Disclaimer

This pathway is about diagnosis and initial management of suspected stroke.

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Red Flags

- Transient ischaemic attack in last 48 hours
- Multiple or recurrent transient ischaemic attack episodes in the last seven days
- Amaurosis fugax in last 48 hours.
- Persistent neurological deficit

Background

About stroke

There are 2 main types of stroke:

- **Haemorrhagic:**
  - Accounts for about 20% of strokes
  - Can present with meningism, headache, vomiting, progressive neurological symptoms, or coma
  - Requires CT to make diagnosis
- **Ischaemic:**
  - Accounts for about 80% of strokes
  - May be associated with atrial fibrillation and past transient ischaemic attacks (TIAs)

In acute ischaemic stroke:

- **Thrombolysis within 4.5 hours** (up to 6 hours in selected patients) can restore blood flow before major brain damage has occurred. The main risk of thrombolysis is intracranial haemorrhage.
- **Urgent endovascular therapy within 6 hours of onset** (up to 24 hours in selected patients) can improve functional outcome in patients with large vessel occlusion.

Assessment

1. In triaging by telephone, use the **FAST tool**. If stroke suspected, act fast – call 000 and advise patient to go directly to hospital by ambulance, not by private car.

   **FAST tool**

   *The Face, Arm, Speech Test is used to screen for a TIA or stroke. TIA symptoms may have resolved by presentation and may need to be applied retrospectively.*

   - **Face** – Ask to smile. Is it droopy on one side?
   - **Arm** – Ask to raise both arms to 90 degrees. Does one drift down or fall rapidly?
   - **Speech** – Are there any new disturbances e.g., slurring, word finding, or object naming difficulty?
   - **Time** – If the patient fails any of the above tests, get to hospital FAST.

2. In patients presenting to clinic with strong suspicion of stroke, call an ambulance to arrange immediate neurological referral or admission before conducting an in-depth history and examination.
3. Take a history:
  - Look for *stroke symptoms*.

**Stroke symptoms**

*Symptoms are generally sudden.*

- Unilateral weakness
- Unilateral altered sensation
- Visual impairment:
  - Transient vision loss, generally unilateral
  - Hemianopia
  - Diplopia
- Dysarthria
- Dysphasia
- Dysphagia

*May be consistent with stroke in conjunction with typical symptoms:*

- Severe headache
- Vomiting
- Meningism
- Altered level of consciousness
- Ataxia
- Vertigo
- Delirium

- Check for stroke *risk factors*.

**Risk factors**

- Heart disease, especially atrial fibrillation (AF)
- Previous TIA or stroke
- Diabetes mellitus
- Hypertension
- Dyslipidaemia
- Smoking
- Aged > 55 years
- Thrombophilia
- Vasculitis
- Peripheral arterial disease, e.g. carotid artery stenosis
- Combined oral contraceptives or hormone replacement therapy (HRT)
- Alcohol abuse
- Migraine with aura

4. Determine time of symptom onset if possible. If uncertain, use the time the patient was last known to be well. Classify acute stroke. If within 24 hours patient may be eligible for reperfusion therapy.

5. Consider *differential diagnoses*.

**Differential diagnoses**

*Examples:*

- Acute neurological deficit:
Hypoglycaemia (always check BGL)
- Central nervous system (CNS) or other systemic infection
- Drug overdose
- Head trauma
- Seizure with post-ictal deficit (however, large strokes may present as seizure)
- Subdural bleed or haematoma
- Intracranial space-occupying lesion

➢ Subacute neurological deficit:
- Subdural bleed or haematoma
- Intracranial space-occupying lesion
- Cerebral venous thrombosis
- Hypertensive encephalopathy
- Multiple sclerosis

6. Examine the patient:

- If reduced consciousness, check Glasgow Coma Scale score.
- Check blood pressure in both arms, heart rate, peripheral pulses, temperature, and oxygen saturation.
- Complete a 5 minute neurological examination.

5-minute neurological examination

The aim of the neurological exam is to determine if any symptoms are still present, to exclude differentials, and to help localise a possible stroke. If any symptoms whatsoever remain, the diagnosis is presumptive stroke, not TIA.

Check:

➢ Gait (if able):

Gait

Gait changes in stroke may be hemiplegic or ataxic:
- A hemiplegic gait is caused by unilateral weakness on the affected side. As a result, the patient falls towards the weak side.
- An ataxic gait can occur in a posterior circulation, including cerebellar, stroke. It is characterised by a wide base.

In a unilateral cerebellar lesion, the patient will veer towards the side of the lesion.

- Tandem gait (heel-toe)

➢ Eyes:

Eyes

- Screen movements in 4 primary directions.
- Look for restriction of eye movements and nystagmus. Nystagmus which changes direction or is vertical must be central.
- Test for inattention. If the patient sees finger movement accurately in the right and left field individually but neglects
one side with bilateral simultaneous stimulation, they have visual inattention.

- Eye movements (H pattern)
- Visual fields
- Visual inattention

**Face:**

**Face**

Sparing or relative sparing of the upper half of the face is usually seen in stroke. Significant involvement of the forehead and eye closure suggests a lower motor neurone lesion e.g., Bell's Palsy.

- “Show me your teeth”
- “Raise your eyebrows”
- “Close your eyes”

**Drift:**

**Drift**

Pronator drift of one arm indicates presence of an upper motor neurone lesion.

- Eyes closed, arms outstretched, palms turned upwards

**Motor strength:**

**Motor strength**

Hip strength may appear reduced in the elderly when supine. Asymmetrical loss of hip strength indicates stroke.

- Screen proximal and distal groups:
  - Shoulder abduction and adduction
  - Hip flexion and extension
  - Wrist flexion and extension
  - Ankle dorsiflexion and plantar flexion
  - Hand grip strength

**Cerebellar system:**

**Cerebellar system**

A cerebellar lesion causes an ataxic gait which is typically:

- Wide-based
- Staggering
- May veer to one side

To test for upper limb ataxia, ask the patient to touch the examiner's finger with their index finger and then touch their nose. Look for past-pointing and intention tremor.

- Test for dysdiadochokinesis.
- Gait (finger-to-nose, heel-to-shin)

➤ Sensory testing:

**Sensory testing**

Unilateral sensory changes (hypoesthesia, pins and needles) affecting face, arm and/or leg (usually 2 areas) is commonly described after stroke.

If patient feels each side individually but neglects one side with bilateral simultaneous stimulation, they have sensory inattention.

- Lightly touch each side of face, arm, and leg separately, then simultaneously
- Patient has eyes closed

➤ Speech and language:

**Speech and language**

- Test for dysphasia by asking the patient to name:
  - A pen, and then the tip of the pen.
  - A watch, and then face of a watch.
- Ask the patient to follow a simple command: “make a fist”, then a complex command: “touch your left ear with your right thumb”.
- Screen for dysarthria by observing the patient’s speech. Phrases such as “Tip Top”, “Fifty-Fifty”, and “Baseball Player” can be used.
  - Dysphasia
  - Dysarthria

➤ Mental state:

- Observation during consultation

7. Arrange investigations as indicated by time since last neurological symptom.

**Investigations**

<table>
<thead>
<tr>
<th>Time since last symptom</th>
<th>Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 48 hours</td>
<td>• Blood sugar level</td>
</tr>
<tr>
<td></td>
<td>• Immediate transfer to hospital</td>
</tr>
<tr>
<td>Crescendo or recurrent</td>
<td></td>
</tr>
<tr>
<td>symptoms</td>
<td></td>
</tr>
<tr>
<td>Persistent neurological</td>
<td></td>
</tr>
<tr>
<td>deficit</td>
<td></td>
</tr>
<tr>
<td>48 hours to 7 days</td>
<td>Complete all investigations within 24 to 48 hours:</td>
</tr>
<tr>
<td></td>
<td>• CT brain</td>
</tr>
<tr>
<td></td>
<td>• 12 lead ECG</td>
</tr>
<tr>
<td></td>
<td>• Carotid Doppler ultrasound</td>
</tr>
</tbody>
</table>
Management

Acute management

1. If any red flags:
   - Call an ambulance to arrange immediate neurological referral or admission.
   - If unconscious patient with suspected fall and unable to evaluate cervical spine, immobilise neck before transfer.
   - Ensure medical stability with attention to airway, breathing, and circulation. Be prepared to perform CPR if they become unresponsive.

   **CPR**
   
   ➢ **Perform DRS ABCD:**
     - Dangers?
     - Responsive?
     - Send for help
     - Open Airway
     - Normal Breathing?
     - Start CPR (30 compressions, 2 breaths)
     - Attach Defibrillator (AED) as soon as available and follow prompts.

   ➢ Continue CPR until responsiveness or normal breathing returns.

2. Give oxygen if oxygen saturation < 94%, aiming for 94 to 98%. If COPD and risk of hypercapnia, aim for oxygen saturation of 88 to 92%.

3. Check blood glucose if not already done.

4. Do not give antiplatelets or anticoagulation until haemorrhagic stroke excluded with imaging.

5. Keep patient nil by mouth.
6. Manage blood pressure:
   - Ischaemic stroke:
     - Blood pressure acceptable 120 to 220 systolic for the first 72 hours (raised blood pressure may be a physiological response to large vessel clot).
     - After 72 hours, aim as per sub-acute management below.
   - Haemorrhagic stroke – aim for < 140 in hyperacute management (physiological response may impede this).

7. If transient ischaemic attack has occurred more than 48 hours ago and within the last two weeks, seek same day stroke team advice.

**Subacute management**

1. If patient presents with suspected stroke and the last change in symptoms > 2 weeks, request urgent or routine stroke team assessment.

2. If initial investigations do not establish the cause of stroke, consider seeking stroke team advice on further investigations.

3. If carotid stenosis, see the Carotid Artery Stenosis pathway. Symptomatic carotid stenosis > 50% requires surgical assessment within 2 weeks.

4. Start secondary prevention measures in all patients:
   - Start medications, as clinically indicated:
     - **Antiplatelet therapy**, once haemorrhagic stroke has been ruled out on non-contrast CT.

**Antiplatelet therapy**

- **First-line options:**
  - Aspirin 100 mg per day
  - Aspirin plus dipyridamole, modified release 25 mg + 200 mg twice a day.
    - PBS – prevention of recurrence of ischaemic stroke or transient cerebral ischaemic events.
    - Advise that headache is a common side effect in 10% of patients and can be relieved by paracetamol and 3 coffees a day.
    - Start at night while maintaining morning aspirin dose for a week to reduce headaches.
    - Marginally more effective than aspirin alone.

- **Second-line option:**
  - Clopidogrel 75 mg per day.
  - PBS – prevention of recurrence of ischaemic stroke or transient cerebral ischaemic events in patients who cannot tolerate or are allergic to aspirin, or who have had a stroke or TIA while taking aspirin.
➢ The combination of clopidogrel and aspirin is used in some patients (e.g., high-risk TIA, mild stroke or carotid stents), and generally short-term (< 1 month).

- **Antihypertensive medication** to optimise blood pressure management. See also Hypertension.

### Antihypertensive medication

Aim for systolic blood pressure ≤ 140 mmHg following 72 hours. If significant carotid or basilar disease identified aim for ≤ 150 mmHg.

- First-line treatment – angiotensin-converting enzyme inhibitor (ACE inhibitor), unless contraindicated.
- Second line – calcium channel blocker with diuretic.

Beta blockers are not advisable unless specific indication for rhythm control or heart failure

Consider adding a diuretic if blood pressure target is not met, or if ACE inhibitors are contraindicated or not tolerated.

- **Lipid-lowering medication**

### Lipid-lowering medication

Aim for:

- total cholesterol < 4.0
- \( LDL < 1.8 \)

**Statins:**

- Consider statin therapy in a patient with atherosclerotic strokes, unless contraindicated.
- Use minimal dose required to meet total and LDL cholesterol targets.

- Manage co-morbidities (e.g., diabetes, obesity, sleep apnoea) and risk factors (SNAP).

**SNAP**

- Smoking
- Nutrition
- Alcohol
- Physical activity

5. If taking hormone replacement therapy (HRT), or combined oral contraceptive pill (COCP), or other combined (non-oral) contraceptive:

- Oestrogen increases the risk of ischaemic stroke, but progesterone does not.
- Discuss risks versus benefits, and recommend stopping.
- If contraception is needed, consider progestogen-only or non-hormonal methods.

6. Arrange regular follow-up to check blood pressure and symptoms, and to manage any medications started.
7. Educate the patient and their family to recognise the signs and symptoms of stroke, and when to seek emergency care.

8. Discuss **driving**.

### Driving

- **Driving is not permitted after a stroke:**
  - Private vehicle – for 4 weeks
  - Commercial vehicle – for 3 months
- **If persistent neurological deficit, driving fitness depends on the extent of impairment, and may require** practical driver assessment.
- **If full neurological recovery, private vehicle drivers do not require a conditional licence.**
- **Patient needs to comply with stroke prevention therapy.**

For full details, see Austroads – Assessing Fitness to Drive: Neurological Conditions.

9. For further rehabilitation management:
   - consider requesting occupational therapy and physiotherapy.
   - prepare a General Practice Management Plan (GPMP) and Team Care Arrangement (TCA) if appropriate.
   - consider Stroke Rehabilitation.

10. Consider:
    - requesting a medication management review (MBS Item 900 or 903).
    - discussing advance care planning.

### Referral

- If any red flags call an ambulance to arrange immediate neurological referral or admission.
- If transient ischaemic attack has occurred more than 48 hours ago and within the last two weeks, seek same day stroke team advice.
- If suspected stroke with last change in symptoms > 2 weeks ago, request urgent or routine stroke team assessment.
- Consider requesting:
  - occupational therapy and physiotherapy for rehabilitation management.
  - medication management review (MBS Item 900 or 903).
- If persistent neurological deficit, consider requesting practical driver assessment.

### Information

#### For health professionals

**Further information**

- National Institute for Health and Care Excellence (NICE) – Stroke and Transient Ischaemic Attack in Over 16s: Diagnosis and Initial Management
- Stroke Foundation:
For patients

- Better Health Channel – Stroke Explained
- Health Translations – Have You Had a Heart and Stroke Check? Your First Step to Help Prevent a Heart Attack or Stroke
- Patient – Stroke
- Stroke Foundation

References


Select bibliography


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