STROKE MANAGEMENT IN GENERAL PRACTICE

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Update on Transient Ischaemic Attack and Ischaemic Stroke
What is a stroke?

- A clinical syndrome characterized by an **acute loss of focal brain function lasting more than 24 hours or leading to (earlier) death**

- **Ischemic stroke/cerebral infarction** (death of brain tissue) - due to inadequate blood supply to apart of the brain as a result of low blood flow, thrombosis or embolism associated with diseases of the blood vessels, heart or blood

- **Haemorrhagic stroke** (primary intracerebral haemorrhage or subarachnoid haemorrhage) - due to either spontaneous haemorrhage into or over the brain substance
Key symptoms of stroke

Sudden onset of one or more of:

- Weakness or numbness in face, arm or leg, especially on one side of the body;
- Difficulty speaking or understanding;
- Loss of balance or coordination such as difficulty walking.

Risk factors for stroke

- High blood pressure;
- Previous stroke or TIA, or a family history of stroke;
- Atrial fibrillation (irregular heart rhythm);
- High blood cholesterol;
- Diabetes;
- Smoking;
- Advancing age;
- Unhealthy diet.
What is a Transient Ischaemic Attack (TIA)?

• Traditional definition - a *sudden, focal neurological deficit of presumed vascular origin lasting <24 hours.*

• *Reversible ischemic neurological deficit (RIND)* - events lasting 24 hours to 7 days. (obsolete)

• 1970 - events lasting 24 hours to 7 days were associated with infarction

• 2002: Time-based definition → tissue-based, because many ischemic episodes with symptoms lasting <24 hours also are associated with new infarction in high-resolution CT and especially diffusion-weighted MRI studies.
New Definitions

• A brief episode of neurological dysfunction caused by focal brain or retinal ischemia, with clinical symptoms typically lasting less than one hour, and without evidence of acute infarction.

Arguments in Favor of the New Definition

• The classic 24-hour definition is misleading in that many patients with transient <24-hour events actually have associated cerebral infarction.

AHA-Endorsed Revised Definition of TIA

• A transient episode of neurological dysfunction caused by focal brain, spinal cord, or retinal ischemia, without acute infarction.
New Definitions

- **Ischemic stroke** - an infarction of central nervous system tissue.

- **Symptomatic ischemic strokes** are manifest by clinical signs of focal or global cerebral, spinal, or retinal dysfunction caused by central nervous system infarction.

- **A silent stroke** is a documented central nervous system infarction that was asymptomatic.
TIA MANAGEMENT
## Grade a TIA – ABCD^2

<table>
<thead>
<tr>
<th>ABCD</th>
<th>RISK FACTOR</th>
<th>SCORE</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>Age below 60</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Age 60 or above</td>
<td>1</td>
</tr>
<tr>
<td>BLOOD</td>
<td>Systolic BP above 140 mmHg, and/or diastolic BP 90 mmHg or higher</td>
<td>1</td>
</tr>
<tr>
<td>PRESSURE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CLINICAL</td>
<td>One-sided weakness of face, arm, hand or leg</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Speech disturbance without weakness</td>
<td>1</td>
</tr>
<tr>
<td>DURATION</td>
<td>Symptoms lasted more than 60 minute</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Symptoms lasted 10 to 60 minutes</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Symptoms lasted less than 10 minutes</td>
<td>0</td>
</tr>
<tr>
<td>DIABETES</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
ABCD² Score

- 6 to 7 points = **HIGH** risk (21% of pts 8.1% two day risk)

- 4 to 5 points = **Moderate** risk (45% of pts 4.1% two day risk)

- 0 to 3 points = **Low** risk (34% two day risk)
Suspected TIA

Neurological symptoms fully resolved

Is history compatible with TIA?

Yes

Start Aspirin 300 mg and consider the following:
- Statins
- BP control
- Lifestyle changes

Assess risk of stroke using ABCD² score

ABCD² ≥ 4

ABCD² < 4

Specialist assessment within 1 week

No

Consider alternative diagnosis

Specialist assessment within 24 hours

ABCD² ≥ 4

Best medical treatment (control of BP, antiplatelets and cholesterol lowering through diet, drugs and smoking cessation)

STROKE
Stroke

Diagnosis and initial management of acute stroke and transient ischaemic attack (TIA)
- Assess risk of subsequent stroke as soon as possible using a validated scoring system such as ABCD².

High risk of stroke:
- ABCD² score of 4 or more
- People with crescendo TIA

Specialist assessment within 24 hours of symptom onset, including decision on brain imaging

If vascular territory or pathology is uncertain, refer for urgent brain imaging

Lower risk of stroke:
- ABCD² score of 3 or below
- Presenting more than 1 week after symptoms have resolved

Specialist assessment within 1 week of symptom onset, including decision on brain imaging

If vascular territory or pathology is uncertain, refer for brain imaging

- Use diffusion-weighted MRI for brain imaging, except where contraindicated. For these people use CT scanning.
Brain Imaging

CT is expected to be normal because

• transient ischemia; or
• too small to see on CT; or
• not ischemia.

MRI is more likely than CT to be helpful because

• it shows a small stroke that was negative on CT; or
• it shows a vascular lesion (small vessel disease, old stroke, arterial stenosis, etc.); or
• it shows some other explanation of the transient event (subdural hematoma, tumor, etc.).
Decide whether this is more likely a TIA or something else

- Other tests might be done to exclude non-TIA diagnoses if they are suspected.

- Electrocardiogram (EKG/ECG) – to rule out AF, that was a likely cause of a cardioembolic TIA.

- Measurement of blood sugar - hypoglycemia

- Measurement of other electrolytes - electrolyte abnormalities
Management

• *Observe the patient for 24 hours.*
• Start daily *antiplatelets.*
• MRI to evaluate for new and old stroke.
• Carotid ultrasound and transcranial Doppler ultrasound (TCD), MRA of neck and brain, or CT angiogram of neck and brain to look for *arterial stenosis.*
• EKG/ECG, and consider EKG telemetry.
• *Cardiovascular risk-factor:* evaluation of BP, lipids, and FBS.
• Consider echocardiogram for evaluation of cardioembolic source.
• Educate the patient about:
  – stroke risk factors including smoking, exercise, weight loss, alcohol;
  – specific medications prescribed for prevention;
  – recurrent symptoms to look for; and
  – calling emergency services for acute stroke symptoms.
• Discharge with established follow-up plans.
Risk of stroke after TIA

Independent predictors

- TIAs of the brain (compared with TIAs of the eye)
- increasing age
- increasing number of TIAs in the previous 3 months
- peripheral vascular disease
- carotid stenosis >70%

- About 5% in the first month
- 12% in the first year
- 30% over 5 years (i.e. about 6-7% per year)
- Risk of a coronary event after a TIA - about 3% per year.
ACUTE STROKE MANAGEMENT
Rapid recognition of symptoms and diagnosis

- Outside hospital, use a validated tool such as FAST (Face Arm Speech Test) to screen for a diagnosis of stroke or TIA in people with sudden onset of neurological symptoms.

- Exclude hypoglycaemia as the cause of sudden-onset neurological symptoms.

- In A&E, establish the diagnosis rapidly using a validated tool such as ROSIER (Recognition of Stroke in the Emergency Room).
Suspected Stroke

Use FAST to screen for diagnosis of stroke

Exclude hypoglycaemia and stroke mimics

Establish diagnosis rapidly (ROSIER)

Assessment for brain scanning

Pre-hospital/Emergency care

Admit to hospital for specialist monitoring and treatment

Ischaemic Stroke

Give aspirin unless contraindicated

Control: hydration, T°, BP, blood sugar, maintain O₂ levels only if drops <85%

Haemorrhagic Stroke

Control: hydration, T°, BP, blood sugar, maintain O₂ levels only if drops <85%

Surgical referral

Negative screen

Consider alternative diagnosis (stroke remains a possible diagnosis)

Positive screen
Suspect a stroke? Act FAST and call 999.

FAST

Facial weakness  Arm weakness  Speech problems  Time to call 999
The Face, Arm, Speech Test (FAST) can help you recognise the symptoms of a stroke

FAST

**Facial weakness**
Can the person smile? Has their mouth or eye drooped?

**Arm weakness**
Can the person raise both arms?

**Speech problems**
Can the person speak clearly and understand what you say?

**Time**
To call 999

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**What are the symptoms of stroke?**

- Sudden weakness or numbness of the face, arm or leg on one side of the body
- Sudden loss or blurring of vision, in one or both eyes
- Sudden difficulty speaking or understanding spoken language
- Sudden confusion
- Sudden or severe headache with no apparent cause
- Dizziness, unsteadiness or a sudden fall, especially with any of the other signs

**Why act FAST?**

Stroke is a medical emergency. By calling 999, you can help someone reach hospital quickly and receive the early treatment they need. Prompt action can prevent further damage to the brain and help someone make a full recovery. Delay can result in death or major long-term disabilities, such as paralysis, severe memory loss and communication problems. Ambulance crews use FAST and with hospital staff can act fast to identify and diagnose a stroke quickly.
STROKE IS AN EMERGENCY!
LEARN TO RECOGNISE STROKE SYMPTOMS –

FAST!

FACE WEAKNESS  ARM WEAKNESS  SPEECH PROBLEM  TIME

One side of your face is weak or paralysed
Your arm feels numb or weak
Your speech is slurred or does not make sense

FAST! Assessment
The more Time you waste, the more Brain you waste.
CINCINNATI PREHOSPITAL STROKE SCALE

Facial Droop
• Normal: Both sides of face move equally
• Abnormal: One side of face does not move at all

Arm Drift
• Normal: Both arms move equally or not at all
• Abnormal: One arm drifts compared to the other

Speech
• Normal: Patient uses correct words with no slurring
• Abnormal: Slurred or inappropriate words or mute
Facial Droop
Arm Drift
Recognition of Stroke in the Emergency Room
Rosier

Date/time of symptom onset

Has there been loss of consciousness or syncope?
Y(-1) ☐ N(0) ☐

Has there been seizure activity?
Y(-1) ☐ N(0) ☐

Is there a NEW ACUTE onset or on awakening from sleep

Asymmetric facial weakness Y(1) ☐ N(0) ☐
Asymmetric arm weakness Y(1) ☐ N(0) ☐
Asymmetric leg weakness Y(1) ☐ N(0) ☐
Speech disturbance Y(1) ☐ N(0) ☐
Visual field defect Y(1) ☐ N(0) ☐

**Total Score ____ (-2 to +6)

**Refer to stroke team if total score is 1 or more.
**ROSIER STROKE SCALE** The aim of this assessment tool is to enable medical and nursing staff to differentiate patients with stroke and stroke mimics.

Has there been loss of consciousness or syncope  Yes (-1) □ No (0) □
Has there been seizure activity Yes (-1) □ No (0) □

**Is there a New Acute onset (or on awakening from sleep)**

Asymmetric Facial Weakness  Yes (+1) □ No (0) □
Asymmetric Arm Weakness  Yes (+1) □ No (0) □
Asymmetric Leg Weakness Yes (+1) □ No (0) □
Speech Disturbance Yes (+1) □ No (0) □
Visual Field Defect Yes (+1) □ No (0) □

Total score = ________ (-2 to +5)

Stroke likely if total scores > 0.
If total score 0, -1 or -2 low probability of stroke but not completely excluded, needs further medical review.
# What is the lesion? Hemorrhagic vs. Ischemic Stroke

<table>
<thead>
<tr>
<th>Feature</th>
<th>Hemorrhagic</th>
<th>Ischaemic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension</td>
<td>usually present</td>
<td>often present</td>
</tr>
<tr>
<td>Preceding TIA</td>
<td>no</td>
<td>30% of cases</td>
</tr>
<tr>
<td>Onset</td>
<td>often with activity</td>
<td>often at night or no activity</td>
</tr>
<tr>
<td>Course</td>
<td>rapidly progressive</td>
<td>static (rarely stepwise)</td>
</tr>
<tr>
<td>Increased ICP</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>CT scan</td>
<td>shows blood</td>
<td>normal or changes of infarction</td>
</tr>
</tbody>
</table>

CT (or MRI) is the only reliable way to rule out hemorrhage
Differentiating Haemorrhagic and Ischaemic Stroke

No clinical scoring system (Siraj, Guy’s, others) reliably distinguishes between haemorrhagic stroke and ischaemic stroke, so imaging is essential.

- Rapid deterioration
- Headache
- Vomiting

Suggest haemorrhagic stroke, although all can be seen in patients with ischaemia.
Chart comparing features of transient ischemic attack (TIA), ischemic stroke, intracerebral hemorrhage (ICH), subarachnoid hemorrhage (SAH)

<table>
<thead>
<tr>
<th></th>
<th>TIA</th>
<th>Ischemic stroke</th>
<th>ICH</th>
<th>SAH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decreased LOC</td>
<td>Uncommon in history, absent after minutes</td>
<td>Possible, but uncommon</td>
<td>Common (50%)</td>
<td>Common if large</td>
</tr>
<tr>
<td>Headache</td>
<td>Usually absent</td>
<td>10%, especially with arterial dissection</td>
<td>Common (40%)</td>
<td>Universal, unless patient unconscious</td>
</tr>
<tr>
<td>Focal symptoms and signs</td>
<td>Absent after minutes</td>
<td>Almost always</td>
<td>Very common</td>
<td>Common if large</td>
</tr>
<tr>
<td>Seizures</td>
<td>Absent</td>
<td>Uncommon</td>
<td>6–7%</td>
<td>10–25%</td>
</tr>
<tr>
<td>Nausea/vomiting</td>
<td>Absent</td>
<td>Uncommon</td>
<td>40–50%</td>
<td>Common</td>
</tr>
<tr>
<td>Head CT</td>
<td>Normal</td>
<td>Normal in first few hours, then hypodense regions</td>
<td>Blood in parenchyma</td>
<td>Blood in subarachnoid space</td>
</tr>
</tbody>
</table>
Immediate Evaluation

• Stabilization of the ABCs.

• Patients with stroke should have a careful clinical assessment, including history, physical examination, especially brief and thorough neurological examination in a timely fashion.

• Diagnostic tests
### Guidelines for Emergency Management of patients with Suspected Stroke

<table>
<thead>
<tr>
<th>Recommended</th>
<th>Not Recommended</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manage ABCs</td>
<td>Dextrose-containing fluids in non-hypoglycemic patients</td>
</tr>
<tr>
<td>Cardiac monitoring</td>
<td>Hypotension/excessive BP reduction</td>
</tr>
<tr>
<td>Intravenous access</td>
<td>Excessive intravenous fluids</td>
</tr>
<tr>
<td>Oxygen (as required O\textsubscript{2} saturation 92%)</td>
<td></td>
</tr>
<tr>
<td>Assess for hypoglycemia</td>
<td></td>
</tr>
<tr>
<td>Nil per os (NPO)</td>
<td></td>
</tr>
<tr>
<td>Rapid transport to closest appropriate facility capable of treating acute stroke</td>
<td></td>
</tr>
</tbody>
</table>
Stroke Mimics and Clinical Features

- **Conversion disorder**
  Lack of cranial nerve findings, neurological findings in a nonvascular distribution, inconsistent examination

- **HTN encephalopathy**
  Headache, delirium, significant hypertension, cerebral oedema

- **Hypoglycemia**
  History of diabetes, serum glucose low, decreased level of consciousness

- **Complicated migraine**
  History of similar events, preceding aura, headache

- **Seizures**
  History of seizures, witnessed seizure activity, postictal period
What are the most frequent mimics of stroke?

From 7 studies*, in order of frequency:

Seizure
Sepsis
Syncope
Migraine
Functional
Toxic/Metabolic
Brain tumours
Vestibulopathy
Neuropathies (mono- and radiculo- combined)
Delirium (not explained by above)

Recommended emergency diagnostic tests

All patients:
• *Serum glucose*
• Full blood count
• *Serum electrolytes* and renal function tests
• Coagulations studies (PT, INR, APTT)
• *Electrocardiogram*
• Cardiac enzymes
• *Non-contrast CT of head*

Selected patients:
• Pregnancy test
• Liver-function tests
• Blood alcohol concentration
• Urine or serum toxicology screen
• Arterial blood gas
• Chest radiograph
• Lumbar puncture
Neuroimaging for early diagnosis

- Imaging of the brain is recommended before initiating any specific therapy (Class I, Level of Evidence A).
- Emergency non-contrast CT head identifies haemorrhage and can help distinguish non-vascular causes such as tumour.
- CT can identify subtle signs of early ischaemia or arterial occlusion.
- Loss of grey-white differentiation, especially in the insular ribbon or lentiform nucleus, and hemispheric sulcal effacement can be detected within 6 h of ischaemia.
- A clearly visible hypodensity on CT is rarely seen within 3 h of onset of stroke.
CT brain scan showing a right hemisphere total *anterior circulation infarct* (A) at *four hours*, and (B) at *five days* after symptom onset. Note on (A) the *subtle signs of early infarction*: loss of the basal ganglia on the right (white arrow—compare with the left where the caudate and lentiform nuclei are clearly visible), loss of the grey/white matter cortical differentiation (black arrowheads), a little swelling with sulcal effacement (black arrow and compare left side). On day 5 there is obvious hypodensity and massive infarct swelling with midline shift and obstruction of the left lateral ventricle.
Acute CT at six hours showing “dense MCA [middle cerebral artery] sign.”

CT scan showing complete left middle cerebral artery territory infarction, three days after the event.
Stroke

Diagnosis and initial management of acute stroke and transient ischaemic attack (TIA)
Emergency treatment for acute stroke

Acute stroke confirmed

Indications for immediate brain imaging

Immediate imaging

Indications for thrombolysis

Thrombolysis with alteplase

Admit to specialist acute stroke unit

No indications for immediate brain imaging

Imaging as soon as possible (within 24 hours)

Early mobilisation following assessment

Screen swallowing before giving any oral food, fluid or medication

Give aspirin 300 mg unless contraindicated

Screen for malnutrition using validated tool, e.g. MUST
Pre-hospital Management

Stroke Chain of Survival

• **Detection**  Recognition of stroke signs and symptoms

• **Dispatch Call**  Call ? and priority EMS dispatch

• **Delivery**  Prompt transport and pre-hospital notification to hospital

• **Door**  Immediate ED triage

• **Data**  ED evaluation, prompt laboratory studies, & CT imaging

• **Decision**  Diagnosis and decision about appropriate therapy

• **Drug**  Administration of appropriate drugs or other interventions
Criteria for admission to hospital versus initial management in the community

Admit immediately for:

• investigation to reach definitive diagnosis
• acute/rehabilitation care to optimize recovery
• immediate support of activities of daily living

Avoid or defer admission only if

• progressive advanced debility (cancer, dementia) and existing nursing support is adequate or
• extremely mild symptoms and rapid outpatient assessment is certain

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General Medical Care

• Airway, ventilatory support, and supplemental $O_2$
• Body Temperature
• Cardiac monitoring and treatment
• Arterial hypertension and hypotension
• Hypoglycemia and hyperglycemia
• Fluid and Electrolytes
Arterial Hypertension

• A **cautious approach** to the treatment of arterial hypertension should be recommended (Class I, Level of Evidence C).

• **Urgent antihypertensive therapy** for patients who also have hypertensive encephalopathy, aortic dissection, acute renal failure, acute pulmonary edema, or acute myocardial infarction.

• **Theoretical reasons for lowering BP:** Reducing the formation of brain edema, lessening the risk of hemorrhagic transformation of the infarction, preventing further vascular damage, and forestalling early recurrent stroke.

• Patients with markedly elevated BP may have to lower BP by ≈15% during the first 24 hours after onset of stroke.
Arterial Hypertension

• Medications should be withheld unless the SBP is >220 mm Hg or the mean BP is >120 mm Hg (Class I, Level of Evidence C).

• No data are available to guide selection of medications for the lowering of BP. (Class IIa, Level of Evidence C).

• Initiation of antihypertensive therapy within 24 hours of stroke is relatively safe.

• Generally, antihypertensive medications should be restarted at ≈24 hours for patients who have preexisting hypertension and are neurologically stable unless a specific contraindication to restarting treatment is known (Class IIa, Level of Evidence B).
# Approach to hypertension in acute ischaemic stroke

## Patients ineligible for thrombolysis

<table>
<thead>
<tr>
<th>BP (mm Hg)</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBP ≤ 220 or DBP ≤ 120</td>
<td>Observation</td>
</tr>
<tr>
<td>SBP &gt; 220 or DBP 121–140</td>
<td>Captopril (PO or IM)</td>
</tr>
<tr>
<td></td>
<td>Labetalol (IV)</td>
</tr>
<tr>
<td></td>
<td>Nicardipine infusion</td>
</tr>
<tr>
<td>DBP &gt; 140</td>
<td>Nitroprusside infusion*</td>
</tr>
</tbody>
</table>

*(5 mg/h, titrate up by 0.25 mg/h at 5- to 15-minute intervals, maximum dose 15 mg/h; when desired BP attained, reduce to 3 mg/h)*
Blood Glucose

• **Persistent hyperglycemia (>140 mg/dL)** during the **first 24 hours** after stroke is associated with **poor outcomes**, and thus it should be treated.

• Serum glucose concentrations (**possibly >140 to 185 mg/dL**) probably should trigger administration of **insulin** (Class IIa, Level of Evidence C).

• Close monitoring of glucose concentrations with adjustment of insulin doses **to avoid hypoglycemia** is recommended.
Fluid and Electrolytes

• Fluid and electrolyte status should be closely monitored and corrected to avoid plasma volume contraction, raised haematocrit, and impairment of rheologic properties of the blood.

• Hypotonic solutions (Na Cl 0.45% or glucose 5%) are contraindicated due to the risk of brain oedema, increase consequent to reduction of plasma osmolality.
Specific treatment for Acute Ischaemic Stroke

(a) Recannalizing Therapy
   - Thrombolysis
   - Defibrinogating Enzymes

(b) Antithrombotic Therapy
   - Antiplatelets
   - Anticoagulants

(c) Haemodilution

(d) Neuroprotectants
Antiplatelet Agents

• The oral administration of **aspirin** (initial dose is 325 mg) **within 24 to 48 hours** after stroke onset is recommended for treatment of most patients (Class I, Level of Evidence A).

• The administration of **clopidogrel** alone or in combination with aspirin is not recommended for the treatment of acute ischemic stroke (Class III, Level of Evidence C).

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Anticoagulants

• **Urgent anticoagulation** with the goal of preventing early recurrent stroke, halting neurological worsening, or improving outcomes after acute ischemic stroke is not recommended for treatment of patients with acute ischemic stroke (Class III, Level of Evidence A).

• Urgent anticoagulation is not recommended for patients with moderate to severe strokes because of an increased risk of serious intracranial hemorrhagic complications (Class III, Level of Evidence A).
Neuroprotective Agents

• At present, no intervention with putative neuro-protective actions has been established as effective in improving outcomes after stroke, and therefore none currently can be recommended (Class III, Level of Evidence A).

• Improved functional outcome for patients treated with *Cerebrolysin* within 12 – 24 hrs.

• Positive effects of *Cerebrolysin* on motor function and activities of daily living, improvement of cognitive function after the stroke in a recently completed randomized controlled study.

• Try to confirm a potent anti-ischaemic effect in current larger on-going trials in Asian countries.
General Acute Treatment after hospitalization

- General Care
- Nutrition and hydration
- Infections
- Deep vein thrombosis and pulmonary embolism
- Other care
Treatment of Acute Neurological Complications

- Ischaemic brain swelling
- Haemorrhagic transformation
- Electrolytes imbalance
- Seizures
Initial management of Brain swelling

• Restriction of *free water* to avoid hypo-osmolar fluid that may worsen oedema.
• To correct hypoxemia, hypercarbia, and hyperthermia
• To elevate the head of the bed at 20° to 30°
• To avoid antihypertensive agents particularly those that include cerebral vasodilatation
Ischemic Brain Swelling

- Decompressive surgical evacuation of a space occupying cerebellar infarction is a potentially lifesaving measure, and clinical recovery may be very good (Class I, Level of Evidence B).

- Unproven aggressive medical measures, including osmotherapy, have been recommended for treatment of deteriorating patients with malignant brain edema after large cerebral infarction (Class IIa, Level of Evidence C).

- Hyperventilation is a short-lived intervention.

- Corticosteroids are not recommended for treatment of cerebral edema and increased intracranial pressure complicating ischemic stroke (Class III, Level of Evidence A).
Seizures

• Seizures usually occur in the first 24 h and are partial with or without secondary generalisation.

• **AEDs** are recommended if a patient has *suspected* or *witnessed* seizures.

• **Recurrent seizures** after stroke should be treated in a manner similar to other acute neurological conditions (Class I, Level of Evidence B).

• **Prophylactic** administration of **anticonvulsants** to patients with stroke but who have not had seizures is not recommended (Class III, Level of Evidence C).
Role of the GP in managing stroke patients at home

• Nursing care
• Physiotherapy, occupational therapy and speech therapy
• Social support
• Preventing further stroke for controlling risk factors
  – Stop smoking
  – Avoid alcohol excess
  – Control diabetes
  – Encourage exercise
  – Lower cholesterol
    • if scheme heart disease is present
    • if age < 75
    • if cholesterol x 10 (mmol/L) > age (y)
Aggressive strategy for controlling risk factors

• Stop smoking
• Consider nicotine patch
• Take caution with zyban since stroke increases seizure risk
• Avoid alcohol excess
• Control diabetes
• Consider insulin for poorly controlled type II diabetes
• Encourage exercise
• Enroll in exercise classes, e.g. cardiac rehabilitation, etc.
• Lower cholesterol
• Use a statin, aim for cholesterol < 5 mmol/L and HDL ratio < 4.0
• Consider second-line antiplatelet drug, possibly unusual antiplatelet combination(s)
Recommendations for Antiplatelet Therapy

**Class I Recommendations**

1. For patients with noncardioembolic ischemic stroke or TIA, *antiplatelet agents* rather than oral anticoagulation are recommended to reduce the risk of recurrent stroke and other cardiovascular events (*Class I, Level of Evidence A*).

2. **Old recommendation**: Aspirin (50 to 325 mg/d), the combination of aspirin and extended-release dipyridamole, and clopidogrel are all acceptable options for initial therapy (*Class IIa, Level of Evidence A*). **New recommendation**: Aspirin (50 to 325 mg/d) monotherapy, the combination of aspirin and extended-release dipyridamole, and clopidogrel monotherapy are all acceptable options for initial therapy (*Class I, Level of Evidence A*).

*No evidence of beneficial effect on increasing aspirin dose; no single agent or combination as alternative while receiving aspirin.*
3. **Old recommendation**: Compared with aspirin alone, both the combination of aspirin and extended-release dipyridamole and clopidogrel are safe. The combination of aspirin and extended-release dipyridamole is suggested over aspirin alone (*Class IIa, Level of Evidence A*).

**New recommendation**: The combination of aspirin and extended-release dipyridamole is recommended over aspirin alone (*Class I, Level of Evidence B*).

**Class III Recommendation**

- Increased risk of haemorrhage in addition of aspirin to clopidogrel
- Combination therapy not routinely recommended unless there is a specific indication (ie, coronary stent or acute coronary syndrome)
Recommendations for Lipid Management

Class I Recommendations

• Ischemic stroke or TIA patients with elevated cholesterol, comorbid coronary artery disease, or evidence of an atherosclerotic origin should be managed according to NCEP III guidelines, which include lifestyle modification, dietary guidelines, and medication recommendations. (Class I, Level A)

• Statin agents are recommended, and the target goal for cholesterol lowering for those with CHD or symptomatic atherosclerotic disease is an LDL-C level of <100 mg/dL. An LDL-C <70 mg/dL is recommended for very high-risk persons with multiple risk factors. (Class I, Level A)

New Recommendation

• On the basis of the SPARCL trial, administration of statin therapy with intensive lipid-lowering effects is recommended for patients with atherosclerotic ischemic stroke or TIA and without known CHD to reduce the risk of stroke and cardiovascular events. (Class I, Level B)
Thank You