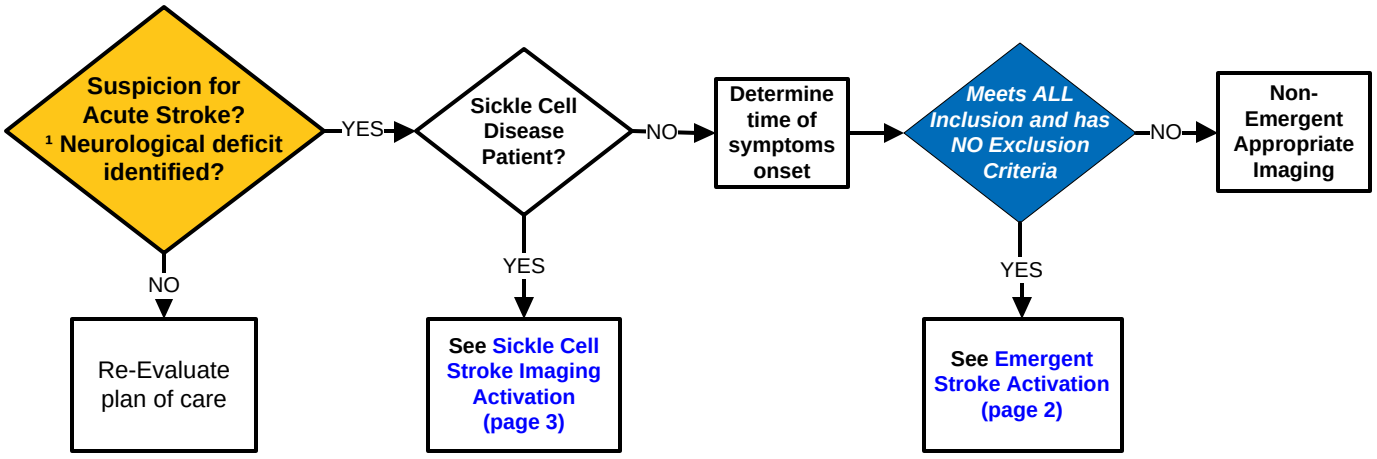
Pediatric Stroke < 18 Years - *Phase 1 – Imaging Guideline*

Practice Guideline Focus: Acute Imaging Of The Stroke Patient Up To 18 Years Of Age And All Sickle Cell Disease Patients

High Risk Factors: Sickle Cell Diseases (SS, SO, or Sbeta^0 Thal.), **Previous Stroke, Cardiac Surgery**



[1] Screening Quick Assessment Reference

Identified Focal Neurological Deficit as defined: (any one or more)

1. Weakness on one side of the body
2. Numbness on one side of the body
3. Weakness on one side of the face
4. Able to understand, but not able to speak
5. Uncoordinated on one side of the body
6. Unable to see on one side
7. Awake and alert, but "word salad" speech (meaning random words, jumbled speech)

Resource: Virtual PICU

Inclusion Criteria

- 2 to <18 years of age
- Onset of symptoms within 8 hours
- Patient able to undergo MRI or CT / CTA (MR compatible, no contrast allergies, sedation/anesthesia available if necessary) **(Link to MRI Checklist)**

Exclusion Criteria

- **≥18 years of age** - see Stroke ≥18 years Resource Page on Careforce **(Link)**

tPA Exclusions

- Decline blood transfusion if indicated
- Prior intracranial hemorrhage
- Known cerebral arterial venous malformation, aneurysm, or neoplasm
- Prior stroke, major head trauma, or intracranial surgery within the past 3 months
- Possible Stroke from subacute bacterial endocarditis, moyamoya, sickle cell disease, meningitis, bone marrow, air, or fat embolism
- Pregnancy

Pediatric Stroke < 18 Years - *Emergent Stroke Imaging (Non Sickle Cell)*

Final 7/10/2015

Practice Guideline Focus: Acute Imaging Of The Stroke Patient Up To 18 Years Of Age

High Risk Factors:
Previous Stroke, Cardiac Surgery, Sickle Cell Diseases (see page 3)

Emergent Stroke Imaging Process

1. **ED / Inpatient Attending Physician calls the CHOA Transfer Center at 5-7778 to conference the Neurologist and Radiology Physician / Neuroradiology Fellow to discuss the Imaging Plan. Inform Transfer Center - potential PICU admission.**
2. **Consider arrangements for sedation if necessary** (MRI Checklist - link)
3. **ED / Inpatient Unit sends patient to MRI or CT for imaging** (Obtain Consents)
4. **Consider obtaining recommended labs / starting IV** [1]

Emergent Stroke Imaging Activation

If MRI not immediately available or not possible, choose CT / CTA

MRI (see page 4)

- DWI + Positive (Diffusion Weighted Imaging) → Radiology Attending or Neuroradiology Fellow **calls Neurology Attending with MRI results immediately** → **Neurology calls ED / Inpatient Physician with results** → Continue with **Limited MRI Stroke Protocol (page 4)**
- DWI – Negative (Diffusion Weighted Imaging) → Radiology Attending or Neuroradiology Fellow **calls Neurology Attending with MRI results immediately** → **Neurology calls ED / Inpatient Physician with results** → **Patient to return to ED / home department to Re-Evaluate plan of care**

CT / CTA Head & Neck (see page 4)

- CT/CTA + positive → Radiology Attending or Neuroradiology Fellow **calls Neurology Attending with CT/CTA results immediately** → **Neurology calls ED / Inpatient Physician with results**
- CT/CTA - Negative → Radiology Attending or Neuroradiology Fellow **calls Neurology Attending with CT/CTA results immediately** → **Neurology calls ED / Inpatient Physician with results** → **Patient to return to ED / home department to Re-Evaluate plan of care**

Disposition patient to PICU for Immediate Management

If Transfer to Emory for treatment recommended, transfer process to begin in ED and patient to go to PICU if not transferred within 60 minutes

Evaluate patient for any Neuroimaging Exclusion Criteria for Intervention

- Intracranial Hemorrhage on pretreatment head MRI or head CT
- Intracranial Dissection(defined as at or distal to the opthalmic artery)
- Large Infarct volume, defined by the finding of acute infarct on MRI involving one-third or more of the complete MCA territory involvement

Hughes Spalding Process patient with Suspected Stroke

- < 15 years of age = Transfer to Egleston.
- >/= 15 years of age = Call CHOA Transfer Center to arrange a transfer to Emory University ER or Grady ER
- **All Sickle Cell Patients** to be transferred to EG or SR regardless of age

[1] Recommended Labs/ Orders

Imaging / Testing:
- *Stroke Imaging Path*
- *EKG*
- *ECHO (inpatient)*
- *Keep patient NPO*

Labs:
- *Start IV*
- *CG8*
- *CMP*
- *Cardiac Enzymes*
- *CBC with differential*
- *DIC Panel*
- *Serum pregnancy test, qualitative*
- *Lipid Profile (inpatient)*

Consults:
- *Neurology consult*
- *PT / OT / Speech / Physiatry for rehab assessment*

Therapeutics:
- *Consider tPA or antithrombotic*
- *O2 Sats – assess O2 need*
- *VTE Prophylaxis*

Pediatric Stroke < 18 Years – *Sickle Cell Acute Stroke Imaging*

Practice Guideline Focus: Sickle Cell Patient Acute Stroke Imaging

High Risk Factors:
SS, SO, or Sbeta⁰ Thal.
Previous Stroke,
Seizure

Suspicion for Acute Stroke? Neurological deficit identified? [1]

NO → Re-Evaluate plan of care

YES

1. ED/Inpatient Attending Physician completes Sickle Stroke Order Set
2. Obtain IV Access and send Labs [2]
3. ED / Inpatient Attending Physician calls the CHOA Transfer Center at 5-7778 to conference the Hemonc Physician and Radiology Physician / Neuroradiology Fellow to discuss the Imaging Plan. Inform Transfer Center – potential PICU admission. (**MRI Checklist - Link**)
4. **Hemonc Physician - Initiate Red Cell Exchange Algorithm**
   (Emergent RBC Exchange Transfusion Protocol – Link)
4. ED / Inpatient unit sends patient to Radiology (Obtain Consents)

Sickle Cell Acute Stroke Imaging

MRI Available and No Contraindications to MRI present?

NO → **Perform Non-Contrast Head CT** → **Radiology Attending or Neuroradiology Fellow calls HemOnc Physician with imaging results immediately** *(Report presence of Acute Hemorrhage)* → **HemOnc notifies CHOA Apheresis (404-785-2600)** → Hemonc calls ED / Inpatient Physician with results → **Disposition patient to PICU for Emergent RBC Transfusion Protocol**

YES → **Perform Limited MRI Sickle Cell Stroke Protocol [3]** → **MRI Positive for Acute Stroke?**

YES → **Radiology Attending or Neuroradiology Fellow calls HemOnc Physician with imaging results immediately** *(Report presence of Acute Hemorrhage)*

NO → **Return to Originating Unit (ED or Floor)** → **Consult Hematology/ Oncology** → Re-Evaluate plan of care

Inclusion Criteria

- **Any Patient With Sickle Cell Disease**

Exclusion Criteria

- **No Imaging Exclusions For CT**
- **MRI Exclusionary Criteria (page 1)**

Hughes Spalding Process
patient with Suspected Stroke
Notify On Call Hematologist for HS and Contact CHOA transfer center to arrange emergent transfer to EG or SR PICU

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Resource: Virtual PICU

[2] Sickle Stroke Orders

Interventions:

- *NPO*
- *Supplemental Oxygen*
- *Secure IV access and send labs*
- *Imaging Activation*
- *Consult Hemonc Physician on call*

Stat Labs:

- *CBC with differential*
- *Retic*
- *CMP*
- *HGBSCD (hemoglobin electropheresis)*
- *Human Erythrocyte Antigen (HEA) Phenotyping by DNA*
- *DIC Panel*
- *Serum pregnancy test, qualitative*
- ***Type and Cross:*** *for Leukoreduced, sickle negative, phenotypically appropriate units based on weight (kg) for RBC exchange transfusion:*

Less than 15 kg	=	*3 units (includes prime)*
15 – 35 kg	=	*4 units*
36 – 55 kg	=	*5 units*
56 – 75 kg	=	*6 units*
> 75 kg	=	*7-8 units*

[3] Limited MRI Sickle Cell Stroke Protocol

During MRI Hours:

DWI (Diffusion Weighted Imaging) &
SWI (Susceptibility Weighted Imaging) -
MRI Sequence, Axial, Send ADC Map

After MRI hours/night:

Non contrast Head CT

[3] If during MRI Hours a scanner is not available within 90 minutes; patient should undergo a non-enhanced CT and transferred to PICU for admission and treatment.

Emergent Stroke Imaging Reference - Radiology

NOTE:
For the Scottish Rite campus only, a teleradiology service will provide reads from Midnight – 07:00 am. This service has a Stroke Alert Protocol and can provide preliminary reports within 10 minutes. If there are any concerns about any emergent study, even those read by our teleradiology service, the SR radiologist on call is available to answer questions and review studies remotely.

For the Egleston Campus, the Neuroradiology Attending or Fellow will be available to read films 24/7

ACUTE STROKE IMAGING (Non Sickle Cell)

CT - Emergent CT Stroke Protocol

Sequence

1. Non Contrast Head CT
2. CTA Head
3. CTA Neck

MRI - Emergent Limited MR Stroke Protocol

Sequence	*Plane*	*Comment*
1. DWI (Diffusion Weighted Imaging)	AX	Send ADC Map
2. T2 Flair	AX	5mm
3. SWI (Susceptibility Weighted Imaging)	AX	5 mm
4. 3D TOF MRA Head	AX	Base of skull to top of ventricles. Send standard MIPs.

SICKLE CELL ACUTE STROKE IMAGING *TPA CONTRAINDICATED*

1. Call Hematology / Oncology Physician On Call Immediately
2. Call Advanced Technology (404) 785 – 2800

Sequence

Non Enhanced Head CT

- Or -

Limited MRI Sickle Cell Stroke Protocol (DWI - Diffusion Weighted Imaging & SWI - Susceptibility Weighted Imaging)