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Stroke Coordinator
BOOT CAMP

DISCLOSURES

FACULTY

- Claranne Mathiesen has nothing to disclose
- Julie Fussner has nothing to disclose

• *Special thanks to Lynn Hundley for sharing slides from ISC 2019 presentation*

American Stroke Association.
A division of the American Heart Association.

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DOOR IN, DOOR OUT (DIDO): ASR

REPORTING TO JOINT COMMISSION BEGAN JANUARY 1, 2018 FOR DISCHARGES FROM ASR'S

- Door to transfer (Goal 120 mins)
 - ASR-OP-2a – Overall rate
 - ASR-OP-2b – Hemorrhagic Stroke
 - ASR-OP-2c – AIS: tPA drip & ship only
 - ASR-OP-2d – AIS: No Alteplase prior to transfer
- Reports should be available by April 24th

AIS = Acute ischemic stroke

The Brain Attack Coalition (BAC) recommends transfer within 2 hours (Alberts, 2013)

1 in 4 pts are transferred while receiving TPA (Sheth, 2015)

DOOR IN, DOOR OUT (DIDO): PSC

REPORTING TO JOINT COMMISSION BEGINS JAN 1, 2019 FOR DISCHARGES FROM PSC'S

- Door to transfer (Goal 120 mins)
 - STK-OP-1a – Overall Rate (Not reported)
 - STK-OP-1b – Hemorrhagic transfer
 - STK-OP-1c – AIS: tPA drip & ship only
 - STK-OP-1d – AIS: + LVO, eligible for MT
 - STK-OP-1e – AIS: + LVO, NOT eligible for MT
 - STK-OP-1f – AIS: No tPA, - LVO, not eligible for MT

AIS = Acute ischemic stroke
LVO = Large vessel occlusion
MT = Mechanical thrombectomy

Not Pass/ Fail measure
Continuous variable – Median Time

**WHY IS THIS SO IMPORTANT:
STROKE IS A TREATABLE NEUROEMERGENCY!**

Saver Time Is Brain—Quantified

Estimated Pace of Neural Circuitry Loss in Typical Large Vessel, Supratentorial Acute Ischemic Stroke

	Neurons Lost	Synapses Lost	Myelinated Fibers Lost	Accelerated Aging
Per Stroke	1.2 billion	8.3 trillion	7140 km/4470 miles	36 y
Per Hour	120 million	830 billion	714 km/447 miles	3.6 y
Per Minute	1.9 million	14 billion	12 km/7.5 miles	3.1 wk
Per Second	32 000	230 million	200 meters/218 yards	8.7 h

Stroke.2006;37:263-266.

Clinical outcomes are dependent on time to tissue reperfusion. If reperfusion achieved within 150 min of LKW ~91% probability of functional independence. (*Curr Atheroscler Rep (2017) 19:52*)

INTEGRATED SYSTEMS OF STROKE CARE

KEY COMPONENTS:

- Optimize patient care and management processes to improve patient outcomes
- Communication is vital!
- First Medical Contact- EMS response – Prehospital alert- PSC/CSC
- Clear protocols for advanced imaging and treatment
- Protocols for interhospital transfer of patients should be established /approved for efficient patient transfers to be accomplished 24/7
- Leveraging technology: Track EMS, Pulsara, Join, Twiage- may foster coordination
- Bypassing to get to CSC or Endovascular-capable hospital?
 - Use of prehospital severity scales
 - Improving efficiency of transfers: “grab and go”
 - Sharing of neuro-imaging

SUMMARY OF TIME IN CLINICAL TRIALS

Table 1
Endovascular stroke trials and treatment time

Study	Time to groin (median) (min)	Time to reperfusion (median) (min)	mRS 0–2 Endovascular %	mRS 0–2 Medical %	Absolute difference %
IMS III	208	325	40.8	38.7	2.1
MR CLEAN	260	332	32.6	19.1	13.5
REVASCAT	269	355	43.7	28.2	15.5
SWIFT PRIME	224	252	60.2	35.5	24.7
EXTEND IA	210	248	71	40	31
ESCAPE	185	241	53	29.3	23.7

• IMS, Interventional Management of Stroke; mRS, modified Rankin Scale.

Shorter times = Better Clinical Outcomes!

J Neurointerv Surg (2017); Aug 9(8); 802-812



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IMPROVING INTERVENTION TIMES

FACTORS CONTRIBUTING TO INCREASED DOOR TO GROIN PUNCTURE TIMES:

- Inefficient workflow, ineffective use of staff, delays in arrival
- System reorganization to optimize parallel processes:
 - Door to CTA
 - Activation of transport
 - CTA to IR
 - IR to Groin
 - Door to transport



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Norton Healthcare

The Joint Commission American Heart Association American Stroke Association
 CERTIFICATION
 Meets standards for
Comprehensive Stroke Center

The Joint Commission American Heart Association American Stroke Association
 CERTIFICATION
 Meets standards for
Primary Stroke Center

The Joint Commission American Heart Association American Stroke Association
 CERTIFICATION
 Meets standards for
Acute Stroke Ready Hospital

NORTON HEALTHCARE

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Current State Process Map DMAIC

Current Average 123mins!

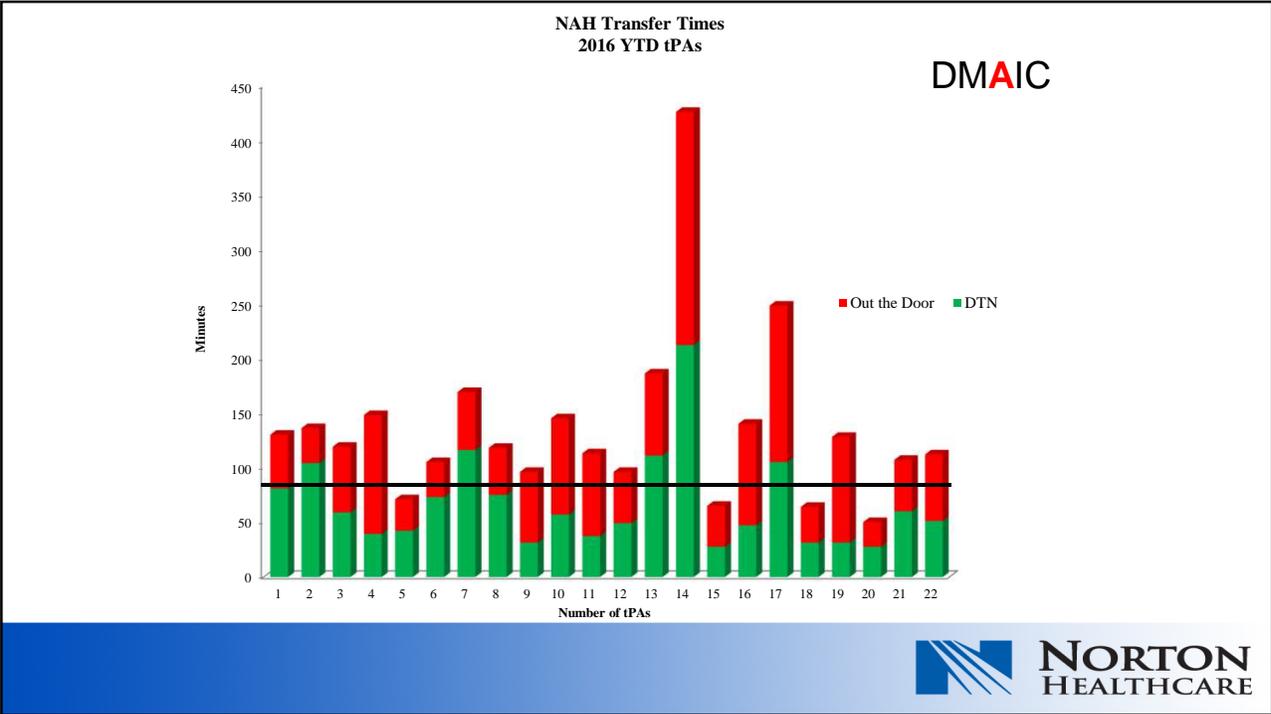
● Only Value added phone calls to get patient Transferred.

Current process has multiple Non-value added steps contributing to patient care delays.
 Goal Door In Door Out (DiDo) is 90mins.
 Only meeting that goal **18% of patient transfers** (2016)

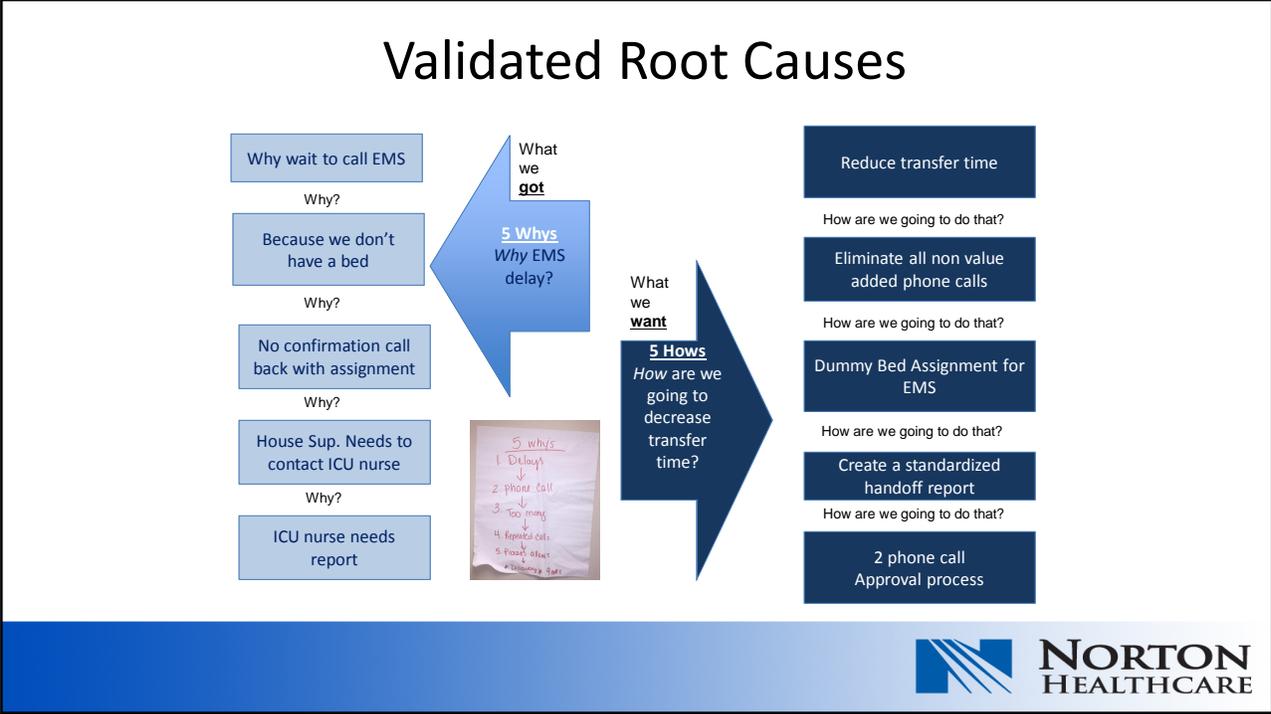
We learned:
 Multiple phone calls are not needed to transfer the patient. Bedside handoff is completed at receiving facility.

NORTON HEALTHCARE

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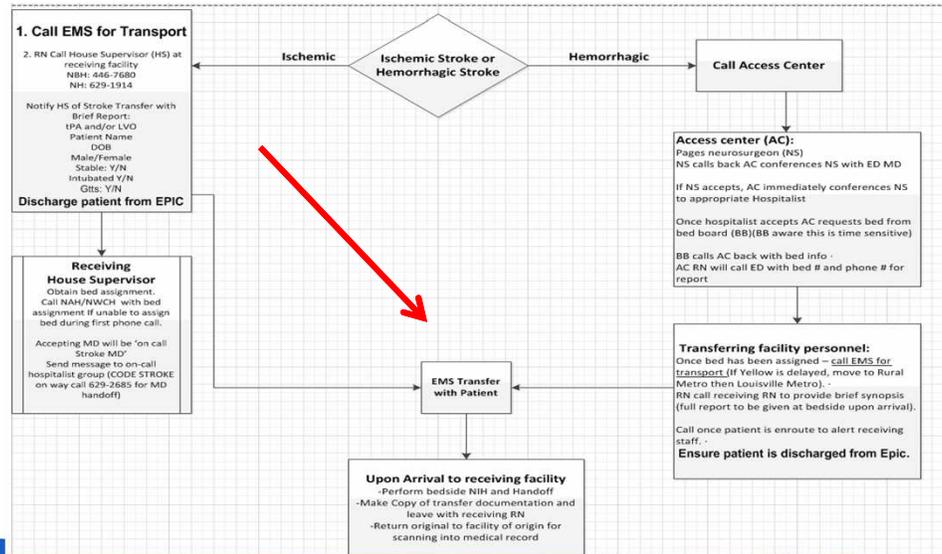


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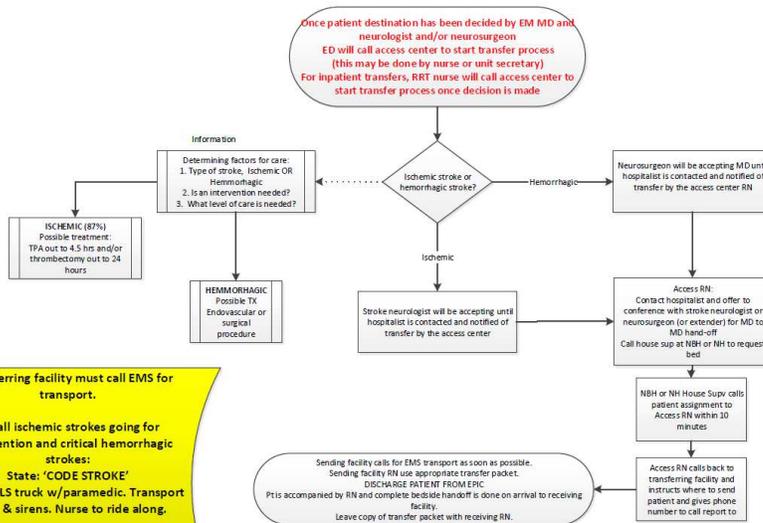
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New Process Map



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NORTON TO NORTON STROKE TRANSFER PROCESS



Transferring facility must call EMS for transport.

For all Ischemic strokes going for intervention and critical hemorrhagic strokes:
State: 'CODE STROKE'
Need ACLS truck w/paramedic. Transport lights & sirens. Nurse to ride along.

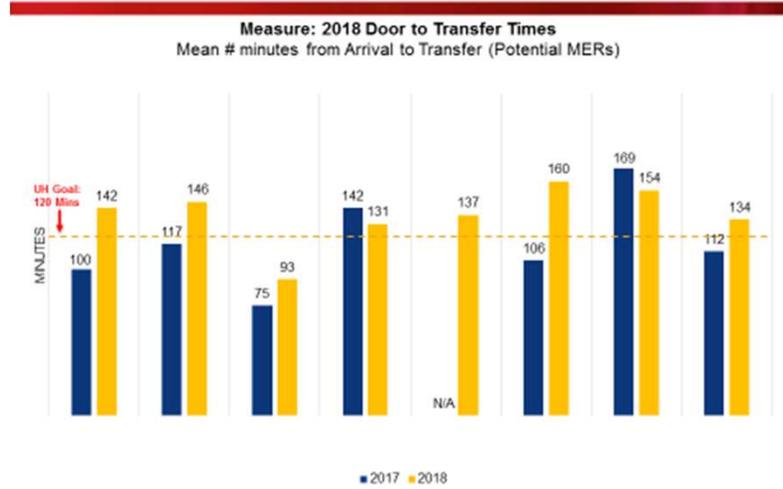
If pt is determined to be stable and NOT in need of intervention, lights & sirens are not needed.



J.H October 2018

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DOOR IN, DOOR OUT (DIDO): UH TRACKING



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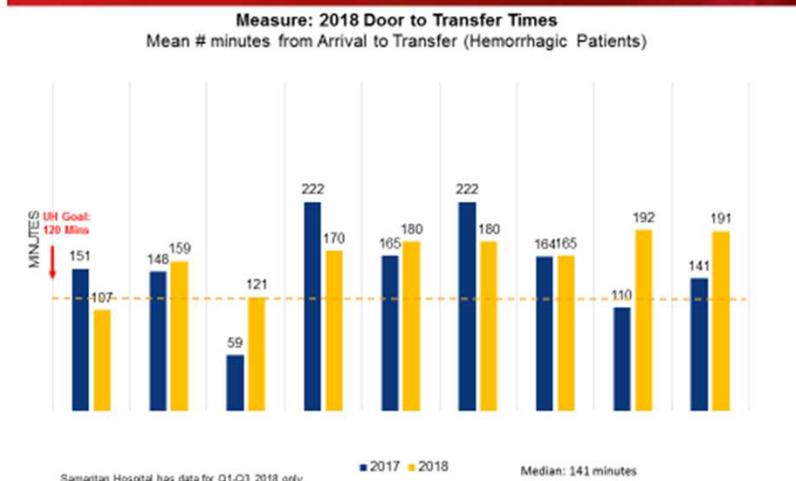
University Hospitals

Cleveland | Ohio



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DOOR IN, DOOR OUT (DIDO): UH TRACKING



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University Hospitals

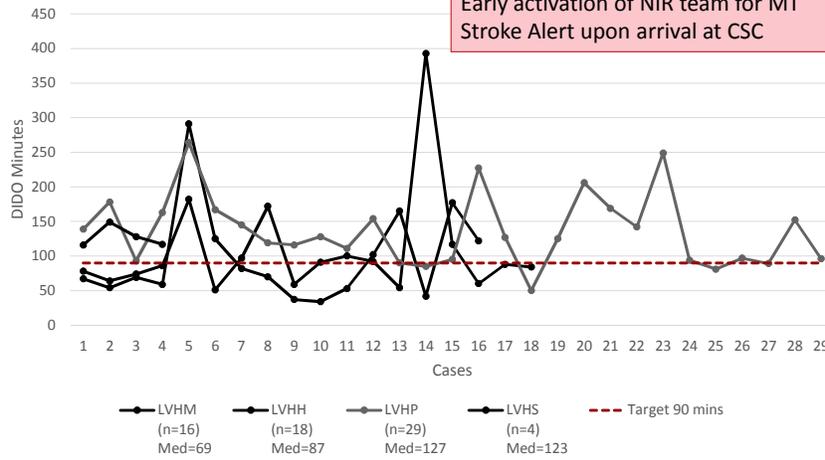
Cleveland | Ohio



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FY18 LVHN ISCHEMIC TRANSFER DOOR IN DOOR OUT (DIDO)

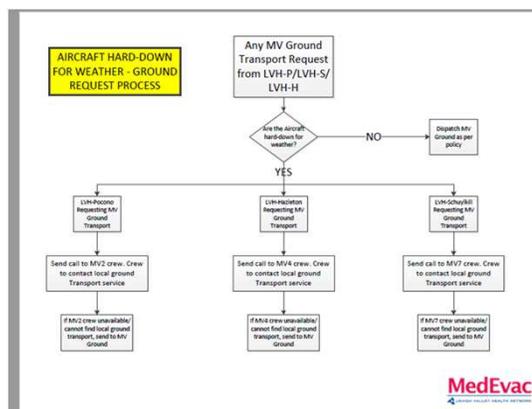
Transport put on standby at first contact to transfer center
Fastest mode of transport identified
Air crew released to join ground when needed
Early activation of NIR team for MT
Stroke Alert upon arrival at CSC



NOTE: Includes transfers only, excludes hemorrhagic strokes, data from LVHCC Stroke Alert/tPA Log



THINKING DIFFERENTLY...



DOOR IN, DOOR OUT (DIDO): DISCUSSION

- WHAT PRACTICES / PROCESSES DOES YOUR HOSPITAL USE TO REDUCE TIME?
- HAVE YOU CREATED A PROCESS MAP?
- DO YOU HAVE WRITTEN PROTOCOLS?
- TIMELINESS OF CTA RESULTS?
- WHO MAKES THE DECISION TO TRANSFER PATIENT (ED OR NEUROLOGIST) ?
- WHO COORDINATES THE TRANSFER?
- EDUCATION OF TRANSPORT TEAMS?



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DOOR IN, DOOR OUT (DIDO): DOCUMENTATION

- **ABSTRACTION:**
- Presence of LVO?
- MER eligible ?
- Time the patient departed from the emergency department?

Endovascular Therapy

Is there documentation of a LVO in the medical record? Yes No

Is there documentation in the medical record that the patient is eligible for MER therapy or a mechanical thrombectomy procedure? Yes No

Demographics Admin Clinical Codes Admission Hospitalization Advanced Stroke Care Discharge Optional Core Measures **Outpatient** Measures
Special Initiatives Historic

Patient

Encounter Date

E/M Code

Discharge

What is the date/time the patient departed from the emergency department?
MMDDYYYYHH24MI

For discharges on or after 07/01/2012: What was the patient's discharge code from the outpatient setting?



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IMPROVING COMPLEX CLINICAL SYSTEMS

- ~~KEY TAKEAWAYS:~~
- EXPLICIT GOAL OF REDUCING DIDO
- VISIBLE LEADERSHIP SUPPORT
- INNOVATIVE STANDARDIZED PROTOCOLS
- COLLABORATIVE, INTERPROFESSIONAL TEAMS
- DATA FEEDBACK TO MONITOR = ITERATIVE EVALUATION
- FOSTER PERSISTENCE
- REMAIN PATIENT FOCUSED

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Circulation. 2006; 113: 1079-1085



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NEED FOR SPEED: TIME IS BRAIN!

THANK YOU!



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STRATIS REGISTRY

ORIGINAL RESEARCH ARTICLE

Interhospital Transfer Before Thrombectomy Is Associated With Delayed Treatment and Worse Outcome in the STRATIS Registry (Systematic Evaluation of Patients Treated With Neurothrombectomy Devices for Acute Ischemic Stroke)

Editorial, see p 2322

Michael T. Froehle, MD, PhD et al

BACKGROUND: Endovascular treatment with mechanical thrombectomy (MT) is beneficial for patients with acute stroke suffering a large-vessel occlusion, although treatment efficacy is highly time-dependent. We hypothesized that interhospital transfer to endovascular-capable centers would result in treatment delays and worse clinical outcomes compared with direct presentation.

METHODS: STRATIS (Systematic Evaluation of Patients Treated With Neurothrombectomy Devices for Acute Ischemic Stroke) was a prospective, multicenter, observational, single-arm study of real-world MT for acute stroke because of anterior-circulation large-vessel occlusion performed at 55 sites over 2 years, including 1000 patients with severe stroke and treated within 8 hours. Patients underwent MT with or without intravenous tissue plasminogen activator and were stratified to endovascular-capable centers via either interhospital transfer or direct presentation. The primary clinical outcome was functional independence (modified Rankin Score 0–2) at 90 days. We assessed (1) real-world time metrics of stroke care delivery, (2) outcome differences between direct and transfer patients undergoing MT, and (3) the potential impact of local hospital factors.

RESULTS: A total of 984 patients were analyzed. Median onset-to-revascularization time was 202.0 minutes for direct versus 311.5 minutes for transfer patients (P<0.001). Clinical outcomes were better in the direct group, with 60.0% (259/438) achieving functional independence compared with 52.2% (213/408) in the transfer group (odds ratio, 1.38; 95% confidence interval, 1.06–1.79; P=0.02). Likewise, excellent outcome (modified Rankin Score 0–1) was achieved in 47.4% (236/498) of direct patients versus 38.0% (155/408) of transfer patients (odds ratio, 1.47; 95% confidence interval, 1.13–1.92; P=0.005). Mortality did not differ between the 2 groups (5.1% for direct, 5.7% for transfer; P=0.55). Intravenous tissue plasminogen activator did not impact outcomes. Hypothetical bypass modeling for all transferred patients suggested that intravenous tissue plasminogen activator would be delayed by 12 minutes, but MT would be performed 91 minutes sooner if patients were routed directly to endovascular-capable centers. If bypass is limited to a 20-mile radius from onset, then intravenous tissue plasminogen activator would be delayed by 7 minutes and MT performed 84 minutes earlier.

CONCLUSIONS: In this large, real-world study, interhospital transfer was associated with significant treatment delays and lower chance of good outcome. Strategies to facilitate more rapid identification of large-vessel occlusion and direct routing to endovascular-capable centers for patients with severe stroke may improve outcomes.

CLINICAL TRIAL REGISTRATION: URL: <https://www.clinicaltrials.gov>; Unique identifier: NCT02239540.

The full author list is available on page 2319.

Correspondence to: Michael T. Froehle, MD, PhD, Center for Stroke and Neurovascular Program, Wakefield School of Medicine, Wake Forest University Medical Center, 101 S. Tenth Street, Winston-Salem, NC 27157. E-mail: mtfroehle@wakehealth.edu

Source of Funding: See page 2319.

Key Words: emergency medical services • interhospital treatment • ischemic stroke • start-receive times of care

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- PROSPECTIVE MULTICENTER OBSERVATIONAL STUDY OF MT FOR ACUTE STROKE
- 55 SITES/ 1000 PATIENTS
- ONSET TO REVASCLARIZATION: 202 MIN FOR DIRECT; 311 MIN FOR TRANSFER
- CLINICAL OUTCOME BETTER FOR DIRECT GROUP W/ 60% FUNCTIONALLY INDEPENDENT VS 52% IN TRANSFER GROUP
- INTERHOSPITAL TRANSFER ASSOC. W/ SIGNIFICANT DELAYS & LOWER CHANCE OF GOOD OUTCOME



WHAT MIGHT THIS LOOK LIKE:

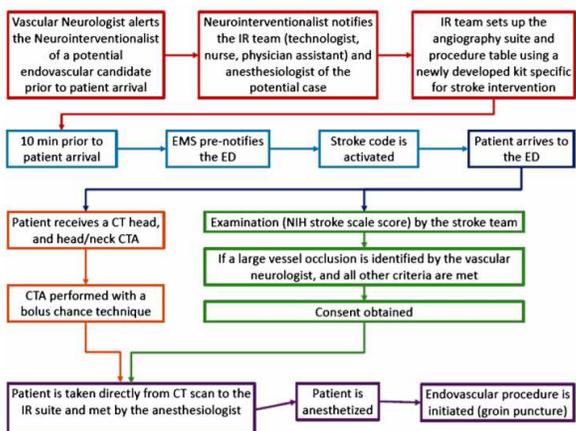


Fig. 2 This multidisciplinary and inter-departmental performance improvement (PI) initiative aimed to reduce door-to-groin (DTG) time at our facility. The PI initiative found that parallel processes can reduce DTG by as much as 56%, and a < 60-min mean DTG target was achieved after standard protocol implementation



