

Clinical Guidelines for Stroke Management

Summary – Emergency Department

This summary is a quick reference to the recommendations in the Clinical Guidelines for Stroke Management most relevant to the emergency department.

The Emergency Department (ED) is often the first point of contact for the stroke patient seeking treatment, and decisions made in the ED need to be based on the best available evidence to achieve the most beneficial outcomes for the patient.

While this summary focuses on specific recommendations, stroke care is the most effective when all members of an interdisciplinary team are involved. For the comprehensive set of recommendations that covers the whole continuum of stroke care, please refer to further information on InformMe <https://informme.org.au/Guidelines/Clinical-Guidelines-for-Stroke-Management>.

The Stroke Foundation in partnership with Cochrane Australia is testing a model of continually reviewing and updating recommendations for the Clinical Guidelines for Stroke Management in response to new evidence on a monthly basis. For changes to recommendations based on new research evidence, please refer to further information on InformMe <https://informme.org.au/Guidelines/Living-guidelines-for-stroke-management>

The Clinical Guidelines uses an internationally recognised guideline development approach called GRADE (Grading of Recommendations Assessment, Development and Evaluation) and an innovative guidelines development and publishing platform known as MAGICapp (MAKING Grade the Irresistible Choice). GRADE ensures a systematic process in developing recommendation, which are based on the balance of benefits and harms, quality of evidence, patient values, and resource considerations. MAGICapp enables transparent display of this process and access to additional practical information for recommendation implementation.

Recommendations

Each recommendation is given a strength based on GRADE. GRADE methodology includes four factors to guide the development of a recommendation and determine the strength of that recommendation.

- The balance between desirable and undesirable consequences
- Confidence in the estimates of effect (quality of evidence)
- Confidence in values and preferences and their variability (clinical and consumer preferences)
- Resource use (cost and implementation considerations).

The GRADE process uses only two categories for the strength of recommendation, based on how confidence the guideline developers are in that the “desirable effects of an intervention outweigh undesirable effect [...] across the range of patients for whom the recommendation is intended” (GRADE Handbook):

- **Strong recommendations:** where guideline developers are certain that the evidence supports a clear balance towards either desirable or undesirable effects; or
- **Weak recommendations:** where guideline developers are not as certain about the balance between desirable and undesirable effects as the evidence base isn't as robust.

These strong or weak recommendations can either be for or against an intervention. If the recommendation is AGAINST an intervention this means it is recommended NOT to do that intervention.

Consensus-based recommendations: statements have been developed based on consensus and expert opinion (guided by any underlying or indirect evidence) for topics where there is either a lack of evidence or insufficient quality of evidence on which to base a recommendation but it was felt that advice should be made.

Practice points: for questions outside the search strategy (i.e. where no systematic literature search was conducted), additional considerations are provided.

Recommendations are presented as at December 2020 with a note if it has changed since the 2017 recommendations and are also presented in Chapter order for easier reference to the relevant section of the full Clinical Guidelines.

For the full list of references, please refer to the individual MAGICapp chapters through InformMe <https://informme.org.au/Guidelines/Clinical-Guidelines-for-Stroke-Management>.

Chapter 1 of 8: Pre-hospital care

Pre-hospital care

Strong recommendation

All stroke patients potentially eligible for reperfusion therapies should have an ambulance dispatched as an immediate response and be managed as a time critical emergency. (Berglund et al 2012)

Strong recommendation

- a. Ambulance services should preferentially transfer suspected stroke patients to a hospital capable of delivering reperfusion therapies as well as stroke unit care. (O'Brien et al 2012)
- b. Ambulance services should pre-notify the hospital of a suspected stroke case where the patient may be eligible for reperfusion therapies. (O'Brien et al 2012)

Info Box

Practice Point

General practitioners are encouraged to educate reception staff in the FAST stroke recognition message and to redirect any calls about suspected acute stroke to 000.

Chapter 2 of 8: Early assessment and diagnosis

Transient ischaemic attack

Strong recommendation

- All patients with suspected transient ischaemic attack (TIA), i.e. focal neurological symptoms due to focal ischaemia that have fully resolved, should have urgent clinical assessment. (Lavalley et al. 2007; Rothwell et al. 2007) (*Refer to the 'Practical Information' section for further useful information*)
- Patients with symptoms that are present or fluctuating at time of initial assessment should be treated as having a stroke and be immediately referred for emergency department and stroke specialist assessment, investigation and reperfusion therapy where appropriate. (Lavalley et al 2007; Rothwell et al. 2007)
- In pre-hospital settings, high risk indicators (e.g. crescendo TIA, current or suspected AF, current use of anticoagulants, carotid stenosis or high ABCD² score) can be used to identify patients for urgent specialist assessment. (Lavalley et al. 2007; Rothwell et al. 2007)

Strong recommendation

When TIA patients present to primary care, the use of TIA electronic decision support, when available, is recommended to improve diagnostic and triage decisions. (Ranta et al. 2015)

Weak recommendation **AGAINST**

In TIA patients, use of the ABCD² risk score in isolation to determine the urgency of investigation may delay recognition of atrial fibrillation and symptomatic carotid stenosis in some patients and should be avoided. (Wardlaw et al. 2015)

Strong recommendation

All TIA patients with anterior circulation symptoms should undergo early carotid imaging with CT angiography (aortic arch to cerebral vertex), carotid Doppler ultrasound or MR angiography. Carotid imaging should preferably be done during the initial assessment but should not be delayed more than 2 days (see [Imaging](#)).

Weak recommendation

Patients with TIA should routinely undergo brain imaging to exclude stroke mimics and intracranial haemorrhage. MRI, when available, is recommended to improve diagnostic accuracy (see [Imaging](#)).

Strong recommendation

Patients with suspected TIA should commence secondary prevention therapy urgently (see [Secondary Prevention](#)).

Strong recommendation

- All patients with TIA should be investigated for atrial fibrillation with ECG during initial assessment and referred for possible prolonged cardiac monitoring as required (see [Cardiac Investigations](#)).
- TIA patients with atrial fibrillation should commence anticoagulation therapy early after brain imaging has excluded haemorrhage, unless contraindicated (see [Anticoagulant therapy](#) in [Secondary Prevention](#)).

Practice statement

Consensus-based recommendations

- All patients and their family/carers should receive information about TIA, screening for diabetes, tailored advice on lifestyle modification strategies (smoking cessation, exercise, diabetes optimisation if relevant – see [Secondary prevention](#)), return to driving (see [Driving](#) in [Community participation and long-term care](#)) and the recognition of signs of stroke and when to seek emergency care.
- All health services should develop and use a local TIA pathway covering primary care, emergency and stroke specialist teams to ensure patients with suspected TIA are managed as rapidly and comprehensively as possible within locally available resources.

Assessment of suspected stroke

Strong recommendation

All suspected stroke patients who have been pre-notified to the stroke or ED team, and who may be candidates for reperfusion therapy, should be met at arrival and assessed by the stroke team or other experienced personnel. (Meretoja et al. 2012; Meretoja et al. 2013)

Weak recommendation

The use of clinical screening tools to identify stroke by ED staff is recommended where an expert stroke team is unable to immediately assess a patient. (Jiang et al. 2014; Whiteley et al. 2011)

Info box

Practice points

- Initial diagnosis should be reviewed by a clinician experienced in the evaluation of stroke.
- Stroke severity should be assessed and recorded on admission by a trained clinician using a validated tool (e.g. NIHSS).
- A blood glucose reading should be taken to improve specificity (hypoglycaemia can present as a 'stroke mimic').

Investigations

Imaging

Brain imaging

Strong recommendation

All patients with suspected stroke who are candidates for reperfusion therapies should undergo brain imaging immediately. All other suspected stroke patients should have an urgent brain CT or MRI ('urgent' being immediately where facilities are available and preferably within 60 minutes). (Brazzelli et al. 2009)

Weak recommendation

In patients with suspected stroke and TIA, MRI is more sensitive and specific than non-contrast CT and is the preferred modality when diagnostic confirmation is required. (Brazzelli et al. 2009)

Practice statement

Consensus-based recommendation

Either CT or MRI are acceptable acute imaging options but these need to be immediately accessible to avoid delaying reperfusion therapies.

Strong recommendation

If using CT to identify hyperdense thrombus, thin slice (< 2 mm) non-contrast CT should be used rather than the standard 5 mm slices to improve diagnostic sensitivity for vessel occlusion. (Mair et al. 2015)

Weak recommendation

CT perfusion imaging may be used in addition to routine imaging to improve diagnostic and prognostic accuracy. (Biesbroek et al. 2012)

Info box

Practice points

- If a patient with stroke develops neurological deterioration, immediate clinical assessment and further brain imaging (CT or MRI) should be considered.
- Routine brain imaging approximately 24 hours after reperfusion therapies have been administered is recommended to identify haemorrhagic transformation and delineate the extent of infarction, both of which are important when making decisions about antithrombotic therapy and DVT prophylaxis.

Imaging

Vascular imaging

Strong recommendation

- All patients who would potentially be candidates for endovascular thrombectomy should have vascular imaging from aortic arch to cerebral vertex (CTA or MRA) to establish the presence of vascular occlusion as a target for thrombectomy and to assess proximal vascular access. (Goyal et al. 2016; Broderick et al. 2013)
- All other patients with carotid territory symptoms who would potentially be candidates for carotid re-vascularisation should have early vascular imaging to identify stenosis in the ipsilateral carotid artery. CT angiography (if not already performed as part of assessment for reperfusion therapies), Doppler ultrasound or contrast-enhanced MR angiography are all reasonable options depending on local experience and availability. (Netuka et al. 2016; Chappell et al. 2009; Nonent et al. 2011; Anzidei et al. 2012)

Info box

Practice points

In ischaemic stroke and TIA patients, routinely imaging the entire vasculature from aortic arch to cerebral vertex with CTA or MRA is encouraged to improve diagnosis, recognition of stroke aetiology and assessment of prognosis.

The administration of intravenous iodinated contrast for CT angiography/perfusion, when clinically indicated, should not be delayed by concerns regarding renal function. Post-hydration with intravenous 0.9% saline is advisable. (RANZCR guidelines 2016; Ang et al. 2015).

Info box

Practice points

Vascular imaging should not be performed for syncope or other non-focal neurological presentations.

Cardiac investigations

Weak recommendation

Initial ECG monitoring should be undertaken for all patients with stroke. The duration and mode of monitoring should be guided by individual patient factors but would generally be recommended for at least the first 24 hours. (Kurka et al. 2015)

Strong recommendation

For patients with embolic stroke of uncertain source, longer term ECG monitoring (external or implantable) should be used. (Afzal et al. 2015)

Weak recommendation

Further cardiac investigations should be performed where clarification of stroke aetiology is required after initial investigations. In patients with ischaemic stroke, echocardiography should be considered based on individual patient factors. Transoesophageal echocardiography is more sensitive for suspected valvular, left atrial and aortic arch pathology. (Holmes et al. 2014)

Chapter 3 of 8: Acute medical and surgical management

Stroke unit care

Strong recommendation

All stroke patients should be admitted to hospital and be treated in a stroke unit with an interdisciplinary team. (Langhorne 2020)

Info box

Practice points

- All stroke patients should be admitted directly to a stroke unit (preferably within three hours of stroke onset).
- For patients with suspected stroke presenting to non-stroke unit hospitals, transfer protocols should be developed and used to guide urgent transfers to the nearest stroke unit hospital.
- Where transfer is not feasible, smaller isolated hospitals should manage stroke services in a manner that adheres as closely as possible to the criteria for stroke unit care. Where possible, stroke patients should receive care in geographically discrete units.

Strong recommendation

All acute stroke services should implement standardised protocols to manage fever, glucose and swallowing difficulties in stroke patients. (Middleton et al. 2011)

Palliative care

Strong recommendation

Stroke patients and their families/carers should have access to specialist palliative care teams as needed and receive care consistent with the principles and philosophies of palliative care. (Gade et al. 2008)

Practice statement

Consensus-based recommendations

- For patients with severe stroke who are deteriorating, a considered assessment of prognosis or imminent death should be made.
- A pathway for stroke palliative care can be used to support stroke patients and their families/carers and improve care for people dying after stroke.

Reperfusion therapy

Thrombolysis

Strong recommendation

For patients with potentially disabling ischaemic stroke within 4.5 hours of onset who meet specific eligibility criteria, intravenous thrombolysis should be administered as early as possible after stroke onset (Wardlaw et al. 2014; Emberson et al. 2014)

Strong recommendation

For patients with potentially disabling ischaemic stroke due to large vessel occlusion who meet specific eligibility criteria, intravenous tenecteplase (0.25mg/kg, maximum of 25mg) or alteplase (0.9mg/kg, maximum of 90mg) should be administered up to 4.5 hours after the time the patient was last known to be well. (Parsons et al 2012; Campbell et al 2018)

Weak recommendation

For patients with potentially disabling ischaemic stroke without large vessel occlusion who meet specific clinical and brain imaging eligibility criteria, tenecteplase may be used as an alternative to alteplase within 4.5 hours of onset. (Huang et al 2016)

Strong recommendation

When using intravenous alteplase, a dose of 0.9 mg/kg, maximum of 90 mg should be administered. (Wardlaw et al. 2014; Emberson et al. 2014; Anderson et al. 2016)

Strong recommendation

For patients with potentially disabling ischaemic stroke who meet perfusion mismatch criteria in addition to standard clinical criteria, intravenous alteplase (dose of 0.9 mg/kg, maximum of 90 mg) should be administered up to 9 hours after the time the patient was last known to be well, or from the midpoint of sleep for patients who wake with stroke symptoms, unless immediate endovascular thrombectomy is planned. (Ma et al 2019; Campbell et al 2019)

Weak recommendation

For patients with potentially disabling ischaemic stroke of unknown onset time who meet MRI FLAIR-diffusion mismatch criteria in addition to standard clinical criteria, intravenous alteplase (dose of 0.9 mg/kg, maximum of 90 mg) may be administered (Thomalla et al 2019).

Practice statement

Consensus-based recommendations

Thrombolysis should be undertaken in a setting with appropriate infrastructure, facilities and network support (e.g. via telemedicine) including:

- access to an interdisciplinary acute care team with expert knowledge of stroke management, who are trained in delivery of thrombolysis and monitoring of patients receiving thrombolytic therapy

- a streamlined acute stroke assessment workflow (including ambulance pre-notification, code stroke team response and direct transport from triage to CT scan) to minimise treatment delays, and protocols available to guide medical, nursing and allied health acute phase management
- immediate access to imaging facilities and staff trained to interpret images
- routine data collected in a central register to allow monitoring, benchmarking and improvements of patient outcomes over time for those treated with reperfusion.

The patient and caregivers should be involved in the decision to give thrombolysis whenever possible and this discussion of risk and benefit documented in the medical record. However, as a time-critical emergency therapy, thrombolysis should not be delayed if the patient does not have the capacity to consent and there are no legal representatives present. Clinicians should follow local health department policies regarding consent for emergency treatment in patients who are unable to consent for themselves.

Neurointervention

Strong recommendation

For patients with ischaemic stroke caused by a large vessel occlusion in the internal carotid artery, proximal middle cerebral artery (M1 segment), or with tandem occlusion of both the cervical carotid and intracranial large arteries, endovascular thrombectomy should be undertaken when the procedure can be commenced within six hours of stroke onset. (Goyal et al. 2016)

Strong recommendation

For patients with ischaemic stroke caused by a large vessel occlusion in the internal carotid artery, proximal middle cerebral artery (M1 segment), or with tandem occlusion of both the cervical carotid and intracranial large arteries, endovascular thrombectomy should be undertaken when the procedure can be commenced between 6-24 hours after they were last known to be well if clinical and CT perfusion or MRI features indicate the presence of salvageable brain tissue. (Nogueira et al. 2017, Albers et al. 2018)

Strong recommendation

Eligible stroke patients should receive intravenous thrombolysis while concurrently arranging endovascular thrombectomy, with neither treatment delaying the other. (Goyal et al. 2016)

Strong recommendation

In selected stroke patients with occlusion of the basilar artery, endovascular thrombectomy should be undertaken. (Kumar et al. 2015)

Practice statement

Consensus-based recommendations

For patients with ischaemic stroke caused by occlusion in the M2 segment of the middle cerebral artery, endovascular thrombectomy may be considered based on individual patient and advanced imaging factors.

Endovascular thrombectomy should be performed by an experienced neurointerventionist with recognised training in the procedure (Conjoint Committee for Recognition of Training in Interventional Neuroradiology CCINR.org.au).

Dysphagia

Practice statement

Consensus-based recommendations

People with acute stroke should have their swallowing screened within four hours of arrival at hospital and before being given any oral food, fluid or medication. (Bray et al. 2016)

Weak recommendation

People with acute stroke should have their swallowing screened, using a validated screening tool, by a trained healthcare professional. (Poorjavad et al. 2014)

Weak recommendation

All stroke patients who have failed swallow screening or who deteriorate should have a comprehensive assessment of swallowing performed by a speech pathologist. (Kertscher et al. 2014; O'Horo et al. 2015)

Strong recommendation

For stroke survivors with swallowing difficulties, behavioural approaches such as swallowing exercises, environmental modifications, safe swallowing advice, and appropriate dietary modifications should be used early. (Geeganage et al. 2012)

Weak recommendation AGAINST

For stroke survivors with dysphagia, non-invasive brain stimulation should only be provided within a research framework. (Pisegna et al. 2016)

Weak recommendation AGAINST

For patients with stroke, acupuncture should not be used for treatment of dysphagia in routine practice other than as part of a research study. (Long et al. 2012)

Weak recommendation AGAINST

For stroke survivors with dysphagia, surface neuromuscular electrical stimulation should only be delivered by clinicians experienced in this intervention, and be applied according to published parameters in a research framework. (Chen et al. 2016)

Weak recommendation AGAINST

For stroke survivors with dysphagia, pharyngeal electrical stimulation is not routinely recommended. (Bath et al. 2016; Scutt et al. 2015)

Practice statement

Consensus-based recommendations

- Until a safe swallowing method is established for oral intake, patients with dysphagia should have their nutrition and hydration assessed and managed with early consideration of alternative non-oral routes.
- Patients with dysphagia on texture-modified diets and/or fluids should have their intake and tolerance to the modified diet monitored regularly due to the increased risk of malnutrition and dehydration.
- Patients with dysphagia should be offered regular therapy that includes skill and strength training in direct therapy (with food/fluids) and indirect motor therapy which capitalises on the principles of neural plasticity to improve swallowing skills.
- Patients with persistent weight loss, dehydration and/or recurrent chest infections should be urgently reviewed.
- All staff and carers involved in feeding patients should receive appropriate training in feeding and swallowing techniques.
- All staff should be appropriately trained in the maintenance of oral hygiene, including daily brushing of teeth and/or dentures and care of gums.

Please also refer to the topic Early Nutrition in [Managing Complications](#).

Acute antithrombotic therapy

Strong recommendation

Patients with ischaemic stroke who are not receiving reperfusion therapy should receive antiplatelet therapy as soon as brain imaging has excluded haemorrhage. (Sandercock et al. 2014)

Strong recommendation **AGAINST**

Acute antiplatelet therapy should not be given within 24 hours of thrombolysis administration with the exception of patients who require stent implantation as part of acute stroke therapy. (Zinkstok et al. 2012)

Strong recommendation **AGAINST**

Routine use of anticoagulation in patients without cardioembolism (e.g. atrial fibrillation) following TIA/stroke is not recommended. (Sandercock et al. 2015; Whiteley et al. 2013)

Strong recommendation

Aspirin plus clopidogrel should be commenced within 24 hours and used in the short term (first three weeks) in patients with minor ischaemic stroke or high-risk TIA to prevent stroke recurrence. (Hao et al. 2018)

Weak recommendation

Aspirin plus ticagrelor commenced within 24 hours may be used in the short term (first 30 days) in patients with minor ischaemic stroke or high-risk TIA to prevent stroke recurrence. (Johnston et al 2020)

Acute blood pressure lowering therapy

Weak recommendation **AGAINST**

Intensive blood pressure lowering in the acute phase of care to a target SBP of < 140 mmHg is not recommended for any patient with stroke. (Bath and Krishnan 2014)

Weak recommendation

In patients with intracerebral haemorrhage, blood pressure may be acutely reduced to a target systolic blood pressure of around 140 mmHg (but not substantially below). (Tsvigoulis et al. 2014; Qureshi et al. 2016)

Weak recommendation

Pre-existing antihypertensive medication may be withheld until patients are neurologically stable and treatment can be given safely. (Bath and Krishnan 2014)

Practice statement

Consensus-based recommendations

- All acute stroke patients should have their blood pressure closely monitored in the first 48 hours after stroke onset.
- Patients with acute ischaemic stroke eligible for treatment with intravenous thrombolysis should have their blood pressure reduced to below 185/110 mmHg before treatment and in the first 24 hours after treatment.
- Patients with acute ischaemic stroke with blood pressure > 220/120 mmHg should have their blood pressure cautiously reduced (e.g. by no more than 20%) over the first 24 hours.

Surgery for ischaemic stroke

Strong recommendation

Selected patients aged 60 years and under with malignant middle cerebral artery territory infarction should undergo urgent neurosurgical assessment for consideration of decompressive hemicraniectomy. When undertaken, hemicraniectomy should ideally be performed within 48 hours of stroke onset. (Cruz-Flores et al. 2012; Vahedi et al. 2007)

Weak recommendation

Decompressive hemicraniectomy may be considered in highly selected stroke patients over the age of 60 years, after careful consideration of the pre-morbid functional status and patient preferences. (Back et al. 2015; Jüttler et al. 2014)

Practice statement

Consensus-based recommendations

For selected patients with large cerebellar infarction threatening brainstem and 4th ventricular compression, decompressive surgery should be offered.

Management of cerebral oedema

Weak recommendation **AGAINST**

Corticosteroids are not recommended for management of stroke patients with brain oedema and raised intracranial pressure. (Sandercock et al. 2011)

Practice statement

Consensus-based recommendations

In stroke patients with brain oedema and raised intracranial pressure, osmotherapy and hyperventilation can be trialled while a neurosurgical consultation is undertaken.

Intracerebral haemorrhage (ICH) management

Medical interventions

Weak recommendation

- For stroke patients with warfarin-related intracerebral haemorrhage, prothrombin complex concentrate should be urgently administered in preference to standard fresh frozen plasma to reverse coagulopathy. (Steiner et al. 2016)
- Intravenous vitamin K (5–10 mg) should be used in addition to prothrombin complex to reverse warfarin but is insufficient as a sole treatment. (Steiner et al. 2016)

Weak recommendation

Stroke patients with intracerebral haemorrhage related to direct oral anticoagulants should urgently receive a specific reversal agent where available. (Pollack et al. 2016; Connolly 2016)

Strong recommendation **AGAINST**

For stroke patients with intracerebral haemorrhage previously receiving antiplatelet therapy, platelet transfusion should not be administered. (Baharoglu et al. 2016)

Weak recommendation

For stroke patients with intracerebral haemorrhage, blood pressure may be acutely reduced to a target systolic blood pressure of around 140 mmHg (but not substantially below) (see [Acute blood pressure lowering therapy](#)).

Surgical interventions

Weak recommendation **AGAINST**

For stroke patients with supratentorial intracerebral haemorrhage (lobar, basal ganglia and/or thalamic locations), routine surgical evacuation is not recommended outside the context of research. (Mendelow et al. 2013; Gregson et al. 2012)

Weak recommendation AGAINST

For stroke patients with intraventricular haemorrhage, the use of intraventricular thrombolysis via external ventricular drain catheter is not recommended outside the context of research. (Gregson et al. 2012; Naff et al. 2011)

Practice statement

Consensus-based recommendations

- For selected patients with large (> 3 cm) cerebellar haemorrhage, decompressive surgery should be offered. For other infratentorial haemorrhages (< 3 cm cerebellar, brainstem) the value of surgical intervention is unclear.
- Ventricular drainage as treatment for hydrocephalus is reasonable, especially in patients with decreased level of consciousness.
- In previously independent patients with large supratentorial haemorrhage and deteriorating conscious state, haematoma evacuation may be a life-saving measure but consideration of the likely level of long term disability is required.

Oxygen therapy

Weak recommendation AGAINST

For acute stroke and Transient Ischaemic Attack (TIA) patients who have SpO₂ >92% on room air, the routine use of supplemental oxygen is not recommended. (Chu et al 2018; Ding et al 2018)

Weak recommendation AGAINST

For acute ischaemic stroke patients, hyperbaric oxygen therapy is not recommended. (Bennett et al. 2014)

Practice statement

Consensus-based recommendations

If supplemental oxygen is required (SpO₂ <93% on room air) a target oxygen saturation of 94-96% is reasonable, or 88-92% if the patient is at risk of hypercapnic respiratory failure. (Beasley et al 2015)

Neuroprotection

Practice statement

Consensus-based recommendations

For stroke patients, putative neuroprotective agents, including hypothermic cooling, are not recommended outside the context of research.

Practice statement

Consensus-based recommendations

Patients with acute ischaemic stroke who were receiving statins prior to admission can continue statin treatment.

Glycaemic therapy

Strong recommendation

All stroke patients should have their blood glucose level monitored for the first 72 hours following admission, and appropriate glycaemic therapy instituted to treat hyperglycaemia (glucose levels greater than 10 mmol/L), regardless of their diabetic status. (Middleton et al. 2011)

Strong recommendation AGAINST

For stroke patients, an intensive approach to the maintenance of tight glycaemic control (between 4.0–7.5 mmol/L) is not recommended. (Bellolio et al. 2014; Ntaios et al. 2014; Johnston et al. 2019)

Pyrexia management

Strong recommendation

All stroke patients should have their temperature monitored at least four times a day for 72 hours. (Middleton et al. 2011)

Weak recommendation

Stroke patients with fever ≥ 37.5 °C may be treated with paracetamol as an antipyretic therapy. (Chen et al. 2018; Middleton et al. 2011)

Chapter 4 of 8: Secondary prevention

Adherence to pharmacotherapy

Weak recommendation

Interventions to promote adherence with medication regimens may be provided to all patients with stroke. Such regimens may include combinations of the following:

- reminders, self-monitoring, reinforcement, counselling, motivational interviewing, family therapy, telephone follow-up, supportive care and dose administration aids (Lawrence et al 2015; Mahtani et al 2011; Nieuwlaat et al 2014; Haynes et al 2008)
- development of self-management skills and modification of dysfunctional beliefs about medication (O'Carroll et al 2014; Kronish et al 2014)
- information and education in hospital and in the community (Lawrence et al 2015; Mahtani et al 2011; Nieuwlaat et al 2014).

Blood pressure lowering therapy

Acute blood pressure management

Practice statement

Consensus-based recommendations

- All patients with acute stroke should have their blood pressure closely monitored in the first 48 hours after stroke onset.
- Patients with acute ischaemic stroke eligible for treatment with intravenous thrombolysis should have their blood pressure reduced to below 185/110 mmHg before treatment and in the first 24 hours after treatment.
- Patients with acute ischaemic stroke with blood pressure >220/120/mmHg should have their blood pressure cautiously reduced (e.g. by no more than 20%) over the first 24 hours.

Weak recommendation AGAINST

Intensive blood pressure lowering in the acute phase of care to a target SBP of <140mmHg is not recommended for any patient with stroke. (Bath and Krishnan 2014)

Weak recommendation

In patients with intracerebral haemorrhage blood pressure may be acutely reduced to a target systolic blood pressure of around 140mmHg (but not substantially below). (Tsivgoulis et al 2014; Qureshi et al 2016)

Weak recommendation

Pre-existing antihypertensive agents may be withheld until patients are neurologically stable and treatment can be given safely. (Bath and Krishnan 2014)

Long term blood pressure management

Strong recommendation

- All patients with stroke or TIA, with a clinic blood pressure of $>140/90$ mmHg should have long term blood pressure lowering therapy initiated or intensified. (Zonneveld et al 2018; Ettehad et al 2016)
- Blood pressure lowering therapy should be initiated or intensified before discharge for those with stroke or TIA, or soon after TIA if the patient is not admitted. (Zonneveld et al 2018; Ettehad et al 2016)
- Any of the following drug classes are acceptable as blood pressure lowering therapy; angiotensin-converting-enzyme inhibitor, angiotensin II receptor antagonists, calcium channel blocker, thiazide diuretics. Beta-blockers should not be used as first-line agents unless the patient has ischaemic heart disease. (Zonneveld et al 2018; Mukete et al 2015)

Weak recommendation

- In patients with a systolic blood pressure of 120-140mmHg who are not on treatment, initiation of antihypertensive treatment is reasonable, with best evidence for dual (ACEI/diuretic) therapy. (Ettehad et al 2016; Kitagawa et al 2019; Katsanos et al 2017)
- The ideal long term blood pressure target is not well established. A target of <130 mmHg systolic may achieve greater benefit than a target of 140mmHg systolic, especially in patients with stroke due to small vessel disease, provided there are no adverse effects from excessive blood pressure lowering. (Kitagawa et al 2019; Ettehad et al 2016)

Management of atrial fibrillation

Strong recommendation

- For patients with ischaemic stroke or TIA, with atrial fibrillation (both paroxysmal and permanent), oral anticoagulation is recommended for long-term secondary prevention. (Saxena et al 2004; Saxena 2004; Ruff et al 2014)
- Direct oral anticoagulants (DOACs) should be initiated in preference to warfarin for patients with non-valvular atrial fibrillation and adequate renal function. (Ruff et al 2014)
- For patients with valvular atrial fibrillation or inadequate renal function, warfarin (target INR 2.5, range 2.0-3.0) should be used. Patients with mechanical heart valves or other indications for anticoagulation should be prescribed warfarin. (Tawfik et al 2016)

Practice statement

Consensus-based recommendations

For patients with ischaemic stroke, the decision to begin anticoagulant therapy can be delayed for up to two weeks but should be made prior to discharge.

Info box

Practice points

- Concurrent antiplatelet therapy should not be used for patients who are anticoagulated for atrial fibrillation unless there is clear indication (e.g. recent coronary stent). Addition of antiplatelet for stable coronary artery disease in the absence of stents should not be used.
- For patients with TIA, anticoagulant therapy should begin once CT or MRI has excluded intracranial haemorrhage as the cause of the current event.
- For patients with ischaemic stroke due to atrial fibrillation and a genuine contraindication to long-term anticoagulation, percutaneous left atrial appendage occlusion may be a reasonable treatment to reduce recurrent stroke risk.

Antiplatelet therapy

Strong recommendation

Long-term antiplatelet therapy (low-dose aspirin, clopidogrel or combined low-dose aspirin and modified release dipyridamole) should be prescribed to all patients with ischaemic stroke or TIA who are not prescribed anticoagulation therapy, taking into consideration patient co-morbidities. (Rothwell et al 2016; Niu et al 2016; Greving et al 2019)

Strong recommendation

All ischaemic stroke and TIA patients should have antiplatelet therapy commenced as soon as possible once brain imaging has excluded haemorrhage unless thrombolysis has been administered, in which case antiplatelet therapy can commence after 24-hour brain imaging has excluded major haemorrhagic transformation. (see [Antithrombotic therapy](#) in [Acute medical and surgical management](#))

Strong recommendation

Aspirin plus clopidogrel should be commenced within 24 hours and used in the short term (first three weeks) in patients with minor ischaemic stroke or high-risk TIA to prevent stroke recurrence. (Hao et al. 2018) (see [Antithrombotic therapy](#) in [Acute medical and surgical management](#))

Strong recommendation **AGAINST**

The combination of aspirin plus clopidogrel should not be used for the long-term secondary prevention of cerebrovascular disease in people who do not have acute coronary disease or recent coronary stent. (Zhang et al 2015; Greving et al 2019)

Strong recommendation **AGAINST**

Antiplatelet agents should not be used for stroke prevention in patients with atrial fibrillation. (Connolly et al 2011)

Weak recommendation **Draft**

In patients with spontaneous (or primary) intracerebral haemorrhage who were previously prescribed antiplatelet therapy for secondary prevention of cardiovascular and/or cerebrovascular disease, restarting antiplatelet therapy after the acute phase is reasonable.

Cholesterol lowering therapy

Strong recommendation

All patients with ischaemic stroke or TIA with possible atherosclerotic contribution and reasonable life expectancy should be prescribed a high-potency statin, regardless of baseline lipid levels. (Manktelow et al 2009; Tramacer et al 2019)

Strong recommendation

In patients with ischaemic stroke, cholesterol lowering therapy should target LDL cholesterol < 1.8 mmol/L for secondary prevention of atherosclerotic cardiovascular disease. (Amarenco et al 2020)

Weak recommendation **AGAINST**

Statins should not be used routinely for intracerebral haemorrhage. (Manktelow et al 2009; Amarenco et al 2006)

Weak recommendation **AGAINST**

Fibrates should not be used routinely for the secondary prevention of stroke. (Zhou et al 2013; Wang et al 2015)

Carotid surgery

Strong recommendation

- Carotid endarterectomy is recommended for patients with recent (<3 months) non-disabling carotid artery territory ischaemic stroke or TIA with ipsilateral carotid stenosis measured at 70-99% (NASCET criteria) if it can be performed by a specialist team with audited practice and a low rate (<6%) of perioperative stroke and death.
- Carotid endarterectomy can be considered in selected patients with recent (<3 months) non-disabling ischaemic stroke or TIA patients with symptomatic carotid stenosis of 50-69% (NASCET criteria) if it can be performed by a specialist team with audited practice and a very low rate (<3%) of perioperative stroke and death.
- Carotid endarterectomy should be performed as soon as possible (ideally within two weeks) after the ischaemic stroke or TIA.
- All patients with carotid stenosis should be treated with intensive vascular secondary prevention therapy.

(Bangalore et al 2011, Rerkasem et al 2020)

Weak recommendation

- Carotid endarterectomy should be performed in preference to carotid stenting due to a lower perioperative stroke risk. However, in selected patients with unfavourable anatomy, symptomatic re-stenosis after endarterectomy or previous radiotherapy, stenting may be reasonable.
- In patients aged <70 years old, carotid stenting with an experienced proceduralist may be reasonable.

(Muller et al 2020)

Weak recommendation AGAINST

In patients with asymptomatic carotid stenosis, carotid endarterectomy or stenting should not be performed. (Galyfos et al 2019; Raman et al 2013; Muller et al 2020)

Strong recommendation AGAINST

In patients with symptomatic carotid occlusion, extracranial/ intracranial bypass is not recommended. (Powers et al 2011; Fluri et al 2010)

Cervical artery dissection

Strong recommendation

Patients with acute ischaemic stroke due to cervical arterial dissection should be treated with antithrombotic therapy. There is no clear benefit of anticoagulation over antiplatelet therapy. (CADISS 2015)

Cerebral venous sinus thrombosis

Strong recommendation

Patients with cerebral venous sinus thrombosis (CVST) without contraindications to anticoagulation should be treated with either body weight-adjusted subcutaneous low molecular weight heparin or dose-adjusted intravenous heparin, followed by warfarin, regardless of the presence of intracerebral haemorrhage. (Coutinho et al 2011; Misra et al 2012; Afshari et al 2015)

Practice statement

Consensus-based recommendations

- In patients with CVST, the optimal duration of oral anticoagulation after the acute phase is unclear and may be taken in consultation with a haematologist.
- In patients with CVST with an underlying thrombophilic disorder, or who have had a recurrent CVST, indefinite anticoagulation should be considered.
- In patients with CVST, there is insufficient evidence to support the use of either systemic or local thrombolysis.
- In patients with CVST and impending cerebral herniation, craniectomy can be used as a life-saving intervention.
- In patients with the clinical features of idiopathic intracranial hypertension, imaging of the cerebral venous system is recommended to exclude CVST.

Diabetes management

Info box

Practice point

Patients with glucose intolerance or diabetes should be managed in line with [Diabetes Australia Best Practice Guidelines](#).

Patent foramen ovale management

Strong recommendation

Patients with ischaemic stroke or TIA and PFO should receive optimal medical therapy including antiplatelet therapy or anticoagulation if indicated. (Romoli et al 2020; Sagris et al 2019)

Strong recommendation

In patients with ischaemic stroke aged <60 in whom a patent foramen ovale is considered the likely cause of stroke after thorough exclusion of other aetiologies, percutaneous closure of the PFO is recommended (Turc et al 2018, Saver et al 2018).

Lifestyle modifications

Info box

Practice point

All patients with stroke or TIA (except those receiving palliative care) should be assessed and informed of their risk factors for recurrent stroke and strategies to modify identified risk factors. This should occur as soon as possible and prior to discharge from hospital.

Diet

Info box

Practice point

- Patients with stroke or TIA should be advised to manage their dietary requirements in accordance with the [Australian Dietary Guidelines](#). (NHMRC 2013)
- All patients with stroke should be referred to an Accredited Practising Dietitian who can provide individualised dietary advice.

Physical activity

Info box

Practice point

Patients with stroke or TIA should be advised and supported to undertake appropriate, regular physical activity as outlined in one of the following existing guidelines:

- [Australia's Physical Activity & Sedentary Behaviour Guidelines for Adults \(18-64 years\)](#) (Commonwealth of Australia 2014) OR
- [Physical Activity Recommendations for Older Australians \(65 years and older\)](#) (Commonwealth of Australia 2014).

Obesity

Info box

Practice point

Patients with stroke or TIA who are overweight or obese should be offered advice and support to aid weight loss as outlined in the [Clinical Practice Guidelines for the Management of Overweight and Obesity in Adults, Adolescents and Children in Australia](#). (NHMRC 2013)

Smoking

Info box

Practice point

Patients with stroke or TIA who smoke should be advised to stop and assisted to quit in line with existing guidelines, such as [Supporting smoking cessation: a guide for health professionals](#). (RACGP 2019)

Alcohol

Info box

Practice points

People with stroke or TIA should be advised to avoid excessive alcohol consumption (>4 standard drinks per day) in line with the [Australian Guidelines to Reduce Health Risks from Drinking Alcohol](#). (NHMRC 2020)

Chapter 6 of 8: Managing complications

Nutrition and hydration

Early hydration

Strong recommendation

- All stroke patients should have their hydration status assessed, monitored, and managed throughout their hospital admission.
- Where fluid support is required, crystalloid solution should be used in preference to colloid solutions as the first option to treat or prevent dehydration. (Visvanathan et al. 2015)

Early feeding

Strong recommendation

All stroke patients should be screened for malnutrition at admission and on an ongoing basis (at least weekly) while in hospital. (Dennis et al 2005)

Strong recommendation

For stroke patients whose nutrition status is poor or deteriorating, nutrition supplementation should be offered. (Geeganage et al 2012; Dennis et al 2005)

Weak recommendation

- For stroke patients who do not recover a functional swallow, nasogastric tube feeding is the preferred method of feeding in the short term. (Geeganage et al 2012; Gomes et al 2015; Dennis et al 2005)
- For stroke patients, there is no preference with regard to continuous pump (meaning using a pump for greater than or equal to 16hrs out of 24hrs for less than or equal to 80ml/hr) feeding versus intermittent bolus feeding (meaning 250-400mls/hr for 4-5times/day) therefore practical issues, cost and patient preferences should guide practice. (Lee et al 2010)

Weak recommendation

For stroke patients who are adequately nourished, routine oral nutrition supplements are not recommended. (Geeganage et al 2012; Dennis et al 2005)

Info box

Practice points

- For patients with acute stroke food and fluid intake should be monitored.
- Stroke patients who are at risk of malnutrition, including those with dysphagia, should be referred to an Accredited Practising Dietitian for assessment and ongoing management.

Oral hygiene

Strong recommendation

All stroke patients, particularly those with swallowing difficulties, should have assistance and/or education to maintain good oral and dental (including dentures) hygiene. (Chipps et al 2014; Lam et al 2013; Brady et al 2006)

Strong recommendation

Staff and carers of stroke patients (in hospital, in residential care and home settings) should be trained in assessment and management of oral hygiene. (Brady et al 2006)

Weak recommendation

For stroke patients, chlorhexidine in combination with oral hygiene instruction, and/or assisted brushing may be used to decrease dental plaque and gingiva bleeding. Caution should be taken, however, for patients with dysphagia. (Lam et al 2013)

Incontinence

Urinary incontinence

Weak recommendation

- All stroke survivors with suspected urinary continence difficulties should be assessed by trained personnel using a structured functional assessment. (Martin et al 2006)
- For stroke survivors, a portable bladder ultrasound scan should be used to assist in diagnosis and management of urinary incontinence. (Martin et al 2006)

Weak recommendation

- Stroke patients in hospital with confirmed continence difficulties, should have a structured continence management plan formulated, documented, implemented and monitored. (Thomas et al 2008)
- A community continence management plan should be developed with the stroke survivor and family/carer prior to discharge, and should include information on accessing continence resources and appropriate review in the community. (Thomas et al 2008)
- If incontinence persists the stroke survivor should be re-assessed and referred for specialist review. (Thomas et al 2008)

Weak recommendation

For stroke survivors with urge incontinence:

- anticholinergic drugs can be tried (Nabi et al 2006);
- a prompted or scheduled voiding regime program/ bladder retraining can be trialled (Thomas et al 2015; Thomas et al 2008);
- if continence is unachievable, containment aids can assist with social continence.

Practice statement

Consensus-based recommendations

For stroke patients with urinary retention:

- The routine use of indwelling catheters is not recommended. However if urinary retention is severe, intermittent catheterisation should be used to assist bladder emptying during hospitalisation. If retention continues, intermittent catheterisation is preferable to indwelling catheterisation.
- If using intermittent catheterisation, a closed sterile catheterisation technique should be used in hospital.
- Where management of chronic retention requires catheterisation, consideration should be given to the choice of appropriate route, urethral or suprapubic.
- If a stroke survivor is discharged with either intermittent or indwelling catheterisation, they and their family/carer will require education about management, where to access supplies and who to contact in case of problems.

Practice statement

Consensus-based recommendations

For stroke survivors with functional incontinence, a whole-team approach is recommended.

Practice statement

Consensus-based recommendations

For stroke survivors, the use of indwelling catheters should be avoided as an initial management strategy except in acute urinary retention.

Faecal incontinence

Weak recommendation

- All stroke survivors with suspected faecal continence difficulties should be assessed by trained personnel using a structured functional assessment. (Harari et al 2004)
- For stroke survivors with constipation or faecal incontinence, a full assessment (including a rectal examination) should be carried out and appropriate management of constipation, faecal overflow or bowel incontinence established and targeted education provided. (Harari et al 2004)

Weak recommendation

For stroke survivors with bowel dysfunction, bowel habit retraining using type and timing of diet and exploiting the gastro-colic reflex should be used. (Venn et al 1992; Munchiando et al 1993)

Practice statement

Consensus-based recommendations

For stroke survivors with bowel dysfunction:

- Education and careful discharge planning should be provided.
- Use of short-term laxatives may be trialled.
- Increase frequency of mobilisation (walking and out of bed activity) to reduce constipation.
- Use of the bathroom rather than use of bed pans should be encouraged.
- Use of containment aids to assist with social continence where continence is unachievable.

Deep venous thrombosis or pulmonary embolism

Weak recommendation

For acute ischaemic stroke patients who are immobile, low molecular weight heparin in prophylactic doses may be used in the absence of contraindications. (Sandercock et al 2015; Sherman et al 2007)

Weak recommendation

For acute stroke patients who are immobile, the use of intermittent pneumatic compression may be used, either as an alternative to low molecular weight heparin or in those with a contraindication to pharmacological DVT prophylaxis (including patients with intracerebral haemorrhage or within 24 hours of thrombolysis). (Dennis et al 2013)

Strong recommendation AGAINST

Antithrombotic stockings are not recommended for the prevention of DVT or PE post stroke. (Naccarato et al 2010)

Info box

Practice points

- For stroke patients, pharmacological prophylaxis should not be used in the first 24 hours after thrombolysis until brain imaging has excluded significant haemorrhagic transformation.
- For acute stroke patients, early mobilisation and adequate hydration should be encouraged to help prevent DVT and PE.
- For stroke patients receiving intermittent pneumatic compression, skin integrity should be assessed daily.
- For patients with intracerebral haemorrhage, pharmacological prophylaxis may be considered after 48-72 hours and once haematoma growth has stabilised, although evidence is limited.

Falls

Practice statement

Consensus-based recommendations

- For stroke patients, a falls risk assessment, including fear of falling, should be undertaken on admission to hospital. A management plan should be initiated for all patients identified as at risk of falls.
- For stroke survivors at high risk of falls, a comprehensive home assessment for the purposes of reducing falling hazards should be carried out by a qualified health professional. Appropriate home modifications (as determined by a health professional) for example installation of grab rails and ramps may further reduce falls risk.

Weak recommendation

For stroke survivors who are at risk of falling, multifactorial interventions in the community, including an individually prescribed exercise program and advice on safety, should be provided. (Denissen et al 2019; Gillespie et al 2012)

For access to the full Clinical Guidelines and further information refer to InformMe <https://informme.org.au/Guidelines/Clinical-Guidelines-for-Stroke-Management>.