

Acute stroke

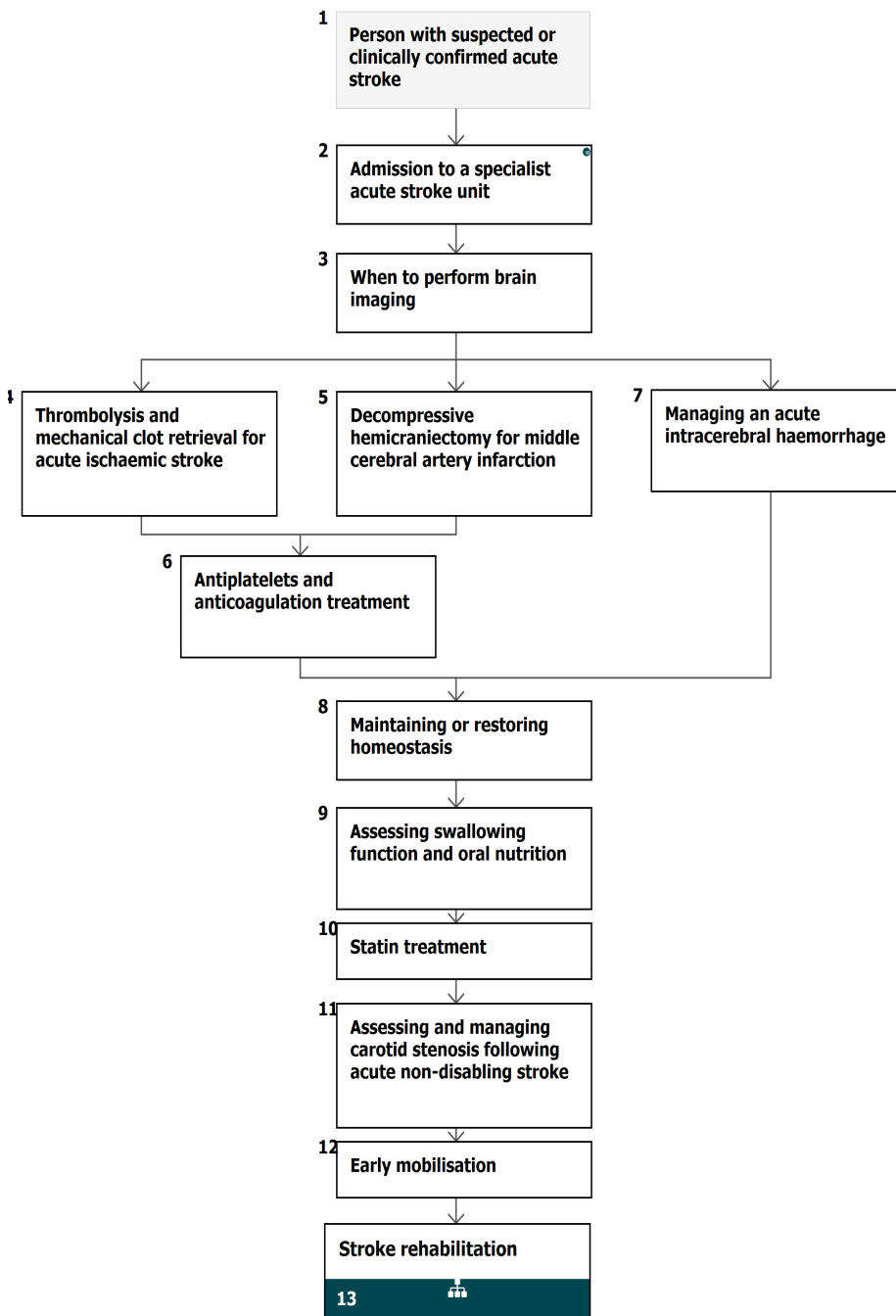
NICE Pathways bring together everything NICE says on a topic in an interactive flowchart. NICE Pathways are interactive and designed to be used online.

They are updated regularly as new NICE guidance is published. To view the latest version of this NICE Pathway see:

<http://pathways.nice.org.uk/pathways/stroke>

NICE Pathway last updated: 27 February 2019

This document contains a single flowchart and uses numbering to link the boxes to the associated recommendations.



1 Person with suspected or clinically confirmed acute stroke

No additional information

2 Admission to a specialist acute stroke unit

All people with suspected stroke should be admitted directly to a specialist acute stroke unit following initial assessment, either from the community or from the A&E department.

Quality standards

The following quality statement is relevant to this part of the interactive flowchart.

Stroke in adults

1. Prompt admission to specialist acute stroke units

3 When to perform brain imaging

Brain imaging should be performed immediately for people with acute stroke if any of the following apply:

- indications for thrombolysis or early anticoagulation treatment
- on anticoagulant treatment
- a known bleeding tendency
- a depressed level of consciousness (GCS <13)
- unexplained progressive or fluctuating symptoms
- papilloedema, neck stiffness or fever
- severe headache at onset of stroke symptoms.

'Immediately' is defined as 'ideally the next slot and definitely within 1 hour, whichever is sooner', in line with the National Stroke Strategy.

For all people with acute stroke without indications for immediate brain imaging, scanning should be performed as soon as possible. 'As soon as possible' is defined as 'within a maximum of 24 hours after onset of symptoms', in line with the National Stroke Strategy.

4 Thrombolysis and mechanical clot retrieval for acute ischaemic stroke

Thrombolysis with alteplase

The following recommendation is from NICE technology appraisal guidance on [alteplase for treating acute ischaemic stroke](#).

Alteplase is recommended within its marketing authorisation for treating acute ischaemic stroke in adults if:

- treatment is started as early as possible within 4.5 hours of onset of stroke symptoms, and
- intracranial haemorrhage has been excluded by appropriate imaging techniques.

NICE has written information for the public on [alteplase](#).

Administering alteplase

Alteplase should be administered only within a well-organised stroke service with:

- staff trained in delivering thrombolysis and in monitoring for any associated complications
- level 1 and level 2 nursing care staff trained in acute stroke and thrombolysis
- immediate access to imaging and re-imaging, and staff trained to interpret the images.

Staff in A&E departments, if appropriately trained and supported, can administer alteplase for the treatment of acute ischaemic stroke provided that patients can be managed within an acute stroke service with appropriate neuroradiological and stroke physician support.

Protocols should be in place for the delivery and management of thrombolysis, including post-thrombolysis complications.

For information on blood pressure reduction in people who are candidates for thrombolysis, see [maintaining or restoring homeostasis \[See page 8\]](#).

Mechanical clot retrieval

NICE has published interventional procedures guidance on [mechanical clot retrieval for treating acute ischaemic stroke](#) with **standard arrangements** for clinical governance, consent and audit.

NICE has published a medtech innovation briefing on [mechanical thrombectomy devices for acute ischaemic stroke](#).

5 Decompressive hemicraniectomy for middle cerebral artery infarction

People with middle cerebral artery infarction who meet all of the criteria below should be considered for decompressive hemicraniectomy. They should be referred within 24 hours of onset of symptoms and treated within a maximum of 48 hours.

- Aged 60 years or under.
- Clinical deficits suggestive of infarction in the territory of the middle cerebral artery, with a score on the NIHSS of above 15.
- Decrease in the level of consciousness to give a score of 1 or more on item 1a of the NIHSS.
- Signs on CT of an infarct of at least 50% of the middle cerebral artery territory, with or without additional infarction in the territory of the anterior or posterior cerebral artery on the same side, or infarct volume greater than 145 cm³ as shown on diffusion-weighted MRI.

People who are referred for decompressive hemicraniectomy should be monitored by appropriately trained professionals skilled in neurological assessment.

6 Antiplatelets and anticoagulation treatment

Antiplatelets

All people presenting with acute stroke who have had a diagnosis of primary intracerebral haemorrhage excluded by brain imaging should, as soon as possible but certainly within 24 hours, be given:

- aspirin 300 mg orally if they are not dysphagic or
- aspirin 300 mg rectally or by enteral tube if they are dysphagic.

Thereafter, aspirin 300 mg should be continued until 2 weeks after the onset of stroke symptoms, at which time definitive long-term antithrombotic treatment should be initiated. People being discharged before 2 weeks can be started on long-term treatment earlier.

Any person with acute ischaemic stroke for whom previous dyspepsia associated with aspirin is reported should be given a proton pump inhibitor in addition to aspirin. (Aspirin intolerance is defined in NICE technology appraisal guidance on [clopidogrel and modified-release](#)

dipyridamole in the prevention of occlusive vascular events as either of the following: proven hypersensitivity to aspirin-containing medicines; or history of severe dyspepsia induced by low-dose aspirin.)

Any person with acute ischaemic stroke who is allergic to or genuinely intolerant of aspirin should be given an alternative antiplatelet agent.

Clopidogrel and modified-release dipyridamole

The following recommendations are an extract from NICE technology appraisal guidance on clopidogrel and modified-release dipyridamole for the prevention of occlusive vascular events.

Clopidogrel is recommended as an option to prevent occlusive vascular events for people who have had an ischaemic stroke or who have peripheral arterial disease or multivascular disease.

Modified-release dipyridamole in combination with aspirin is recommended as an option to prevent occlusive vascular events for people who have had an ischaemic stroke only if clopidogrel is contraindicated or not tolerated.

Modified-release dipyridamole alone is recommended as an option to prevent occlusive vascular events for people who have had an ischaemic stroke only if aspirin and clopidogrel are contraindicated or not tolerated.

Treatment with clopidogrel to prevent occlusive vascular events should be started with the least costly licensed preparation.

People currently receiving clopidogrel or modified-release dipyridamole either with or without aspirin outside these criteria (listed above) should have the option to continue treatment until they and their clinicians consider it appropriate to stop.

NICE has written information for the public on clopidogrel and modified-release dipyridamole.

Anticoagulation treatment

Anticoagulation treatment should not be used routinely for the treatment of acute stroke. (There may be a subgroup of people for whom the risk of venous thromboembolism outweighs the risk of haemorrhagic transformation. People considered to be at particularly high risk of venous thromboembolism include anyone with complete paralysis of the leg, a previous history of venous thromboembolism, dehydration or comorbidities [such as malignant disease], or who is a current or recent smoker. Such people should be kept under regular review if they are given

prophylactic anticoagulation. For further information about preventing venous thromboembolism, see what NICE says on [venous thromboembolism](#).)

Acute venous stroke

People diagnosed with cerebral venous sinus thrombosis (including those with secondary cerebral haemorrhage) should be given full-dose anticoagulation treatment (initially full-dose heparin and then warfarin [INR 2–3]) unless there are comorbidities that preclude its use.

Stroke associated with arterial dissection

People with stroke secondary to acute arterial dissection should be treated with either anticoagulants or antiplatelet agents, preferably as part of a randomised controlled trial to compare the effects of the two treatments.

Acute ischaemic stroke associated with antiphospholipid syndrome

People with antiphospholipid syndrome who have an acute ischaemic stroke should be managed in same way as people with acute ischaemic stroke without antiphospholipid syndrome.

Disabling ischaemic stroke with atrial fibrillation

People with disabling ischaemic stroke who are in atrial fibrillation should be treated with aspirin 300 mg for the first 2 weeks before considering anticoagulation treatment.

See also what NICE says on [atrial fibrillation](#).

Other comorbidities

In people with prosthetic valves who have disabling cerebral infarction and who are at significant risk of haemorrhagic transformation, anticoagulation treatment should be stopped for 1 week and aspirin 300 mg substituted.

People with ischaemic stroke and symptomatic proximal deep vein thrombosis or pulmonary embolism should receive anticoagulation treatment in preference to treatment with aspirin unless there are other contraindications to anticoagulation.

7 Managing an acute intracerebral haemorrhage

Stroke services should agree protocols for the monitoring, referral and transfer of people to regional neurosurgical centres for the management of symptomatic hydrocephalus.

People with intracranial haemorrhage should be monitored by specialists in neurosurgical or stroke care for deterioration in function and referred immediately for brain imaging when necessary.

Previously fit people should be considered for surgical intervention following primary intracranial haemorrhage if they have hydrocephalus.

People with any of the following rarely require surgical intervention and should receive medical treatment initially:

- small deep haemorrhages
- lobar haemorrhage without either hydrocephalus or rapid neurological deterioration
- a large haemorrhage and significant comorbidities before the stroke
- a GCS of below 8 unless this is because of hydrocephalus
- posterior fossa haemorrhage.

Anticoagulation treatment

Clotting levels in people with a primary intracerebral haemorrhage who were receiving anticoagulation treatment before their stroke (and have elevated INR) should be returned to normal as soon as possible, by reversing the effects of the anticoagulation treatment using a combination of prothrombin complex concentrate and intravenous vitamin K.

People with haemorrhagic stroke and symptomatic deep vein thrombosis or pulmonary embolism should have treatment to prevent the development of further pulmonary emboli using either anticoagulation or a caval filter.

8 Maintaining or restoring homeostasis

Supplemental oxygen therapy

People who have had a stroke should receive supplemental oxygen only if their oxygen saturation drops below 95%. The routine use of supplemental oxygen is not recommended in

people with acute stroke who are not hypoxic.

Blood sugar control

People with acute stroke should be treated to maintain a blood glucose concentration between 4 and 11 mmol/litre.

Provide optimal insulin therapy, which can be achieved by the use of intravenous insulin and glucose, to all adults with type 1 diabetes with threatened or actual stroke. Critical care and emergency departments should have a protocol for such management.

For more information on treatment for adults with type 1 diabetes who have had a stroke, see what NICE says on [intensive management after myocardial infarction or stroke](#).

Blood pressure control

Anti-hypertensive treatment in people with acute stroke is recommended only if there is a hypertensive emergency with one or more of the following:

- hypertensive encephalopathy
- hypertensive nephropathy
- hypertensive cardiac failure/myocardial infarction
- aortic dissection
- pre-eclampsia/eclampsia
- intracerebral haemorrhage with systolic blood pressure over 200 mmHg.

Blood pressure reduction to 185/110 mmHg or lower should be considered in people who are candidates for thrombolysis.

9

Assessing swallowing function and oral nutrition

Swallowing function

On admission, people with acute stroke should have their swallowing screened by an appropriately trained healthcare professional before being given any oral food, fluid or medication.

If the admission screen indicates problems with swallowing, the person should have a specialist assessment of swallowing, preferably within 24 hours of admission and not more than 72 hours

afterwards.

People with suspected aspiration on specialist assessment, or who require tube feeding or dietary modification for 3 days, should be:

- reassessed and consider for instrumental examination
- referred for dietary advice.

People with acute stroke who are unable to take adequate nutrition and fluids orally should:

- receive tube feeding with a nasogastric tube within 24 hours of admission
- be considered for a nasal bridge tube or gastrostomy if they are unable to tolerate a nasogastric tube
- be referred to an appropriately trained healthcare professional for detailed nutritional assessment, individualised advice and monitoring.

In people with dysphagia, give food and fluids in a form that can be swallowed without aspiration, following the specialist assessment of swallowing.

Oral nutrition

All hospital inpatients on admission should be screened for malnutrition and the risk of malnutrition. Screening should be repeated weekly for inpatients

Screening should assess body mass index (BMI) and percentage unintentional weight loss and should also consider the time over which nutrient intake has been unintentionally reduced and/or the likelihood of future impaired nutrient intake. The Malnutrition Universal Screening Tool (MUST), for example, may be used to do this.

When screening for malnutrition and the risk of malnutrition, healthcare professionals should be aware that dysphagia, poor oral health and reduced ability to self-feed will affect nutrition in people with stroke.

Screening for malnutrition and the risk of malnutrition should be carried out by healthcare professionals with appropriate skills and training.

Routine nutritional supplementation is not recommended for people with acute stroke who are adequately nourished on admission.

Nutrition support should be initiated for people with stroke who are at risk of malnutrition. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding.

All people with acute stroke should have their hydration assessed on admission, reviewed regularly and managed so that normal hydration is maintained. For more information on nutritional supplementation, see what NICE says on [nutrition support in adults](#).

10 Statin treatment

Immediate initiation of statin treatment is not recommended in people with acute stroke (it is considered safe to start statins after 48 hours).

People with acute stroke who are already receiving statins should continue their statin treatment.

11 Assessing and managing carotid stenosis following acute non-disabling stroke

Early carotid imaging

Some people who have had a stroke have narrowing of the carotid artery that may require surgical intervention. Carotid imaging is required to define the extent of carotid artery narrowing.

All people with suspected non-disabling stroke who after specialist assessment are considered as candidates for carotid endarterectomy should have carotid imaging within 1 week of onset of symptoms.

Urgent carotid endarterectomy

People with stable neurological symptoms from acute non-disabling stroke who have symptomatic carotid stenosis of 50–99% according to the NASCET criteria, or 70–99% according to the ECST criteria, should:

- be assessed and referred for carotid endarterectomy within 1 week of onset of stroke symptoms
- undergo surgery within a maximum of 2 weeks of onset of stroke symptoms
- receive best medical treatment (control of blood pressure, antiplatelet agents, cholesterol lowering through diet and drugs, lifestyle advice).

People with stable neurological symptoms from acute non-disabling stroke who have symptomatic carotid stenosis of less than 50% according to the NASCET criteria, or less than 70% according to the ECST criteria, should:

- not undergo surgery
- receive best medical treatment (control of blood pressure, antiplatelet agents, cholesterol lowering through diet and drugs, lifestyle advice).

Carotid imaging reports should clearly state which criteria (ECST or NASCET) were used when measuring the extent of carotid stenosis.

Interventional procedures

NICE has published guidance on [transcervical extracorporeal reverse flow neuroprotection for reducing the risk of stroke during carotid artery stenting](#) with **standard arrangements** for clinical governance, consent and audit.

NICE has published guidance on [carotid artery stent placement for symptomatic extracranial carotid stenosis](#) with **normal arrangements** for clinical governance and audit or research.

NICE has published guidance on the following procedures with **special arrangements** for clinical governance, consent and audit or research:

- [carotid artery stent placement for asymptomatic extracranial carotid stenosis](#)
- [laser-assisted cerebral vascular anastomosis without temporary arterial occlusion](#).

12 Early mobilisation

People with acute stroke should be mobilised as soon as possible (when their clinical condition permits) as part of an active management programme in a specialist stroke unit.

People with acute stroke should be helped to sit up as soon as possible (when their clinical condition permits).

13 Stroke rehabilitation

[See Stroke / Stroke rehabilitation](#)

Glossary

ABCD2

a prognostic score to identify people at high risk of stroke after a TIA

acute stroke unit

a discrete area in the hospital that is staffed by a specialist stroke multidisciplinary team; it has access to equipment for monitoring and rehabilitating patients and regular multidisciplinary team meetings occur for goal setting

aphasia

loss or impairment of the ability to use and comprehend language, usually resulting from brain damage

Apraxia

apraxia of speech is a difficulty in initiating and executing the voluntary movement needed to produce speech when there is no weakness of speech muscles; it may cause difficulty producing the correct speech or changes in the rhythm or rate of speaking

Dysarthria

difficulty in articulating words

Dysphagia

difficulty in swallowing

Dyspraxia

difficulty in planning and executing movement

Early supported discharge

a service for people after stroke which allows transfer of care from an inpatient environment to a primary care setting to continue rehabilitation, at the same level of intensity and expertise that they would have received in the inpatient setting

ECST

European Carotid Surgery Trialists' Collaborative Group

FAST

face arm speech test, a test used to screen for a diagnosis of stroke or TIA

GCS

Glasgow coma score

Hemianopia

blindness in one half of the visual field of one or both eyes

INR

international normalised ratio

neglect

an inability to orient towards and attend to stimuli, including body parts, on the side of the body affected by the stroke

NASCET

North American symptomatic carotid endarterectomy trial

NIHSS

National Institutes of Health Stroke Scale

non-disabling stroke

a stroke with symptoms that last for more than 24 hours but later resolve, leaving no permanent disability

Orthosis

a device that supports or corrects the function of a limb or the torso

ROSIER

Recognition of stroke in the emergency room, a scale used to confirm a diagnosis of stroke or TIA

Screening

a process of identifying people with particular impairments; people can then be offered information, further assessment and appropriate treatment, screening may be performed as a precursor to more detailed assessment

Stroke rehabilitation service

a stroke service designed to deliver stroke rehabilitation either in hospital or in the community

Stroke inpatient unit

an environment in which multidisciplinary stroke teams deliver stroke care in a dedicated ward which has a bed area, dining area, gym, and access to assessment kitchens

TIA

a TIA (transient ischaemic attack) is defined as stroke symptoms and signs that resolve within 24 hours

Sources

Stroke and transient ischaemic attack in over 16s: diagnosis and initial management (2008)
NICE guideline CG68

Alteplase for treating acute ischaemic stroke (2012) NICE technology appraisal guidance 264

Clopidogrel and modified-release dipyridamole for the prevention of occlusive vascular events (2010) NICE technology appraisal guidance 210

Your responsibility

Guidelines

The recommendations in this guideline represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, professionals and practitioners are expected to take this guideline fully into account, alongside the individual needs, preferences and values of their patients or the people using their service. It is not mandatory to apply the recommendations, and the guideline does not override the responsibility to make decisions appropriate to the circumstances of the individual, in consultation with them and their families and carers or guardian.

Local commissioners and providers of healthcare have a responsibility to enable the guideline to be applied when individual professionals and people using services wish to use it. They should do so in the context of local and national priorities for funding and developing services, and in light of their duties to have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities. Nothing in this guideline should be interpreted in a way that would be inconsistent with complying with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Technology appraisals

The recommendations in this interactive flowchart represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, health professionals are expected to take these recommendations fully into account, alongside the individual needs, preferences and values of their patients. The application of the recommendations in this interactive flowchart is at the discretion of health professionals and their individual patients and do not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or their carer or guardian.

Commissioners and/or providers have a responsibility to provide the funding required to enable the recommendations to be applied when individual health professionals and their patients wish to use it, in accordance with the NHS Constitution. They should do so in light of their duties to

have due regard to the need to eliminate unlawful discrimination, to advance equality of opportunity and to reduce health inequalities.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.

Medical technologies guidance, diagnostics guidance and interventional procedures guidance

The recommendations in this interactive flowchart represent the view of NICE, arrived at after careful consideration of the evidence available. When exercising their judgement, healthcare professionals are expected to take these recommendations fully into account. However, the interactive flowchart does not override the individual responsibility of healthcare professionals to make decisions appropriate to the circumstances of the individual patient, in consultation with the patient and/or guardian or carer.

Commissioners and/or providers have a responsibility to implement the recommendations, in their local context, in light of their duties to have due regard to the need to eliminate unlawful discrimination, advance equality of opportunity, and foster good relations. Nothing in this interactive flowchart should be interpreted in a way that would be inconsistent with compliance with those duties.

Commissioners and providers have a responsibility to promote an environmentally sustainable health and care system and should assess and reduce the environmental impact of implementing NICE recommendations wherever possible.