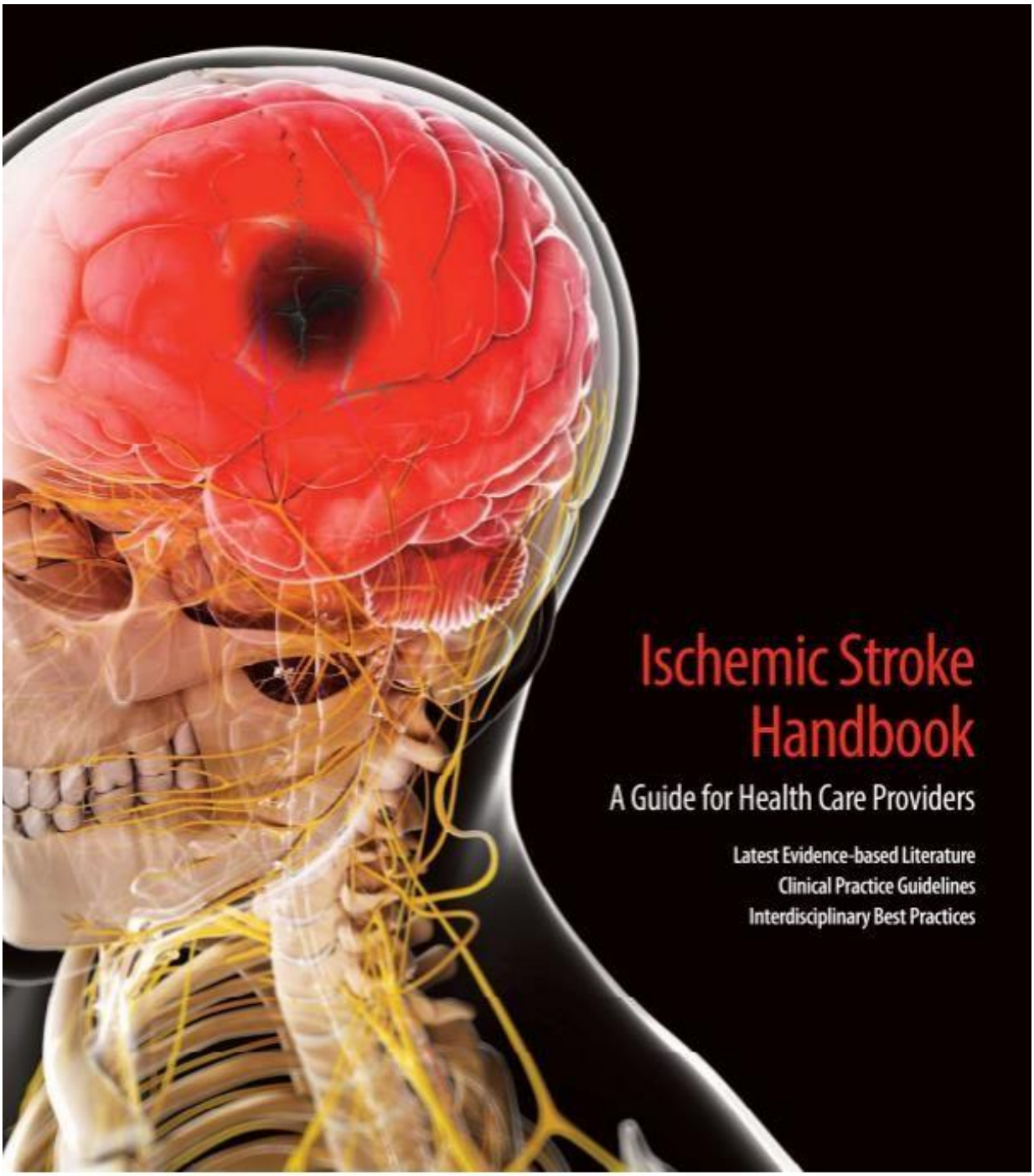

Ischemic Stroke Handbook

A Guide for Health Care Providers

Latest Evidence-based Literature
Clinical Practice Guidelines
Interdisciplinary Best Practices

WakeMed
Stroke Program

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The policies and practices below are also reviewed by interdisciplinary committees, including but not limited to the Stroke Taskforce (monthly meeting) and the Neurocritical Care Committee (meets every other month). The policies and practices are updated annually as mandated by new evidence, and as these expert groups identify areas of necessary change. The authors above reach out as needed to key stakeholders and leaders in the WakeMed community to further our interdisciplinary effort towards excellence in stroke care.

This handbook is reviewed and updated annually.

Table of Contents

Introduction and Overview 1
Pre-Hospital Stroke Care 1
WakeMed Health and Hospitals Locations and Care Overview 1
Transfer Algorithms and Criteria 2
WakeMed Acute Stroke Care 2
Important Order Sets and Orders 2
Acute Code Stroke Algorithms 2
Thrombolytic Inclusion/Exclusion Criteria 2
Embolectomy Inclusion/Exclusion Criteria 2
Acute Dual Antiplatelet Use 3
In-Patient Code Stroke Resources 3
Blood Pressure Management Considerations 4
Acute Complications of Ischemic Stroke 5
Important order sets and orders 5
Acute Decline – Processes of Care 5
Post-Thrombolytic Bleeding 5
Post-Thrombolytic Angioedema 5
Malignant Edema 5
In-Hospital Evaluation and Secondary Prevention Strategies 7
Important order sets and orders 7
Admission Criteria for In-Patient Units 7
Specific Post-Thrombolytic and Post-Embolectomy Care 8
Etiology Specific Management and Treatment Plans 9
DVT Prophylaxis and Timing 11
Antiplatelet Considerations 11
Anticoagulation Considerations 12
Statins 12
Lifestyle 12
Prognosis Discussions 12
Rehab Care 13
Getting In Touch with Providers On-Call 13
Appendix 16
Transfer Algorithm 16
Acute Code Stroke Algorithms 17
Raleigh ED 17
Cary ED 18
North ED 19
Brier Creek ED 19

Garner ED 20
Apex ED 22
Wendell ED 23
Raleigh In-Patient 23
Cary In-Patient 25
North In-Patient 25
Thrombolytic Inclusion/Exclusion Criteria 26
Embolectomy Inclusion/Exclusion Criteria 29
Raleigh Rounding RN Summary Card 30
Raleigh Hospitalist Summary Card 31
Cary ICU Rounder RN Summary 31
Cary Hospitalist Summary Card 33
North ED RN Summary Card 34
North Hospitalist Summary Card 35
Hemicraniectomy Patient Considerations 35
PFO Closure Algorithm 36
Cervical Artery Dissection Algorithm 37
Anticoagulation Timing Considerations 38
Cerebral Venous Thrombosis with Serious Complications Algorithm 38
North Inpatient Code Stroke Checklist 40
ED Boarded Code Strokes 41
Cath Lab Code Stroke Workflow 42

References: 42

Introduction and Overview

WakeMed Health and Hospitals strive to provide the best evidence-based stroke care to all our patients. We follow guidelines from the American Heart/American Stroke Association as the framework of care for our patients. Where not specifically addressed below, please know that we use national guidelines to direct our stroke patient care and protocols[1,2]. To ensure alignment across WakeMed policies and procedures across our administration, physician, and nursing staff, this handbook supports the WakeMed Administrative Patient Care policy for Code Stroke Process & Associated Elements. The audience of this handbook includes clinical staff supporting stroke patient populations and units/departments.

In areas where care is less defined and structured, we discuss protocols in an interdisciplinary fashion. This handbook captures those areas of care and is designed to highlight our goal to standardize care and ensure consistent high-quality care as we continue our goal of becoming a top 10 stroke program. In addition to standardized approaches, we always care for each patient as an individual, taking into consideration unique factors when making any plan of care decisions, and aligning with our core mission to put the patient and their family at the top of everything we do.

Pre-Hospital Stroke Care

WakeMed Health and Hospitals Locations and Care Overview

1) WakeMed Raleigh serves as a location where the full scope of patient care can be provided.
    a. This includes but is not limited to the administration of thrombolytic, embolectomy procedures, post-thrombolytic, and post-embolectomy care.
    b. Critical Care services are available 24/7 along with Intensive Care Units
    c. Neurosurgical services are available 24/7 to perform procedures including but not limited to hemicraniectomy, and care of the SAH, ICH, and SDH patients.
2) WakeMed Cary serves as a location where patients can have the administration of thrombolytic, embolectomy procedures, and receive post-thrombolytic, and post-embolectomy care in noncomplex patients.
    a. Critical Care services are available 24/7 along with an Intensive Care Unit.
    b. Neurosurgical services are limited, and patients will need to transfer to WakeMed Raleigh if more complex surgical services are anticipated, such as hemicraniectomy or SAH.
3) WakeMed North serves as a location where non-complex, non-thrombolytic, and non-embolectomy stroke patients can be cared for. Patients can receive emergent stroke care including the administration of IV-Thrombolytic
    a. Teleneurology services are available from 8 AM – 12 PM for in-patient needs.
    b. Complex patients need to be transferred to WakeMed Raleigh, including those who receive IV-Thrombolytic
4) WakeMed Brier Creek, Garner and Wendell serve as free-standing emergency departments where patients can receive emergent stroke care including the administration of IV-Thrombolytic.
    a. Patients requiring in-patient services will be transferred to WakeMed Raleigh or North, depending on the subsequent need for higher-level care.
5) WakeMed Apex serves as a free-standing emergency department where patients can receive emergent stroke care including the administration of IV-Thrombolytic.

a. Patients requiring in-patient care will be transferred to WakeMed Cary for subsequent higher-level care.

Transfer Algorithms and Criteria

Based on the capabilities of the facilities as described above, discussions between the Emergency Department and the receiving higher-level of care facility, a decision will be made to ensure the patient is sent to the most appropriate hospital for subsequent care.

For non-WakeMed hospitals, calls for transfer will be initiated through the Transfer Center with patients accepted on a case-by-case model. This allows for the early involvement of experts, and facilities decision-making while maintaining standard practices and communication.

- For cases being considered for emergent thrombectomy, the Neurointerventional team will be involved early in the transfer care decisions. Below are current workflows with specific non-WakeMed hospitals.

WakeMed Acute Stroke Care

Important Order Sets and Orders:

- EDSO Code Stroke (For ED code strokes)
- Code Stroke Orders (For in-patient code strokes)
- Stroke/TIA Admission
    - ○ includes Thrombectomy order panel
- Thrombolysis for Stroke (Tenecteplase) (aka TNK)
- MRI thrombolytic specialized without contrast
- MRI LVO without contrast

Acute Code Stroke Algorithms

- While we seek to standardize care, there are nuanced differences between each of our locations, necessitating the use of a specific algorithm for each facility. The algorithms show the key roles and responsibilities for the main bedside provider and RN along with the integration with the telestroke neurologist. *By clicking on the facility name, you will be brought to that specific algorithm, housed within the appendix of this document.
    - There are 6 algorithms for patients who present to ED locations at Raleigh, Cary, North, Brier Creek, Apex and Wendell.
    - There are 3 algorithms for the in-patient code strokes at Raleigh, Cary, and North Hospitals.

Thrombolytic Inclusion/Exclusion Criteria

See Appendix for updated criteria.

Embolectomy Inclusion/Exclusion Criteria

See Appendix for updated criteria. Embolectomies are only done at WakeMed Raleigh or Cary

The telestroke attending will contact the neurointerventional attending to discuss potential embolectomy candidates.

Candidates in whom a discussion of embolectomy is expected:

1. Any patient with an mRS of <=3, NIHSS >= 6, who has a symptomatic cervical ICA, ICA terminus, M1, or basilar artery occlusion
2. Any patient with an mRS of <=3, NIHSS >= 6 with an M2, A1, vertebral artery or P1 occlusions per discretion of telestroke neurologist
3. Any patient outside these parameters the telestroke provider feels could be a candidate for embolectomy and needs to be discussed (ex: low NIHSS but disabling aphasia, partial occlusion and may go on to full occlusion, etc.)

The telestroke neurologist can declare the following patients NOT candidates for embolectomy, in which case the neurointerventionalist does NOT need to be called. The telestroke neurologist will document reason against embolectomy in most cases:

1. Patients with very low, dark/dense ASPECT and poor chances of meaningful outcome from embolectomy (keeping in mind latest large core trial patients should be considered for embolectomy)
2. Chronic occlusions seen clearly on prior WakeMed images.
3. Patients with chronic, life-ending diagnoses or severe disability with a family who would not want invasive medical care.

For patients with a large vessel occlusion without any strict contraindications, keeping the head of bed flat rather than 30 degrees is recommended until further treatment or care plan changes.

Acute Dual Antiplatelet Use

Patients identified as high-risk TIA patients or minor stroke patients will be considered for early (within 24 hours) antiplatelet load and initiation of dual antiplatelet use. Duration of dual antiplatelet use will be made depending on further stroke etiology work-up. For select patients with atherosclerosis related strokes, load of antiplatelet may be considered out to 72 hours post last known normal.

In-Patient Code Stroke Resources

For WakeMed Raleigh, Cary, and North, there are acute code stroke teams prepared to respond to in-patient code strokes. The following people make up the code stroke team for each inpatient hospital.

a. ICU Rounding nurse serves as the lead nurse. In-house 24/7
b. Hospitalists leader. In-house 24/7
c. Telestroke neurologist. Available by phone and telecart 24/7
d. Neurointerventionalist. Available 24/7 to come in for cases.
e. Bedside primary RN and Bedside primary/admitting team.

Please see Appendix for resources to help with the acute code stroke process in the in-patient setting. Currently, these include specialized stroke summary cards for the RN and hospitalist leads at each institution with key phone numbers and patient information details critical to acute stroke care. *By clicking on the facility name above, you

will be brought to that location's specific in-house summary resource card, housed within the appendix of this document.

Blood Pressure Management Considerations

These are general guidelines for MOST patients, but specific case by case alterations may be needed.

- *Non-thrombolytic and non-embolectomy patient care primarily driven by either hospitalist or neurology teams*:
  - Permissive HTN up to 220/120 should be allowed if possible.
  - For about 24-48 hours, we will avoid standing oral BP medications (except for heart failure medications that can be started at lower doses)
  - Once a patient is stable, the general guidance is to lower BP by about 10% per day.

- *Thrombolytic alone, care driven primarily by intensivist and neurology teams*:
  - Pre-treatment, BP should be controlled to <185/110 before giving thrombolytic ○ Post-treatment, BP should be controlled to <180/105 for at least 24 hours.
    - After 24 hours, if the patient seems to need more permissive HTN for penumbral tissue, BP can be liberalized to a higher level as specified by neurology.
  - Once a patient is stable, the general guidance is to lower BP by about 10% per day.
- *Embolectomy alone (no thrombolytic), care driven primarily by intensivist and neurointerventional teams*:
  - Pre-treatment (pre-recanalization), BP can be controlled to <220/120 while trying to allow for permissive HTN with vessel still occluded by maintaining SBP >100 and MAP >70.Posttreatment with TICI 2b or 3 recanalization, BP can be controlled to <160/105 to avoid reperfusion injury.
  - Post-treatment with TICI 0, 1, or 2a; BP goals will depend on concern for hemorrhage while balancing continued permissive HTN needs with ongoing occlusion.
    - A patient with significant perfusion needs can be allowed permissive HTN up to 220/120 while a patient with concern for hemorrhage risk will have a lower permissive HTN allowance.
  - Once a patient is stable, the general guidance is to lower BP by about 10% per day.

- *Both thrombolytic and embolectomy, care driven primarily by intensivist, neurointerventional, and neurology teams*:
  - After thrombolytic is given, allow for permissive HTN up to 180/105 while embolectomy is being undertaken.
  - In general, post embolectomy BP goals should be dictated by recanalization levels described above in the embolectomy section, with the exception that BP post thrombolytic should not exceed 180/105.

- *Hypotension*:
  - Low BP is known to worsen ischemic tissue area, and care should be taken in all stroke patients to maintain at least a MAP > 65

Acute Complications of Ischemic Stroke

Important order sets and orders:

- Anticoagulation Reversal Orders
- Angioedema Medication Orders (aka angioedema)

Acute Decline – Processes of Care

For any patient who received IV-Thrombolytic and has an acute neurologic decline of ≥4 NIHSS points after the initial evaluation, a code stroke should be re-called if appropriate. Guidance will be given by the telestroke neurologist. If the patient is post-embolectomy, the initial call should be to the Neurointerventionalist who performed the embolectomy for further recommendations.

Symptomatic hemorrhage definition for WakeMed: Imaging positive hemorrhage that happens within 36 hours of IV thrombolytic and/or embolectomy AND is felt to be the predominant cause of an increase in NIHSS of ≥4 points. Symptomatic vs asymptomatic hemorrhage must be documented in a Provider's note.

Post-Thrombolytic Bleeding

In any patient found to have a symptomatic hemorrhage post-thrombolytic administration, the telestroke neurologist should be contacted and will provide acute guidance and document recommendations. Neurosurgery should also be consulted. Our treatment choices will be based on the AHA/ASA guidelines (Table 6; Powers 2019)

Post-Thrombolytic Angioedema

In any patient found to have orolingual angioedema post thrombolytic administration, the telestroke neurologist should be contacted and will provide acute guidance and document recommendations. An ED or ICU provider should evaluate the patient for consideration of intubation needs. Our approach is based on the AHA/ASA guidelines (Table 7; Powers 2019)

Malignant Edema

Medical Management

Use of osmotic therapy is generally recommended for use in patients with clinical deterioration. Prophylactic use has not been shown to be effective.

- For most patients without concern for significant, malignant edema, aiming for normonatremia is appropriate.
- In patients with signs of edema or large strokes at risk for significant edema, neurology or neurointerventional team may recommend a slightly higher sodium goal, generally > 145, through peak edema.
- For patients with significant edema and deterioration who are either not surgical candidates or being prepared for emergent surgery, an even higher sodium goal may be considered, generally > 150.
- Preference of treatment is for hypertonic saline. ○ Mannitol is also available as an option
- Note that brief moderate hyperventilation (Pco2 target, 30–34 mm Hg) is a reasonable treatment for patients with acute severe neurological decline from brain swelling as a bridge to more definitive therapy.

Decompressive Surgery Family Conversations

- Early conversations, before herniation, are vital to ensure patient centered care and appropriate goals of care decision making. This conversation will occur between neurosurgery and the patients' families.
- Conversations regarding anterior circulation vs cerebellar circulation strokes will be different as better prognosis can be seen in cerebellar circulation decompression.

MCA Territory Strokes

- Hemicraniectomy for malignant MCA infarct has been shown to reduce mortality. It may not always improve morbidity. Offering the treatment is not obligatory but will be considered at our hospital for certain patient populations.
  - See algorithms in Appendix (page 32) for general approach neurosurgery will take to considering. MCA patients for hemicraniectomy
    - Factors to take into consideration that make meaningful prognosis less likely
      - Contralateral ischemia or other brain lesions
      - Space occupying hemorrhage in the infarcted tissue (PH2)
      - Other serious medical conditions
      - Contraindications against hemicraniectomy
- Life expectancy < 3 years
- Pupils are both fixed and dilated.

- Predictors of malignant edema

  Please plan to consult neurosurgery if a patient is < 80 years old, within 48 hours of their stroke onset, and meets any of the criteria below.
  - >50% involvement of the MCA region
  - Stroke volume > 80 cm^3 within the first 6 hours or > 145 cm^3 at 14 hours.
  - NIHSS > 14 (non-dominant) or NIHSS > 19 (dominant)
    - Early midline shift

Posterior Circulation Strokes

- Ventriculostomy and/or decompressive surgical evacuation after space-occupying cerebellar infarction is a potentially lifesaving intervention and is generally recommended for patients with major cerebellar infarction. High risk patients should be monitored at WakeMed Raleigh in the ICU
  - If unclear about the risk, please call the Raleigh Neurology Associates on call attending neurologist to review and discuss. As a guideline, please plan to discuss any patient who has any of the following:
    - **Size**: Generally, lesions > 3 cm are worth discussing. Smaller lesions are less likely to cause malignant edema.
    - **Location**: Lesions closer to the 4th ventricle and bilateral lesions have more risk to cause obstructive hydrocephalus
    - **Time of Stroke Onset**: Patients with new symptoms within the prior 3-5 days are still within risk of peak edema.
    - **Age**: Younger patients have less space in the posterior compartment for swelling
    - **Exam**: Patients with decreased level of consciousness are more difficult to monitor and may need a higher level of care for accurate neurochecks

- **Associated factors**: Severe basilar stenosis patients may need closer monitoring.
    - Please plan to consult neurosurgery in all patients with large cerebellar strokes with likelihood of compression of the 4th ventricle (unless they have contraindications listed below)
- Factors to take into consideration that make meaningful prognosis less likely.
    i. Other significant areas of ischemia
    ii. Other serious medical conditions
- Contraindications against hemicraniectomy
    i. Life expectancy < 3 years ii. Pupils both fixed and dilated.

Triggers for Which to Place a STAT CT Head and Call to Neurosurgery

- Decreased level of consciousness to a score of ≥ 1 on item 1a of the NIHSS is a reasonable marker to follow for considering a patient for STAT further evaluation and surgery.
    - Confounding factors must be ruled out quickly first
        - New fever/infection
        - Recent sedating medications
        - Other active medical issues
        - Change in pupillary or other brainstem reflexes.

Other Decompressive Surgery Considerations

- Earlier surgery is best and should be done without waiting for significant patient deterioration.
- Bone flap of at least 11-12 cm in diameter should be removed in MCA region strokes.
- DVT prophylaxis should be used per standard of care.
- Seizure prophylaxis in patients without seizures is not indicated.

In-Hospital Evaluation and Secondary Prevention Strategies

Important order sets and orders:

- Stroke-TIA Admission Orders
- Stroke Post-Endovascular Intervention Orders (FOUND imbedded in the Stroke-TIA Admission Orders)
- MRI Head Without IV Contrast **must specify time**
    - Timed to be performed 24 hr (+/- 4 hr) after Tenecteplase bolus for stroke.
- Code Stroke Orders (For in-patient code strokes)
- Thrombolysis for Stroke (Tenecteplase) (aka TNK)

Admission Criteria for In-Patient Units

ICU:

- All patients who receive thrombolytic alone will be monitored in the ICU for initial care. Intensivists serve as the admitting providers for these stroke patients.
- At WakeMed Raleigh alone, a patient who meets all the following criteria can be considered for transfer to the step-down unit after 12 hours of ICU care:
    - NIHSS <= 6 (at the time of transfer)
        - No significant signs or imaging findings of posterior stroke (not covered on NIHSS, i.e.: truncal ataxia, profound nausea/vomiting, potential neurosurgical needs)

- Stable respiratory status
- Not requiring frequent suctioning or blood sugar checks
- Off all BP drips for at least 4 hours ○ Did not undergo embolectomy or other procedures requiring ongoing ICU monitoring.
    - Nursing staff available on stepdown unit to complete q1 hour neuro checks and further neuro checks.
- No provider or RN concerns

- All patients who receive an embolectomy will be monitored in the ICU until specified by the neurointerventional team in collaboration with the ICU team and neurology. Intensivist attendings will also admit these patients.

Step-down/Telemetry:

- Stable patients who did not receive thrombolytic or an embolectomy may be monitored in a telemetry unit if there are no other ICU needs (ex: watching for hemicraniectomy).
- The hospitalists will be the primary attending for these patients.

Specific Post-Thrombolytic and Post-Embolectomy Care

Blood Pressure Considerations:

See above in the acute stroke care section for both acute and subsequent BP considerations.

Imaging Recommendations for 24-hour Images:

- Post-thrombolytic, a patient must have repeat brain imaging at 24 hours with EITHER an MRI or head CT. ○ Either image will be considered in the appropriate window if completed and read within 4 hours before or after the 24-hour post-thrombolytic mark.
- The goal is to make sure patients do not have major imaging contraindications before initiating antiplatelets or anticoagulants.
- For patients who receive embolectomy only, there are no specific requirements for a post 24hour image. Either the Neuro IR team or neurology will request images as needed for further clinical care

Care in Patients Who Receive Thrombolytic and Have Embolectomy:

See above for complications and who to call.

- Regarding decision making, collaboration between neurology and the neurointerventional team will dictate further work-up and management plan.
- For any patient who received a stent placed during embolectomy, antiplatelet decision will be driven by neurointerventional team.

Procedures Post-Thrombolytic

When possible, invasive procedures will be deferred for 12 hours after the end of the thrombolytic (ex: foley placement, etc.).

Post-Embolectomy Puncture Site Checks:

Nursing will be instructed to monitor puncture site and perform peripheral vascular assessments below sheath removal site at time of hemostasis and then q15 min x 4, then q30 min x 2, then q1 hr x 2, then q4 hr x 3

Nursing Neuro Checks

- ICU: Neuro and Vital Sign assessments post-thrombolytic and embolectomy will be followed as specified in the latest AHA guidelines. For post-embolectomy patients, the neuro and vital sign assessments will start (restart if patient received thrombolytic prior to procedure) after the embolectomy at time of hemostasis to monitor for complications.
    - at time of bolus/hemostasis and then q15 min x 2 hrs, q30 min x 6 hrs, q1 hr x 16 hrs
    - After 24 hours, patients generally move down to Q2 hour neuro checks unless otherwise ordered. Further spacing out of neuro checks depends on patient stability.

- Step-down: Generally, patients have Q4 hour neuro checks unless otherwise ordered. Further spacing out of neuro checks depends on patient stability.

- Telemetry/Floor: Generally, patients should have Q4 hours neuro checks unless otherwise ordered. Further spacing out of neuro checks depends on patient stability.

Etiology Specific Management and Treatment Plans

Cardioembolic

- PFO closure
    - Please see Appendix for the WakeMed algorithm regarding collaboration between primary attending
      service and neurology with involvement of cardiology and hematology if needed to make PFO closure decisions.
    - The in-patient neurology team should be consulted for any patient in whom a PFO is felt to be related to ischemic stroke and may be considered for closure.
    - If the neurology team feels that PFO closure should be considered, further involvement of the primary attending service and cardiology will complete the work-up and decision-making process.
    - Please also see the AHA/ASA guideline Figure 5 (Kleindorfer 2021) for factors we will consider when deciding on PFO closure.
- Endocarditis
    - Appropriate antibiotic therapy is the main treatment course for secondary stroke.
        - prevention in strokes caused by infective endocarditis.
        - Ischemic strokes caused by infective endocarditis have a high risk of bleeding. There is no specific guidance for when to start any indicated antiplatelets or anticoagulation; so, when appropriate, the following timeline will be considered.
    - DVT ppx may be reasonable to delay for 24-72 hours unless stroke is < 5 cm, in which case earlier initiation should be completed.
        - If the patient has an indication for an antiplatelet, if possible, delay initiation until patient has one week of negative blood cultures.
        - If the patient has an indication for anticoagulation, if possible, delay initiation until the patient has two weeks of negative blood cultures.

Large Vessel Disease Related to Atherosclerosis and Stenoses

- Intracranial Disease (anterior and posterior circulation)
    - Medical management: For patients with moderate to severe stenosis in an intracranial vessel as the likely etiology of their stroke, preference will be for dual antiplatelet use for 90 days followed by monotherapy with one antiplatelet. A high intensity statin will also be preferred treatment with long term goal LDL < 70 mg/dL, unless there are extenuating circumstances.
    - For selected patients with CAD and PAD who have stroke related to intracranial atherosclerosis, we can also consider aspirin use with the addition of low dose rivaroxaban.
    - Surgical management: For patients who continue to have strokes related to moderate to severe intracranial stenosis despite appropriate maximal medical management, cases will be discussed with the neurointerventional team to see if there are off label interventional options.

- Extracranial Carotid Disease
    - medical management for symptomatic vessel: For patients with moderate to severe stenosis in their carotid artery, as the likely etiology of their stroke, off label dual antiplatelets will be used for at least 21 days while considering surgical options.
    - Surgical management for symptomatic vessel: vascular surgery and neurosurgery teams are available to think about carotid endarterectomy (CEA), transcarotid artery revascularization (TCAR) or transfemoral carotid artery stenting (CAS) procedures.
        - Choice of the procedure depends on patient-specific factors. In general, CEA and TCAR are favored over transfemoral stenting.
        - As needed, vascular surgery and neurosurgery will collaborate with patients on the choice of procedure.
        - In general, if safe, the procedure will be attempted to be completed within 2 weeks from stroke to increase the benefit/risk profile.
    - Asymptomatic carotid disease can be considered for surgical management if the patient has a high-grade stenosis with very low surgical risks. These cases will be discussed between either neurosurgery or vascular surgery and asymptomatic patients.

- Special considerations for extracranial posterior circulation
    - Medical management: Most patients will likely get dual antiplatelets for at least 21 days and high intensity statin for goal LDL < 70 mg/dL
    - Surgical management: In patients who fail medical management, cases will be discussed with the neurointerventional team to see if off-label surgical approaches may help.

Small Vessel Disease

- In patients who have minor strokes or high risk TIAs felt likely due to small vessel disease risk factors, dual antiplatelet therapy for 21 days is reasonable
    - If beyond 24 hours from the last known well, dual antiplatelets will usually be initiated without a load. For select patients with atherosclerosis related strokes, load of antiplatelet may be considered out to 72 hours post last known normal.

- Blood pressure management: please see above under acute stroke care for general BP guidance. Once a patient has stabilized clinically, in general BP will be lowered at a rate no faster than about 10% per day. Long-term outpatient BP goal will be <130/80.

Cervical artery Dissection

Literature does not strongly support anticoagulation over antiplatelet therapy, and in general low risk dissections will be treated with monotherapy or dual antiplatelet therapy. For higher risk, higher grade dissections, including traumatic dissections, please see Appendix for general collaboration between neurology and neurointerventional teams and use of antiplatelet vs anticoagulation both acutely and long term.

Hypercoagulable States

In general, hypercoagulable testing tends to be low yield. Suspicion for a hypercoagulable state will be higher in patients under the age of 60 who have a self or family history of unprovoked thrombosis, prior spontaneous abortion or coexistence of systemic signs and symptoms suggestive of hypercoagulability. In these patients, consultation with hematology may appropriate for best resource utilization for hypercoagulable testing, and this can potentially be deferred to the outpatient setting. The highest yield testing is for antiphospholipid antibody testing.

Cryptogenic

- To truly be considered cryptogenic, appropriate work-up to look for the most common etiologies described above should have been completed.
- Clinicians will also consider looking for infectious causes of stroke, primary and secondary vasculitis, drug use, and/or genetic causes of stroke in appropriate patients.
- For embolic stroke of undetermined source (ESUS), treatment with empiric anticoagulation has not shown benefit and should not be done routinely, especially in first time stroke events.
    - Extended cardiac monitoring can be pursued.
    - A minimum of 2 weeks and more commonly 1 month or longer of monitoring would be appropriate.
    - Please see the Appendix for an algorithm created in collaboration between cardiology, EP cardiology, neurology, and hospitalists regarding which patient may benefit more from the implanted heart monitor (ILR) vs an external monitor.

DVT Prophylaxis and Timing

- Mechanical devices for DVT/VTE prophylaxis are appropriate for most patients and should be used from admission.
    - If a patient cannot have mechanical DVT/VTE prophylaxis, the reason should be documented.
- Regarding pharmacologic prophylaxis, unless a stroke patient has recently had thrombolytic, has a major hemorrhage or other contraindication, DVT/VTE pharmacologic prophylaxis is likely appropriate and should be used from the day of admission.
    - It is reasonable for a provider to document any reason for delay in pharmacologic prophylaxis.

Antiplatelet Considerations

Dual antiplatelet use: The specific use of DAPT is described in other sections of this handbook, including in the acute treatment section, large vessel disease, and small vessel disease.

Timing of starting antiplatelet: Stroke patients should have antiplatelet initiated within 48 hours of admission and those who cannot receive antiplatelets within 48hrs must have the reason documented.

Laboratory testing: Before considering a patient to have failed use of clopidogrel and for patients requiring clopidogrel for stent stability, it is reasonable to test PRU level to ensure the patient is a responder and able to convert the medication to its active metabolite.

Anticoagulation Considerations

Timing of starting anticoagulation: In general, we will wait 48 hours post stroke to initiate anticoagulation. Please see Appendix or general guide for starting anticoagulation in non-urgent cases. This algorithm is based on the size of stroke in the largest axial image. There is data to support earlier initiation of anticoagulation if needed. Factors that can be taken into consideration to delay starting anticoagulation include NIHSS > 9, early hemorrhage, eloquent territory of stroke, or other risks of bleeding systemically. These factors may favor waiting for healing before initiating anticoagulation.

Special populations where early anticoagulation should be considered:
Certain patients may be high risk for deterioration or complications without earlier initiation of anticoagulation. These patients include those with mobile carotid thrombus, left atrium thrombus, left ventricular thrombus, DVT, pulmonary embolism, or other situations. Multidisciplinary conversations will ensue to discuss optimal timing.

Choice of anticoagulation
For any patient who is higher risk for bleeding or in whom future procedures may be needed, heparin may be the preferred agent. For patients with higher risk of bleeding, low goal heparin with NO bolusing protocol may be preferred. In general, can advance the heparin after 24-48 hours of stability but NO bolusing protocol should be maintained. Once patients is closer to discharge, team can transition to appropriate oral anticoagulant.

Statins

- In patients in whom atherosclerosis is related to stroke etiology or in non-atherosclerotic stroke patients with an LDL > 100 mg/dL, high intensity statin use will be strongly considered unless strictly contraindicated.
- Long-term goal LDL is < 70 mg/dL.
- When a high-intensity statin is indicated, atorvastatin 40-80 mg daily or rosuvastatin 20-40 mg daily will be the preferred medication.
- There is evidence to suggest Ezetimibe use if needed.
- PCSK9 (proprotein convertase subtilisin kexin type 9) inhibitor therapy is also a reasonable option.

Lifestyle

We recognize the critical importance of lifestyle modifications for stroke risk factors. The AHA/ASA outlines lifestyle recommendations that should be incorporated into stroke education that every stroke patient and their family get before discharge.

Prognosis Discussions

- It is important for all stroke and TIA patients to understand their risks of future stroke and general prognosis for recovery. Emphasis should be placed on the fact that long-term recovery is measured in months and not days; so, early recovery may not be obvious.

- The primary attending service and/or in-patient neurology team would be best to give consistent information regarding prognosis of recovery.

- For end-of-life strokes or large strokes that will likely leave a patient with significant disability, it is important for patients and families to be aware of potential long-term deficits so they may focus their goals of care appropriately ○ For any patients, families, or healthcare teams requiring more support for difficult prognosis discussions, it is reasonable and appropriate to involve the in-patient palliative care team early in the hospitalization

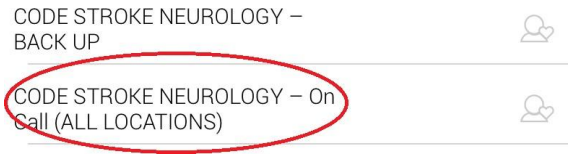
Rehab Care

- Patients with admission of potential stroke or TIA will have a swallow evaluation by bedside nursing or speech therapy prior to initiation of oral medication or food, a physical therapy evaluation, and an occupational therapy evaluation as needed. For cases with no or very minimal deficits, a provider may attest that the patient has no rehab needs ○ For those who need evaluations, the goal for evaluation is within 24 hours with some exceptions ○ For patients who receive thrombolytic, evaluations may be deferred until the 24-hour bedrest is discontinued or if the provider feels a safe evaluation is possible earlier than 24 hours
  - Any patients with concern for ongoing penumbra tissue at risk for further ischemia may have deferred PT and OT evaluations as specified by the bedside provider.

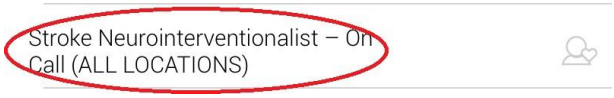
Getting In Touch with Providers On-Call

- Telestroke team for all acute stroke questions
  - In general, any patient with acute stroke symptoms within the prior 24 hours should be reviewed with the telestroke team to consider if eligible for potential thrombolytic or embolectomy. High-risk TIA patients should also be reviewed with the telestroke team for consideration of dual antiplatelet treatment options.

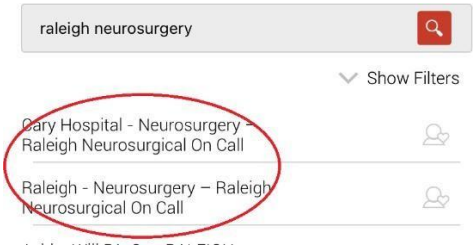
- **631-250-8545** (One number for all WakeMed facilities)
  - Teams should press:
    - 1 – Raleigh
    - 2- Cary
    - 3 – Apex
    - 4 – Garner
    - 5 – Brier Creek
    - 6 – North
    - 7 - Wendell
  - If the initial on-call provider does not answer, caller should remain on the line as it automatically goes down a back-up triage plan
- 855-264-0149(Back-up number)



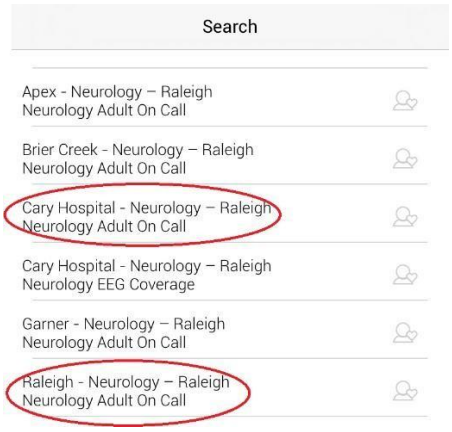
- Stroke NeuroInterventionalist on-call.
  Search in RapidConnect for Stroke Neurointerventionalist – On Call (ALL LOCATIONS)
  - NEVER text information for an acute stroke, always call ○ If unable to reach the Neurointerventionalist on call on their cell phone on first attempt, proceed with the following:
  - Call the on-call MD's cell. If no answer =>
    - Call the Cath Lab. If unable to reach Neuro IR MD there =>
      Call the OR. If unable to reach Neuro IR MD there => Call on call MD cell AGAIN, then call the other 2 providers.
  - If no IR provider is available or you are unable to reach anyone within 30 min, prepare to emergently transfer the patient out for stroke intervention. ED Leadership should place WakeMed on IR diversion until Neuro IR can be reached.



- Neurosurgery for emergent questions such as hemicraniectomy
  - ○ Search in RapidConnect for Raleigh Neurosurgery Attending Trauma On Call
  - For routine questions, please search Raleigh Neurosurgery and pick the on call attending by location.



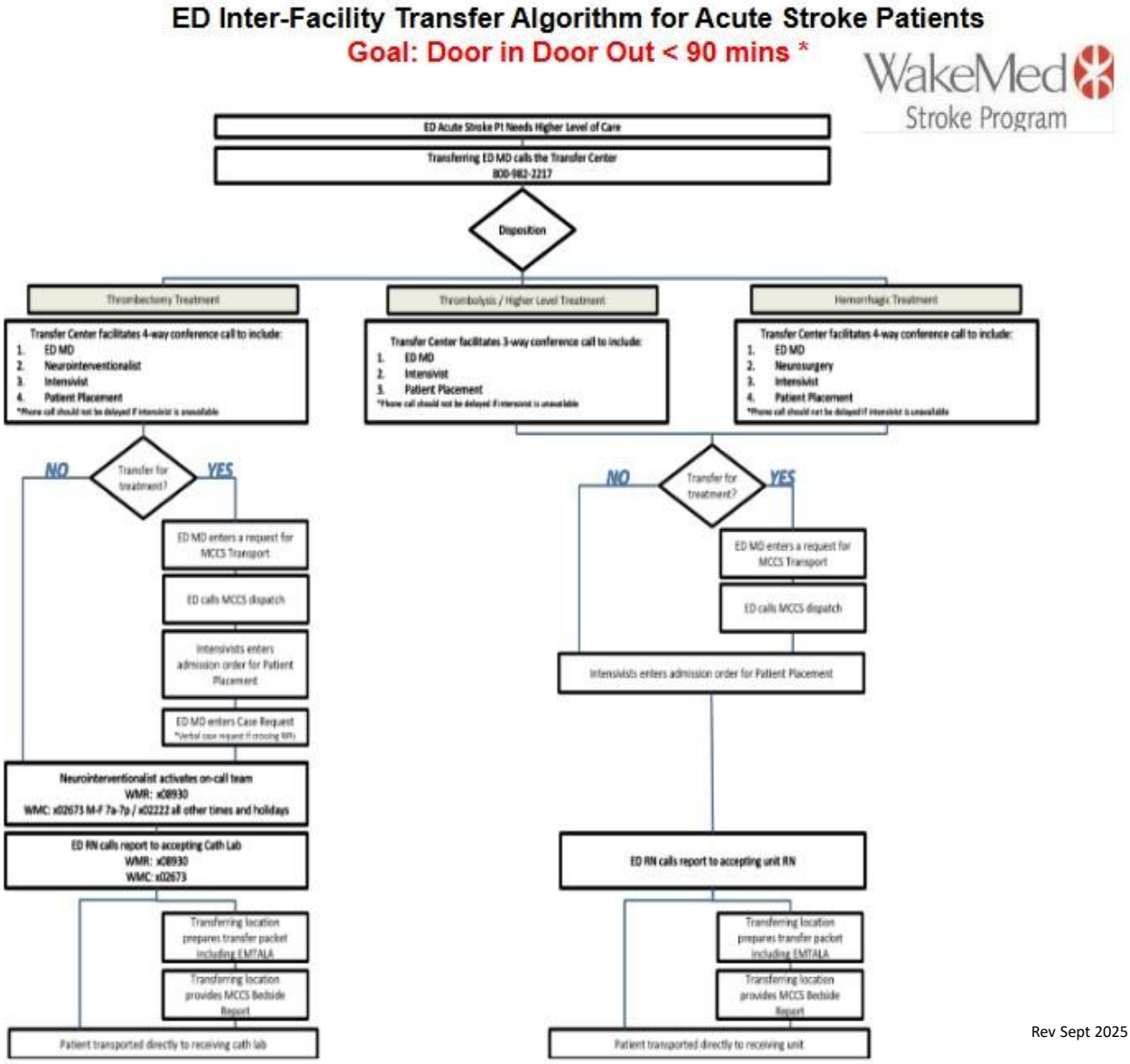
- Raleigh Neurology Associates for subacute stroke care at Raleigh and Cary Hospitals
  - For non-acute stroke but urgent matters: Please try to call through Rapid Connect by clicking the appropriate on-call provider for the facility or page the on-call provider through the Raleigh. Neurology Clinic at 919-782-3456
    - For routine consults, please place Consult Order in EPIC
  - For non-urgent questions can send messages through RapidConnect to the Raleigh Neurology Adult On Call based on location



- Teleneurology VMS for in-patient/subacute stroke care at North Hospital
  - Available during the hours of 08:00 – 12:00, 7 days/week ○
  - For routine consults
    - Place a ROUTINE neurology consult via RapidConnect using “VMS Teleneurology North”
  - ○ When to call: Please consult neurology for new/acute routine neurologic abnormalities which need inpatient work-up (ex: new seizures, new weakness, etc.).
  - ○ Please remember that acute CODE STROKES should be a DIRECT CALL to the acute telestroke team (listed above) after activating the CODE STROKE. Do NOT place these in as Emergent Consults as this can delay care.
    - For urgent consult needs that occur outside of VMS hours and do not meet Code Stroke criteria, page Raleigh Neurology Associates for phone consultation

Appendix Transfer

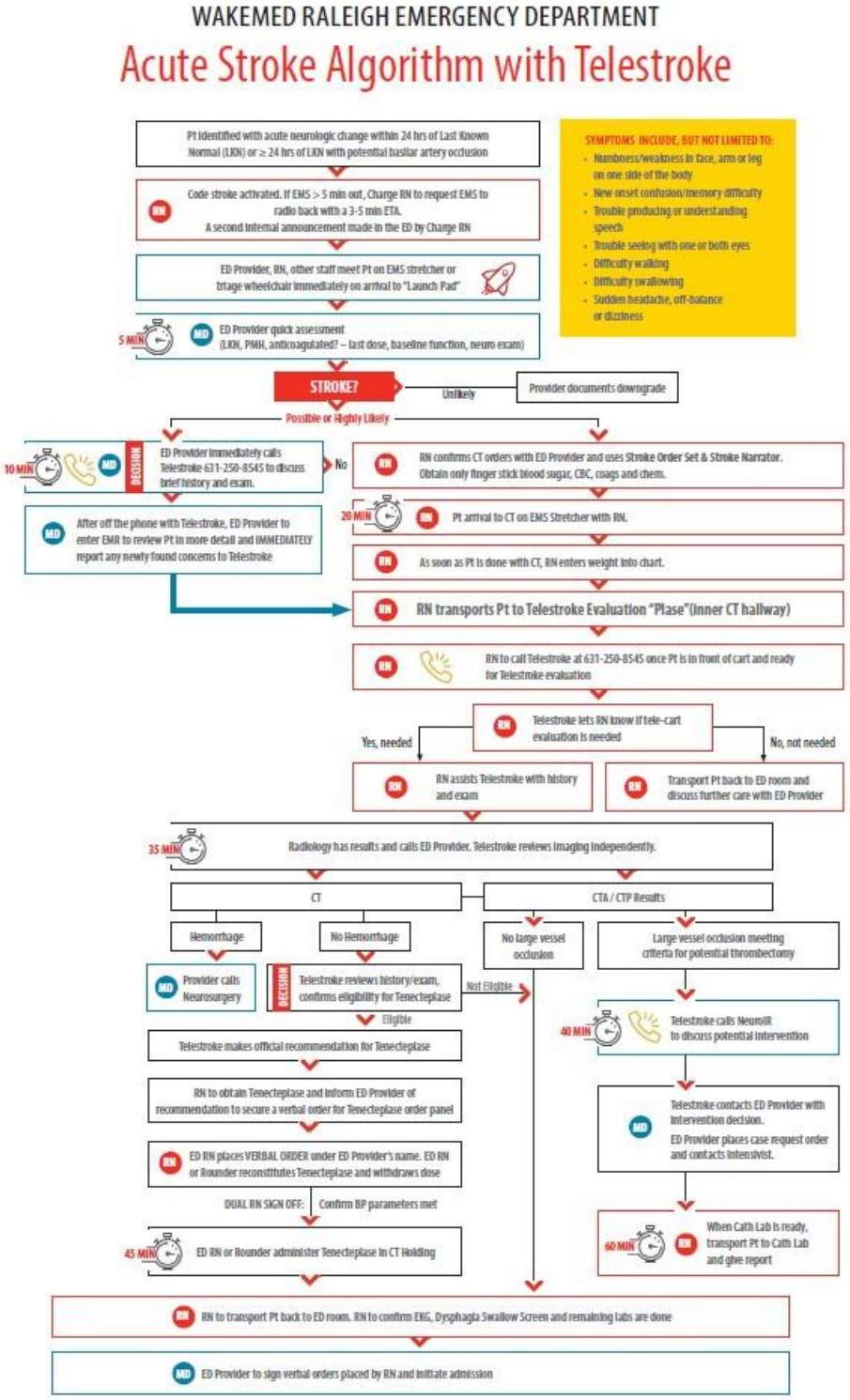
Transfer Algorithm



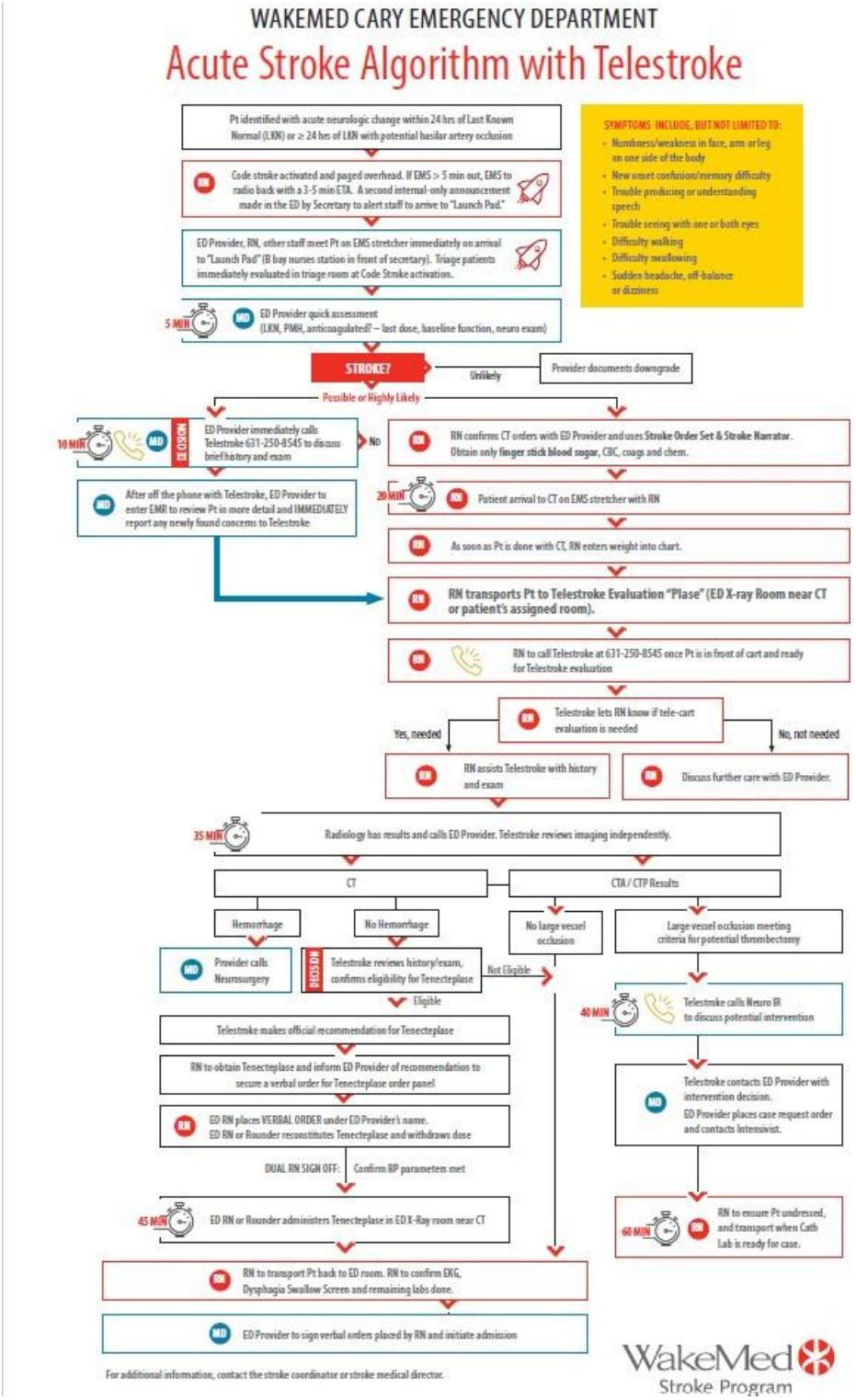
Rev Sept 2025

Acute Code Stroke Algorithms

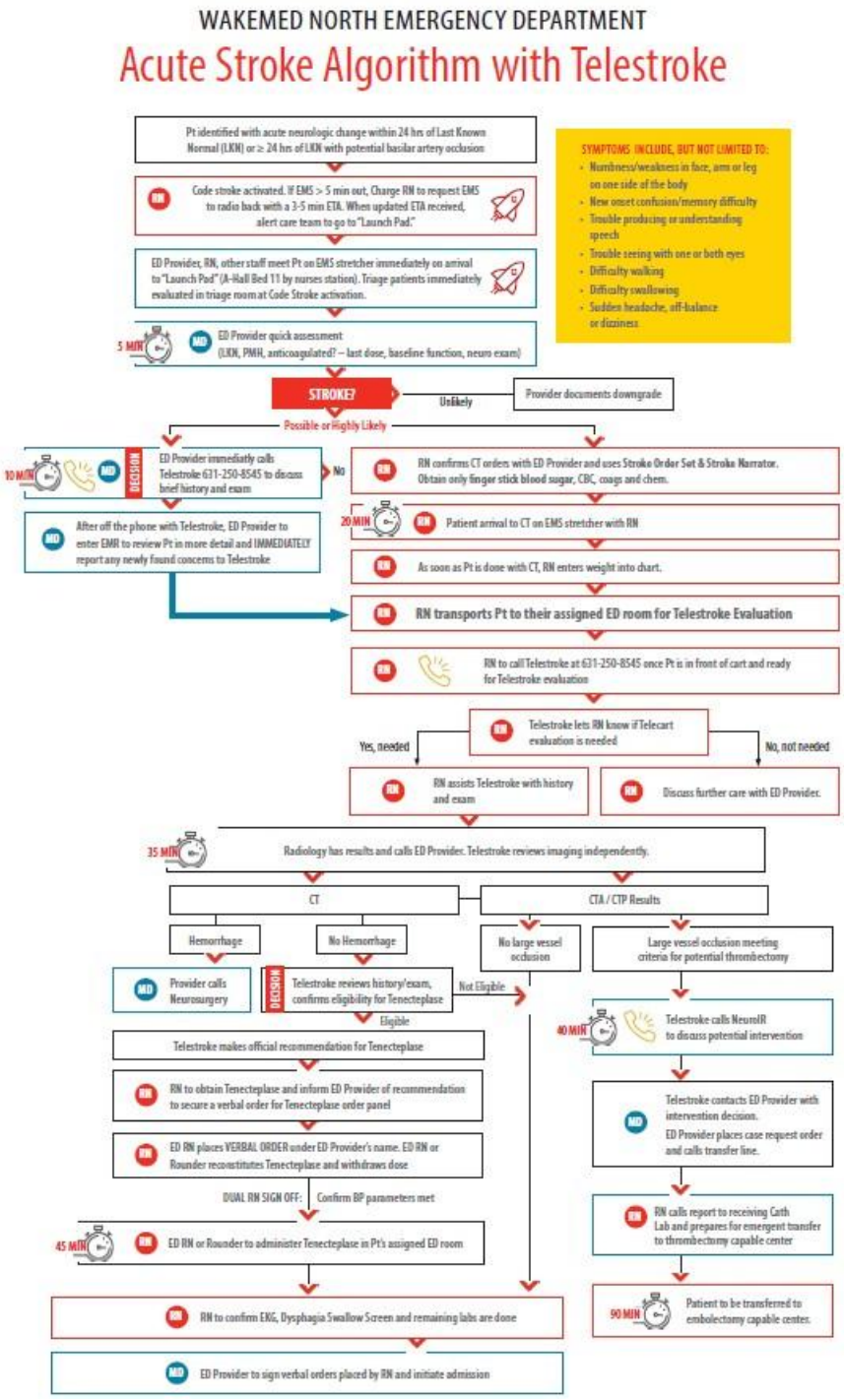
Raleigh ED



Cary ED


WAKEMED CARY EMERGENCY DEPARTMENT
Acute Stroke Algorithm with Telestroke
Pt identified with acute neurologic change within 24 hrs of Last Known Normal (LKN) or ≥ 24 hrs of LKN with potential basilar artery occlusion
SYMPTOMS INCLUDE, BUT NOT LIMITED TO:
Numbness/weakness in face, arm or leg on one side of the body
New onset confusion/memory difficulty
Trouble producing or understanding speech
Trouble seeing with one or both eyes
Difficulty walking
Difficulty swallowing
Sudden headache, off-balance or dizziness
Code stroke activated and paged overhead. If EMS > 5 min out, EMS to radio back with a 3-5 min ETA. A second internal-only announcement made in the ED by Secretary to alert staff to arrive to "Launch Pad."
ED Provider, RN, other staff meet Pt on EMS stretcher immediately on arrival to "Launch Pad" (B bay nurses station in front of secretary). Triage patients immediately evaluated in triage room at Code Stroke activation.
5 MIN
ED Provider quick assessment (LKN, PMH, anticoagulated? – last dose, baseline function, neuro exam)
STROKE?
Unlikely
Provider documents downgrade
Possible or Highly Likely
10 MIN
DECISION
ED Provider immediately calls Telestroke 631-250-8545 to discuss brief history and exam
No
RN confirms CT orders with ED Provider and uses Stroke Order Set & Stroke Narrator. Obtain only finger stick blood sugar, CBC, coags and chem.
20 MIN
Patient arrival to CT on EMS stretcher with RN
As soon as Pt is done with CT, RN enters weight into chart.
After off the phone with Telestroke, ED Provider to enter EMR to review Pt in more detail and IMMEDIATELY report any newly found concerns to Telestroke
RN transports Pt to Telestroke Evaluation "Plase" (ED X-ray Room near CT or patient's assigned room).
RN to call Telestroke at 631-250-8545 once Pt is in front of cart and ready for Telestroke evaluation
Telestroke lets RN know if tele-cart evaluation is needed
Yes, needed
No, not needed
RN assists Telestroke with history and exam
Discuss further care with ED Provider.
35 MIN
Radiology has results and calls ED Provider. Telestroke reviews imaging independently.
CT
CTA / CTP Results
Hemorrhage
No Hemorrhage
No large vessel occlusion
Large vessel occlusion meeting criteria for potential thrombectomy
Provider calls Neurosurgery
DECISION
Telestroke reviews history/exam, confirms eligibility for Tenecteplase
Not Eligible
Eligible
40 MIN
Telestroke calls Neuro IR to discuss potential intervention
Telestroke makes official recommendation for Tenecteplase
RN to obtain Tenecteplase and inform ED Provider of recommendation to secure a verbal order for Tenecteplase order panel
ED RN places VERBAL ORDER under ED Provider's name. ED RN or Rounder reconstitutes Tenecteplase and withdraws dose
Telestroke contacts ED Provider with intervention decision. ED Provider places case request order and contacts Intensivist.
DUAL RN SIGN OFF:
Confirm BP parameters met
45 MIN
ED RN or Rounder administers Tenecteplase in ED X-Ray room near CT
60 MIN
RN to ensure Pt undressed, and transport when Cath Lab is ready for case.
RN to transport Pt back to ED room. RN to confirm EKG, Dysphagia Swallow Screen and remaining labs done.
ED Provider to sign verbal orders placed by RN and initiate admission
For additional information, contact the stroke coordinator or stroke medical director.
WakeMed
Stroke Program

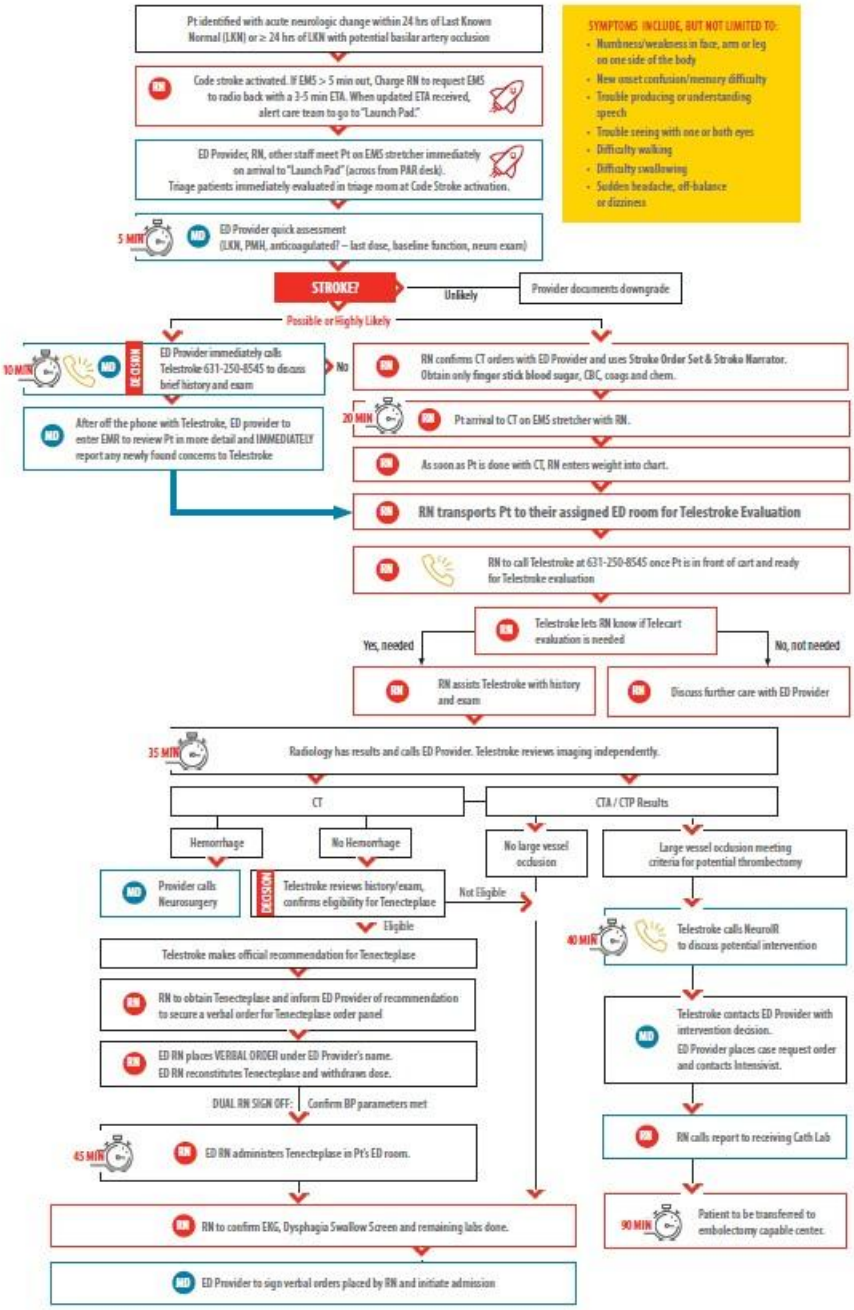
North ED



Brier Creek ED

WAKEMED BRIER CREEK EMERGENCY DEPARTMENT

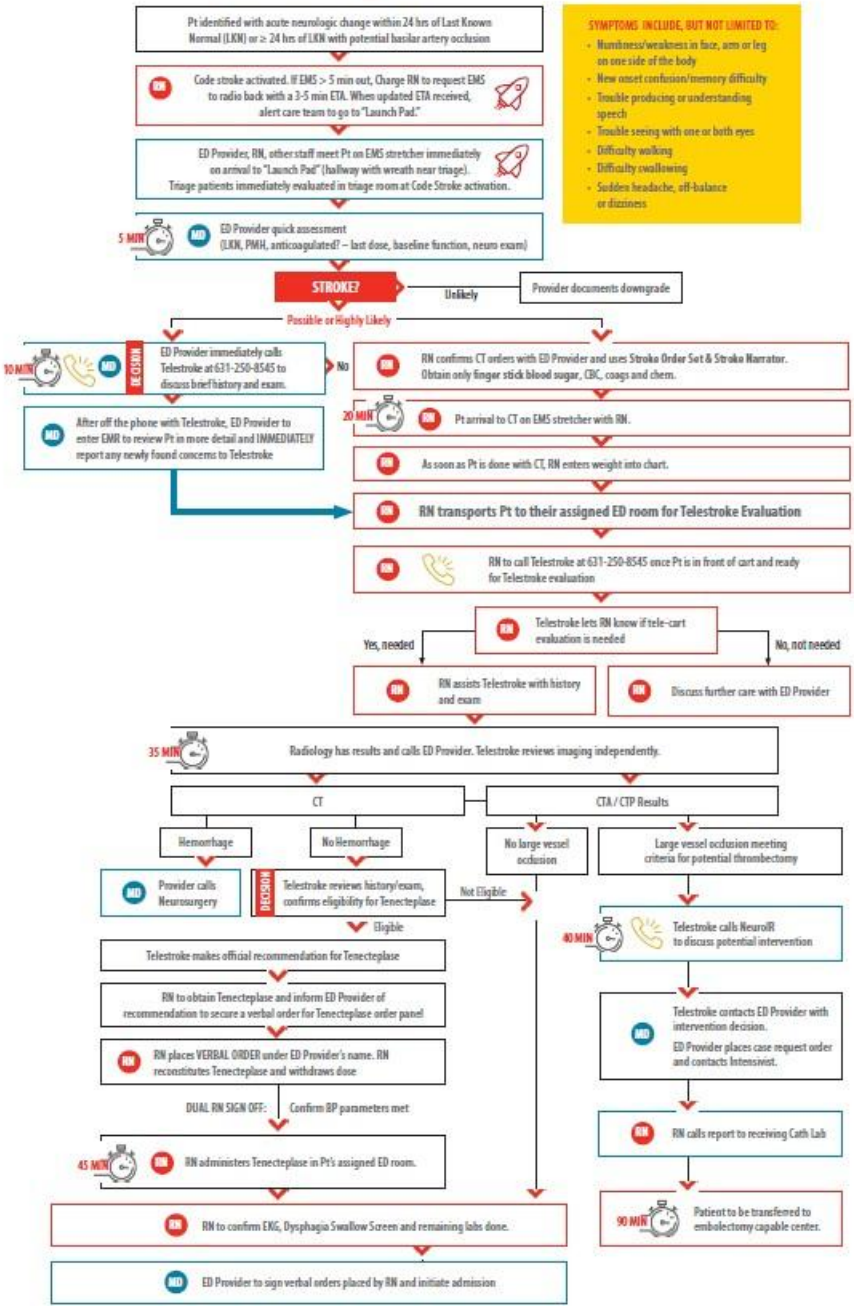
Acute Stroke Algorithm with Telestroke



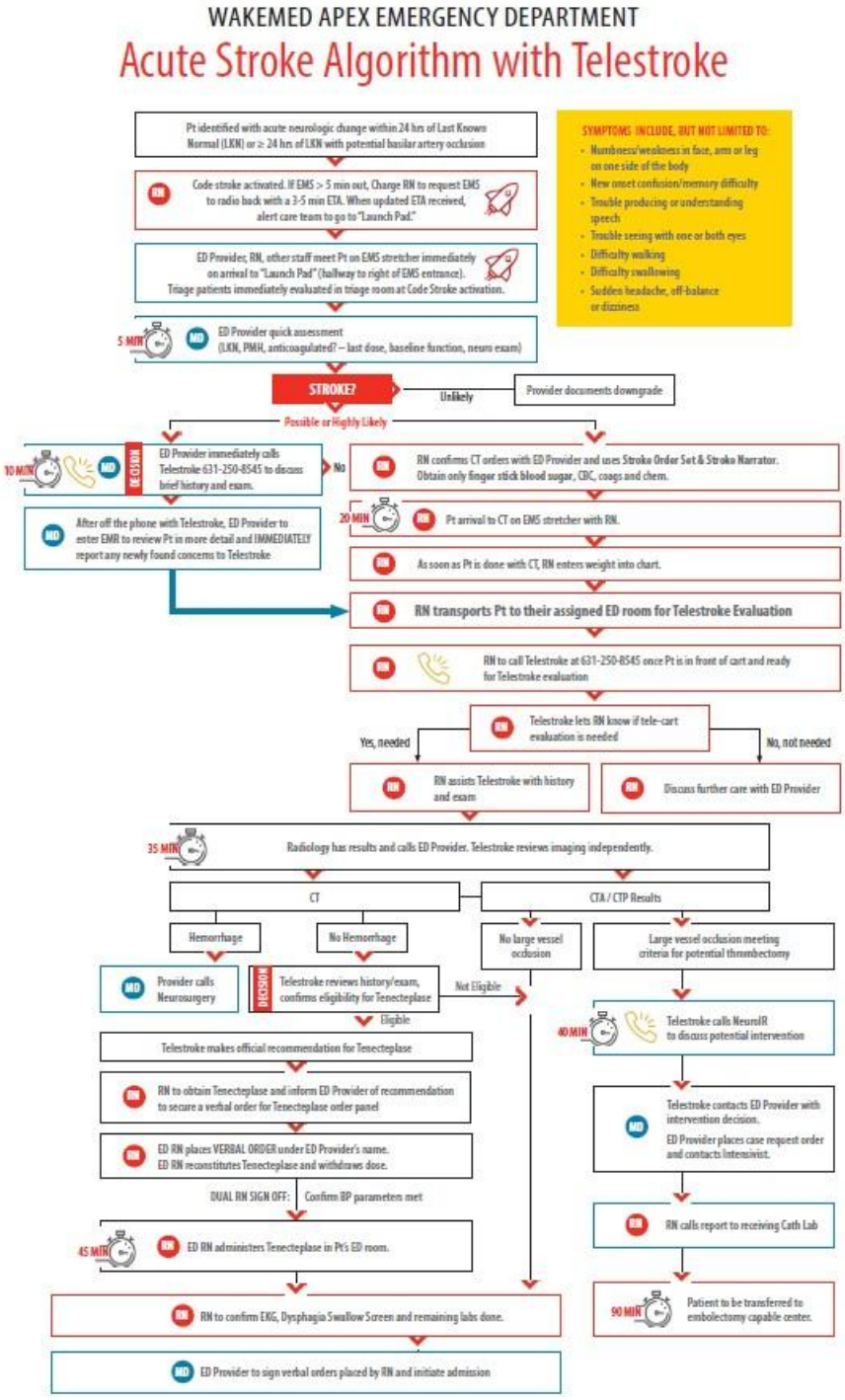
Garner ED

WAKEMED GARNER EMERGENCY DEPARTMENT

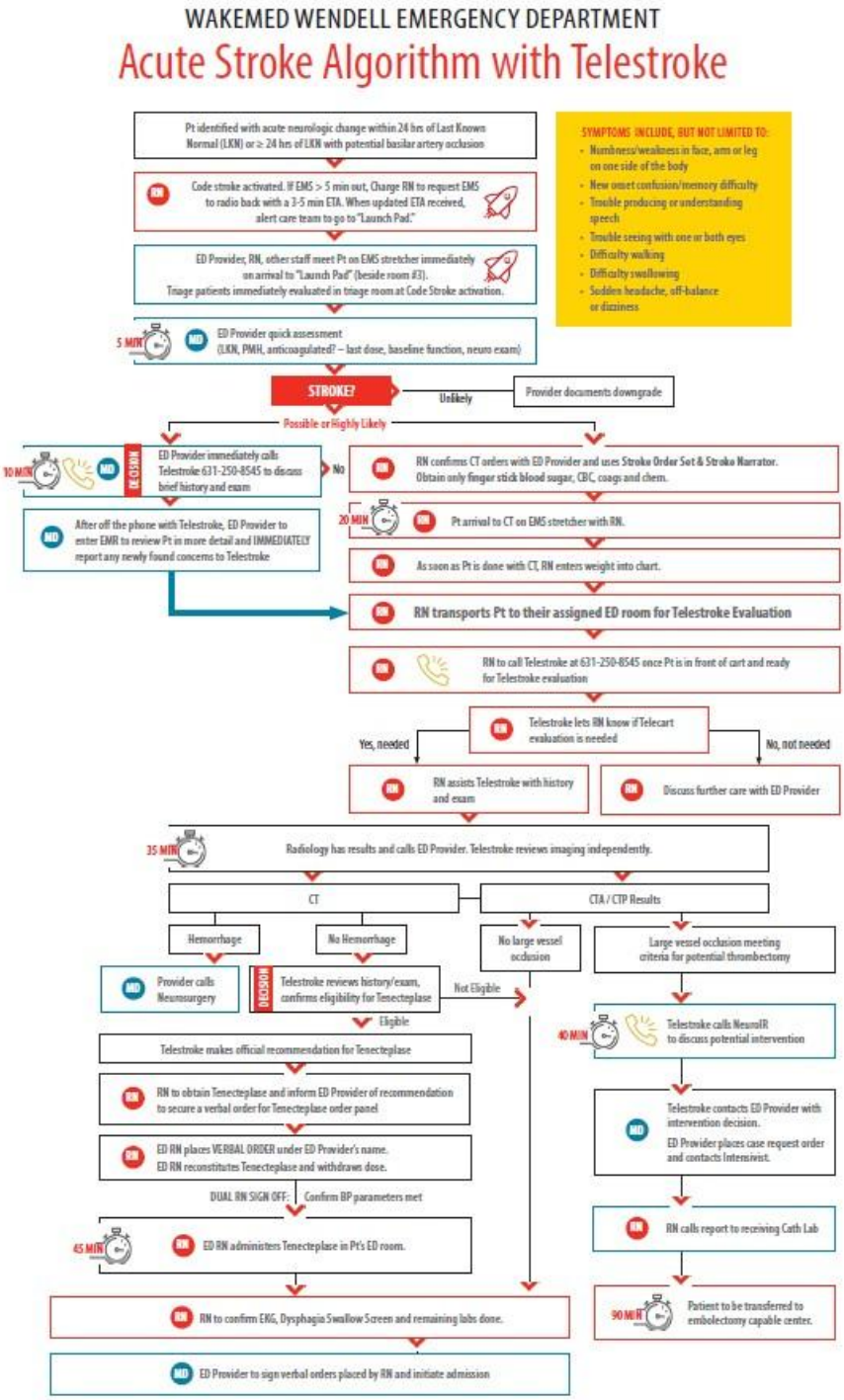
Acute Stroke Algorithm with Telestroke



Apex ED

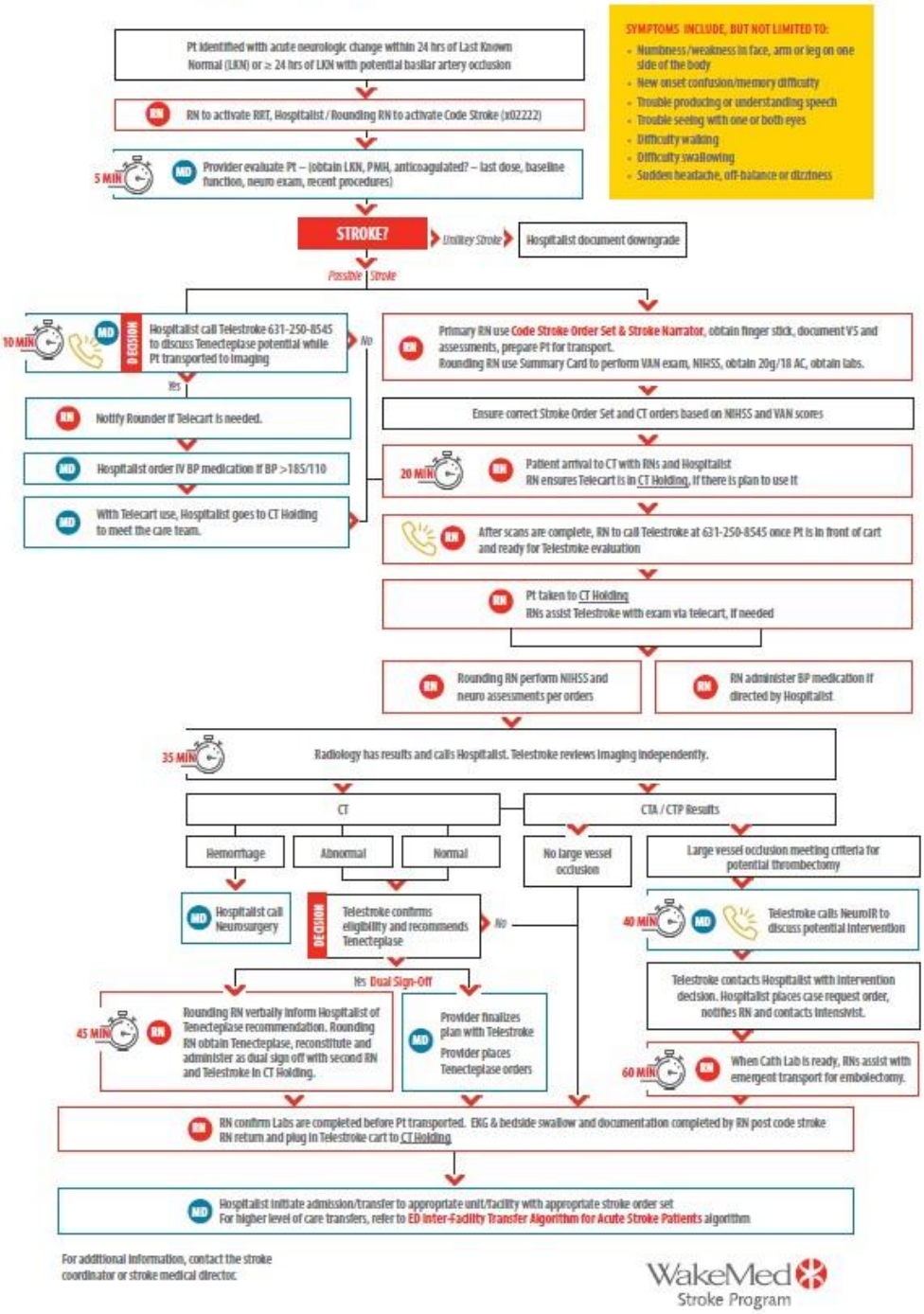

WAKEMED APEX EMERGENCY DEPARTMENT
Acute Stroke Algorithm with Telestroke
Pt identified with acute neurologic change within 24 hrs of Last Known Normal (LKN) or ≥ 24 hrs of LKN with potential basilar artery occlusion
SYMPTOMS INCLUDE, BUT NOT LIMITED TO:
Numbness/weakness in face, arm or leg on one side of the body
New onset confusion/memory difficulty
Trouble producing or understanding speech
Trouble seeing with one or both eyes
Difficulty walking
Difficulty swallowing
Sudden headache, off-balance or dizziness
Code stroke activated. If EMS > 5 min out, Charge RN to request EMS to radio back with a 3-5 min ETA. When updated ETA received, alert care team to go to "Launch Pad."
ED Provider, RN, other staff meet Pt on EMS stretcher immediately on arrival to "Launch Pad" (hallway to right of EMS entrance). Triage patients immediately evaluated in triage room at Code Stroke activation.
5 MIN
ED Provider quick assessment (LKN, PMH, anticoagulated? – last dose, baseline function, neuro exam)
STROKE?
Unlikely
Provider documents downgrade
Possible or Highly Likely
10 MIN
DECISION
ED Provider immediately calls Telestroke 631-250-8545 to discuss brief history and exam.
No
After off the phone with Telestroke, ED Provider to enter EMR to review Pt in more detail and IMMEDIATELY report any newly found concerns to Telestroke
RN confirms CT orders with ED Provider and uses Stroke Order Set & Stroke Narrator. Obtain only finger stick blood sugar, CBC, coags and chem.
20 MIN
Pt arrival to CT on EMS stretcher with RN.
As soon as Pt is done with CT, RN enters weight into chart.
RN transports Pt to their assigned ED room for Telestroke Evaluation
RN to call Telestroke at 631-250-8545 once Pt is in front of cart and ready for Telestroke evaluation
Telestroke lets RN know if tele-cart evaluation is needed
Yes, needed
No, not needed
RN assists Telestroke with history and exam
Discuss further care with ED Provider
35 MIN
Radiology has results and calls ED Provider. Telestroke reviews imaging independently.
CT
CTA / CTP Results
Hemorrhage
No Hemorrhage
No large vessel occlusion
Large vessel occlusion meeting criteria for potential thrombectomy
Provider calls Neurosurgery
DECISION
Telestroke reviews history/exam, confirms eligibility for Tenecteplase
Not Eligible
Eligible
40 MIN
Telestroke calls NeuroIR to discuss potential intervention
Telestroke makes official recommendation for Tenecteplase
RN to obtain Tenecteplase and inform ED Provider of recommendation to secure a verbal order for Tenecteplase order panel
ED RN places VERBAL ORDER under ED Provider's name. ED RN reconstitutes Tenecteplase and withdraws dose.
Telestroke contacts ED Provider with intervention decision.
ED Provider places case request order and contacts Intensivist.
DUAL RN SIGN OFF:
Confirm BP parameters met
RN calls report to receiving Cath Lab
45 MIN
ED RN administers Tenecteplase in Pt's ED room.
90 MIN
Patient to be transferred to embolectomy capable center.
RN to confirm EKG, Dysphagia Swallow Screen and remaining labs done.
ED Provider to sign verbal orders placed by RN and initiate admission

Wendell ED



Raleigh In-Patient

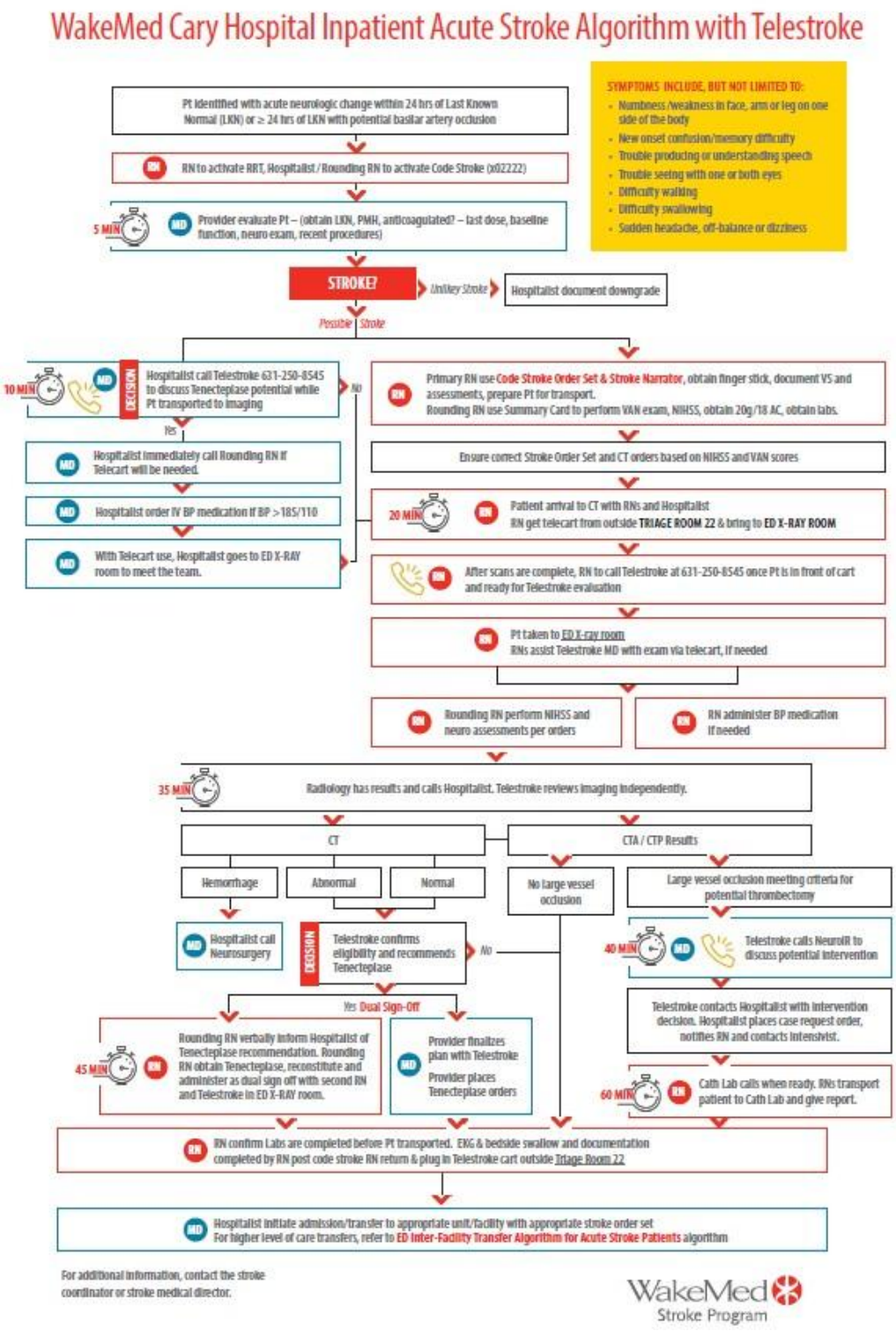
WakeMed Raleigh Campus Inpatient Acute Stroke Algorithm with Telestroke



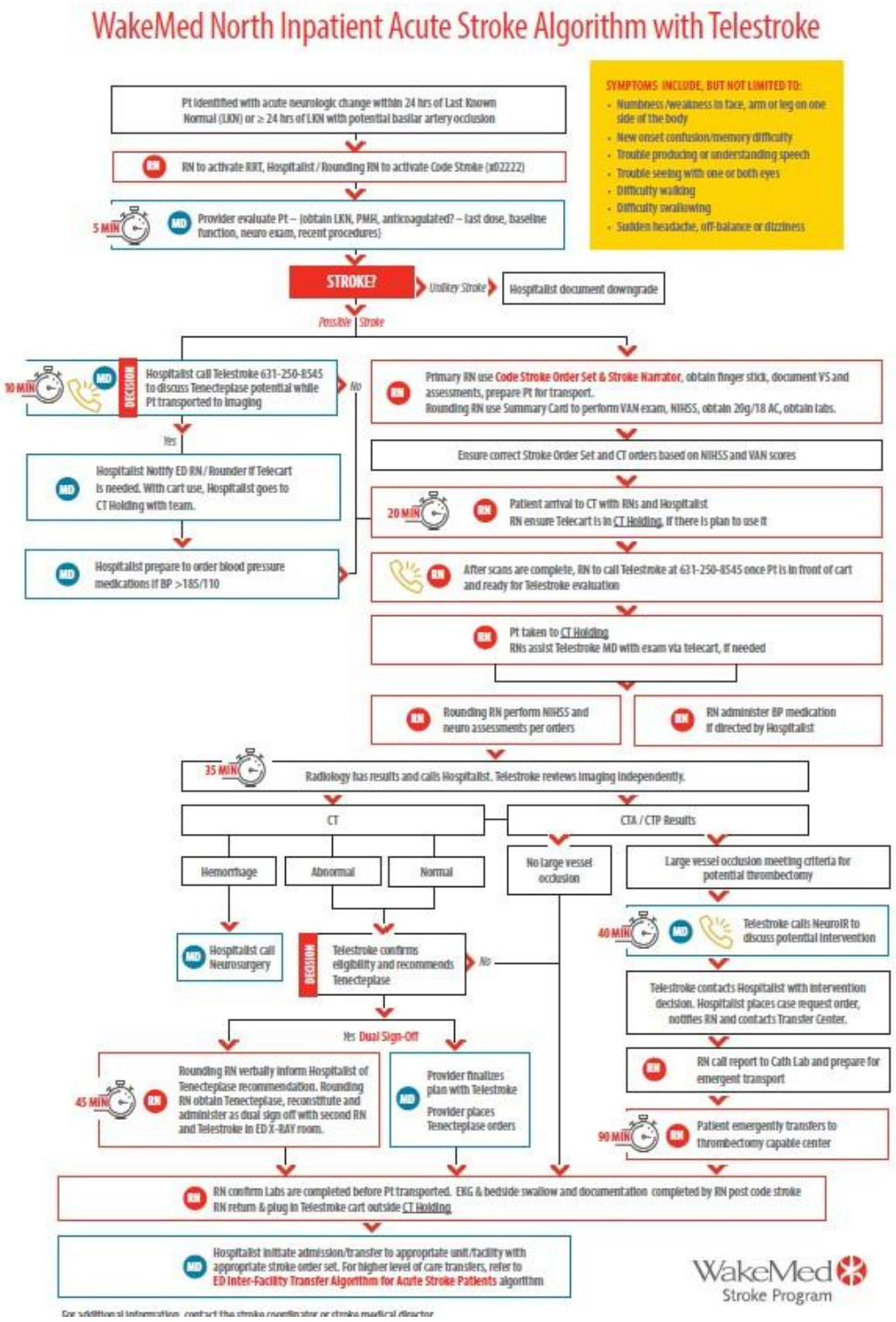
For additional information, contact the stroke coordinator or stroke medical director.

WakeMed Stroke Program

Cary In-Patient



North In-Patient



Thrombolytic Inclusion/Exclusion Criteria

Intravenous Thrombolytic IS RECOMMENDED for Patients Meeting ALL of the below …
Age > 18 years old
Acute ischemic stroke with measurable neurologic deficit

Time of symptom onset less than 4.5 hours before beginning IV thrombolytic
Discussion with and recommendation from the expert stroke neurologist
Intravenous Thrombolytic IS POSSIBLY RECOMMENDED for the Following Cases after careful evaluation of the Risks and Benefits
Mild but Disabling stroke, even with rapid/early improvement in NIHSS
Severe stroke (NIHSS > 25)
Glucose levels <50 and >400 mg/dL at presentation, which are then normalized
Recent Warfarin use as long as INR is ≤ to 1.7 or PT <15 sec
Lumbar puncture within the previous 7 days
Arterial puncture of a noncompressible blood vessels within the previous 7 days
Recent major surgery (not intracranial or spinal) within the previous 14 days *(contact the surgeon to discuss potential bleeding risks)*
Systemic malignancy and reasonable (>6 mo) life expectancy
Extra-axial intracranial neoplasms (not for intra-axial intracranial neoplasms)
Pregnancy, early postpartum period (< 14 days after delivery), menstruation or recent vaginal bleeding *(consult gynecologist)*
Extracranial or intracranial dissections
Unruptured intracranial aneurysms or intracranial malformations *(consult neurosurgeon, especially if aneurysm is >10 mm)*
Acute or recent myocardial infarctions, NSTEMI or STEMI *(consult cardiologist)*
History of diabetic hemorrhagic retinopathy or other hemorrhagic ophthalmic conditions *(consult ophthalmologist)*
Sickle Cell disease
Seizure at onset, if weakness if felt to be possibly related to stroke and not pure post-ictal phenomena
Recent major trauma (not involving the head)
History of GI and GU bleeding (unless GI bleed within last 21 days), *(consult the gastroenterologist or urologist as needed)*
Pre-existing disability or dementia
Stroke mimic with a reasonable assessment that deficits are more likely due to cerebral ischemia
Small Ischemic stroke within the prior 3 months
History of remote traumatic ICH for which stroke expert feels the benefits of thrombolytic would outweigh risks
Intravenous Thrombolytic is CONTRAINDICATED in the Following Cases
CT head or MRI evidence of acute intracranial hemorrhage
CT head showing obvious, frank hypodensity *(early, subtle ischemic changes are okay)*
Signs and symptoms most consistent with subarachnoid hemorrhage
NON-disabling stroke (NIHSS must be ≤ 5 and symptoms should not be disabling)
Use within the prior 48 hours of direct thrombin inhibitors, i.e., Pradaxa (Dabigatran) or factor Xa inhibitors, i.e., Xarelto (Rivaroxaban), Eliquis (Apixaban) or recent Warfarin use with INR >1.7 or PT ≥15 sec
Low-molecular weight heparin (Lovenox) at therapeutic dose received within last 24 hours
Abnormally elevated aPTT/Anti-Xa due to Heparin within previous 48 hours*
Platelet count less than 100,000/mm3*
Structural GI malignancy or recent GI bleeding within prior 21 days
Severe head trauma within the prior 3 months
Intracranial or spinal surgery within the prior 3 months
Intra-axial intracranial neoplasms

History of spontaneous intracranial hemorrhage
Known or suspected infective endocarditis
Known or suspected aortic dissection

*Comment: While every effort should be made to review the platelet count, INR, and PTT prior to the administration of IV thrombolytics, awaiting these lab values should not delay administration if patient does not have a history of blood disorder, liver disease, or anticoagulant use

**Comment: The final decision for thrombolytics will be made by the Stroke MD after thorough review of each patient's case and discussion with other providers, the patient, and/or family. Some case-by-case exceptions to the above guidelines may be made with documentation to support decision making.

Embolectomy Inclusion/Exclusion Criteria

Patients with ALL the following characteristics are STRONGLY CONSIDERED for embolectomy
ICA or M1
NIHSS ≥ 5 with disabling deficits
Modified rankin scale score of ≤ 2
Arriving within < 6 hours of last known normal with an ASPECT score ≥ 6
Arriving between 6-24 hours of last known normal and meeting the DAWN and DEFUSE III criteria suggesting a small stroke core with larger salvageable penumbra
Patients with any of the following criteria require more scrutiny and will be considered for embolectomy if the benefits are felt to outweigh the risks
Basilar artery occlusion, taking into account the natural course of these occlusions may confer benefit beyond even 24 hours of last known normal
M2, A1, or P1 occlusion
NIHSS < 5
Modified rankin scale score = 3
Rapidly resolving neurologic deficits
Imaging evidence to suggest a close to completed infarct
High-grade stenosis or occlusion that may require stenting at the time of the index procedure
Absence of collaterals
ASPECT score ≤ 5 or MRI FLAIR ≥ 100 mL or > 1/3 MCA territory
The following patients may not benefit from embolectomy with the risks likely outweighing potential benefit
Poor baseline independence indicated by modified rankin scale score ≥ 4
Life expectancy < 6 months
Severe medical comorbidities
Acute intracranial hemorrhage
Known chronic occlusion of the relevant vessel
Known vascular anatomy that precludes endovascular recanalization

*Comment: The final decision for embolectomy will be made by the neurointerventionalist after thorough review of each patient's case and discussion with other providers, the patient, and/or family. Some case-by-case exceptions to the above guidelines may be made with documentation to support decision making.

Raleigh Rounding RN Summary Card

Rounding RN Code Stroke Summary Card

Date _____ Time Paged _____ Time Rounding RN arrives _____

Last Known Normal _____

Symptom Discovery Time _____

Time Provider at Bedside _____

Blood Glucose _____

VAN positive/negative

Neuro checks/vital signs q1hr x3

Labs drawn & walked _____

NIHSS _____

Key Phone Numbers

Teleneurology: 631-250-8545

Main Pharmacy: 350-8192

Lab: 350-8242

CT Main Line: 350-5963

Priority Tasks

1. Get Hospitalist Name _____
2. Get Hospitalist Cell # _____
3. Hand Hospitalist their summary card

Head CT ordered_____ **(obtain w/n 20 min of code stroke page time)**

CTA _____ (NIHSS >6 **or** VAN +)

CTP _____ [LKN >6hrs **AND** (NIHSS >6 **or** VAN +)]

TNK Yes/No (**Administration goal of <45min to bolus from code stroke page time)**

TNK TIMEOUT:

Blood pressure (<185/110) _____

TNK exclusion criteria reviewed _____

History obtained _____

Last known well confirmed _____

Confirm weight _____

BP Goals for Ischemic Stroke

Before TNK or Intervention <185/110

After TNK <180/105

No TNK or Intervention < 220/120

Patient Next Steps: back to previous room/higher level of care/Cath lab

End Time_____

Complete all documentation in Stroke Narrator

Notes:

Ver. 09.2025

Raleigh Hospitalist Summary Card

Raleigh Hospitalist Stroke Summary Card

Key Names & Phone Numbers	
Teleneurologist: _____	Teleneurology: 631-250-8545
ICU Rounder RN: _____	Rounder RN: 919-235-1251
Interventionalist: _____	Cellphone: _____
Main Pharmacy: 350-1364	CT Main Line: 350-1535
Lab: 350-8242	Radiologist: 350-7133

Last Known Normal _____ **Symptom Discovery Time** _____

Brief Hospital Course:

Brief Important Exam Details

Motor: Weak side? _____, How weak? _____

Language: Speaking? _____, Following commands? _____

Neglect? _____Gaze Deviation and Visual Fields: _____

NIHSS_____

Other concerning exam findings _____

Does this seem like a likely acute stroke? Yes/No

(If "no", can cancel code stroke and assist primary team in plan of care)

DIRECTLY CALL (do not text) the Teleneurologist within 5 minutes of your arrival

Any TNK Contraindications? (**see back**)

Is TNK okay with Primary Team or Other Important Providers: _____

TNK TIMEOUT:	**BP Goals for Ischemic Stroke**
Blood pressure (<185/110) _____	Before TNK or Intervention <185/110
TNK exclusion criteria reviewed _____	After TNK <180/105
History obtained _____	No TNK or Intervention < 220/120
Last known well confirmed _____	
Confirm weight _____	

Ver. 9/2025

Cary ICU Rounder RN Summary

ICU Rounder Code Stroke Summary Card

Date _____ Time Paged _____ Time ICU Rounder RN arrives _____

Last Known Normal _____

Symptom Discovery Time _____

Time Provider at Bedside _____

Blood Glucose _____

VAN positive/negative

Neuro checks/vital signs q1hr x3

Labs drawn & walked _____

NIHSS _____

Key Phone Numbers
Teleneurology: 631-250-8545
Main Pharmacy: 350-2355
Lab: 350-8242
CT Main Line: 350-4861

Priority Tasks
1. Get Hospitalist Name _____
2. Get Hospitalist Cell # _____
3. Hand Hospitalist their summary card

Head CT ordered_____ **(obtain w/n 20 min of code stroke page time)**

CTA _____ (NIHSS ≥6 **or** VAN +)

CTP _____ [LKN ≥6hrs **AND** (NIHSS ≥6 **or** VAN +)]

TNK Yes/No (**Administration goal of <45min to bolus from code stroke page time)**

TNK TIMEOUT:
Blood pressure (<185/110) _____
TNK exclusion criteria reviewed _____
History obtained _____
Last known well confirmed _____
Confirm weight _____

BP Goals for Ischemic Stroke
Before TNK or Intervention <185/110
After TNK <180/105
No TNK or Intervention < 220/120

Patient Next Steps: back to previous room/higher level of care/Cath lab

End Time_____

Complete all documentation in Stroke Narrator

Notes:

Ver. 09.2025

Cary Hospitalist Summary Card

Cary Hospitalist Stroke Summary Card

Key Names & Phone Numbers	
Telestroke MD: _____	Telestroke: 631-250-8545
ICU Rounder RN: _____	ICU Rounder RN: 350-4011
Interventionalist: _____	Cellphone: _____
Main Pharmacy: 350-2355	CT Main Line: 350-4861
Lab: 350-8242	Radiologist: 350-7133

Last Known Normal _____ **Symptom Discovery Time** _____

Brief Hospital Course:

Brief Important Exam Details

Motor: Weak side? _____, How weak? _____

Language: Speaking? _____, Following commands? _____

Neglect? _____Gaze Deviation and Visual Fields: _____

NIHSS_____

Other concerning exam findings _____

Does this seem like a likely acute stroke? Yes/No

(If "no", can cancel code stroke and assist primary team in plan of care)

DIRECTLY CALL (do not text) the Teleneurologist within 5 minutes of your arrival

Any TNK Contraindications? (**see back**)

Is TNK okay with Primary Team or Other Important Providers: _____

TNK TIMEOUT:	**BP Goals for Ischemic Stroke**
Blood pressure (<185/110) _____	Before TNK or Intervention <185/110
TNK exclusion criteria reviewed _____	After TNK <180/105
History obtained _____	No TNK or Intervention < 220/120
Last known well confirmed _____	
Confirm weight _____	

- **ENTER order for Tenecteplase, when recommended by Neurology**

If Large Vessel (M1, M2, A1, Basilar, P1) is Occluded, DIRECTLY CALL Neuro IR (do not text)

Ver. 09.2025

North ED RN Summary Card

North Rounder Code Stroke Summary Card

Date _____ Time Paged _____ Time Rounder RN arrives _____

Last Known Normal _____

Symptom Discovery Time _____

Time Provider at Bedside _____

Blood Glucose _____

VAN positive/negative

Neuro checks/vital signs q1hr x3

Labs drawn & walked _____

NIHSS _____

Key Phone Numbers
Teleneurology: 631-250-8545
Main Pharmacy: 350-1364
Lab: 350-8242
CT Main Line: 350-1535

Priority Tasks
1. Get Hospitalist Name _____
2. Get Hospitalist Cell # _____
3. Hand Hospitalist their summary card

Head CT ordered_____ **(obtain w/n 20 min of code stroke page time)**

CTA _____ (NIHSS >6 **or** VAN +)

CTP _____ [LKN >6hrs **AND** (NIHSS >6 **or** VAN +)]

TNK Yes/No (**Administration goal of <45min to bolus from code stroke page time)**

TNK TIMEOUT:
Blood pressure (<185/110) _____
TNK exclusion criteria reviewed _____
History obtained _____
Last known well confirmed _____
Confirm weight _____

BP Goals for Ischemic Stroke
Before TNK or Intervention <185/110
After TNK <180/105
No TNK or Intervention < 220/120

Patient Next Steps: back to previous room/higher level of care/cath lab

End Time_____

Complete all documentation in Stroke Narrator

Notes:

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North Hospitalist Summary Card

North Hospitalist Stroke Summary Card

Key Names & Phone Numbers	
Teleneurologist: _____	Teleneurology: 631-250-8545
ED Rounder RN: _____	ED Rounder RN: _____
Interventionalist: _____	Cellphone: _____
Main Pharmacy: 350-1364	CT Main Line: 350-1535
Lab: 350-8242	Radiologist: 350-7133

Last Known Normal _____ **Symptom Discovery Time** _____

Brief Hospital Course:

Brief Important Exam Details

Motor: Weak side? _____, How weak? _____

Language: Speaking? _____, Following commands? _____

Neglect? _____Gaze Deviation and Visual Fields: _____

NIHSS_____

Other concerning exam findings _____

Does this seem like a likely acute stroke? Yes/No

(If "no", can cancel code stroke and assist primary team in plan of care)

DIRECTLY CALL (do not text) the Teleneurologist within 5 minutes of your arrival.

Any Thrombolytic Contraindications? (**See back**)

Is Thrombolytic okay with Primary Team or Other Important Providers: _____

Thrombolytic TIMEOUT:	**BP Goals for Ischemic Stroke**
Blood pressure (<185/110) _____	Before Thrombolytic or Intervention <185/110
Thrombolytic exclusion criteria reviewed _____	After Thrombolytic <180/105
History obtained _____	

- **ENTER order for Thrombolytic, when recommended by Neurology.**

Radiology will contact you if LVO on CTA. TELESTROKE will contact Neuro IR.

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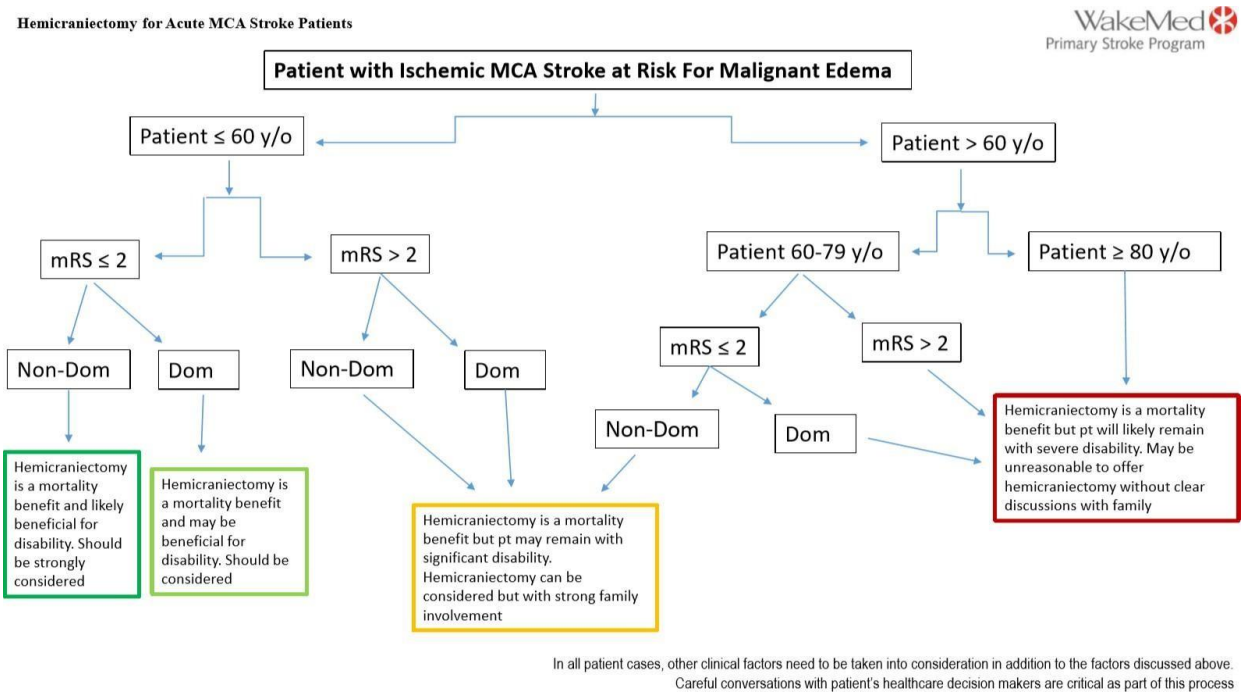
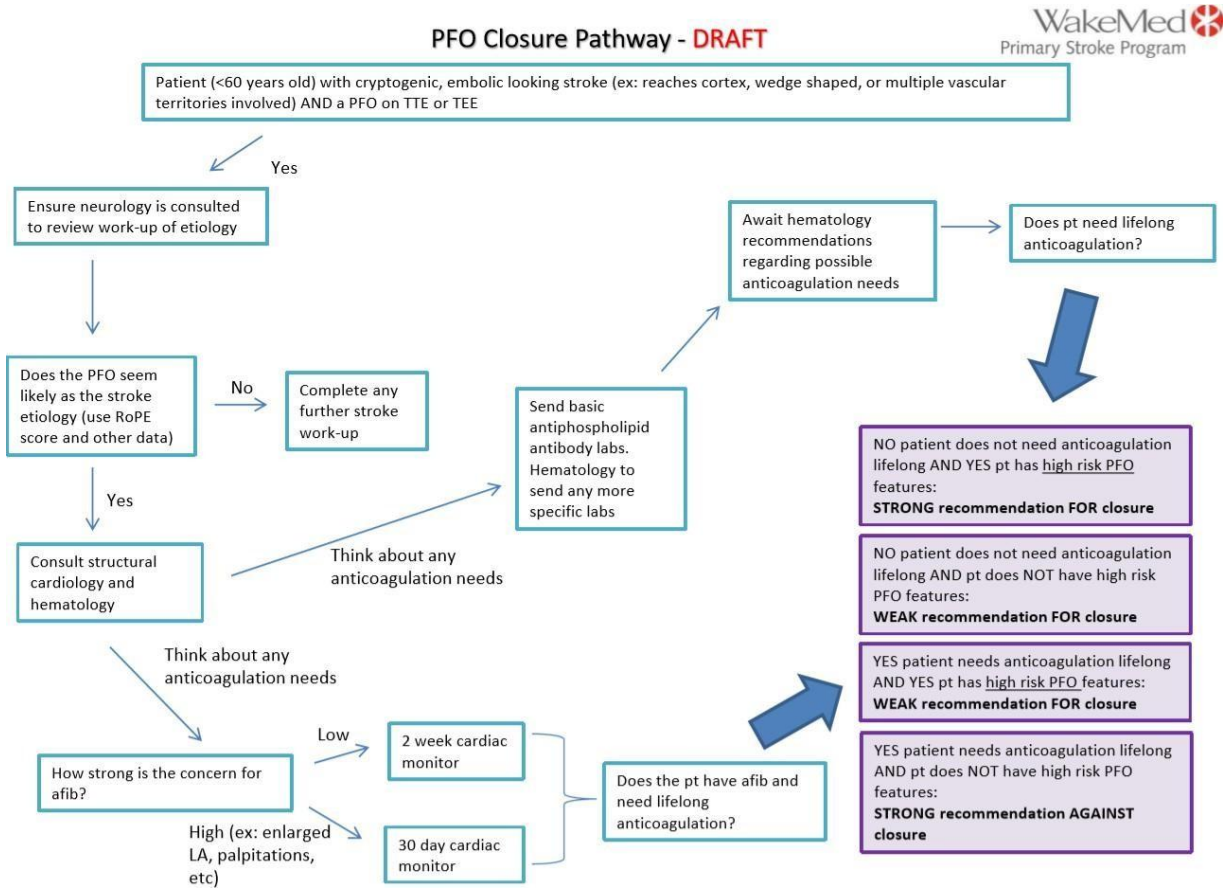
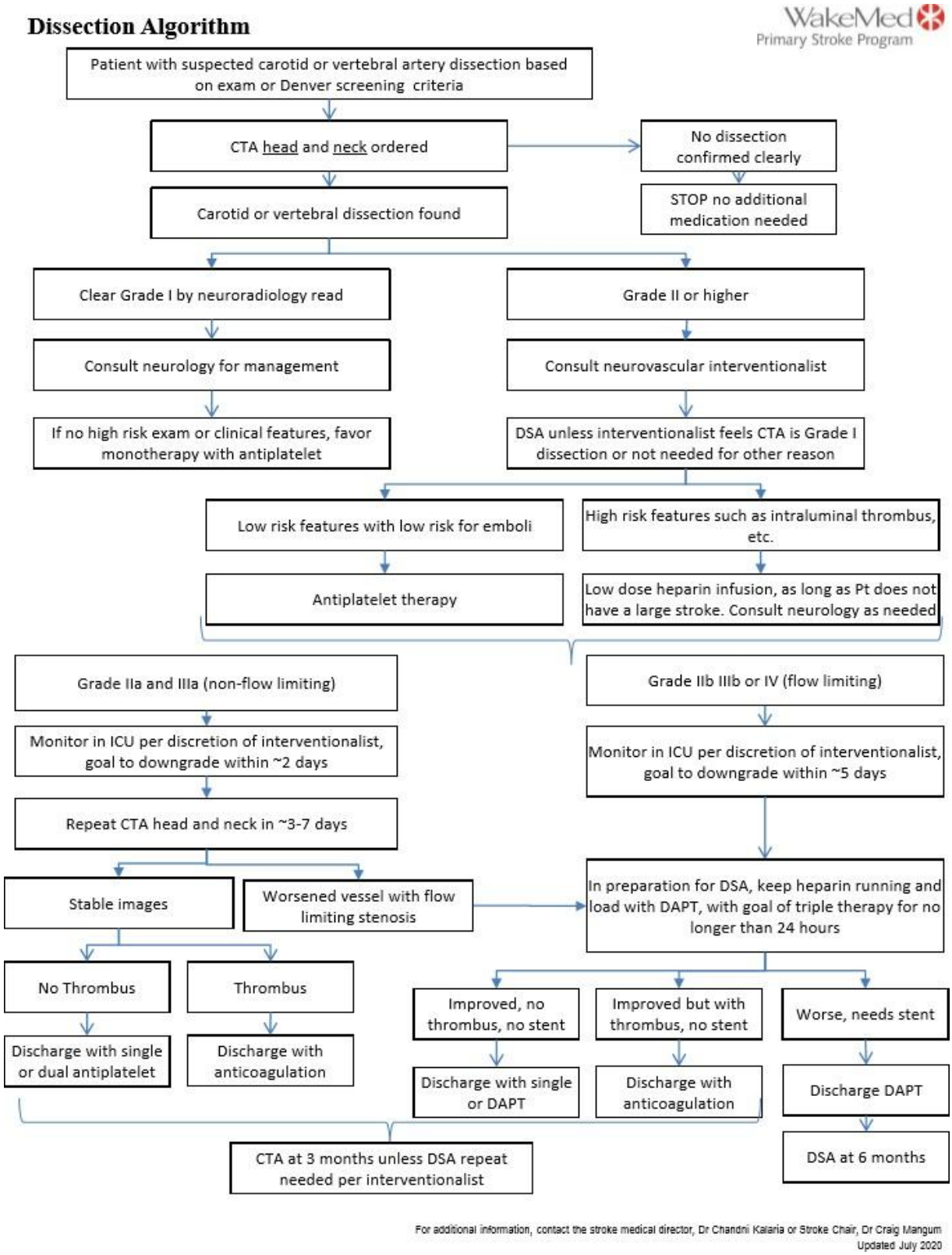
Hemicraniectomy Patient Considerations



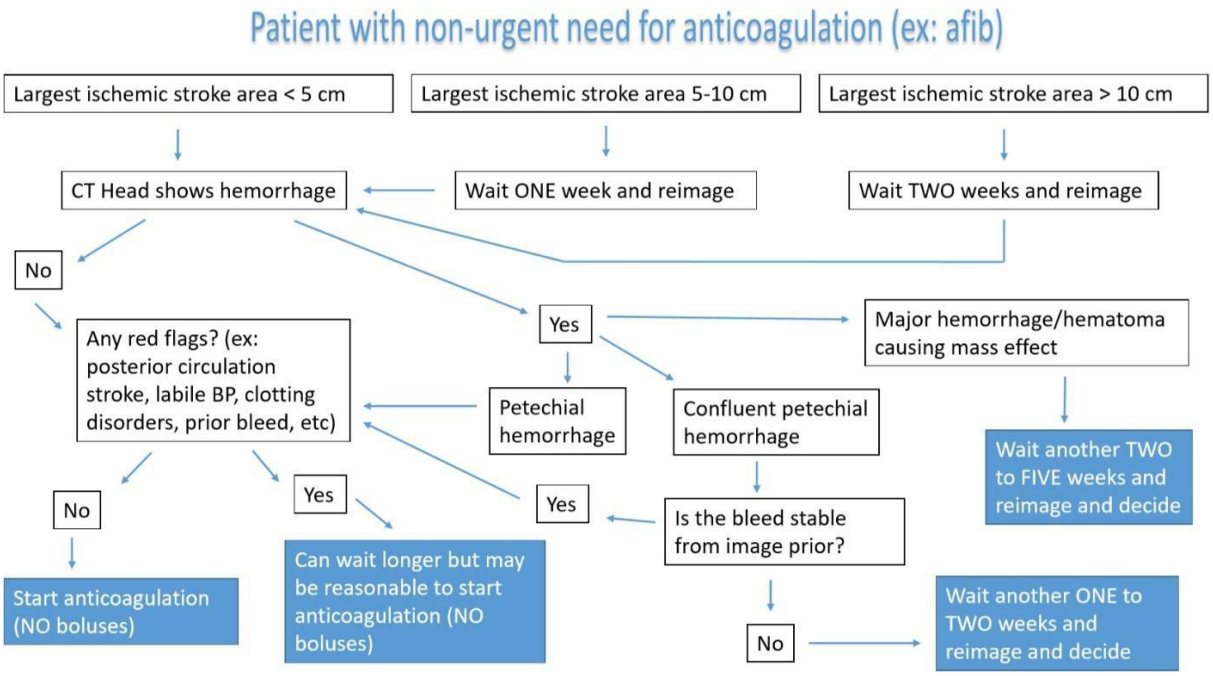
PFO Closure Algorithm



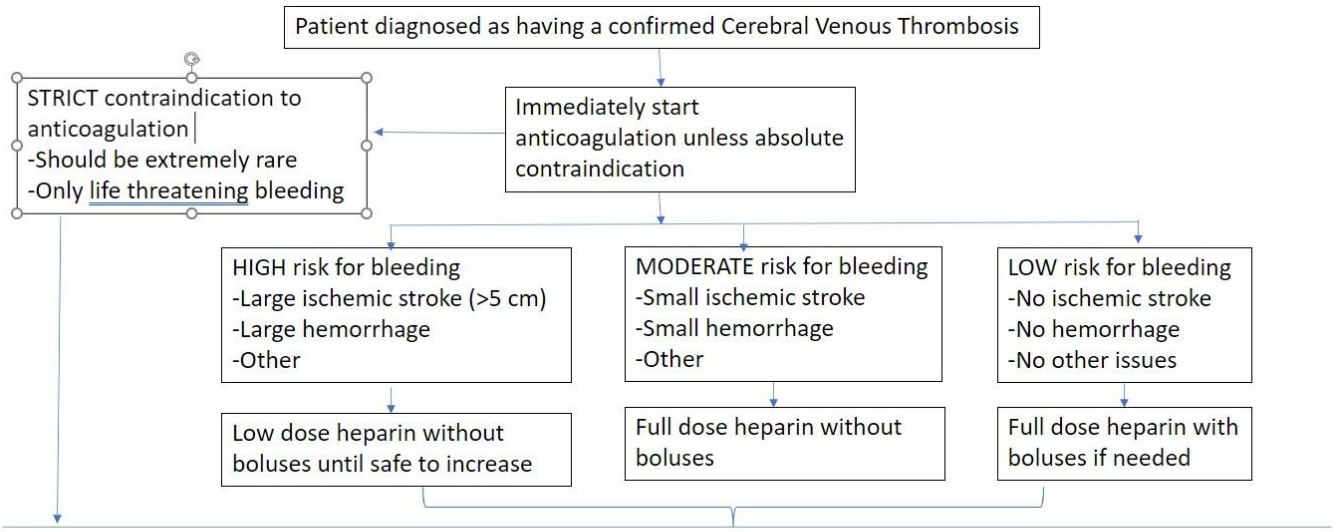
Cervical Artery Dissection Algorithm



Anticoagulation Timing Considerations



Cerebral Venous Thrombosis with Serious Complications Algorithm



The majority of patients will be placed on heparin; monitor response for at least 24 hours. Patient should be therapeutic on heparin to be considered appropriately medically treated.

In the rare, complex patient who is felt to have significant, clinical deterioration (directly related to CVT worsening), a **collaborative discussion** between neurointerventional team, ICU team, and neurology should be held to discuss potential need for endovascular therapy – direct tPA approach.

Higher risk patients appropriate for aggressive therapy will likely have deep vein involvement, GCS < 9, ICH or altered state

This is anticipated to be needed rarely (~ 1-2 patients/year)

North Inpatient Code Stroke Checklist

WakeMed Stroke Program

WakeMed North: INPATIENT CODE STROKE CHECKLIST

IN YOUR PATIENT'S ROOM: You've just called an RRT… What's next?

- **Primary RN**
  - Obtain blood sugar, neuro assessment and vital signs
  - If Code Stroke activated by Rounder or Provider, place order set and document in Stroke Narrator.
- **Rounding RN**
  - Perform VAN/Neuro Assessment, confirm vitals/blood sugar
  - Activate Code Stroke if appropriate and ensure order set is placed
- **Hospitalist**
  - Arrive to bedside to examine patient, confirm imaging orders
  - Call Telestroke (855) 264-0149 immediately following exam
  - If Telestroke Cart is to be used, call the RN to inform them

Call Telestroke 831-250-8545 immediately following exam
If Telestroke Cart is to be used, call the RN to inform them

AFTER CT, GO TO CT HOLDING: Post-CT Duties

- **Primary and Rounding RNs**
  - Ensure patient has an accurate weight charted
- **Hospitalist**
  - Perform VAN/Neuro Assessment
  - Confirm vital signs and blood sugar level
  - Activate Code Stroke if appropriate and assist with order set

TENECTEPLASE CANDIDATE: Time for Action!

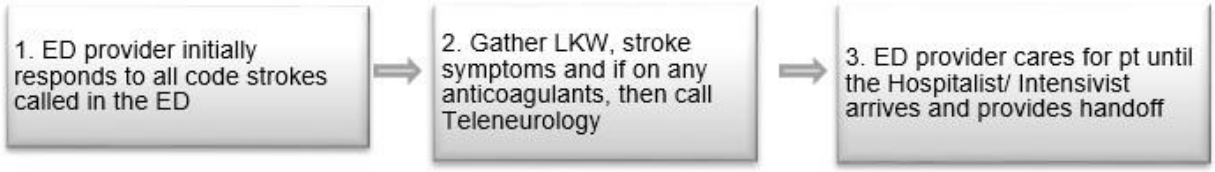
- **Primary RN**
  - Report to Rounding RN to transfer care
  - Help task for the Rounding RN – one nurse can't do it alone!
    - You are not expected to sign off on Tenecteplase
- **Rounding RNs**
  - Tenecteplase is available in A and C Bay pyxis machines
  - DUAL RN sign off to confirm BP < 185/110, bolus, waste and infusion
  - Document Neuro/VS at time of bolus
- **Hospitalist**
  - Place Tenecteplase Order Panel, including BP meds as needed
  - Initiate patient transfer to ICU

THROMBECTOMY CANDIDATE: Time for Action!

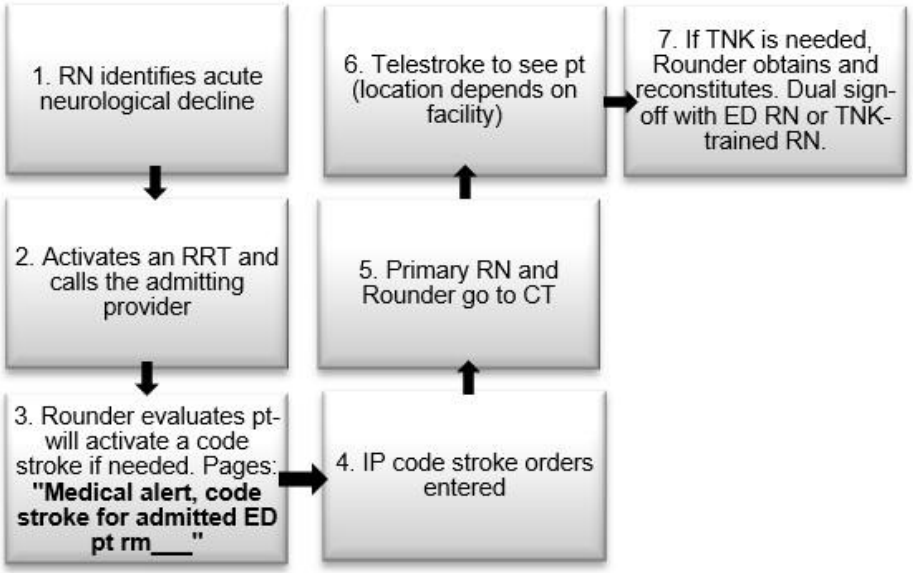
- **Hospitalist**
  - Consult Neurointerventionalist. If patient accepted:
  - Place order for Mobile Critical Care transport and Case Request: Cath Lab
  - Call Transfer Center (x01000) to contact Intensivist to accept patient
- **Primary RN (if care not already transferred for Alteplase admin)**
  - Report to Rounding RN to transfer care
  - Help Rounding RN complete remaining tasks per Code Stroke orders
- **Rounding RN**
  - Call report to receiving Cath Lab RN
  - Document NIH, VS and repeat Neuro Assessments per Code Stroke orders
  - If patient is hypertensive >/= 185/110, alert the Hospitalist

ED Boarded Code Strokes

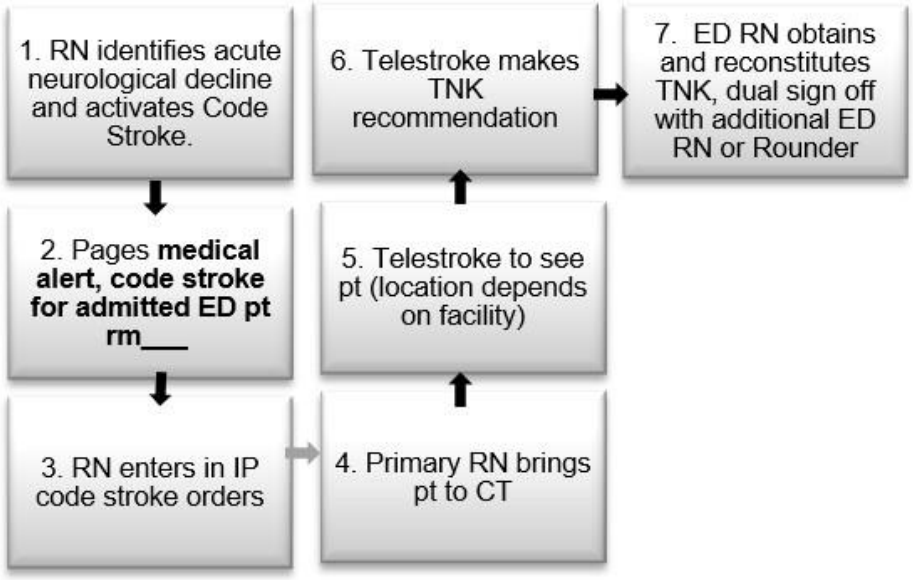
ED Provider



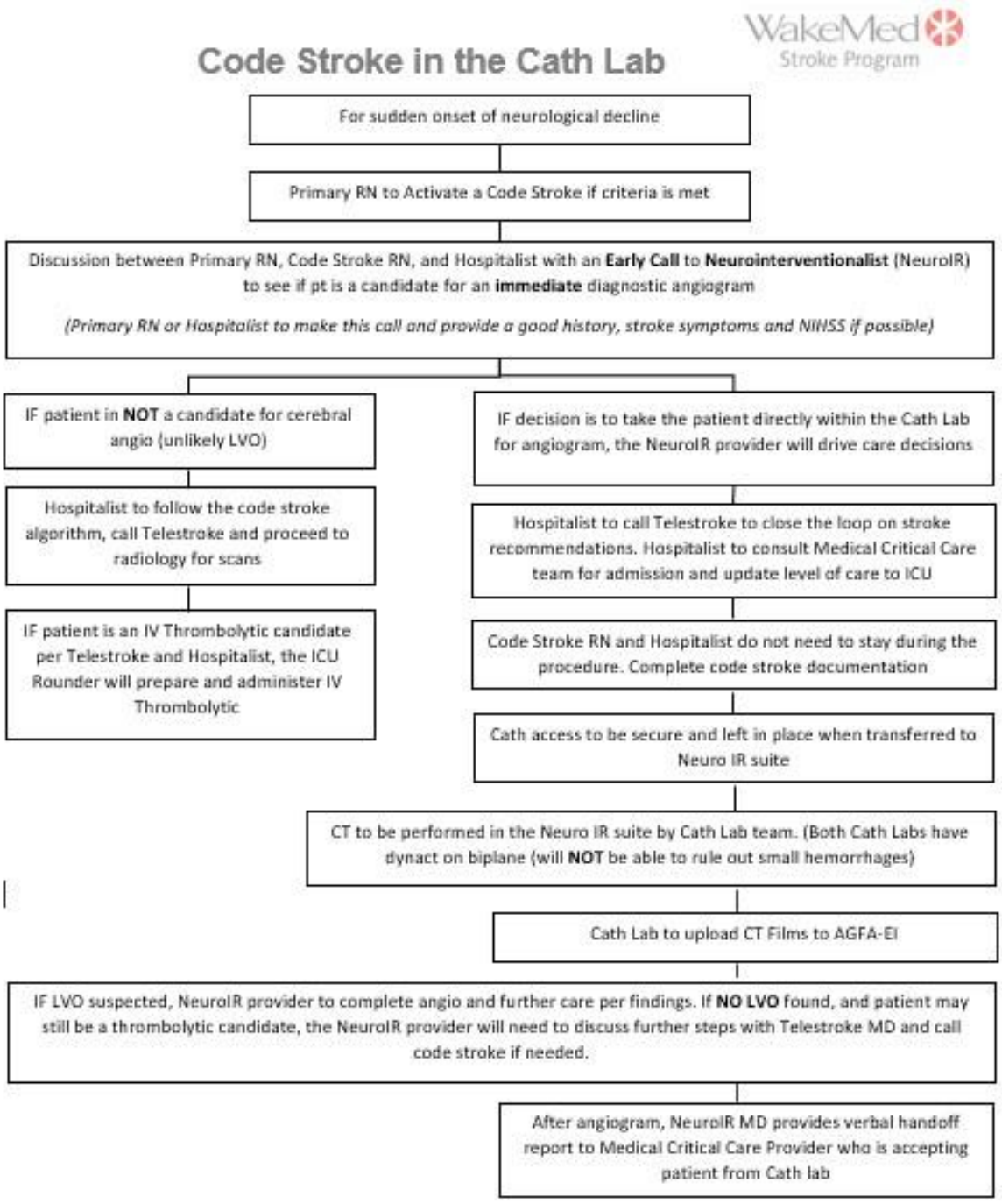
Floor or non-ED Float Pool RN



ED RN



Cath Lab Code Stroke Workflow



Original 4/2022
Revised 8/2023

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