Management of Adult Transient Ischaemic Attack and Stroke

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AUTHOR/S

This Clinical Guideline has been developed by the Neurology unit in consultation with Emergency Medicine and NeuroInterventional Radiology.

TARGET AUDIENCE and SETTING

This guideline applies to Monash Health staff providing care for patients requiring time critical assessment and management of ischaemic stroke and TIA across all Monash Health sites

DEFINITIONS

ACE: angiotensin-converting enzyme
AF: atrial fibrillation
AMI: acute myocardial infarction
aPL: antiphospholipid antibodies
ARB: angiotensin receptor blockers
ASPECTS: Alberta stroke programme early CT score
ASSIST: Acute Screening of Swallow in Stroke/Transient Ischaemic Attack
BGL: blood glucose level
BP: blood pressure
CEA: carotid endarterectomy
CT: computed tomography
CTA: computed tomography angiogram
CTP: computed tomography perfusion
DWI: diffusion-weighted imaging
ECG: electrocardiogram
FBC: full blood count
FFP: fresh frozen plasma
GCS: Glasgow coma score
HDU: high dependency unit
HsCRP: high sensitivity c-reactive protein
ICA: internal carotid artery
ICH: intracerebral haemorrhage
IDC: indwelling catheter
INR: international normalised ratio
LMWH: low molecular weight heparin
MCA: middle cerebral artery

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MRA: magnetic resonance angiography
MRI: magnetic resonance imaging
NIHSS: National Institutes of Health Stroke Scale
NOAC/DOAC: novel/direct oral anticoagulant
PFO: patent foramen ovale
SGLT2: sodium-glucose transport protein 2 inhibitors
SCD: sequential compression device
TIA: transient ischaemic attack
TOE: transoesophageal echocardiogram
TTE: transthoracic echocardiogram
UEC: urea, electrolytes and creatinine

CLINICAL GUIDELINE

1. Clinical presentation

- The following patients must be discussed and initially managed by the Stroke Team:
  - Patients presenting with sudden onset or high clinical suspicion of stroke (persistent, non-resolving symptoms), refer to Code Stroke - Adult procedure.
  - Patients with resolving, or resolved focal neurological deficits within 9 hours of onset of symptoms.

2. Cautions and considerations

- Stroke in infants and paediatric patients – refer to Paediatric Code Stroke procedure and Management of Paediatric Stroke clinical guideline.
- This guideline does not cover patients with subarachnoid haemorrhage.
- For TIA patients, refer to TIA pathway, in conjunction with this guideline.
- For minor stroke patients, refer to Minor Stroke to Home pathway, in conjunction with this guideline.
- For patients with large stroke, refer to Large Stroke pathway, in conjunction with this guideline.
- For patients with venous stroke, refer to Venous Stroke pathway, in conjunction with this guideline.

3. Investigations and assessment

- Patients with suspected TIA and stroke must have a full assessment that includes a detailed history and clinical, prognostic, and investigative tests.
- Order sets are available in the Electronic Medical Record for the Management of Acute Stroke and Alteplase Infusion in Acute Ischaemic Stroke.

3.1 Imaging

- All patients with suspected stroke must have an urgent brain CT Perfusion or MRI as per the Code Stroke Imaging protocol. Patients who are candidates for intravenous tissue plasminogen activator or thrombectomy must undergo brain imaging immediately.
- Patients who present with TIA, beyond 9 hours of symptoms onset must undergo:
  - Urgent brain imaging.
  - Urgent carotid imaging (carotid doppler ultrasound) for patients with anterior circulation symptoms who are potential candidates for carotid re-vascularisation within 24 hours. Carotid ultrasound is not required for posterior circulation.

        - Carotid occlusion or stenosis on ultrasound (>50%) must be confirmed by contrast-enhanced MRA or CTA where measurement of carotid stenosis by NASCET criteria can be obtained (stroke can be attributed to carotid artery disease even when the degree of stenosis is less than 70%).
        - For patients with brainstem symptoms, the result of carotid ultrasound will not affect patient care since carotid stenosis in this case is considered to be asymptomatic. The benefit of carotid endarterectomy (CEA) in asymptomatic carotid artery is minimal (patients have an upfront risk of stroke at the time of CEA).
        - Digital subtraction angiography is not routinely required for CEA and is associated with some risk of TIA/stroke. When suspecting arterial dissection, MRI of the neck with dissection protocol is to be requested.
    - Patients aged >65 years with transient neurological deficit, normal CT and absence of stroke mechanisms, must have MRI as soon as feasible to exclude cases of amyloid angiopathy masquerading as TIA.
    - **All TIA referrals must be approved by the neurology registrar via phone call discussion prior to being referred to Monash Neurology TIA clinic. This is to ensure the safety of the patient by excluding potential TIA mimics.**
- Further brain, cardiac or carotid imaging is to be undertaken in selected patients:
    - Where initial assessment has not identified the likely source of the ischaemic event:
        - For patients with TIA or ischaemic stroke then a TTE and Holter monitor should be performed. In some cases a loop recorder can help to identify patients with paroxysmal atrial fibrillation.
        - Aortic arch atheroma is a risk factor for stroke, but there is no evidence to support the use of warfarin in these patients over antiplatelet medications, hence TOE is not recommended as a routine test.
    - With a history of more than one TIA.
    - Likely to undergo carotid surgery.
    - Arterial dissection (ask for MR with dissection protocol).

3.2 Investigations

- The following investigations must be routinely carried out in all patients with suspected stroke: FBC, UEC, ECG, LFT, BGL, lipid profile, HbA1c, APTT, INR, PT, drug assay for novel/direct oral anticoagulant (NOAC/DOAC) (for those on dabigatran, apixaban, rivaroxaban), fibrinogen, group and antibody screen, HsCRP.
    - Ensure thorough investigation of all patient records, including the scanned medical record (SMR) to determine if a patient is on a NOAC/DOAC.
    - These tests constitute the foundation of secondary prevention. Lipid profile can be assessed in non-fasting state. Patients who are already on a high dose of a HMG-CoA reductase Inhibitor (statin) who have residual elevated low-density lipoprotein (LDL) cholesterol are to be put on a statin and ezetimibe. For patients who have high HsCRP, despite being on a statin and ezetimibe, will be prescribed low dose colchicine.
- If the patient is on a novel/direct oral anticoagulant (NOAC/DOAC), request the following additional tests and consult Haematology:
    - For apixaban and rivaroxaban, ask for an anti-factor Xa level.
    - For dabigatran, order a thrombin time (TT) as well as a dabigatran level.
- Selected patients will require the following additional investigations: catheter angiography, chest x-ray.

- Most thrombophilic disorders do not cause arterial ischaemic stroke and their contribution to arterial ischaemic stroke care is doubtful. Avoid measuring protein C&S level if patient is on warfarin, and antithrombin III level if patient is on heparin.
- Vasculitis screen has doubtful value in the management of patients with typical stroke. In an audit of patients admitted to the Stroke Unit at Monash Health, only one case of vasculitis was identified over a 10 year period among those presenting with stroke as the initial presentation.

- Refer also to Guideline for Investigation of Stroke Mechanisms in Patients with TIA/Stroke.

3.3 Antithrombotic therapy

- For stroke patients without atrial fibrillation (AF), aspirin is the treatment of choice. Aspirin must be given as soon as possible after the onset of stroke symptoms (i.e., within 24 hours) if CT/MRI scans excludes haemorrhage. The first dose must be 100 to 300 mg. Dosage thereafter can be reduced (e.g., 100 mg daily).
- If patient is already on aspirin, then commence aspirin/dipyridamole or clopidogrel. Clopidogrel can be used in patients allergic to aspirin.
- The routine use of early anticoagulation in unselected patients following ischaemic stroke/TIA is not recommended.
- The stroke team must be consulted and lead the introduction of anticoagulation after a stroke.
- For an ischaemic stroke patient with AF and no contraindication to oral anticoagulants, an oral anticoagulant is to be commenced. The choice will be based on patient profile and contraindications.
- Antiphospholipid antibodies (aPL) are present in 12%-50% of healthy elderly subjects. In the absence of lupus anticoagulant and beta-glycoprotein, a positive aPL does not necessarily equate with antiphospholipid antibody syndrome. For patients with ischaemic stroke and aPL, there is no difference between warfarin and aspirin.
- Reconsider the use of warfarin in patients with family history of haemophilia, liver disease, malabsorption, malnutrition, metastatic cancer or ambulatory patients at extremely high risk of falls (e.g., fracture).

4. Treatment – intravenous tissue plasminogen activator (IV thrombolysis)

- The use of IV thrombolysis is appropriate in patients meeting eligibility criteria:
  - No evidence of haemorrhage or non-vascular cause for stroke.
  - For patients with potentially disabling ischaemic stroke within 9 hours of onset, IV thrombolysis is to be administered as early as possible after stroke onset.
  - For patients with potentially disabling ischaemic stroke due to large vessel occlusion, intravenous tenecteplase (0.25 mg/kg, maximum of 25 mg) or alteplase (0.9 mg/kg, maximum of 90 mg) is to be administered up to 4.5 hours after the time the patient was last known to be well. Note, there is only an alteplase infusion for thrombolysis management of ischaemic stroke. Tenecteplase requires a Single Patient Use (SPU) request.
  - 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), can 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.
- Decision to proceed with intravenous thrombolysis is only to occur following recommendation/consultation with the Stroke Consultant.

- Patients not for thrombolysis, refer to relevant management pathway.
- There is no age cut off for IV thrombolysis and where possible, bolus of thrombolysis is given whilst the patient is in the CT scanner.

4.1 Absolute exclusions for IV thrombolysis (thrombolysis must not be administered)

- Stroke onset > 9 hours
- Clinical and radiological suspicion of subarachnoid haemorrhage with vasospasm.
- Suspected septic embolus.
- Suspected aortic dissection.
- Active systemic bleeding (excluding menses and minor haemoptysis).
- Systemic coagulopathy with platelet count <100 x 109/L.
- INR >1.7, including warfarin use
- Patients on NOAC/DOAC need to have drug level performed prior to consideration for thrombolysis
- Infective endocarditis or acute pancreatitis.
- Hypoglycaemia (BGL <2.8 mmol/L) or hyperglycaemia (BGL ≥22.0 mmol/L), where there is no perfusion defect or arterial occlusion on CT or where normal glucose levels cannot be achieved within the 4.5 hours window.
- Seizure at symptom onset without vessel occlusion or CT perfusion abnormality.

4.2 Relative considerations (administer thrombolysis with caution)

- Hypertension, systolic blood pressure ≥185 mmHg or diastolic blood pressure >110mmHg on repeated measures (thrombolysis can commence prior to BP being controlled as in practice safe levels are always achievable and more harm can occur from delays in treatment).
- Pregnancy.
- CT evidence of extensive middle cerebral artery (MCA) territory infarction (>1/3 MCA of ASPECTS of less than 7) or matched CT perfusion lesion, especially 3-4.5 hours post onset.
- Therapeutic unreversed NOAC/DOAC within 24-48 hours.
- Stroke or serious head trauma within the past three months where the risks of bleeding are considered to outweigh the benefits of therapy.
- Patient has known history of intracranial haemorrhage, subarachnoid haemorrhage, known intracranial arteriovenous malformation or previously known intracranial neoplasm, such that, in the opinion of the clinician, the increased risk of intracranial bleeding would outweigh the potential benefits of treatment.
- Suspected recent (within 30 days) transmural myocardial infarction.
- Recent (<30 days) parenchymal organ biopsy or surgery, trauma with internal injuries, parturition, gastrointestinal or urinary tract haemorrhage that in the opinion of the responsible clinician, would increase the risk of unmanageable bleeding (e.g. by local pressure). Note that discussion with the responsible surgeon can help clarify risk-benefit ratio.
- Cardiopulmonary resuscitation or arterial puncture at non-compressible site within the last seven days.
- Severe co-morbidities limiting life expectancy or posing treatment risk.
- Pre-existing dementia or dependency (modified Rankin score ≥3).
- Minor or rapidly improving non-disabling neurological deficit (especially if CTA/CTP is normal).

4.3 Risks of IV thrombolysis

- The risk of bleeding is a principal concern. Risks include, but are not limited to:
  - Intracerebral haemorrhage (up to 10% of patients).
  - Gastrointestinal haemorrhage.
  - Eye, urogenital, pericardial, respiratory tract haemorrhage.
  - Superficial bleeding (injection/puncture sites).
  - Allergic reactions: fever, chills, rash, bronchospasm, angioedema, hypotension, anaphylaxis, shock.

4.4 Pre-administration of IV thrombolysis

- Refer to investigations and assessment.
- The medical team is to document review and assessment, which includes but is not limited to:
  - Consultant review of patient, imaging and results for vessel occlusion and/or perfusion mismatch.
  - Document results of subsequent scans as they are completed and reviewed.
  - NIHSS assessment and findings.
  - ASPECTS.
  - Discussions with other medical teams including diagnostic imaging, NeuroInterventional Radiology if patient is eligible for ECR and requires stenting, and/or neurosurgery and consideration of alternative treatments as required.
- Review inclusion/exclusion criteria.
- Review pathology results.
- Basilar occlusion must be approached in the same way as other occlusion cases. Ensure absence of irreversible ischaemia to brain stem before proceeding.

4.5 Alteplase dosing and administration

- Refer to Alteplase for Acute Ischaemic Stroke adult medication profile and Tenecteplase medication profile.
- Stroke Registrar to stay with the patient during administration of thrombolysis therapy.

4.6 Post IV thrombolysis care

- Patients receiving thrombolysis must be nursed in a High Dependency Init (HDU) environment for the first 24 hours. Refer to Protocol for post IV thrombolysis care.
- Use of a dedicated cannula is recommended.
- Avoid invasive therapies for at least 12 hours, including but not limited to:
  - Non-urgent blood sampling.
  - Intramuscular injections.
  - Delay placement of Nasogastric tube (NGT) for 24 hours where possible
  - Avoid indwelling catheter (IDC) <1-hour post infusion (if not inserted prior to IV thrombolysis).
- Sequential compression device (SCD) is recommended for deep vein thrombosis prophylaxis in the first 24 hours.
- Prevention of falls strategies.
- Use electric razors only.
- All nursing staff must hand over to the next person by completing a full NIHSS (or GCS where used together).
- Monitor for signs of allergy to thrombolysis or internal and external bleeding.

- Maintain nil by mouth until Acute Screening of Swallow in Stroke/Transient Ischaemic Attack (ASSIST) or speech pathology assessment. Consider IV hydration.
- Repeat CT brain 24 hours post IV thrombolysis, or earlier if there is clinical concern. It is best to plan for the CT scan to occur during office hours, and commence aspirin at the 24-hour mark.

4.7 Protocol for post IV thrombolysis care

Time (hrs)	Activity
0	• Apply telemetry monitoring equipment • Administer thrombolysis as per protocol

0-1	• 15 minutely observations
	  ○ Glasgow Coma Score (GCS)
	  ○ Respiratory rate (RR)
	  ○ Blood pressure (BP)
	  ○ Pulse (HR)
	  ○ Oxygen saturation (SpO2)
	  ○ Temperature (T)
	• 12 lead ECG
	• Hourly fluid balance chart (ongoing)
	• Strict rest in bed and falls prevention strategies (ongoing)
	• Avoid invasive therapies
	• Internal and external bleeding assessment

1-2	• 15 minutely observations ○ GCS, RR, BP, HR SpO2, and T • Pressure area care • *If required* BGL 2 hourly (ongoing) • Internal and external bleeding assessment • Commence sequential compression device if required
2-6	• 30 minutely observations ○ GCS, RR, BP, HR, SpO2, and T • Strict rest in bed and safety precautions: falls prevention and pressure area care (ongoing) • Internal and external bleeding assessment
6-24	• Hourly observations ○ GCS, RR, BP, HR, SpO2, and T • Internal and external bleeding assessment • Swallow assessment by speech pathologist if failed swallow screen • Nasogastric feeding tube can be inserted if required • Internal and external bleeding assessment • NIHSS completed at 24 hours post thrombolysis

4.8 High Dependency Unit management

- Discharge from HDU to stroke unit after 24 hours if blood pressure <185/110 mm/Hg.
- Ensure protocol observations.
- Ensure regular and current antihypertensive medications are prescribed and administered whilst in HDU.

- If nil by mouth, ensure sodium chloride 0.9% 1L is prescribed and administered intravenously at 12 hourly rate (take care if patient has pre-existing congestive cardiac failure).
- Where blood glucose level ≥11.0 mmol/L, refer to Hyperglycaemia – General Wards and CCU (Adult) procedure.

4.9 Potential serious complications following IV thrombolysis

- Deterioration in neurological status, new headache, nausea/vomiting:
  - High BP (BP >150/95):
    - Nursing staff ensure prn antihypertensive medications charted on arrival to HDU.
    - Notify Stroke Registrar (at all hours) who is to review the patient.
    - Give stat dose candesartan 4 mg or ramipril 1.25 mg or perindopril 2.5 mg.
    - If BP >185/110 (Systolic >180mmHg or Diastolic >110mmHg):
      - Give bolus IV hydralazine 2.5 mg/hr up to 10 mg/hr – a higher dose can be ordered by a Neurologist, or bolus IV verapamil 2.5 mg up to 10 mg/hr, or bolus IV metoprolol 1 mg up to 10 mg/hr.
    - Exclude pain and urinary retention.
    - Notify on call Neurologist
      - ICU consultation.
  - Suspect ICH:
    - Extracranial haemorrhage or ICH with mass effect
      - Check FBC/fibrinogen G&H, local compression.
      - Contact Neurologist/Haematology Registrar.
        - Give FFP or cryoprecipitate if platelet count <100 000
          - Contact Neurosurgery
        - ? blood transfusion
          - Contact Haematology Registrar
    - ICH but no mass effect or evolution of infarct
      - Treat high BP if >180/110.
      - Post thrombolysis observations.
      - Stroke pathway.

5. Carotid endarterectomy

- 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 must be performed as soon as possible (ideally within two weeks) after the ischaemic stroke or TIA.
- Avoid CEA within two days of TIA/minor stroke or stroke in evolution. Swedish study: combined mortality and stroke 11.5% (within two days of event) compared to 3.6% at day three.
- All patients with carotid stenosis are to be treated with intensive vascular secondary prevention therapy.
- In patients with symptomatic carotid occlusion, extracranial/intracranial bypass is not recommended.
- **A small group of patients who would not be eligible for carotid endarterectomy can be eligible for carotid stenting. This would need to be discussed on a case-by-case situation with multiple teams (stroke, vascular, neurointerventional radiology input).**

6. Management of blood pressure

- Exclude common causes of high BP such as pain and urinary/faecal retention.
- Do not lower BP in the first week unless BP is very high (persistent blood pressures above 180/110mmHg in ischaemic strokes that have not had any intervention warrant gentle blood pressure lowering).
- Avoid aggressive lowering of BP in patients with critical ICA or vertebrobasilar stenosis/dissection.
- For patients with markedly elevated BP (>210/110mmHg) a stepped approach is preferred.
- The most aggressive approach is reserved for patients who have received thrombolytic treatment with alteplase or tenecteplase. Start antihypertensive medications for BP >185/110mmHg.
- In patients with isolated systolic hypertension, take care not to drop diastolic blood pressure below 65mmHg. The aim is not to aggressively normalise blood pressure in the acute phase of stroke (with the exception of patients receiving thrombolytic medications).
- After commencement of ACE inhibitor/diuretics and as long as the patients remain in hospital, electrolytes must be checked.
- In the sub-acute setting, ACE inhibitors (e.g. ramipril/perindopril) or angiotensin receptor blockers (ARB) (e.g. telmisartan) have been shown to reduce the risk of further stroke. Avoid combination ACE inhibitor and ARB (Profess trial).

7. Management of blood glucose

- Identify if patient has type 1 or type 2 diabetes. All patients with type 1 diabetes are to be referred to Endocrinology on admission to the hospital.
- All patients are to have an HBA1c ordered.
- The aim is not to have tight control of blood sugar. Trials have not shown benefit of insulin infusion in management blood sugar in the setting of stroke.
- **Acute phase**
  - *Type 1 diabetes*
    - Notify Endocrinology.
    - If nil oral, will require a glucose 5% infusion to prevent ketosis.
    - Insulin must not be withheld and patients could require an insulin infusion.
    - Whilst on an insulin infusion, blood glucose levels (BGLs) must be checked hourly initially and if stable can be extended to 2 hourly intervals.
    - Monitor ketones 4 hourly whilst fasted. See Ketone testing interpretation for sick day and DKA implementation tool.
  - *Type 2 diabetes*
    - For patients on oral hypoglycaemic agents only and nil oral:
      - Withhold oral hypoglycaemic agents.
      - If on SGLT2 inhibitor, ensure ketones are checked at baseline. Monitor BGLs 4-hourly. If BGL >10mmol/L inform Diabetes unit due to risk of euglycaemic diabetic ketoacidosis.
    - For patients on insulin and nil oral:
      - Inform Diabetes unit. Consider treatment as for patient with type 1 diabetes.
- **Subacute phase**
  - *Type 1 diabetes*
    - Optimise glycaemic control with titration of insulin as indicated.
  - *Type 2 diabetes*

- Optimise glycaemic control with titration of oral hypoglycaemic agents and/or insulin as indicated and prescribed.

8. Warfarin and NOAC/DOACs in stroke (refer also to Warfarin Adult Medication Profile)

- Reversal of anticoagulant therapy
  - Check for indication to reverse warfarin e.g., not all patients with haemorrhagic transformation require reversal. Consultant neurologist to review case.
  - Prothrombin complex concentrate 25 international units/kg (does not contain factor VII).
  - Add FFP 150-300 mL (take care in elderly).
  - Discuss with Stroke Team.
- Warfarin/antiplatelet medicines in surgery
  - Risk of stroke in AF differs between those patients who have had previous strokes (higher risk) and those who have not (lower risk).
  - Discuss directly with Stroke Team regarding NOAC/DOACs such as dabigatran, rivaroxaban, and apixaban.
  - All patients on warfarin and NOAC/antiplatelet medication and have cessation of this therapy for a procedure may be at risk of peri-operative or post-operative stroke. This risk can occur even after minor surgery, endoscopy or dental procedure.
  - Patients may not need medications to be stopped for cataract surgery, dental procedure, skin biopsy, arthrocentesis, and endoscopy.

8.1 Surgery and warfarin and NOACs/antiplatelet medicines in stroke prevention

- Before surgery:
  - Assess if needs to stop warfarin (some surgeons are happy to operate with the patient on aspirin).
  - Omit warfarin five (5) days before surgery or antiplatelet medication seven (7) days before surgery.
  - Commence low molecular weight heparin (LMWH) (enoxaparin 1.5 mg/kg daily) next day. Lower dose in patients with renal impairment or very obese patients.
  - Omit LMWH the day of surgery.
- After surgery:
  - Restart LMWH immediately after procedure (until INR ≥2).
  - Recommence warfarin/antiplatelet medications at previous dose on the day of surgery or when oral intake possible.
  - If in doubt, check with the physician who initiated warfarin/antiplatelet medications or Stroke Team.

9. Discharge planning

- Provide a timely discharge summary containing clear, relevant and concise information, written in plain language and without abbreviations.
- Deep vein thrombosis (DVT) prophylaxis choices include heparin twice a day or enoxaparin daily. It is relatively safe to commence heparin/enoxaparin DVT prophylaxis two days after intracranial haemorrhage.

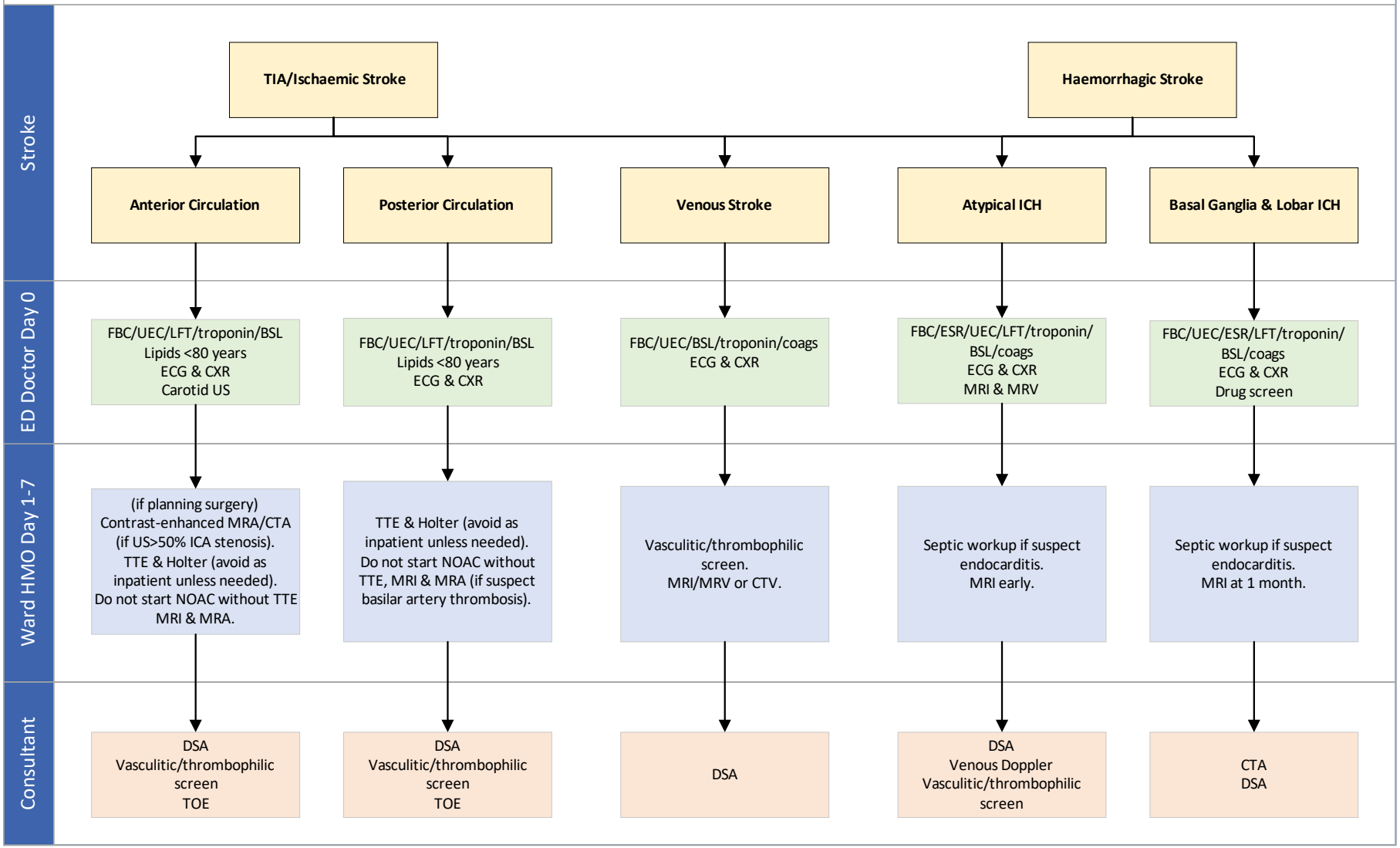
CLINICAL PATHWAY/FLOWCHART/ALGORITHM

Guideline for Investigation of Stroke Mechanism in Patients with TIA/Stroke
TIA Pathway

Management of Adult Transient Ischaemic Attack and Stroke

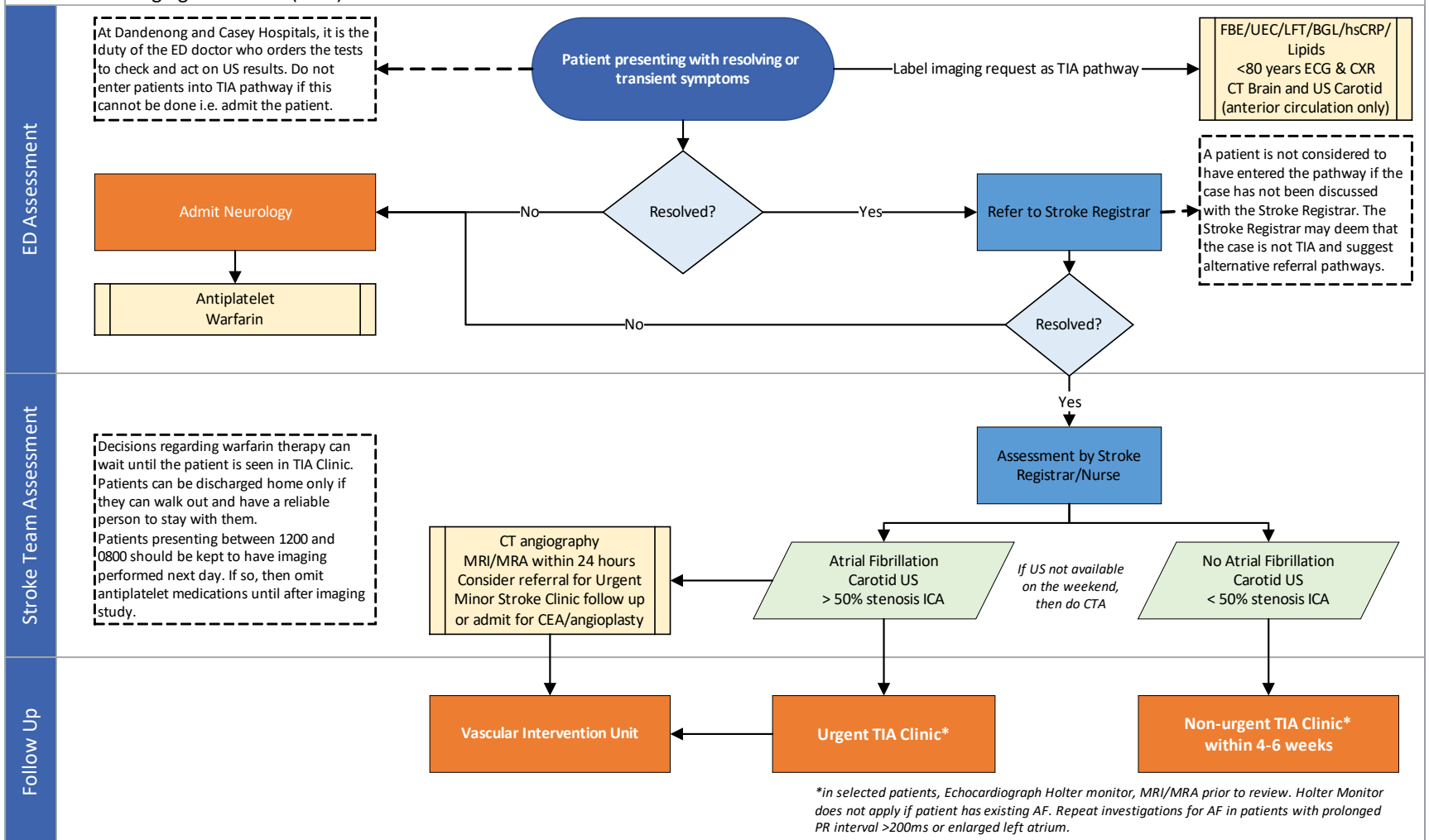
Minor Stroke to Home Pathway
Large Stroke Pathway
Venous Stroke Pathway

Guideline for Investigation of Stroke Mechanism in Patients with TIA/Stroke

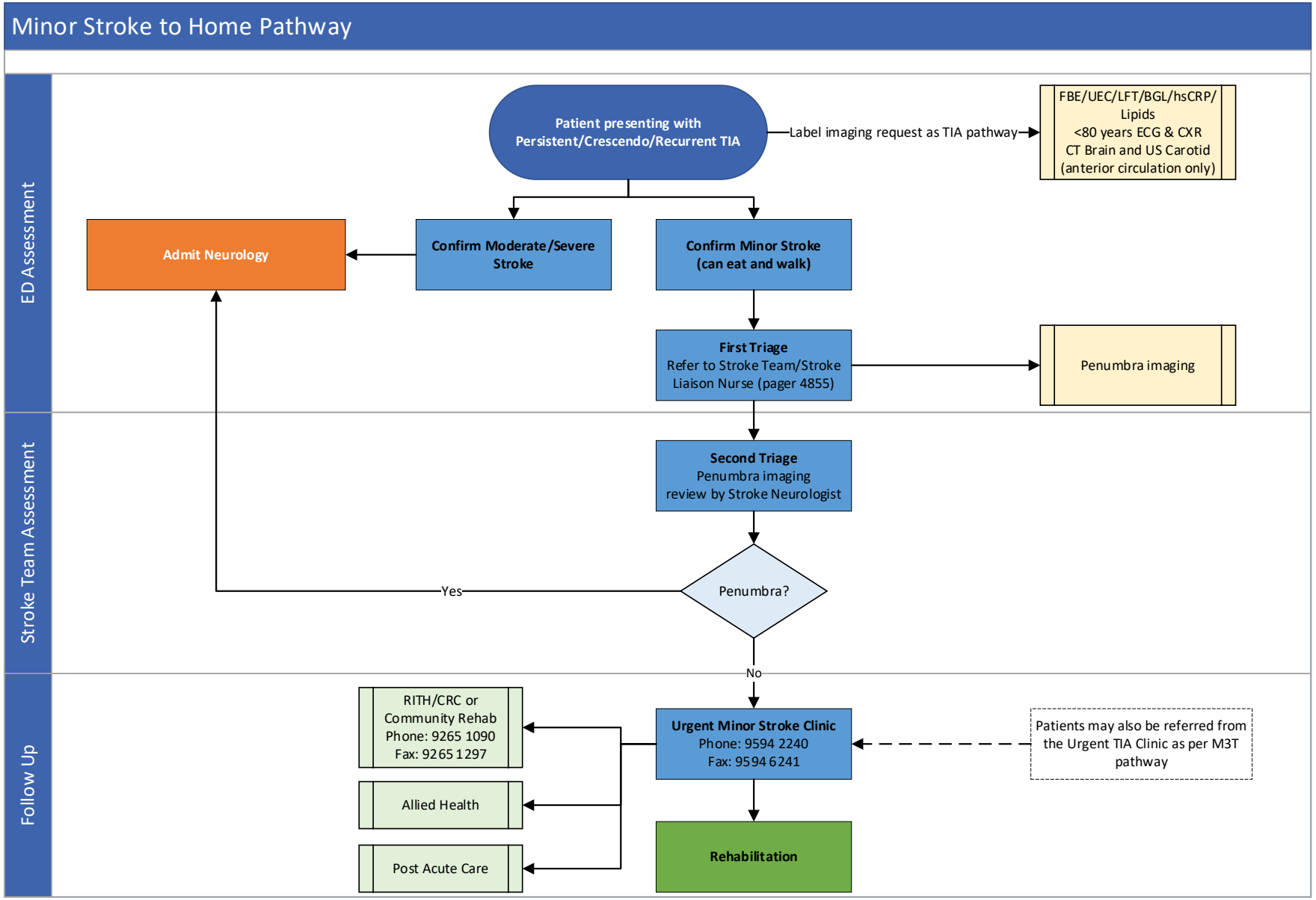


TIA Pathway

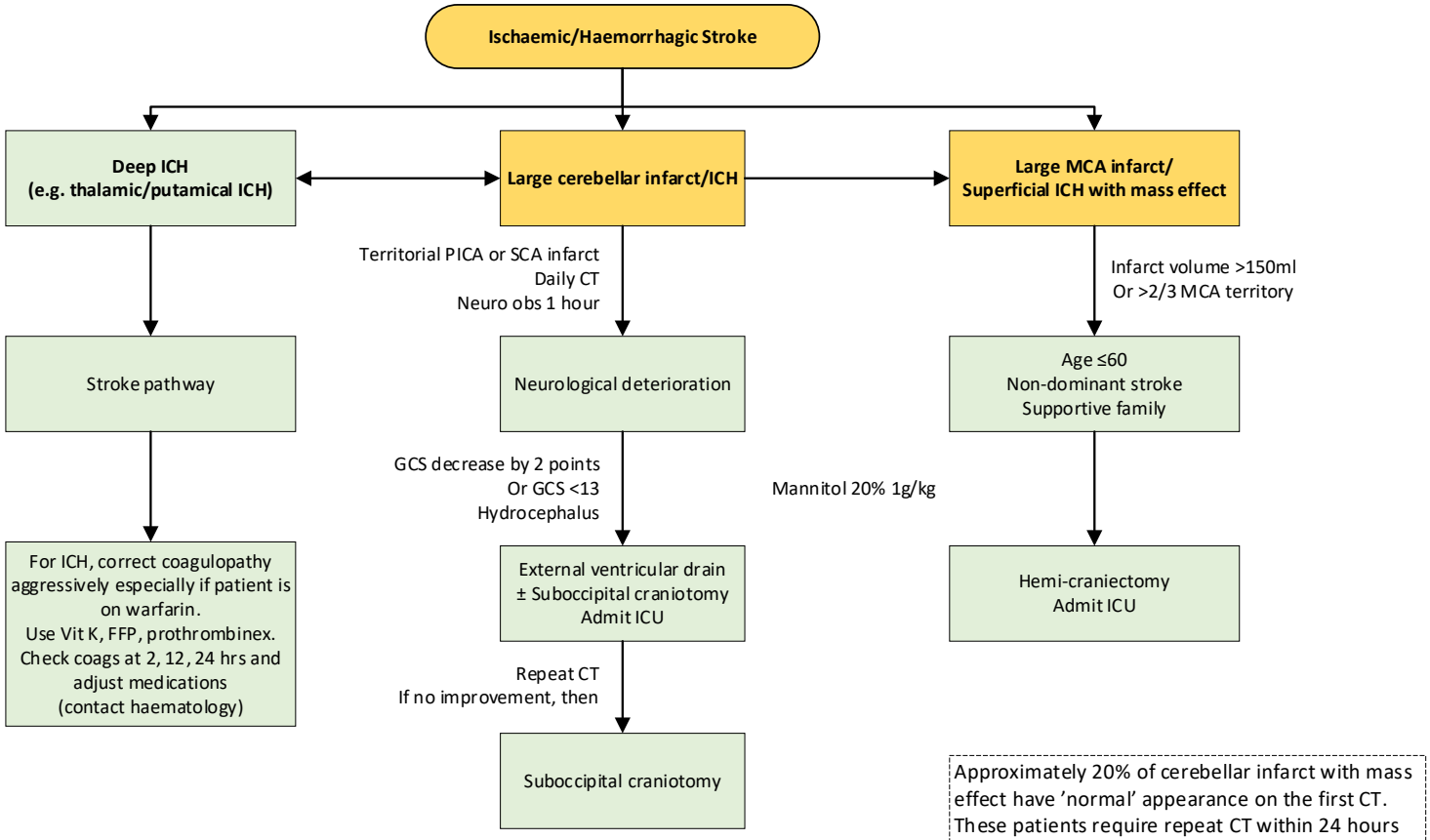
Monash TIA Triaging Treatment (M3T)



The role of the TIA Clinic is to diagnose TIA and expedite intervention in patients with symptomatic carotid artery stenosis. It is a triaging clinic and not a holding clinic. The only question that will be addressed in this clinic is does this patient have a TIA and if carotid endarterectomy or angioplasty with stenting is requir ed. Follow up for non -TIA diagnoses will be referred to the appropriate outpatient clinic. For patients with TIA, appropriate secondary prevention therapies will be instituted and the patient will be referred to Stroke Prevention Clinic for continual management.

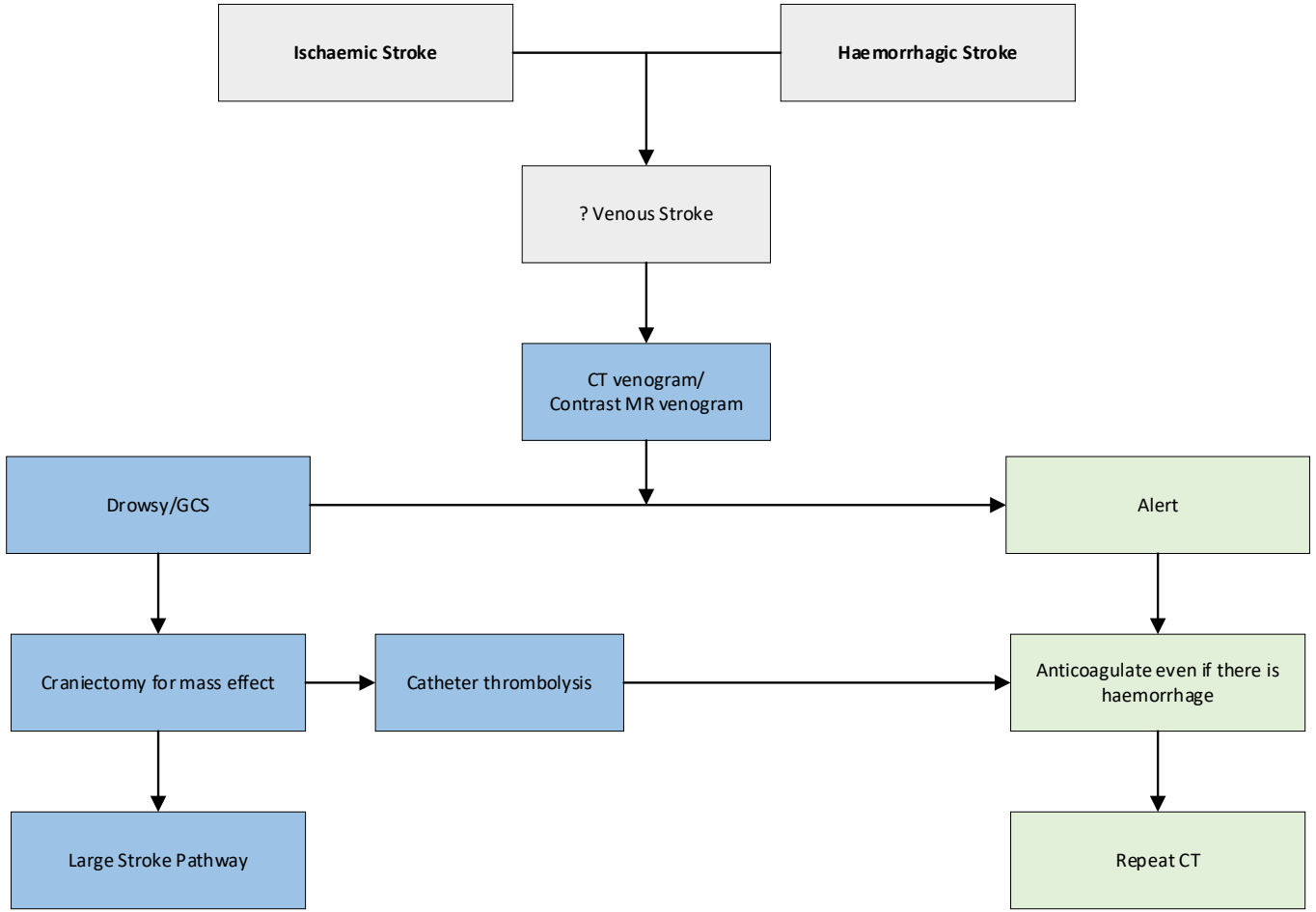

Minor Stroke to Home Pathway
ED Assessment
Stroke Team Assessment
Follow Up
Patient presenting with Persistent/Crescendo/Recurrent TIA
Label imaging request as TIA pathway
FBE/UEC/LFT/BGL/hsCRP/ Lipids
<80 years ECG & CXR
CT Brain and US Carotid (anterior circulation only)
Admit Neurology
Confirm Moderate/Severe Stroke
Confirm Minor Stroke (can eat and walk)
First Triage
Refer to Stroke Team/Stroke Liaison Nurse (pager 4855)
Penumbra imaging
Second Triage
Penumbra imaging review by Stroke Neurologist
Penumbra?
Yes
No
RITH/CRC or Community Rehab
Phone: 9265 1090
Fax: 9265 1297
Allied Health
Post Acute Care
Urgent Minor Stroke Clinic
Phone: 9594 2240
Fax: 9594 6241
Patients may also be referred from the Urgent TIA Clinic as per M3T pathway
Rehabilitation

Large Stroke Pathway



Approximately 20% of cerebellar infarct with mass effect have 'normal' appearance on the first CT. These patients require repeat CT within 24 hours of admission. Malignant MCA stroke occurs in patients with large infarct >150ml. Infarct volume can be estimated by using the ½ ABC rule. The aim is to operate prophylactically rather than wait for deterioration. Following hemicraniectomy, 7% of patients remain independent, 35% mild to moderately disabled, and 58% dead or severely disabled.

Venous Stroke Pathway



ADDITIONAL RESOURCES

Code Stroke Adult procedure
Alteplase for Acute Ischaemic Stroke adult medication profile
Tenecteplase medication profile
Warfarin Adult Medication Profile
Hyperglycaemia – General Wards and CCU (Adult) procedure
Ketone testing interpretation for sick day and DKA implementation tool

KEY LEGISLATION AND STANDARDS

Acute Stroke Clinical Care Standard, Australian Commission on Safety and Quality in Health Care, October 2019.

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