Achieving Door to TPA Times in under 45 Minutes: Instituting Best Practice in a Rural Community Hospital

Target Stroke: PHASE II
Disclosures: None
<table>
<thead>
<tr>
<th>Objectives</th>
<th>Goals:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Define minimum standards for door to tPA times</td>
<td>• Remove barriers in systems of care in prehospital and ED setting to achieve Target Stroke Phase II goals in your hospital setting</td>
</tr>
<tr>
<td>• Discuss Target Stroke Phase II goals and how they differ from minimum standards</td>
<td>• Utilize LEAN methodology/tools to reduce waste in time and energy in initiating a rapid Code Stroke Process</td>
</tr>
</tbody>
</table>
No CSC or PSC with IA capabilities within 30-60 min
Central by the Numbers

- 12,000 mile service area
- 50% of patients are from greater Wenatchee Area
- 50% from Grant Co., North Douglas County, Okanogan Co
- 198 beds
- Level 1 Cardiac, Level II Stroke and III Trauma
- 275-300 AIS per year, 65 TIA, 40 ICH, 6 SAH
Our Stroke Service

- Reporting to GWTG in 2008
- AHA/ASA: GWTG Bronze in 2011, 2012
- June 2013, established Tele-stroke Partnership with UW/HMC
- Began reporting Stroke Core Measure and Stroke Coordinator Position was created
- May 2015: Awarded Joint Commission Certification for Primary Stroke Center
- 2016 and 2017: GWTG Gold Plus and Target Stroke HONOR Roll, with 70% of patients receiving tPA in under 60 minutes...
Target Stroke:
The primary goal of Target Stroke Phase I was for participating hospitals to treat

- At least 50% of their acute ischemic stroke patients with intravenous tissue plasminogen activator (tPA) within 60 minutes or less of hospital arrival.
- After the initiation of Target Stroke, there was a substantial improvement in the timelines of tPA administration with the proportion of patients with DTN times < 60 minutes increasing from 29.6% to 53.3% by the third quarter of 2013.
Target Stroke Phase II

- **Primary Goal:** Achieve Door-to-Needle Times within 60 minutes in 75% or more of acute ischemic stroke patients treated with IV tPA.

- **Secondary Goal:** Achieve Door-to-Needle times within 45 minutes in 50% or more of acute ischemic stroke patients treated with IV tPA.
Target Stroke Phase II

- Door to MD < 10
- Door to Stroke Team < 15
- Door to CT initiation < 20
- Door to CT Read < 35
- Door to Lab/ECG results < 30
- Door to TPA < 45
- Door to tele stroke within 20 min determined by provider
- Transfer to CSC, 2 hours of ED arrival
- Door to monitored bed if admitted < 3 hours

And

Target Stroke/Minimum Standards

- Door to tPA in under 60 minutes
- EMS Pre-notification
- Rapid Triage Protocol
- Activating stroke team on arrival
- Rapid CT (25 minutes) and Rapid read (45 minutes)
- Rapid lab testing when indicated (30 minutes)
- Stroke protocols
- Pre-mixing tPA
- Stroke team based approach
- Data feedback

Target Stoke: Launched in 2010
Previous State for *Stroke Activation*

- Pre-hospital notification from EMS and direct to CT (Best Practice)
- 1 call activation of Stroke Activation (Best Practice)
- Acute stroke algorithms in place for the ED
- *Goal time of tPA under 60 minutes (Best Practice) Target Stroke*
  
  *CT: Under 35, CT Read: 45 Min, Lab: 45 Min*

- tPA kit at the bedside and **ED RN mixing** when order was given
Previous State for *Stroke Activation*

- Minimum 4 hours of Stroke education a year for Providers and Nursing plus NIHSS
- Feedback to staff and providers regarding times and barriers (Best Practice)
- ED RN and ED Provider providing almost all care for stroke patients “AST”
Our Goals for 2017/2018

• Primary Goal: Reduce door to tPA times to under 60 min, 75% of the time on AIS patients

• Secondary Goal: Reduce door to TPA times to under 45 min 50% of the time on AIS
Additional Goals

- DNV certification for PSC
- CT/CTA
- Incorporate intervention timeframes in our algorithms 0-24 hours
- REACH cart for Tele-stroke with Harborview
We Have A Problem Here....
We Have A Problem Here....
We Have A Problem Here

### Confluence Health Central Washington Hospital Target: Time Interval Dashboard

<table>
<thead>
<tr>
<th></th>
<th>Q4'16</th>
<th>Q1'2017</th>
<th>Q2'2017</th>
<th>Q3'2017</th>
<th>Q4'2017</th>
</tr>
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<tbody>
<tr>
<td>Acute Ischemic Stroke (AIS)</td>
<td>43</td>
<td>52</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TIA</td>
<td>7</td>
<td>8</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subarachnoid Hemorrhage</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intracerebral Hemorrhage</td>
<td>7</td>
<td>4</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>57</td>
<td>66</td>
<td>72</td>
<td>0</td>
<td>0</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Step</th>
<th></th>
<th></th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Door to MD &lt;10 Min</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to MD &lt;10: % Yes</td>
<td>100%</td>
<td>50%</td>
<td>40%</td>
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<td></td>
</tr>
<tr>
<td>Door to CT Initiation &lt; 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to CT Initiation &lt; 20: % Yes</td>
<td>71%</td>
<td>63%</td>
<td>56%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to CT Read &lt;35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to CT Read &lt;35: Yes</td>
<td>71%</td>
<td>38%</td>
<td>69%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to Lab results &lt;30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to Lab results &lt;30: % Yes</td>
<td>71%</td>
<td>43%</td>
<td>25%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to ECG results &lt;30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to ECG results &lt;30: % Yes</td>
<td>86%</td>
<td>100%</td>
<td>27%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to Telestroke within 20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to Telestroke within 20: % Yes</td>
<td>NA</td>
<td>NA</td>
<td>0%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to tPA &lt;45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to tPA &lt;45: % Yes</td>
<td>20%</td>
<td>25%</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to Bed &lt;3 hrs</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door to Bed &lt;3 hrs: % Yes</td>
<td>100%</td>
<td>41%</td>
<td>30%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Previous State for Stroke Activation: Barriers to achievement

- No clear defined roles for Stroke despite algorithms and policies
- EMS called in Code Stroke based on + FAST, sometimes report was given to ED provider over cell phone
- POV arrivals had significant delays related to bedding and assessment before activation
- Focus on improvement without a lot of traction and staff buy-in
- Too much work for ED RN
  1. NIHSS
  2. TPA Kit
  3. All documentation
  3. Swallow
Previous State for *Stroke Activation*: Barriers to achievement

- *Stroke Activation* not seen as a *Priority* with ED Staff, physicians and Leadership and other Ancillary Services
- Too much work for some staff, none or very little for others
- Little standard, specific education that was focused on stroke process and the WHY of stroke urgency
Previous State for *Stroke Activation*

- “Wait and See” approach was adopted over time and Stroke Activation was not called 100% of the time for 100% of the patients who met criteria
- When activation was initiated:
  - Patient was met by ED RN at ambulance bay doors, and then accompanied to CT (most of the time)
  - Some reporting and handoff was done between EMS and RN
  - CT completed, images were pushed to Harborview *(if Code Activation had been activated)*, also called to Radiologist on day shift to review or Radiologist on nights for STAT read
  - CT completed -> back to ED -> tPA decision -> back to CTA
- Provider met the patient back in the ED at some point after initial head CT
- **So, why was that a problem?**
We would NEVER achieve Target Stroke Phase II goals
Mean DTN time was 65 Minutes

What is the Motivation?

- “Time is brain”
- Every minute lost increases the chance of stroke-related disability or death
- Timely medical attention is crucial

**Estimated pace of neural circuitry loss in typical large-vessel AIS**

<table>
<thead>
<tr>
<th>Time</th>
<th>Neurons lost</th>
<th>Myelinated fibers* lost</th>
<th>Accelerated aging†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per second</td>
<td>32,000</td>
<td>218 yards</td>
<td>8.7 hours</td>
</tr>
<tr>
<td>Per minute</td>
<td>1.9 million</td>
<td>7.5 miles</td>
<td>3.1 weeks</td>
</tr>
<tr>
<td>Per hour</td>
<td>120 million</td>
<td>447 miles</td>
<td>3.6 years</td>
</tr>
<tr>
<td>Per stroke</td>
<td>1.2 billion</td>
<td>4470 miles</td>
<td>36 years</td>
</tr>
</tbody>
</table>

AIS=acute ischemic stroke.

*Myelinated fibers are nerve fibers wrapped in a protective myelin sheath.

†Compared with normal aging, estimated at approximately 31 million neurons lost per year.
What were some of the barriers?

- Lack of a defined roles
- No designated team responding
- Lack of help for primary RN
- Too much to do for 1 person/not enough for others
- Confusing documentation
- Too much documentation
- Provider differences and preferences
- Acuity of other patients
- No sense of urgency/emergency as an organization
Stroke is An Emergency

• Historically stroke has not been treated as a true emergency and the response lacked urgency and attention
• Strokes don’t hurt, they don’t bleed...
• Culture needed to change
• *Stroke Activation/Alert*
Culture Change: Step 1

- Proposed a business plan to executive leadership to become an **Advanced Stroke Life Support** Certified Instruction center
- 1st in Washington State
- **GOAL:** Increase the level and standardization of stroke education from EMS, RN to provider from ED to the inpatient and rehab.
Culture Change: Step 1 ASLS

- Course addresses the prehospital, emergency department, and stroke unit management of patients with acute stroke
- Using interactive discussions, hands-on workshops, multimedia (video case-based scenarios) and standardized patient simulations (for stroke syndrome identification and management decision-making)
- Focus: differential diagnosis of stroke, rapid recognition of 5 major stroke syndromes, training in the use of the Miami Emergency Neurologic Deficit (M.E.N.D.) exam (based on the National Institutes of Health Stroke Scale and incorporating the Cincinnati Prehospital Stroke Scale)
- Course is required q2 years
MEND EXAM

• The MEND exam: Based on a combo of Cincinnati prehospital Stroke Scale and NIHSS)
• Does not require extra tools - just practitioner (no charts/pictures that require cultural norms)
• Takes < 3 min, including grading
• Nurses: Quick scale 0-22 - where 0 is completely normal exam and 22 is completely abnormal exam. Each box checked gets a score of 1. (Each abnormal is 1 point)
• Divided in to 3 broad categories - Mental Status, Cranial Nerves and Limbs
MEND Badge for RN

**MENTAL STATUS**
- Level of Consciousness (AVPU)
- Speech: “You can’t teach an old dog new tricks”
- Questions (age, month)
- Commands (close, open eyes)

**CRANIAL NERVES**
- Facial Droop (show teeth or smile)
- Visual Fields (four quadrants)
- Horizontal Gaze (side to side)

**LIMBS**
- Motor – Arm Drift (close eyes – hold out arms)
  - Leg Drift (open eyes – lift each leg separately)
- Sensory – Arm, Leg (close eyes & touch, pinch)
- Coordination – Arm, Leg (fingernose, heel-shin)

**Stroke Documentation:** All Strokes
NPO until Swallow assess, NIHSS x1, VS & MEND = complete at same time in Epic

- Code Neuro Less than 4.5 hrs. LNW (no tPA)
- BP Goal: Sys <220 or Dias <120,
- BP Ref Doc: Nursing Decision Support Non-tPA
- VS/MEND: q15 x 4, q1 hr. x 2, q 4
- NIHSS 15 min, MD 10 min

- TPA Eligible AIS (do not wait for order for tPA)
- BP Ref Doc: Nursing protocol for tPA Stroke
- BP Goal: Sys <180 or Dias <105 before & 24 hr.
- VS/MEND: q15 x 15, q 30 x 6 hr., q1 hr. x 16
- NIHSS 15 min, MD 10 min

- Modified Stroke LNW greater than 4.5-21 hr
- BP Goal: Sys <220 or Dias <120,
- BP Ref Doc: Nursing Decision Support Non-tPA
- VS/MEND: q 30 x 2, then q 1 hr. x 2, q4. & PRN
- NIHSS 45 min

- ICH/SAH (not time dependent)
  - Goal: Rapid reduction to Sys less than 140,
  greater 120, and Dias less than 105, greater than 50
- BP Ref Doc: BP management of ICH Patients
  (ED/ICU)
- VS/MEND: q 15 x 4, q 30 x 2, q1 hr. & PRN
- NIHSS 45
Culture Change: Step 2

- **Rapid Process Improvement Project utilizing Lean Methodology** Sept. 11-15
- Multidisciplinary Group, 5 days to improve door to tPA time in the ED
- Senior Leadership Sponsorship
- Lead by 3 departments, Emergency Department, DI, and Stroke
RPIW Team
Process Map

[Diagram showing a process map with various steps and nodes, some labeled with X marks indicating issues or delays.]

<table>
<thead>
<tr>
<th>Step</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>EMS Arrives</td>
<td>75</td>
</tr>
<tr>
<td>EMS Vehicle</td>
<td>345</td>
</tr>
<tr>
<td>CT Scan 1</td>
<td>276</td>
</tr>
<tr>
<td>Lab Draws</td>
<td>116</td>
</tr>
<tr>
<td>IV Placed</td>
<td>124</td>
</tr>
<tr>
<td>MD Placement</td>
<td>156</td>
</tr>
<tr>
<td>MD Evaluation</td>
<td>117</td>
</tr>
<tr>
<td>CT Scan 2</td>
<td>336</td>
</tr>
<tr>
<td>In Room X-ray</td>
<td>594</td>
</tr>
<tr>
<td>EKG</td>
<td>114</td>
</tr>
</tbody>
</table>

[Table with codes and values indicating different processes and measurements, such as Lead Time, PT, CO, VA, NVA, and SVA.]
# Time Observation Form: Stroke Activation

## Time Observation Form

<table>
<thead>
<tr>
<th>Step #</th>
<th>Description of Operation</th>
<th>Task Time</th>
<th>Most Frequent Task Time (mode)</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EMS Arrives</td>
<td>0</td>
<td>75</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>CT Scan 1</td>
<td>214</td>
<td>124</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>194</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Labs Drawn</td>
<td>614</td>
<td>154</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>133</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>IV Placed</td>
<td>846</td>
<td>117</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>117</td>
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<td></td>
</tr>
<tr>
<td>5</td>
<td>MD Evaluation</td>
<td>1166</td>
<td>336</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>156</td>
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<td></td>
</tr>
<tr>
<td>6</td>
<td>CT Scan 2</td>
<td>1815</td>
<td>504</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>504</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>In Room X-ray</td>
<td>2626</td>
<td>61</td>
<td>Median</td>
</tr>
<tr>
<td></td>
<td></td>
<td>61</td>
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</tbody>
</table>

## Process Boundaries

<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Area</th>
<th>Out of boundaries</th>
<th>Out of order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Door</td>
<td>Tpa</td>
<td>Emergency Dept</td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>From</th>
<th>Door to TPA</th>
<th>Cycle</th>
<th>Demand</th>
<th>1 patient</th>
<th>Time</th>
<th>TAKT Time</th>
<th>Completed By</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/9</td>
<td>0.130</td>
<td>0.36</td>
<td>1.56</td>
<td>3.31</td>
<td></td>
<td>1440 min/24 hrs</td>
<td>EB/CL/SJ</td>
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</tr>
<tr>
<td>2</td>
<td>0.380</td>
<td>0.75</td>
<td>1.10</td>
<td>0.49</td>
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<tr>
<td>3</td>
<td>0.738</td>
<td>0.520</td>
<td>0.532</td>
<td>0.280</td>
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<tr>
<td>4</td>
<td>0.964</td>
<td>0.906</td>
<td>0.153</td>
<td>0.335</td>
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<tr>
<td>5</td>
<td>1.184</td>
<td>0.99</td>
<td>0.594</td>
<td>0.993</td>
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</tr>
<tr>
<td>6</td>
<td>2.015</td>
<td>2.37</td>
<td>0.517</td>
<td>1.197</td>
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<tr>
<td>7</td>
<td>2.626</td>
<td>0.626</td>
<td>0.50</td>
<td>0.307</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Item</td>
<td>Problem</td>
<td>Action Needed To Complete</td>
<td>Responsibility</td>
<td>By When</td>
<td>Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Other staff members not aware of stroke protocol</td>
<td>Education Plan</td>
<td>Teri, Cora, Jamie, Pam Hannah, Jack Day</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Unclear identification for who is responding when a stroke patient arrives</td>
<td>Create a Stroke Code Response Team Policy</td>
<td>Teri</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>RN feels overwhelmed when mixing tPA</td>
<td>Pharmacy Tech and Pharmacist will respond, carrying the tPA kit. The Pharmacist will mix the tPA with second RN</td>
<td>Team, Teri, Joe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Unclear role definitions</td>
<td>Clearly identify tasks that need to be done, then assign to roles – standard work</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>EMS does not have a designated team to provide report to.</td>
<td>EMS to give report to MD and RN outside of CT Room utilizing the RN Checklist</td>
<td>Team, EMS, Teri</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Not efficient to have large response team to respond to stroke call</td>
<td>Designate phase 1 and phase 2 tasks, have Pharmacy come to stroke at phase 2 call.</td>
<td>Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Multiple people talked with to send the page</td>
<td>Admitting staff to send group page with a standard work sheet and put an icon on their desktop – work order</td>
<td>La Dora</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>XRay adds time</td>
<td>Stop having CXR required, plan it as a non-priority</td>
<td>Becky, Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>EKG adds time</td>
<td>Stop having EKG required, plan it as a non-priority</td>
<td>LaDora, Team</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Culture Change: Step 2 Process Improvement

- New algorithm with phases of care *(See copies)*
- New team members added
- Roles and expectations clearly defined *(See Badges)*
- Wastes of time and resources eliminated
- New overhead "Code Neuro" Page
- CT->CTA Direct (Not just CT)
- Incorporate extended time frames and REACH cart for telestroke
Culture Change: Step 2 Process Improvement

- **Second tPA Alert** if head CT negative for bleed and continued deficits
- Epic Stroke Narrator redo and new MEND exam tool
- The members of the Code Neuro Response Team have received specialized training and will be the only people responding to the code event.
Culture Change: Step 2

- New process for POV arrivals - No bedding Direct to CT
- Standardized Stroke and TPA education tool (See Handouts)
- House supervisors looped in to provide education on stroke to patient and family
- Pharmacist now involved in mixing at the bedside
- ED Techs- REACH cart
ED Acute Stroke Care Pathways: Activation Criteria
EMS/ED Staff identifies 1 Positive FAST Exam, OR Sudden Severe Stroke Symptom, Persistent/Fluctuating stroke symptoms/ +FAST, OR S/SX of Posterior Circ. Stroke or ICH
- Sudden Onset Numbness/weakness in one or both legs
- Sudden Confusion/trouble understanding
- Sudden trouble seeing out of one or both eyes
- Sudden dizziness/loss of balance/coordination
- Sudden severe Headache w/ No known cause

Code Neuro Level 1 Response, Symptom Onset or LWK 0-4 hours
Activate Code Neuro Overhead page and Pulse

Acute Stroke Level 2 Response, Symptom Onset or LWK 4-21 hrs. No Code Neuro Page, Continue workup STAT for Potential Thrombectomy

ED CODE NEURO PATHWAY 0-4

PHASE 0
Activation Criteria
- See above
- ACTIVATE CODE NEURO

EMS ARRIVAL
- Code Neuro Team (MD, RN, STAT, House Supervisor, ED Tech)
  outside CT. Proceed direct to CT if stable
- Team receives report from EMS
- Weigh patient (Kg) in CT before CT begins

POV ARRIVAL
- Admitting staff note potential Stroke – Immediately notify Charge RN
- If criteria is met for Acute Stroke – notify Admitting Rep & ACTIVATE CODE NEURO
- Begin VS, BG and MEND exam, – Do not room patient
- Patient proceeds direct o CT
- Weigh patient (Kg) in CT before CT begins

TPA Alert Paged
- STAT/PCI RN Call 855-1277 STAT
- Proceed back to ED room OR CTA
- Pharmacy call Pharmacy Tech to meet in ED with TPA Kit

If unofficial read suggests ICH/SAH, do not page for TPA Alert. Proceed back to ED and continue Acute Stroke workup.

PHASE I (0-15 minutes)
- Begin Code Neuro Checklist
- MD/Primary RN: short history/neuro exam and quantify measurable deficits w/NIHSS/MEND
- Lab draw (labs per Provider, draw Rainbow)
- House Supervisor ensures that team members have arrived
- STAT/PCI RN ensure 2 IV’s
- DI push images to HMC/VPN & notify Radiologist STAT of Code Neuro
- MD completes preliminary read of Head CT ( unofficial) - if no blood and LWK less than 4 hours = Proceed with PHASE II and verbally notify Primary RN and STAT/PCI RN to page TPA Alert

PHASE II (15-30 minutes)
- Provider/RN completes Neuro exam (NIHSS/MEND)
- EKG
- weight in Stroke Narrator
- House Supervisor assists family/patient with education
- ED Tech enters patient in REACH Cart
Code Neuro Checklist
Door to TPA Time - Goal Less than 45 Minutes

PHASE 0
- Time of Arrival ______ Mode: POV/EMS
- Pre-Hospital Notification: YES/NO
- Code Neuro Activation: YES/NO
- Last Known Well Time: ______:____ OR Symptom Onset ______:____
- Neuro Deficits: _______________________________________________________
- On Arrival to ED: BP _____/_____ HR _____ Weight _____Kg
- Blood Glucose ________EMS CWH

PHASE I
(0-15 minutes)
- Door to CT Less than 20 Minutes: YES/NO
- Head CT Preliminary Read ED Provider: NEGATIVE/POSITIVE
- TPA Alert Paged: YES/NO

PHASE II
(15-30 minutes)
- NIHSS Scored: YES/NO
- TPA Ordered: YES/NO
- TPA Started Within 45 Minutes: YES/NO

STAFF SIGN IN
- STAT RN Initial ______ Time IN______OUT______ * House Supervisor Initial _____ Time IN _____OUT ______
- PC1 Initial _____ Time IN______OUT______
- Pharmacy Initial _____ Time IN______OUT______
- ED Tech Initial _____ Time IN______OUT______

Place Patient Label Here

Complete and Place in ED Stroke Folder in Clinical Manager Basket
### Code Neuro: House Supervisor

**Phase 0**
- Meet Team at EMS Doors/CT
- Proceed to CT
- Ensure STAT is available

**Phase I**
- Sign In
- If No STAT, Call PCU1 Charge
- Assist as needed
- Obtain REACH CART/Enter data (future state)

**Phase II**
- Provide Stroke/tPA education to family
- Liaise with family
- Sign out

### Code Neuro: Response: Primary RN

**Phase 0 Tasks POV:**
- Bring Stroke bag to lobby
- Assess Pt in Lobby if notified of possible Stroke
- If meets Criteria, Notify Admitting to Page Code Neuro
- Begin MEND, VS, BG, DO not place Pt in Bed
- Proceed to CT once available with Team

**Phase 0 Tasks EMS:**
- Code Neuro Team Meet Pt at EMS doors
- Begin Neuro Code Check List/Time Clock
- Proceed with direct to CT
- Ensure weight is completed

### Code Neuro: STAT/PCU 1

**Phase I Tasks**
- Sign In
- Ensure Weight In KG completed
- Place IV’s if not done prior
- Assist with CT/ Brief Neuro exam
- VS q 15 min & BG
- IF Head CT Negative-> Call TPA Alert 885-1277
- Assist Transport Back to EC OR Complete Phase II in CTA

**Phase II Tasks**
- Pharm/TPA kit arrives-> M x TPA waste/bolus/gtt
- VS, Assist with MEND/NIHSS q 15 min
- Establish Second IV if not done

**Phase III Tasks**
- Assist primary RN w/TPA admin after Verbal order to admin TPA from ED provider
- Witness TPA in EMR
- Goal tPA less than 45 min
- Assist with MEND/VS as needed
- Sign out

### Code Neuro: Provider Responsibilities

**Phase 0**
- Identify Stroke Symptoms
- “Code Neuro” activation
- Follow patient to CT on arrival (POV or EMS)

**Phase 1**
- Brief neuro eval in CT
- Remain in CT until you see images – Bleed/No Bleed
- If No Bleed & Neuro Deficit – tell “TPA Alert” to RN/STAT

**Phase 2**
- Provider determines TPA eligibility
- NIH Stroke Scale in ED
- Radiology report review
- Contact HMC at provider’s discretion for MDM

**Phase 3**
- Review risk/benefit handout
- Verbal patient/family consent if able
- Administer TPA if eligible
- Verbal TPA order to RN
- Epic TPA order
- CTA Head and Neck for LVO

### Code Neuro: Pharmacy

**Phase 0**
- Alert once Code Neuro is paged overhead

**Phase I**
- Once TPA Alert notified on Ascom phone-> Call Pharm Tech to meet in ED with TPA KIT
- Proceed to ED STAT

**Phase II**
- Sign In
- Verify Head CT (prelim)
- Verify Weight In kg
- Begin mixing TPA with STAT RN/PCU 1

**Phase III**
- (may leave once mixed and labeled)
  - Only administer once verbal order given
  - May witness in EMR
  - Sign out
  - Goal tPA less than 45 min

### Code Neuro: ED Tech

**Phase 0 Tasks: POV/EMS**
- Meet Code Neuro team outside CT
- Proceed with Pt to CT
- Ensure weight is completed
- Calc Weight if on EMS stretcher
- Write Weight on Wrist band in kg
- Wristband: LW & Time of Arrival

**Phase I Tasks**
- Sign In
- Assist with transfer to CT table
- Assist with assessment, VS, BG, lab draw
- Assist with Transfer Back to ED

**Phase II Tasks**
- Undress/Gown Patient
- Place on Monitor/q 15 min VS
- ECG
- Complete Phase I tasks
- Sign out
Biggest Gains: Code Neuro
Biggest Gains: **Code Neuro**
Biggest Gains: TEAM Concept

EMS ARRIVAL

**Code Neuro Activated Pre-Arrival**

- Code Neuro Team (MD, RN, STAT, House Supervisor, ED Tech) assembles outside CT
- Team receives report from EMS
- Proceed direct to CT with team
- Weigh patient (Kg) in CT before CT begins
Biggest Gains: POV Arrivals

POV ARRIVAL

- Admitting staff note potential Stroke – Immediately notify Charge RN
- Charge RN or Designee acquire Stroke Bag and proceed to ED lobby
- If criteria is met for Acute Stroke – notify Admitting Rep & **Activate Code Neuro** and page overhead
- Begin VS, BG and MEND exam while waiting for CT Tech in lobby – **Do not room patient**
- Team meets patient either in Triage area or CT once ready – Primary RN to provide Hx to team
- Weigh patient (Kg) in CT before CT begins
Biggest Gains: Weighing the Patient in CT
**Biggest Gains:**

**TPA Alert**

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**PHASE I (0 – 15 minutes)**

- Primary RN begins Code Neuro Checklist
- MD/Primary RN begin short history and neuro exam and quantify measurable deficits with NIHSS/MEND
- Lab draw (labs per Provider, draw Rainbow)
- House Supervisor ensures that team members have arrived
- STAT/PC1 RN ensure 2 IVs are in place
- DI push images to HMC and notify Radiologist STAT of Code Neuro
- MD completes preliminary read of Head CT (unofficial) – if no blood and LKW less than 4 hours = Proceed with PHASE II and verbally notify Primary RN and STAT/PC1 RN to page TPA Alert

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**TPA ALERT PAGED**

- STAT/PC1 RN Call 885-1277 STAT
- Proceed back to ED room OR CTA at Provider’s discretion continue with PHASE II in CT
- Pharmacy call Pharmacy Tech to meet in ED with TPA Kit

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If unofficial read suggests ICH/SAH, do not page for TPA Alert and do not do CTA. Proceed back to ED and continue Acute Stroke workup.
Biggest Gains: TPA Alert/KIT
Biggest Gains: TPA Alert/KIT
Biggest Gains: TPA Alert/KIT
Biggest Gains: Additional Roles

- House supervisor: Assists with ensuring team members arrival and beginning standard stroke and tPA/alteplase education with patient and family
- Pharmacy
- STAT RN
- ED Tech
Current State: Code Neuro (average 37 minutes q3)

Percent ALL Stroke Patients With tPA Initiated ≤45 & ≤60 Minutes of Arrival

- % Patients: Arrival to tPA ≤60 minutes (goal 75%)
- % Patients: Arrival to tPA ≤45 minutes (goal 50%)

2016 Q1 tPA moved to ED instead of 60 Min. Goal

45 Min. Goal
NCW vs the STATE and WEST Region

Median Time to Intravenous Thrombolytic Therapy 2017 - 2018 Q2

Measure Definition: Time from hospital arrival to initiation of thrombolytic therapy administration for ischemic stroke patients treated at my hospital
All Arrivals includes POV, EMS, Transfer, Mobile Stroke Unit, ND/Unknown (N: Blank = N<5)
Region includes all GWTG Hospitals
Data accessed through October 24, 2018

American Heart Association, Get With the Guidelines Acute Stroke Registry, 2017-2018
Current State: Code Neuro

**tPA Stroke Case**

(Target Stroke goal: ≤ 45 minutes)

CSN or TIA (75 YO) (NIH: 17)

Time from Symptom Onset to tPA: 1:15

ED Staff: Dr Kim & Niki Stegeman, RN

<table>
<thead>
<tr>
<th>Symptom Onset</th>
<th>Patient Arrival</th>
<th>Door To CT Complete</th>
<th>Labs Available</th>
<th>CT Reviewed</th>
<th>tPA Initiated</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:45</td>
<td>7:30</td>
<td>7:42</td>
<td>7:47</td>
<td>7:49</td>
<td>8:00</td>
</tr>
</tbody>
</table>

Elapsed time from arrival:

- Door to CT Complete: 0:12
- Labs Available: 0:17
- CT Reviewed: 0:19
- tPA Initiated: 0:30

0:45 Time from onset to presentation
Current State

• 2018 GWTG Gold Plus and Target Stroke ELITE PLUS

• Average door to tPA 37 minutes
• tPA per AIS 16% average in 2018
• No increase in complications
References

Questions?
Contact me

• teri.mcintyre@confluencehealth.org