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Diagnosis and Initial Management of Acute Stroke and Transient Ischaemic Attack (TIA)

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DIAGNOSIS AND INITIAL MANAGEMENT OF ACUTE STROKE AND TRANSIENT ISCHAEMIC ATTACK (TIA)

CONTENTS **PAGE**

DEFINITIONS

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.

TIA is defined as an acute loss of focal cerebral or ocular function with symptoms lasting less than 24 hours and which is thought to be due to 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.

RAPID RECOGNITION OF SYMPTOMS AND DIAGNOSIS

In patients with sudden onset of neurological symptoms:

- **Hypoglycaemia** should be excluded as the cause of these symptoms
- A validated tool, such as **FAST** (Face, Arm, Speech, Time to call 999), should be used outside hospital to screen for a diagnosis of stroke or TIA.

Patients who are admitted to the emergency department with a suspected stroke or TIA should have the diagnosis established rapidly. The FAST test remains useful in this situation but clinicians should be aware that some people with stroke will not be identified by the FAST test (e.g. sudden onset visual disturbance, lateralising cerebellar dysfunction).

Therefore clinicians should continue to treat a person as having a suspected stroke if they are suspicious of the diagnosis despite a negative FAST test.

THE FAST TEST

FACE: Can the person smile? Has their face fallen on one side?

ARM: Can the person raise both arms and keep them there?

SPEECH: Can the person speak clearly and understand what you say? Is their speech slurred?

TIME: If you see any one of these three signs, it's TIME to call 999. Stroke is always a medical emergency that requires immediate medical attention.

Other tests such as the (National Institute of Health Stroke Scale) NIHSS need more evaluation before they can be recommended for screening in the Emergency Department (ED). Patients with residual neurological symptoms or signs must remain nil by mouth until screened for dysphagia by a specifically trained healthcare professional.

MANAGEMENT OF TRANSIENT ISCHAEMIC ATTACKS (TIA)

Patients with acute neurological symptoms that resolve completely within 24 hours (i.e. a suspected TIA) should be given aspirin 300 mg immediately and assessed urgently within 24 hours by a specialist physician in a neurovascular clinic or on an acute stroke unit.

Risk stratification tools are not helpful to determine urgency. However, patients with suspected TIA that occurred more than a week previously should be assessed by a specialist physician as soon as possible within 7 days.

TIA MANAGEMENT

Patients who have had a suspected TIA are at high risk of stroke in the coming few days and should therefore have the following management plan:

- Aspirin 300 mg given **immediately** (or clopidogrel 300mg if allergic)
- Specialist assessments and investigation within **24 hours**
- Advise the patient not to drive until seen by a specialist
- **Complete the Online TIA Referral** to the access the TIA Clinic
- If clinical concerns remain then admission via the stroke unit can be arranged and assessments and investigations can proceed as an in-patient
- Advice is available via the **Stroke Nurse Practitioner (07769 932 342**) or from the on-call stroke consultant via switch (dial 0) if admission may be needed.

If the patient is admitted to the Acute Stroke Unit due to clinical concerns, then investigations should all occur as an in-patient. The risk of early stroke in high risk patients is substantial.

BRAIN IMAGING IN TIA

Patients with suspected TIA should be assessed by a specialist physician before a decision on brain imaging is made, except when haemorrhage requires exclusion in patients taking an anticoagulant or with a bleeding disorder when unenhanced CT should be performed urgently.

Imaging can be restricted to those patients where the results of such imaging are likely to influence management such as confirming the territory of ischaemia prior to making a decision about carotid artery surgery.

Magnetic resonance imaging (MRI) to detect ischaemic lesions using diffusion-weighted imaging (DWI) makes it the modality of choice if positive confirmation of the presence or location of a lesion is the objective, but the significant false-negative rate with DWI precludes its use as a diagnostic tool.

TREATMENT OF TIA

Patients with non-disabling stroke or TIA should receive treatment for secondary prevention introduced as soon as the diagnosis is confirmed, including:

- Discussion of individual lifestyle factors (smoking, alcohol excess, diet, exercise)
- Clopidogrel 300 mg loading dose followed by 75 mg daily
- High intensity statin therapy with atorvastatin 20-80 mg daily
- Blood pressure-lowering therapy with a thiazide-like diuretic, long-acting calcium channel blocker or angiotensin-converting enzyme inhibitor

Patients with non-disabling stroke or TIA in atrial fibrillation should be anticoagulated as soon as intracranial bleeding has been excluded and with an anticoagulant that has rapid onset, provided there are no other contraindications. (Please refer to anticoagulation guidelines)

CAROTID IMAGING IN TIA PATIENTS

All patients with a **carotid territory TIA who are candidates for carotid endarterectomy** after specialist assessment should have a carotid imaging within 24 hours.

Patients with a **symptomatic carotid stenosis of 50%-99% by (North American Symptomatic Carotid Endarterectomy Trial) NASCET criteria** should be referred and assessed to undergo **carotid endarterectomy within 7 days** and receive best medical therapy as above in the meantime.

Carotid stenting should be considered in those patients unsuitable for carotid endarterectomy (e.g. inaccessible carotid bifurcation, re-stenosis following endarterectomy, radiotherapy-associated carotid stenosis).

The evidence for surgery in asymptomatic carotid disease and stenosis below 50% by NASCET criteria should generally not undergo surgery but receive best medical therapy as outlined above.

DIAGNOSIS OF ACUTE STROKE

SPECIALIST STROKE UNITS

All people with suspected stroke should be **admitted directly to a specialist hyper-acute stroke unit** following initial assessment, either from the community or from the ED department.

This may necessitate medical clerking in the ED or on the hyper-acute stroke ward itself. Patients should not wait in the ED for clerking and timely admission to the stroke unit should be the priority after confirmation of the diagnosis and completion of necessary imaging.

Confirmed stroke patients should ideally be on the acute stroke unit within 4 hours of admission. Access the acute stroke unit by calling the **STROKE NURSE PRACTITIONER (07769 932 342**) or ringing the nurse in charge of the hyper-acute stroke unit.

BRAIN IMAGING FOR THE EARLY ASSESSMENT OF PEOPLE WITH ACUTE STROKE

Brain imaging must be performed urgently for people with acute stroke and certainly within 1 hour of arrival in the Emergency Department.

Patients with ischaemic stroke who are eligible for endovascular therapy should have a CT angiogram from aortic arch to skull vertex immediately. This should not delay the administration of intravenous thrombolysis.

MRI with stroke-specific sequences (diffusion-weighted imaging) should be performed in patients with suspected acute stroke when there is diagnostic uncertainty.

MANAGEMENT OF ISCHAEMIC STROKE

THROMBOLYSIS WITH ALTEPLASE

Intravenous alteplase is currently recommended for the acute treatment of ischaemic stroke up to 3 hours after symptom onset **regardless of age or stroke severity.**

Patients under 80 should also be treated from 3 hours to 4.5 hours after symptom onset. Patients over 80 and between 3 hours and 4.5 hours can be treated with alteplase on an individual basis but in this group the benefits of treatment are smaller. It must be delivered only by physicians trained and experienced in the management of acute stroke. Thrombolysis protocols including exclusion criteria and dosing charts are available in the Emergency Department and on the intranet.

If a potential thrombolysis case is admitted delays should be minimised with the aim to achieve a door-to-needle time below 30 minutes.

Immediately call the **Stroke Nurse Practitioner (07769 932 342)**
After 5pm contact the **Specialist Registrar on-call for Stroke** or the **Stroke Consultant** directly via switchboard (dial 0)
Contact the on-call **Radiology Specialist Registrar** to request an immediate CTA head scan
Obtain as much collateral history as is available and insert a peripheral cannula in each arm

INTRA-ARTERIAL CLOT EXTRACTION (THROMBECTOMY)

Thrombectomy for acute ischaemic stroke is always done via the on-call stroke consultant in discussion with the on-call interventional neuroradiologist and neuroanaesthetist. These patient groups may benefit:

- Proximal intracranial large vessel occlusion
- Disabling acute stroke (NIHSS ≥ 6)
- Procedure can begin within 5 hours (to groin puncture)

Patients with a large artery occlusion in the posterior circulation may benefit from intervention up to 24 hours post onset of symptoms.

Patients with salvageable brain tissue proven on advanced brain imaging may benefit up to 12 hours post onset of symptoms.

FULL THROMBOLYSIS AND THROMBECTOMY GUIDELINES ARE AVAILABLE ON THE INTRANET SEPARATELY

ANTIPLATELET TREATMENT

All people presenting with acute stroke who have had intracerebral haemorrhage excluded by brain imaging should be administered as soon as possible

- **Aspirin 300 mg orally** if they are not dysphagic or
- **Aspirin 300 mg rectally** or by enteral tube if they are dysphagic

Aspirin should be continued for 2 weeks when long-term antithrombotic treatment can be commenced. **(SEE SECONDARY PREVENTION OF STROKE AND TIA)**

Patients with acute ischaemic stroke reporting previous dyspepsia with an antiplatelet agent should be given a proton pump inhibitor in addition to aspirin.

Patients with acute ischaemic stroke who are allergic to or intolerant of aspirin should be given an alternative antiplatelet agent (e.g. clopidogrel)

Patients with acute ischaemic stroke treated with thrombolysis should be started on an antiplatelet agent after 24 hours unless contraindicated, once haemorrhage has been excluded.

MALIGNANT MIDDLE CEREBRAL ARTERY (MCA) SYNDROME

Patients with malignant middle cerebral artery syndrome have a reduced mortality and modest functional improvement with **decompressive hemicraniectomy.** Patients should be referred to neurosurgery **within 24 hours of stroke onset and treated within 48 hours of stroke onset** if they meet the following criteria:

- Pre-stroke modified Rankin Scale score of less than 2;
- Clinical deficits indicating infarction in the territory of the MCA;
- National Institutes of Health Stroke Scale (NIHSS) score of more than 15;
- A decrease in the level of consciousness to a score of 1 or more on item 1a of the NIHSS;
- Signs on CT of an infarct of at least 50% of the MCA territory with or without additional infarction in the territory of the anterior or posterior cerebral artery on the same side, or
- Infarct volume greater than 145 cubic centimetres on diffusion-weighted MRI.

ACUTE ISCHAEMIC STROKE (CEREBELLAR)

Patients with cerebellar infarction and effacement of the 4th ventricle as with cerebellar haemorrhage are at risk of hydrocephalus and should be discussed with the neurosurgical team for consideration of decompression.

MANAGEMENT OF PRIMARY INTRACEREBRAL HAEMORRHAGE

ANTICOAGULATION REVERSAL

Patients with intracerebral haemorrhage in association with **vitamin K antagonist** treatment (usually warfarin) should have the anticoagulant urgently reversed with a combination of **prothrombin complex concentrate and intravenous vitamin K**. This may need discussion with the on-call haematologist first or with reference to prothrombin guidelines.

Patients with intracerebral haemorrhage in association with **a direct oral anticoagulant** may need urgent reversal of the agent with either prothrombin complex concentrate or a specific reversal agent. Refer to local guidelines for initiation and monitoring of DOACs (Direct Oral Anticoagulants).

BLOOD PRESSURE MANAGEMENT (HAEMORRHAGIC STROKE)

Patients with primary intracerebral haemorrhage who present **within 6 hours of onset** with a systolic blood pressure above 150mmHg should be treated urgently using a locally agreed protocol for **blood pressure lowering to a systolic blood pressure of 140 mmHg for at least 7 days**, unless:

- The Glasgow Coma Scale score is 5 or less
- The haematoma is very large and death is expected
- A structural cause for the haematoma is identified
- Immediate surgery to evacuate the haematoma is planned

Recent trials have shown that antihypertensive treatment is associated with a trend to improvement in functional outcomes though not mortality. Consider using:

- **Labetalol 10 mg intravenously over 1-2 minutes**
- **Labetalol infusion intravenously at 2 - 8 mg/min**
- **GTN infusion intravenously 20mg in 50mls to run at between 2-10ml/hour**

IMAGING

Patients with a deterioration in their conscious level will need immediate repeat imaging and the presence of hydrocephalus should prompt consideration of external ventricular drain. Most patients will require additional imaging to look for an underlying cause following recovery.

MANAGEMENT OF CERVICAL ARTERY DISSECTION

Cervical artery dissection is an increasingly common diagnosis particularly in younger patients with stroke. Patients often experience pain and sometimes give a history of preceding trauma in the days before the stroke.

Conventional treatments such a thrombolysis with alteplase and thrombectomy should be offered as normal.

In addition, all patients suspected of having a dissection should undergo vascular imaging of their cervical and intracranial vasculature. This would usually require CT or MR angiography the latter with fat-sat views and potentially contrast. Please consider early discussion with neuroradiology about best imaging modality.

Patients with a proven dissection should be **treated for at least three months** with either **antiplatelets or anticoagulants**. Early discussion with a member of the stroke team and neuroradiology is recommended as repeat imaging may be warranted.

MANAGEMENT OF CEREBRAL VENOUS THROMBOSIS

Cerebral venous thrombosis (CVT) is a rare cause of acute stroke but should be suspected in patients with headache, seizures, in addition to focal neurological deficits. It is more likely in prothrombotic states especially in **pregnancy, sepsis, malignancy or dehydration**.

Patients should be considered for anticoagulation, even in the presence of intracranial haemorrhage although the randomised controlled evidence in this area remains weak.

To make the diagnosis imaging needs to be specifically **CT venography or MR venography.**

Consider anticoagulation with **treatment dose low molecular weight heparin (e.g. tinzaparin;** full treatment prescribing advice may be found in the summary of product characteristics (SPC) http://www.medicines.org.uk/emc/medicine/29741) **followed by warfarin**. The non-vitamin K oral anticoagulants are not licensed for use in CVT. Steroids have not been shown to have a role in management.

ACUTE STROKE CARE

Patients should be admitted to a hyper-acute stroke unit with monitoring and protocols for maintaining normal physiology including level of consciousness; blood glucose; blood pressure; oxygen saturation; respiratory rate; hydration and nutrition; temperature; cardiac rhythm and rate.

SWALLOWING

Patients must have their swallowing screened by an appropriately trained healthcare professional before being given any oral food, fluid or medication within 4 hours of admission.

If the admission screen indicates problems with swallowing the patient must:

- Be immediately considered for alternative fluids;
- Have a comprehensive specialist assessment of their swallowing;
- Be considered for nasogastric tube feeding within 24 hours;
- Be referred to a dietitian for specialist nutritional assessment, advice and monitoring;
- Receive adequate hydration, nutrition and medication by alternative means.

Patients must have their hydration assessed on admission and regularly thereafter so that normal hydration is maintained.

OXYGEN THERAPY

Supplemental oxygen should be used **only if saturations drop below 95%** and if no contraindications. Routine use of oxygen in acute stroke is not recommended if patient is not hypoxic.

BLOOD SUGAR CONTROL

Patients with acute stroke should have the blood glucose **maintained between 5mmol/L and 15mmol/L** where possible. This may require the use of intravenous insulin in selected cases but with caution as hypoglycaemia is potentially very hazardous.

BLOOD PRESSURE CONTROL (ISCHAEMIC STROKE)

Patients with acute ischaemic stroke should only receive blood pressure-lowering treatment if there is an indication for emergency treatment, such as:

Systolic BP above 185 mmHg or diastolic BP above 110 mmHg when the patient is otherwise eligible for treatment with alteplase
Hypertensive encephalopathy
Hypertensive nephropathy
Hypertensive cardiac failure/myocardial infarction
Aortic dissection
Pre-eclampsia/eclampsia

Patients with acute stroke admitted on anti-hypertensive medication should resume oral treatment once they are medically stable and as soon as they can swallow medication safely.

STATIN THERAPY

Patients with **acute ischaemic stroke** should receive high intensity statin treatment with **atorvastatin 20-80 mg daily** as soon as they can swallow medication safely. Patients with primary intracerebral haemorrhage should only be started on statin treatment based on their cardiovascular disease risk and not for prevention of intracerebral haemorrhage.

DEEP VENOUS THROMBOSIS (DVT)

Deep venous thrombosis (DVT) and pulmonary embolism remain common complications following stroke. Recent trials have shown that only **intermittent pneumatic compression (IPC) stockings** are effective and safe in stroke patients. All patients with reduced mobility as a result of a stroke should be considered for IPC stockings **within 3 days of admission and for up to 30 days** or until mobility is normal or discharge occurs.

Conventional compression stockings and low molecular weight heparins (LMWH) are not routinely used for the prevention of DVT.

Patients with ischaemic stroke and symptomatic deep vein thrombosis or pulmonary embolism should receive anticoagulant treatment provided there are no contraindications. Patients with intracerebral haemorrhage and symptomatic deep vein thrombosis or pulmonary embolism should receive treatment with a vena caval filter until such time as the benefits of anticoagulation outweigh the risks. The IVC filter can then be removed if anticoagulation is safely re-established.

SURGERY FOR ACUTE HAEMORRHAGIC STROKE

CEREBELLAR HAEMORRHAGES

This can be an emergency and should be considered for neurosurgical intervention especially if:

- The patient has signs of a brain stem syndrome (e.g. dysarthria, diplopia etc.)
- There is progressive neurological deterioration, including agitation
- There is evidence of hydrocephalus or brainstem compression on CT
- The tectal cisterns are obliterated on CT (risk of brain stem compression)

SUPRATENTORIAL HAEMORRHAGE

Trial data does not support routine surgical evacuation but a sub-group analysis of the STICH trial suggests a possible benefit for evacuating superficial cortical haemorrhages in selected cases.

Any patient with impaired conscious level should always be discussed with the neurosurgical team (unless deemed clearly unsuitable for any intervention). Selected cases may be considered for surgery especially lobar rather than deep haemorrhages. Discussions with a neurosurgeon should occur on an individual patient basis. Especially in case of:

- Progressive neurologic deterioration
- Hydrocephalus
- Appearance on plain CT suggesting structural underlying cause such as:
    - Subarachnoid component of the haemorrhage
    - Intraventricular haemorrhage
    - Abnormal calcification
    - Prominent vascular structures
    - Site of haemorrhage (e.g. temporal or close to Sylvian fissure)

Surgery would **NOT** normally be considered in the case of:

- Mild neurological deficits
- Small volume supratentorial haemorrhage
- Brain stem haemorrhage
- Pupils fixed and dilated
- GCS < 4 (except in case of cerebellar haemorrhage, when surgery is still considered)

SUBARACHNOID AND INTRAVENTRICULAR HAEMORRHAGES (IVH)

All subarachnoid haemorrhages must be referred to neurosurgery. Intraventricular haemorrhages must be referred immediately, in case of hydrocephalus or an underlying aneurysm or arteriovenous malformation (AVM) as cause of IVH.

SECONDARY PREVENTION OF STROKE AND TIA

There is little or no distinction made between the secondary prevention of acute ischaemic stroke and transient ischaemic attacks (TIA). This section details the interventions taken to prevent recurrent strokes and TIAs following the initial treatment of the acute phase as detailed above.

ANTIPLATELET THERAPY

Patients with an acute ischaemic stroke or TIA and without atrial fibrillation should be commenced on lifelong antiplatelet therapy for the long term prevention of further strokes. Clopidogrel is likely at least as efficacious as aspirin/dipyridamole combination therapy.

The following combination is recommended in order of effectiveness:

1. Clopidogrel 75 mg daily
2. Aspirin 75 mg daily + Dipyridamole MR 200mg twice daily
3. Aspirin 75mg daily
4. Dipyridamole MR 200mg twice daily

Aspirin in combination with clopidogrel is **not** recommended in patients for secondary prevention of ischaemic stroke if this is the sole pathology but has a potential indication in those with concurrent cardiac disease such as a recent myocardial event or cardiac stent.

Patients with haemorrhagic transformation of an infarct should generally be treated with antiplatelets.

ANTICOAGULANTS

Anticoagulation with warfarin or non-vitamin K oral anticoagulants (or DOACs) should be considered in all patients (once haemorrhage is excluded on imaging) with acute ischaemic stroke and atrial fibrillation (paroxysmal, permanent or persistent).

Anticoagulation is usually started two weeks after a disabling ischaemic stroke and continued for life unless there are compelling contraindications. A solitary fall would not normally be considered a compelling contraindication for example. Aspirin 300mg should be used in the interim.

In non-disabling stroke anticoagulation should be commenced at a time at the discretion of the clinician but certainly no later than 14 days. **In TIA, anticoagulation should be started immediately** once brain imaging has excluded haemorrhage.

ANTI-HYPERTENSIVE TREATMENT

To reduce the risk of recurrent stroke, treatment should be initiated and/or increased to achieve a **systolic blood pressure of 130mmHg**. Unless there is severe hypertension, an intracerebral haemorrhage, or a need for rapid control to facilitate thrombolysis; blood pressure-lowering treatment for people with stroke or TIA should be initiated prior to discharge from hospital or at 2 weeks, whichever is the soonest, or at the first clinic visit for people not admitted.

In the case of severe bilateral carotid artery stenosis a more modest target BP of 140-150mmHg is recommended.

For people with stroke or TIA aged 55 or over, or of African or Caribbean origin at any age, antihypertensive treatment should be initiated with a long-acting dihydropyridine calcium channel blocker or a thiazide-like diuretic. If target blood pressure is not achieved, an angiotensin converting enzyme inhibitor or angiotensin II receptor blocker should be added.

For people with stroke or TIA not of African or Caribbean origin and younger than 55 years, antihypertensive treatment should be initiated with an angiotensin converting enzyme inhibitor or an angiotensin II receptor blocker.

CHOLESTEROL TREATMENT

People with ischaemic stroke or TIA should be offered treatment with a statin drug unless contraindicated. Treatment should:

- Begin with a high intensity statin such as **atorvastatin 20-80mg daily**;
- Then try an alternative statin at the maximum tolerated dose if a high intensity statin is unsuitable or not tolerated;
- Aim for a greater than 40% reduction in non-HDL cholesterol.

If this is not achieved within 3 months, the prescriber should:

- Discuss adherence and timing of dose;
- Optimise dietary and lifestyle measures;
- Consider increasing to a higher dose if this was not prescribed from the outset.

People with ischaemic stroke or TIA should not be prescribed fibrates, bile acid sequestrants, nicotinic acid or omega-3 fatty acid compounds for secondary vascular prevention. Ezetimibe should be used only in people who also have familial hypercholesterolaemia.

People with **primary intracerebral haemorrhage should avoid statin treatment** unless it is required for other indications.

CARDIAC DISEASE AND ACUTE ISCHAEMIC STROKE

The main concerns in acute ischaemic stroke from a cardiac perspective are rhythm disturbances, specifically atrial fibrillation (paroxysmal or permanent), and also structural or valvular problems that could act as an embolic source.

Atrial fibrillation is an important and treatable cause of ischaemic stroke so it is important to consider investigations especially in patients over 50 years of age or those with known heart disease.

PAROXYSMAL ATRIAL FIBRILLATION

People with ischaemic stroke or TIA who would be eligible for secondary prevention treatment for atrial fibrillation (anticoagulation or left atrial appendage device closure) should undergo a period of prolonged (at least 12 hours) cardiac monitoring.

People with ischaemic stroke or TIA who would be eligible for secondary prevention treatment for atrial fibrillation and in whom no other cause of stroke has been found should be considered for more prolonged ECG monitoring (24 hours or longer), particularly if they have a pattern of cerebral ischaemia on brain imaging suggestive of cardioembolism.

Patients with **multiple stroke events in more than one territory** and therefore a high clinical suspicion of an embolic event consideration should be given to a longer monitoring device such as an **implantable REVEAL device** if initial investigations are normal. The duration of paroxysmal AF which is considered significant is unclear but most studies have used a threshold of 30 seconds or more as significant.

ECHOCARDIOGRAPHY IN STROKE

Transthoracic echocardiography (TTE) should be considered in patients with acute ischaemic stroke only if a cardio embolic focus is suspected. In patients with a solitary stroke event and clear other aetiology, usually no cardiac imaging is needed.

People with stroke or TIA should be investigated with **transthoracic echocardiography** if the detection of a structural cardiac abnormality would prompt a change of management and if they have:

- Clinical or ECG findings suggestive of structural cardiac disease that would require assessment in its own right, or
- Unexplained stroke or TIA, especially if other brain imaging features suggestive of cardioembolism are present.

PATENT FORAMEN OVALE

Closure of a patent foramen ovale (PFO) remains an uncertain area with further research trials still pending. Whilst awaiting further evidence, there may be circumstances in which device closure

may be a reasonable option. In these cases, the decision should be made by a multi-disciplinary team (MDT), including a cardiologist, and the patient should be provided with unbiased information on which to judge the balance of risk and benefit.

People with ischaemic stroke or TIA and a patent foramen ovale should receive optimal secondary prevention, including antiplatelet therapy, blood pressure treatment, lipid lowering therapy and lifestyle modification. Anticoagulation is not recommended unless there is another recognised indication.

People with stroke or TIA and patent foramen ovale should not be routinely offered device closure except in the context of a clinical trial or prospective register.

CAROTID ARTERY DISEASE

In stroke patients with carotid territory strokes who have made a good or complete recovery and are candidates for carotid endarterectomy should have carotid imaging with ultrasound.

Patients with a symptomatic carotid stenosis of 50%-99% by NASCET criteria on imaging should have confirmatory imaging using a second modality urgently. Patients with carotid disease less than 50% by NASCET criteria should not be offered carotid intervention.

Carotid endarterectomy for people with symptomatic carotid stenosis should be:

- The treatment of choice, particularly for people who are 70 years of age and over or for whom the intervention is planned within seven days of stroke or TIA;
- Performed in people who are neurologically stable and who are fit for surgery using either local or general anaesthetic according to the person's preference;
- Performed as soon as possible and within 1 week of first presentation;
- Deferred for 72 hours in people treated with intravenous thrombolysis.

Carotid angioplasty and stenting should be considered for people with symptomatic carotid stenosis who are:

- Unsuitable for open surgery (e.g. high carotid bifurcation, symptomatic re-stenosis following endarterectomy, radiotherapy-associated carotid stenosis);
- Less than 70 years of age and who have a preference for carotid artery stenting.

Patients should be reviewed post-operatively by a stroke physician to optimise medical management of secondary prevention and organise follow-up.

VERTEBRAL ARTERY DISEASE

People with ischaemic stroke or TIA and symptomatic vertebral artery stenosis should receive optimal secondary prevention including antiplatelet therapy, blood pressure treatment, lipid lowering therapy and lifestyle modification. Angioplasty and stenting of the vertebral artery should only be offered in the context of a clinical trial.

INTRACRANIAL ARTERY STENOSIS

People with ischaemic stroke or TIA due to severe symptomatic intracranial stenosis should be offered **dual antiplatelet therapy with aspirin and clopidogrel for the first three months** in addition to optimal secondary prevention including blood pressure treatment, lipid-lowering therapy and lifestyle modification. Endovascular or surgical intervention should only be offered in the context of a clinical trial.

ORAL CONTRACEPTION AND HORMONE REPLACEMENT THERAPY (HRT)

Pre-menopausal women with stroke and TIA **should not be offered the combined oral contraceptive pill**. Alternative hormonal (progestogen-only) and non-hormonal contraceptive methods should be considered instead.

Post-menopausal women with ischaemic stroke or TIA who wish to start or continue hormone replacement therapy should receive advice based on the overall balance of risk and benefit, taking account of the woman's preferences. Transdermal treatment may be appropriate in these cases.

Post-menopausal women with ischaemic stroke or TIA should not be offered hormone replacement therapy for secondary vascular prevention.

FABRY DISEASE

Young people with stroke or TIA should be investigated for Fabry disease if they have suggestive clinical features such as acroparesthesias, angiokeratomas, sweating abnormalities, corneal opacities, unexplained renal insufficiency or a family history suggesting the condition.

People with stroke or TIA and a diagnosis of Fabry disease should receive optimal secondary prevention and be referred to specialist genetic and metabolic services for advice on other aspects of care including the provision of enzyme replacement therapy.

ANTIPHOSPHOLIPID SYNDROME

People with ischaemic stroke or TIA in whom other conditions such as atrial fibrillation and large or small vessel atherosclerotic disease have been excluded should be investigated for antiphospholipid syndrome (with IgG and IgM anticardiolipin ELISA and lupus anticoagulant), particularly if the person:

- Is under 50 years of age especially if any of the following apply;
- Has any autoimmune rheumatic disease, particularly systemic lupus erythematosus;
- Has a history of one or more venous thromboses;

- Has a history of recurrent first trimester pregnancy loss or at least one late pregnancy loss (second or third trimester).

People with antiphospholipid syndrome who have an ischaemic stroke or TIA:

- Should be managed acutely in the same way as people without antiphospholipid syndrome;
- Should have decisions on long-term secondary prevention made on an individual basis in conjunction with appropriate specialists including haematology and/or rheumatology.

DISCHARGE AND FOLLOW UP

Stroke patients discharged from the acute hospital usually require ongoing support and follow up from a number of specialties and support agencies.

Patients may be discharged home directly, with or without the support of a stroke specific rehabilitation community team or via Moseley Hall Hospital (Ward 8) following a further period of in-patient rehabilitation if this is required.

STROKE CLINIC FOLLOW-UP

Out-patient follow up may consist of a number of ongoing therapy appointments but will usually at least include a 6 week appointment with a stroke consultant on the acute site and a 6 month appointment with the stroke nurse practitioner.

Please access through the **STROKE NURSE PRACTITIONER (07769 932 342**) for advice and to facilitate ongoing care if this is not already arranged.

Depending on their requirements patients may also be followed up by vascular surgery, neurosurgery and / or neuro-opthalmology.

The latter is particularly relevant in those patients with persistent field defects and / or diplopia especially if they are drivers.

All stroke patients should also receive a Stroke Association pack with contact details for a local support worker who also has access to contacts in housing, social services and in the voluntary sector.

CHOOSING WISELY

The Academy of Medical Royal Colleges is asking its member colleges to promote informed choice through the identification of tests or interventions commonly used in their field, the necessity or practice of which should be questioned or avoided. The Intercollegiate Stroke Working Party provide here a list of interventions of questionable value in stroke (together with alternatives) to promote discussion between healthcare professionals and patients and encourage the selective use of limited resources. For more information visit www.choosingwisely.org

1. **Do not** give heparin (in any dose) for the prevention of DVT and PE in patients who are immobile after acute stroke, and do not attempt to select those patients in whom the risk of VTE is sufficiently high to warrant the use of heparin.
   Do use intermittent pneumatic compression instead.

2. **Do not** treat recurrent TIA in patients in sinus rhythm with anticoagulants.
   Do use antiplatelet treatment and investigate for carotid stenosis and paroxysmal atrial fibrillation before considering unusual causes of TIA or an alternative diagnosis.

3. **Do not** routinely perform echocardiography in people with stroke or TIA.
   Do select those patients in whom an echocardiogram may be appropriate according to a history of structural cardiac disease or abnormal physical or ECG findings.

4. **Do not** routinely use a urinary catheter or continence pads as first line management for people with continence problems after a stroke.
   Do use behavioural interventions such as timed toileting and prompted voiding first.

5. **Do not** routinely offer oral nutritional supplements to patients with acute stroke who are adequately nourished on admission.
   Do assess hydration and risk of malnutrition in patients admitted to hospital with acute stroke

6. **Do not** use overhead arm slings and pulleys in people with stroke who have functional loss in the arm.
   Do ensure careful positioning of the affected arm and that carers and family handle the arm correctly.

7. **Do not** assess driving eligibility with cognitive tests if the person's language impairment would invalidate the results.
   Do refer for an on-road assessment if there is uncertainty about eligibility for driving.

8. **Do not** routinely provide specialist occupational therapy for people who have reached the end of their stroke rehabilitation and are now living in a care home.
   Do offer assessment and activities that might improve quality of life.

9. **Do not** routinely close a patent foramen ovale in a patient with stroke.
   Do offer antiplatelet treatment for the prevention of recurrent stroke.

10. **Do not** use fibrates, ezetimibe, bile acid sequestrants, nicotinic acid or omega-3 fatty acids for cholesterol-lowering after stroke if the patient is unable to tolerate a statin.
    Do try alternative methods to improve the tolerability of a statin such as a reduced dose, alternate day dosing or a lower-intensity statin.

FURTHER READING

NICE Clinical Guidelines (CG68) on Stroke & TIA:
http://www.nice.org.uk/CG68

NICE Technology Appraisal (TA122) of Alteplase in Ischaemic Stroke
http://guidance.nice.org.uk/TA122

NICE Technology Appraisal (TA122) on Vascular Disease - clopidogrel and dipyridamole
http://guidance.nice.org.uk/TA210

RCP Guidelines on Stroke:
http://www.rcplondon.ac.uk/resources/stroke-guidelines

SIGN Guidelines on Stroke & TIA:
http://www.sign.ac.uk/guidelines/fulltext/108/index.html

GLOSSARY

FAST:	Face, Arm, Speech, Time to call 999
GCS:	Glasgow Coma Score
CT:	Computerised Topography
CTA:	Computerised Topography Angiogram
MRI:	Magnetic Resonance Imaging
MRA:	Magnetic Resonance Angiogram
NIHSS:	National Institute for Health Stroke Scale
DWI:	Diffusion Weighted Imaging
NASCET:	North American Symptomatic Carotid Endarterectomy Trial
IA:	Intra-arterial
INR:	International Normalised Ratio
ED:	Emergency Department
MCA:	Middle Cerebral Artery