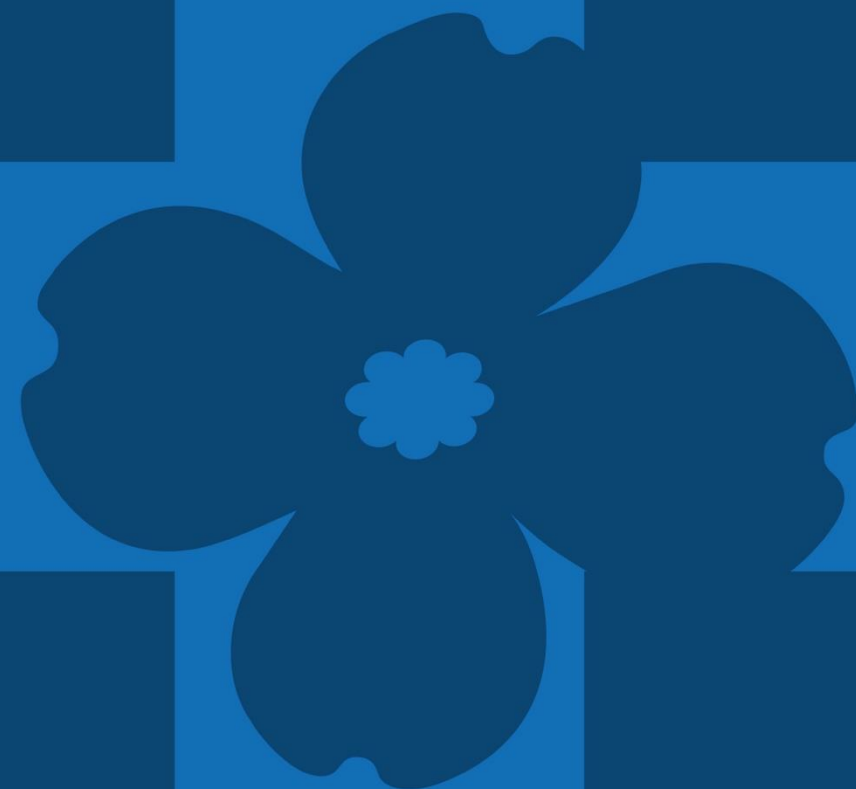




Mission Health Stroke Program  
WNC Stroke Network

Alex Schneider, MD  
Mission Neurology

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Stroke Program Manager



# Mission Hospital Comprehensive Stroke Program

- Anchor hospital of Mission Health and HCA North Carolina Division
- Includes six hospitals plus an acute rehab hospital and children's hospital
- Regional referral center for western North Carolina
- Serving ~ 1 million people in 18 counties
- Mission Hospital: 803 Licensed Beds
- Average Annual Stroke Volume = 1450 (all types)
- 308 transfers from outside hospital
- 189 treated with IV thrombolytic in 2020 (System combined)
- 130 Mechanical thrombectomy (at CSC)



# Member Hospitals

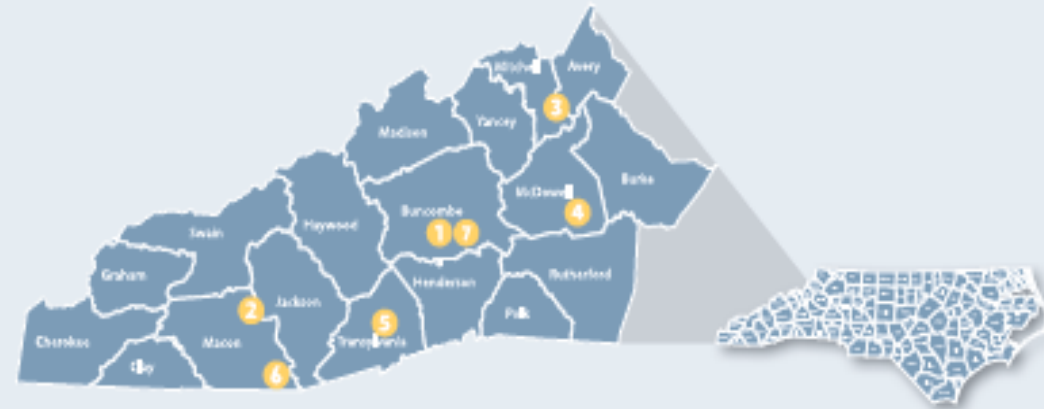


## 2020 Acute Ischemic Stroke

- 195 Code Stroke Activations
- 143 Telestroke Encounters
- 46 IV thrombolytic treated

## Mission Health Member Hospitals

- 1 Mission Hospital
- 2 Angel Medical Center
- 3 Blue Ridge Regional Hospital
- 4 McDowell Hospital
- 5 Transylvania Regional Hospital
- 6 Highlands-Cashiers Hospital
- 7 CarePartners



# WNC Stroke Network

- For over 20 years we have built a network based on relationships and mutual goal to give each patient the best chance at optimal recovery
- Every hospital in WNC is “Stroke Treatment Capable” with the ability to treat with IV thrombolytics 24/7
- Key elements
  - Telehealth
  - Collaborative partnerships with EMS and local hospitals
    - Ongoing education and continuous quality improvement
    - County specific EMS Triage Destination Plans
  - Feedback to key stakeholders and front line providers



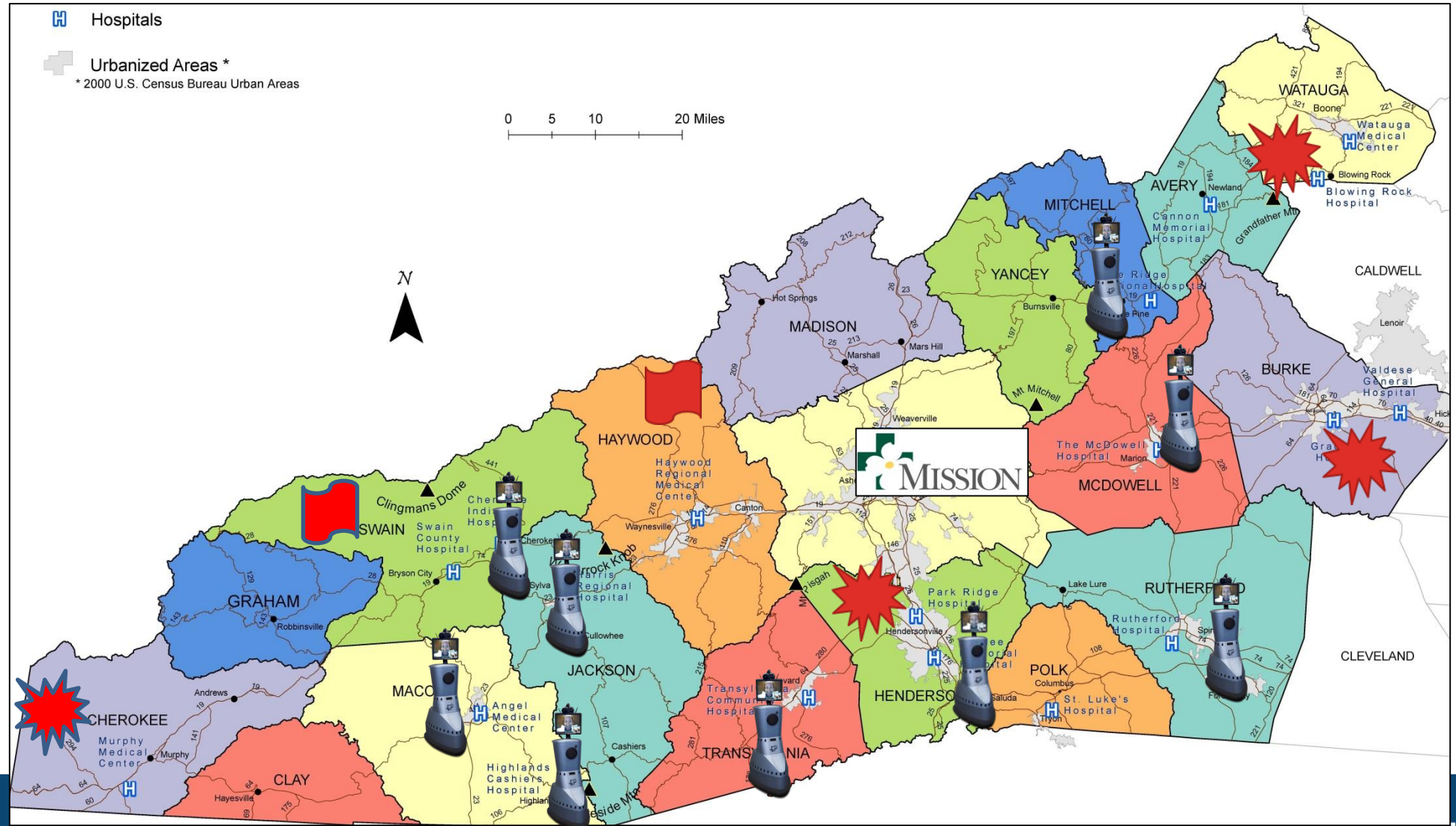
# WNC Stroke Network

Every hospital in our service area is IV Thrombolytic Capable

Mission Hospital is the only one in WNC capable of performing IR thrombectomy and Neurosurgery

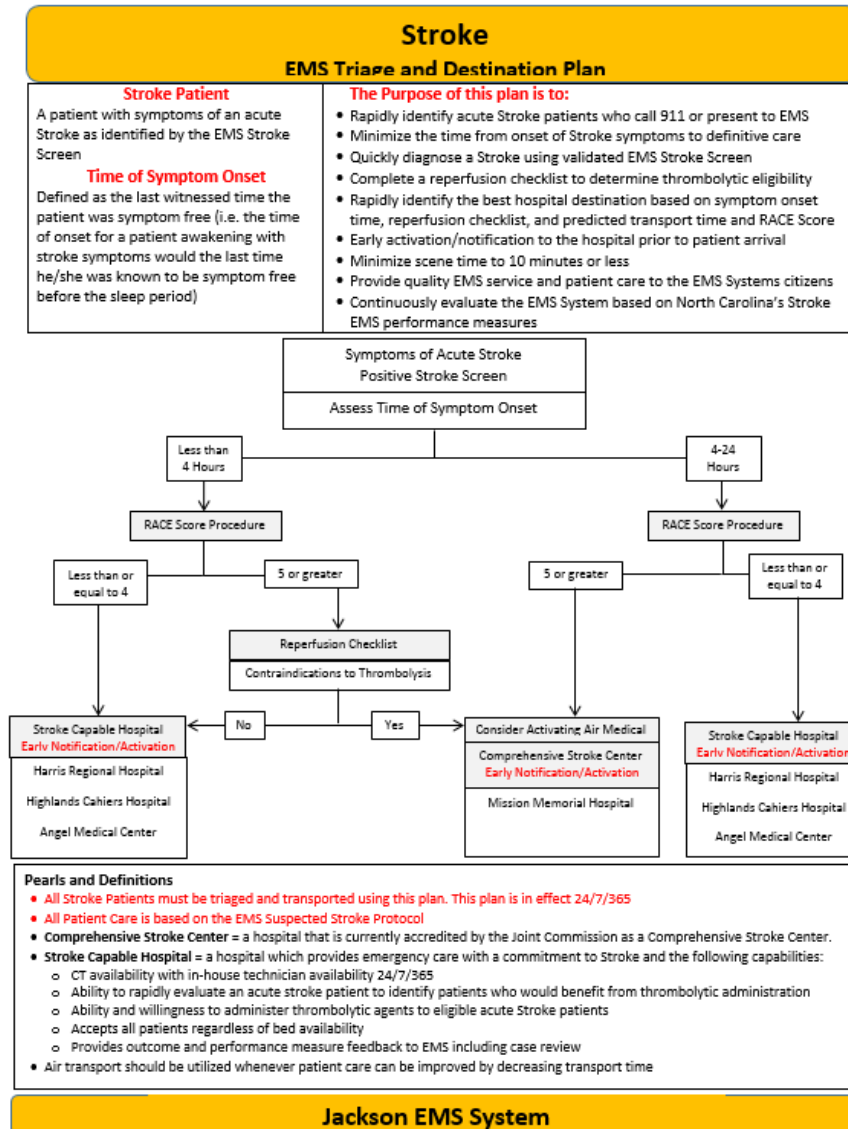


**Mission**  
**Telestroke**  
**Third Party**  
**Telestroke**  
**Telephone**  
**Consult only**



# What is Your Agency Stroke Destination Plan

- Time LKN
- RACE
- Anticoagulation use
- Location and ability to fly



# PROCEDURE 45A: R.A.C.E Stroke Screen

- 2018 R.A.C.E screening tool for large vessel occlusion

Test Item	Score = 0	Score = 1	Score = 2	Pt Score
Facial Palsy	Absent	Mild	Moderate/Severe	
Arm Motor	Normal/Mild	Moderate	Severe	
Leg Motor	Normal/Mild	Moderate	Severe	
Head/Gaze Deviation	Absent	Present	N/A	
Aphasia* (if right hemiparesis)	Performs Both Tasks	Performs 1 Task	Performs Neither Tasks	
Agnosia* (if left hemiparesis)	Pt Recognizes Arm & Impairment	Unable to recognize Arm or Impairment	Unable to recognize BOTH Arm or Impairment	
			Total Score (0-9) =	

**\*Aphasia: Ask the patient to: 1. “Close your Eyes” AND 2. “Make a Fist”**

**\*Agnosia: Ask the patient and evaluate recognition of deficit:**

**1. While showing paretic arm: “Whose arm is this?”**

**2. Ask patient: “Can you lift both arms and clap?”**

**A Score of greater than  $\geq 5$  may indicate Large Vessel Occlusion.**





## Reperfusion Checklist

## Clinical Indications:

Rapid evaluation of a patient with suspected acute stroke and/or acute myocardial infarction (STEMI) to:

- Determine eligibility and potential benefit from fibrinolysis..
- Rapid identification of patients who are not eligible for fibrinolysis and will require interventional therapy.

	MR	
B	EMT	B
A	AEMT	A
P	PARAMEDIC	P

## Procedure:

1. Follow the appropriate protocol for the patient's complaint to assess and identify an acute condition which could potentially benefit from fibrinolysis. If a positive finding is noted on one of the following assessments, proceed to step 2.
  - Perform a 12-lead ECG to identify an acute ST elevation myocardial infarction (STEMI).
  - Perform the Cincinnati Stroke Screen to identify an acute stroke
2. Complete the Reperfusion Check Sheet to identify any potential contraindications to fibrinolysis. (See Appendix)
  - Systolic Blood Pressure greater than 180 mm Hg
  - Diastolic Blood Pressure greater than 110 mm Hg
  - Right vs. Left Arm Systolic Blood Pressure difference of greater than 15 mm Hg
  - History of structural Central Nervous System disease (age >= 18, history of aneurysm or AV-malformation, tumors, masses, hemorrhage, etc.)
  - Significant closed head or facial trauma within the previous 3 months
  - Recent (within 6 weeks) major trauma, surgery (including laser eye surgery), gastrointestinal bleeding, or severe genital-urinary bleeding
  - Bleeding or clotting problem or on blood thinners
  - CPR performed greater than 10 minutes
  - Currently Pregnant
  - Serious Systemic Disease such as advanced/terminal cancer or severe liver or kidney failure.
3. Identify if the patient is currently in heart failure or cardiogenic shock. For these patients, a percutaneous coronary intervention is more effective.
  - Presence of pulmonary edema (rales greater than halfway up lung fields)
  - Systemic hypoperfusion (cool and clammy)
4. If any contraindication is noted using the check list and an acute Stroke is suspected by exam or a STEMI is confirmed by ECG, activate the EMS Stroke Plan or EMS STEMI Plan for fibrinolytic ineligible patients. This may require the EMS Agency, an Air Medical Service, or a Specialty Care Transport Service to transport directly to an specialty center capable of interventional care within the therapeutic window of time.
5. Record all findings in the Patient Care Report (PCR).

## Certification Requirements:

Maintain knowledge of the indications, contraindications, technique, and possible complications of the procedure. Assessment of this knowledge may be accomplished via quality assurance mechanisms, classroom demonstrations, skills stations, or other mechanisms as deemed appropriate by the local EMS System.

Reviewed /  
Revised  
01/2018

ASP - 7

This procedure adheres to all applicable NCEMS rules and standards of care. Local EMS System changes are approved by NCEMS.

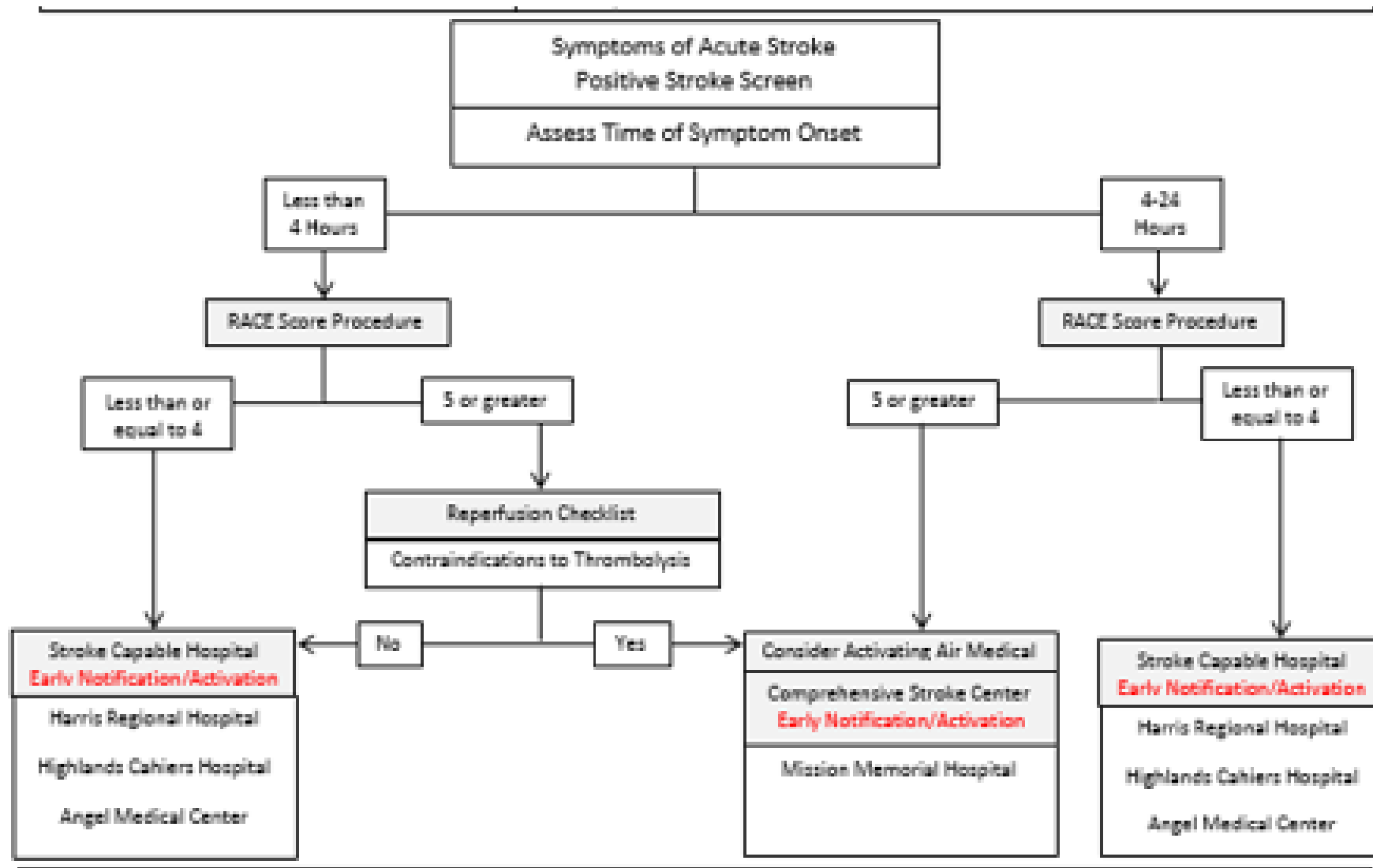
August 1,  
2018

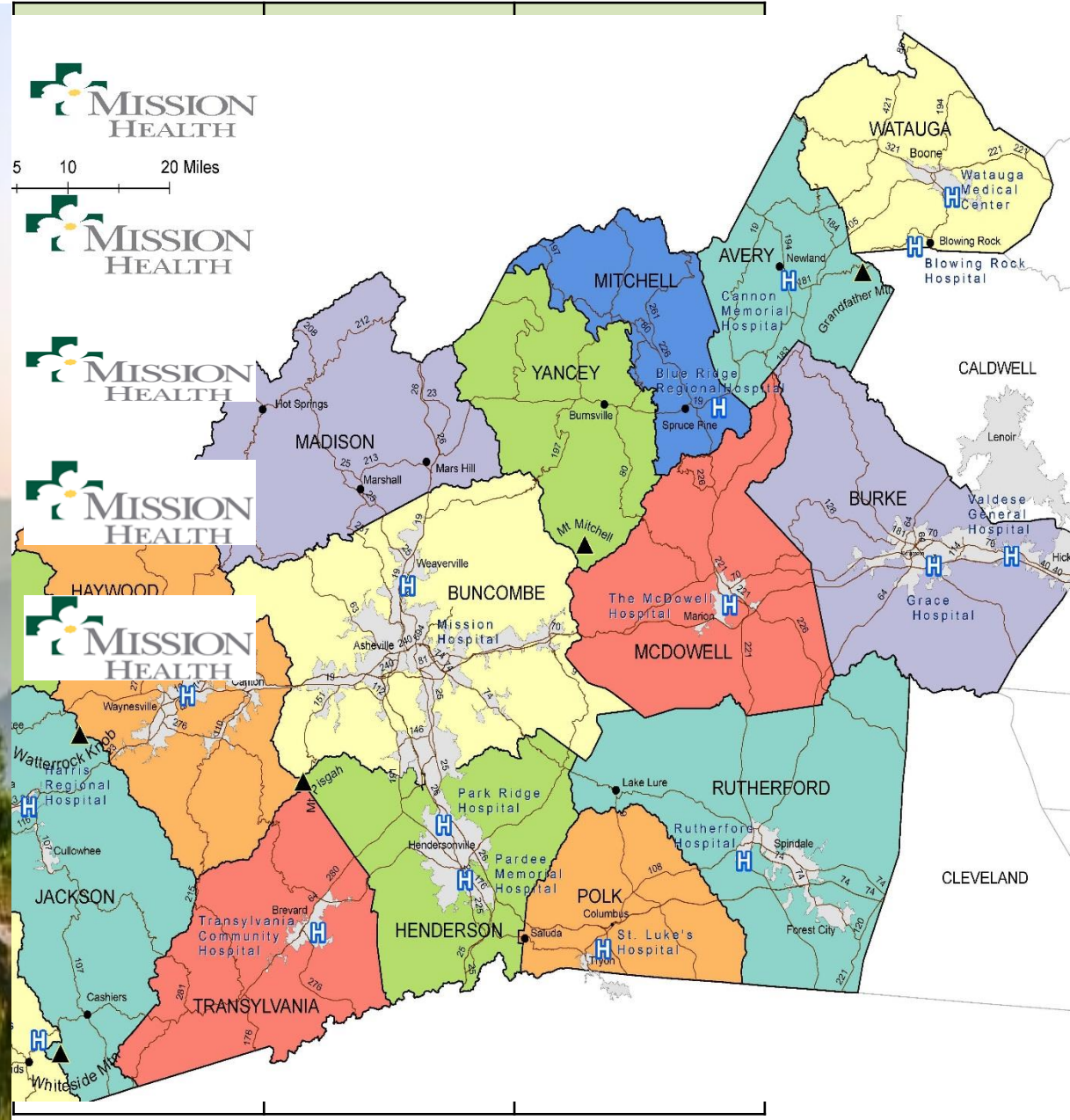
## Know Your Anticoagulants

Include information in your pre-arrival notification – this helps the stroke team determine potential treatment options!

Generic Name	Brand Name	Drug Class
apixaban	Eliquis	Oral Factor Xa Inhibitor
argatroban	N/A	Direct Thrombin Inhibitor
dabigatran, dabigatran etexilate	Pradaxa	Direct Thrombin Inhibitor
dalteparin	Fragmin	LMWH
desirudin*	Iprivask*	Direct Thrombin Inhibitor
edoxaban	Savaysa	Oral Factor Xa Inhibitor
enoxaparin	Lovenox	LMWH (Note: Lovenox 40 mg sc qd is for DVT prevention and not of proven benefit for stroke prevention and is insufficient as antithrombotic therapy at this dose)
fondaparinux	Arixtra	Factor Xa Inhibitor
Heparin IV (heparin, heparin sodium, heparin Na, heparin sod, heparin sodium inj, heparin sodium inj pork, unfractionated heparin [NOT hep-lock, heparin flush])	N/A	Unfractionated Heparin IV
lepirudin	Refludan	Direct Thrombin Inhibitor
rivaroxaban	Xarelto	Oral Factor Xa Inhibitor
tinzaparin	Innohep	LMWH
Warfarin, Warfarin Sodium	Coumadin, Jantoven	







# Macon County EMS Triage Destination Plan

Macon EMS Stroke Triage Destination Plan (Guidelines)

Franklin Area – 68 miles to Mission

Time of onset	RACE score	Reperfusion Checklist	Destination	Mode of Transport
≤ 4 hours	≤ 4	Passed	AMC	Ground
≤ 4 hours	≤ 4	Failed	AMC	Ground
≤ 4 hours	≥ 5	Passed	AMC	Ground
≤ 4 hours	≥ 5	Failed	MMH	Air medical
>4 and <24 hours	≤ 4	N/A	AMC	Ground
>4 and <24 hours	≥ 5	N/A	AMC	Ground

Highlands Area – 95 miles to Mission

Time of onset	RACE score	Reperfusion Checklist	Destination	Mode of Transport
≤ 4 hours	≤ 4	Passed	Highlands/Cashiers	Ground
≤ 4 hours	≤ 4	Failed	Highlands/Cashiers	Ground
≤ 4 hours	≥ 5	Passed	Highlands/Cashiers	Ground
≤ 4 hours	≥ 5	Failed	MMH	Air Medical
>4 and <24 hours	≤ 4	N/A	Highlands/Cashiers	Ground
>4 and <24 hours	≥ 5	N/A	Highlands/Cashiers	Ground

Nantahala Area 100 miles to Mission 48 miles to Angel

Time of onset	RACE score	Reperfusion Checklist	Destination	Mode of Transport
≤ 4 hours	≤ 4	Passed	AMC	Ground
≤ 4 hours	≤ 4	Failed	AMC	Ground
≤ 4 hours	≥ 5	Passed	MMH	Air Medical
≤ 4 hours	≥ 5	Failed	MMH	Air Medical
>4 and <24 hours	≤ 4	N/A	AMC	Ground
>4 and <24 hours	≥ 5	N/A	AMC	Ground

If you can't fly from Nantahala

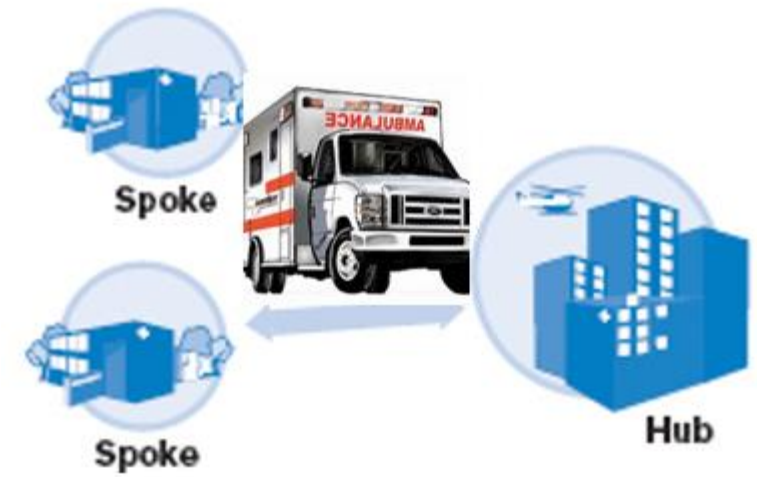
Time of onset	RACE score	Reperfusion Checklist	Destination	Mode of Transport
≤ 4 hours	≤ 4	Passed	AMC	Ground
≤ 4 hours	≤ 4	Failed	AMC	Ground
≤ 4 hours	≥ 5	Passed	MMH	Ground
≤ 4 hours	≥ 5	Failed	MMH	Ground
>4 and <24 hours	≤ 4	N/A	AMC	Ground
>4 and <24 hours	≥ 5	N/A	AMC	Ground





# Stroke System of Care

## DIDO goals



- Network infrastructure needed to support goals of care
- DIDO goals vary depending on urgency of care i.e. need for specialty procedure or critical care
- Acute ischemic stroke going to IR <60 min
- Post IV thrombolytic DIDO goal <120 min
- Hemorrhagic stroke unstable/intubated/going to surgery <60 min
- Hemorrhagic Stroke stable <120 min
- Ischemic stroke non treated and stable <180 min



# Transfer Triage Guidelines

## CALL TRIAGE GUIDELINES

RED (IMMEDIATE) Target <30 minutes	ORANGE (ASAP) Target <90 minutes	YELLOW (PRIORITY) Target <3 hours	GREEN (MINIMAL DELAY) Target <6 hours
Code Trauma criteria	Post TPA stroke or PE	Inter-Facility scheduled CABG/Cath Lab	BLS Returns
Code STEMI	Open Fractures/ Unreduced dislocations	NSTEMI (Non High Risk, Stable)	Campus admissions
High Risk NSTEMI *	Post out of hospital or ED delivery Mother/Baby	ICU to ICU	Inter-Facility stable floor admissions
Code Stroke that needs interventional radiology	Stable Trauma with potential significant injuries	ED Bed Clearing	Elective outbound Pt. transfers
Emergency OB ( <i>must be stable for transport from EMTALA perspective, i.e., not going to deliver in ambulance</i> )	Critical but stable medical (sepsis, DKA, HyperK+, etc)	Inter-Facility ED to ED/Inpatient ( <i>Non-critical medical, closed fractures, appendicitis, stable GI bleed, non-STEMI, etc.</i> )	Campus off-site appointments
Patients with BP<90	Neuro Intact ICH	Airport crew pickup	Campus post procedure returns
Intubated with continued ventilator/oxygenation difficulty		Airport Pt. delivery	Outbound stable Pt. transfers to other hospitals
ROSC following cardiac arrest		Campus to scheduled Invasive surgical procedure	Stable psych to PEA/Copestone
Acute limb ischemia		Campus to Radiation/Radiology/Dialysis	
Ruptured AAA		Outbound Pt. Critical Care	
Aortic dissection		Outbound Pt. NICU	
Need for other emergency surgery/intervention ( <i>ischemic bowel, active GI bleed, need for emergent IR or other surgery</i> )			

► \* **High Risk NSTEMI** = Patients that have:  
 1) Ischemic Chest Pain with Troponin of 0.1 or greater  
 2) 1 or more of the below to meet High Risk Category:

- Persistent or Stuttering CP despite treatment with ASA, NTG gtt, Heparin
- New LBBB
- Dynamic ST / T Wave Changes
- Cardiac Shock ( SBP<90 mmHg, NSR>110BPM)
- Sustained Ventricular Tachycardia



Rev. 6/25/2020

# What works and What Needs Work

## What is working

- Engaged and committed EMS partners
- Universal use of RACE screen
- Pre-arrival notification >95% of all EMS acute stroke transports to CSC
- Shared PACS images
- Common EMR for Mission Health hospitals
- Transfer Center/Med-com dispatch for interfacility transfers

## What Needs Work

- CT capacity limited to one CT scanner for most WNC hospitals
- Hospital diversion when CT not operational
- EMS scene records not available to CSC for transferred patients (limited information as to scene exam)
- Blood pressure control during interfacility transport (county specific medications)
- Disparate EMR outside of MH system (handoff communication)
- IRR RACE screen
- DIDO challenges

