Integrated Endovascular Workflow

**5 Rs of EMS Stroke Activation**

- **Dispatch**: 9-1-1 Call
  - Pre-arrival Instructions
  - Pre-packaging Instructions
  - Verbalize stroke evidence/grade to EMS/FD

- **On Scene**: <10 Minutes
  - **RECOGNIZE**: Stroke Scale to Identify Stroke
  - **RULE OUT**: BGL, Sepsis, Seizure, Toxins
  - **RANK**: RACE/LAMS/C-STAT
  - **REPORT**: Stroke Alert to Hospital, LKW time, Previous Disabilities, Severity, ETA

- **Transport**: CSC Vs. PSC
  - **ROLLOUT**: 3/12 Lead, Bilateral IVs, Pre Registration of patient, Beta Blockers if severe Hypertension (t-PA parameters of 185/110)

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**EMS Algorithm For Transporting Emergent Large Vessel Occlusions (ELVO)**

**Not Eligible for IV tPA**

- ELVO Screen
- Transport to Closest CSC
- Evaluate for Endo Rx and/or Clinical Trial
- Transport to closest Stroke Accepting Hospital
- Send to CSC if HLoC needed
- Lacunar Stroke
- Not tPA or Endo candidate

**IV tPA Eligible**

- ELVO Screen
- Transport to closest IV tPA Ready Hospital - ? Rx with tPA
- Send to CSC if LVO or if HLoC needed
- Transport to closest IV tPA Ready Hospital
- STAT Send to CSC if LVO or if HLoC needed
- Transport to closest CSC for IV tPA, Endo Rx, and/or Clinical Trial
- Transporting to CSC will add > 30 mins to Hospital Door?
- Transport to closest Stroke Accepting Hospital
- Evaluate for Endo Rx and/or Clinical Trial
- Send to CSC if HLoC needed
- Lacunar Stroke
- Not tPA or Endo candidate

**TIME LINE GOALS**

- IV tPA Eligible
  - < 4.5 hours from onset/LKW?
  - ELVO Screen LAMS or RACE or C-STAT

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**Example ED Stroke Protocol**

- **F**: Facial weakness
- **A**: Arm numbness/tingling: weakness
- **S**: Slurred speech/aphasia
- **T**: Time to call
- **V**: Vision changes/loss of vision

Primary work up for all stroke alerts - obtain non-contrast CT brain & CTA head and neck.

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**LEVEL 1**

- Patient with stroke symptoms (FASTV (+) exam) with last known well (LKW) less than 24 hours
- Patients who have received IV Alteplase from outside facilities
- All Intraparenchymal hemorrhages

**LEVEL 2**

- Patient with neurologic deficits (FASTV (+) exam) with last known well (LKW) greater than 24 hours

**LEVEL 3**

- Patient with stroke symptoms that have resolved at the time of presentation

**LEVEL 4**

- Do CT, CTA head & neck.
- If patient candidate for Endo Rx & 6 - 24 hrs do CTP (Do CTP for stroke 0 – 6 hrs or CTA for ICH at neuro discretion)

**TIME LINE GOALS**

- MD in ED, 10 min • Patient Straight to CT
- Door To IV tPA: 30 min
- Door to Groin Puncture: 60 min
- Door to Reperfusion Goal of < 90 minutes

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**CT Table to be Prioritized**

**Call Neurosurgery for all Hemorrhages**
Top 10 Tips for Stroke Teams

1. **Time remains Brain** for all reperfusion strategies, thus minimizing delays to all forms of reperfusion maximizes patient’s chances of a good recovery.

2. **Alteplase remains standard of care**, and assessment for LVO should not delay alteplase administration in eligible patients.

3. **Build a regional stroke system** of care that ensures sharing of best practice and develops a regional triage protocol which optimizes use of hospital resources. *Mission Lifeline: Stroke* is an example of such a protocol.

4. **Build an expert stroke team** rather than a team of stroke experts, and work collectively to maximize the stroke program.

5. **Preparation is key.** Implement proven *Target Stroke I and II* strategies to minimize treatment delays.

6. **Provide continuous EMS training** on stroke screens, scores, and triage protocols (EMS 5 R’s of Stroke Activation).

7. **Encourage EMS triage and pre-notification** based on suspicion of stroke and stroke severity.

8. **Primary Work-up** NCCT/CTA Head and Neck 0-6 hours LKW and Secondary Perfusion Studies 6-24 Hours or Wake if Confirmed LVO on Primary work up (within 6 hours of stroke onset for patients with a LVO perfusion imaging is not required for EVT).

9. **Decreasing Door In Door Out times** for interfaculty transfers is critical to maximizing eligibility for and outcomes of EVT.


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