Benefits of Speed!
Strategies to Decrease Your Facility’s Door In Door Out Time

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
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!

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, Triage- 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

*Stroke, 2006;37:263-266.*
SUMMARY OF TIME IN CLINICAL TRIALS

Table 1
Endovascular stroke trials and treatment time

<table>
<thead>
<tr>
<th>Study</th>
<th>Time to groin (median) (min)</th>
<th>Time to reperfusion (median) (min)</th>
<th>mRS 0–2 Endovascular (%)</th>
<th>mRS 0–2 Medical (%)</th>
<th>Absolute difference (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IMS III</td>
<td>208</td>
<td>325</td>
<td>40.8</td>
<td>38.7</td>
<td>2.1</td>
</tr>
<tr>
<td>MR CLEAN</td>
<td>260</td>
<td>332</td>
<td>32.6</td>
<td>19.1</td>
<td>13.5</td>
</tr>
<tr>
<td>REVASCAT</td>
<td>269</td>
<td>355</td>
<td>43.7</td>
<td>28.2</td>
<td>15.5</td>
</tr>
<tr>
<td>SHIFTPRIME</td>
<td>224</td>
<td>252</td>
<td>40.2</td>
<td>35.5</td>
<td>24.7</td>
</tr>
<tr>
<td>EXTENDA</td>
<td>240</td>
<td>246</td>
<td>71</td>
<td>40</td>
<td>31</td>
</tr>
<tr>
<td>ESCAPE</td>
<td>285</td>
<td>241</td>
<td>53</td>
<td>29.3</td>
<td>23.7</td>
</tr>
</tbody>
</table>

* mRS, Intervventional 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
PRIMARY STROKE CENTER PROTOCOL FOR LVO

- Key steps:
  - Use of LAMS by ED MD before imaging
  - CSC transport dispatched
  - If LAMS 4 or higher CTA w/ NCCT < 30 min PSC arrival
  - Share images in cloud-based platform
  - LVO transfer to CSC angiography directly

Shorter PSC DIDO time, faster arrival to CSC recanalization, & improved patient outcomes.

JAMA Neurol. 2017 Jul;74(7): 793-800

STROKE RESCUE PROGRAM

Transfer Process:
1. Transport 1 (Initial phone call from PSC till EMS arrival at PSC)
2. ED time (EMS PSC arrival to PSC departure)
3. Transport 2 (PSC departure to CSC arrival)

Total transport time target set at less than 60 minutes

Journal Stroke and Cerebrovascular Disease. (2017); 26(1); 192-195.
Norton Healthcare

Current State Process Map

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.

Only Value added phone calls to get patient transferred.
Validated Root Causes


What we want: 5 Hows. How are we going to decrease transfer time? How are we going to do that? Reduce transfer time. How are we going to do that? Eliminate all non value added phone calls. How are we going to do that? Dummy Bed Assignment for EMS. How are we going to do that? Create a standardized handoff report. How are we going to do that? 2 phone call Approval process.

NAH Transfer Times
2016 YTD IPAs

DMAIC
DOOR IN, DOOR OUT (DIDO): UH TRACKING

Measure: 2018 Door to Transfer Times
Mean # minutes from Arrival to Transfer (Potential MERs)

<table>
<thead>
<tr>
<th>Location</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH Goal 100 Mils</td>
<td>142</td>
<td>146</td>
</tr>
<tr>
<td></td>
<td>117</td>
<td>142</td>
</tr>
<tr>
<td></td>
<td>71</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>N/A</td>
<td>137</td>
</tr>
</tbody>
</table>

DOOR IN, DOOR OUT (DIDO): UH TRACKING

Measure: 2018 Door to Transfer Times
Mean # minutes from Arrival to Transfer (Hemorrhagic Patients)

<table>
<thead>
<tr>
<th>Location</th>
<th>2017</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>UH Goal 100 Mils</td>
<td>151</td>
<td>149</td>
</tr>
<tr>
<td></td>
<td>121</td>
<td>170</td>
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<td></td>
<td>121</td>
<td>192</td>
</tr>
<tr>
<td></td>
<td>141</td>
<td>191</td>
</tr>
</tbody>
</table>

Samarian Hospital has data for Q1-Q3 2018 only.
Median: 141 minutes
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?

DOOR IN, DOOR OUT (DIDO): DOCUMENTATION

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

<table>
<thead>
<tr>
<th>Patient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encounter Date</td>
</tr>
<tr>
<td>L/M Code</td>
</tr>
<tr>
<td>Discharge</td>
</tr>
<tr>
<td>What is the date/time the patient departed from the emergency department?</td>
</tr>
<tr>
<td>For discharges on or after 07/01/2012: What was the patient’s discharge code from the outpatient setting?</td>
</tr>
</tbody>
</table>
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

**NEED FOR SPEED: TIME IS BRAIN!**

**THANK YOU!**
REFERENCES

References

OPTIMIZING TRANSPORT

Optimal Transport Destination for Ischemic Stroke Patients With Unknown Vessel Status
Use of Prehospital Triage Scores

Eckard Scherrm, MBBS, MD; Martin Ebinger, MD; Christian H. Nied, MD; Matthias Endes, MD; Ludwik Scherrm, MD

Background and Purpose—Patients with acute ischemic stroke (AIS) and large vessel occlusions may benefit from direct transportation to an endovascular capable comprehensive stroke center (CSC) as opposed to direct transportation to the nearest stroke unit without endovascular therapy (EVT). The optimal transport strategy for patients with AIS and unknown vessel status is uncertain. The optimal location evaluation score (ROC) score ranges from 0 to 1, with scores indicating higher stroke severity correlates with the National Institutes of Health Stroke Scale and was developed to identify patients with large vessel occlusion in a prehospital setting. We evaluate how the ROC score can help select the prehospital transport strategy for AIS patients.

Method—This model-based approach, we evaluate probability of good outcome (adjusted Rankin Scale score of 2 or 3) at 90 days as a function of severity of stroke symptoms and transport times for the triage approach and the EVT and transport approach. We use these probabilities to derive optimal ROC cutoff scores for different transport time settings and combinations of treatment options that have eligibility for EVT under the EVT and transport approach, time-based eligibility for thrombosis at the comprehensive stroke center, and the treatment approach.

Results—As a result, patients with AIS and large vessel occlusion are more likely to benefit from direct transport to the comprehensive stroke center if they meet certain criteria. These results improve upon previous studies with similar outcomes. Values of the optimal ROC cutoff score range from 0 (no eligibility for all patients to no EVT and transport in all patients) to 1 (eligibility for all patients to EVT and transport in all patients). Further studies should evaluate the scalability of translation into clinical practice.

Stroke.2017;48:2184-2191
STRATIS REGISTRY

- PROSPECTIVE MULTICENTER OBSERVATIONAL STUDY OF MT FOR ACUTE STROKE
- 55 SITES/ 1000 PATIENTS
- ONSET TO REVASCULARIZATION: 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

Circulation. (2017); 136:2311-2321

WHAT MIGHT THIS LOOK LIKE:

<table>
<thead>
<tr>
<th>Vascular Neurologist alerts the Neurointerventionalist of a potential endovascular candidate prior to patient arrival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurointerventionalist notifies the IR team (technologist, nurse, physician assistant) and anesthesiologist of the potential case</td>
</tr>
<tr>
<td>IR team sets up the angiography suite and procedure table using a newly developed kit specific for stroke intervention</td>
</tr>
</tbody>
</table>

10 min prior to patient arrival

EMS pre-notifies the ED

Stroke code is activated

Patient arrives to the ED

Patient receives a CT head and headache x CTA

Examination (NIH stroke scale score) by the stroke team

If a large vessel occlusion is identified by the vascular neurologist, and all other criteria are met

Consent obtained

CIR performed with a bolus chase technique

Patient is taken directly from CT scan to the IR suite and met by the anesthesiologist

Patient is anesthetized

Endovascular procedure is isolated (giant puncture)

Fig. 2 This multidisciplinary and interdepartmental 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 50%, and a 60% near DTG target was achieved after standard protocol implementation.

Curr Atheroscler Rep (2017) 19:52
Protocol-driven process significantly improve efficiency of care in time-sensitive stroke interventions.