

### 5.4.2.1 Parameters

- Quality reference 170mAs
- Rotation time 0.33sec
- Pitch 0.6
- Iterative recons
- K-edge kV
- 0.75mm/0.7mm

### 5.4.2.2 Protocol

- Arch to vertex
- Delayed 12 second head

### 5.4.2.3 Reconstructions

- 1mm and 5mm axial reformats of source data of 1<sup>st</sup> phase, brain parenchyma windows (to assess regional cerebral blood flow)
- 1mm and 5mm axial reformats of source data of 2<sup>nd</sup> phase, brain parenchyma windows (to assess regional cerebral blood volume)
- Thick (24mm) and 12 mm Spacing axial MIPs of 1<sup>st</sup> phase (to assess early filling collaterals)
- Thick (24mm) and 12 mm Spacing axial MIPs of 2<sup>nd</sup> phase (to assess late filling collaterals)
- Please correct for head tilt/cant

## 6 Stroke and TIA therapy management

### 6.1 Referral Process

#### 6.1.1 Acute Stroke Unit

All people resident on the Acute Stroke Unit (Wards 25/26) who receive a diagnosis of acute stroke are automatically assessed by the Stroke Physiotherapy (PT) and Occupational Therapy (OT) teams.

Patients diagnosed with a TIA (Transient Ischemic Attack) will not automatically be assessed by PT and OT. If an assessment is required by either the PT or OT, a verbal referral is needed to the relevant therapist on the ward to include to reason for therapy input.

#### 6.1.2 Elsewhere

People on non-stroke wards with a diagnosis of an acute stroke need to be referred to the ward-based PT or OT for assessment. Where feasible, patients will be transferred immediately to the acute stroke ward. Advice can be given to PT and OT staff on outlying wards by the PT or OT based on the acute stroke unit.

### 6.2 Assessment

#### 6.2.1 Time of assessment

PT and OT will assess people with an acute stroke to sit out of bed, stand or walk as soon as their clinical condition permits, as part of an active management programme. Caution may be indicated with extremes of blood pressure or significant ongoing symptoms like dizziness. Please verify with the responsible senior clinician if required.

#### 6.2.2 Delays in assessment

If people need help to sit out of bed, stand or walk, PT and OT will not offer high intensity mobilisation in the first 24 hours after symptom onset. Other reasons for delays in assessment could include:

- Patient being medically unwell/unstable for therapy
- No Sunday/Bank Holiday service of the relevant profession
- Patient declining assessment

#### 6.2.3 Assessment procedure

PT and OT will obtain clinical history from medical notes and nerve centre prior to completing a full joint therapy assessment. The PT and OT will complete these sessions while both retaining their professional autonomy. Assessments will be documented on joint PT and OT paperwork with the start and finish time of initial assessment clearly documented.

From assessment findings, PT and/or OT specific problem lists, treatment plans and therapy goals will be formulated and clearly documented within this paperwork. Ongoing follow-up will be documented in the medical notes. If staffing doesn't allow for joint assessment, OT and PT will complete profession specific paperwork following their assessment as above. As part of the assessment procedure, OT and PT will advise regarding optimal positioning.

#### 6.2.4 Occupational Therapy assessment

OT assessment to include, but not limited to:

- Cognition
- Perception and visual fields
- Sensation and proprioception
- Coordination
- Physical ability i.e. transfers, upper limb
- Seating
- Tone
- Functional ability including equipment needs
- Full social history
- Mood

#### 6.2.5 Physiotherapy assessment

PT assessment to include, but not limited to:

- Power in all limbs
- Range of movement in all limbs
- Sensation and proprioception
- Coordination
- Tone
- Physical ability i.e. sitting balance, transfers, mobility, stairs
- Upper limb functional use
- Seating
- Vision
- Respiratory review.

## 6.3 Outcome measures

### 6.3.1 Time of outcome measures

During initial assessment a relevant clinical outcome measure will be completed by PT and OT. A patient reported outcome measure (for example EQ5DL) will be completed as soon as appropriate with all people who are able to complete it. Clinical outcome measures will be reviewed on a regular basis (once per week).

### 6.3.2 Occupational Therapy outcome measures

OT outcome measures used include, but are not limited to:

- Barthel Index
- 9-hole peg test
- Modified Ranking Scale
- Upper limb section of Motor Assessment Scale

### 6.3.3 Physiotherapy outcome measures

PT outcome measures used include, but are not limited to:

- 9-hole PEG test
- Berg Balance scale
- Tinetti
- Postural Assessment Scale for Stroke
- Timed Unsupported Sit
- Timed Unsupported Steady Stand
- 10m Timed Walk Test
- Timed Up and Go
- Upper limb section of Motor Assessment Scale

## 6.4 Goal setting

PT and OT-specific SMART (Specific, Measurable, Achievable, Realistic and Timed) goals to be set following initial assessment. Where appropriate, PT and OT meaningful goals will be set in conjunction with the patient. Once set all PT and OT goals to be continually reviewed and modified throughout the person's therapy. All goals set will be clearly documented within the medical notes.

## 6.5 Treatment

### 6.5.1 Treatment intensity

If people need help to sit out of bed, stand or walk, PT and OT will not offer high intensity mobilisation in the first 24 hours after symptom onset.

Along with Speech and Language therapists, OT and PT will offer needs-based rehabilitation to people after stroke, striving to achieve 3 hours a day on at least 5 days of the week.

Where it is agreed with the person after stroke that they are unable, or do not wish to participate in rehabilitation therapy (intensity as above), therapists will still strive to offer any therapy as needed on 5 days per week.

### 6.5.2 Treatment given

All clinical practice is to be based on sound clinical reasoning and current evidence-based practice as a result of assessment findings and individual person problem list and goals. Where joint treatment is indicated the PT and OT will complete these sessions together while both retaining their professional autonomy. Therapy Support Workers will also be utilised to provide both PT and OT under the guidance of qualified Physiotherapists and Occupational Therapists, providing treatment within their scope of practice. Therapists will provide information on what the person can expect from the rehabilitation sessions, linking to the person's goals and tailored to any ongoing medical needs. Therapists will strive to involve families and carers in rehabilitation sessions, when appropriate.

### 6.5.3 Occupational therapy treatments

OT interventions to include, but not limited to

- Activities of daily living interventions
- Cognitive treatment
- Perceptual treatment
- Tonal management, including splinting where appropriate
- Transfer practice
- Seating practice and provision
- Equipment provision

- Remedial activities
- Sensory work
- Upper limb rehab

#### 6.5.3.1 Occupational Therapy Treatment Approaches

OT treatment approaches used in the treatment of stroke patients include, but not limited to:

- Normal movement (Bobath Concept)
- Motor re-learning
- Functional approach
- Mirror therapy
- Compensatory Approach
- Errorless Learning

#### 6.5.4 Physiotherapy treatments

PT interventions will aim to work on, but not limited to the following:

- Tonal management
- Sensory loss
- Limb weakness
- Reduced coordination
- Reduced functional use of upper limb
- Visual field deficit
- Inattention (sensory or visual)
- Pushing syndrome
- Reduced sitting balance
- Reduced postural control
- Altered perception of midline
- Seating difficulties
- Reduced standing balance
- Inability to sit to stand
- Altered gait pattern/inability to mobilise
- Lack of safety on stairs
- Respiratory complications



#### 6.5.4.1 *Physiotherapy treatment approaches*

PT treatment approaches used in the treatment of stroke people include, but not limited to:

- Normal movement (Bobath Concept)
- Motor re-learning
- Functional approach
- Taping
- Mirror therapy
- Functional Electrical Stimulation

#### 6.5.5 Therapy support worker treatments

Interventions provided by the Therapy Support Workers are always under the guidance of a qualified Physiotherapist or Occupational Therapist. Interventions include, but are not limited to:

- Passive range of motion
- Active assisted range of movement exercises
- Sensory re-education
- Bed and chair exercises
- Mobility practice
- Balance work
- Upper limb dexterity work
- Upper limb functional tasks
- Completing the Montreal Cognitive Assessment (MoCA)
- Completing the Butt Non-Verbal Reasoning Test (BNVR)
- Kitchen assessments
- Washing and Dressing assessments
- Providing information

#### 6.5.6 Documentation of treatment

All treatment sessions are to be documented clearly and concisely within the medical notes using a structured format e.g. SOAP (Subjective, Objective, Analysis and Plan) format. Documentation is to be completed as soon as possible, by the end of the working day, in line with HCPC (Health Care Professions Council) and trust guidelines. A brief description of intervention will be added to nerve centre in the MDT section. The timing of the treatment session will be documented in the medical notes, along with the time the entry was made. Therapy minutes will also be recorded on SSNAP via the SSNAPPY screens.

## 6.6 Discharge

### 6.6.1 Discharge planning

Discharge plans are to be made in conjunction with both the patient and their next of kin/carers (where appropriate).

Throughout interventions both Physiotherapy and Occupational Therapy are to advise the wider multidisciplinary team regarding appropriate discharge destinations from the acute setting and discharge destinations include, but are not limited to:

- Home with no further Physiotherapy or Occupational Therapy follow-up needed
- Home with Early Supported Discharge Service (ESDS)
- Home with stroke specialist community service - CINSS (Community Integrated Neurology and Stroke Service)
- Inpatient stroke specific rehabilitation within Leicester, Leicestershire and Rutland
  - Ward 3 LGH
  - Coalville Stroke Unit
  - Market Harborough Stroke Unit
- 24 hour care – new placement via Discharge to Assess bed or return to previous placement
- Repatriation to local area (if patient lives out of the Leicester, Leicestershire or Rutland area)

The Physiotherapy and Occupational Therapy teams will advise the wider multidisciplinary team and action what is required for discharge to include, but not limited to:

- Care package
- Equipment for mobility and activities of daily living
- Early Supported Discharge (ESDS) referrals
- Community Integrated Neurology and Stroke Service (CINSS) referrals
- Other community services referrals

Advice to people and families given, to include but not limited to:

- Splinting
- Sensory re-education
- Stretching
- Mobility
- Return to work
- Driving

- Exercises
- Healthy lifestyle

## 6.7 Communication

Throughout a person's admission to achieve optimal patient care both Physiotherapy and Occupational Therapy teams will maintain good communication with:

- Service users
- Families/carers
- Relevant internal and external agencies
- Multidisciplinary team
- On-going rehabilitation services (e.g. ward 3, ESDS)

This will be achieved by, but not limited to:

- Attending daily board round
- Attending/arranging family meetings
- Telephone calls
- Clear and concise documentation
- Face to face communication
- Written referrals

## 7 Get It Right First Time (GIRFT) and Choosing Wisely

Getting It Right First Time is a national programme designed to improve the quality of care within the NHS by reducing unwarranted variations. As part of the worldwide 'Choosing Wisely' initiative the Intercollegiate Stroke Working Party have provided a list of interventions of questionable value in stroke (together with alternatives) to promote discussion between healthcare professionals and service users and encourage the selective use of limited resources. For more information visit [www.choosingwisely.org](http://www.choosingwisely.org). Through experience, the issues pertinent to UHL are listed.

Whilst the majority of the focus in this section is on the acute pathway there are other areas where consistency is valuable, cost-effective and promotes equity.

## 7.1 Investigations to look for the cause of stroke or TIA

- All people with a stroke or TIA should undergo 12-lead ECG examination within 24 hours of admission.
- Echocardiography should only be requested where there is a history of structural cardiac disease or abnormal physical or ECG findings.
- Investigate for paroxysmal atrial fibrillation before considering unusual causes of TIA or stroke.
- For suspected cervical artery dissection – a CT angiogram is superior to a time-of-flight MR angiogram.
- For uncomplicated intra-cerebral haemorrhage, request MRI brain no earlier than 12 weeks except where indicated by a consultant neuro-radiologist.
- For presumed cryptogenic stroke workup, please refer to the [relevant guideline](#).

## 7.2 Stroke management

- All nurses and doctors conducting the initial assessment of stroke severity should hold a valid certificate of NIHSS training.
- All consultants managing people eligible for Mechanical Thrombectomy should have attended CTA interpretation training.
- Do not use a GTN patch for the treatment of high blood pressure unless intravenous access is delayed.
- In cerebral venous thrombosis, do not withhold anticoagulation solely due to the presence of intra-cerebral haemorrhage or oedema.
- For people with functional loss in the arm, ensure careful positioning of the affected arm and that carers and family handle the arm correctly.
- Do not routinely insert a urinary catheter for a single episode of urinary retention post-stroke. Do an in-out catheterisation and monitor bladder volume. For people with continence problems after a stroke, behavioural interventions such as timed toileting and prompted voiding should be used first, before continence pads or urinary catheter.
- Do not withhold stroke rehabilitation therapy solely due to high blood pressure.
- For people unable to tolerate a statin, try alternative methods to improve the tolerability such as a reduced dose, alternate-day dosing or a lower-intensity statin. Consider combination therapy as per the [LLR Lipid Pathway](#). For people meeting the referral criteria, PCSK-9 inhibition should be considered.

## 8 Common pitfalls in the management of stroke across the care sectors in Leicestershire, Leicester City and Rutland

Following many clinician-years of experience at the ‘coal-face’ of managing stroke in LLR, local peculiarities have been identified (which may be present in all organisations but not necessarily the same issues) that impede the correct management of people with stroke. Appropriate recommendations are listed here for information, reflection and as prompts for clinical audit and evaluation.

### 8.1 Intravenous thrombolysis

- Do not underestimate the benefits of thrombolysis (1:3 get better with early treatment) or overestimate the risks of thrombolysis (e.g. epistaxis can be managed with packing from ENT).

Ask, “*how bad will this stroke be if I don’t thrombolysed*”?

- Insufficient reasons to withhold intravenous thrombolysis include:
  - Previous stroke AND diabetes
  - On low dose (prophylactic) low molecular weight heparin
  - Unclear onset time if other biomarkers of tissue viability are favourable (plain CT with a good ASPECTS score e.g. 8-10, CTA)
  - Asymptomatic intra-cerebral aneurysm
  - Presence of micro-bleeds on previous MRI brain
  - Age or frailty alone
- If thrombolysis is indicated, make the decision quickly as “Time is Brain”.

### 8.2 Stroke prevention

#### 8.2.1 Anticoagulation for atrial fibrillation

- Do adhere to [NICE Guideline 180](#) in respect of anticoagulation for atrial fibrillation. In particular:
  - Do not underestimate the risk of stroke in atrial fibrillation (circa. 25% per year in those with the highest CHADS2VASC scores)
  - Do not overestimate the risk of harm of anticoagulation due to falling or the risk of falls
  - Do not overestimate the risk of bleeding with anticoagulation (circa. 2% per year and mostly treatable)
  - Do not underestimate the severe effects a stroke will have on a person, family and the cost of care (£30,000 compared with anticoagulation costs circa. £700 per year)
  - Do consider referral for left atrial appendage occlusion where indicated, by referring to the

#### Heart-Brain MDT.

- Do recognise underlying atrial fibrillation in people with a regular pulse due to a cardiac pacemaker
- Do restart anticoagulation at appropriate interval after a treated and resolved episode of bleeding
- Do prescribe/verify the correct licensed dose of DOAC for stroke prevention in atrial fibrillation (note the dosing criteria for each drug: refer to BNF or [local guidance](#))
- Do anticoagulate people with acute atrial fibrillation when they are admitted with another condition (e.g. pneumonia) and continue anticoagulation at discharge with appropriate communication to GP.
- Do consider referral to the Heart-Brain MDT for potential left atrial appendage occlusion (LAO) if anticoagulation is absolutely contraindicated or not tolerated.

### 8.2.2 Treatment of other risk factors

- Do not use a predominantly beta-blocker-based regime for hypertension (associated with increased stroke risk cf. other regimes)
- Do ensure strict blood pressure control. After stroke or in diabetes, longer term blood pressure should be no higher than 130/80 (Home BP <125/75). Consider treatment of excessive blood pressure variability with calcium channel blockers or thiazide diuretics
- Do ensure strict lipid control in the presence of atherosclerotic disease exploring the full range of statins, at lower dose, or alternate day-dosing if poorly tolerated and consider combination therapy or referral to consider eligibility for PCSK-9 inhibition (in line with the LLR Lipid Pathway).
- Do monitor response to therapy and indicate appropriate targets for ongoing monitoring.

### 8.3 Management of stroke in the Emergency Department

- Do activate the 'ED Suspected Stroke and TIA management pathway' proforma as soon as stroke is suspected by any member of the ED assessment team and complete the ED proforma
- Do not discuss intra-cerebral haemorrhage with the QMC neurosurgical team before discussion with the local stroke service
- Do organise urgent reversal of any anticoagulated state in the case of intra-cerebral bleeding
- Do not arrange for people with stroke to go to medical wards/ITU/CCU without first review by the stroke team
- Do think about basilar artery thrombosis as the cause of rapid loss of consciousness with bilateral neurological signs and pupillary abnormalities. Organise urgent CT angiography (a plain CT head is not adequate).
- Do not perform a CT head for an uncomplicated TIA

## 8.4 Radiology reporting of acute intra-cerebral haemorrhage

- Do not automatically recommend discussion with a neurosurgeon for primary intracerebral haemorrhage. Instead recommend urgent discussion with a UHL stroke physician (on call 24/7) and to follow the UHL management guidelines
- Most primary intracerebral haemorrhage DOES NOT benefit from neurosurgery but DOES benefit from intensive blood pressure lowering and reversal of anti-coagulated state. There is concern that whilst performing the referral for neurosurgery, other evidence-based management could be delayed.

## 9 Supporting references

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**Ma L, Hu X, et al; INTERACT3 Investigators.** The third Intensive Care Bundle with Blood Pressure Reduction in Acute Cerebral Haemorrhage Trial (INTERACT3): an international, stepped wedge cluster randomised controlled trial. *Lancet.* 2023 Jul 1;402(10395):27-40. doi: 10.1016/S0140-6736(23)00806-1.

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National Institute for Health and Care Excellence. Stroke and transient ischaemic attack in over 16s: diagnosis and initial management. NG128. May 2019 (updated April 2022). Available from: <https://www.nice.org.uk/guidance/ng128>

**Parry-Jones** et al. Acute care bundles should be used for patients with intracerebral haemorrhage: An expert consensus statement. *Eur Stroke J.* 2023 Dec 27;23969873231220235. doi: 10.1177/23969873231220235. Epub ahead of print. PMID: 38149323.

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**Puetz** et al. Extent of hypoattenuation on CT angiography source images predicts functional outcome in patients with basilar artery occlusion. *Stroke.* 2008 Sep;39(9):2485-90. doi: 10.1161/STROKEAHA.107.511162. Epub 2008 Jul 10



# 10 Associated documents

## 10.1 Blue sheet for ED documentation by RAP team

Front of blue sheet

Emergency Stroke Team Card – for use by Stroke RAP Team V4.0 2024

<b>Source of referral</b>		Blue Light <input type="checkbox"/>	ED LRI <input type="checkbox"/>	IP Stroke <input type="checkbox"/>	Other <input type="checkbox"/>
<b>Patient details</b> (or use sticky label)		<b>DATES</b>		<b>TIMES</b>	
Name:		Today			
DOB:		Onset		Onset	
Hosp no:		Precise <input type="checkbox"/> Estimate <input type="checkbox"/> Wake up <input type="checkbox"/>		Precise <input type="checkbox"/> Best estimate <input type="checkbox"/> Time not known <input type="checkbox"/>	
NOK name/mob no:		<b>Weight</b>		Stroke referral	
		PHVT Triage Yes <input type="checkbox"/> No <input type="checkbox"/>		Stroke Nurse	
		*Cons present @ ED arrival Yes <input type="checkbox"/> No <input type="checkbox"/>		*Stroke Medic (Cons/Assoc Sp)	
<b>GCS on admission</b>		<b>Total</b>		<b>Comments</b>	
<input type="checkbox"/> 4 Spontaneous <input type="checkbox"/> 3 To sound <input type="checkbox"/> 2 To pressure <input type="checkbox"/> 1 None		<input type="checkbox"/> 5 Orientated <input type="checkbox"/> 4 Confused <input type="checkbox"/> 3 Words <input type="checkbox"/> 2 Sounds <input type="checkbox"/> 1 None		<input type="checkbox"/> 6 Obeys commands <input type="checkbox"/> 5 Localising <input type="checkbox"/> 4 Normal flexion <input type="checkbox"/> 3 Abnormal flexion <input type="checkbox"/> 2 Extension <input type="checkbox"/> 1 None	
		/15		Is patient stable for a CT scan?	
<b>NIHSS on admission (circle scores &amp; add up)</b>		<b>Total</b>		<b>Comments</b>	
1a Consciousness 0 1 2 3		4 Face 0 1 2 3		7 Ataxia 0 1 2	
1b Questions 0 1 2		5 Left Arm 0 1 2 3 4		8 Sensory 0 1 2	
1c Commands 0 1 2		5 Right Arm 0 1 2 3 4		9 Language 0 1 2 3	
2 Visual Gaze 0 1 2		6 Left Leg 0 1 2 3 4		10 Dysarthria 0 1 2	
3 Fields 0 1 2 3		6 Right Leg 0 1 2 3 4		11 Extinction 0 1 2	
		/42		Does it fit a stroke pattern?	
<b>Pre-morbid functional status - modified Rankin Scale (mRS)</b>					
<input type="checkbox"/> 0	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
No symptoms Independent Asymptomatic	No significant disability Able to carry out all usual activities despite some symptoms	Slight disability Able to look after own affairs without assistance, but unable to carry out all previous activities	Moderate disability Requires some help, but able to walk unassisted.	Moderately severe disability Needs assistance for own bodily needs & unable to walk unassisted	Severe disability Requires constant nursing care and attention, bedridden
<b>NCCT (non-contrast CT)</b>					
	At the level of the Basal Ganglia C – Caudate L – Lentiform nucleus I – Insula IC – Internal Capsule M1 – Frontal operculum M2 – Anterior temporal lobe M3 – Posterior temporal lobe		Above the level of the Basal Ganglia M4 – Anterior MCA, superior to M1 M5 – Lateral MCA, superior to M2 M6 – Posterior MCA, superior to M3	<b>ASPECTS</b> FOR STROKE SPECIALIST ...../10 (1 point deduction for loss of grey-white differentiation in each of 10 areas – 10/10 = no hyperacute ischaemia)	
Scan finding(s)		<b>ISCHAEMIA</b> <input type="checkbox"/> No acute abnormality seen <input type="checkbox"/> Hyperacute ischaemic change(s) <input type="checkbox"/> Acute/subacute Infarct(s)		<b>HAEMORRHAGE</b> <input type="checkbox"/> Acute bleed (ICH) Max diameter of ICH ..... cm <input type="checkbox"/> Acute bleed (SAH/SDH/EDH)	
<b>*CT Angiogram</b>		QMC hotline: 07812 270086 (MT available 8-6 weekdays, Sat/Sun 8-4)			
<input type="checkbox"/> Not indicated	<input type="checkbox"/> Out-of-hrs	Time:	<input type="checkbox"/> LVO <input type="checkbox"/> no LVO	Collaterals – <input type="checkbox"/> poor <input type="checkbox"/> intermed <input type="checkbox"/> good	
Time referred to QMC: .....		<input type="checkbox"/> Accepted <input type="checkbox"/> Not accepted	Time set off: .....		
<b>Hyperacute bundle for Ischaemic stroke</b> <span style="float: right;">STRIKE OUT IF NOT ISCHAEMIC</span>					
<b>IV Thrombolysis</b> (Times must be indicated)		<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> No but		If lysing, see dosing table overleaf.	
Bolus:		Infusion:		If not lysed, please document contraindication below	
CTA / MT		<input type="checkbox"/> Out of hours – plan for CTA@0800		<input type="checkbox"/> CTA LVO referred <input type="checkbox"/> Accepted <input type="checkbox"/> Not accepted	
<b>*REASON not thrombolysed</b>					
<input type="checkbox"/> Not a stroke <input type="checkbox"/> Bleed		<input type="checkbox"/> Age		<input type="checkbox"/> Co-morbidity	
<input type="checkbox"/> Stroke too mild (NIH<4)		<input type="checkbox"/> Stroke too severe		<input type="checkbox"/> Symptoms improving	
<input type="checkbox"/> Arrived outside time window		<input type="checkbox"/> Symptom onset time unknown/wake-up stroke			
<input type="checkbox"/> Contraindicated medication		<input type="checkbox"/> Pt/Rel Refusal		<input type="checkbox"/> Other medical reason	

General Tips: Time is brain; involve Stroke Consultant where needed.  
 Assessment: Document a diagnosis; if ischaemic stroke – state OSCP & CT finding; if bleed, indicate location on CT  
 Management: If no bleed & not amenable to lysis/MT – give aspirin 300mg stat  
 Process: Work with RAP nurse to expedite time-critical steps

AKM/PB/CG Jul 2024



## 10.2 LRI ED Pathway for suspected stroke, TIA or proven ICH

**LRI Emergency Department**  
**Suspected stroke or TIA, or proven ICH**

Use in adults deemed BEFAST+ by ambulance crews or with NEW:

- Unilateral limb weakness
- Unilateral facial weakness after excluding Bell's palsy
- Speech disturbance
- Visual loss or field defect
- Unilateral hearing loss
- Loss of balance with direction-changing nystagmus and/or finger-nose/heel-shin ataxia
- Inability to swallow
- Intracerebral bleed on CT

Disclaimer: This is a clinical template; clinicians should always use judgment when managing individual patients

**Patient details**

Full name: \_\_\_\_\_

DOB: \_\_\_\_\_

Unit number: \_\_\_\_\_

(use sticker if available)

**① Is ROSIER score positive?**

Tick any applicable criteria below and record total score at the bottom

**HAS THERE BEEN**

Loss of consciousness or syncope -1

Seizure activity -1

**ON EXAMINATION, IS THERE ANY NEW**

Asymmetric facial weakness 1

Asymmetric arm weakness 1

Asymmetric leg weakness 1

Speech disturbance 1

Visual field defect 1

**Yes** – as 'ROSIER score' > 0

**No** – as 'ROSIER score' < 1

**NB: If stroke specialist advice required please contact stroke consultant or registrar rather than stroke specialist nurse**

**ED nurse or doctor to complete**

The flowchart starts with a decision: 'CT already done and showing primary intracerebral bleed?'. If 'Yes', it leads to 'Balance, Eyes, Face, Arm, Speech Test, as carried out by EMAS'. If 'No', it leads to 'Red CALL for BEFAST-positive patient?'. From 'Red CALL', if 'Yes', it leads to 'All symptoms resolved now?'. If 'No', it leads to 'While on phone to crew' (complete boxes 2 & 3, ask for details, remind paramedics, record BEFAST on PRF, stop to weigh patient). If 'Yes' to 'All symptoms resolved now?', it leads to 'as assessed by a competent clinician'. From 'as assessed by a competent clinician', if 'ROSIER-positive (complete box 1)?' is 'Yes', it leads to 'Posterior circulation stroke (POCS) suspected (see box 4)?'. If 'No', it leads to 'Is brain at risk (see box 3)?'. From 'Posterior circulation stroke (POCS) suspected', if 'Yes', it leads to 'Refer to stroke registrar or consultant via switchboard'. If 'No', it leads to 'Is brain at risk (see box 3)?'. From 'Is brain at risk (see box 3)?', if 'Yes', it leads to 'Dial 2222; say "RAP team to ED [state area, e.g. ER]; ETA [state time, e.g. 7min]"; Clear a space for patient. On arrival, check BM if not done by EMAS. Stroke team will assume management responsibility'. If 'No', it leads to 'Refer to stroke specialist nurse on Nervecentre ("ED Referral Stroke")'. A note at the bottom says: 'NB: Request CT head on behalf of stroke team if stroke specialist nurse delayed. If patient is critically unwell, the ED team will lead clinical management in the ER with input from Stroke Team and ICU teams as appropriate.'

**② Duration of symptoms**

Date and time last seen well \*

\* equal to 'date and time of onset' if patient able to communicate this or if onset was witnessed

Present date and time

Duration of symptoms (calculated from the times above)

**③ Brain at risk?**

**Yes**, as at least one of the below

Neurological deficit onset within previous 10h (see box 2)

On anticoagulant medication (Warfarin, LMWH or a DOAC)

Known bleeding diathesis

**No**, as none of the above

**④ POCS suspected?**

**YES**, as at least one of the below

Direction-changing nystagmus

Finger-nose / heel-shin ataxia

New unilateral hearing loss

Acute inability to swallow

**No**, as none of the above

**⑤ Is stroke disabling?**

**Yes**, as at least one of the below

NIHSS  $\geq 4$

Speech affected

Swallow abnormal

Visual fields affected

Walking abnormal

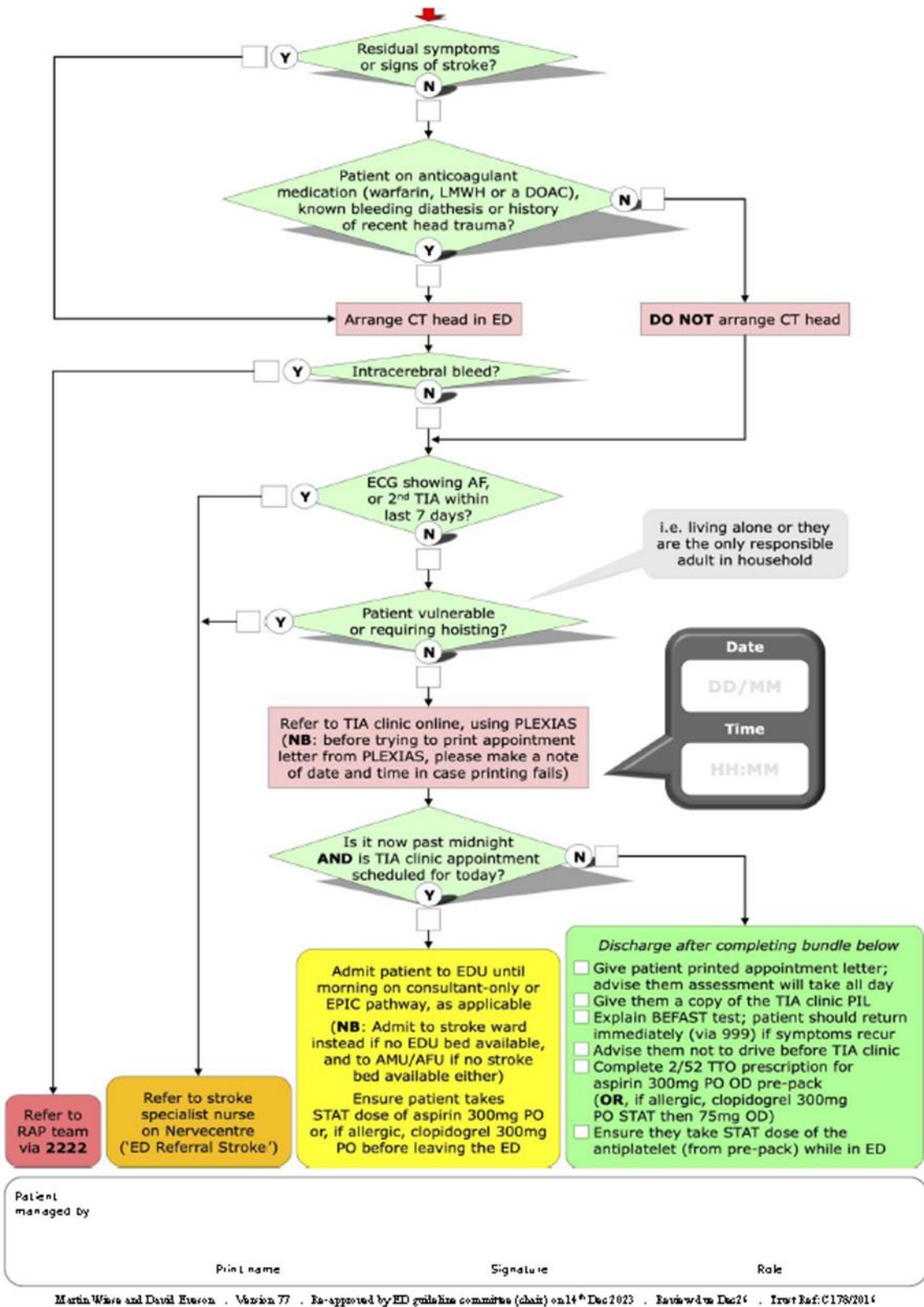
Person cannot self-care

**NO**, as none of the above

**Stroke team to complete**

The flowchart starts with 'Stroke likely?'. If 'Yes', it leads to 'Is stroke disabling (complete box 5)?'. If 'No', it leads to 'Correct EMAS referral?'. From 'Is stroke disabling (complete box 5)?', if 'Yes', it leads to 'Discharge with TIA clinic follow-up after CT head to exclude haemorrhage (see box 6)'. If 'No', it leads to 'Thrombolysed if indicated and arrange admission to HASU (or AMU/AFU if no bed available within 4h of arrival)'. From 'Correct EMAS referral?', if 'Yes', it leads to 'Hand pt over to Medical Team and add to AMU/AFU bed list'. If 'No', it leads to 'ROSIER-positive?'. From 'ROSIER-positive?', if 'Yes', it leads to 'Stroke team maintains management responsibility; this includes completion of NerveCentre GP letter'. If 'No', it leads to 'Hand pt over to Medical Team and add to AMU/AFU bed list'. A note says: 'NB: No need to return to ED after CT head if bed ready'.

6 ED management of suspected TIA and non-disabling stroke



Please refer to latest version available online

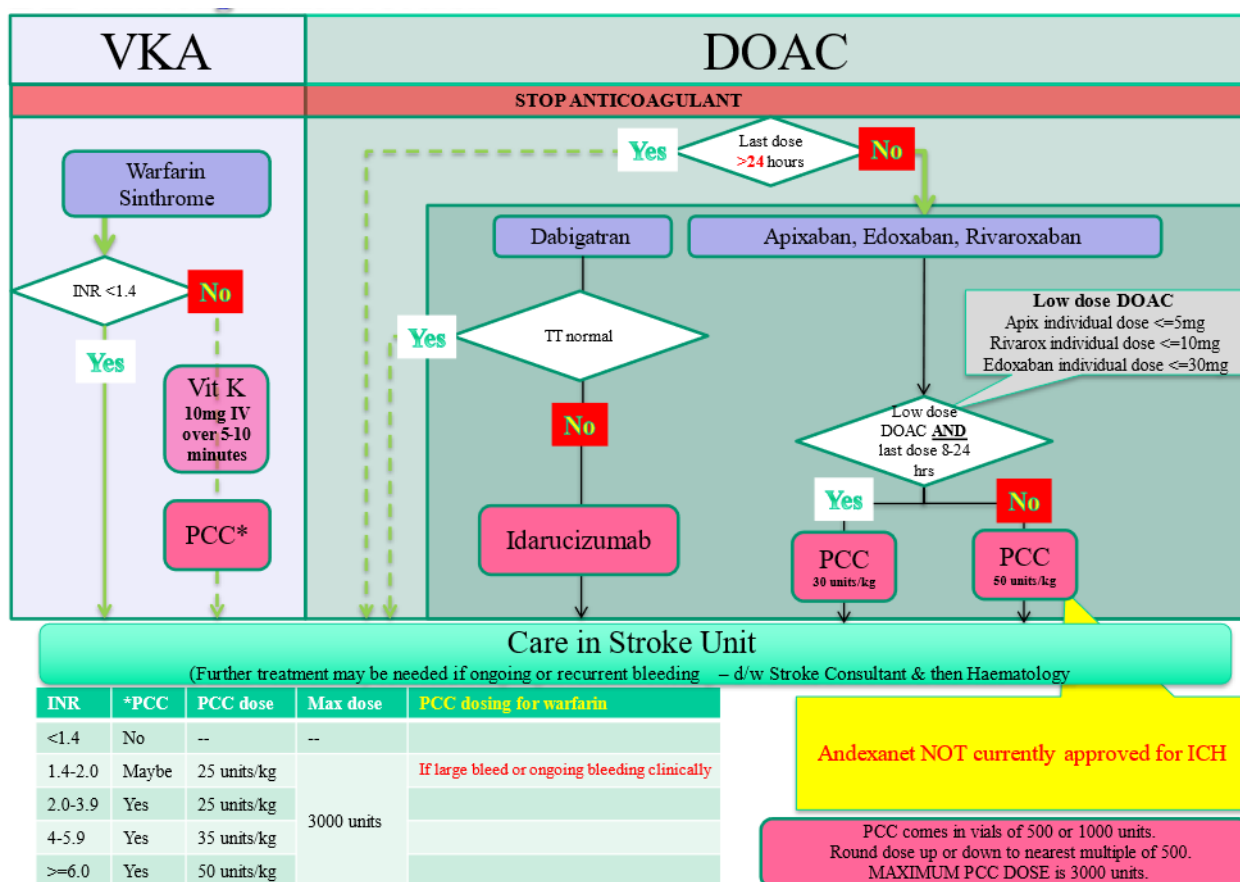
### 10.3 ABC Protocol for Intracerebral Haemorrhage

The ABC protocol is reported to reduce 30-day mortality by a third (~35% to ~24%).

Where appropriate, the following should be implemented within 1 hour of ED arrival

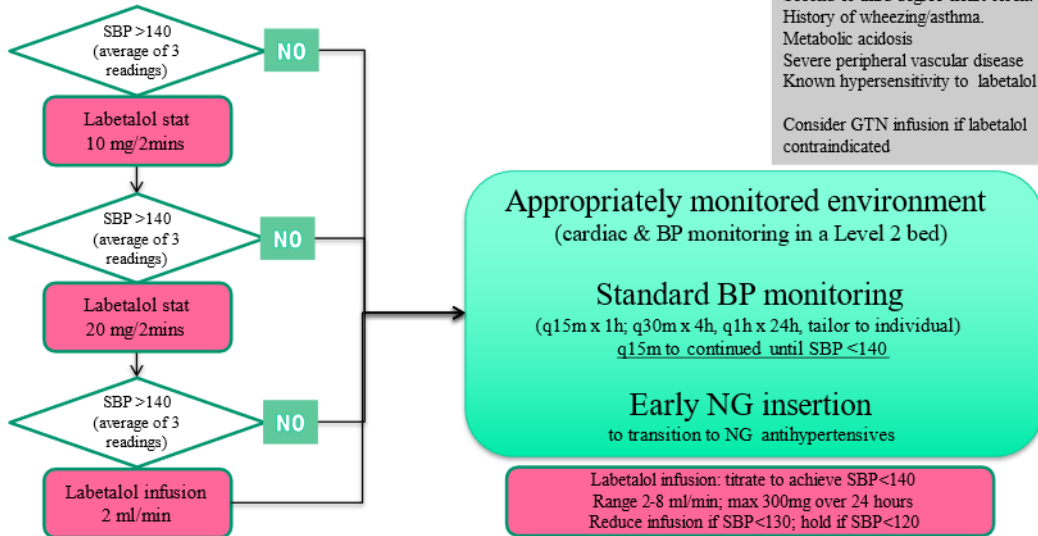
1. A – anticoagulation reversal
2. B – BP lowering aggressively
3. C – care pathway i.e. in appropriate location for level of care needed

#### 10.3.1 Anticoagulation reversal



### 10.3.2 BP lowering

## B blood pressure lowering



**Contraindications to labetalol**  
 HR < 50 (unless pacemaker in situ)  
 Cardiogenic shock  
 Severe heart failure  
 Second or third degree heart block.  
 History of wheezing/asthma.  
 Metabolic acidosis  
 Severe peripheral vascular disease  
 Known hypersensitivity to labetalol

Consider GTN infusion if labetalol contraindicated

**DO NOT OFFER RAPID BP LOWERING IF**

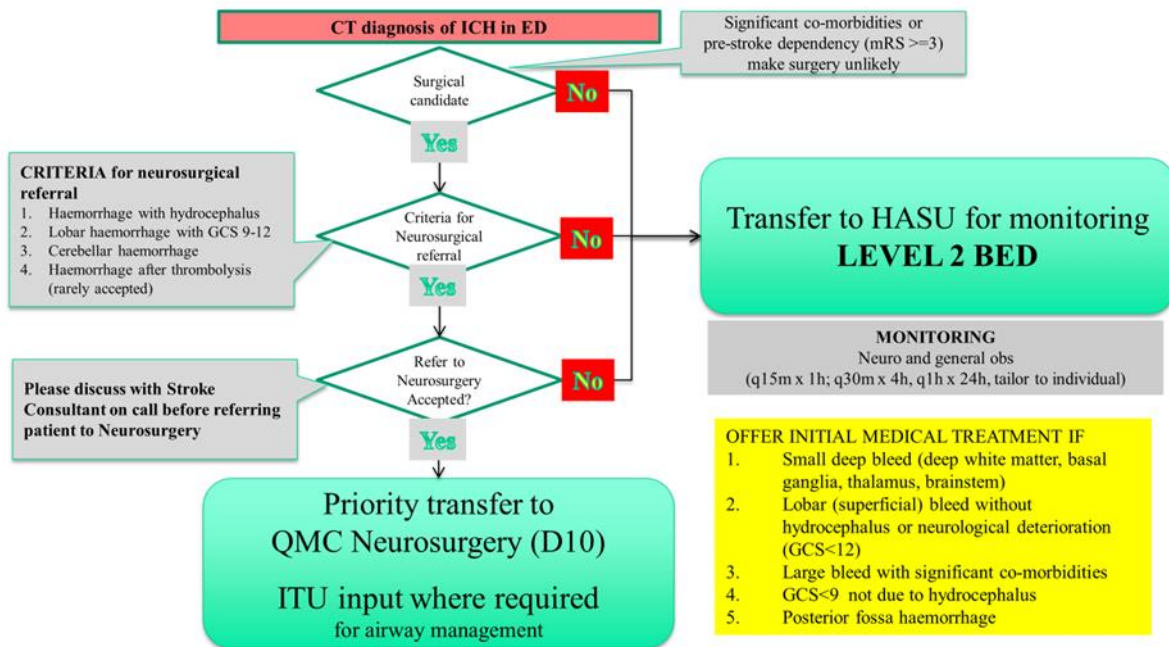
1. ICH with underlying structural cause (for example, tumour, arteriovenous malformation or aneurysm)
2. Glasgow Coma Scale < 6
3. Planned for early neurosurgery to evacuate the haematoma
4. Massive haematoma with a poor expected prognosis

**Consider and address other causes of high BP**

- Pain / headache
- Bladder retention
- Anxiety
- Respiratory distress

### 10.3.3 Care pathway

## C Care pathway



## 10.4 Stroke clinical assessments

### 10.4.1 ROSIER scale

# ROSIER Scale Stroke Assessment

The aim of this assessment tool is to enable medical and nursing staff to differentiate patients with stroke and stroke mimics.

Assessment Date  Time   
Symptom onset Date  Time

GGS E= M= V= BP  \*BM

*\* If BM < 3.5 mmol/l treat urgently and reassess once blood glucose normal*

Has there been loss of consciousness or syncope?

Y (-1)  N (0)

Has there been seizure activity?

Y (-1)  N (0)

Is there a NEW ACUTE onset (or on awakening from sleep)?

I. Asymmetric facial weakness Y (+1)  N (0)

II. Asymmetric arm weakness Y (+1)  N (0)

III. Asymmetric leg weakness Y (+1)  N (0)

IV. Speech disturbance Y (+1)  N (0)

V. Visual field defect Y (+1)  N (0)






\*Total Score \_\_\_\_\_ (-2 to +5)

Provisional diagnosis:  Stroke  Non-stroke (specify) \_\_\_\_\_

\* Stroke is likely if total scores are > 0. Scores of <= 0 have a low possibility of stroke but not completely excluded.

### 10.4.2 BEFAST test

# B E F A S T

BALANCE	EYES	FACE	ARM	SPEECH	TERRIBLE HEADACHE
					
Sudden loss of balance?	Loss of vision in one or both eyes?	Face looks uneven?	Arm or leg weak/hanging down?	Speech slurred? Trouble speaking or seem confused?	Thunder clap headache? Worst headache of your life?

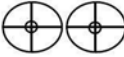
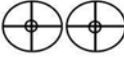

### 10.4.3 Glasgow Coma Score

## Glasgow Coma Scale

Best eye response (E)	Spontaneous--open with blinking at baseline	4
	Opens to verbal command, speech, or shout	3
	Opens to pain, not applied to face	2
	None	1
Best verbal response (V)	Oriented	5
	Confused conversation, but able to answer questions	4
	In appropriate responses, words discernible	3
	In comprehensible speech	2
	None	1
Best motor response (M)	Obeys commands for movement	6
	Purposeful movement to painful stimulus	5
	Withdraws from pain	4
	Abnormal (spastic) flexion, decorticate posture	3
	Extensor (rigid) response, decerebrate posture	2
	None	1



### 10.4.4 NIH Stroke Scale (NIHSS)

NATIONAL INSTITUTE OF HEALTH STROKE SCALE (NIHSS)		Pre-thrombolysis / Admission	Post thrombolysis / Consultant Review	Further review (eg 24hrs post thrombolysis)
Instructions	Scale Definition	Date: ..... Time: .....	Date: ..... Time: .....	Date: ..... Time: .....
1a Level of Consciousness (LOC)	0 = Alert, keenly responsive 1 = Not alert, but arousable by minor stimulation 2 = Not alert, requires repeated stimulation to attend, or is obtunded and requires strong and painful stimulation to make movements 3 = Responds only with reflex motor or autonomic effects or totally unresponsive, flaccid and areflexic			
1b LOC Questions (Age and current month)	0 = Answers both correctly 1 = Answers one correctly 2 = Answers neither correctly			
1c LOC Commands (Open eyes and make fist)	0 = Performs both correctly 1 = Performs one task correctly 2 = Performs neither correctly			
2 Best Gaze	0 = Normal 1 = Partial gaze palsy 2 = Forced deviation or total gaze paresis not overcome by the oculocephalic manoeuvre			
3 Visual	0 = No visual loss 1 = Partial hemianopia 2 = Complete hemianopia 3 = Bilateral hemianopia (blind including cortical blindness)			
4 Facial Palsy	0 = Normal symmetrical movement 1 = Minor paralysis 2 = Partial paralysis 3 = Complete paralysis of one or both sides (involving upper and lower face)	L <input type="checkbox"/> R <input type="checkbox"/>	L <input type="checkbox"/> R <input type="checkbox"/>	L <input type="checkbox"/> R <input type="checkbox"/>
5 Motor Arm	0 = No drift for full 10 seconds 1 = Drift, limb holds up and drifts but does not hit support 2 = Some effort against gravity but falls to support within 10 seconds 3 = No effort against gravity, limb falls to support, some movement 4 = No movement	LEFT RIGHT	LEFT RIGHT	LEFT RIGHT
6 Motor Leg	0 = No drift for full 5 seconds 1 = Drift, limb holds up and drifts but does not hit support 2 = Some effort against gravity but falls to support within 5 seconds 3 = No effort against gravity, limb falls to support, some movement 4 = No movement	LEFT RIGHT	LEFT RIGHT	LEFT RIGHT
7 Limb Ataxia	0 = Absent 1 = Present in one limb 2 = Present in two limbs			
8 Sensory	0 = Normal, no sensory loss 1 = Mild to moderate sensory loss, patient feels pinprick is less sharp or dull, or loss of superficial pain on affected side but patient is aware he/she is being touched 2 = Severe to total sensory loss, patient is not aware of being touched in the face, arm and leg			
9 Best Language	0 = No aphasia, normal 1 = Mild to moderate aphasia, examiner can identify picture or naming card from response 2 = Severe aphasia, fragmentary expression, listener carries burden of communication 3 = Mute			
10 Dysarthria	0 = Normal 1 = Mild to moderate 2 = Severe, unintelligible (out of proportion to dysphasia)			
11 Extinction and Inattention	0 = No abnormality 1 = Inattention or extinction to one sensory modality (visual, tactile, auditory, spacial or personal) 2 = Inattention or extinction to more than one modality			
<b>TOTAL</b>		/42	/42	/42

### 10.4.5 The modified Rankin Scale (mRS)

The scale runs from 0-6, running from perfect health without symptoms to death.

0 - No symptoms.

1 - No significant disability. Able to carry out all usual activities, despite some symptoms.

2 - Slight disability. Able to look after own affairs without assistance, but unable to carry out all previous activities.

3 - Moderate disability. Requires some help, but able to walk unassisted.

4 - Moderately severe disability. Unable to attend to own bodily needs without assistance, and unable to walk unassisted.

5 - Severe disability. Requires constant nursing care and attention, bedridden, incontinent.

6 – Dead

This is perhaps a condensed version of the Clinical Frailty Score, and more suitable and validated in the stroke setting. e.g. In general, mechanical thrombectomy would be considered for someone with a score of  $\leq 2$ .

Online training for mRS (courtesy of Lancashire & South Cumbria ISNDN) is available at:

<https://rise.articulate.com/share/SVQYC-2gt9SFfNZtA2X6UFLZqmA52NYM#/>

## 10.5 Physiotherapy assessment pack

University Hospitals of Leicester		Patient Sticker	
Department of Stroke Medicine			
Physiotherapy Assessment			
Diagnosis/Imaging:		Date and time of admission:	
Consent: Verbal / Presumed Details of presumed consent:		Others present:	
Observation Chart Checked: <input type="checkbox"/>	EWS =	Case notes reviewed: <input type="checkbox"/>	Dominant Hand: Left / Right
Baseline mobility:		Communication / Cognition:	
Respiratory Review Required: Yes / No If Yes Details:			
Vision:		Inattention:	
Upper Limb	Range of Motion, Coordination, Proprioception, Strength		
Head, Trunk and Pelvis	Posture, Symmetry, Alignment		
Lower Limb	Range of Motion, Coordination, Proprioception, Strength		
Name		Signature	Date
Designation		Time of assessment	Time notes written
HCPC Number		From:            To:            =            mins	
<i>KEY: Mob = mobilised, T/F = transferred, ROM = Range of motion, S/V = supervision, AO = assistance of, é = with, BOS = Base of Support, WB = weight bearing, UL = upper limb, LL = lower limb, D/C = discharge, ( R )=right, ( L ) = left, pt = patient, PT = physiotherapist, NAD = no abnormalities detected, n/a = not appropriate, ( I ) = independent, ADL's = Activities of daily living</i>			

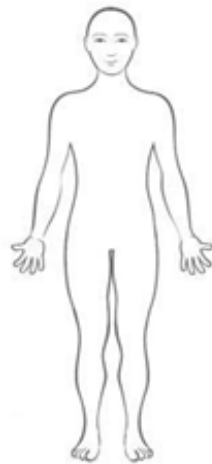
University Hospitals of Leicester

Department of Stroke Medicine

Physiotherapy Assessment

Patient Sticker

Body Chart



Key:

Low tone:

--- Severe

-- Moderate

- Mild

High Tone:

+++ Severe

++ Moderate

+ Mild

N Normal

Areas of Altered sensation:



Functional Ability (bed mobility, sitting balance, standing balance, transfers, mobility, stairs)

Contact with family/carers

Name	Signature	Date
Designation	Time of assessment	Time notes written
HCPC Number	From:            To:            =            mins	
<p><i>KEY: Mob = mobilised, T/F = transferred, ROM = Range of motion, S/V = supervision, AO = assistance of, é = with, BOS = Base of Support, WB = weight bearing, UL = upper limb, LL = lower limb, D/C = discharge, ( R ) = right, ( L ) = left, pt = patient, PT = physiotherapist, NAD = no abnormalities detected, n/a = not appropriate, ( I ) = independent, ADL's = Activities of daily living</i></p>		

University Hospitals of Leicester

Department of Stroke Medicine

Physiotherapy Assessment

Patient Sticker



Problem List	Treatment Plan	SMART Goal	Date Achieved
Likely discharge destination:			
Goals discussed with patient: Yes / No If no why not:		Moving and handling advice given:	
Further comments:			
Patient reported outcome measure completed (see separate sheet): Yes / No If no why not:			
Name	Signature	Date	
Designation	Time of assessment	Time notes written	
HCPC Number	From:            To:            =            mins		
<small><b>KEY:</b> Mob = mobilised, T/F = transferred, ROM = Range of motion, S/V = supervision, AO = assistance of, <math>\acute{c}</math> = with, BOS = Base of Support, WB = weight bearing, UL = upper limb, LL = lower limb, D/C = discharge, ( R )=right, ( L ) = left, pt = patient, PT = physiotherapist, NAD = no abnormalities detected, n/a = not appropriate, ( <b>I</b> ) = independent, ADL's = Activities of daily living</small>			

University Hospitals of Leicester

Department of Stroke Medicine


Physiotherapy Assessment  
Postural Assessment Scale for  
Stroke

Patient Sticker

If not tested mark N/T

Maintaining a Posture:	Date:	Date:	Date:	Date:	Date:
<b>1. Sitting Without Support on Edge of 50cm High Plinth, Feet Touching the Floor:</b>					
0 = Cannot sit 1 = Can sit with slight support e.g. one hand 2 = Can sit for more than 10 seconds without support 3 = Can sit for more than 5 minutes without support					
<b>2. Standing with Support:</b>					
0 = Cannot stand, even with support 1 = Can stand with strong support of 2 2 = Can stand with moderate support of 1 3 = Can stand with support of only 1 hand					
<b>3. Standing Without Support (Feet Position free, No Other Constraints):</b>					
0 = Cannot stand without support 1 = Stand for 10 seconds or leans heavily on 1 leg 2 = Stand for 1 minute or slightly asymmetrically 3 = Stand for > 1minute whilst punching arms above shoulder level					
<b>4. Standing on Non-Paretic Leg (No Other Constraints):</b>					
0 = Cannot stand on non-paretic leg 1 = Can stand on non-paretic leg for a few seconds 2 = Can stand on non-paretic leg for more than 5 seconds 3 = Can stand on non-paretic leg for more than 10seconds					
<b>5. Standing on Paretic Leg (No Other Constraints):</b>					
0 = Cannot stand on paretic leg 1 = Can stand on paretic leg for a few seconds 2 = Can stand on paretic leg for more than 5 seconds 3 = Can stand on paretic leg for more than 10seconds					
<b>Moving Through Postures:</b>					
Scores: 0: Cannot Perform 1: Can Perform with Min A02/Max A01 2: Can Perform with Min A01 3: Can Perform, No Help					
<b>6. Rolling Supine to Affected Side</b>					
<b>7. Rolling Supine to Non-Affected Side</b>					
<b>8. Supine to Sitting up on Edge of 50cm Plinth</b>					
<b>9. Sitting on Edge of 50cm Plinth to Supine</b>					
<b>10. Sitting on 50cm Plinth to Standing, No Support</b>					
<b>11. Standing to Sitting Down on 50cm Plinth, No Support</b>					
<b>12. Standing, Picking up Pencil off Floor, No Support</b>					
<b>Total Score (Out of 36)</b>					
Signature					
Name					
Designation					

## 10.6 Occupational therapy assessment pack

University Hospitals of Leicester   
NHS Trust

Acute Stroke Admission Proforma  
Version 2018

Addressograph

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### Occupational Therapy Screening Assessment

<b>Initial Impression / EWS:</b>
<b>Others present:</b>
<b>Cognition / Perception:</b>
<b>Upper limb (U/L) activity / sensation / splinting:</b>
<b>Transfers / Mobility:</b>
<b>Seating:</b>
<b>Current ADLs:</b>
<b>Needs further Intervention:</b> Yes <input type="checkbox"/> No <input type="checkbox"/>
<b>Plan:</b> Seating <input type="checkbox"/> Transfer <input type="checkbox"/> Cognition / perception <input type="checkbox"/> U/L <input type="checkbox"/> Establish Baseline <input type="checkbox"/>
Wash& Dress <input type="checkbox"/> Kitchen <input type="checkbox"/>
<b><u>GOALS / TREATMENT PLAN:</u></b>
<b>Estimated Discharge Outcome:</b> Home <input type="checkbox"/> ESDS <input type="checkbox"/> Rehabilitation <input type="checkbox"/> CINSS <input type="checkbox"/>
Signed: ..... Name: ..... Designation: ..... Date: ..... Time: .....

Acute Stroke Admission Proforma  
 Version 2018

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**Pre-admission Functional History**

<p style="text-align: center;"><b><u>HOME:</u></b></p> <p>Lives: Alone <input type="checkbox"/> with .....</p> <p>Support from: Family <input type="checkbox"/> POC <input type="checkbox"/> Details:.....</p> <p>Property: House <input type="checkbox"/> Bungalow <input type="checkbox"/> Flat <input type="checkbox"/> (floor:.....) NH <input type="checkbox"/> RH <input type="checkbox"/></p> <p>Pendant alarm <input type="checkbox"/> Pull cord <input type="checkbox"/> Keysafe <input type="checkbox"/></p> <p>Access to property: Steps:..... Ramp:..... Rails .....</p> <p>Steps inside: Yes <input type="checkbox"/> No <input type="checkbox"/> Where?..... Pets: Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Stairs: Yes <input type="checkbox"/> No <input type="checkbox"/> Handrail: Left <input type="checkbox"/> Right <input type="checkbox"/> Stairlift/lift <input type="checkbox"/></p> <p style="text-align: center;"><b><u>MOBILITY:</u></b></p> <p>Indoors: unaided <input type="checkbox"/> Stick <input type="checkbox"/> WZF <input type="checkbox"/> Other <input type="checkbox"/> Transfer only <input type="checkbox"/></p> <p>Outdoors: ..... Distance: .....</p> <p>History of falls in the last year?.....</p> <p>Attended falls clinic: Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Drives? Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p style="text-align: center;"><b><u>TRANSFERS / EQUIPMENT</u></b></p> <p>Chair:..... Bed: up/down.....</p> <p>Toilet: up/down/outside..... Commode:.....</p> <p>Bathroom: up/down Facilities.....</p> <p style="text-align: center;"><b><u>ADLs</u></b></p> <p>Personal care (including grooming):.....</p> <p>Toileting:.....</p> <p>Continent: Bladder Yes <input type="checkbox"/> No <input type="checkbox"/> Bowels Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Meal Preparation: Self <input type="checkbox"/> Assistance <input type="checkbox"/> .....</p> <p>Snack: Self <input type="checkbox"/> Assistance <input type="checkbox"/> Hot drinks: Self <input type="checkbox"/> Assistance <input type="checkbox"/></p> <p>.....</p> <p>Shopping:..... Cleaning / Laundry :.....</p>	<p><b><u>Cognitive Baseline:</u></b></p> <p>.....</p> <p>.....</p> <p><b><u>Occupation / Hobbies:</u></b></p> <p>.....</p> <p>.....</p> <p><b><u>Mood:</u></b></p> <p>Is the patient basically happy with life?                  Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><b><u>Vision / Hearing:</u></b></p> <p>.....</p> <p><b><u>U/L:</u></b></p> <p>Functional use: Right Yes <input type="checkbox"/> No <input type="checkbox"/>                  Left Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Hand Dominance: Right <input type="checkbox"/> Left <input type="checkbox"/></p> <p><b><u>Medication</u></b></p> <p>Does patient self-medicate?                  Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>Dosette Box?                  Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p><b><u>Other Information:</u></b></p> <p>.....</p> <p>.....</p>
<p>Information gathered from: Patient <input type="checkbox"/> Other <input type="checkbox"/> (Please state).....</p> <p>Information gathered via: Face to Face <input type="checkbox"/> Telephone <input type="checkbox"/> Other <input type="checkbox"/> (Please state) .....</p>	
<p>Signed: ..... Name: ..... Designation: ..... Date: ..... Time: .....</p>	



## 10.7 Patient reported outcome measure

Under each heading, please tick the ONE box that best describes your health TODAY

### MOBILITY

- I have no problems in walking about
- I have slight problems in walking about
- I have moderate problems in walking about
- I have severe problems in walking about
- I am unable to walk about

### SELF-CARE

- I have no problems washing or dressing myself
- I have slight problems washing or dressing myself
- I have moderate problems washing or dressing myself
- I have severe problems washing or dressing myself
- I am unable to wash or dress myself

### USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- I have no problems doing my usual activities
- I have slight problems doing my usual activities
- I have moderate problems doing my usual activities
- I have severe problems doing my usual activities
- I am unable to do my usual activities

### PAIN / DISCOMFORT

- I have no pain or discomfort
- I have slight pain or discomfort
- I have moderate pain or discomfort
- I have severe pain or discomfort
- I have extreme pain or discomfort

### ANXIETY / DEPRESSION

- I am not anxious or depressed
- I am slightly anxious or depressed
- I am moderately anxious or depressed
- I am severely anxious or depressed
- I am extremely anxious or depressed

Therapist Name: ..... Therapist Signature: .....

Date: ..... Time: .....

## 11 Monitoring and Audit Criteria

Key Performance Indicator	Target	Issuing body	Body reference	UHL guideline reference	Method of Assessment	Frequency	Lead
Proportion of patients who were assessed by a nurse trained in stroke management within 24h of clock start <b><i>('clock start' is equivalent to hospital admission time, or time of stroke if occurring as an in-patient)</i></b>	90%	SSNAP	4.3	2.1.3.1	National stroke audit	Quarterly	Head of service for stroke medicine via UHL Acute Stroke working group and Clinical Specialist Physiotherapist and Occupational Therapist.
Proportion of applicable patients who were given a swallow screen within 4h of clock start	90%		4.5	2.1.7			
Proportion of patients Scanned within 1 hour of clock start	90%		1.1	2.1.9			
Proportion of patients assessed by a stroke specialist clinician within 24h of clock start	90%		4.1	2.1.3			
Proportion of patients directly admitted to a stroke unit within 4 hours of clock start	90%		2.1	2.1.11			
Proportion of applicable patients who were given a formal swallow assessment within 72h of clock start	90%		4.6	2.1.18			

Proportion of applicable patients who were assessed by an occupational therapist within 72h of clock start	90%		8.1	5.2.4			
Proportion of applicable patients who were assessed by a physiotherapist within 72h of clock start	90%		8.3	5.2.5			
Proportion of applicable patients who are assessed by a nurse within 24h AND at least one therapist within 24h AND all relevant therapists within 72h AND have rehab goals agreed within 5 days	90%		8.8	2.1.18			
Proportion of all stroke patients given thrombolysis (all stroke types)	15%		3.1	7.1			
Proportion of patients who were thrombolysed within 1 hour of clock start	80%		3.3	7.1			

## 12 Legal Liability Guideline Statement

Guidelines or Procedures issued and approved by the Trust are considered to represent best practice. Staff may only exceptionally depart from any relevant Trust guidelines or Procedures and always only providing that such departure is confined to the specific needs of individual circumstances. In healthcare delivery such departure shall only be undertaken where, in the judgement of the responsible healthcare professional' it is fully appropriate and justifiable - such decision to be fully recorded in the patient's notes.

## 13 Process for Version Control, Document Archiving and Review

This document will be uploaded onto SharePoint and available for access by Staff through INsite. It will be stored and archived through this system.

The next guideline review date is scheduled for **February 2028**. The UHL acute stroke working group, led by the Head of Service, will be responsible for review and updating of the document.

### 3. Education and Training

Clinical staff are not required to develop novel skills in order to implement this guideline. Simplified, pictorial tools are to be distilled from this guideline, relevant to the clinical areas within the EMSG for handy reference. Regular educational events amongst various pathway stakeholders support implementation including induction, in-service training and clinical supervision. The standards in this document can be audited and evaluated within or without the SSNAP process.

### 4. Monitoring Compliance

See Section 11.

### 5. Equality analysis assessment

The Trust recognises the diversity of the local community it serves. Our aim therefore is to provide a safe environment free from discrimination and treat all individuals fairly with dignity and appropriately according to their needs.

As part of its development, this guideline and its impact on equality have been reviewed and no detriment was identified.

### 6. Supporting references

See Section 9.

### 7. Key Words

Stroke; Ischaemic Stroke; Haemorrhagic Stroke; Transient Ischaemic Attack; TIA; Cerebral venous thrombosis; Intravenous thrombolysis; Decompressive hemicraniectomy; Mechanical thrombectomy; Physiotherapy; Occupational Therapy

<b>CONTACT AND REVIEW DETAILS</b>	
<b>Guideline Lead (Name and Title)</b> Dr Amit Mistri Head of Service, Stroke Medicine	<b>Executive Lead</b> Mr Andrew Furlong Medical Director
<b>Details of Changes made during review:</b> Major update – all changes highlighted in red.	