

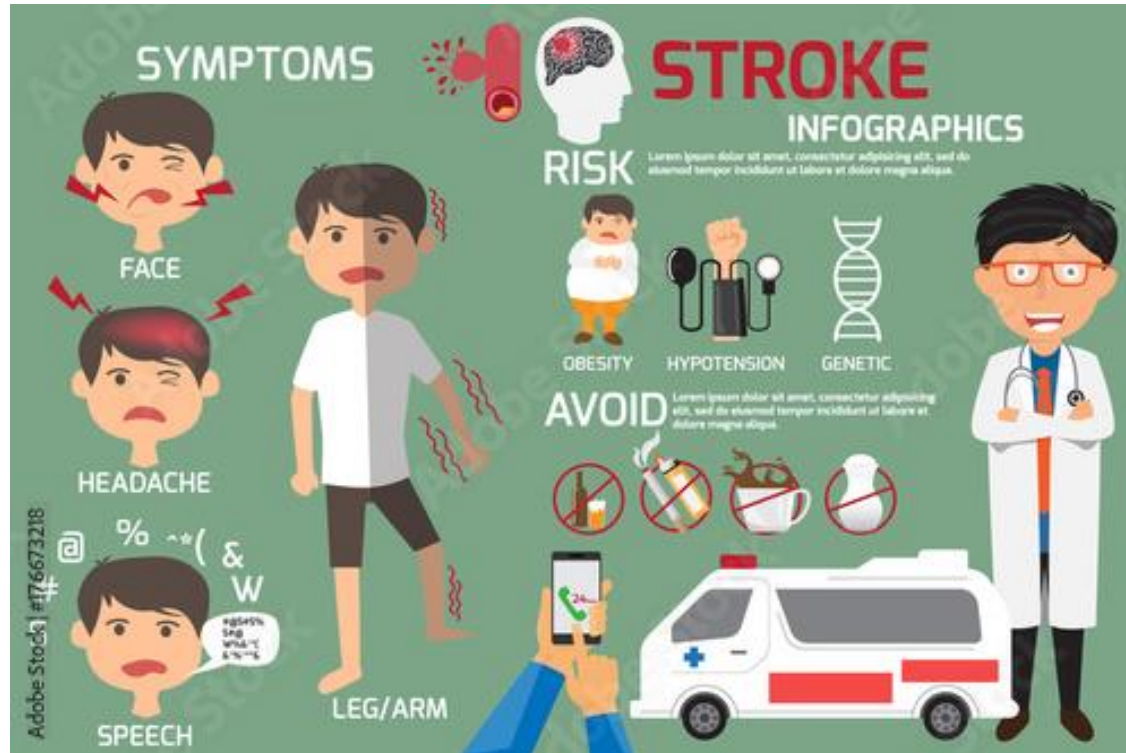
# 2023 ORH Hospital Quality Workshop

May 15-17, 2023  
Seaside Civic and Convention Center | Seaside, OR

## Improving Timeliness of Stroke Care: A Lean Six Sigma Project

Theresa Via, RN, MS, CPHQ  
Director of Quality Resources  
Samaritan North Lincoln Hospital

# DEFINE PHASE



# Project Charter Summary

Executive Sponsor	Operational Owner(s)	LSS Greenbelt Class Facilitator(s)
Denise Moland, VPPCS	Dr. Andescavage & Casi Lamp	Theresa Via NLH Quality Director

**Background:** SHS strives to reduce patient harm by providing Quality Care to all patients. AHA Get with the Guidelines provides recognition for hospitals that consistently provide timely and quality care to patients being treated for Stroke. NLH is the sole hospital in the SHS that has not received recognition for meeting their guidelines in the past 2 years.

**Problem(s) To Be Addressed and High-Level Objectives:** ***NLH is not providing stroke care that is consistent in meeting both quality and timeliness standards We too often fall outside of best practice for time to thrombolytic, time to CT and time to CT interpretation***

**Measurable SMART Goals/AIM Statement:** Decrease the time from patient arrival to administration of IV Thrombolytic therapy to < 60 minutes more than 85% of the episodes by Dec. 2022. . In order to meet this objective, we will also be working to decrease the time from patient arrival to CT and CT interpretation.

**Scope:** The scope for this lean project will focus on the care provided to stroke patients from the time patient arrival to our hospital to time of IV Thrombolytic administration. We will also be working with our local EMS to improve the timeliness and quality of care provided from EMS arrival to scene to CT initiation.

# NLH Stroke Care SIPOC

Step 4 Supplier	Step 2 Input	Step 1 Process	Step 3 Outputs	Step 5 Customers
Patient / Family EMS Registration Triage RN ED – Clerk, Tech, RN, Doctor DI Department – Tech, Radiologist TeleStroke Provider Pharmacist Management	Assessment including BG, LKW and BEFAST  Overhead page Code Stroke  Patient Registered  Doctor Assessment and Orders  EPIC - EMR  CT findings (non contrast and contrast)  Materials, medications and Equipment	<u><b>Thrombolytic administer            within 60 minutes of patient            arrival</b></u>  <b>Suspected Stroke patient            identified by EMS / Triage</b>  <b>RN BEFAST assessment/ Doc            assessment</b>  <b>Patient transport to DI for CT</b>  <b>Call to TeleStroke provider</b>  <b>CT results shared with            providers</b>  <b>Thrombolytic Administered</b>	Patient Treated - Thrombotic Stoke diagnosed or ruled out & Patient treated with Thrombolytic  Patient Experience  Outcome Improvement  EPIC updated  CT findings (non contrast and contrast)	Patient / Family – earlier initiation of treatment  Hospital Management – Expedition of patient flow

# Stakeholder Analysis

Stakeholder	Stakeholder Info.	Stakeholder's Project Interest	Stakeholder's Strengths and Weaknesses	Strategies to Obtain Support or Reduce Obstacles
ED Physicians	Communicate at ED Committee Meeting and by e-mail. 5 primary physicians staff the ED. COVID fatigue. ED director is a project participant, buy in towards project improving but not total.	Project will improve patient care and outcomes. Project is moving their cheese. Influence critical. Able to provide knowledge on process details and suggestions for process changes.	Usually very busy. Timely communication can be difficult. Project will not be successful without physician buy in.	Keep project progress visible. Share data and keep goal transparent. Interest in obtaining recognition for work well done. Be sure to ask advice and permission before making critical changes
ED RNs	Communicate by e-mail and in department meetings. COVID fatigue. ED RN manager is a project participant and supportive for changes	Project will improve patient care and outcomes. Project is moving their cheese - ie changing current processes.. Influence High. Able to provide knowledge on process details and suggestions for process changes	Usually very busy. Timely communication can be difficult. Project will not be successful without nursing buy in	Difficult to get clinical staff to participate in PI project. Feedback on project provided by managers. Interest in obtaining recognition for work well done.

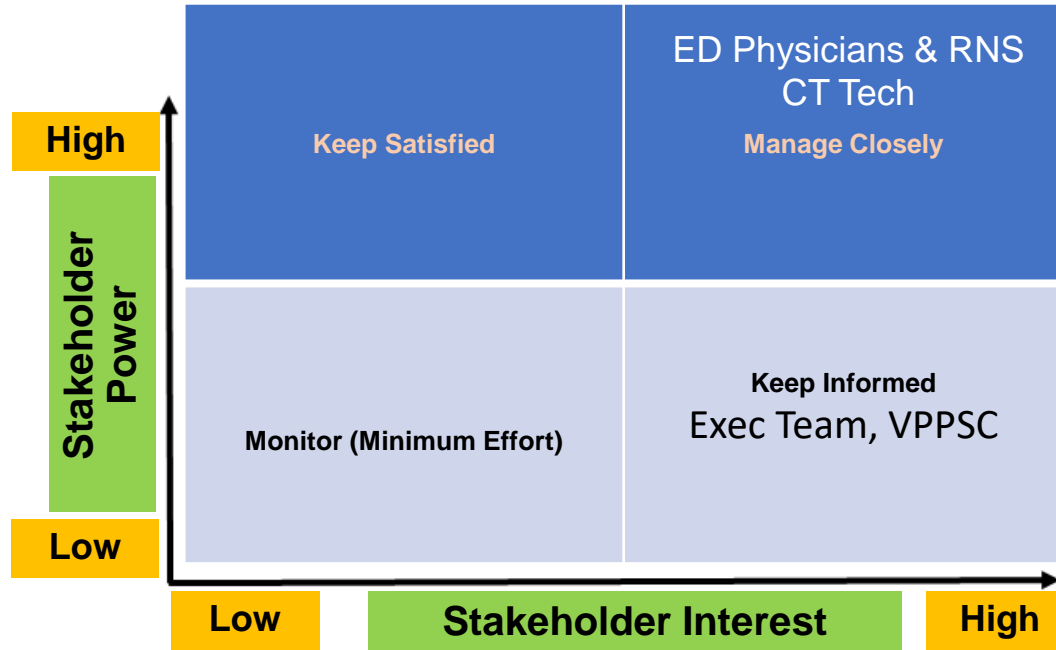


# Stakeholder Analysis

Stakeholder	Stakeholder Info.	Stakeholder's Project Interest	Stakeholder's Strengths and Weaknesses	Strategies to Obtain Support or Reduce Obstacles
CT Tech	Communicate by e-mail and in department meetings. Both CT tech and managers are project participants and supportive for changes	Have been working on this project for over a year within their departments. Few Staff members but all have buy-in and + attitude for this project. Influence High	Small department. Existing by-in to project	Keep project progress visible, Share data and keep goal transparent. Give Recognition when indicated.
VP Patient Care	Project Leader. Communicate by e mail, messenger and in Exec team meeting. Participant in project and very supportive for change	Influence Critical and able to provide best practice reference. + attitude toward project	Can help to overcome barriers and provide budget when needed	Keep project progress visible. Supportive of Celebrating Successes
NLH Executive Team	Supportive of project. Requests monthly updates on project from QI director. Very interesting in obtaining Stoke recognition from AHA and DNV	Influence High + attitude toward project	Can help to overcome barriers and provide budget when needed	Keep project progress visible. Supportive of celebrating successes



# Stakeholder Analysis Plot



Those things that **if you provided** them, would **Wow** the customer.

- Acute Stroke Ready Certification
- AHA Gold Plus or Silver Plus Award for Stroke

Those things that you **currently** provide customers, that **Wow** them. They love this feature

- Direct line to CT from EMS entryways
- Providence TeleStroke Neurologist Consults

Those **basic** things that you are **not currently doing** well.

- Time to IV Thrombolytic Therapy (60 Min)
  - Time to Head CT/MRI Results (45min)
- Prompt assessment & recognition and initiation of Code Stroke Protocol
  - Code Stroke called by EMS in field
- Overhead pages for Codes not heard in all workspaces and offices
  - Transport Directly to CT (esp. patient arrive private car)

Those **basic** things that you are **currently** doing **well**.

- Stroke Education, Rehabilitation Considered, LDL Documented, NIHSS Reported, IV Thrombolytic arrive by 3.5 hr, treat by 4.5 hr., Early Antithrombotic, VTE Prophylaxis, Anticoag for Afib/Aflutter, Smoking Cessation, Intensive Statin Therapy

KANO Analysis

# Communications Plan

Stakeholder	Message	Purpose	Owner	Media	Frequency	Status
Who?	What?	Why?	Who is responsible?	How will they do it?	How often?	How is it going?
ED Providers	New Processes. Outcomes Data	Education & Lean Team Progress update	Theresa Via & Casi Lamp	ED Committee Meetings Face to Face / Teams	Monthly	Introduced purpose of team. Discussed expected process changes. Shared Data
Executive Team	New Processes Outcomes Data. Barriers	Lean Team Progress update & Assistance to remove barriers	Theresa Via	Executive Team meetings Face to Face / Teams	Monthly	Introduced purpose of team. Shared Data and barriers to change
SNLH Board	New Processes Outcomes Data	Lean Team Progress update	Theresa Via or Denise Moland	Board Meetings Face to Face / Teams	Every Other Month	First meeting April

# SNLH Stroke Team Aim Statement

To decrease the Door to IV Thrombolytic time for NLH ED Stroke Patients to < 60 minutes to meet Get with the Guideline Targets by Dec. 2022.



Attaining this goal will help improve health outcomes for our stroke patients and help NLH obtain recognition for excellent Stroke care. We can accomplish this objective this year with your participation and support.



# MEASURE



## Balance

Trouble walking, stumbling, falling, feeling dizzy or spinning sensation.

## Eyes

Vision loss, blurry vision, double vision.

## Face

One side of the face is weak or numb, the face appears uneven, drooping.

## Arm

Weakness or numbness in arm (or leg), especially if it is only on one side of the body.

## Speech

Slurred speech, trouble getting words out, speaking gibberish.

## Time

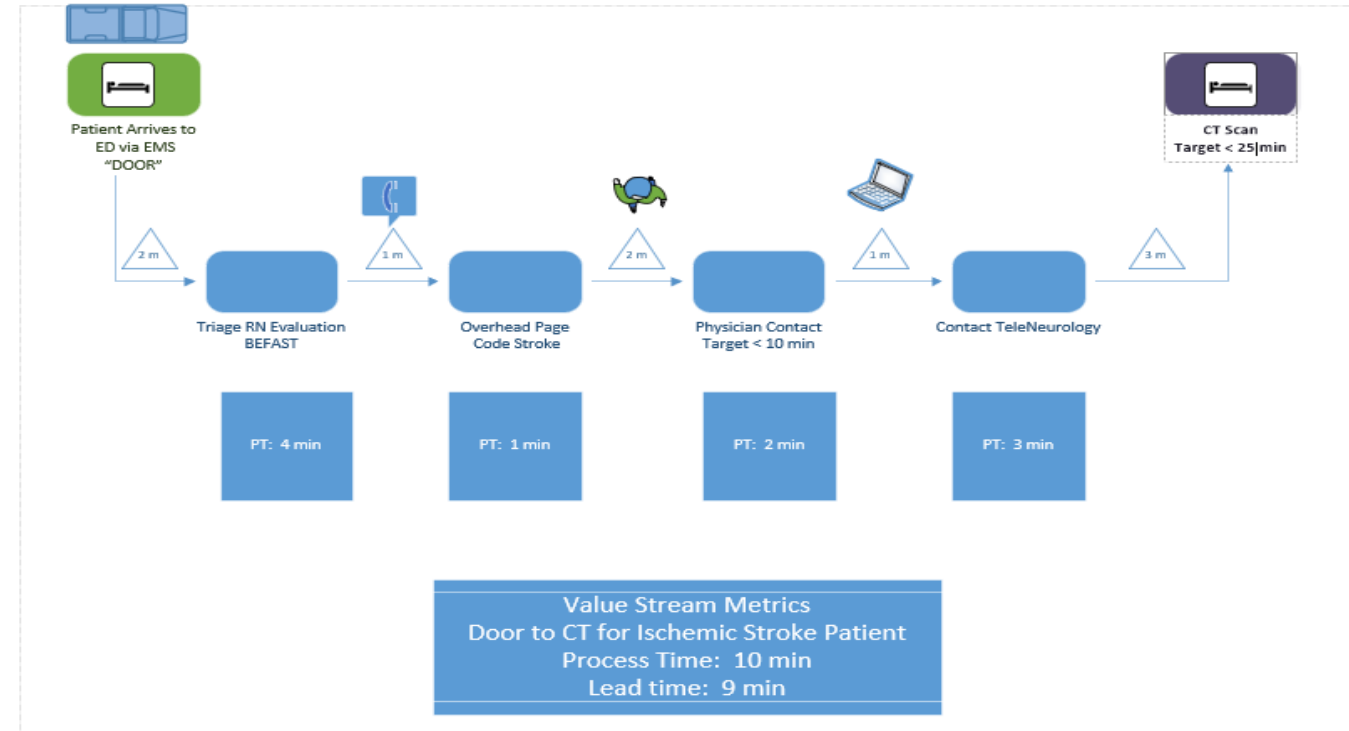
If the person shows any of these symptoms, time is important. Call 9-1-1. Hospital staff, call Code Help.



# Measurement Plan – Stroke Care

What data will be collected? (Tree Diagram)	Operational Definition	Where will the data be collected?	When will the data be collected?	Sample Size	How will data be collected?	Who will collect the data?
Time to intravenous thrombolytic therapy	Minutes from patient arrival to ED to start of IV Thrombolytic therapy	Data is collected within EMR and then abstracted	Data entered real time and abstracted within 2 weeks	All patients presenting to ED with + Thrombolytic Stroke. (exclusions apply)	Manually abstracted from EMR. Data is then entered into stroke registry tool	Quality Analyst
Time to CT Scan start	Minutes from patient arrival to ED to start of CT scan	Data is collected within EMR and then abstracted	Data entered real time and abstracted within 2 weeks	All patients presenting to ED with stroke symptoms	Manually abstracted from EMR. Data is then entered into stroke registry tool	Quality Analyst
Time to provider notification of CT Scan results	Minutes from patient arrival to ED to the provider being notified of CT scan results	Data is collected within the EMR and then abstracted	Data entered real time and abstracted within 2 weeks	All patients presenting to ED with stroke symptoms	Manually abstracted from EMR. Data is then entered into stroke registry tool	Quality Analyst

# Door to CT Value Stream Map



# ANALYZE



**Global Aim:**  
Become a HRO.

## Stroke Key Driver Diagram

**Change Ideas**

### Key Drivers

**SMART Aim:**  
Thrombolytic  
administer within 60  
minutes of Patient  
Arrival

Follow approved  
Interdisciplinary  
Process

Early identification  
of eligible patients

Early overhead  
page of Code  
Stroke

Early TeleStroke  
consultation -  
Neurologist

Early initiation of  
CT

Multidisciplinary involvement in  
development of process

Education

Visibility/Feedback of performance  
indicators

Education, BEFAST Assessment

Prioritized ED Doctor Evaluation, Direct to  
CT (do not bed in ED)

Education

Empower RN to page Code Stroke based on  
+ BEFAST

Education

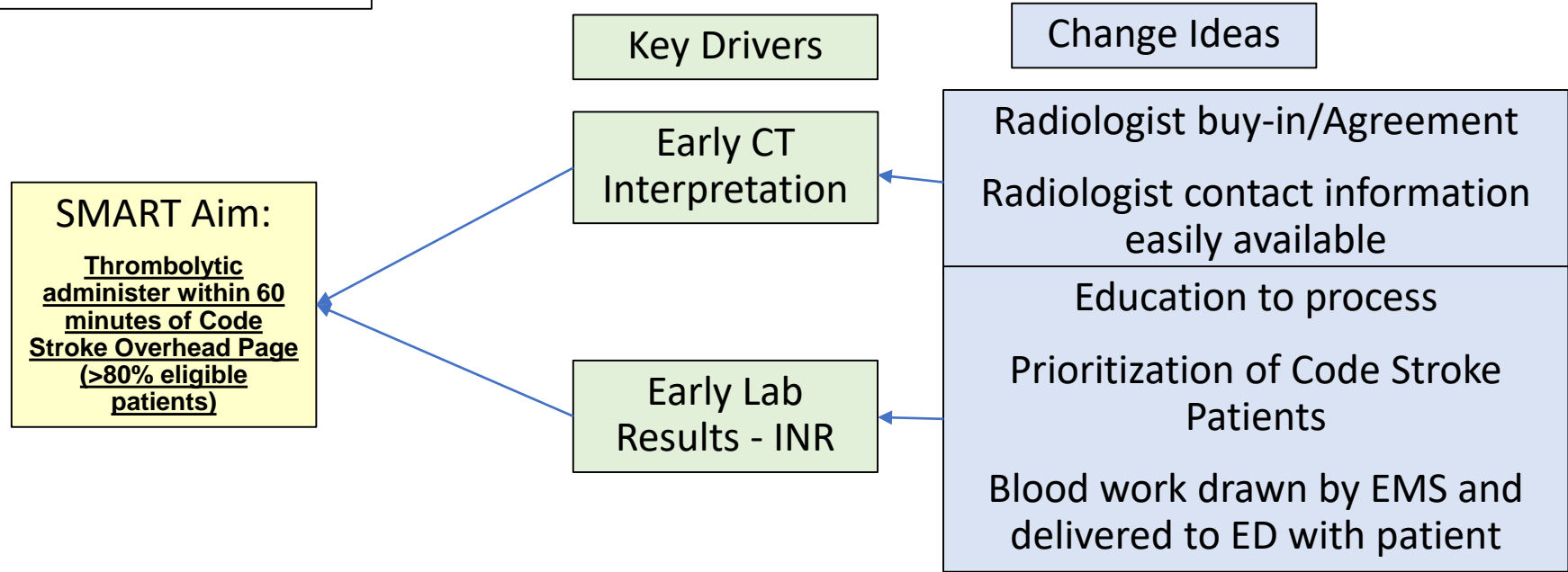
Gather Necessary Information

Prioritization of 'Code Stoke' Patients

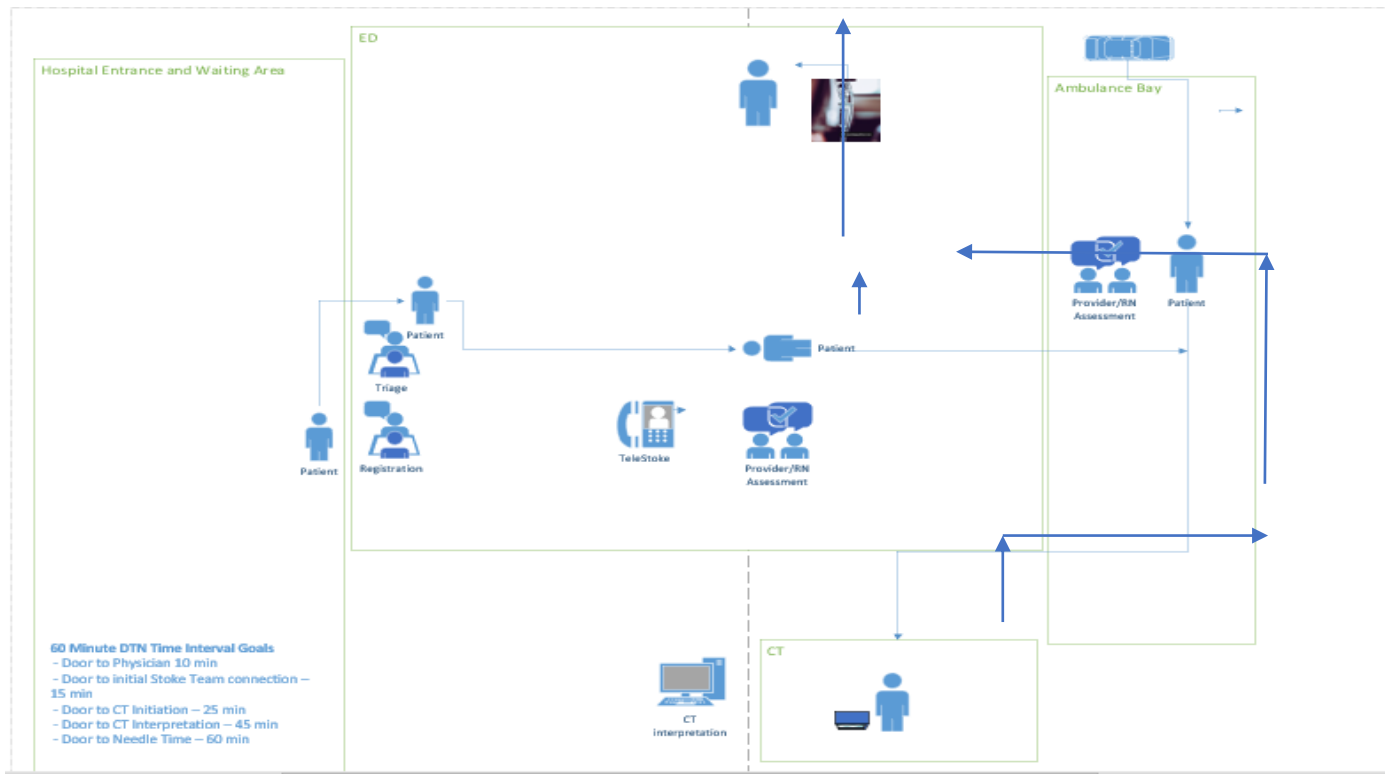
Direct Transfer to CT

Global Aim: Become a  
HRO.

## Stroke Key Driver Diagram



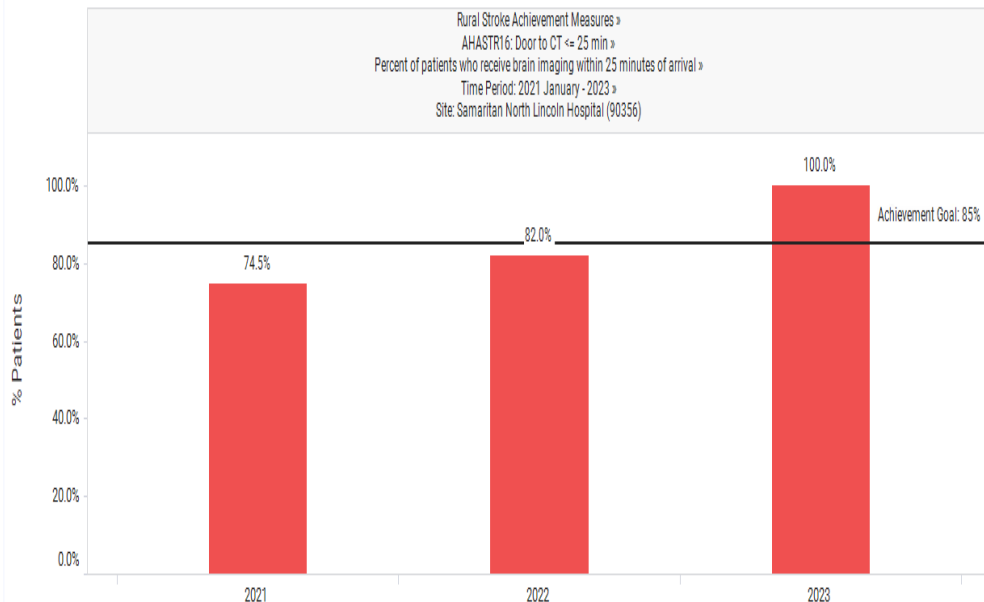
# Target State – Flow Diagram



# Analyze

<i>Door to Brain Image Initiated Time (min)</i>		
	2022	2021
Mean	16.55462185	28.58108108
Standard Error	2.631628032	2.834579723
Median	8	19
Mode	7	10
Standard Deviation	28.70767259	34.48415066
Sample Variance	824.1304657	1189.156646
Kurtosis	54.42067518	18.81523428
Skewness	6.588423216	3.754109971
Range	271	270
Minimum	1	2
Maximum	272	272
Sum	1970	4230
Count	119	101

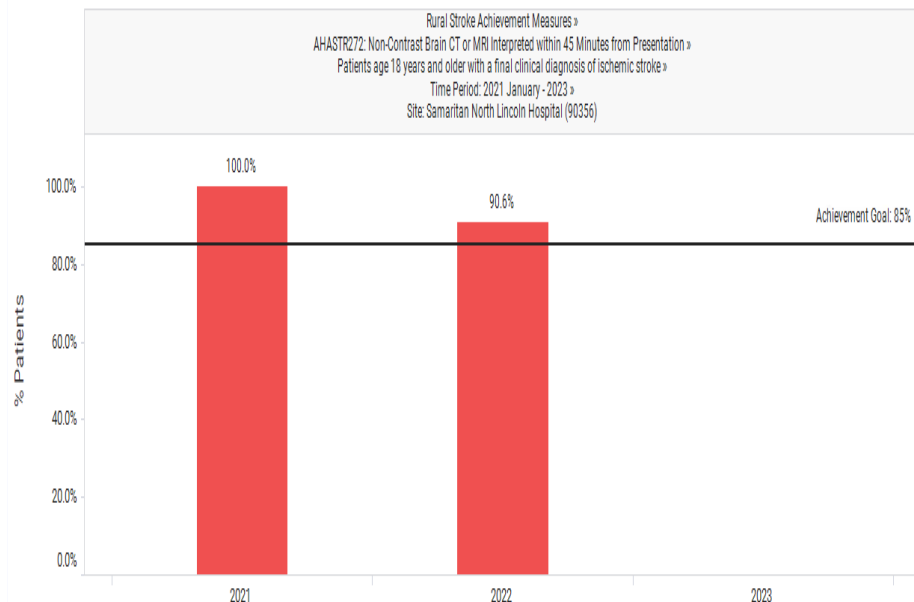
Measure Summary



# Analyze

Door to Brain Image Interpreted Time (Min)		
	2022	2021
Mean	29.59663866	30.98019802
Standard Error	2.807104324	2.811397602
Median	21	26
Mode	21	21
Standard Deviation	30.62189295	28.25419622
Sample Variance	937.7003276	798.299604
Kurtosis	40.88546227	65.34925624
Skewness	5.457478853	7.360316832
Range	279	276
Minimum	5	8
Maximum	284	284
Sum	3522	3129
Count	119	101

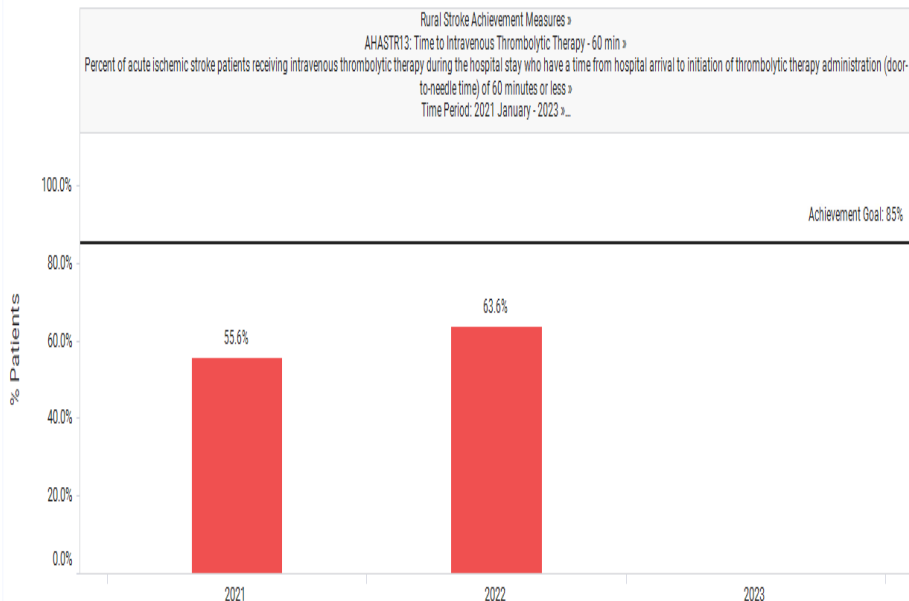
Measure Summary



# Analyze

<i>Door to Thrombolytic</i>		
	2022	2021
Mean	58.53846154	72.11764706
Standard Error	6.029431432	6.034753731
Median	50	62
Mode	41	52
Standard Deviation	21.73942419	24.88192706
Sample Variance	472.6025641	619.1102941
Kurtosis	0.678927003	-0.240828857
Skewness	1.237304813	0.952667782
Range	68	82
Minimum	34	45
Maximum	102	127
Sum	761	1226
Count	13	17

## Measure Summary





# Cranium Conserver Award

FOR EXCELLENCE IN STROKE CARE

*STEVEN ANDESCAVAGE, HEIDI LEE, SERENA MOCK, SYDNEY PAHRE, DANE JENSON, ERIN YECK, JENINE KRAMER, LORI MEYER, ILEANA MOORE*

- DOOR TO PROVIDER: **2 MINUTES**
- DOOR TO CT: **2 MINUTES**
- DOOR TO INTERPRET: **16 MINUTES**
- DOOR TO TNKASE: **47 MINUTES**

ON 5/1/2022

PREARRIVAL STROKE ALERT BY EMS, INITIAL NIH STROKE SCALE 8, PATIENT RECEIVED TNKASE, TRANSFERRED VIA AMBULANCE. DISCHARGED AFTER 3 DAYS TO HOME, PATIENT HAD SOME CONT. ARM WEAKNESS AND WAS SCHEDULED FOR OP THERAPY



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Health  
Services

## Process/Product Failure Modes and Effects Analysis Form (FMEA)

Process or Product Name:	Timely Stroke Diagnosis and Treatment	Prepared by: QI Strategies Team	Page 1
Responsible:	Stroke Lean Team	FMEA Date 6/15/22, Reviewed and update action plan progress 10/19/2022, updated 12/21/2022 please see note at bottom of template	

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**Process/Product  
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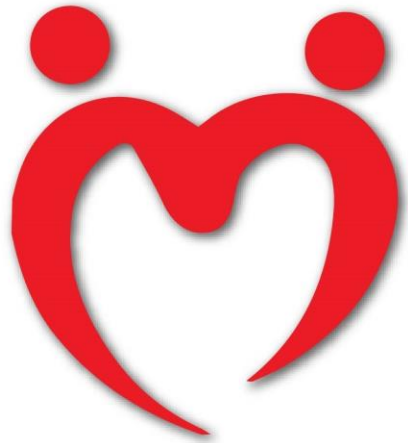
Process Step / Input	Potential Failure Mode	Potential Failure Effects	SEVERITY	Potential Causes	OCCURRENCE	Current Controls	DETECTION	RPN	Actions Recommended	Resp.	Actions Taken	SEVERITY	OCCURRENCE	DETECTION	RPN
What is the process step and input under investigation?	In what ways does the Key Input go wrong?	What is the impact on the Key Output Variables (Customer Requirements)?		What causes the Key Input to go wrong?		What are the existing controls and procedures (inspection and test) that prevent either the cause or the Failure Mode?			What are the actions for reducing the occurrence of the cause, or improving detection?	Responsible Person or Organization	What are the completed actions taken with the recalculated RPN?				
Code Stroke Paged Overhead	1) Overhead page not announced or not heard	1) Not full response such as CT table not available 2) Lack of notification of proper personnel	8	1) Registration notification of stroke not done 2) Dead zones for overhead pages	4	1) ER staff communicate with Registration staff or ED staff makes the page themselves 2) Phone anyone that does not show up 3) More phones have been linked Avaya phones linked to the paging system 4) DI staff walks over when announced, so are there to transport the patient quickly	1	32	1) Continue to monitor the overhead pages to make sure the communication is highly reliable between ED and DI with refinement as needed.	Sanders and Lamp ongoing	10/19/2022 update - overhead paging taskforce has met regularly, policy has been rewritten re: Codes, extensive investigation using Code 33 button instead of phone, still use *88 for Code Stroke and RRT. Education done with registration personnel in how to announce and speak louder, and utilize Avaya system	8	1	1	8
ED Provider evaluation	1) Provider not immediately available 2) Provider does not drop in the stroke protocol in a timely fashion	1) Delay in care 2) Nurses may hesitate to move ahead with stroke protocol	9	1) ED volume or more critical patients and only one ED provider at times	2	1) The providers have back up person to call, but there may be a delay to arrive 2) Charge Nurse is designated now to start the stroke protocol when the provider is not immediately available.	2	36	1) Triage Nurse paging Code Stroke to help commence protocol quickly with ongoing monitoring of timeliness data	Andersson and Lamp ongoing	10/19/2022 update - Increased # of Code Strokes now being called, Charge Nurse is initiating the protocols and is actually calling it when the provider is at the bedside	3	1	1	3
TeleStroke Neurologist contacted	1) Technology issues 2) Availability or timely? 3) May delay to call until CTA available	1) Provider hesitant to give TPA until speak to neurologist which can lead to treatment delays.	9	1) Providers want to be prepared with CTA scan results for their presentation?	5	1) Provider judgment	3	135	Either call Neurologist quicker or develop provider comfort in administering TPA without neurology consult. Develop a clearer process with clearer expectations and of timeliness and whether first contact should include the CTA especially if CTA is delayed. Develop clear expectations of timeliness with TeleStroke contract/agency.	Andersson and Riffle	10/19/2022 update - No need to wait for CTA prior to calling TeleStroke, and can decide to give TPA without TeleStroke consult but hesitant to do so still - one process outlier being address by Stroke Team Committee 12/21/22 update - CT Tech now calling TeleStroke and this has helped.	3	1	1	3
Patient taken directly for CT	1) Patient decompensates rapidly, is unstable, or deteriorates in CT 2) Glucose not checked prior to CT, so unnecessary radiation exposure	1) May need RRT or Code in CT scan 2) Unnecessary radiation exposure	8	1) Time pressure 2) Forgetting or time pressure so cut a corner	3	1) Education on protocol 2) Inherent variation due to patient stability or instability	2	48	Observe for now and if identify specific issues will address it	Adersson and Lamp	10/19/2022 update - Still going well				0

**Process/Product  
Failure Modes and Effects Analysis Form  
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Process Step / Input	Potential Failure Mode	Potential Failure Effects	SEVERITY	Potential Causes	OCURRENCE	Current Controls	DETECTION	RPN	Actions Recommended	Resp.	Actions Taken	SEVERITY	OCURRENCE	DETECTION	RPN
What is the process step and Input under investigation?	In what ways does the Key Input go wrong?	What is the impact on the Key Output Variables (Customer Requirements)?		What causes the Key Input to go wrong?		What are the existing controls and procedures (inspection and test) that prevent either the cause or the Failure Mode?			What are the actions for reducing the occurrence of the cause, or improving detection?	Responsible Person or Organization	What are the completed actions taken with the recalculated RPN?				
noncontrast CT and CTA read by Radiologist	1) Delay in reading 2) Misread or underread	1) Delay in stroke protocol 2) Inappropriate treatment or lack of treatment	3	1) Radiologist technical skill 2) CT Tech staff did not send it to the radiologist or there was a technology delay	4	On-call radiologist at GSR is a backup if STATRad is delayed.	2	72	We are looking at an alternative company instead of STATRad with pilot at Albany General Hospital, Encouraging ED providers to open the images and review them personally.	System approach	10/19/2022 update - Alternative company (internal) in Albany will not be up and running until Jan 2023 as there are turnover issues among the radiologists 12/21/22 update - The internal radiologists are now available until midnight and that has helped substantially.	3	1	1	3
Real time management of timeliness								0	Create realtime management of timeliness to help maintain situational awareness and deliver the 60 minute TNKase administration time. Appoint a single person as the time keeper such as the Charge Nurse to maintain situational awareness of time passing. Establish several intermediate milestone time targets within the first hour. Have the Charge Nurse announce the times and announce whether ontime with praise or announce falling behind and try to troubleshoot and catch up if delays have occurred. Add to the patient tracking board in red or green whether the patient protocol is being carried out on time or is falling behind. If any milestone is missed track the reason it was missed in the moment by the Charge Nurse in a form created for this purpose and have Case Lamp review this to do continuous process improvement day by day and have the Stroke work group review this also.. Also, introduce a Code Stroke debrief if that is not already in place.		10/19/2022 update - Time clock added in ED, but not part of the process yet				0

**IMPROVE**



**Stroke Survivors  
CAN!**



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Health  
Services

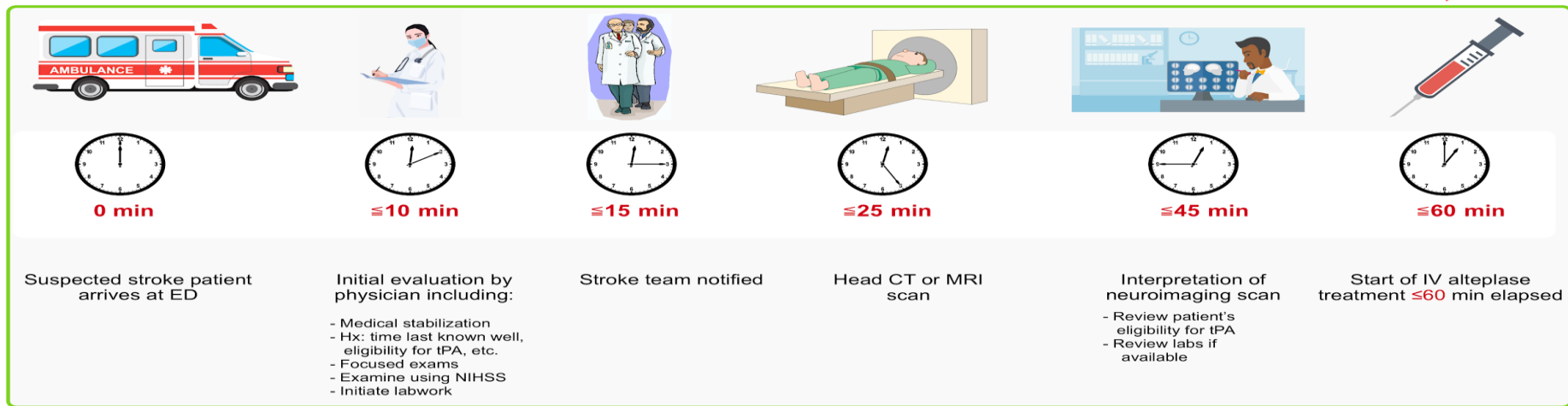
# Change Management Plan

**Vision:** Decrease the time from patient arrival to administration of IV Thrombolytic therapy to < 60 minutes more than 85% of the episodes by October 2022

Change Management Strategy	Stakeholders	Anticipated Level of Resistance <i>(e.g., H, M, L)</i>	Comments
Education, BEFAST Assessment	Stroke Coordinators RNs	Low	Completed
Empower Triage RN to page Code Stroke based on + BEFAST	Stoke Coordinators RNs, Physicians	Moderate	RN want MD input prior to taking patient to CT. RN want MD to place CT order
Prioritized ED Doctor Evaluations	RNs, Physicians	Low	What if it is BUSY?
Patients to be taken directly to CT – not bedded in ED (No IV, EKG, Lab, etc)	RNs	Low	RN want MD input prior to taking to CT.
Empower to call Code Stroke from Field and Draw Blood Work.	EMS, Lab	Low	Concern for mislabeling of specimens

# CONTROL

Door-to-needle time of  $\leq 60$  min



**Figure 6.** in-hospital timeline as a goal for all patients with acute ischemic stroke who are eligible for treatment with intravenous alteplase. Adapted from AHA/ASA, 2019 Update to the 2018 Guidelines for the Early Management of Acute Ischemic Stroke.

# Control

- *Continue Monthly Meeting to review metrics and provide 1:1 feedback as needed*
- *Spreading work to look at Rural Stroke Achievement Measures*
- *Lessons Learned –*
  - *Important to keep team motivated and keep the eye of the target*
  - *Follow the Steps of the Lean Six Sigma Process - DMAIC*
  - *Key Stakeholder involvement*
  - *Celebrate Successes*



# Open Issues, Recommendations, and Next Steps

## Decisions Needed/Open Issues:

Decision Needed or Issue/Barrier	Action Needed	Assigned	Target Date
Refocus on Rural Stroke Achievement Measures	Review of 2022 Rural Measures and select 2023 project focus	Team	March 2023
Dysphagia Screening	Education, Monitoring and prompt feedback	Team	Dec 2023
Documentation of NIH Stroke Scale and LKW	Education, Monitoring and prompt feedback	Team	Dec 2023
EMS Prenotification Documentation	Education, Monitoring and prompt feedback	Team	Dec 2023
Cont. review of timeliness metrics		Team	Ongoing
Apply for DNV Stroke Ready Certification		Team	2024

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## Thank you!

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[tvia@samhealth.org](mailto:tvia@samhealth.org)