

## ACUTE STROKE UNIT CLINICAL GUIDELINE

### ENDOVASCULAR CLOT RETRIEVAL (ECR) FOR ACUTE ISCHAEMIC STROKE

#### Staff this document applies to:

This guideline applies to all staff and departments involved in acute stroke assessment/management and bed

managers at Austin Health (AH).

- Acute Stroke Team (Medical and Nursing)
- Emergency Department (ED) Team (Medical and Nursing)
- Neurointerventional Radiology Team (Neurointerventionist, Nurse, Radiographer, Technicians)
- Stroke Unit (SU) Team (Medical and Nursing)
- Anaesthetics Team (Medical and Nursing)
- Operating Theatre and Recovery Team (Medical and Nursing)
- Medical Emergency Team (MET) (Medical and Nursing)
- Bed Managers (BM) and After-Hours Site Managers (AHSM)

#### Related Austin Health policies, procedures or guidelines:

[Management of Acute Stroke Emergencies](#)

[Acute Stroke Care Unit \(ASCU\): Intravenous Thrombolysis – Tenecteplase and Alteplase Acute Ischaemic Stroke](#)

[Consent to Medical Treatment Policy](#)

[Patient Transfers – Clinical Responsibilities for Communication, Patient Preparation, Clinical Handover And Clinical Escort](#)

[Femoral Arterial Sheath Removal](#)

#### Key points:

- Endovascular clot retrieval (ECR) is a highly effective treatment that reduces disability and death after ischaemic stroke
- ECR is time critical. Delays from stroke onset to reperfusion must be minimised at every step to achieve the best patient outcomes
- At Austin Hospital, ECR is available 24 hours per day, 7 days per week and is performed in the **Level 2 Radiology Angiography Suite**, by a skilled Neurointerventional Team
- Anaesthetics will be in attendance at all ECR cases performed at AH

- All patients will be transferred to Operating Theatre Recovery following ECR

#### Purpose:

This document describes the organisational processes governing ECR (also known as ‘mechanical thrombectomy (MT)’),

a Neurointerventional procedure for treatment of acute ischaemic stroke, including;

- Indications and Cautions for ECR
- Consent and risks
- Anaesthetics and Operating Theatre Cooperation
- Interdepartmental Transfer from ED to Level 2 Angiography Suite
- Post-Procedural Care
- Management of complications (i.e. intra-cranial or extra cranial bleeding)
- Safety monitoring, quality audit and reporting

#### Background:

Stroke is a medical emergency, associated with significant mortality and devastating long-term disability. Brain damage

from ischaemic stroke can have a profoundly disabling effect (impacting the individual’s physical, emotional and social

functioning).

In 2015, five landmark studies of endovascular clot retrieval (ECR) were published, describing an intra-arterial procedure

to treat ischaemic stroke. In those trials, ECR (combined with intravenous thrombolysis, or alone in patients who are

ineligible for thrombolysis) resulted in marked improvements in patient outcomes – up to 70% of patients treated with

ECR made a good recovery.

ECR is a time-critical intervention. Thus, an organised system of care is essential, to ensure rapid and streamlined

processes of care and assessment for all patients presenting with suspected acute stroke.

Every effort, by every clinician, at every step is the Austin Health ethos, in order to minimise treatment delays in acute

stroke care

#### Definition:

- ECR is an intra-arterial procedure during which the Neurointerventionist attempts to manually remove a clot  
which has occluded a main artery in the brain
- The Neurointerventionist visualises arteries using a combination of fluoroscopy and injections of iodising  
contrast (dye)

- The procedure requires the Neurointerventionist to puncture a main artery (usually in the groin) and thread a catheter up through the arterial system into the brain circulation. A combination of high-tech devices (stent retrievers and suction catheters) are carefully used to manually remove the blockage

#### Indications for ECR:

Unlike with thrombolysis (where time from onset is a primary consideration for treatment eligibility) ECR eligibility relies

heavily on appearance of brain imaging. Benefits of the procedure are demonstrable up to 24 hours after onset in

(radiologically and clinically) select cases. Thus, all patients with a reasonable level of functional independence (modified

Rankin Scale (mRS) score  $\leq 3$ ), within 24 hours of stroke onset, should undergo urgent advanced brain imaging (with CT

perfusion and CT angiogram) to assist in determining ECR treatment eligibility, even if stroke signs/symptoms are mild

or resolving

The following criteria guide identification of patients who are potentially eligibility for ECR:

1. Adult patients
2. Reasonable degree of baseline functional independence – modified Rankin Scale (mRS) score  $\leq 3$  (e.g. people who do not have advanced dementia and who are able to shower/dress/toilet independently, mobilise with or without gait aid and assistance)
3. Imaging confirms large vessel occlusion of any of the following large arteries;
  - Internal Carotid Artery (ICA)
  - Basilar Artery (BA)
  - Middle Cerebral Artery (MCA) – first segment (M1) or proximal portion of the second segment (M2)
  - Distal Vertebral Artery (VA)
  - Posterior Cerebral Artery (PCA) – proximal segment of first segment (P1)
4. Imaging confirms mismatch between salvageable ischaemic penumbra and infarct core
5. Absence of extensive hypodensity on initial non-contrast CT

#### Cautions and considerations for ECR:

Careful consideration should be given to ECR eligibility decisions in the following scenarios;

1. Paediatric patients – should be discussed urgently with Dr Mark Mackey, Paediatric Neurologist, Royal Children's Hospital and/or Royal Melbourne Hospital Stroke Consultant on call
2. Patients with end-stage terminal illness (i.e. currently receiving palliative care) – consider quality of life benefit

3. Patients with very poor level of baseline functioning who are dependent on a carer for personal activities of daily living, characterised by modified Rankin Scale (mRS) scale score of  $\geq 4$  (i.e. patients who cannot shower/dress/toilet independently, cannot mobilise, and/or have advanced dementia) – consider quality of life benefit
4. Patients in whom initial non-contrast CT scan shows extensive hypodensity (i.e. ischaemia evident in  $>2/3$  of the anterior circulation territory, or an Alberta Stroke Project Early CT Score (ASPECTS)  $\leq 5$ ) – Consider risk of reperfusion injury/limited evidence for benefit in patients with large core ( $>70$  ml as quantified by RAPID)
5. Patients who make an informed refusal of treatment (includes looking for a current, documented Advanced

Care Plan or Limitation of Treatment order)

#### Consent:

AH has a responsibility to ensure that, wherever possible, valid informed consent is obtained (from the patient or their

representative) for any treatments provided. Please refer to AH clinical policy [Consent to Medical Treatment Policy](#) for

further detail.

ECR is an **emergency treatment**. Frequently the treating teams will judge that treatment with ECR is warranted, however

informed consent cannot be obtained from the patient (i.e. due to stroke deficit/lack of capacity or competence). In

such instances, it is important that reasonable efforts are made to identify a '**Person Responsible**' (note that this should

not cause significant delay) who can consent to treatment on the patient's behalf.

If no such person can be identified within a reasonable timeframe, treatment can proceed without consent, as outlined

in Section 4.5 of the abovementioned policy.

Consent for ECR should include all of the following; **Digital subtraction angiography +/- endovascular clot retrieval +/-**

**general anaesthetic +/- angioplasty and stent implantation** and should refer to the risks listed below.

#### Clinical risks associated with ECR:

ECR is a specialised, technically challenging procedure which carries risks. ECR should be performed only by highly

trained and skilled Neurointerventionists, in a centre with 24 hours, 7 days per week support from radiology, neurosurgery, anaesthetics, intensive care, and acute stroke services.

The following risks are associated with ECR and should be documented;

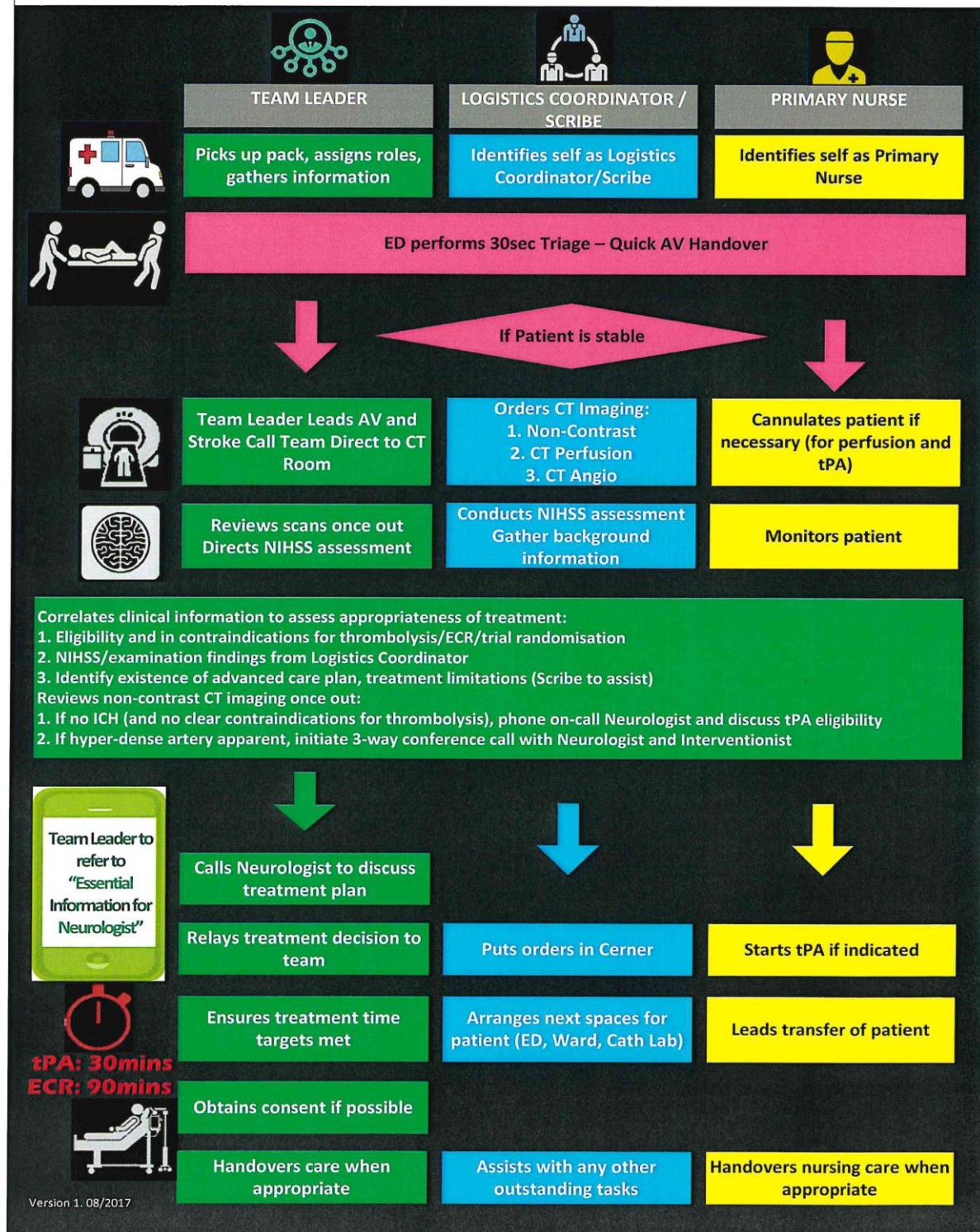
- Risk of bleeding
  - Arterial puncture site
  - Intracranial haemorrhage
  - Other internal bleeding
- Risk of failed procedure
- Risk of embolic stroke
- Risk associated with general anaesthetic and sedation
- Risk of anaphylaxis or allergic reaction
- Risk of pain and discomfort during the procedure
- Risk of death

**Organisation Workflow Process for Referral and ECR Process:**

Refer to next page



## ED Stroke Call Workflow



### Referral to Neurointerventionist:

Responsibility for identifying ECR eligibility rests with the Acute Stroke Team Leader (usually the Stroke Registrar or Stroke Nurse Practitioner, but may be the Emergency Department Registrar after hours). The Neurologist on call will ultimately determine if referral to Neurointerventionist should be activated.

- Austin's Neurologist on call is available 24 hours per day, 7 days per week on phone no. **1300 OSTROK**, or 1300 078 765

For effective and streamlined referral, it is recommended that a **3-way telephone 'conference call'** take place between the Acute Stroke Team Leader, Neurologist and Neurointerventionist;

- The Austin Hospital Neurointerventionists can be contacted 24 hours per day, 7 days per week on phone no. **1300 AUS ECR**, or 1300 287 327

### Activation of the Neurointerventional Team

Activation of the on-call Neurointerventional Team is the responsibility of the Radiology Department, in accordance with the AH Radiology On-Call, Recall and Clinical Overrun Guideline.

Additionally, The ECR Lanpage Alert should be activated by a member of the acute stroke team, as early as possible after the patient is accepted for ECR by the Neurointerventionist.

**ECR Lanpage alert** – Pager #2888 ('Stroke ECR Alert', include call-back number)

Recipients:

- |                             |        |
|-----------------------------|--------|
| • Stroke Registrar          | # 6078 |
| • Stroke Registrar 2        | # 6107 |
| • Stroke On-Call            | # 6129 |
| • Epilepsy Registrar        | # 6220 |
| • Neurology Registrar       | # 8451 |
| • Stroke Intern             | # 4519 |
| • Stroke Nurse Practitioner | # 3136 |
| • Stroke Liaison Nurse      | # 5598 |
| • Radiographer CT           | # 1281 |
| • ANUM 6 East               | # 4962 |
| • Bed Manager               | # 1121 |

### Referral to Anaesthetic and Notification to the Operating Theatre Flow Coordinator:

Patients referred for ECR may be neurologically compromised and, in rare cases, may become increasingly drowsy. Sometimes comprehension is impaired, making communication with the patient very challenging. Patients are required to lie still, in a supine position, for the duration of the ECR procedure and the agitated patient may require sedation to achieve this, which may further compromise airway protection. Pain is often experienced during the procedure, necessitating the need to administer intravenous analgesia. Haemodynamic instability is not uncommon.

At AH, a focussed assessment will be undertaken by an Anaesthetist prior to commencing ECR in every case;

- Patients should not be transferred from the ED trolley to the Angiography laboratory table until the Anaesthetics Doctor is in attendance and has assessed the patient.
- ECR procedure can commence prior to arrival of the Anaesthetics Nurse ONLY IF the Anaesthetics Doctor decides that it is safe to do so.

**Referral to Senior-In-Charge Anaesthetist**      **call Ext. 3186**    *ASAP after accepted for ECR*

**Referral to OT Floor Coordinator**              **call Ext. 3446**    *ASAP after accepted for ECR*

### **Emergency Intubation due to Imminent Airway Compromise (prior to ECR)**

Patients who are intubated by MICA Paramedics prior to hospital arrival or on arrival at ED (i.e. patients who are intubated for any reason other than to facilitate general anaesthesia) should be considered an 'emergency intubation' for the purposes of this pathway. It is anticipated that this patient group may not be safely extubated at completion of procedure and will require admission to intensive care. The Stroke Team Leader is responsible for arranging an Intensive Care Unit (ICU) bed following the procedure and discussing with the Bed Manager

### **Inter-departmental transfer, patient escort and clinical handover:**

Prior to ECR, patients will remain in ED (or current ward bed) until the Neurointerventional Team alert the Acute Stroke Team Leader that they are ready to accept the patient.

**Angio Ready Lanpage alert** – Pager #2888 ('ECR Lab Ready', include call-back number)

The Angiography Team must consider **timing/availability of the Anaesthetics Doctor before accepting transfer of the patient.**

Patient transport, in accordance with AH protocol [Patient Transfers - Clinical Responsibilities for Communication, Patient Preparation, Clinical Handover and Clinical Escort](#)

Managed with assistance from a Patient Services Attendant (PSA) and escort by two clinicians; 1) a suitably qualified registered nurse, and 2) a suitably qualified specialist clinician;

- 1) For intubated patients, 'suitably qualified' is defined as;
  - A Division 1 Registered Nurse with Advanced Life Support qualification, and
  - A Medical Doctor who is authorised to manage an intubated patient (ED, ICU or Anaesthetics) – this clinician is responsible for handover of patient care
- 2) For patients with stable airway who are not intubated, 'suitably qualified' is defined as;
  - A Division 1 Registered Nurse, and
  - The Acute Stroke Team Leader or other available qualified Medical Clinician who has expertise in acute stroke management

### **Monitoring Equipment**

Changeover from ED monitoring equipment to Radiology Anaesthetics monitoring equipment should happen promptly after the patient arrives in the Level 2 Angiography Laboratory, in order for the ED equipment to be returned to the department in a timely manner.

### **Transfer of Patient Care and Handover**

Clinical handover should take place inside the designated Level 2 Angiography suite using a 'Time-Out' approach, during which time minimal background activity takes place.

The following clinicians are required to be involved in handover (i.e. listen attentively, acknowledge that they are satisfied with the information they have received);

- Responsible stroke team clinician
- Neurointerventionist
- Anaesthetist
- Radiographer
- Radiology Scout Nurse



If the patient is intubated prior to arrival, the responsible Airway Doctor

## Post Procedure Care

### Immediate Post Procedural Care

Following Intra-arterial Sheath removal, all patients require 30 minutes (minimum) of groin pressure, (regardless of use of a closure device). This is particularly important for patients who have received thrombolysis. All patients are to remain flat (supine, head of bed 30 degrees elevation) for at least 4 hours following the procedure in accordance with [Femoral Arterial Sheath Removal](#)

### Operating Theatre Recovery Room

All patients who have undergone ECR will be transported to the Operating Theatre Recovery Room (except those for whom ICU is indicated).

Assessment of clinical stability, to determine safety of transfer to Stroke Unit, should incorporate;

- Level of consciousness (GCS  $\geq$ 10, stable, airway protected)
- Groin site assessment (no haematoma)
- BP within target range (targets identified by Neurointerventionist, PRN medications charted)
- Haemodynamic stability (as per MET criteria)
- Pain control (patient is pain free and analgesia is charted)

### Arterial Groin Puncture Observations

#### Physiological Monitoring

Unless otherwise specified by the Neurointerventionist or Stroke Team Leader, frequency of neurological and vital observations following ECR are recommended as follows;

- 15 minutely for 1 hour
- 30 minutely for 2 hours
- 1 hourly for 4 hours
- 2 hourly for 4 hours
- 4 hourly (unless otherwise specified)

#### Blood Pressure Targets

The Neurointerventionist is responsible for documenting blood pressure targets for all patients following ECR. Unless otherwise specified, blood pressure targets should align with the blood pressure aims for patients who have received intravenous thrombolysis.

#### Antiplatelet, Antithrombotic and Anticoagulant Therapy

The Neurointerventionist is responsible for communicating the need for antiplatelet agents following ECR and the timing (note that antiplatelet therapy is typically contraindicated for 24 hours following intravenous thrombolysis and until post treatment CT scan excludes haemorrhagic transformation - however this can be discussed with the Neurologist as required).

**Nursing staff are advised to page the Stroke Registrar for URGENT CLINICAL REVIEW if any of the following occur:**

- Onset of severe headache, or unexpected nausea, vomiting or agitation
- Sudden neurological deterioration/change in level of alertness
- New stroke signs/symptoms in another vascular territory

- Hypertension (SBP persistently >185 mmHg and/or DBP persistently >110 mmHg)
- Hypotension (SBP <100 mmHg systolic)
- New tachycardia (Heart rate >100 bpm)
- Fever (Temp > 38.0 degrees Celsius)
- Any evidence of significant bleeding
- Suspicion of angioedema, anaphylaxis or other allergic reaction
- New symptoms of concern (especially if abrupt in onset)

In event of neurological deterioration (NIHSS increase of 4 points or more), vomiting, agitation or severe headache, a CT brain scan should be performed immediately to assess for intracranial haemorrhage and the Neurointerventionist should be notified immediately (before transfer to CT, as they may request additional imaging).

### **Repeat Brain Imaging and Antiplatelet Therapy**

Repeat brain imaging (with CT or MRI) is indicated 24 hours after ECR (i.e. 18-30 hours) to assess size of infarct and presence of intracerebral haemorrhage. The Stroke Team is responsible for requesting and reviewing brain imaging.

Antithrombotic medication should not be initiated until post-procedural imaging has been completed and reviewed. Timing of repeat brain imaging can be directed by the Neurointerventionist, if antithrombotic medication is judged to be urgent (i.e. if a stent has been inserted).

### **Interhospital Transfer of patients after ECR**

Following ECR, patients should remain an inpatient of Austin Hospital for at least 24 hours and should have repeat brain imaging performed (18-30 hours after procedure) and reviewed prior to interhospital transfer to another health facility.

### **Quality Assurance and Monitoring:**

The acute stroke team and Neurointerventional teams are jointly responsible for monthly quality auditing of ECR cases. Reports will be presented at the stroke multidisciplinary team at monthly quality meetings and will be distributed via email to the following teams;

- Stroke multidisciplinary team
- Emergency department team
- Radiology team
- Bed management team
- Ambulance Victoria
- Quality & Safety Coordinator for Neurosciences
- CSU director

An annual quality report will also be developed and provided to the AH quality unit, Director of Neurosciences department, Emergency medicine General Manager, Cancer and Neurosciences General Manager and Ambulance Victoria.

Reports will include reporting of the following quality, performance, and safety indicators;

- Riskman reports (relevant to patients with ECR)
- Performance (time delays)
- Patient outcomes

Stroke Nurse Practitioner and Stroke Liaison Nurses will be jointly responsible for quality review process, overseen by Head of Stroke Services.

#### Document Author/Contributors:

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#### Contributors

Senior representatives from the following departments contributed to development of this protocol;

- Radiology
- Emergency Department
- Anaesthetics
- Neurology/Stroke
- Operating Theatre

#### Legislation/References/Supporting Documents:

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