NICE National Institute for Health and Care Excellence

NICE guideline

Stroke and transient ischaemic attack in over 16s: diagnosis and initial management

NICE guideline
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Your responsibility

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.

All problems (adverse events) related to a medicine or medical device used for treatment or in a procedure should be reported to the Medicines and Healthcare products Regulatory Agency using the Yellow Card Scheme.

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.

Contents

This guideline replaces CG68.

This guideline is the basis of QS2.

Overview

This guideline covers interventions in the acute stage of a stroke or transient ischaemic attack (TIA). It offers the best clinical advice on the diagnosis and acute management of stroke and TIA in the 48 hours after onset of symptoms.

Who is it for?

- Healthcare professionals in primary and secondary NHS healthcare settings
- Commissioners and providers of services
- People aged over 16 who have had a stroke or TIA, their families and carers

Recommendations

People have the right to be involved in discussions and make informed decisions about their care, as described in NICE's information on making decisions about your care.

Making decisions using NICE guidelines explains how we use words to show the strength (or certainty) of our recommendations, and has information about prescribing medicines (including off-label use), professional guidelines, standards and laws (including on consent and mental capacity), and safeguarding.

NICE has also produced patient decision aids on decompressive hemicraniectomy.

1.1 Rapid recognition of symptoms and diagnosis

Prompt recognition of symptoms of stroke and transient ischaemic attack

1.1.1 Use a validated tool, such as FAST (Face Arm Speech Test), outside hospital to screen people with sudden onset of neurological symptoms for a diagnosis of stroke or transient ischaemic attack (TIA). **[2008]**

1.1.2 Exclude hypoglycaemia in people with sudden onset of neurological symptoms as the cause of these symptoms. **[2008]**

1.1.3 For people who are admitted to the emergency department with a suspected stroke or TIA, establish the diagnosis rapidly using a validated tool, such as ROSIER (Recognition of Stroke in the Emergency Room). **[2008]**

Initial management of suspected and confirmed TIA

1.1.4 Offer aspirin (300 mg daily), unless contraindicated, to people who have had a

suspected TIA, to be started immediately. **[2019]**

For a short explanation of why the committee made this 2019 recommendation and how it might affect practice, see the rationale and impact section on initial management of suspected and confirmed transient ischaemic attack (aspirin).

Full details of the evidence and the committee's discussion are in evidence review A: aspirin.

1.1.5 Refer immediately people who have had a suspected TIA for specialist assessment and investigation, to be seen within 24 hours of onset of symptoms. **[2019]**

1.1.6 Do not use scoring systems, such as ABCD2, to assess risk of subsequent stroke or to inform urgency of referral for people who have had a suspected or confirmed TIA. **[2019]**

1.1.7 Offer secondary prevention, in addition to aspirin, as soon as possible after the diagnosis of TIA is confirmed. **[2008, amended 2019]**

For a short explanation of why the committee made these 2019 recommendations and how they might affect practice, see the rationale and impact section on initial management of suspected and confirmed transient ischaemic attack.

Full details of the evidence and the committee's discussion are in evidence review B: TIA prediction rules.

1.2 Imaging for people who have had a suspected TIA or acute non-disabling stroke

Suspected TIA

1.2.1 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. **[2019]**

1.2.2 After specialist assessment in the TIA clinic, consider MRI (including diffusion-weighted and blood-sensitive sequences) to determine the territory of ischaemia, or to detect haemorrhage or alternative pathologies. If MRI is done, perform it on the same day as the assessment. **[2019]**

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on imaging for people who have had a suspected TIA or acute non-disabling stroke.

Full details of the evidence and the committee's discussion are in evidence review C: TIA imaging.

Carotid imaging

1.2.3 Everyone with TIA who after specialist assessment is considered as a candidate for carotid endarterectomy should have urgent carotid imaging. **[2008, amended 2019]**

Urgent carotid endarterectomy

1.2.4 Ensure that people with stable neurological symptoms from acute non-disabling stroke or TIA who have symptomatic carotid stenosis of 50% to 99% according to the NASCET (North American Symptomatic Carotid Endarterectomy Trial) criteria, or 70% to 99% according to the ECST (European Carotid Surgery Trial) criteria:

- are assessed and referred urgently for carotid endarterectomy to a service following current national standards (see the NHS England and NHS Improvement National Stroke Service Model)
- receive best medical treatment (control of blood pressure, antiplatelet agents, cholesterol lowering through diet and drugs, lifestyle advice). **[2008, amended 2019]**

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

- do not have surgery
- receive best medical treatment (control of blood pressure, antiplatelet agents, cholesterol lowering through diet and drugs, lifestyle advice). **[2008]**

1.2.6 Ensure that carotid imaging reports clearly state which criteria (ECST or NASCET) were used when measuring the extent of carotid stenosis. **[2008]**

1.3 Specialist care for people with acute stroke

Specialist stroke units

1.3.1 Admit everyone with suspected stroke directly to a specialist acute stroke unit after initial assessment, from either the community, the emergency department, or outpatient clinics. (An acute stroke unit is 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. Regular multidisciplinary team meetings occur for goal setting.). **[2008]**

Brain imaging for the early assessment of people with suspected acute stroke

1.3.2 Perform brain imaging immediately with a non-enhanced CT for people with suspected acute stroke if any of the following apply (see additional information):

- indications for thrombolysis or thrombectomy
- on anticoagulant treatment
- a known bleeding tendency
- a depressed level of consciousness (Glasgow Coma Score below 13)

- unexplained progressive or fluctuating symptoms
- papilloedema, neck stiffness or fever
- severe headache at onset of stroke symptoms.

If thrombectomy might be indicated, perform imaging with CT contrast angiography following initial non-enhanced CT. Add CT perfusion imaging (or MR equivalent) if thrombectomy might be indicated beyond 6 hours of symptom onset. **[2008, amended 2019]**

1.3.3 Perform scanning as soon as possible and within 24 hours of symptom onset in everyone with suspected acute stroke without indications for immediate brain imaging. **[2008]**

The NHS England and NHS Improvement National Stroke Service Model contains a patient-centred national optimal stroke imaging pathway.

1.4 Pharmacological treatments and thrombectomy for people with acute stroke

Thrombolysis for people with acute ischaemic stroke

1.4.1 For thrombolytic medicines recommended as options in NICE technology appraisal guidance for treating acute ischaemic stroke within 4.5 hours of symptom onset and when intracranial haemorrhage has been excluded, see the guidance on:

- tenecteplase (TA990, 2024)
- alteplase (TA264, 2012).

1.4.2 Administer alteplase or tenecteplase only within a well-organised stroke service with:

- staff trained in delivering thrombolysis and in monitoring for any

complications associated with thrombolysis

- nursing staff trained in acute stroke and thrombolysis to provide level 1 and level 2 care (see the NHS Data Model and Dictionary on critical care level)
- immediate access to imaging and re-imaging, and staff trained to interpret the images. **[2008, amended 2025]**

1.4.3 Staff in emergency departments, if appropriately trained and supported, can administer alteplase or tenecteplase for the treatment of ischaemic stroke provided that patients can be managed within an acute stroke service with appropriate neuroradiological and stroke physician support. **[2008, amended 2025]**

1.4.4 Ensure that protocols are in place for delivering and managing intravenous thrombolysis, including post-thrombolysis complications. **[2008]**

Thrombectomy for people with acute ischaemic stroke

1.4.5 Offer thrombectomy as soon as possible and within 6 hours of symptom onset, together with intravenous thrombolysis (if not contraindicated and within the licensed time window), to people who have:

- acute ischaemic stroke **and**
- confirmed occlusion of the proximal anterior circulation demonstrated by computed tomographic angiography (CTA) or magnetic resonance angiography (MRA)

taking into account the factors in recommendation 1.4.8 (see additional information). **[2019]**

1.4.6 Offer thrombectomy as soon as possible to people who were last known to be well between 6 hours and 24 hours previously (including wake-up strokes):

- who have acute ischaemic stroke and confirmed occlusion of the proximal anterior circulation demonstrated by CTA or MRA **and**

- if there is the potential to salvage brain tissue, as shown by imaging such as CT perfusion or diffusion-weighted MRI sequences showing limited infarct core volume

  taking into account the factors in recommendation 1.4.8 (see additional information). **[2019]**

1.4.7 Consider thrombectomy together with intravenous thrombolysis (where not contraindicated and within the licensed time window) as soon as possible for people last known to be well up to 24 hours previously (including wake-up strokes):

- who have acute ischaemic stroke and confirmed occlusion of the proximal posterior circulation (that is, basilar or posterior cerebral artery) demonstrated by CTA or MRA **and**
- if there is the potential to salvage brain tissue, as shown by imaging such as CT perfusion or diffusion-weighted MRI sequences showing limited infarct core volume

  taking into account the factors in recommendation 1.4.8 (see additional information). **[2019]**

1.4.8 Take into account the person's overall clinical status and the extent of established infarction on initial brain imaging to inform decisions about thrombectomy. Select people who have (in addition to the factors in recommendations 1.4.5 to 1.4.7):

- a pre-stroke functional status of less than 3 on the modified Rankin scale **and**
- a score of more than 5 on the National Institutes of Health Stroke Scale (NIHSS). **[2019]**

For a short explanation of why the committee made these 2019 recommendations and how they might affect practice, see the rationale and impact section on thrombectomy for people with acute ischaemic stroke.

Full details of the evidence and the committee's discussion are in evidence review D: thrombectomy.

Aspirin and anticoagulant treatment

People with acute ischaemic stroke

1.4.9 Offer the following as soon as possible, but certainly within 24 hours, to everyone presenting with acute stroke who has had a diagnosis of intracerebral haemorrhage excluded by brain imaging:

- aspirin 300 mg orally if they do not have dysphagia **or**
- aspirin 300 mg rectally or by enteral tube if they do have dysphagia.

Continue aspirin daily 300 mg until 2 weeks after the onset of stroke symptoms, at which time start definitive long-term antithrombotic treatment. Start people on long-term treatment earlier if they are being discharged before 2 weeks. **[2008]**

1.4.10 Offer a proton pump inhibitor, in addition to aspirin, to anyone with acute ischaemic stroke for whom previous dyspepsia associated with aspirin is reported. **[2008]**

1.4.11 Offer an alternative antiplatelet agent to anyone with acute ischaemic stroke who is allergic to or genuinely intolerant of aspirin. (Aspirin intolerance is defined as either of the following: proven hypersensitivity to aspirin-containing medicines, or history of severe dyspepsia induced by low-dose aspirin.) **[2008]**

1.4.12 Do not use anticoagulation treatment routinely for the treatment of acute stroke (see additional information). **[2008]**

People with acute venous stroke

1.4.13 Offer people diagnosed with cerebral venous sinus thrombosis (including those with secondary cerebral haemorrhage) full-dose anticoagulation treatment (initially full-dose heparin and then warfarin [international normalised ratio 2 to 3]) unless there are comorbidities that preclude its use. **[2008]**

People with stroke associated with arterial dissection

1.4.14 Offer either anticoagulants or antiplatelet agents to people who have stroke secondary to acute arterial dissection. **[2008, amended 2019]**

People with acute ischaemic stroke associated with antiphospholipid syndrome

1.4.15 Manage acute ischaemic stroke associated with antiphospholipid syndrome in the same way as acute ischaemic stroke without antiphospholipid syndrome (see additional information). **[2008]**

Reversal of anticoagulation treatment in people with haemorrhagic stroke

1.4.16 Return clotting levels to normal as soon as possible in people with a primary intracerebral haemorrhage who were receiving warfarin before their stroke (and have elevated international normalised ratio). Do this by reversing the effects of the warfarin using a combination of prothrombin complex concentrate and intravenous vitamin K. **[2008, amended 2019]**

For advice on reversing direct-acting oral anticoagulants (DOACs), see the MHRA safety advice on DOACs for a list of reversal agents.

Anticoagulation treatment for other comorbidities

1.4.17 Ensure that people with disabling ischaemic stroke who are in atrial fibrillation are treated with aspirin 300 mg for the first 2 weeks before anticoagulation treatment

is considered. **[2008]**

1.4.18 For people with prosthetic valves who have disabling cerebral infarction and who are at significant risk of haemorrhagic transformation, stop anticoagulation treatment for 1 week and substitute aspirin 300 mg. **[2008]**

1.4.19 Ensure that people with ischaemic stroke and symptomatic proximal deep vein thrombosis or pulmonary embolism receive anticoagulation treatment in preference to treatment with aspirin unless there are other contraindications to anticoagulation. **[2008]**

1.4.20 Treat people who have haemorrhagic stroke and symptomatic deep vein thrombosis or pulmonary embolism to prevent the development of further pulmonary emboli using either anticoagulation or a caval filter. **[2008]**

Statin treatment

1.4.21 Immediate initiation of statin treatment is not recommended in people with acute stroke (see additional information). **[2008]**

1.4.22 Continue statin treatment in people with acute stroke who are already receiving statins. **[2008]**

1.5 Maintenance or restoration of homeostasis

Supplemental oxygen therapy

1.5.1 Give supplemental oxygen to people who have had a stroke 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. **[2008]**

Be aware that some pulse oximeters can underestimate or overestimate oxygen saturation levels, especially if the saturation level is borderline. Overestimation has been reported in people with dark skin. See also the NHS England Patient

Safety Alert on the risk of harm from inappropriate placement of pulse oximeter probes.

Blood sugar control

1.5.2 Maintain a blood glucose concentration between 4 and 11 mmol/litre in people with acute stroke. **[2008]**

1.5.3 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. **[2008]**

Blood pressure control for people with acute intracerebral haemorrhage

1.5.4 Consider rapid blood pressure lowering for people with acute intracerebral haemorrhage who do not have any of the exclusions listed in recommendation 1.5.7 and who:

- present within 6 hours of symptom onset **and**
- have a systolic blood pressure of between 150 and 220 mmHg. **[2022]**

1.5.5 Taking into account the risk of harm, consider rapid blood pressure lowering on a case-by-case basis for people with acute intracerebral haemorrhage who do not have any of the exclusions listed in recommendation 1.5.7 and who:

- present beyond 6 hours of symptom onset **or**
- have a systolic blood pressure greater than 220 mmHg. **[2022]**

1.5.6 When rapidly lowering blood pressure in people with acute intracerebral haemorrhage, aim to reach a systolic blood pressure of 140 mmHg or lower while ensuring that the magnitude drop does not exceed 60 mmHg within 1 hour of starting treatment. **[2022]**

1.5.7 Do not offer rapid blood pressure lowering to people who:

- have an underlying structural cause (for example, tumour, arteriovenous malformation or aneurysm)
- have a score on the Glasgow Coma Scale of below 6
- are going to have early neurosurgery to evacuate the haematoma
- have a massive haematoma with a poor expected prognosis. **[2019]**

1.5.8 When considering blood pressure lowering in young people aged 16 or 17 with acute intracerebral haemorrhage who do not have any of the exclusions listed in recommendation 1.5.7, seek advice from a paediatric specialist. **[2022]**

For a short explanation of why the committee made the 2022 recommendations and how they might affect practice, see the rationale and impact section on blood pressure control for people with acute intracerebral haemorrhage.

Full details of the evidence and the committee's discussion are in evidence review E: intensive interventions to lower blood pressure in people with acute intracerebral haemorrhage.

Blood pressure control for people with acute ischaemic stroke

1.5.9 Anti-hypertensive treatment in people with acute ischaemic stroke is recommended only if there is a hypertensive emergency with one or more of the following serious concomitant medical issues:

- hypertensive encephalopathy
- hypertensive nephropathy
- hypertensive cardiac failure/myocardial infarction
- aortic dissection
- pre-eclampsia/eclampsia. **[2008, amended 2019]**

1.5.10 Blood pressure reduction to 185/110 mmHg or lower should be considered in people who are candidates for intravenous thrombolysis. **[2008]**

1.6 Nutrition and hydration

Assessment of swallowing function

1.6.1 On admission, ensure that people with acute stroke have their swallowing screened by an appropriately trained healthcare professional before being given any oral food, fluid or medication. **[2008]**

1.6.2 If the admission screen indicates problems with swallowing, ensure that the person has a specialist assessment of swallowing, preferably within 24 hours of admission and not more than 72 hours afterwards. **[2008]**

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

- re-assessed and considered for instrumental examination
- referred for dietary advice. **[2008]**

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

- receive tube feeding with a nasogastric tube within 24 hours of admission unless they have had thrombolysis
- be considered for a nasal bridle 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
- have their oral medication reviewed to amend either the formulation or the route of administration. **[2008, amended 2019]**

Oral nutritional supplementation

1.6.5 Screen all hospital inpatients on admission for malnutrition and the risk of malnutrition. Repeat screening weekly for inpatients. **[2008]**

1.6.6 Screening should assess body mass index (BMI) and percentage unintentional weight loss. It should also consider the time over which a 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. **[2008]**

1.6.7 When screening for malnutrition and the risk of malnutrition, be aware that dysphagia, poor oral health and reduced ability to self-feed will affect nutrition in people with stroke. **[2008]**

1.6.8 Screening for malnutrition and the risk of malnutrition should be carried out by healthcare professionals with appropriate skills and training. **[2008]**

1.6.9 Routine nutritional supplementation is not recommended for people with acute stroke who are adequately nourished on admission. **[2008]**

1.6.10 Start nutrition support for people with stroke who are at risk of malnutrition. This may include oral nutritional supplements, specialist dietary advice and/or tube feeding. **[2008]**

Hydration

1.6.11 Assess, on admission, the hydration of everyone with acute stroke. Review hydration regularly and manage it so that normal hydration is maintained. **[2008]**

1.7 Optimal positioning and early mobilisation for people with acute stroke

Optimal positioning

1.7.1 Assess the individual clinical needs and personal preferences of people with acute stroke to determine their optimal head position. Take into account factors such as their comfort, physical and cognitive abilities and postural control. **[2019]**

For a short explanation of why the committee made this recommendation and how it might affect practice, see the rationale and impact section on optimal positioning for people with acute stroke.

Full details of the evidence and the committee's discussion are in evidence review G: head positioning.

Early mobilisation

1.7.2 Help people with acute stroke to sit out of bed, stand or walk as soon as their clinical condition permits as part of an active management programme in a specialist stroke unit. **[2019]**

1.7.3 If people need help to sit out of bed, stand or walk, do not offer high-intensity mobilisation in the first 24 hours after symptom onset. **[2019]**

For a short explanation of why the committee made these recommendations and how they might affect practice, see the rationale and impact section on early mobilisation for people with acute stroke.

Full details of the evidence and the committee's discussion are in evidence review F: very early mobilisation.

1.8 Avoiding aspiration pneumonia

1.8.1 To avoid aspiration pneumonia, give food, fluids and medication to people with dysphagia in a form that can be swallowed without aspiration, after specialist assessment of swallowing (see recommendation 1.6.2). **[2008]**

1.9 Surgery for people with acute stroke

Acute intracerebral haemorrhage

1.9.1 Stroke services should agree protocols for monitoring, referring and transferring people to regional neurosurgical centres for the management of symptomatic hydrocephalus. **[2008]**

1.9.2 People with intracerebral haemorrhage should be monitored by specialists in neurosurgical or stroke care for deterioration in function and referred immediately for brain imaging when necessary. **[2008]**

1.9.3 Previously fit people should be considered for surgical intervention following primary intracerebral haemorrhage if they have hydrocephalus. **[2008]**

1.9.4 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 score on the Glasgow Coma Scale of below 8 unless this is because of hydrocephalus
- posterior fossa haemorrhage. **[2008]**

Decompressive hemicraniectomy

1.9.5 Consider decompressive hemicraniectomy (which should be performed within 48 hours of symptom onset) for people with acute stroke who meet all of the following criteria:

- clinical deficits that suggest infarction in the territory of the middle cerebral artery, with a score above 15 on the NIHSS
- decreased level of consciousness, with 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**
  - with infarct volume greater than 145 cm^3, as shown on diffusion-weighted MRI scan. **[2019]**

1.9.6 Discuss the risks and benefits of decompressive hemicraniectomy with people or their family members or carers (as appropriate), taking into account their functional status before the stroke, and their wishes and preferences. **[2019]**

NICE has produced patient decision aids to support discussions about decompressive hemicraniectomy.

1.9.7 People who are referred for decompressive hemicraniectomy should be monitored by appropriately trained professionals skilled in neurological assessment. **[2008]**

For a short explanation of why the committee made these 2019 recommendations and how they might affect practice, see the rationale and impact section on decompressive hemicraniectomy for people with acute stroke.

Full details of the evidence and the committee's discussion are in evidence review H: surgery (decompressive hemicraniectomy).

Terms used in this guideline

This section defines terms that have been used in a particular way for this guideline. For other definitions, see the NICE glossary.

High-intensity mobilisation

High-intensity mobilisation refers to the very early mobilisation intervention from the AVERT trial. (Further details of the intervention performed in the trial can be found in NICE's evidence review F: very early mobilisation.) It includes mobilisation that:

- begins within the first 24 hours of stroke onset
- includes at least 3 additional out-of-bed sessions compared with usual care
- focuses on sitting, standing and walking (that is, out of bed) activity.

Additional information

Recommendation 1.3.2

The committee felt that 'immediately' is defined as 'ideally the next slot and definitely within 1 hour, whichever is sooner'.

Recommendations 1.4.5 to 1.4.7

In May 2019, not all devices with a CE mark for thrombectomy were intended by the manufacturer for use as recommended here. The healthcare professional should follow relevant professional guidance, taking full responsibility for the decision. Informed consent should be obtained and documented. Medicines and Healthcare products Regulatory Agency (MHRA) advice remains to use CE-marked devices for their intended purpose where possible. See MHRA's guidance on off-label use of a medical device for further information.

Recommendation 1.4.12

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.

Recommendation 1.4.15

There was insufficient evidence to support any recommendation on the safety and efficacy of anticoagulants versus antiplatelets for the treatment of people with acute ischaemic stroke associated with antiphospholipid syndrome.

Recommendation 1.4.21

The consensus of the committee is that it would be safe to start statins after 48 hours.

Recommendations for research

As part of the 2022 update, the guideline committee made an additional 2 recommendations for research.

As part of the 2019 update, the guideline committee retained the recommendations for research on avoidance of aspiration pneumonia, aspirin and anticoagulant treatment for acute ischaemic stroke, aspirin treatment in acute ischaemic stroke, early mobilisation and optimum positioning of people with acute stroke, blood pressure control, and safety and efficacy of carotid stenting. The committee made an additional recommendation for research on MRI brain scanning.

Key recommendations for research

1 Impact of intensive blood pressure lowering on people who are frail

What is the efficacy and safety of intensive interventions to lower blood pressure compared with less intensive interventions for people with acute intracerebral haemorrhage who are frail at presentation? **[2022]**

For a short explanation of why the committee made this recommendation for research, see the rationale section on blood pressure control for people with acute intracerebral haemorrhage.

Full details of the evidence and the committee's discussion are in evidence review E: intensive interventions to lower blood pressure in people with acute intracerebral haemorrhage.

2 Impact of intensive interventions to lower blood pressure on cognitive function, functional ability and quality of life

What are the long-term effects of intensive interventions to lower blood pressure on cognitive function, functional ability and quality of life compared with standard

interventions in people with acute intracerebral haemorrhage? **[2022]**

For a short explanation of why the committee made this recommendation for research, see the rationale section on blood pressure control for people with acute intracerebral haemorrhage.

Full details of the evidence and the committee's discussion are in evidence review E: intensive interventions to lower blood pressure in people with acute intracerebral haemorrhage.

3 MRI brain scanning

Does early MRI brain scanning improve outcomes after suspected transient ischaemic attack (TIA)? **[2019]**

For a short explanation of why the committee made this recommendation for research, see the rationale section on imaging for people who have had a suspected TIA or acute non-disabling stroke.

Full details of the evidence and the committee's discussion are in evidence review C: TIA imaging.

4 Avoidance of aspiration pneumonia

Does the withdrawal of oral liquids or the use of modified (thickened) oral fluids prevent the development of aspiration pneumonia after an acute stroke?

Why this is important

People with dysphagia after an acute stroke are at higher risk of aspiration pneumonia. The guideline development group considered how best to reduce the likelihood of people with acute stroke developing aspiration pneumonia, but there was insufficient evidence on which to base a recommendation. Current clinical practice dictates that those people with clinical evidence of aspiration are given 'nil by mouth' or are given modified (thickened) oral fluids. However, there is little evidence to suggest that withdrawal or modification of

fluids reduces the incidence of pneumonia. Oral hygiene is impaired by the withdrawal of oral fluids, and aspirated saliva (up to 2 litres/day) may be infected as a result. Medications are not given orally, and patients may be distressed by the withholding of oral fluids. The research question is whether allowing people with evidence of aspiration free access to water predisposes them to the development of aspiration pneumonia compared with withdrawal of oral liquids or the use of modified (thickened) oral fluids. **[2008]**

5 Aspirin and anticoagulant treatment for acute ischaemic stroke

Does modified-release dipyridamole or clopidogrel with aspirin improve outcome compared with aspirin alone when administered early after acute ischaemic stroke?

Why this is important

Aspirin administered within 48 hours of acute ischaemic stroke improves outcome compared with no treatment or early anticoagulation. In the secondary prevention of stroke, the combination of modified-release dipyridamole with aspirin improves outcome compared with aspirin alone. Clopidogrel, administered with aspirin, improves outcome after myocardial infarction. It is not known whether antiplatelet agents other than aspirin (alone or in combination) may be more effective than aspirin alone in the acute phase of ischaemic stroke. The research question to be addressed is whether modified-release dipyridamole or clopidogrel with aspirin improves outcome compared with aspirin alone when administered early after acute ischaemic stroke. **[2008]**

6 Aspirin treatment in acute ischaemic stroke

Should a person who has a stroke or a TIA and is already taking aspirin be prescribed the same or an increased dose of aspirin after the stroke?

Why this is important

Many people take aspirin routinely for the secondary or primary prevention of vascular disease. When a person who is taking 75 mg aspirin daily has a stroke or TIA, there is no evidence to guide clinicians on whether to maintain or increase the dose. The research question to be addressed is whether a person already on aspirin who has a stroke or TIA should be offered the same or an increased dose of aspirin. **[2008]**

7 Early mobilisation and optimum positioning of people with acute stroke

How safe and effective is very early mobilisation delivered by appropriately trained healthcare professionals after stroke?

Why this is important

Most people with stroke are nursed in bed for at least the first day after their admission to the stroke unit. The severity of limb weakness or incoordination and reduced awareness or an impaired level of consciousness may make mobilisation potentially hazardous. There are concerns about the effect of very early mobilisation on blood pressure and cerebral perfusion pressure. However, early mobilisation may have beneficial effects on oxygenation and lead to a reduction in complications such as venous thromboembolism and hypostatic pneumonia. There could be benefits for motor and sensory recovery, and patient motivation. The research question to be addressed is whether very early mobilisation with the aid of appropriately trained professionals is safe and improves outcome compared with standard care. **[2008]**

8 Safety and efficacy of carotid stenting

What is the safety and efficacy of carotid stenting compared with carotid endarterectomy when these procedures are carried out within 2 weeks of TIA or recovered stroke?

Why this is important

Carotid stenting is less invasive than carotid endarterectomy and might be safer, particularly for patients very soon after a TIA or stroke, for whom the risks of general anaesthetic might be high. However, neither the risk of stroke nor long-term outcomes after early carotid stenting are known. A randomised controlled trial comparing these interventions early after stroke would determine which of them is associated with the best outcome, as well as comparing their relative safety and cost effectiveness. **[2008]**

Rationale and impact

These sections briefly explain why the committee made the recommendations and how they might affect practice.

Initial management of suspected and confirmed transient ischaemic attack (aspirin)

Recommendation 1.1.4

Why the committee made the recommendation

There was some evidence for a benefit of aspirin in the early management of confirmed transient ischaemic attack (TIA) or minor stroke in reducing the risk of stroke or recurrent stroke in secondary care in stroke services units. This is not directly applicable to the area of review, which was about TIA at first contact with a healthcare professional. However, in the committee's experience, the earlier that aspirin can be administered, the better this will also be for patient outcomes in this group. The risk of haemorrhage in this group, and of other risks associated with administering aspirin (aspirin allergy or gastrointestinal bleed), is low. The recommendation was based largely on the knowledge and experience of the committee supported by the indirect evidence.

How the recommendation might affect practice

The recommendation represents a change from current practice. However, because of the low unit cost of aspirin, the committee did not expect the recommendation to result in a significant resource impact. General practices will need to ensure they have adequate supplies of aspirin to enable immediate administration.

Return to recommendation

Initial management of suspected and confirmed transient ischaemic attack

Recommendations 1.1.5 to 1.1.7

Why the committee made the recommendations

Evidence showed that risk prediction scores (ABCD2 and ABCD3) used in isolation are poor at discriminating low and high risk of stroke after TIA. Adding imaging of the brain and carotid arteries to the risk scores (as is done in the ABCD2-I and ABCD3-I tools) modestly improves discrimination. However, appropriate imaging (including MRI) is not available in general practice or for paramedics, 2 of the key situations when these tools would be used. Arranging specialist assessment less urgently for some people based on a tool with poor discriminative ability for stroke risk has the potential for harm. Therefore, the committee agreed that risk scores should not be used.

The committee agreed, based on their clinical experience and the limited predictive performance of risk scores, that all cases of suspected TIA should be considered as potentially high risk for stroke. Also, because there is no reliable diagnostic test for TIA (the risk stratification tools are not diagnostic tests), it is important to urgently confirm or refute the diagnosis of a suspected TIA with specialist opinion. This is particularly so because in practice, a significant proportion of suspected TIA (30% to 50%) will have an alternative diagnosis (that is, TIA-mimic). Therefore, it was agreed that everyone who has had a suspected TIA should have specialist assessment and investigation within 24 hours of the onset of symptoms. The committee noted the results of an original cost–utility analysis, which was undertaken for this review question in the 2008 version of the stroke guideline (CG68). The analysis concluded that 'immediate assessment' had both better health outcomes and lower costs than 'assessment within a week' for the entire population of suspected TIA, without the use of a risk stratification tool.

The committee acknowledged that having a TIA (or suspected TIA) is a worrying time and most people would prefer to be assessed as soon as possible. Urgent specialist assessment should ensure that people at high risk of stroke are identified early. This would allow preventative treatment to begin, which should be introduced as soon as the diagnosis of TIA is confirmed.

How the recommendations might affect practice

The recommendations reflect current best practice of expert assessment in a TIA clinic within 24 hours, irrespective of risk stratification using clinical scoring systems. Although everyone with a suspected TIA should be seen within 24 hours, provision of daily TIA clinics is not universal. Therefore, some areas will need to set up daily TIA clinics to provide this best practice service.

The recommendations should not influence the absolute number of people who need to be subsequently assessed in a TIA clinic, but will result in all suspected TIAs being assessed with an equal degree of urgency. There are likely to be implementation challenges for some areas in providing an adequately responsive 7-days-a-week TIA clinic (or a suitable alternative 7-day service) where they currently do not exist. However, services are already being encouraged to implement TIA clinics 7 days a week. The committee acknowledged that setting up responsive (7 days a week) services in trusts that do not currently offer daily clinics could require significant additional resource and this may result in a substantial resource impact for the NHS in England. However, preventing stroke is likely to result in cost savings later on.

The recommendation on offering measures for secondary prevention reflects current practice so no change is expected.

Return to recommendations

Imaging for people who have had a suspected TIA or acute non-disabling stroke

Recommendations 1.2.1 and 1.2.2

Why the committee made the recommendations

No evidence was identified from test-and-treat trials (which the committee considered would have been the most useful form of evidence to inform decision making). In these studies, different imaging strategies are performed on randomised groups followed by management on the basis of the results, to compare patient outcomes after different imaging strategies. Therefore, the committee used their knowledge and experience to conclude that clinical assessment is the best form of diagnosis at this point. The

committee agreed that CT is most useful when there is a clinical suspicion of an alternative diagnosis that CT could detect. It should not be routinely performed for everyone with a suspected TIA because it rarely confirms a diagnosis in these patients.

Routine CT imaging is common in current practice and the committee agreed that this could waste resources, extend the length of stay in the emergency department, and expose people to unnecessary radiation.

The committee discussed the possible risks of not offering CT brain imaging to everyone with a suspected TIA. They agreed that, in the absence of clinical 'red flag' indicators (for example, headache, anticoagulation, head injury, repetitive stereotyped events), it is rare for a CT scan to reveal an alternative diagnosis needing a different referral pathway. Therefore, the number of referrals to TIA clinics should not increase greatly.

In a TIA clinic, not all people will need an MRI. Therefore, clinical assessment by a specialist in a TIA clinic is important for identifying people who may need MRI to determine the vascular territory of ischaemia (the region of the brain with loss of blood flow, supplied by either the anterior or posterior circulation). For example, this could be before a decision is made to refer for a carotid endarterectomy, or to detect alternative pathologies such as tumours, demyelinating disorders or convexity subarachnoid haemorrhage. There was uncertainty about whether urgent, routine MRI screening improves the outcomes for people with suspected TIA, and so the committee made a recommendation for research on early MRI brain scanning.

How the recommendations might affect practice

Not routinely offering CT brain imaging will be a change in practice for some providers (especially in the emergency department), whereas MRI use in the TIA clinic aligns broadly with current practice.

The committee was uncertain whether these recommendations will be cost saving overall. It will be a trade-off between a reduction in CT requests against a potential increase in MRI requests. The committee also highlighted that any increase in MRI requests may be small because the decision to perform an MRI will not generally be affected by the results of a previous CT scan.

The committee recognised that if there was an increase in MRI requests, this could be a challenge because access to high-quality MRI scanners is limited in some trusts. In

addition, there are limits on the number of MRI slots per day, so there may be a need for dedicated MRI slots for people with suspected TIA.

Return to recommendations

Thrombectomy for people with acute ischaemic stroke

Recommendations 1.4.5 to 1.4.8

Why the committee made the recommendations

Anterior circulation stroke

Overall, the evidence across timeframes showed that thrombectomy, with or without thrombolysis, improved functional outcome as measured by the modified Rankin Scale (mRS) in people last known to be well up to 24 hours previously, compared with usual care. There was also a potential benefit for improved quality of life. However, there was no clinical difference in mortality and there were low rates of symptomatic intracerebral haemorrhage. The committee noted there had been some procedural complications associated with thrombectomy, but agreed that these were outweighed by the benefits of improvement in functional outcome.

The committee looked at the results of 2 published cost–utility analyses with a UK NHS perspective. The first estimated that thrombectomy alongside intravenous thrombolysis (when appropriate) is cost effective compared with intravenous thrombolysis alone, when performed within 6 hours of stroke onset (that is, from when a person was last known to be well). The second demonstrated the cost effectiveness of thrombectomy therapy and best medical therapy compared with best medical therapy alone, when performed 6 to 24 hours after stroke onset. Therefore, the committee agreed to recommend thrombectomy up to 24 hours after stroke onset, together with intravenous thrombolysis if within the licensed time window, for people with appropriate clinical and radiological characteristics. Few people presenting between 6 and 24 hours after stroke onset received thrombolysis because this is outside the licensed time window. Therefore, the recommendation for those presenting beyond 6 hours is for thrombectomy alone.

The evidence for thrombectomy within 6 hours of symptom onset was from populations

selected using computed tomographic angiography (CTA) or magnetic resonance angiography (MRA) to identify proximal anterior circulation occlusions. For thrombectomy undertaken between 6 and 24 hours after stroke onset, the evidence was based on more highly selected populations using CT perfusion, MRI diffusion and MRI perfusion imaging, in addition to identifying a proximal anterior circulation arterial occlusion. Because the effectiveness of thrombectomy is likely to be lower in a less selected population, the committee recommended that, in line with the evidence, imaging such as CT perfusion or diffusion-weighted MRI sequences is performed if presentation is 6 to 24 hours after stroke onset in people being considered for thrombectomy. This would ensure that there is vulnerable but salvageable brain tissue to be targeted for thrombectomy. Although benefit is still seen up to 24 hours after stroke, time is still critical. Therefore, the committee agreed that thrombectomy should be performed as soon as possible.

To help determine what clinical characteristics make this intervention suitable, it is important to consider the National Institutes of Health Stroke Scale (NIHSS) score and the person's overall functional capacity before the stroke. The committee agreed that it was not possible on the basis of the evidence reviewed to specify strict threshold criteria for eligibility based on pre-stroke functional status, clinical severity of stroke or the extent of established infarction on initial brain imaging. This is because there was variation in the trial entry criteria used in the studies and the committee agreed that these factors should be considered as part of the clinical judgement on an individual basis. However, because it was important to make a recommendation that can be implemented in practice, mRS and NIHSS eligibility thresholds were included to be consistent with the NHS England clinical commissioning policy on mechanical thrombectomy for acute ischaemic stroke.

Posterior circulation stroke

No clinical- or cost-effectiveness evidence was identified for the population with posterior circulation stroke. The committee discussed that prognosis is usually very poor in basilar artery occlusion, with around an 80% mortality. As few as 2% to 5% of people with basilar artery occlusion make a full neurological recovery in the absence of interventions to achieve recanalisation or reperfusion. The committee agreed that the prevalent current practice is to consider intravenous thrombolysis and mechanical thrombectomy. Good outcomes can be achieved even up to 24 hours after stroke onset, which is important because diagnosis can be delayed in this population by a non-focal presentation, a reduced conscious level, or both.

The main risk of thrombectomy and thrombolysis in this population is intervening when

there is established disabling ischaemic brain injury. For example, if a person with basilar artery occlusion has irreversible bilateral damage to the pons, they may be left with locked-in-syndrome with complete face and body paralysis but clear consciousness, even if the basilar artery is opened. The committee agreed that it is standard practice to perform brain imaging and look for established tissue damage in the brain regions affected by the arterial occlusion, particularly in the brainstem, before intervening. This reduces the number of people surviving with severe neurological disability. Appropriate CT perfusion imaging or diffusion-weighted MRI sequences should be performed to demonstrate that there is salvageable brain tissue and to seek evidence of established injury to functionally critical areas of the posterior circulation.

The outlook for this population without intervention is poor, but good outcomes can be achieved with intervention and there is supportive evidence from treating anterior stroke. Therefore, the committee agreed that thrombectomy, and thrombolysis within its licensed indications, should be considered for people with posterior circulation proximal occlusions and without evidence of irreversible infarction who were last known well up to 24 hours previously. This should be done as soon as possible after presentation because better outcomes are likely with earlier intervention.

How the recommendations might affect practice

The committee noted that in current practice, around 10% of people presenting with all strokes in the UK are eligible for endovascular therapy. More people are likely to be offered endovascular therapy as a result of these recommendations. The recommendation on thrombectomy together with thrombolysis within 6 hours of symptom onset is aligned with current best practice and the NHS England clinical commissioning policy on mechanical thrombectomy for acute ischaemic stroke. The recommendation for thrombectomy between 6 and 24 hours requires a change from current practice by most providers. Currently, the NHS England clinical commissioning policy states that mechanical thrombectomy will be commissioned when substantial salvageable brain tissue is identified up to 12 hours. However, this extension of the eligibility period up to 24 hours was supported by clinical- and cost-effectiveness evidence as discussed above. The recommendation to consider endovascular therapy for posterior circulation stroke reflects current best practice.

Overall, the new recommendations are likely to have a substantial resource impact on the NHS. Thrombectomy is already performed in most neuroscience centres, but the recommendations will mean 24-hour access to appropriate staffing and imaging.

The committee discussed the possibility that the new recommendations could initially result in a large increase in referrals to centres that already have thrombectomy services. It also noted that there are likely to be additional costs incurred in transferring people to these centres. This will have implications for the spoke site for arranging transfers, for the ambulance service and at the hub site, where more people will be received. There may need to be networked arrangements for spoke sites around a thrombectomy 'hub' with fast image transfer, referral, eligibility assessment and responsive repatriation systems.

The positive implications for other aspects of stroke care help to address the balance in demand for resources. For example, it is expected that there will be a decrease in demand for decompressive hemicraniectomies and inpatient rehabilitation. There may also be a reduction in the need for long-term social care.

Return to recommendations

Blood pressure control for people with acute intracerebral haemorrhage

Recommendations 1.5.4 to 1.5.8

Why the committee made the recommendations

For the groups covered, moderate-quality evidence from a large clinical trial showed a modest benefit treatment effect on haematoma expansion and quality of life (EQ-5D utility index) in rapidly lowering blood pressure to a target systolic blood pressure of 140 mmHg or lower compared with less intensive blood pressure lowering treatment.

The committee acknowledged the uncertainty over the evidence. They discussed the additional potential harms relating to rapid blood pressure lowering in people who present after 6 hours or who have a systolic blood pressure greater than 220 mmHg, and agreed that these factors should be taken into account when considering rapid blood pressure lowering for these groups.

The committee decided to remove the aim of reaching the target within 1 hour because only a minority (33.4%) of participants in the INTERACT2 trial achieved the target of 140 mmHg within 1 hour and, more importantly, to avoid the potential harm of reducing systolic blood pressure by more than 60 mmHg in the first hour.

There was evidence that rapidly lowering blood pressure does not increase the risk of neurological deterioration caused by reduced blood flow to the brain and has the potential to improve quality of life.

In contrast, the committee noted that in another clinical trial, there was no benefit to rapidly lowering blood pressure and there was an increase in adverse renal events. The committee noted the treatment regimens were more aggressive in this trial compared with the other trials included in the review.

The committee agreed that while there is some evidence that rapid blood pressure lowering treatment is beneficial, there may be an increase in adverse renal events, and they were concerned about the lack of evidence in people who are frail. Taking this into account, the committee agreed that rapid blood pressure lowering treatment should be considered as a treatment option except for the groups highlighted in recommendation 1.5.7.

There was evidence that a moderate reduction of up to 60 mmHg within the first hour was associated with better outcomes such as functional independence. A reduction of more than 60 mmHg within 1 hour was associated with significantly worse outcomes such as renal failure, early neurological deterioration, and death, compared with standard treatment. Therefore, the committee agreed that a large reduction of 60 mmHg or more within 1 hour should be avoided.

The 2019 guideline included a 130 mmHg lower target limit. However, the committee were concerned that a narrow range would be too restrictive, and the variation in the class of drugs used in practice means it is difficult to predict the blood pressure reduction. The committee decided to remove the 130 mmHg lower target limit. The committee considered the potential risk of systolic blood pressure dropping too low but noted that this potential concern is addressed by the avoidance of a large reduction of 60 mmHg or more within 1 hour. The committee also agreed that the target systolic blood pressure and the systolic blood pressure reduction should be made into a separate recommendation (1.5.6).

There was little evidence on people presenting beyond 6 hours or those with a systolic blood pressure over 220 mmHg. However, the committee agreed that some guidance is needed on treating hypertension in these groups and that it is appropriate to extrapolate from the available data to these groups, but that healthcare professionals should take into account the individual risk of harm when considering rapid blood pressure lowering using clinical judgement on a case-by-case basis.

The committee agreed that the evidence to support maintaining the target blood pressure for at least 7 days is weak. They were also concerned about the potential impact on patient flow, bed management and resources in the NHS, so removed the timeframe.

The committee discussed the uncertainty about how long to continue acute treatment. However, this evidence review is primarily concerned with treatment within the first 24 hours. The committee highlighted that blood pressure should still remain lowered after acute treatment in order to reduce the longer-term effect of the acute intracerebral haemorrhage. The committee agreed that people receiving intensive blood pressure treatment would not need to stay in hospital for acute management for 7 days. This can be managed through secondary prevention, which can be indicated when treatment is changed from intravenous to an oral route of administration. The committee also noted that longer-term management of blood pressure can be managed in primary care.

The committee did not change the existing practice of not offering rapid blood pressure lowering to specific groups that were excluded from the key clinical trial. This is because there is no evidence of whether this would be safe or beneficial.

The committee discussed rapid blood pressure lowering for young people aged 16 and 17. The evidence reviewed covers adults 18 and over, but the committee agreed that this can be extrapolated for young people after seeking advice from a paediatric specialist.

The committee wanted to consider the long-term effect of intensive blood pressure lowering on quality of life, but limited evidence was available to show how it affected quality of life at 6 and 12 months, and no evidence was available on cognitive function or functional ability. Given the lack of evidence for these important outcomes, the committee made a recommendation for research about the impact of intensive interventions to lower blood pressure on cognitive function, functional ability and quality of life compared with less intensive interventions.

The committee identified a gap in the evidence on the impact of intensive blood pressure treatment on people who are frail. There is currently no guidance or treatment pathway for people who are frail, so the committee also made a recommendation for research about the impact of intensive blood pressure lowering on people who are frail, and encouraged the use of frailty scores to evaluate the impact of frailty on outcomes and treatment prognoses.

Other factors the committee took into account

The committee were aware of the European Stroke Organisation (ESO) guideline on blood pressure management in acute ischaemic stroke and intracerebral haemorrhage, which suggests 'In patients with hyperacute (presenting within 6 hours) intracerebral haemorrhage, lowering blood pressure to below 140 mmHg (and to keep it above 110 mmHg) to reduce haematoma expansion'. The committee agreed that this is broadly in line with NICE recommendations.

How the recommendations might affect practice

The recommendations reflect a small change to current best practice. The difference in target blood pressure range and magnitude in drop from starting treatment up to the first hour in the 2022 update might need additional planning and closer management by the nursing team. Given that these people currently need close monitoring, any change is likely to be very small. There may be an increased cost of intravenous antihypertension medication, but the recommendations should save resources because of reduced harms. Overall, the recommendations should not have a resource impact to the NHS in England.

Return to recommendations

Optimal positioning for people with acute stroke

Recommendation 1.7.1

Why the committee made the recommendation

The evidence did not indicate any difference in outcomes between lying flat or with the head elevated. No cost-effectiveness evidence was identified and no cost difference between the 2 strategies is expected. Therefore, the committee used their knowledge and experience to recommend positioning people according to their preferences and individual requirements.

How the recommendation might affect practice

Optimal positioning is an important part of early acute stroke management and rehabilitation. In current practice, people are assessed in bed and optimal head positioning

is determined based on clinical presentation, medical needs and patient comfort. The recommendation therefore reflects current practice in most hospitals and so the committee agreed that there should be little or no change.

Return to recommendation

Early mobilisation for people with acute stroke

Recommendations 1.7.2 and 1.7.3

Why the committee made the recommendations

Regarding the recommendation to mobilise people after having a stroke when their clinical condition permits, there was no clear evidence of benefit or harm for early mobilisation within the first 48 hours after symptom onset compared with standard care. Therefore, the committee made a recommendation based on their knowledge and experience. The committee agreed that early mobilisation may be appropriate in some cases where people need minimal assistance to mobilise, such as in those who have suffered a mild stroke, or are experiencing language and/or upper limb dysfunction alone.

Regarding the recommendation not to offer high-intensity mobilisation within the first 24 hours of symptom onset, a published within-trial cost-effectiveness analysis from the Australian hospital perspective was identified. However, the treatment effect for the health outcome mRS 0 to 2 used in the study differed from the treatment effect calculated in the clinical review. Because the cost-effectiveness evidence was incompatible with the results of the clinical review, the committee chose to make a recommendation based on the clinical evidence for mortality. The evidence suggested clinical harm associated with high-intensity mobilisation within the first 24 hours after acute stroke. However, based on their clinical experience they discussed that this harm was most relevant to those who need help to sit out of bed, stand or walk. Therefore, they limited the recommendation to this group because they did not want to prevent appropriate early mobilisation in people who are independently mobile after having a stroke.

How the recommendations might affect practice

The committee was confident that making these recommendations would not have a resource impact, because there was no indication that mobilising later and with a lower

intensity leads to a longer length of stay. The committee noted that people will still be assessed and mobilised and there are unlikely to be differences in staff costs. In current practice, mobilisation strategies differ according to stroke severity and the clinical condition of the person with stroke. The strategy may also be impacted by the availability of different types of specialist seating. The recommendations may change current practice in stroke units where there is an 'as soon as possible' focus on mobilisation. They will encourage healthcare professionals to consider the intensity of very early mobilisation and advice on intensity of activities to people discharged from hospital early after a stroke.

Return to recommendations

Decompressive hemicraniectomy for people with acute stroke

Recommendations 1.9.5 and 1.9.7

Why the committee made the recommendations

The evidence showed that surgery improved mortality rates and, to a lesser extent, functional outcomes as measured by the mRS. The benefit on mortality was seen in all age groups considered, although the benefit for functional outcome was smaller in people aged over 60 years than in people under 60 years. Based on this, and to ensure that people over 60 have similar opportunities for the surgery as younger people, the committee removed the previous age cut-off for considering surgery. The committee also acknowledged that although surgery results in more people surviving and better functional outcome than without surgery, many still have overall poor functional outcome and their quality of life may be low. The acceptability of this trade-off was agreed to be a very individual judgement. Some people may choose not to have surgery if there is a risk of severe disability, whereas others may wish to go ahead based on mortality benefit alone. Therefore, the committee highlighted the need for careful discussion about risks and benefits between clinicians and family members or carers. They noted that patients would not be able to be involved at the time because of the severity of the stroke, so the family or carers would be responsible for making the decision. In deciding whether to opt for surgery, considerations should include pre-stroke functional status, because surgery would not be appropriate for people with severe disability before stroke.

The committee noted that although some of the trials included people who had surgery as

long as 96 hours after symptom onset, the benefits in terms of reduced mortality and improved functional outcome were largely driven by studies that only allowed surgery up to a maximum of 48 hours after onset. Therefore, it agreed to retain the reference to surgery being performed within 48 hours of onset from the original recommendations. The committee also reviewed the criteria used to determine eligibility for hemicraniectomy from NICE's stroke guideline published in 2008. It was agreed that these were still appropriate and reflect the populations included in the studies used to inform the new recommendations.

The committee agreed that although the cost effectiveness of decompressive hemicraniectomy remains uncertain, it should be considered for some people because of the clear mortality benefit and the improved functional outcomes. Shared decision making between physicians, surgeons, families and carers is important given the high likelihood of residual moderate or severe disability after surgery.

How the recommendations might affect practice

In current practice, around 5% of people on the stroke unit are referred for decompressive hemicraniectomy. Decompressive hemicraniectomy is currently considered for those aged under 60.

This recommendation will require a change from current practice by all providers. The guidance will also require healthcare professionals to take into account people's pre-stroke functional status and to have a discussion about the risks and benefits.

The committee believed that including people over 60 years would not necessarily lead to significantly more people undergoing surgery because informed discussion of the outcomes might reduce its uptake in this population. In addition, increasing the population eligible for endovascular therapy and its provision is likely to decrease the population referred for decompressive hemicraniectomy. The committee therefore did not anticipate a substantial resource impact to result from this recommendation.

Return to recommendations

Context

Since NICE published its guideline on stroke and transient ischaemic attack (TIA) in 2008, the management of stroke has changed. New evidence has emerged in areas such as thrombectomy (clot retrieval procedures) in ischaemic stroke, controlling high blood pressure in people with acute haemorrhagic stroke, the role of hemicraniectomy and early mobilisation and optimum positioning of people with acute stroke. In addition, there is some uncertainty about the use of aspirin when TIA is first suspected, the role of conventional risk stratification in TIA and the best approach to intracerebral imaging after TIA. This guideline update includes recommendations on these specific issues.

A stroke occurs when the blood supply to a part of the brain is acutely compromised. Most strokes (85%) are caused by a blockage in a blood vessel (artery) that supplies blood to the brain. A TIA or 'mini stroke' has the same clinical presentation as a stroke except that symptoms disappear within 24 hours.

The symptoms experienced depend on the part of the brain that is affected. They usually occur suddenly and without any warning. Common symptoms include loss of movement or sensation in an arm or leg, problems speaking, a drooping of one side of the face or problems with vision.

A stroke can occur at any age. The average age for stroke varies across the UK, with a median age of 77 years (interquartile range 67 to 85). A quarter of strokes occur in people of working age.

First-ever stroke affects 230 people per 100,000 each year, with over 80,000 people hospitalised per year in England. Although the death rate has been falling, figures from the Sentinel Stroke National Audit Programme show that 13.6% of people admitted to hospital with stroke in England and Wales died (either in hospital or after being discharged from inpatient care) within 30 days. There are approximately 1.2 million stroke survivors in the UK. The risk of recurrent stroke is 26% within 5 years of a first stroke and 39% by 10 years.

Stroke is the single biggest cause of disability in adults. The Stroke Association has estimated an annual cost to the NHS in England of £2.98 billion per year. In addition, annual social care costs have been estimated at £4.55 billion with almost half of that estimated to be from public funds. Of stroke survivors, 1 in 12 have to move into a care home because of the effects of their stroke. There is also a substantial burden to families

of people who have had a stroke in terms of informal unpaid care. The importance of stroke care in the NHS is also highlighted in the NHS Long Term Plan, the National Stroke Programme, the Intercollegiate Stroke Working Party national clinical guideline for stroke, and the 2018 publication of NHS England's clinical commissioning policy for mechanical thrombectomy for acute ischaemic stroke in the NHS. Also, the Royal College of Paediatrics and Child Health published guidelines in 2017 on the treatment of stroke in those under 18 years old.

This guideline covers people over 16 with suspected or confirmed TIAs or completed strokes, that is, an acute neurological event presumed to be vascular in origin and causing cerebral ischaemia, cerebral infarction or cerebral haemorrhage. This includes first and recurrent events, thrombotic and embolic events and primary intracerebral haemorrhage of any cause, including venous thrombosis. Areas that are not covered include specific issues relating to the general management of underlying conditions and subarachnoid haemorrhage.

Finding more information and resources

To find NICE guidance on related topics, including guidance in development, see the NICE topic page on cardiovascular conditions.

For full details of the evidence and the guideline committee's discussions, see the evidence reviews. You can also find information about how the guideline was developed, including details of the committee.

NICE has produced tools and resources to help you put this guideline into practice. For general help and advice on putting NICE guidelines into practice, see resources to help you put guidance into practice.

Update information

April 2022: We have:

- reviewed the evidence on blood pressure control for people with acute intracerebral haemorrhage **and**
- updated recommendations 1.5.4, 1.5.5, 1.5.6 and 1.5.8.

May 2019: We have reviewed the evidence on thrombectomy (clot retrieval procedures) in ischaemic stroke, controlling high blood pressure in people with acute haemorrhagic stroke, the role of hemicraniectomy, and early mobilisation and optimum positioning of people with acute stroke. In addition, we have addressed the use of aspirin when transient ischaemic attack (TIA) is first suspected, the role of conventional risk stratification in TIA and the best approach to intracerebral imaging after TIA. These recommendations are marked **[2019]**.

We have also made some changes without an evidence review:

- Recommendation 1.1.7 has been made consistent with new recommendations in relation to rapid referral and review in the TIA clinic. The remaining part of the recommendation has been replaced by recommendations 1.1.4 to 1.1.6.
- Recommendation 1.2.3 has been made consistent with new recommendations in relation to rapid referral and review in the TIA clinic.
- Recommendation 1.2.4 has been made consistent with new recommendations in relation to rapid referral and review in the TIA clinic and to omit the European Carotid Surgery Trial (ECST) criteria because these are no longer used.
- Recommendation 1.3.2 has been amended because early coagulation therapy is not relevant in this context. Non-enhanced means 'plain'; it is the basic form of CT scan without any contrast (that is, not CT angiography/perfusion). At this very early stage in the diagnostic pathway, acute stroke is still 'suspected'; the CT may show up an alternative diagnosis or further clinical assessment may also reveal an alternative diagnosis (the CT is often performed directly off the ambulance when there is little more than 'FAST +ve' criteria). CT angiography and CT perfusion indications have been added to be consistent with the new recommendations on thrombectomy.

- Recommendation 1.4.2 has been amended to clarify that the levels relate to the level of care required by the patient.
- Recommendation 1.5.7 has been amended to be consistent with the subheading for this recommendation, which now applies to acute ischaemic stroke (that is, not haemorrhagic stroke). The remaining part of the recommendation has been replaced by recommendation 1.5.5.

These recommendations are marked **[2008, amended 2019]**.

Recommendations marked **[2008]** last had an evidence review in 2008. In some cases, minor changes have been made to the wording to bring the language and style up to date, without changing the meaning.

Minor changes since publication

March 2025: We added links to relevant technology appraisal guidance in the section on thrombolysis for people with acute ischaemic stroke. Recommendations marked **[2008, amended 2025]** clarify how to use medicines recommended in NICE technology appraisal guidance. We removed the link to TA697 from the section on reversal of anticoagulation treatment in people with haemorrhagic stroke, because the updated guidance is no longer applicable to stroke.

August 2023: We added links to the MHRA safety advice on DOACs and NICE's technology appraisal guidance on andexanet alfa for reversing anticoagulation from apixaban or rivaroxaban (TA697) to the section on reversal of anticoagulation treatment in people with haemorrhagic stroke.

July 2023: We added reference to the European Carotid Surgery Trial criteria in recommendation 1.2.4.

March 2023: We have corrected the link in recommendation 1.2.4.

October 2022: We added text to indicate that pulse oximetry may be less reliable in people with dark skin. We also added a link to the NHS patient safety alerton the risk of harm from inappropriate placement of pulse oximeter probes. See recommendation 1.5.1.

November 2021: We added a link to the NHS England and NHS Improvement National Stroke Service Model in section 1.3 on specialist care for people with acute stroke.

October 2020: We added the recommendations for research from the 2008 guideline.

April 2020: We corrected the links to the rationales in section 1.1 on rapid recognition of symptoms and diagnosis.

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