

**Door-In-Door-Out Time Improvement Ideas**

**Pre-arrival**

* EMS stroke recognition education
  + Include Large Vessel Occlusion (LVO) recognition with screening tool and scripting
* EMS actions on scene:

1. Obtain pertinent medical history & meds, baseline function, and family contact number (expedites alteplase administration & screening for endovascular treatment)
2. Placement of 2 PIVs, 1 AC (expedites alteplase treatment & advanced imaging)
3. Prenotify hospital of FAST positive and LVO positive patient en route

\*Note: These DIDO Improvement ideas need to be tailored for the specific EMS agency by the Stroke Coordinator and EMS Director

**Routing**

* EMS route to CSC if LVO screen +, LKW < 24 hrs. or unknown, and direct transport doesn’t add > 15 min or preclude use of IV alteplase

**Arrival of Patient**

* EMS handoff to hospital staff including if LVO screen positive
* Standardize EMS to RN/MD Handoff

**Acute Phase**

* Implement a single call activation system when stroke patient presents
* Turn CT scanner on, if after hours, and call in CT tech.
* Transport patient directly to CT by EMS
* Activate telestroke early when available
* Mix alteplase ahead of time, if indicated
* Have alteplase readily available to Stroke Team, if indicated
* Screen for LVO with initial assessment (NIHSS > 6 or LVO deficits – gaze deviation, vision loss, aphasia, neglect, paralysis)
* CTA acquisition, if possible, with interpretation < 20 min & clouded quickly---if not possible, consult with 24/7 stroke support line to see if it would be better option to send patient
* **Early** and real-time communication between transferring physician and accepting Neurologist (ex: BAT Phone), eliminating redundant communication
  + **Some have recommended calling transferring facility before imaging has been done**
* Use cloud-based image sharing, if available
* Standardizing RN-RN Handoff Report

**EMS Transfer**

* Call EMS early for suspected transfer or encourage EMS who brought patient to facility to wait around to transfer *“Waste gas not brain”*
* Protocol to manage hypertension in field, post alteplase care
* If authorized, auto-launch interfacility transport to referring hospitals for select presumed LVO. Have criteria available to start process.
  + Ex:
    - NIHSS ≥6 with LVO positive screen
    - Last Known Well ≤24 hours
    - CTA Head/Neck with ASPECT Score ≥6
    - LVO studies shared on cloud-based sharing platform

**NIH Stroke Scale as a LVO Tool**

**If NIHSS > 6 or highlighted field scored, consider LVO**

|  |  |  |
| --- | --- | --- |
| **Item** | **Description** | **Score** |
| **1a. Level of Consciousness (LOC)** Arousal Status | Alert (or awakens easily and stays awake)  Drowsy (Responds to minor stim. but falls back asleep)  Obtunded (Responds only to deep pain or vigorous stim)  Comatose (No response) | 0  1  2  3 |
| **1b. LOC – Questions**  (Month & Age) | Both questions answered correctly  One question answered correctly  Neither question answered correctly | 0  1  2 |
| **1c. LOC – Commands**  Opens/closes eyes  Opens/closes hands | Both commands performed correctly  One command performed correctly  Neither command performed correctly | 0  1  2 |
| **2. Best Gaze**  Horizontal eye  Movements | Normal  Mild gaze paralysis (able to cross midline)  Complete gaze paralysis (deviated & unable to cross midline) | 0  1  2 |
| **3. Visual Fields**  Sees objects in  Four quadrants | Normal  Partial hemianopia (upper OR lower quadrant)  Complete hemianopia (upper AND lower quadrants)  Bilateral hemianopia (total blindness) | 0  1  2  3 |
| **4. Facial Palsy**  Facial movements | Normal  Minor paralysis (flattening of nasolabial folds)  Partial paralysis (near or total paralysis lower face)  Complete paralysis (Of upper and lower face) | 0  1  2  3 |
| **5a. Motor – Left Arm**  Hold arm straight out  from chest | Normal (No drift at all)  Drift (Drifts downward but NOT to bed before 10 sec.)  Drifts to bed within 10 sec  Movement, but not against gravity  Complete paralysis (No movement at all)  *Amputation or joint fusion* | 0  1  2  3  4  N/A |
| **5b. Motor – Right Arm**  Hold arm straight out  from chest | Normal (No drift at all)  Drift (Drifts downward but NOT to bed before 10 sec.)  Drifts to bed within 10 sec  Movement, but not against gravity  Complete paralysis (No movement at all)  *Amputation or joint fusion* | 0  1  2  3  4  N/A |
| **6a. Motor – Left Leg**  Keep leg off bed | Normal (No drift at all)  Drift (Drifts downward but NOT to bed before 5 sec.)  Drifts to bed within 5 sec  Movement, but not against gravity  Complete paralysis (No movement at all)  *Amputation or joint fusion* | 0  1  2  3  4  N/A |
| **6b. Motor – Right Leg**  Keep leg off bed | Normal (No drift at all)  Drift (Drifts downward but NOT to bed before 5 sec.)  Drifts to bed within 5 sec  Movement, but not against gravity  Complete paralysis (No movement at all)  *Amputation or joint fusion* | 0  1  2  3  4  N/A |
| **7. Limb Ataxia**  Finger-Nose  Heel-Knee-Shin | Absent (no ataxia, OR pt cannot move arm/leg)  Present in one limb  Present in two or more limbs  (is absent if patient cannot understand or is too weak to do) | 0  1  2 |
| **8. Sensory**  Compare side to side on face, arm, & leg | Normal, no sensory loss  Mild to moderate loss  Severe to total sensory loss (unaware of being touched) | 0  1  2 |
| **9. Best Language**  Repetition &  Comprehension | Normal ability to use words and follow commands  Mild to Moderate (Repeats / names with some difficulty)  Severe Aphasia (very few words correct or understood)  Mute (no ability to speak or understand at all) | 0  1  2  3 |
| **10. Dysarthria** | Normal  Mild to moderate slurred speech (some or most)  Severe (unintelligible - none understandable)  Intubated or other physical barrier | 0  1  2  N/A |
| **11. Extinction & Inattention**  Ignores touch or vision to one side | No abnormality  Mild (either visual or tactile – partial neglect)  Profound (Visual and tactile – complete neglect) | 0  1  2 |
| **Total Score** | **If NIHSS > 6 or highlighted field scored, consider LVO** |  |

References

Ekstrom, E., Pochert, A., Smith, J., Chung, L., Hannon, P., Majersik, J. (2019). Site-specific education significantly improves door-in door-out times within a large telestroke network [Abstract TP290]. Abstract retrieved from International Stroke Conference 2019 Poster Abstracts.

Mctaggart, R. A., Yaghi, S., Cutting, S. M., Hemendinger, M., Baird, G. L., Haas, R. A., Jayaraman, M. V. (2017). Association of a primary stroke center protocol for suspected stroke by large-vessel occlusion with efficiency of care and patient outcomes. JAMA Neurology, 74(7), 793.

Mendelson, S.J., Khorzad, R., Barnard, A., Richards, C., Jahromi, B., Bernstein, R., Prabhakaran, S. (2019). Reducing door-in-door-out time for stroke using failure mode, effects and criticality analysis [Abstract TP 359]. Abstract retrieved from International Stroke Conference 2019 Poster Abstracts.

Target: Stroke Phase II: 12 Key Best Practice Strategies (2017). Retrieved from

<https://www.heart.org/-/media/files/professional/quality-improvement/target->stroke/target-stroke-phase ii/targetstrokebestpractices\_ucm\_470145.pdf?la=en&hash=ACC1CCA2179879AE7C49C8 3C42506EAD7BC34298

Zammit, C., Gallagher, S., Teeter, M.A. et al. Auto-launching of interfacility transport to referring hospitals for presumed emergent large vessel occlusion strokes may decrease time to mechanical thrombectomy and improve outcomes [Abstract WP286]. Abstract retrieved from International Stroke Conference 2019 Poster Abstracts.