Stroke and Transient Ischaemic Attack

SAS ON-SCENE F.A.S.T ASSESSMENT CHECKLIST

- Note 'TIME AT PATIENT' and 'TIME OF ONSET' for documenting in 'Additional Comments'.
- Assess and treat any time critical ABC features.
- De-prioritise 12 Lead ECG and cannula unless clinically indicated.
- Perform F.A.S.T. Test and exclude hypoglycaemia.
- If F.A.S.T. Positive, or stroke is suspected, pre-alert and undertake rapid transfer to appropriate receiving hospital (refer to local guidelines), **where known onset time is less than 4.5 hours OR where onset time is unknown.**

Key Information to include in Pre-Alert:

- CHI if known, or name and DOB.
- Symptom onset time.

Additional Information:

Currently, there are no local arrangements in any health board for Scottish Ambulance Service Clinician referrals to Transient Ischaemic Attack (TIA) Clinics.

Following F.A.S.T test completion, if symptoms are assessed to have resolved, continue to strongly suspect stroke and manage as per JRCALC Stroke and Transient Ischaemic Attack Guideline.

Version 1.0, Craig Henderson Clinical Lead Stroke and Thrombectomy, 16/01/2025

QUICK LOOK

KEY POINTS

Stroke and Transient Ischaemic Attack

- Time is of the essence in suspected acute stroke. Time is brain. Every effort MUST be made to minimise on-scene time, including avoidance of interventions that do not add value to the stroke patient, e.g. 12-Lead ECG and IV access, unless clearly indicated.
- Record time of onset if known or last-seen-well time and pre-alert the appropriate hospital.
- Stroke is common and may be due to either cerebral infarction or haemorrhage – it is not possible to distinguish haemorrhagic or ischaemic stroke clinically.
- Mechanical Intra-Arterial Thrombectomy (IAT) is becoming increasingly available.
- The most sensitive features associated with diagnosing stroke in the pre-hospital setting are facial weakness, arm and leg weakness and speech disturbance — the FAST test.
- The FAST test should be carried out on ALL patients with suspected stroke or TIA.
- Patients with TIA may be at high risk of stroke and require urgent specialist assessment, and local pathways should be followed.

REFERENCE

1. Introduction

- Stroke is a major health problem in the UK. Improving care for patients with stroke and transient ischaemic attack (TIA) is a key national priority. The most recent national clinical guideline for stroke was developed by the Intercollegiate Stroke Guideline Working Party and published by the Royal College of Physicians in 2016, under a process accredited by the National Institute for Health and Care Excellence (NICE). The JRCALC guidelines draw heavily on these. NICE published an updated guideline (NG128) in May 2019.
- The Intercollegiate Stroke Guideline Working Party (2016) and JRCALC acknowledge the paucity of evidence for pre-hospital assessment and management of patients with suspected stroke. Many recommendations are therefore based on expert consensus and accepted practice. Ambulance services are increasingly engaging with stroke specialists and academic partners on high-quality research to help develop the evidence to inform future guidelines and practice.

2. Pathophysiology

2.1 Acute Stroke

- Stroke is defined as a clinical syndrome, of presumed vascular origin, typified by rapidly developing signs of focal or global disturbance of cerebral functions lasting more than 24 hours or leading to death. Cerebrovascular disease is the third leading cause of disability in the UK. Approximately 85% of strokes are caused by cerebral infarction resulting from ischaemic stroke, 10% by primary intracerebral haemorrhage (ICH) and 5% by subarachnoid haemorrhage. The risk of recurrent stroke is 26% within 5 years of a first stroke and 39% by 10 years.
- Acute stroke is a **TIME-CRITICAL** medical emergency. For eligible patients with ischaemic stroke, treatment with thrombolytic therapy with alteplase is highly time dependent. Data from the Sentinel Stroke National Audit Programme (SSNAP) shows that in 2019–20 only 11.7% of all UK stroke patients received thrombolysis and 1.8% underwent thrombectomy. In order to determine suitability for treatment, patients must undergo a CT brain scan; therefore, patients need to be transferred to an appropriate hospital as rapidly as possible once the diagnosis is suspected. As an additional treatment for a specific cohort of selected patients, interventional arterial therapy is available. Mechanical Intra-Arterial Thrombectomy (IAT) is becoming increasingly available in specialist centres (now known as comprehensive stroke centres).
- According to the Intercollegiate Stroke Working Party (2016): 'There is strong evidence that specialised stroke unit care initiated as soon as possible after the onset of stroke provides effective treatments that reduce long-term brain damage, disability and healthcare costs'.
- The vast majority (95%) of people with stroke present in the community setting. Public information campaigns, notably the Stroke Association's FAST campaign, have raised awareness of stroke symptoms and encourage early call for help using the 999 system. Research has helped to inform procedures in ambulance Emergency Operations Centres to recognise stroke symptoms as early and accurately as possible to facilitate an appropriate emergency response. Reducing time from symptom onset by calling for help, and by speeding up pre-hospital assessment and reducing on-scene time, can expedite admission to an appropriate hospital. This reduces overall time to treatment and helps improve patient outcomes. The recently published Utstein recommendation for Emergency Stroke Care describes a 'Chain of Survival' for stroke care.
- The most sensitive features associated with diagnosing stroke in the pre-hospital setting are unilateral facial weakness, arm or leg weakness and speech disturbance.
- It is important to remember that thrombolysis and/or thrombectomy are not the only management proven to benefit stroke patients. Admission to a stroke unit for early specialist care is known to be life saving and to reduce disability.
- Not all stroke symptoms can be identified by using the FAST test in isolation.
- Have a high index of suspicion of acute stroke in patients presenting with new, sudden onset of the signs and symptoms listed in Table 3.117.

Table 3.117 – Signs and Symptoms

- Sudden onset numbness or weakness of the face, arm, or leg, especially on one side of the body.
- Sudden onset new confusion, trouble speaking, difficulty understanding speech, or difficulty swallowing.
- Sudden onset visual disturbance including in one or both eyes, blurred or double vision or loss of visual field.
- Sudden onset trouble walking, changes in gait, loss of balance, or lack of coordination.
- Sudden onset severe headache resulting in a blinding pain//photophobia unlike anything experienced before (unlike their usual pattern of headaches).
- Sudden onset of dizziness, nausea or vomiting.
- Reduced level of consciousness, or altered mental status including transient loss of consciousness or behavioural changes.
- Acute onset focal neurological deficit, or witnessed acute focal neurological deficit which has since resolved, or new onset focal seizures.
- Acute onset neck pain or neck stiffness with no known cause.
- Locked-in syndrome (full body paralysis below the neck)

- Be aware that the following non-specific symptoms may occur in a child presenting with stroke:

- nausea or vomiting
- fever
- neck pain.

- Acute focal neurological signs may be absent, and attention should be given to parental or young person concerns about the presentation of unusual symptoms.
- However, there may be other non-neurological causes for these symptoms, referred to as 'stroke mimics', which are commoner than acute stroke:
  - seizures
  - syncope
  - sepsis
  - hypoglycaemia
  - migraine
  - decompensation of previous stroke
  - functional disorders.
- About 40% of suspected strokes are eventually diagnosed as a stroke 'mimic'. However, it is extremely difficult to distinguish a stroke mimic from a true stroke in the pre-hospital environment.

2.2 Suspected TIA

- TIA is defined as an acute loss of focal cerebral or ocular function with symptoms lasting less than 24 hours. It is thought to be caused by inadequate cerebral or ocular blood supply as a result of low blood flow, thrombosis or embolism associated with diseases of the blood vessels, heart or blood. TIA is associated with a very high risk of stroke in the first month and up to one year after the event. A suspected cerebrovascular event needs to be urgently followed up with investigation and treatment at a timely TIA specialised clinic.
- During the first few hours of a patient's symptoms it is not possible to differentiate between a TIA or stroke. Therefore, patients presenting with any ongoing facial weakness, arm weakness, speech impairment, loss of focal cerebral or ocular function should immediately be taken to hospital and investigated as suspected stroke.
- Patients with a suspected TIA must have completely returned to their normal level of functioning. Any remaining signs or symptoms, however slight, must be treated as ongoing stroke symptoms and be conveyed to definitive care.
- The 2019 update of NICE guidelines states:
  - Immediately refer patients who have had a suspected TIA for specialist assessment and investigation, to be seen within 24 hours of onset of symptoms. Follow local pathways; these may include ensuring that aspirin is administered to patients who are not conveyed to hospital.
- 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.

2.3 Intracerebral and Subarachnoid Haemorrhage

- Haemorrhagic strokes are generally more severe and are associated with a considerably higher risk of dying within the first three months and beyond when compared to ischaemic strokes. Around 1 in 10 patients who have a haemorrhagic stroke die before reaching hospital.
- Intracerebral haemorrhage (ICH) is a type of stroke often due to a spontaneous rupture of a vessel, causing bleeding within the brain itself. Uncontrolled hypertension (HTN) is the most common risk factor for spontaneous ICH. Ten to twenty percent of acute ICH occurs in patients taking oral anticoagulants and this brings an association with a high risk of early haematoma expansion. Rapid transportation to normalise coagulation can reduce this risk.
- Subarachnoid haemorrhage (SAH) is a haemorrhage from a cerebral blood vessel, aneurysm or vascular malformation into the subarachnoid space, which is the space surrounding the brain where blood vessels lie between the arachnoid and pia mater. The presentation of SAH is usually different from other types of stroke as it typically presents with the sudden onset of severe headache and vomiting, and with non-focal neurological signs that may include loss of consciousness and neck stiffness.
- Sudden onset (thunderclap) occipital headache is a common presentation, the significance of which can be all too easily overlooked. Refer to Headache guideline.

3. Incidence

3.1 Stroke

- According to the *State of the Nation* report published by the Stroke Association in 2018, there are more than 100,000 strokes in the UK each year. That is calculated at approximately one stroke every 5 minutes. The *Burden of Stroke in Europe* report published by King's College, London using 2015 data highlighted 39.3 strokes per 100,000 inhabitants annually within the UK. There are over 1.2 million stroke survivors residing within the UK. Stroke is the fourth biggest killer in England and Wales, and the third biggest killer in Scotland and Northern Ireland.

3.2 Childhood Stroke

- There are over 400 childhood strokes a year in the UK, which is more than one child every day. Anyone of any age can have a stroke, including babies and children. The causes of stroke in children are very different from those in adults, including cardiovascular malformations and genetic causes (such as clotting disorders). Although the risk of stroke in healthy children is extremely low, the risk of a thrombotic stroke is six times higher following a recent illness, such as cold/flu or chickenpox. For children having had none or only some of their routine vaccinations, the risk of a thrombotic stroke is eight times higher compared to those who have had all of their routine vaccinations. The risk of stroke in children is 19 times higher in children with congenital heart disease. Newborns are the most likely to have a stroke.

3.3 TIA

- The estimated incidence of first-ever TIA in the UK is 50 people per 100,000 population each year. This is likely to be an underestimate. One in twelve people (8%) will have a full stroke within a week of having a TIA.

3.4 Haemorrhage

- SAH incidence is 6–12 people per 100,000 population each year in the UK. Approximately 85% of patients bleed from an intracranial aneurysm, 10% from a non-aneurysmal peri-mesencephalic haemorrhage and 5% from other vascular abnormalities including arteriovenous malformation.

4. Severity and Outcome

- The case fatality of ischaemic stroke in adults aged 45 or older is estimated at 10.4 per 100 discharges, suggesting 53,004 deaths, or 41.5 per 100,000 inhabitants, due to stroke each year.

5. Assessment and Management

- The FAST (Face, Arms, Speech, Time) assessment tool should be used and carried out on **ALL** patients with suspected stroke/TIA. A deficit in any one of the face, arms or speech domains is sufficient for the patient to be identified as 'FAST positive'.
- A suspected acute stroke patient should be considered a **TIME-CRITICAL** patient. Perform a brief secondary survey but do not allow this, or any other non-essential pre-hospital interventions, to delay transport to hospital.
- Clinicians may consider using the PASTA (Paramedic Acute Stroke Treatments Assessments) structured assessment and handover as per local arrangements (see Price et al).

Table 3.118 — FAST Test

Facial weakness	Ask the patient to smile or show teeth. Look for **NEW** lack of symmetry.
Arm weakness	Ask the patient to lift their arms together and hold for 5 seconds. Does one arm drift or fall down? The arm with motor weakness will drift downwards compared to the unaffected limb.
Speech	Ask the patient to repeat a phrase. Assess for slurring or difficulty with the words or sentence, hesitation or even an inability to speak at all.
Time	Note the time of onset, if known, and pass this to the hospital as this has been shown to expedite time to CT scan.

- The FAST test is well established in UK practice for both clinicians and the general public. FAST has recognised limitations in that it will not identify all patients with stroke, such as those with sudden-onset visual disturbance/lateralising cerebellar dysfunction. The Intercollegiate Working Party (2016) recommends clinicians continue to treat a person as having a suspected stroke if they are suspicious of the diagnosis despite a negative FAST test.
- The majority of strokes are ischaemic. Distinguishing between ischaemic and haemorrhagic strokes is not currently feasible clinically in the pre-hospital setting.
- Prehospital brain imaging is being evaluated in other countries (and in one UK centre) but the evidence is not sufficient to recommend wider implementation at this time.
- Video-conferencing is currently being evaluated in some parts of the UK to determine whether it assists in the triage and treatment of patients suffering some symptoms of stroke. (See: https://aace.org.uk/wp-content/uploads/2025/02/Stroke-Video-Conferencing.pdf)

Table 3.119 – ASSESSMENT and MANAGEMENT of: Stroke/TIA

Assess <C>ABCDE

- If any of the following **TIME-CRITICAL** features are present:
  - Major **<C>ABCDE** problems (refer to Medical Emergencies in Adults – Overview and Medical Emergencies in Children – Overview).
  - Fast positive or suspected stroke.
  - May have airway and breathing problems (refer to Airway and Breathing Management).
  - Level of consciousness may vary (refer to Altered Level of Consciousness).
  - Assess blood glucose level, as hypoglycaemia may mimic a stroke.
- Start correcting any **<C>ABCDE** problems.
- Undertake a **TIME-CRITICAL** transfer to a Hyper Acute Stroke Unit (HASU) or a thrombectomy-capable hospital, as per local pathway.
- Continue patient management en-route.
- Provide an ATMIST pre-alert call including time of onset of symptoms, if known.

NB A UK study (Sheppard et al.) reported that providing a hospital pre-alert message is the most influential pre-hospital factor in facilitating timely assessment for acute stroke patients upon arrival in hospital and confirms in a UK setting the findings of previous work elsewhere. However, patients were only pre-alerted where stroke was recognised and symptom onset time recorded.

GCS

- Assess Glasgow Coma Scale (GCS) on unaffected side. Eye and motor assessments may be more readily assessed if speech is badly affected.

Respiratory Rate

- Measure and record respiratory rate.

Pulse

- Measure and record pulse.

Oxygen Saturation

- Monitor the patient's SpO_2, administer oxygen to achieve saturations of >94% if the patient presents as hypoxaemic on air (refer to Oxygen).

NB Among non-hypoxaemic patients with acute stroke, the prophylactic use of low-dose oxygen supplementation does not reduce death or disability at 3 months. Oxygen therapy is not recommended unless the patient is hypoxaemic.

Blood Pressure and Fluids

- Measure and record blood pressure; if required, administer fluids (refer to Intravascular Fluid Therapy in Adults and Intravascular Fluid Therapy in Children).

NB The BP will be used as a baseline in hospital.

- Intravenous access is not essential unless the patient requires specific interventions as it may delay transport to hospital.

Blood Glucose

- Measure and record blood glucose for hypo/hyperglycaemia (refer to Glycaemic Emergencies in Adults and Children).

NB Hypoglycaemia may mimic a stroke.

Temperature

- Measure and record temperature en-route to hospital.

NEWS2

- These observations will enable you to calculate a NEWS2 Score (refer to Sepsis).

ECG

- **Do NOT delay transfer to hospital to record a 12-lead ECG. A 12-lead ECG is not necessary for stroke patients unless there are specific reasons (such as concurrent chest pain).**
- The recording of a pre-hospital 12-lead ECG has been associated with delay and worse outcomes in stroke patients.
- **Patients should have continuous (e.g. 3-lead) cardiac monitoring en-route to capture arrhythmia** s and specifically AF which increases the risk of stroke fivefold. This valuable information will help during any subsequent specialist assessment.

Assess the Patient's Pain

- Where present, assess the **SOCRATES** of pain and record initial and subsequent pain scores.
- Consider analgesia if appropriate (refer to Pain Management in Adults and Pain Management in Children).

Transfer

- A suspected acute stroke is a **TIME-CRITICAL** condition. Every effort **MUST** be made to minimise on-scene time.
- The destination hospital will depend on local pathways. For example, bypassing local hospitals and taking the patient direct to a HASU or a thrombectomy-capable hospital may be appropriate, as per local pathways.
- Pre-alert the receiving hospital for all suspected acute stroke patients within locally agreed treatment windows of care.
- Conscious patients should be conveyed in the most comfortable position for them. A large international randomised trial of hospitalised stroke patients reported that outcomes after acute stroke did not differ significantly between patients assigned to a lying-flat position and those assigned to a sitting-up position with the head elevated.
- Patients with suspected acute stroke should remain nil by mouth until they have a swallowing assessment in hospital. Have suction available for patients who are aphagic to protect their airway from secretions if necessary.
- Where possible, a witness should be asked to accompany the patient to hospital, to assist with further assessment.

Documentation

- Complete documentation to include all clinical findings, advice from other clinicians, onward referral and worsening advice given.

6. Audit Information

- Ambulance services are required to monitor aspects of stroke care through the National Ambulance Quality Indicators, and all are linking pre-hospital data to SSNAP to capture the entire acute patient journey. Careful documentation of your assessment and management, including accurate timings, is essential to improving care for this group of patients.
- SSNAP are currently working with NHS England on an ambulance-linkage project to complement and extend the current dataset, incorporating pre-hospital data.

KEY POINTS

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- Record time of onset if known or last-seen-well time and pre-alert the appropriate hospital.
- Stroke is common and may be due to either cerebral infarction or haemorrhage – it is not possible to distinguish haemorrhagic or ischaemic stroke clinically.
- Mechanical Intra-Arterial Thrombectomy (IAT) is becoming increasingly available.
- The most sensitive features associated with diagnosing stroke in the pre-hospital setting are facial weakness, arm and leg weakness and speech disturbance — the FAST test.
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