

Suspected Stroke: Initial diagnosis and management

28 days to 18 years of age

Aim: To standardize evaluation and management of suspected stroke.

Suspicion for stroke (note 1), any of the following:

- Acute onset hemiparesis
- Aphasia
- Visual field loss
- Ataxia
- Dysarthria
- Hemisensory loss
- New-onset focal seizures with > 2 hr post-ictal paralysis

Evaluate emergently:

ED: Do complete evaluation in the ED that the patient presents to. If being transferred from outside ED or via EMS, divert to MPLS ED if possible if stroke suspected.

INPATIENT: Call rapid response (escalate to Code Blue if needed).

- Determine last known well (LKW) time
- STAT page Pediatric Neurology ("Noran" under Neurology on Amion, say STROKE) (and Heme if patient has Sickle Cell Disease)
- NPO, Place PIV, bed rest, keep O2 sats > 95% (cardiac patient: sat goals per cardiology team)
- HOB up 30-45 (in case CVST or intracranial hemorrhage). HOB flat for acute ischemic stroke
- Obtain STAT CBC with diff, PT/PTT/Fib, CMP, POC glucose, EKG - do not delay imaging
- Acetaminophen Q6 hours for temp > 37 C, NO NSAIDS
- Plan for Mpls PICU transfer unless specified by Neuro or Neuro IR - do not delay imaging. If patient on STP campus, transfer once stable for transport.

EXCLUSION GUIDELINES

1. Patients with known metabolic disorders (page genetics STAT and refer to emergency letter)
2. Patients < 28 days old
3. **Cerebral venous sinus thrombosis (CVST): See [separate guideline](#)
4. Moyamoya syndrome

Management:

- Consult neurosurgery (NSG) STAT
- STAT transfer to Mpls (unless directed by NSG)
- Minneapolis PICU admission
- Further imaging per ICU and NSG team
- Consult hematology

Obtain non-contrast head CT immediately (if high probability for LVO, obtain CTA per Neuro recs and alert Neuro IR in Amion). Ensure radiology knows patient may need STAT MRI to follow depending on CT results.

Does imaging show a bleed?

Yes

No

Go to MRI - Quick Brain (QB) preferred acutely (see page 2 for contact info)

- LKW time < 4.5 hrs: QB MRI immediately
- LKW 4.5–24 hr: QB MRI urgently or immediately if close to 24 hour window and endovascular therapy considered (*Note for the 4.5-24 hour window: if time allows, order MRA and MRV per discussion with neurologist)
- LKW > 24 hr: Discuss with Peds Neuro, routine MRI

Off guideline
Evaluate for other causes

MRI positive for stroke (note 1)?

No

Yes

Is there a large vessel occlusion (LVO)?**

Yes

- If patient meets alteplase tPA protocol (note 2), administer tPA (note 3). If does not meet tPA protocol, give aspirin 3-5 mg/kg x 1, max dose 325 mg.
- STAT page to Neuro IR on call (amion, under Interventional Radiology) and also discuss with Neurology
 - Ask radiology department to push images to Abbott or United
 - See page 2 for contact info
- Patient should transfer to Mpls PICU, if not already there, unless specified by Neuro IR and Neurology.

Patients who need neuro-interventional radiology at Abbott or United will return to Children's after their intervention.

Ongoing management per PICU

- Consults: Neurology, Hematology
- Neurosurgery, Neuro-interventional radiologist if applicable
- Consult PT, OT, Speech

Give Aspirin 3-5 mg/kg x 1
(max dose = 325 mg)

No

Meets alteplase tPA criteria?
(note 2)

Yes

Follow alteplase tPA protocol (note 3)

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Note 1. Stroke types

- **Hemorrhagic**
- **AIS** (arterial ischemic stroke)
- **CVST** (cerebral venous sinus thrombosis)

Contact info: Minneapolis

1. Pediatric Neuro On-Call: Amion: Noran
2. Heme: Amion
3. PICU-Mpls attending: 32760/651-855-2760 or Amion
4. Radiology: 612-813-8200 or Amion
5. Anesthesia: Amion
6. Sedation Coordinator: 612-813-8285
7. CVCC Attending: 32773/651-855-2773 or Amion
8. Neuro IR: Amion under IR

Contact info: St. Paul

1. Pediatric Neuro On-Call: Amion: Noran
2. Heme: Amion
3. PICU-St. Paul Attending: 32975/651-855-2975 or Amion
4. Radiology: 651-220-6147
5. Anesthesia: Amion 651-241-2100
6. Neuro IR: Amion under IR

Note 2: Alteplase tPA Criteria (Adapted from CHOP and TIPS trial study criteria, as well as 2026 Guideline for the Early Management of Patients With Acute Ischemic Stroke: A Guideline From the American Heart Association/American Stroke Association⁶)

Inclusion Criteria:

- Clinical diagnosis of ischemic stroke with onset within 4.5 hours of treatment initiation
- Confirmed restricted diffusion on MRI
- Symptoms indicate evolving major disabling stroke

Exclusion Criteria:

- Stroke due to: endocarditis, sickle cell, bilateral Moyamoya
- Stroke or head trauma within past 3 months
- Any prior intracranial hemorrhage which might increase risk recurrent hemorrhage
- Major surgery within 14 days
- GI or GU bleeding within previous 21 days
- Arterial puncture at non-compressible site within 7 days
- Lumbar puncture within 7 days
- Rapidly improving stroke symptoms
- CT or SWI MRI with evidence of hemorrhage
- Presentation consistent with acute myocardial infarction (MI) or post-MI pericarditis (requires cardiology evaluation)
- Persistent systolic blood pressure >15% above the 95th percentile for age while sitting or supine (Table 1, page 4)
- Platelets < 100,000 k/uL
- Glucose < 50 or > 400 mg/dL
- INR > 1.7 if on warfarin
- On heparin therapy within 48 hours and with elevated PTT
- Pregnant or lactating female
- CT with evidence of hypodensity and/or effacement of cerebral or cerebellar sulci in > 33% of MCA territory (relative contraindication)

See Note 3 on Page 3 for Alteplase administration recommendations.

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Note 3: Alteplase tPA administration:

- Give alteplase tPA IMMEDIATELY once CT and MRI completed confirming arterial ischemic stroke and inclusion criteria met (and no exclusions) (Note 2, page 2)
- Total dose 0.9 mg/kg (Max dose 90 mg)
- Administer 10% of the dose as an IV bolus over 1 minute. Infuse remainder over 1 hour via dedicated IV line. Do not delay
- Blood pressures should be recorded at least every 15 minutes for the first 4 hours after tPA infusion begins, then at least every 30 minutes for the next 4 hours, then at least every hour for the first 24 hours after tPA infusion. From 24-48 hours, blood pressure should be monitored at least every 2 hours, and from 48-72 hours, blood pressure should be monitored every 4 hours.
- Titrate systolic blood pressure for minimum of 50th percentile for age and maximum of 15% above 95th percentile for age (Table 1, page 4)
 - If there is persistent blood pressure elevation (more than 1 hour) of 15% or more above the 95th percentile based on age/gender/height norms in the child at rest at any time after tPA infusion, treatment to lower blood pressure should be instituted.
 - If blood pressure is more than 20% over the 95th percentile, blood pressure lowering should be instituted immediately upon verifying the reading. These treatment guidelines should be in place for the duration of the child's hospitalization.
 - Consider treatment of significant hypertension with labetalol or hydralazine to lower by ~25% over 24 hours. Avoid decreasing blood pressure by more than 25% in the first 2 hours of treatment.
- The patient should transfer to the PICU once bed is available, even if actively receiving tPA. The tPA and BP monitoring can continue to completion while in PICU.
- If the patient develops severe headache, acute hypertension, nausea, or vomiting or has a worsening neurological examination, discontinue the infusion (if IV alteplase is being administered) and obtain an emergency head CT scan.
- Hold other anticoagulation at least 24 hours.
- Monitor in ICU at least 48 hours.
- Avoid invasive procedures (e.g. blood draws, catheters, lines, NG placement) at least 24 hours.
- See Anticoagulation Management Guidelines on Star Net for further guidance (lab monitoring, etc).

Suspected Stroke: Table

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Table 1: 95th Percentile BP values (mmHg) for children according to age with assumed 50th percentile height. Adapted from Pediatrics 2017 "Clinical Practice Guideline for Screening and Management of High Blood Pressure in Children and Adolescents." <i>If height is known, please use table 4 and 5 in linked article above for more specific BP cut offs.</i>		
Age	Boys	Girls
1	103/55	103/60
2	106/59	106/64
3	107/62	108/66
4	108/66	109/69
5	109/69	110/71
6	111/71	111/72
7	112/73	112/73
8	114/74	113/74
9	115/76	114/75
10	116/77	116/76
11	118/78	118/77
12	121/78	122/78
13	125/78	124/79
14	130/81	125/80
15	132/83	126/81
16	134/84	127/81
17	135/85	127/81

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