In-Patient Stroke Alert: A Process Review

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Disclosures

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  • Nothing to disclose, no conflicts of interest

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Objectives

- Discuss prevalence of in-hospital strokes and the difference of treatment outcomes.
- Discuss barriers to acute treatment of in-hospital strokes.
- Describe methodology and strategy for re-evaluating and re-designing process using DMAIC.
- Discuss potential strategies to address root causes for delays and barriers for in-hospital stroke alerts.
Rate Your Confidence 1-10

- I feel confident the staff at my hospital knows how to spot a stroke
- I feel confident that the staff at my hospital feel comfortable with knowing what to do if they suspect a stroke…. And know what do to during the stroke alert
- I feel that my inpatient stroke alert process runs smoothly most of the time
- The quality of my inpatient stroke alerts equal the ED stroke alerts
Are Strokes Common?

- Almost 800,000 strokes a year
- **1 in 6 people** will have one in their lifetimes
- **Every 40 seconds** someone has a stroke
- Fifth leading cause of death
- It is estimated that **5-15%** of all strokes occur while the patient is in the hospital
  - High Risk Population (cardiac, surgical, and patients with a-fib)
  - These patients usually have worse outcomes
Literature: In-Hospital Strokes

• “Quality gap for in-hospital stroke with longer in-hospital delays to evaluation and treatment”
• “In-hospital stroke evaluation times remain more than twice the recommended benchmark”
• “Longer time from symptom recognition to neuroimaging and were less likely to receive thrombolysis.”
• Virtually all similar studies over the last 15 years have come to comparable conclusions as above
But Not Us... Right??

- Lots of focus for ED stroke alerts → Recently revised process to start tPA in CT with great results (times routinely less than 45 minutes)

- Inpatient Data was less optimal
  - 7 patients received tPA... with an average time of 79 mins 😞
  - Average symptom recognition to stroke alert called was 21 mins.
  - To Neuro Call back... 23 mins
  - To CT Head Start... 33 mins
  - To CT Head Results... 50 mins
Where We Were

- Not meeting our own stroke goals in the inpatient setting
- Many comments from stroke team that inpatient alerts were “messy” and “unorganized” and “nurse didn’t know what to tell me or what to do”
- Comments from direct staff “I don’t know what to do.”
Performance Improvement

• Needed to improve performance
• Clinicians have a tendency to want to jump to a solution
• Wanted to ensure we are addressing the root cause and using data to drive
• Why use a methodology? Why not just start?
  • Proven problem solving
  • Increase efficiency, reduce waste, and deter variation
• PI methodology does not have to be complicated or scary
Why We Used DMAIC?

- The steps make sense, they are easy to understand and they are logical in their sequence.
- Standardized and systematic method → Helps solve problems where the solution is not always clear.
- Increase efficiency, reduce waste, and deter variation.
- Lots of tools to help us better understand the problem.
- This acronym stands for Define, Measure, Analyze, Improve, and Control.
First Step: DEFINE

- What are you trying to solve by implementing Six Sigma?
- What criteria must you analyze and how will you turn your data into a quantifiable form?
- Who do you need to involve? How is the team to meet and conduct these meetings?
- How big is the problem?
- What is our goal? How will we know when we have reached it?
- Create a project charter
Defining Our Problem

• Inpatient stroke alerts are inconsistent, frustrating for staff, and do not meet national benchmarks/DNV standards for stroke care including symptom discovery time to alteplase bolus administration time.
• Many of our health system’s institutions (and others across the nation) not meeting targets → partner!!
Assembling our Teams

• Two hospitals assembled multidisciplinary teams
• Need to define not only the problem but the purpose of the inpatient stroke alert
• Coordinator to Coordinator partnership sharing information and findings

Sentara Norfolk General Hospital
✓ 525-Bed Teaching Facility, with heart hospital attached.
✓ PSC, Applying for CSC in 2018; ~1000 stroke patients/year

Sentara Virginia Beach General Hospital
✓ 276-Bed Community Hospital.
✓ PSC, ~700 stroke patients/year
Define the Role of the Stroke Alert

- To bring the right care and treatment to the patient as fast as possible
  - NEUROLOGY EVALUATION
  - IMMEDIATE HEAD CT
- Strokes are often “silent” and alerts create urgency to treat & save as much brain tissue as possible (*the brain is the only organ we cannot replace!*)
- Nothing should delay activation of a stroke alert and getting the patient to CT unless life threatening
Second Step: MEASURE

• How does the process currently perform→ what do you look like currently? What is the data telling you?
• Measurement is critical throughout the life of the project→ Edward Deming stated, “In God we trust, all others bring data.”
• Refine the measurement definitions and determines the current performance or the baseline of the process (ex. Is “start” time symptom recognition or stroke alert time)
Measuring the Problem

- Process observation (multiple in-patient stroke alerts observed)
- Process Map completed with key stakeholders from involved departments (inpatient nursing units, ICU, radiology, pharmacy, stroke coordinator, PCS team, ED)
- Retrospective review of stroke alert cases proceeding to TPA administration
# Our Performance

<table>
<thead>
<tr>
<th>Symptom Recognition to...</th>
<th>MRT</th>
<th>Stroke Alert</th>
<th>Neurology Involvement</th>
<th>CT Start</th>
<th>CT Result</th>
<th>tPA Start</th>
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</thead>
<tbody>
<tr>
<td>SNGH</td>
<td>3</td>
<td>27</td>
<td>25</td>
<td>41</td>
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<td>Goal</td>
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<td>&lt;25</td>
<td>&lt;45</td>
<td>&lt;60</td>
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</table>
Third Step: ANALYZE

• What is causing the problem?
• Avoid jumping to solutions before knowing the true root causes of the issues.
• Brainstorm potential root causes (not solutions), develop hypotheses as to why problems exist and then work to prove or disprove their hypotheses.
• Verification includes both process analysis and data analysis and has to be completed before implementing solutions.
Analyzing the Problem
What We Found

• Process was not well defined for everyone’s roles
• Primary nurse and other team members not sure of expectations and responsibilities
  ✓ Poor communication of symptoms, onset, last known well, anticoagulants
  ✓ Often patient had no POC glucose or was prepared for transport
• Not immediately activating the MRT or stroke alert
  ✓ MRT Team Causing Unintentional Delay: drawing blood, starting an IV, or other non-emergent interventions.
What We Found:

**Process**

1. Stroke Symptoms are recognized or suspected
2. Bedside Nurse Call MRT
3. MRT Team Arrives, evaluates patients
4. MRT nurses or MD uses BEFAST, if positive calls Stroke Alert
5. **Stroke Evaluation Begins**: Patient taken to CT, Neurology Responds

**Delays**

1. Symptoms are recognized
2. **Unnecessary delays**: Bedside nurse unsure of role, info not communicated, delay of activation of a stroke alert and getting the patient to CT, delay in neurology involvement
3. **Stroke work up starts**: Patient to CT
The “Magic” Case

• Out of the 7 tPA cases, only 1 was under 60 mins
• Had a symptom recognition to tPA bolus start time of 38 mins!
• How did it happen so fast?
  – No MRT- direct call by cardiac nurse
  – Bedside nurse was prepared for stroke team (LKW, POC glucose, symptoms, etc.)
  – tPA was started in CT
Fourth Step: IMPROVE

- How will the team mitigate the root causes of the problem?
- Finally! it’s time to develop solutions.
- Brainstorms solutions, pilots process changes, implements solutions
- Collects data to confirm there is measurable improvement.
- A structured improvement effort can lead to innovative and elegant solutions that improve the baseline measure and, ultimately, the customer experience
## Improving the Process

<table>
<thead>
<tr>
<th>Solution</th>
<th>VA Beach</th>
<th>Norfolk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outline the inpatient process in a “swim lane” inspired format versus algorithm so each role is outlined</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Utilize new “S.T.R.O.K.E.” algorithm for bedside nurses to remember their steps in stroke alert process and as report structure to Stroke Team</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Remove MRT call as a mandatory step - allow direct calls to stroke team (with specific criteria)</td>
<td></td>
<td>X</td>
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<tr>
<td>Alteplase to start in CT (mimic current ED process for this)</td>
<td>Start in July 2018</td>
<td>X</td>
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</table>
**Sentara Norfolk General Hospital: Inpatient Stroke Alert Process**

**Signs & Symptoms to Trigger a Stroke Alert**

Any **BEFAST** item occurring suddenly (within last 6 hours) or upon waking from sleep/anesthesia.

- Balance: Trouble walking, dizziness, loss of balance/coordination
- Eyes: double vision, trouble seeing in one or both eyes, vision loss
- Face: facial droop, numbness, uneven smile
- Arm/Leg: weakness, numbness, paralysis
- Speech: Slurred speech, inappropriate words, mute, not able to understand speech
- Time: Note the time of symptom onset - when was the patient last seen normal?

**Dial 12: Call a Stroke Alert**

Dial 1-2: Report the following to the operator
1. Activate a stroke alert
2. Your hospital (Sentara Norfolk General Hospital)
3. Your unit and room number
4. Patient’s name
5. Your call back number

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**Bedside Nurse**

Do a STROKE review
1. Symptoms: Know the neuro symptoms the patient is experiencing
2. Time: When was the patient last seen normal?
3. Remain: Stay with the patient
4. Obtain: Get a bedside glucose and new set of vitals
5. Know patient: Know the ID and why patient is here
6. Exchange: When neurologist calls, back exchange phone number for when Neuro/ICU team arrives

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**Patient Care Supervisor**

1. Report to stroke alert room
2. Obtain situation from nurse
3. Ensure Neuro-ICU team members respond as available
4. Communicate with CT
5. Transport patient to CT
6. Get telestroke cart from ED and bring to CT
7. Obtain and double check: Alteplase if needed (CTA for admission if no NICU RN & ED RN)
8. Plan for transfer/return of patient

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**ICU MD**

1. Report to stroke alert room
2. Obtain situation from nurse
3. Complete NIHSS and report to ICU MD or neurologist
4. Return the call to neurologist
5. Enter stroke alert orders (CTA if NIHSS > 6 or sphenoid)

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**Neuro ICU RN**

1. Report to stroke alert room
2. Obtain situation from nurse
3. Complete NIHSS and report to ICU MD or neurologist
4. Transport patient to CT
5. Assist with telestroke evaluation
6. Mix and administer: Alteplase if needed
7. Plan for transfer or return of patient
8. Follow up with patient’s attending if needed (plan w/neurologist)

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**Neurologist**

1. Respond via phone to alert
2. Speak with Neuro/ICU team
3. Enter stroke alert orders if needed (via CTA)
4. Log into telestroke cart or report to CT
5. Review CT
6. Consent patient/family for tPA if needed and order
7. Consult INR if needed
8. Enter acute stroke note
9. Follow up with patient’s attending/NICU physician or plan of care

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New Process Summary

- Each member (including primary nurse) has outlined responsibilities
- Primary nurse does a S.T.R.O.K.E. review.
- **NORFOLK ONLY** → Primary nurse or physician **may directly activate** a stroke alert when any BEFAST criteria is met within 6 hours of "normal baseline" or upon waking (from sleep or anesthesia).
- **NORFOLK ONLY** → Alteplase started in CT
Learn how to B.E. F.A.S.T. with stroke

Notify Clinical Team at the sudden onset of any of these

B E F A S T

BALANCE  EYES  FACE  ARM  SPEECH  TIME

rev. 2/2018

**Symptoms**  Know the neuro symptoms the patient is experiencing

**Time**  When was the patient last seen normal?

**Remain**  Stay with the patient

**Obtain**  Get a bedside glucose and new set of vitals

**Know patient**  Know the PMH and why patient is here

**Exchange**  When neurologist calls back exchange phone numbers for when the Acute Stroke Team arrives

SentaraStrokeEducation.com
Once symptoms are recognized, the primary nurse needs to activate a Stroke Alert and complete a S.T.R.O.K.E. review:

- **S**ymptoms: *Know what neuro symptoms the patient is experiencing*
- **T**ime: *When was the patient last seen normal?*
- **R**emain: *Stay with the patient*
- **O**btain: *Get an accucheck (glucose) and new set of vitals*
- **K**now patient: *Know the PMH and why patient is here*
- **E**xchange: *When neurologist calls back- exchange contact numbers for when Neuro-ICU team arrives*
Implementation Plan

- Our education plan ➔ in-services, train the trainer, electronic/computer course, drills
- Communication in nursing leadership meetings, manager meetings ➔ focus on why the change is important
- Stroke Coordinators worked together to create course foundation ➔ Norfolk expanded to include additional items
- Assigned to all staff initially then added to annual education plan
Norfolk... A BIG Little Change

• Removing MRT as a mandatory step... panic ensued
  – “Going to get hundreds of calls”
  – The “what ifs”
• Goal to increase calls → but what if overwhelming?
• Needed a evaluation plan for assurances for above to team
Fifth Step: CONTROL

- Ensure the process is properly managed and monitored
- Document the improved process
- Apply improvements to other areas
- **Continuously improve** the process using lean principles → what other root causes can you address? Did you learn anything with new implementations?
- Share and celebrate your success
- How do you sustain the improvement → ensure that the process maintains the gains
- May need to develop a Response Plan in case there is a dip in performance
Evaluation of Findings (5 mo.)

Training Started: October 1, 2017
- Ended October 30th
- Process “go-live” Nov. 1st.

Number of Monthly Stroke Alerts:
- Pre-Process Change:
  - 1-3 (Virginia Beach)
  - 3-7 (Norfolk)
- Post-Process Change:
  - 3-5 (Virginia Beach)
  - 9-13 (Norfolk)
Where We Are NOW

**Symptom Recognition to Stroke Alert**
- Pre-Process Change: **25 mins**
- Post-Process Change: **16 mins**
  - With MRT/MD Call First: **21 mins**
  - Direct Stroke Alert Call: **14 mins**

**Symptom Recognition to Neuro Involvement**
- Pre-Process Change: **27 mins**
- Post-Process Change: **18 mins**
  - With MRT/MD Call First: **23 mins**
  - Direct Stroke Alert Call: **12 mins**
Where We Are NOW

**Stroke Alert to CT Head Started**
- Pre-Process Change: **16 mins**
- Post-Process Change: **18 mins**
  - With MRT/MD Call First: **15 mins**
  - Direct Stroke Alert Call: **21 mins**

**Stroke Alert to CT Head Resulted**
- Pre-Process Change: **33 mins**
- Post-Process Change: **35 mins**
  - With MRT/MD Call First: **32 mins**
  - Direct Stroke Alert Call: **38 mins**

**SNGH under construction- elevator closures; extended travel time 5-15 minutes**
Where We Are NOW

**Sympt. Recognition to Alteplase Bolus**
- Pre-Process Change: 79 mins
- Post-Process Change: 65 mins
  - With MRT/MD Call First: 69 mins
  - Direct Stroke Alert Call: 61 mins

**Stroke Alert to Alteplase Bolus**
- Pre-Process Change: 64 mins
- Post-Process Change: 52 mins
  - With MRT/MD Call First: 60 mins
  - Direct Stroke Alert Call: 43 mins
Control-Evaluation of Findings

• Only 5 months of data, continue monitoring
• Improved “flow” of alert → still room for improvement
• Norfolk Findings...
  – Did NOT get “hundreds of alerts”
  – Still seeing MRTs/MD calls first? fear of calling stroke alert?
  – Notable improvement in neurology involvement times when stroke alert called first
• No change in head CT start times... Norfolk hospital under construction... route to CT prolonged
• Improvement in tPA start times (ultimate goal for patient care)
Lessons Learned

• Documentation of inpatient stroke alerts had no consistency
  – Created section in MRT flowsheet, go live in Dec 2017
  – Dot Phrase created using responses in this flowsheet
• Incorporate debriefing in stroke alerts to primary team
• Educate on stroke alerts in current stroke patients: when and when not to call
Next Steps for Project

• Continue data collection 😊
• STROKE acronym went health-system wide as a tool for nurses → badge cards created
• Inpatient Stroke Alert Training added to annual stroke education for all nursing staff
• Trying to incorporate debriefing after stroke alerts with primary team
• Appropriateness of alerts- continue to review
• VA Beach to go live with inpatient alert Alteplase admin in CT July 1... is considering removing MRT as step in future
Take-Aways for You

• Inpatient Stroke Alerts are complicated, as patients are already in hospital for another condition
• Review your process ➔ how comfortable are your staff?
• Review your DATA ➔ how long between symptoms recognized and stroke alert called? CT head start? Alteplase start?
• How can you address the above?
• Remove barriers for staff
• Back to Basics: BEFAST, STROKE
• Don’t be afraid to remove unnecessary steps “the way it’s always been done”
Questions?