

## Emergency intra-arterial intervention in acute ischaemic stroke

Salford Royal   
NHS Foundation Trust

University Teaching Trust

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**Classification:** Policy

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## 2. Who should read this document?

- All stroke medical staff
- All acute stroke unit (ASU) and hyperacute stroke unit (HASU) nursing staff
- All radiology registrars, CT radiographers, neuroradiology consultant staff
- All interventional neuroradiology staff
- All neurocritical care nursing and medical staff

## 3. Key messages

3.1 The most severe ischaemic strokes are caused by occlusion of a major intra-cranial artery (middle cerebral artery, MCA; terminal internal carotid artery, ICA; or basilar artery, BA)

3.2 Recanalisation of major intra-cranial arterial occlusions using intravenous (IV) alteplase has limited success

3.3 Salford Royal Hospital NHS Foundation Trust (SRFT) already provides a 24h IV thrombolysis service

3.4 Evidence from randomised-controlled trials (RCTs) supports the use of emergency intra-arterial (IA) intervention, mainly in addition to IV thrombolysis, for selected patients with MCA or terminal ICA occlusion.

3.5 IA intervention in acute ischaemic stroke should only be undertaken within specialist stroke centres that fulfil agreed standards of care

3.6 This policy provides a framework for the approach to assessment and management of patients considered for IA intervention in line with available RCT evidence and local consensus/guidelines

3.7 Patients receiving IA treatment should be entered into the Stroke Sentinel National Audit Programme (SSNAP) using the IA data collection proforma

## 4. Background and scope

The most severe ischaemic strokes are caused by occlusion of a major intra-cranial artery (middle cerebral artery, MCA; terminal internal carotid artery, ICA; or basilar artery, BA), with mortality in the order of 50-90%.<sup>1</sup> The main approach to limiting the extent of brain damage is by restoring blood flow through the blocked artery (reperfusion). This occurs spontaneously in around 20%, but can be therapeutically achieved using “clot-busting” drugs (thrombolysis), mechanical devices to retrieve the clot from within the artery (thrombectomy), or combination approaches.

Although thrombolysis with IV alteplase is an evidence-based and cost-effective treatment for selected patients with ischaemic stroke, recanalisation is only successful in approximately 50%<sup>2,3</sup>, and is less likely in large intra-cranial artery occlusions. IA thrombectomy or thrombolysis may achieve much higher rates of recanalisation (79%)<sup>4</sup>, but until recently there has been a lack of RCT evidence for these approaches. A number of RCTs, most notably the MR CLEAN trial<sup>5</sup>, have now provided an evolving evidence-base for IA thrombectomy in selected patients with terminal ICA/MCA occlusion, mainly those receiving IV thrombolysis (ESCAPE,

EXTEND-IA, SWIFT-PRIME, REVASCAT).<sup>6-9</sup> In the MR CLEAN trial, 33% treated with IA thrombectomy achieved the *a priori* favourable outcome, compared to 19% receiving standard acute care (OR 1.67; 95% CI 1.2-2.3; NNT=7.1).<sup>5</sup> IA thrombectomy is endorsed by NICE (<https://www.nice.org.uk/guidance/ipg548>)<sup>10</sup>. Recent pooled trial data suggest that patients > 80 years old may benefit from IA thrombectomy, and should not be excluded from consideration of treatment (Goyal et al, 2016)<sup>11</sup>.

SRFT is committed to high-quality care for patients with stroke. Emergency IA intervention is a potential treatment option for patients presenting with occlusion of a major intra-cranial artery. This policy describes the assessment and management of patients being considered for IA intervention in the context of best available evidence, and local consensus, within the limitations of existing resource provision.

## 5. What is new in this version?

5.1 Eligibility for urgent CT angiography (CTA): The upper age limit of 80 y has been removed from the CTA protocol as there is no justification in excluding those >80 y from consideration of thrombectomy<sup>11</sup>

## 6. Policy/ Protocol

### 6.1 Protocol for considering emergency IA intervention

SRFT is the Comprehensive Stroke Centre (CSC) for the Greater Manchester conurbation, and already delivers a 24h IV thrombolysis service and an ad-hoc emergency IA intervention service for stroke. In line with current commissioning, existing infrastructure and resources, SRFT will provide an emergency IA intervention service between 0800-1800 Monday-Friday. Outside of these hours, IA may be considered under exceptional circumstances only following consultant to consultant discussion.

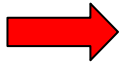
#### 6.1.1 Initial assessment and management

Selected patients with an acute non-haemorrhagic stroke presentation within 4.5h will proceed directly to CTA after plain CT (see **Figure 1**).

#### **Figure 1: Hyperacute Stroke CT Protocol**

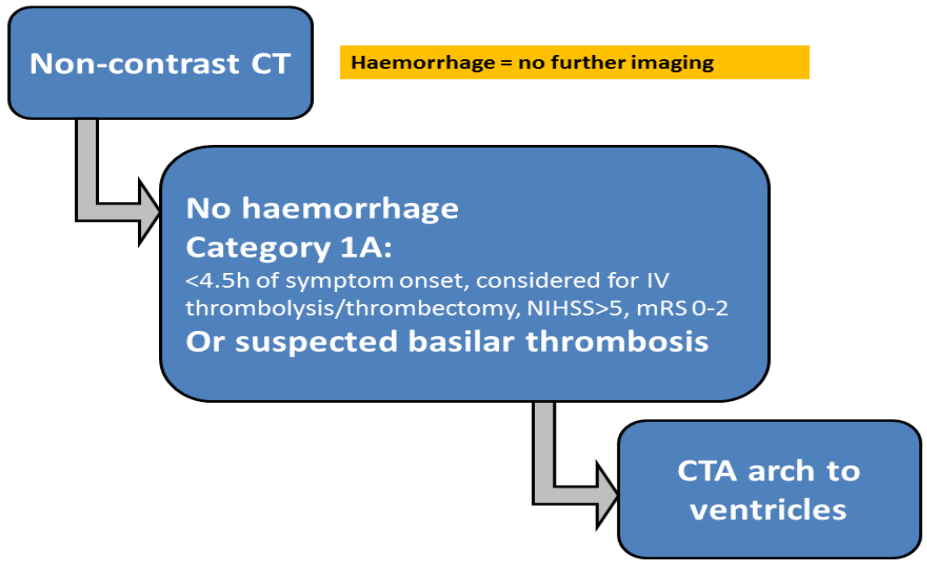
Mon - Fri 0800 to 1800: potentially eligible for IV thrombolysis?

- Within 4.5 hours# of symptom onset
- Aged ≥ 18 years of age
- NIHSS >5
- Pre-stroke mRS 0-2
- Otherwise potential candidate for IA procedure



**CATEGORY 1A: Direct access CT and CTA**

# If proven basilar artery occlusion (BAO), IA thrombectomy may be considered >4.5h after symptom onset on an individual case basis (discuss with the available neurointerventionalist)



Patients potentially eligible for IV thrombolysis <sup>12</sup> should proceed without delay on clinical grounds and the result of plain CT brain imaging. IV thrombolysis should continue until groin puncture, or completion of the prescribed dose of alteplase, whichever occurs first.

The baseline imaging will be discussed with a neuroradiologist as soon as possible. CTA source data are available rapidly so that a major artery occlusion can be diagnosed whilst the patient is in the scan room or shortly thereafter. An ASPECTS score of <7 will be considered a contra-indication to IA intervention.

CT perfusion is not currently recommended. Iodinated contrast agents used in CTA may very rarely precipitate anaphylactoid reactions or contrast-induced nephropathy. National guidelines regarding precautions in patients with dehydration, pre-existing renal disease or preceding treatment with metformin; and the management of complications following iodinated contrast administration are available. <sup>13</sup>

6.1.2 Eligibility and selection for emergency IA intervention

An overview of eligibility and selection for potential emergency IA intervention is shown in **Figure 2 and 3**. The on-call stroke consultant and interventional neuroradiologist (iNeuro) will determine the potential availability of the angiography suite, neuroanaesthetist and a neuro-HDU bed. Anaesthetic cover will be provided by the duty consultant for neuroanaesthesia. Choice of CE mark-approved thrombectomy device is at the discretion of the iNeuro. It is possible that a critical

care bed may not be available at the time the decision is made to proceed to catheter angiography but this should not preclude the patient being treated. In this situation, discussion between the bed manager and senior attending clinicians should be initiated. Patients on ITU/ neuro-HDU will remain under the primary care of the stroke team.

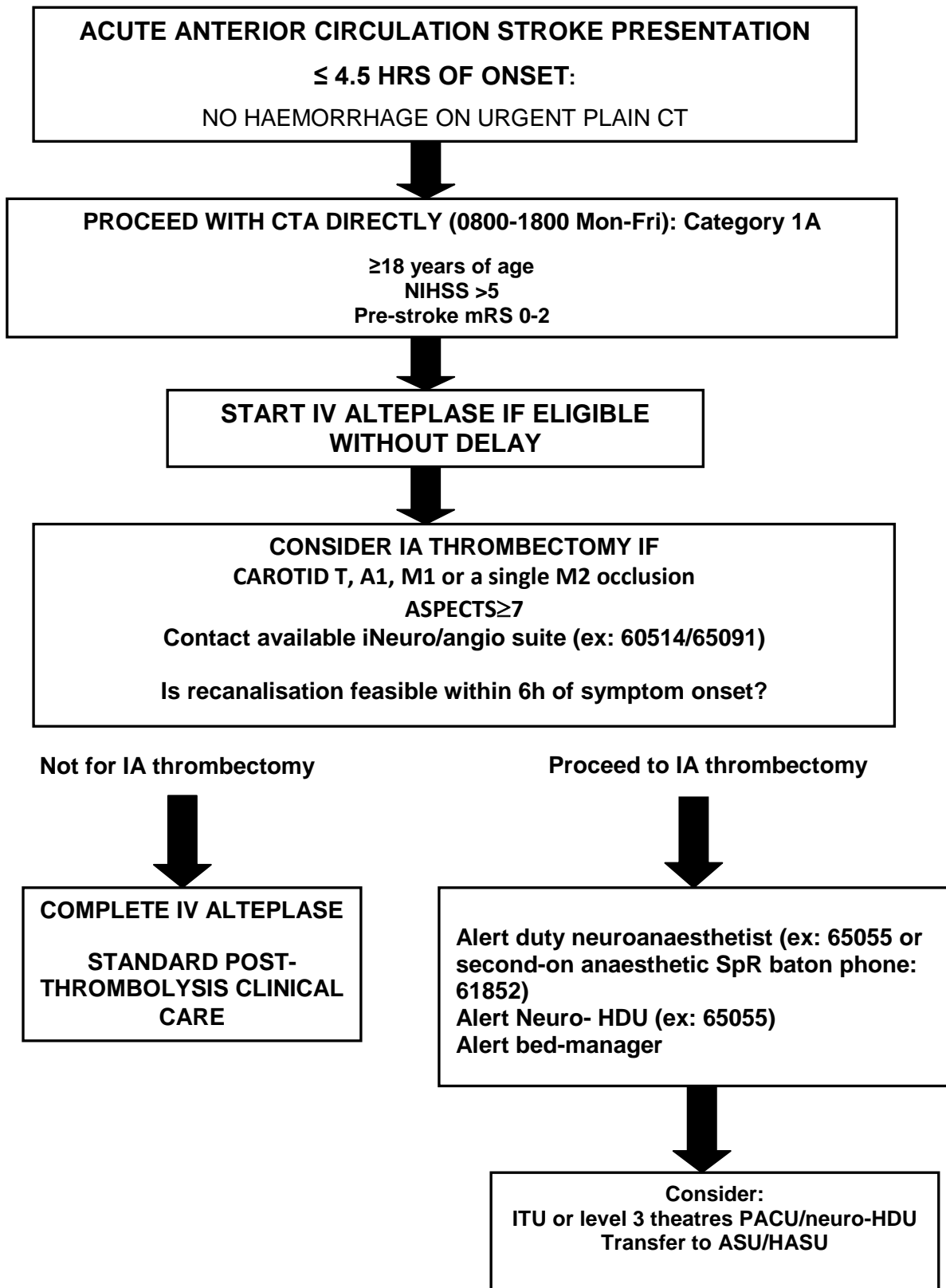
**MCA, proximal ACA or terminal ICA occlusion (Figure 2)**

Appropriate documentation of risks/benefits, and consent process is essential. Administration of a general anaesthetic (GA) versus conscious sedation will be at the discretion of the attending clinical team. Stand-alone IA intervention may be considered on an individual patient basis (eg definite contra-indication to IV thrombolysis). The duty stroke consultant and neuroanaesthetist will determine the need for level 2/3 care on neuro-HDU/ITU, or transfer to ASU/HASU on an individual basis post-procedure. All patients will receive a 24h post-thrombolysis CT scan, or earlier if clinical need dictates. Antiplatelet or anticoagulant therapy will only be considered after review of the 24h CT scan by the stroke team.

**BA occlusion (Figure 3)**

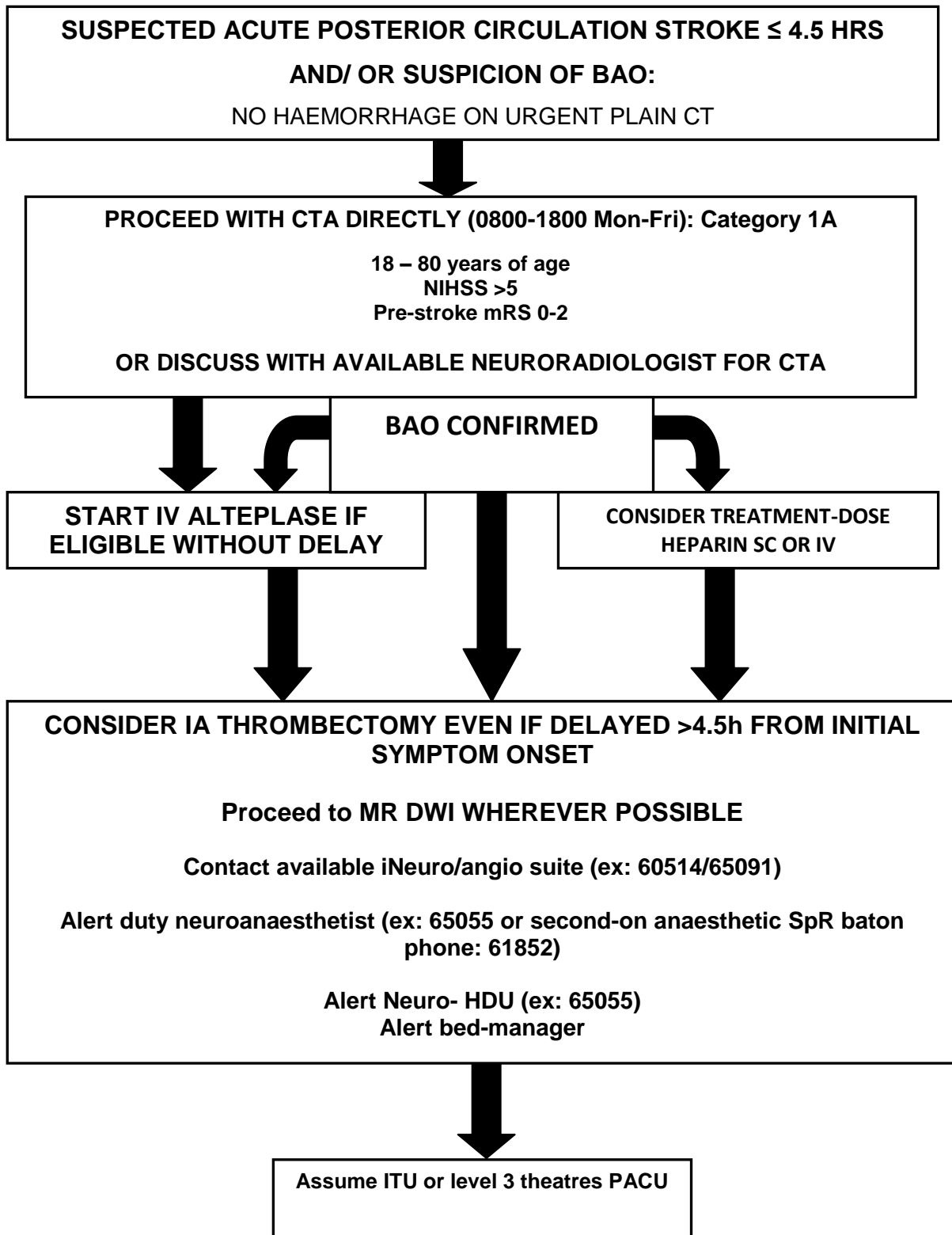
Reperfusion in BA occlusion is often considered separately from that of the anterior circulation, as the prognosis is generally worse yet the reperfusion time window may be more prolonged (> 6hrs). Emergency IA intervention may be considered in addition to IV thrombolysis, or as a stand-alone procedure beyond the usual therapeutic window of 6h from symptom onset. IA intervention for BA occlusion should be considered on a case-by case basis, and should include an MR DWI wherever possible to inform decision-making. Appropriate documentation of risks/benefits, and consent process is essential. GA would be considered usual in patients with BA occlusion undergoing IA intervention. Following successful angiographic recanalisation/ reperfusion of BA occlusion, antiplatelet/anticoagulation therapy may be considered sooner than 24h, guided by interim CT/MR and CTA.

**Figure 2: Protocol for IA intervention: Anterior circulation occlusion**



**NB: STAND-ALONE IA INTERVENTION MAY BE CONSIDERED ON AN INDIVIDUAL PATIENT BASIS**

**Figure 3: Protocol for IA thrombectomy: BA occlusion (BAO)**



## 7. Standards

7.1 Patients presenting with suspected stroke and definite time of onset within 4.5 hours will be screened urgently by the ASU team and undergo urgent CT brain imaging

7.2 In the absence of haemorrhage, or other stroke mimic, selected patients will proceed directly to CT angiography (CTA); category 1A (see **Figure 1**)

7.3 Consideration of emergency IA intervention will be guided by this policy (see **Figure 2 and 3**)

7.4 Patients undergoing emergency IA intervention will be managed on the ITU/ Neuro-HDU, or ASU/HASU depending on clinical need post-procedure

7.5 All patients undergoing IA thrombectomy will be entered into the SSNAP registry using the IA data collection proforma (Appendix 1)

## 8. Explanation of terms and definitions

NIHSS (National Institutes of Health Stroke Scale): a validated, bedside neurological impairment scale used to measure stroke severity

Pre-stroke mRS (modified Rankin): a rating scale of independence, applied in this context to the month preceding the presentation stroke. It therefore gives an indication of an individual's independence before their stroke. The scoring range 0-2 is widely accepted as indicating independence.

## 9. References and supporting documents

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12. Thrombolysis in acute ischaemic stroke – assessment and eligibility for IV alteplase. <http://intranet.srht.nhs.uk/policies-resources/trust-policy-documents/departments/stroke-centre/>

13. <https://www.nice.org.uk/guidance/cg169/evidence/acute-kidney-injury-full-guideline-191530621>

## 10. Roles and responsibilities

ASU Ward Manager and Stroke Consultants: to ensure all stroke medical and trained nursing staff are familiar with this policy and comply with it.

Clinical leads for Neuro-HDU and ICU: to ensure all medical and trained nursing staff in neuro-critical care are familiar and comply with this policy.

Clinical lead for neuroradiology: to ensure all consultant and junior colleagues and CT/angiography radiographers are familiar and comply with this policy.

## 11. Appendices

## Appendix 1: SSNAP proforma for intra-arterial intervention data collection

<b>Patient Name:</b>	SURNAME	FORENAME	
<b>Patient DOB:</b>	DD/MM/YYYY		
<b>NHS No.:</b>	-----		
<b>Hospital No.:</b>			

1) Did the patient receive an intra-arterial intervention for acute stroke?	<input type="checkbox"/> YES	<input type="checkbox"/> NO
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<b>The following questions are only for patients in whom "YES" has been answered:</b>		
2) Was the patient enrolled into a clinical trial of intra-arterial intervention?	<input type="checkbox"/> YES	<input type="checkbox"/> NO

<b>3) What brain imaging technique was carried out prior to the intra-arterial intervention? (Select all that apply)</b>		
CTA or MRA: <input type="checkbox"/> YES <input type="checkbox"/> NO	Measurement of ASPECTS score: <input type="checkbox"/> YES <input type="checkbox"/> NO	Assessment of ischaemic penumbra by perfusion imaging: <input type="checkbox"/> YES <input type="checkbox"/> NO

<b>4) How was anaesthesia managed during the intra-arterial intervention? (Select only the most appropriate response)</b>			
Local anaesthetic only (anaesthetist NOT present)	<input type="checkbox"/>	Local anaesthetic only (anaesthetist present)	<input type="checkbox"/>
Local anaesthetic and conscious sedation (anaesthetist NOT present)	<input type="checkbox"/>	Local anaesthetic and conscious sedation (anaesthetist present)	<input type="checkbox"/>
General anaesthetic	<input type="checkbox"/>	Other	<input type="checkbox"/>

<b>5) What was the specialty of the lead operator? (Select only the most appropriate response)</b>			
Interventional neuroradiologist	<input type="checkbox"/>	Cardiologist	<input type="checkbox"/>
Interventional radiologist	<input type="checkbox"/>	Other	<input type="checkbox"/>

<b>6) Were any of the following used?</b>			
Thrombo-aspiration system: <input type="checkbox"/> YES <input type="checkbox"/> NO	Stent retriever: <input type="checkbox"/> YES <input type="checkbox"/> NO		
Proximal balloon/flow arrest guide catheter: <input type="checkbox"/> YES <input type="checkbox"/> NO	Distal access catheter: <input type="checkbox"/> YES <input type="checkbox"/> NO		

<b>7) Date and time of:</b>			
Arterial puncture:	DD/MM/YYYY	HH:MM	
First deployment of device for thrombectomy or aspiration (if carried out):	DD/MM/YYYY	HH:MM	
Was thrombectomy or aspiration carried out?	<input type="checkbox"/> YES	<input type="checkbox"/> NO	
End of procedure (time of last angiographic run on treated vessel):	DD/MM/YYYY	HH:MM	

<b>8) Did any of the following complications occur? (Select all that apply)</b>		
Symptomatic intra-cranial haemorrhage:	<input type="checkbox"/> YES	<input type="checkbox"/> NO
Extra-cranial haemorrhage:	<input type="checkbox"/> YES	<input type="checkbox"/> NO
Other procedural complication resulting in harm to the patient:	<input type="checkbox"/> YES	<input type="checkbox"/> NO

<b>9) Angiographic appearance of culprit vessel and result assessed by operator (modified TICI score):</b>					
Pre intervention:	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2a <input type="checkbox"/>	2b <input type="checkbox"/>	3 <input type="checkbox"/>
Post intervention:	0 <input type="checkbox"/>	1 <input type="checkbox"/>	2a <input type="checkbox"/>	2b <input type="checkbox"/>	3 <input type="checkbox"/>

<b>10) Where was the patient transferred after the completion of the procedure? (Select only the most appropriate response)</b>		
Intensive care unit or high dependency unit <input type="checkbox"/>	Stroke unit <input type="checkbox"/>	Other <input type="checkbox"/>


For further assistance, please contact the SSNAP Helpdesk (09:00-17:00 Mon-Fri):  
02030751318 / 02030751383 [www.strokeaudit.org/ssnap@rcplondon.ac.uk](http://www.strokeaudit.org/ssnap@rcplondon.ac.uk)

SSNAP Intra-Arterial Intervention Form



**PLEASE COMPLETE ALL SECTIONS**

## Document Control Information

<p><b>Emergency intra-arterial intervention in acute ischaemic stroke</b></p> <p><b>Lead Author:</b> Professor Craig J Smith, Consultant in Stroke Medicine, Greater Manchester Neurosciences Centre  <b>Additional authors:</b> Dr Hannah Stockley, Dr Amit Herwadkar, Dr Craig Carroll, Dr Toby Williams, Dr Rekha Siripurapu, Dr Roger Laitt</p> <p><b>Document owner:</b> Professor Craig J Smith  <b>Contact details:</b> ex 64044/60623; <a href="mailto:craig.smith@srft.nhs.uk">craig.smith@srft.nhs.uk</a></p>	<p style="text-align: right;">Salford Royal   NHS Foundation Trust</p> <hr style="width: 100%;"/> <p style="text-align: right;"><i>University Teaching Trust</i></p> <div style="background-color: #0070C0; color: white; padding: 5px; text-align: center; margin-top: 20px;"> safe • clean • personal </div>
<p><b>Classification:</b> Clinical policy  <b>Scope:</b> Trust-wide and Stroke Centre  <b>Applies to:</b> Medical Neurosciences; Neuroradiology/Radiology; Anaesthesia, Critical Care and theatre recovery  <b>Document for public display:</b> Yes</p>	
<p><b>Keywords:</b> ischaemic stroke; acute stroke; occlusion; thrombolysis; alteplase; thrombectomy; intra-arterial; angiography; basilar artery; middle cerebral artery; internal carotid artery</p>	
<p><b>Associated Documents:</b></p> <p>Consensus statements on intra-arterial interventions in acute stroke:  <a href="http://www.improvement.nhs.uk/stroke/AcuteStroke/tabid/281/Default.aspx">http://www.improvement.nhs.uk/stroke/AcuteStroke/tabid/281/Default.aspx</a></p> <p>Thrombolysis in acute ischaemic stroke – assessment and eligibility for IV alteplase  <a href="http://intranet.srft.nhs.uk/policies-resources/trust-policy-documents/departments/stroke-centre/">http://intranet.srft.nhs.uk/policies-resources/trust-policy-documents/departments/stroke-centre/</a></p>	
<p><b>Unique Identifier:</b> TC23(09)  <b>Issue number:</b> 4.1  <b>Replaces:</b> Issue number 4  <b>Authorised by:</b> Stroke Clinical Governance Committee &amp; CEC  <b>Authorisation date:</b> March 2018  <b>Next review:</b> March 2021</p>	

## Policy Implementation Plan

The clinical leads and HASU/ASU Ward Manager will maintain responsibility for publicising this policy, and providing appropriate induction, training and assessment of competencies, for staff members in the relevant disciplines. The stroke, neuroradiology and neuroanaesthesia clinical governance groups will ensure this policy is implemented and reviewed on an ongoing basis.

## Monitoring and Review

Patients undergoing IA thrombectomy will undergo monitoring and review within the frameworks of the trial governance and mortality and morbidity framework. All patients receiving IA thrombectomy will continue to be collated/audited by the stroke Clinical Governance lead and entered into the SSNAP audit registry.

## Endorsement

Endorsed by:		
Name of Lead Clinician/Manager or Committee Chair	Position of Endorser or Name of Endorsing Committee	Date
Martin Punter	Clinical Governance Lead	27/01/2018
Martin Punter	Chari, MNARC	09/03/2018
Karen Coverley	Chair, DARC	12/03/2018
Peter Turkington	Chair, CEC	12/03/2018

## Screening Equality Analysis Outcomes

The Trust is required to ensure that all our policies/procedures meet the requirements of its service users, that it is accessible to all relevant groups and **further the aims of the Equality Duty for all protected groups by age, religion/ belief, race, disability, sex, sexual orientation, marital status/ civil partnership, pregnancy/ maternity, gender re-assignment.** Due consideration may also be given to carers & socioeconomic factors.

<b>Have you been trained to carryout this assessment? Yes</b> <b>If 'no' contact Equality Team 62598 for details.</b>	
<b>Name of policy or document : Emergency intra-arterial intervention in acute ischaemic stroke</b>	
<b>Key aims/objectives of policy/document: Framework guiding assessment and management of urgent intra-arterial interevention in acute iscahemic stroke</b>	
1) a) Who is this document or policy aimed at?	1a) All patients with ischemic stroke assessed as eligible for thrombolysis with IV altepalse
2) a) Is there any evidence to suggest that your 'end users' have different <u>needs</u> in relation to this policy or document; (e.g. health/ employment inequality outcomes) <b>(NB If you do not have any evidence you should put in section 8 how you will start to review this data)</b>	2a) No
3) a) Does the document require any decision to be made which could result in some individuals receiving different treatment, care, outcomes to other groups/individuals?	3a) Yes
b) If yes, on what basis would this decision be made? <b>(It must be justified objectively)</b>	3b) Patients with a preceding level of dependency (mRS >2) are not routinely considered for IA thrombectomy based on the eligibility criteria of the recent randomised trials.
4) a) Have you included where you may need to make reasonable adjustments for disabled users or staff to ensure they receive the same outcomes to other groups ?	4a) Yes
5) a) Have you undertaken any consultation/ involvement with service users or other groups in relation to this document?	5a) No

b) If yes, what format did this take? Face/face or questionnaire? (please provide details of this)	5b) N/A
c) Have any amendments been made as a result?	5c) N/A
6) a) Are you aware of any complaints from service users in relation to this policy?	6a) No
b) If yes, how was the issue resolved? Has this policy been amended as a result?	6b) N/A

7) a) To summarise; is there any evidence to indicate that any groups listed below receive different outcomes in relation to this document?

	Yes		No	unsure
	Positive	Negative*		
Age			X	
Disability			X	
Sex			X	
Race			X	
Religion & Belief			X	
Sexual orientation			X	
Pregnancy & Maternity			X	
Marital status/civil partnership			X	
Gender Reassignment			X	
Carers *1			X	
Socio/economic**2			X	

1: That these two categories are not classed as protected groups under the Equality Act.

2: Care must be taken when giving due consideration to socio/economic group that we do not inadvertently discriminate against groups with protected characteristics

### **Negative Impacts**

\*If any negative impacts have been identified you must either a) state below how you have eliminated these within the policy or b) conduct a full impact assessment:

8) How will the future outcomes of this policy be monitored?

Audit via local (SSNAP) and SITS registry data

9) **If any negative impact has been highlighted by this assessment, you will need to undertake a full equality impact assessment:**

Will this policy require a full impact assessment? No  
(if yes please contact Equality Team, 62598/67204, for further guidance)

High/Medium/Low Type/sign: Craig Smith  
date: 04/11/17