

Stroke Treatment Pathway: Emergency Department and Inpatient Management

March 2025



After following **Suspected Stroke Imaging Pathway:**
Neuroimaging completed and reviewed by Neurology and
Neuroradiology

Immediate Actions

Neurology must be consulted before making any treatment decisions¹

- Consult Neurology immediately to determine treatment plan (tPA and/or mechanical thrombectomy)
- Ensure PICU/CICU and Pharmacy are aware (per Tier II stroke imaging alert)

Does patient meet
criteria for tPA
administration²?

Yes

No

Prep for tPA

- Make patient NPO
- Ensure IV access
- Obtain consent for tPA³
- Type and Screen (if not already done)
- Notify hematology of any abnormal coagulation labs

- ED attending orders tPA with Neurology recommendation⁴ (refer to tPA checklist on [page 2](#))
- Pharmacist prepares tPA infusion with STAT release

Administer tPA with Neurology at bedside⁴

- Refer to [page 3](#) for post tPA care

Is Mechanical
Thrombectomy
recommended by
Neurology?

Yes

No

Transfer to AMBH if
needed for
Mechanical
Thrombectomy with
Neuro IR

- Neurology Attending to call
Transfer Center
- Transfer center will then
connect Neurology with **all 3:**
Neuro IR, Neurosurgery, and
Anesthesia

Post intervention (tPA,
thrombectomy, etc.)
monitoring to be coordinated
between Neurologist, Neuro
IR, and ICU Provider

- Admit to PICU or
CICU
- Further
management per
Neurology
recommendations

¹Neurology Consult

- The **Neurology Resident** should arrive to the bedside as soon as possible, within 30 minutes of notification.
- The **Neurology Attending** will be involved in the decision making for treatment plan.

²tPA Inclusion Criteria

- Patient 2-21 years old
 - Onset of symptoms ≤ 4.5 hours
 - Persistent focal deficit
 - Neuroimaging confirms no hemorrhage
 - No contraindications for tPA present
- (Refer to tPA checklist on [page 2](#))

³tPA Consent

- The **Neurology Attending** is responsible for obtaining consent for tPA which may be obtained over the phone if necessary with witness present.
- Patient to be evaluated by **Neurology Attending** physician if tPA is administered.
- Consultation per Children's Med Staff bylaws.

⁴tPA Dosing and Administration

Recommended Total Dose for Pediatric Stroke:

0.9mg/kg IV (maximum total dose 90 mg)

- Bolus: 0.09 mg/kg IV (**maximum 9mg**) over 1 min (10% of total dose) **THEN**
- Infusion: 0.81 mg/kg IV (**maximum 81mg**) over 60 mins (90% of total dose)

- Once **Neurology Attending** has been involved in the decision to treat and has obtained consent, the **Neurology Resident** may facilitate and expediate appropriate tPA therapy with direction from the **Neurology Attending** while they are in route. Administration of tPA should not be delayed if the Neurology Attending is not physically at the bedside.

⁵Hughes Spalding Transfers

Hughes Spalding patients 17 years and older:

- Use the Emory Hospital Connect paging system (404-686-5500; ID# 59747). Type in the call back number as instructed. *The ID# 59747 corresponds to the word "LYSIS"*

OR

- Contact the Grady "Hub" (404-616-5846) and ask to speak to the on-call neurologist covering stroke transfers

OUTSIDE HOSPITAL TRANSFERS

Hughes Spalding:

- Contact Children's Transfer Center for Stroke Alert
- For further stroke management:
 - Patients 17 years and older: Transfer to Grady Hospital⁵
 - Patients <17 years: Transfer to AMBH

OSH transfer with confirmed stroke:

- Transfer to
AMBH

**PATIENT'S ARRIVAL AREA (ED OR ICU OR FLOOR,
ETC.) WILL BE DETERMINED DURING ACCEPTANCE
CALL BASED ON ANTICIPATED NEED FOR
INTERVENTIONS.**

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Children's
Healthcare of Atlanta

Exclusion Criteria for tPA Therapy

Patient must have "NO" answered for ALL criteria. If ANY answer is "YES", tPA is contraindicated UNTIL further assessment is completed.

	YES	NO
Stroke Characteristics		
Patient received IV tPA at referring hospital		
Intracranial hemorrhage of any type seen on neuroimaging (including parachymal, subarachnoid, other)		
Clinical presentation suggestive of subarachnoid hemorrhage or aortic arch dissection		
Neuroimaging supports multilobar involvement or large volume infarct involving > 1/3 of a complete arterial territory		
Stroke associated with any of the following: intracranial arterial dissection; endocarditis; moyo moyo; sickle cell disease; CNS vasculitis; meningitis; bone marrow, air, or fat embolism		
Medical History		
Head trauma, intracranial or spinal surgery, or prior stroke in the previous 3 months		
History of previous intracranial hemorrhage, cerebral AVM, aneurysm, neoplasm, or dissection		
Previous diagnosis of vasculitis of the CNS. <i>Focal cerebral arteriopathy of childhood (FCA) is NOT a contraindication.</i>		
Myocardial infarction in the previous 3 months. Clinical presentation consistent with acute MI or post-MI pericarditis that requires evaluation by Cardiology prior to treatment.		
Internal bleeding, GI, or urinary tract hemorrhage in the previous 21 days		
Major surgery, major trauma not involving the head, or parenchymal biopsy in the previous 14 days		
Arterial puncture at a noncompressible site or lumbar puncture in the previous 7 days (<i>Patients who have had a cardiac catheterization via a compressible artery are NOT excluded</i>)		
Known current malignancy and/or within 1 month of completion of treatment for cancer		
Allergy to tPA		
Pregnant		
Vital Signs, Labs, and Other Clinical Features		
Evidence of active bleeding or acute trauma (fracture) on examination		
Blood Glucose concentration <50 mg/dL or >400 mg/dL (ok if it can be corrected and exam reassessment unchanged)		
Persistent systolic blood pressure >15% over the 95 th percentile >1 hour and unresponsive to treatment; OR systolic blood pressure >20% over the 95 th percentile at any time (see blood pressure parameters table on page 3)		
Coagulation Factors:		
○ Platelets <100,000		
○ INR >1.4, PT >15s, or aPTT>38s		
○ Current anticoagulation use (warfarin or heparin) and abnormal INR >1.4, PT >15s, aPTT>38s		
○ Full treatment LMWH within last 24 hours (does not include prophylactic dose)		
○ Current use of direct thrombin or direct Xa inhibitors (such as rivaroxaban) within the last 48 hours (Rivaroxaban, Apixaban, Dabigatran, Argatroban, Bivalirudin)		
○ Bleeding diathesis		
Consent		
Patient will refuse blood transfusion if indicated		
Patient/family do not consent based on known risks and benefits of treatment of stroke with IV tPA		

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tPA Care During and After Administration

tPA administered IV⁴

Admit to PICU/CICU (if not already there)

Patient Monitoring^{5,6,7} (see BP parameters below)

Vital Sign, Blood Pressure (BP) Monitoring, and Neurologic Status Checks

Beginning at the start of tPA infusion:

- Q15 min x 2 hours, then
- Q30 min x 6 hours, then
- Q60 min x 16 hours

Any neurological
deterioration?

Continue Neuro
Checks
as ordered

- **Stop tPA immediately** (if during the infusion stage)
- Provide supportive care (ABCs)
- Order STAT CT head
- Draw STAT CBC, INR, PTT, fibrinogen
- Consult hematology if bleed identified on CT Head. Order and prepare to give 6-8 units of cryoprecipitate (fibrinogen and factor VIII)
- Notify Stroke Neurologist
- Consult neurosurgery if signs of elevated ICP or CT reveals bleed or mass effect

Post-tPA Care

- ICU for minimum of 24 hours; and hospital stay minimum 48 hours
- HOB flat
- NPO x24 hours after tPA
- CBC, INR, PTT, fibrinogen, d-dimer, at 6 hours
- No arterial punctures, invasive procedures, or anti-coagulants (ASA, NSAID, UFH, LMWH) for 24 hours.
 - If placing an arterial line following tPA, perform at a compressible site by an experienced proceduralist. Avoid >1 puncture.
- Avoid placing indwelling urinary catheter, NG tube
- Maintain euglycemia
- Maintain normothermia – avoid fever
- Follow-up imaging per stroke neurologist/ICU
- Head CT the following AM or sooner if needed
- Neurology to perform NIH stroke scale the following morning after tPA

4tPA Dosing and Administration

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5Monitoring & Precautions during & after tPA

If any of the following occurs, stop infusion and notify MD:

- Orolingual Edema
- Decreased level of consciousness
- Suspected hemorrhage
- Headache
- Nausea/Vomiting
- New or worsening Neurological focal features:
 - Language/Speech changes (aphasia, dysarthria)
 - Weakness
 - Coordination or balance problems
 - Sensory changes
- Do not insert foley; if already present, not necessary to remove prior to tPA infusion
- NPO except meds
- Avoid NGT (for first 24 hours after tPA infusion)

6Blood Pressure Management during tPA

- Maintain cardiorespiratory monitoring
- Vitals and neuro checks q15min
- Systolic Blood Pressure (SBP) check q15min
- SBP should be maintained between 50th and 95th percentile for age (**see SBP Parameters below**)
- Treat hypertension if BP >15% above 95th percentile for age for more than 1 hour **OR** if >20% above 95th percentile for age at any time:

Intermittent dosing ("IV push") options:

1. Labetalol (first line):

- Dosing: 0.2 mg/kg/dose IV push over 2-3 minutes, repeat every 15 minutes as needed
- Max single dose: 40 mg

2. Hydralazine (second line):

- Dosing: 0.1-0.2 mg/kg/dose IV push over 1-2 minutes, repeat every 4-6 hours as needed
- Max single dose: 20 mg

Continuous infusion ("Drip") options:

1. Nicardipine (first line):

- Initial dose: 0.5-1 mcg/kg/min OR 2.5-5 mg/hr
- Max dose: 5 mcg/kg/min OR 15 mg/hr
- Titrate by 0.5-1 mcg/kg/min q15-30 min or 1-2 mg/hr to MAP/SBP

2. Labetalol (second line):

- Use with caution in patients with asthma/underlying cardiac disease
- Initial dose: 0.25 mg/kg/hr
- Max dose: 3 mg/kg/hr
- Titrate by 0.5 mg/kg/hr q15-30 min to goal MAP/SBP

7Systolic Blood Pressure (SBP) Parameters

Age	50%	95%	>15% above 95%	>20% above 95%
1-4 years	90	111	128	133
5 years	94	113	130	136
6-10 years	96	121	139	145
11-18 years	105	131	151	157
	105	140	161	168
>18 years	110	140	161	168

Hemorrhagic Stroke/ICH identified by Neuroimaging

Immediate Interventions

- **Hold antithrombotic medications**
- **Begin neuroprotection for elevated ICP**
- Contact Neurosurgery (*before transfer to ICU*)
- Transfer to ICU (if not already there)
 - NOTE:** Cardiac patients should **ONLY** be admitted to CICU. Contact CICU attending and charge RN
- Contact Heart Transplant/VAD physician phone in Voalte immediately for suspected VAD complication
- Provider consults Hematology and confirms notification

⁸Neurosurgical Intervention Criteria

Inclusion Criteria:

- Significant mass effect
- Herniation
- Hydrocephalus
- Active bleeding
- Severe bleed
- Moderate to severe neurologic deficit

Exclusion Criteria:

- Small to moderate bleed and **NO** or minor Neurological focal finding

Does patient meet criteria for possible Neurosurgical Intervention?⁸

Yes

- Continue to hold antithrombotic
- Neuro checks every 1 hour
- Repeat Head CT per Neurosurgery orders

Intervention and post op care per Neurosurgery

No

No, and meets 1 of the following:

- **Moderate-sized bleed OR**
- **Minor focal neurologic Deficit**
- Continue to hold antithrombotic
- Reverse any anticoagulation
- Consider platelet transfusion
- Neurosurgical reassessment for possible intervention

No, and meets the following:

- **Tiny/small bleed AND**
- **No neurologic deficit**
- Continue to hold antithrombotic
- Remain in ICU
- Neurochecks every 1-2 hours
- Repeat Head CT (12-24hrs)

Is the bleed expanding?

No

- Supportive care
- Monitoring neuro exam and vital signs
- Neurological monitoring (serial exams – neuro and CT)

Yes

- Notify Hematology
- Neurosurgery to evaluate if Neurosurgical Intervention indicated