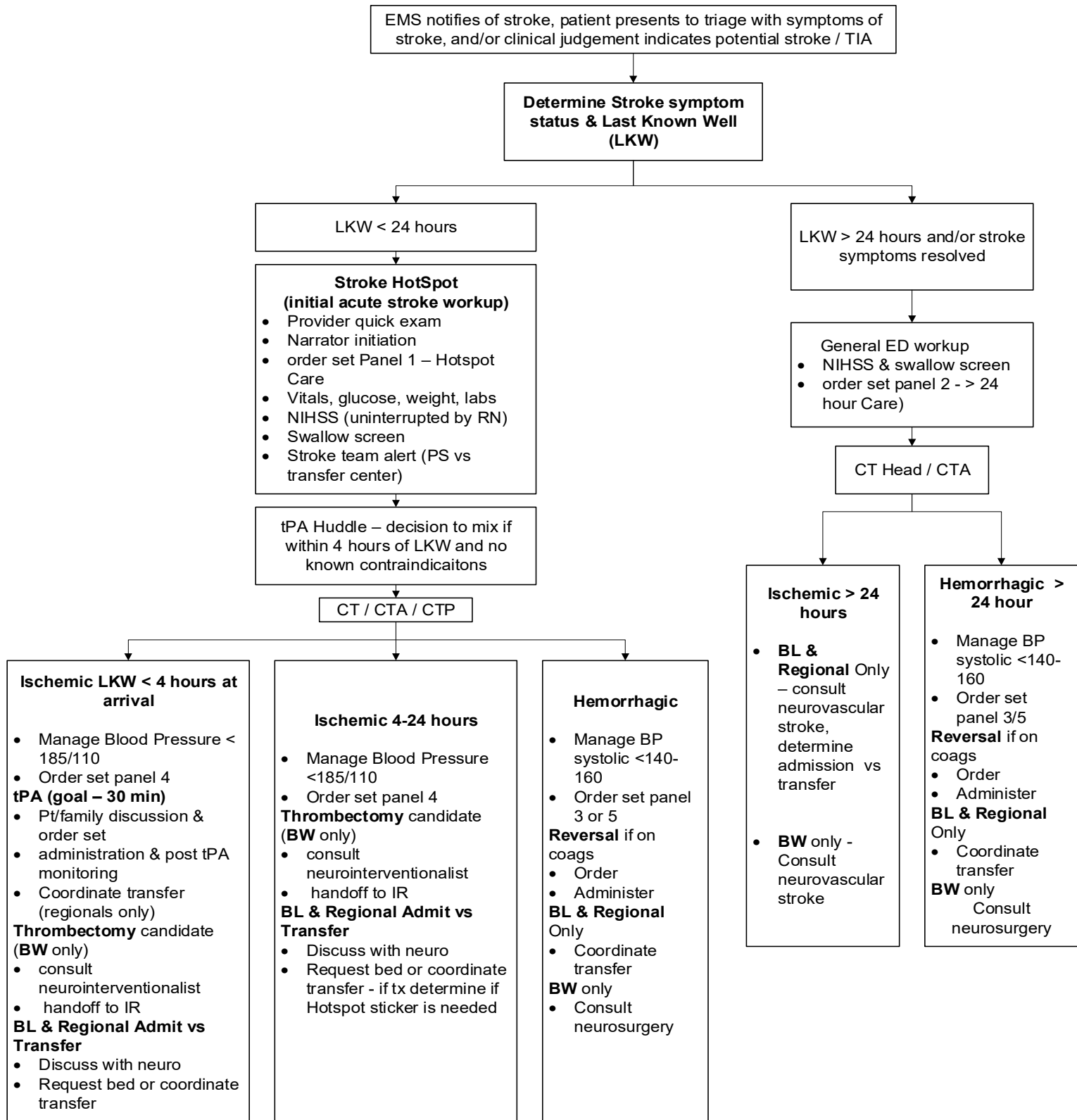


Pathway: Care of Adult Stroke Patients in the Emergency Department

Updated: June 10, 2021

Clinical algorithm:



Clinical pathway summary

CLINICAL PATHWAY NAME: Care of Adult Stroke Patients in the Emergency Department

PATIENT POPULATION AND DIAGNOSIS: Care of adult (ages 18 and greater) patients with stroke symptoms, when clinical judgement indicates potential stroke or TIA

APPLICABLE TO: All Spectrum Health Sites except Lakeland

BRIEF DESCRIPTION: This clinical pathway outlines the management of acute ischemic and hemorrhagic stroke patients within the Emergency Department in a multi-hospital hub and spoke model medical system. Butterworth Hospital is a large academic teaching hospital, subsequently with the most resources, therefore the hub for stroke care. There are nine community hospital spokes that feed into this hub. Blodgett Hospital is closely aligned with Butterworth for protocols, policies, and procedures as the two facilities are located near each other and share staff. Additional spoke facilities include Big Rapids, Gerber, Kelsey, Ludington, Pennock, Reed City, United, and Zeeland Hospitals. Butterworth also accepts patients from non-Spectrum Health affiliate hospitals throughout the state of Michigan for stroke care.

Evidence based care is provided through use of standardized order sets and workflows. These tools were created based on the American Heart Association Get with the Guidelines Clinical Practice Guidelines and Target Stroke definitions.

OPTIMIZED CLINICAL DECISION SUPPORT: Stroke Narrator enhancements, standardized ED note templates, Order Set changes: "ED Acute Stroke/Intracranial Hemorrhage"

DEFINITIONS:

- a. **Ischemic Stroke:** A type of stroke that occurs when a blood vessel carrying blood to the brain is obstructed- this can be caused by a clot (cerebral thrombosis or cerebral embolism)
- b. **Hemorrhagic Stroke:** A type of stroke that is caused by a weakened vessel (aneurysms or arteriovenous malformations) that ruptures and bleeds into the surrounding brain. The blood accumulates and compresses the surrounding brain tissue.
 - i. **Intracerebral Hemorrhage:** Bleeding occurs in the lobes, pons and cerebellum of the brain (bleeding within the brain tissue itself including the brainstem)
 - ii. **Subarachnoid Hemorrhage:** Bleeding that occurs within the subarachnoid space- the area between the surface of the brain and the protective covering surrounding the brain.
- c. **Stroke symptoms-** sudden neurological deficits related to cerebral vascular ischemia or hemorrhage, which include:
 - i. numbness/weakness of face/arm/leg, especially on one side of the body;
 - ii. confusion,
 - iii. trouble speaking/understanding;
 - iv. trouble seeing in one or both eyes;
 - v. trouble walking, dizziness, loss of balance/coordination;
 - vi. severe headache with no known cause.
- d. **Last Known Well (LKW):** The time at which the patient was last known to be without the signs and symptoms of the current stroke or at his or her prior baseline (The Joint Commission [TJC], 2010)
- e. **Stroke Hotspot:** Stroke Hotspot Activation brings nurses, nurse technicians, ED providers, neurovascular providers (BW only), lab, pharmacy (where available) to

the patient's bedside in an urgent response with a specific workflow to expedite stroke identification and care.

- f. **National Institute of Health Stroke Scale (NIHSS):** A standardized assessment scale used to quantify the degree of neurological deficits and aid in the selection of possible interventions (Jauch et al., 2013).
- g. **Tissue plasminogen activator (tPA):** Naturally occurring enzymatic-protein responsible for the conversion of plasminogen to plasmin, subsequently breaking apart a clot.
- h. **Reversal Agent:** Anticoagulant antagonist that is utilized as an acute care management treatment for hemorrhagic strokes to decrease on-going bleeding.
- i. **Computerized Tomography (CT) scan:** Combines a series of X-ray images taken from different angles around your body and uses computer processing to create cross-sectional images (slices) of the bones, blood vessels and soft tissues inside your body.
- j. **Computerized Tomography (CT) with angiogram (CTA):** Uses CT to provide detailed pictures of the heart and the blood vessels that go to the heart, lung, brain, kidneys, head, neck, legs, and arms. An iodine-rich contrast material (dye) is usually used during a CTA scan.
- k. **Computerized Tomography (CT) for perfusion (CTP):** uses CT to provide detailed picture of the microcirculation of the brain to be evaluated. An iodine-rich contrast material (dye) is usually used during a CTA scan.
- l. **Emergent Endovascular Stroke Procedure:** Mechanical carotid / cerebral thrombectomy, angioplasty, and/or stenting within neuro interventional radiology suite (out of scope for ED stroke recognition and management).
- m. **Transfer Center / Mission Control:** Department within Spectrum Health that supports communication and transfer between and within Spectrum Health Hospitals and between outside hospitals.

OVERSIGHT TEAM LEADER(S): Dr. Andrew Kline, Dr. Muhib Khan, Laurel Packard, Tricia Tubergen

OWNING EXPERT IMPROVEMENT TEAM (EIT): Butterworth ED Stroke

MANAGING CLINICAL PRACTICE COUNCIL (CPC): Neurosciences CPC

CPC APPROVAL DATE: April 16th 2021

OTHER TEAM(S) IMPACTED: Emergency departments (Acute Health CPC), Radiology, Pharmacy, Laboratory, Transfer Center

IMPLEMENTATION DATE: June 29, 2021

LAST REVISED: June 10, 2021

FOR MORE INFORMATION, CONTACT: Dr. Andrew Kline, Dr. Muhib Khan, Laurel Packard, Tricia Tubergen

Clinical pathways clinical approach

TREATMENT AND MANAGEMENT:

1. Recognition of stroke Symptoms
 - a. EMS / Prearrival notification (Cincinnati Stroke Screen utilized)
 - b. Walk in stroke symptoms identified - triage stroke screening
 - i. Posterior circulation stroke identification questions plus Cincinnati Stroke Screen utilized at Butterworth, Blodgett
2. Determination of Last Known Well (LKW)
 - a. Document in stroke narrator

- b. Determine appropriate activation / notifications based on hours
 - i. LKW < 24 hours - activate Stroke Hotspot (see definition above)
 - ii. LKW > 24 hours and/or stroke symptoms resolved - triage accordingly for general ED workup

*ED Acute Stroke order set is separated into the following segments and uses two clinical decision support questions around LKW and hemorrhage found on CT guide providers to the correct content:

- Hotspot Care
- > 24 hour since LKW care
- Hemorrhage found on CT
- Suspected or known LVO (transfers)
- Known hemorrhage (transfers)

Last Known Well < 24 hours

1. Stroke Hotspot LKW < 24 hours
 - a. Provider quick examination and utilization of Acute Stroke ED order set
 - b. Obtain vital signs
 - c. Glucose point of care testing
 - d. Obtain weight
 - e. Start IVs
 - f. Obtain blood specimens for lab work
 - g. Initiate blood pressure management (minimally to 185/110)
 - h. Uninterrupted NIHSS by RN
 - i. Stroke attending alert
 - i. Butterworth / Blodgett: internal paging
 - ii. Regionals (spoke): connect with BW Stroke provider via transfer center
 - j. If LKW within 4 hours – huddle to determine tPA candidacy
 - i. Provider to discuss treatment plan including risk and benefits of tPA and seek confirmation from patient or family to proceed with plan. If unable to discuss with patient or family, proceed per standard of care.
 - ii. Pre-mix tPA if no exclusion criteria identified (by pharmacy at BW/BL, by pharmacy when onsite and ED RN when pharmacy not present at all other sites)
2. Obtain CT head non-contrast stroke code (super stat), CT Angiogram head/neck stroke code, CT Perfusion head stroke code

*BW Only for Transfers: Repeat Imaging if tPA at regional, more than 60 Minutes since regional imaging, Clinical Trial Candidate, Change in Neurological Exam, or Transfer from Non-SH regional facility

- a. No hemorrhage detected on CT
 - i. Utilize tPA order set if indicated
 - ii. Ensure blood pressure is within pre-tPA parameters (below 185/110)
 - iii. administer tPA if candidate as determined above

*ED door to tPA administration goal time is 30 minutes per AHA GWTG Target Stroke

- iv. Ensure blood pressure remains below post-tPA parameters (180/105)
- v. If patient demonstrates decline in neurological status or complains of new headache
 1. Stop tPA
 2. Order “tPA Complication STAT CT” from ED Acute Stroke order set to assess for intracranial bleed.
 3. Notify BW stroke provider prior to restarting tPA
 4. After discussion with BW Stroke provider, restart tPA as soon as possible if no bleed demonstrated on CT

- b. Detection of Large Vessel Occlusion

- i. Butterworth (hub) - Consult neurointerventionalist to determine emergent endovascular procedure candidacy
 - ii. Blodgett / Regional (spoke) - coordinate transfer to Butterworth, including ED physician to ED physician acceptance of care
- *ED door to device deployment goal time is 90 minutes for patients presenting initially to Butterworth and 60 minutes for patients transferring from another facility to Butterworth for intervention per AHA GWTG
- c. Detection of Intracerebral Hemorrhage (ICH) or Subarachnoid Hemorrhage (SAH)
 - i. Utilize hemorrhage panel of ED Acute Stroke order set
 - ii. Determine reversal candidacy and utilize Anticoagulated Reversals order set
 - iii. Ensure blood pressure is within hemorrhagic stroke parameters (below 140-160/90)
- *ED door to reversal agent administration and blood pressure management goal times are within 45 minutes per internal process goals
- iv. Butterworth (hub) - Consult neurosurgery
 - v. Blodgett / Regional (spoke) - coordinate transfer to Butterworth including connection with neurosurgery and neuro critical care
- d. Not tPA candidate, no LVO or hemorrhage detected
 - i. Proceed with general ED workup utilizing greater than 24 hours (see below)
 - ii. Disregard any previous blood pressure parameters – manage to permissive hypertension parameters (220 systolic)
- 3. Determine Admission / Transfer / Discharge disposition
 - a. If tPA infusing upon transfer via EMS utilize paper order “Alteplase administration for acute ischemic stroke-EMS transport” (X15522)

Last Known Well > 24 hours and/or stroke symptoms resolved - General ED workup

1. Utilize order set LKW > 24 hour care content
2. Neurovascular Stroke attending alert
 - i. Butterworth (hub): consult with internal paging
 - ii. Blodgett: consult with internal paging, may partner with onsite neurology service
 - iii. Regionals (spoke): connect with BW Stroke provider via transfer center
3. Obtain CT head non-contrast and CT Angiogram head/neck
4. Complete NIHSS & swallow screen
5. Determine Admission / Transfer / Discharge disposition

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