

# Stroke Care at NHRMC



Leading Our Community to Outstanding Health



Tom Curley, MSN, RN, NE-BC – Stroke Center Manager  
Kristy Reese, MSN, RN – Stroke Coordinator



# Presentation Overview

- Mission and Demographics
- Program Structure
- Code Processes
- Data and Process Improvement
- Education and Outreach

# Hospital Demographics

## New Hanover Regional Medical Center (NHRMC)

- DNV-GL Comprehensive Stroke Center
- Service area includes 7-counties in SE NC
- 769 Licensed Beds
- ED Visits (annually)
  - 91,000 Main
  - 35,000 ED North
  - 17,000 OH

# Mission

## ***Hospital Mission:***

Leading our Community to Outstanding Health

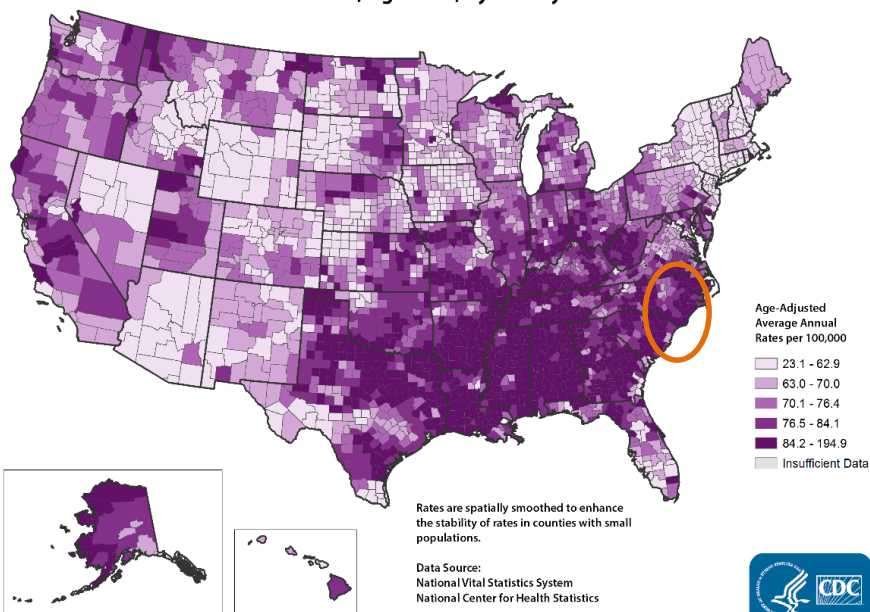
## ***Stroke Center Mission:***

The mission of the NHRMC Stroke Center  
is to provide timely comprehensive  
care for cerebrovascular patients to assure  
optimal outcomes and quality of life

# Stroke & Eastern North Carolina

NHRMC is located in the buckle of the “Stroke Belt”, seeing the highest stroke incidence and mortality rates in the country.

Stroke Death Rates, 2014 - 2016  
Adults, Ages 35+, by County

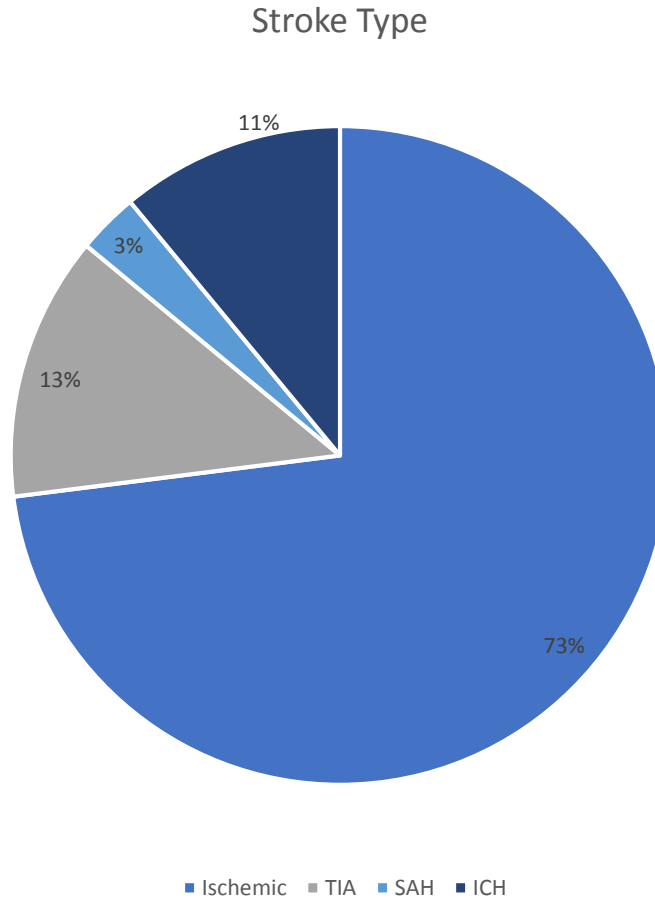


Leading Cause of Death  
New Hanover County 2017

Rank	Cause	Number	%
1	Cancer	444	23
2	Diseases of heart	365	18.9
3	Cerebrovascular diseases	134	7
4	All other unintentional injuries	117	6.1
5	Chronic lower respiratory diseases	63	3.3
6	Alzheimer's disease	55	2.9
7	Nephritis, nephrotic syndrome and nephrosis	46	2.4
8	Intentional self-harm (suicide)	43	2.2
9	Diabetes mellitus	39	2
10	Septicemia	30	1.6
All other causes (Residual)		592	30.6
Total Deaths -- All Causes		1928	100

Source: State Center for Health Statistics, North Carolina  
<https://schs.dph.ncdhs.gov/interactive/query/lcd/getleadcauses.cfm>

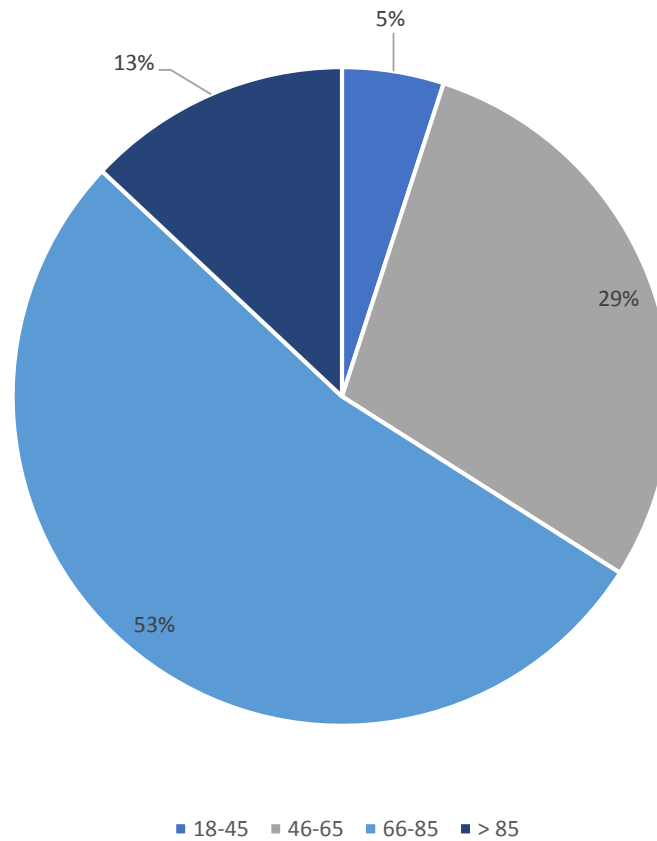
# Demographics



GWTG 1/1/18 – 7/31/19

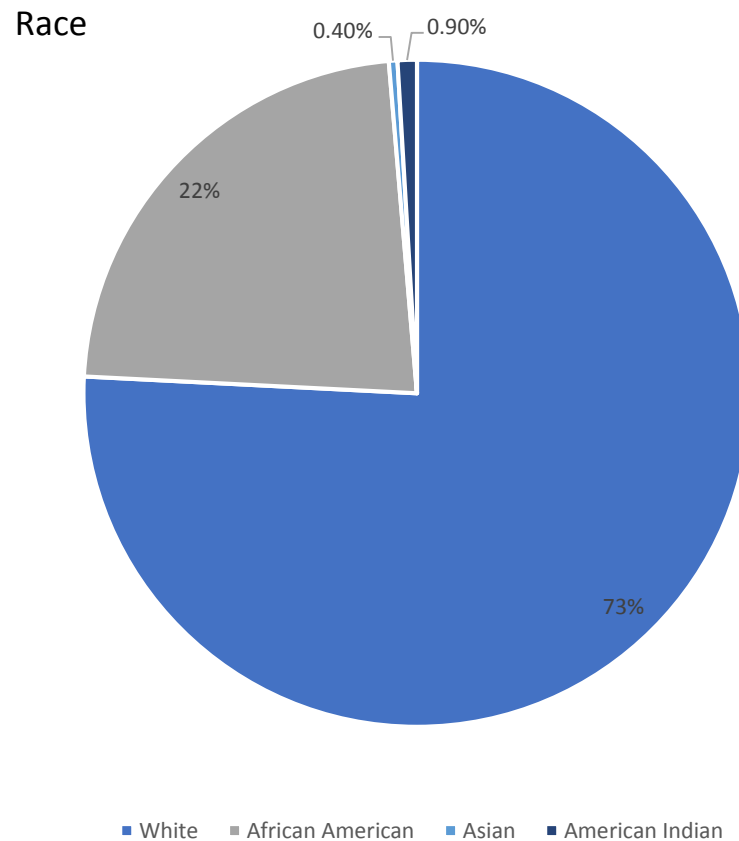
# Demographics

Age



GWTG 1/1/18 – 7/31/19

# Demographics

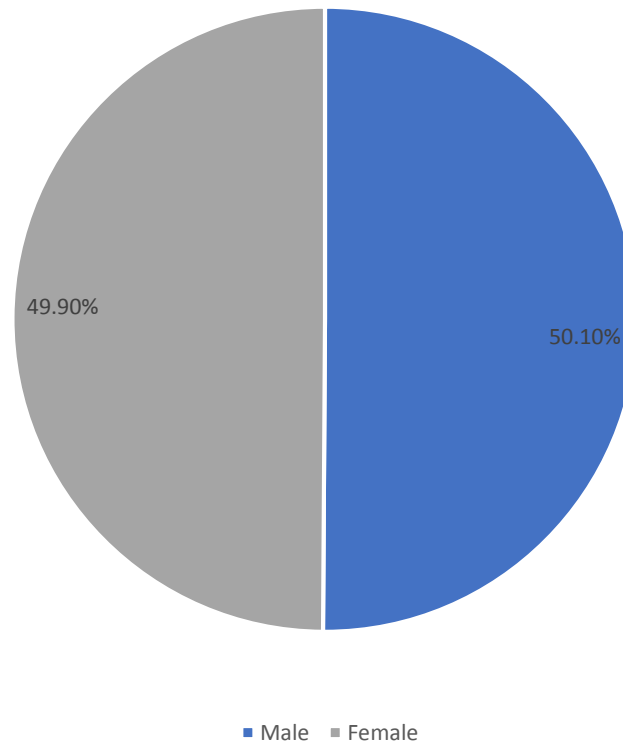


GWTG 1/1/18 – 7/31/19



# Demographics

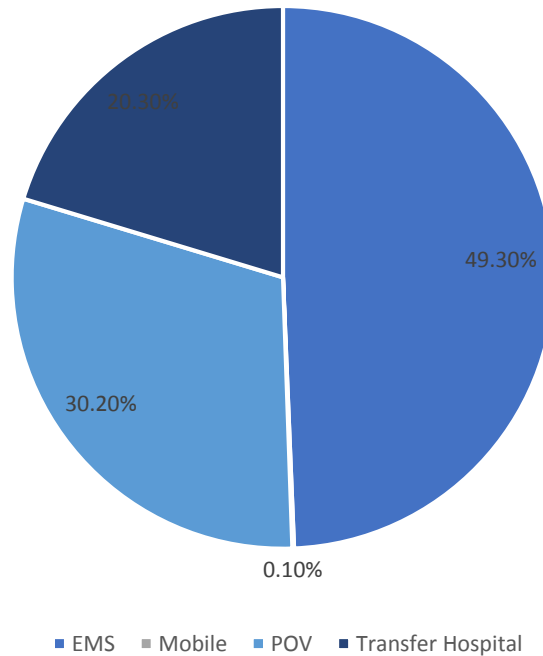
Gender



GWTG 1/1/18 – 7/31/19

# Demographics

Arrival  
Mode



91,000 Annual Visits to NHRMC ED

GWTG 1/1/18 – 7/31/19

# Stroke Volumes

2017 – 881 patients

2018 – 1,075 patients

2019 – 626 patients as of 7/31/19

\*Calendar Year

# Stroke Center Structure

## DEPARTMENT OF NEUROSCIENCES JANUARY 2019

**act F.A.S.T.**

*Do this simple test  
to check for a stroke.*

**F**ace - ask the person to smile, does one side of the face droop?

**A**rms - ask the person to raise their arms, does one arm drift downward?

**S**peech - ask the person to repeat a simple sentence, is the speech slurred?

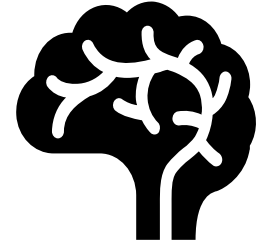
**T**ime - if the person shows any of these signs, time is important.

# Stroke Core Leadership Team

- Medical Director: James McKinney, MD
- Stroke Center Manager: Tom Curley
- Stroke Coordinator: Kristy Reese
- Post Acute Care Coordinator: Erika Yourkiewicz
- Emergency Department Managers: Casey Powell, Amie Ellis
- Interventional Radiology Manager: Anne Crecco
- STNICU Manager: Neta Greenlief
- Stroke Unit Manager: Christine Webb
- PI Coordinator: TBD
- Educators: Blaise Bolan, Casey Stone, Angie Frey

*The team is responsible for providing leadership to ensure Stroke Center clinical and operational standards are met.*

# Neurologists



- Neurologists are in house
  - Dayshift - 7 days per week
- Advanced Care Practitioners
  - Dayshift and night shift
- Tele-Neurology
  - Night shift – On Sundays
  - 24/7 for ED North and Ortho ED

# Emergency Medical Services

- New Hanover Regional EMS (Hospital-based system)
  - 911 Emergency Response
  - NC Office of EMS approved Stroke Protocols
- AirLink/VitaLink
  - NHRMC Critical Care Air & Ground Transport
- Regional EMS Agencies
  - County based systems



# Clinical Practice Guidelines

- American Heart/American Stroke Association: *Guidelines for the Early Management of Patients with Acute Ischemic Stroke (2018)*
- Brain Attack Coalition: *Revised and Updated Recommendations for the Establishment of Primary Stroke Centers*
- American Heart/American Stroke Association: *Guidelines for the Management of Spontaneous Intracerebral Hemorrhage*
- American Heart/American Stroke Association: *Guidelines for the Prevention of Stroke in Patients with Stroke and TIA*
- American Heart Association/American Stroke Association: *Guidelines for the Management of Aneurysmal Subarachnoid Hemorrhage*

 > Stroke Center

## DEPARTMENT DIRECTORY

### Stroke Center

[Activation Criteria](#)

[Process Maps](#)

[Stroke Center Charter](#)

[Stroke Guidelines](#)

[Stroke Order Sets](#)

[Stroke Related Articles](#)

[Stroke Standard Work](#)

[Education Opportunities & Resources](#)



# Standard Work & Process Maps

## Standard Work Activity Instruction Sheet

**Activity: In-House Code Stroke Response**

Purpose: Treat acute stroke patients admitted to NHRMC

Process Owner: Stroke Team Activity      Starts: Pt with stroke symptoms      Performed by: RRT & Stroke Team      Date: 9/10/15 updated 5/03/18

Activity Ends: After Code ELVO or transfer to STNICU or Stroke Unit      Time Needed:

Step	Major Steps (What, When) High Level Steps	Key Points (How, who) Detailed Steps	Reasons for Key
1	Change in patient status with neuro symptoms	<p>Primary RN:</p> <ol style="list-style-type: none"> <li>Identifies change in patient with stroke like symptoms. Utilize FAST (Face, Arm, Speech, Time).</li> <li>Calls Rapid Response if Primary RN is on Stroke Unit/PCU, RN calls Code Stroke and Rapid Response.</li> </ol>	Patients with stroke treated as soon as possible. Early identification of symptoms is key to treatment.
2	RRT Response	<p>RRT:</p> <ol style="list-style-type: none"> <li>Assesses patient. If possible stroke, complete the MEND exam and calculate RACE score, obtain blood glucose.</li> </ol> <p>Code Stroke criteria:</p> <ol style="list-style-type: none"> <li>Positive MEND exam with focal symptoms.</li> <li>Blood Glucose &gt; 50.</li> <li>Last known normal time 0-6 hours.</li> </ol> <p>OR</p> <p>Last known normal time 6-24 hours and RACE score ≥ 4.</p> <p>SEE APPENDIX A for activation algorithm</p>	Rapid Response team to assess and treat. Sudden change in status. Nurses are trained in the MEND exam.

**Reference Notes:**

- ED Coordinator: 667-5657
- ED Pharmacist: 667-7031
- ED Triage Nurse: 667-5173
- ED CTE: 667-7194
- RN Lab: 667-7962
- RN Supervisor/DO: 742-9227
- STICU: 910-415-5155
- STICU Charge: 667-2716 or 2746
- Stroke Activation Line (STICU): 977-647-8364
- Stroke RN Phone: 667-4707 or 4008

STICU initiates Code Stroke activation process

**IR Call back process:**

- Team leader identified for call team before call start.
- Team leader to respond, 2 team members to respond when leader and center activation was received. Team member to respond, 2 team members to respond when leader and center activation was received.
- STICU Charge, 667-2716 or 2746
- Stroke Activation Line (STICU): 977-647-8364
- Stroke RN Phone: 667-4707 or 4008

### Activity Instruction Sheet

#### Activity: Code ELVO (Emergent Large Vessel Occlusion)

Purpose: Identify and rapidly transfer LVO to a facility for endovascular therapy

Process Owner: Claire Corbett

Performed by: RN, Neurologist, RTC, AL/VA, Radiology

Activity Starts: Large Vessel Occlusion identified or suspected

Activity Ends: Completion of EVT or patient departure from NHRMC

Date: 03/01/2016

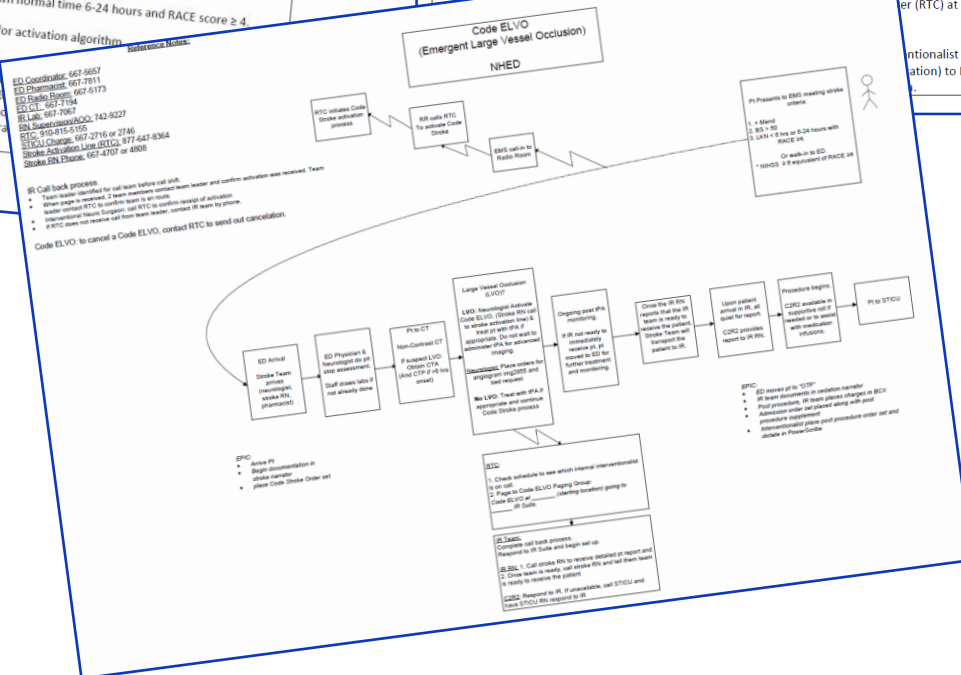
Time needed: 1 hour

Revision Date: 6/5/2018  
Version: #2

Step	Major Steps (What, When) <b>High Level Steps</b>	Key Points (How, who) <b>Detailed Steps</b>	Reasons for Key Points (Why)
1	Identification of suspected large vessel occlusion.	Neurologist: 1. Provider identifies a patient who may need endovascular therapy as early as possible. Continue with treatment algorithm for IV tPA.	Standard of care for large vessel occlusions includes treatment with IV tPA and thrombectomy. Earlier revascularization is associated with better outcomes.
2	Communicate with Stroke Team	Neurologist: 1. Inform Stroke RN and ED treatment team of possible Code ELVO.	Allows the team to be prepared.
3	CTA/CTP	Neurologist: 1. Order CTA head and neck/CTP as indicated. Radiology: 1. Complete imaging as ordered.	CTA/CTP allows visualization of a large vessel occlusion and decision making for the need of endovascular therapy.
4	Activate Code ELVO	Neurologist: 1. After CTA/CTP confirmation clearly announce to the team that we are activating Code ELVO. 2. Discuss case with _____ on-call. ____ (55) and a bed request. ____ (RTC) at 877-647-8364 to initiate ____ (interventionalist) is on-call. ____ (interventionalist) to IR Suite ____ (interventionalist)"	Activation alerts the team and supportive leaders that the Code ELVO process has begun.

Code ELVO  
(Emergent Large Vessel Occlusion)  
NHED

Pre-Prepared to start meeting within 5 minutes



# Evidence Based Order Sets

Number	Name
<b>718</b>	NEUROSCI Code Stroke Orders
<b>1300</b>	NEUROSCI Heparin Stroke Protocol Orders
<b>923</b>	NEUROSCI Alteplase Administration Orders
<b>2476</b>	NEUROSCI Subarachnoid Hemorrhage Orders
<b>2724</b>	NEUROSCI Ischemic Stroke Orders (Alteplase)
<b>2599</b>	NEUROSCI Ischemic Stroke Orders (Non-Alteplase)
<b>2616</b>	NEUROSCI Hemorrhagic Stroke Orders (SAH/ICH)

# Pre-hospital Activation

Code Stroke  
Code ELVO  
Code Neuro



# Pre-hospital Activation

## **Code Stroke Activation** **Criteria**

**Must have all 3 elements**

- 1. Positive MEND Exam with focal symptoms**
- 2. Blood glucose > 50 mg/dL**
- 3. Last known normal time 0-6 hours**

**OR**

**Last known normal time 6-24 hours and  
RACE score  $\geq 4$  (or NIHSS  $\geq 6$ ).**

# Code Stroke Response

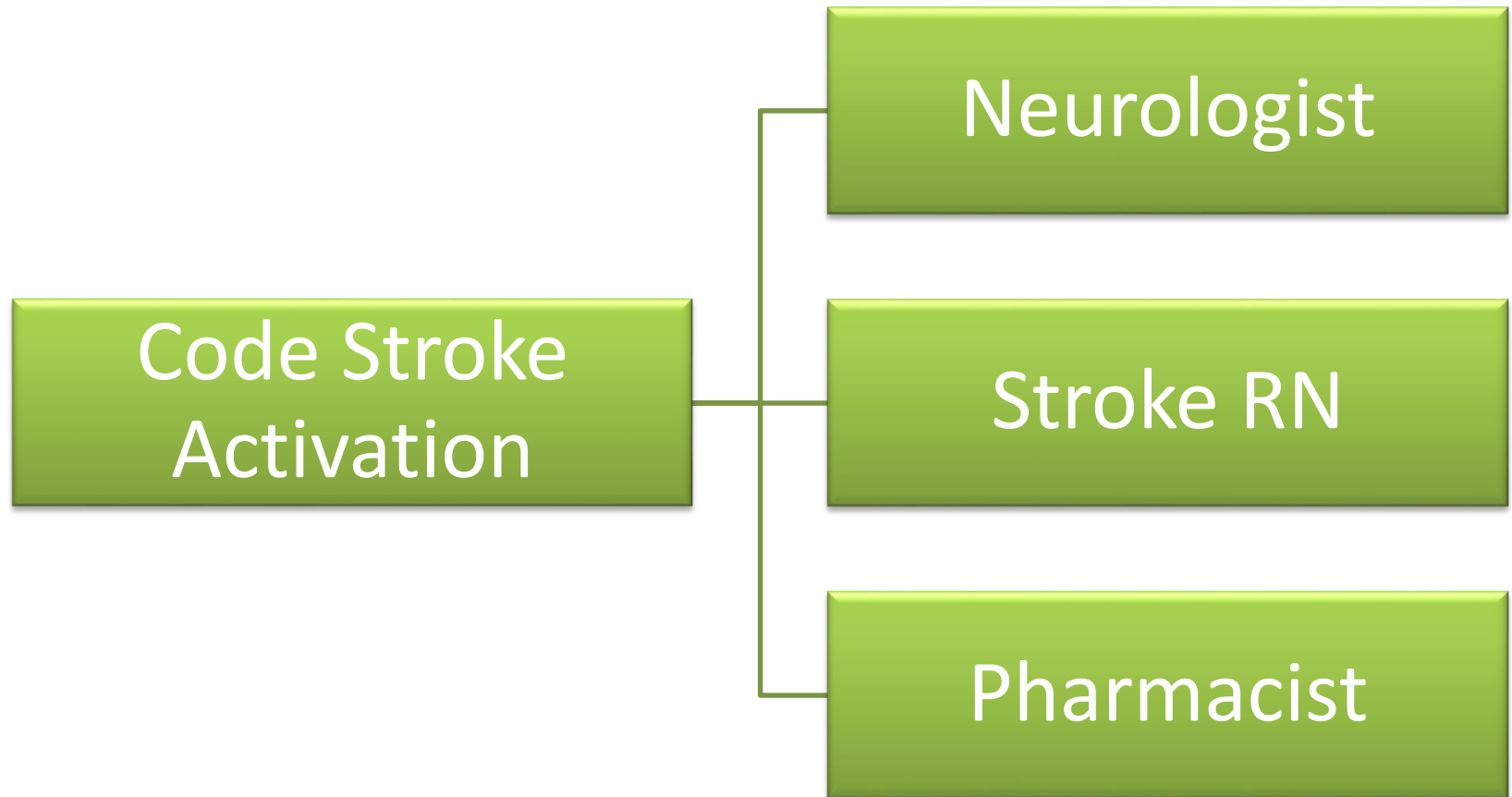
## Goal of Code Stroke

Improve outcomes of acute stroke patients

1. Identify all patients eligible for treatment with thrombolytics or endovascular therapy
2. Increase the speed of treatment



# Code Stroke Response Team



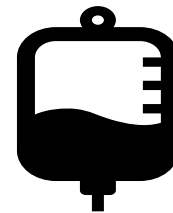
# Role of Stroke Nurse in Code Stroke

- Respond to all Code Strokes & ELVOs
  - Team leader
    - Facilitator
    - Content expert
    - Monitor treatment times
    - Provide patient report to neurologist
- Training Requirements
  - Complete education & competency
  - Complete 3 Code Stroke responses with preceptor



# Role of Pharmacist in Code Stroke

- Responds to all Code Strokes and ELVOs
- ED Based
- Screen patients for alteplase eligibility
- Prepare and mix alteplase for administration
- Validate dosage with Stroke RN
- Alteplase bolus and infusion typically started in CT
- Responds with tool box containing Alteplase, BP management medications and supplies (IV pump, tubing, etc) for rapid administration





# In-House Code Stroke

THINK YOUR PATIENT IS  
HAVING A STROKE?  
THINK FAST...  
AND CALL A RRT  
REMEMBER...

**FAST = RAPID**

CALL  
RAPID RESPONSE TEAM

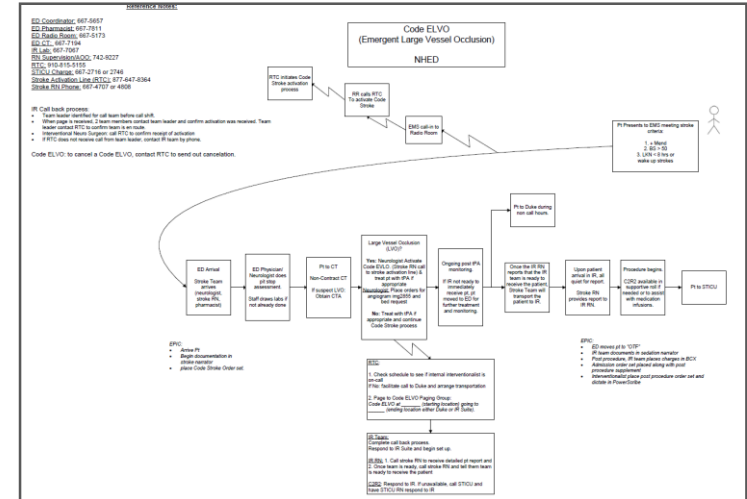
RN recognizes  
stroke  
symptoms &  
calls RRT

RRT assesses  
patient and  
activates  
Code Stroke

Stroke Team  
responds to  
patient  
location

# Code ELVO

- Implemented with Go-Live Jan 2017, 24/7 coverage began Jan 2018
- Process layered onto Code Stroke
  - Built upon strong infrastructure
    - CTA & CTP ordered as appropriate for LVO
  - Patients with confirmed LVO transferred emergently to Interventional Radiology
  - STNICU for post procedure care



# Code Neuro

- GO LIVE – May 1, 2019
- Emergent transfer process that identifies patients with suspected:
  - SAH
  - aneurysms
  - arteriovenous malformation
  - cavernous malformations
- Patients auto accepted to NHRMC
- Response group meets patient in ED for evaluation
- Patient either goes emergently to IR or is admitted to the appropriate level of care (STNICU or Stroke Unit)



# Hospital Admission

**act F.A.S.T.**

*Do this simple test  
to check for a stroke.*

**F**ace - ask the person to smile, does one side of the face droop?

**A**rms - ask the person to raise their arms, does one arm drift downward?

**S**peech - ask the person to repeat a simple sentence, is the speech slurred?

**T**ime - if the person shows any of these signs, time is important.

# Model of Care

- Stroke patients:
  - Admitted to Stroke Unit (7<sup>th</sup> Floor)
- Post Alteplase & ELVO patients
  - Admitted to STNICU or Stroke Unit if criteria is met
  - Transferred to Stroke Unit

Process in place to identify patients who no longer need to be admitted on the Stroke Unit.

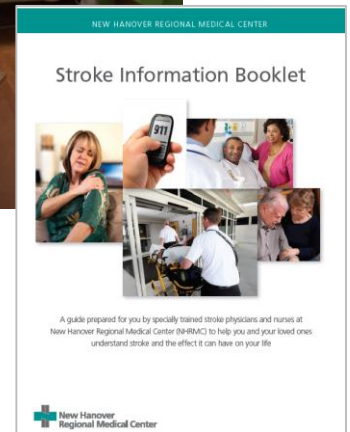
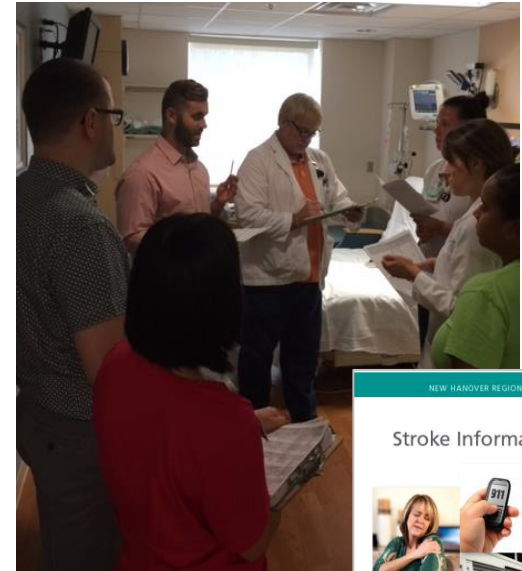
# Stroke Unit



- Stroke Unit opened Sept 2011
  - Admits stroke patients in a designated unit
  - Staff are specially trained in stroke care
  - Supports compliance with standardized processes and treatment guidelines
  - Improves clinical outcomes and patient & family satisfaction

# Stroke Unit

- Model of care: 2 RNs & 1 NA per 6 patients
- Interdisciplinary care rounds daily at bedside
  - Supports optimal care delivery
  - Review:
    - Discharge or transfer planning
    - Ensure optimal medical therapy
    - Stroke education
    - Rehab therapies
    - NIHSS score

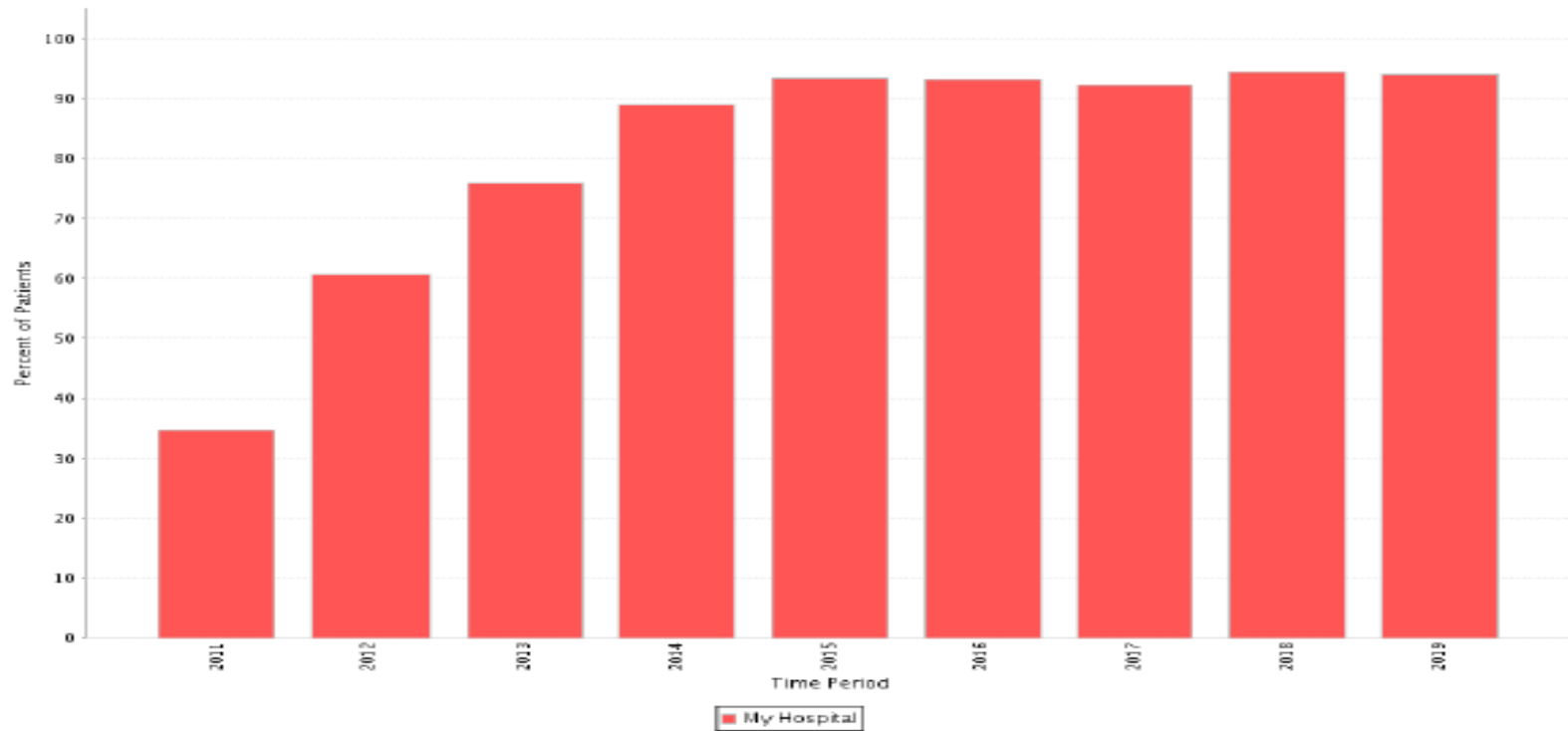


# GWTG – Perfect Care 2011 – 2019

## Stroke Core Measure Defect-Free

Defect-Free Measure of the 8 Stroke Core Measures

Time Period: 01/2011 - 12/2019; Site: New Hanover Regional Medical Center (47514)



Data For: Stroke Core Measure Defect-Free				
Benchmark Group	Time Period	Defect-Free Patients	Total Patients	% Defect-Free Patients
My Hospital	2011	93	268	34.7%
My Hospital	2012	360	595	60.5%
My Hospital	2013	476	628	75.8%
My Hospital	2014	629	708	88.8%
My Hospital	2015	698	748	93.3%
My Hospital	2016	702	754	93.1%
My Hospital	2017	757	821	92.2%
My Hospital	2018	868	919	94.5%
My Hospital	2019	236	251	94.0%



# Rehabilitation Hospital

- Adjacent to NHRMC
- Opened in 1994
  - CARF accredited in 1997
  - CARF Stroke Specialty Accreditation since 2009
- Stroke patients make up 30-35% of patient population.



## Stroke Rehab Program Outcomes 10/1/17-9/30/18

	NHRMC Rehab	National
Number of persons served	244	52044
Average age of persons served	67.7 years old	68.9 years old
Average length of stay	17.9 days	15.62 days
Individuals discharged to community setting	80.74%	71.7%
Individuals transferred to acute care	6.15%	9.61%

# Post Acute Care

- Outpatient Neurology Practice
  - Goal: follow-up for patients in the outpatient clinic within two weeks
  - A nurse practitioner conducts the visits with patient and care-giver
  - 90-day modified Rankins are assessed

# Post Acute Care

- Stroke Support Group and Aphasia Group
- Stroke team partner with inpatient and outpatient rehabilitation staff
- Patient Satisfaction Survey
- Patient and Family Advisory Council
- Partner with all neurology offices
- Stroke Weekend: Refresh and Retreat



# Data & Process Improvement

## **act F.A.S.T.**

*Do this simple test  
to check for a stroke.*

**F**ace - ask the person to smile, does one side of the face droop?

**A**rms - ask the person to raise their arms, does one arm drift downward?

**S**peech - ask the person to repeat a simple sentence, is the speech slurred?

**T**ime - if the person shows any of these signs, time is important.

# Weekly Case Review/Huddle

- Review data
- Discuss Code Stroke and ELVO/Code Neuro cases from the previous week
- Allows for real-time action plans and follow-up to improve processes
- Celebrate successes



Date:	5/8/2019	Weekly Stroke Huddle	
FYTD tPA #	97		
FYTD D2N (Median)	30		
% ≤ 45 mins (75% Goal)	82%		
S/S2N (Median)	101		
1C2N (Median)	61		
FYTD ELVOs	78	IR Suite Cases	75
		Thrombectomy or IA Intervention	63
D2Groin (Median)	59		
D2FP (Median)	70		
D2Revasc (Median)	75		
Week Ending:	5/4/2019		
# CS:	22		
# tPA Cases	1		
Week D2N (Median)	30		
# Outliers (>45)	0		
# In-House CSTR	3		
In-House S/S2N	N/A		
# ELVO	2	1 In House/1 Transfer	
D2Revasc (Median)	76		



# Stroke Steering Committee

- Large multidisciplinary committee
- Meets monthly
- Reviews data, identifies trends and opportunities for improvement
- Discusses ongoing process improvement projects

# Quality Meetings

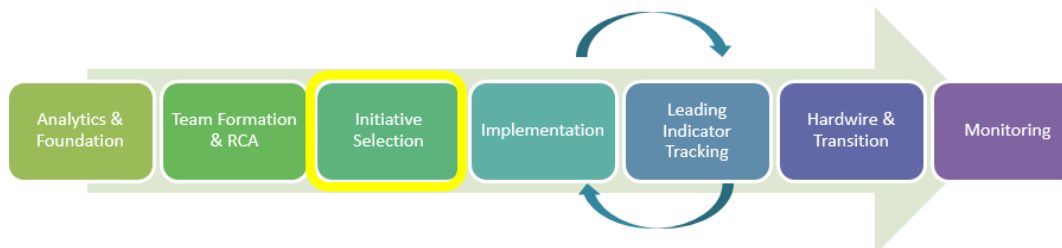
- Multidisciplinary Case Conference
  - neurology, neurosurgery, vascular surgery, radiologists, CT, IR and stroke staff
- Peer Review
- Morbidity and Mortality Conference
- Quality and Safety Steering Committee

# Clinical Excellence Team

## Areas of Focus:

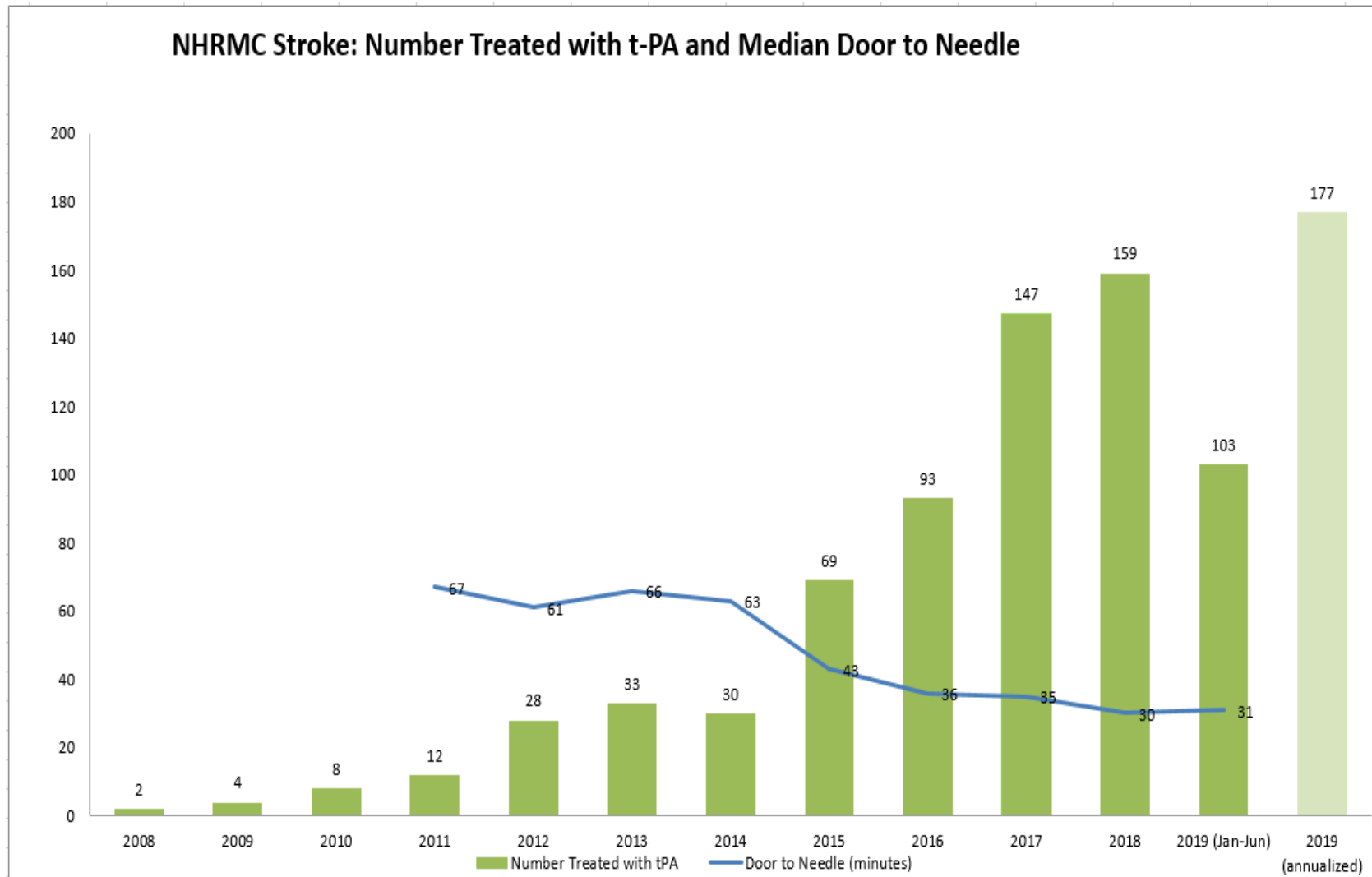


Phase I	ICU Criteria	Imaging	ICH	Rehab Criteria	Order Sets
AIS Variation	✓	✓		✓	✓
ICH Variation	✓	✓	✓	✓	✓
ICU Utilization	✓		✓		✓
LOS	✓	?	✓	✓	✓
Imaging		✓	✓		✓
Phase II					
ELVO					
Carotids					
Aneurysm					





# Treatment Rates and Times



# 2019 Poster Presentation: Implementation and Improvement of Stroke Systems of Care to Improve Patient Outcomes



# Stroke Education and Outreach

## **act F.A.S.T.**

*Do this simple test  
to check for a stroke.*

**F**ace - ask the person to smile, does one side of the face droop?

**A**rms - ask the person to raise their arms, does one arm drift downward?

**S**peech - ask the person to repeat a simple sentence, is the speech slurred?

**T**ime - if the person shows any of these signs, time is important.

# Team Education

Newly developed Stroke Education Subcommittee established in 2018

Program has defined required stroke education for the organization.

- Includes 8 hours annual for departments such as: Stroke Unit, ED, STNICU, and IR

Education for different departments include topics such as:

- alteplase overview
- MEND & RACE assessments
- Code Stroke & ELVO activation and processes
- Dysphagia Screen
- NIHSS

# Stroke Academy I & II

- Target audience: Stroke Unit, ICU, float pool
  - Open to ED, EMS, others
- Prior to course, students complete the NIHSS online training
- Stroke Academy II consists of updates and a Mock Code Stroke

Topic	Instructor (Vary per Class)
NIHSS Online Certification	Independent Online Course
Multidisciplinary Team	Stroke Educator
tPA Overview	Pharmacist
Core Measures & Documentation	Quality Outcomes Manager
Stroke Program Overview	Stroke Coordinator
NIHSS Sim-Lab Check Off	Stroke Educator
Case Studies	Neurologist

# Regional Education Offerings

- Acute Stroke Life Support Classes
  - Free for regional hospitals and EMS agencies
- Comprehensive Stroke Academy
  - In development with RN and EMS Teams
- Emergency Neurological Life Support
  - First offering in September
  - All our ACPs are working toward certification
- Stroke Certification RN Review Course



# Other Education

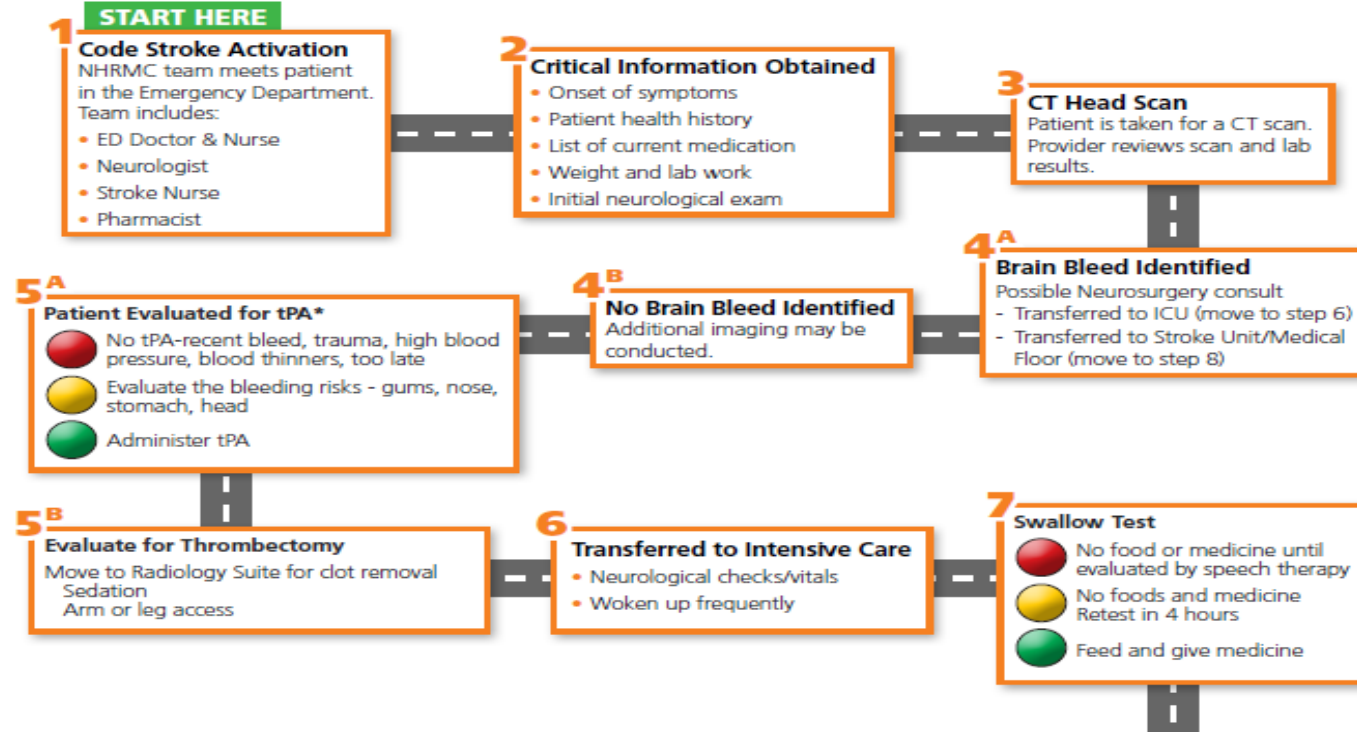
- Stroke Grand Rounds
- Annual Cardiovascular & Stroke Regional Conference
- Education to EMS agencies and hospitals in region
- Lectures to medical staff and residency groups



# Patient and Family Education

## NEW HANOVER REGIONAL MEDICAL CENTER Road Map to Stroke Care and Recovery

The following road map has been developed by your NHRMC care team to help you understand the steps along the path to stroke treatment and recovery.





# Stroke Community Education

- Leveraging Media

- Newspaper
- Radio
- Local News
- Social Media



- Traditional Health Fairs & Community Education Events

Health Fairs (225)    Local Schools (100)  
Lunch talk (27)    Pride Block Party (500)  
Heart Walk (20)    Local churches (75)





# Ranse Jones Beach Jam Annual Volleyball Tournament



Live Simple, Play Hard

# On The Horizons

- 24/7 In House providers
- Regional System of Care - IMPROVE Stroke
  - Acute Stroke Ready Hospitals
- Pediatric Code Stroke Program
- Expand Education
  - Stroke & Neuroscience Symposium
- Stroke retreat for stroke survivors & caregivers
- Research with UNCW



# Leading Our Community to Outstanding Health





The American Heart Association and  
American Stroke Association proudly recognize  
**New Hanover Regional Medical Center  
Wilmington, NC**

**Get With The Guidelines®-Stroke GOLD PLUS with Honor Roll Elite Plus  
Achievement Award Hospital.**

The American Heart Association and American Stroke Association recognize this hospital for its  
continued success in using the **Get With The Guidelines®-Stroke** and **Target: Stroke™** programs.  
Thank you for applying the most up-to-date evidence-based treatment guidelines  
to improve patient care and outcomes in the community you serve.\*

Nancy Brown  
Chief Executive Officer  
American Heart Association

Lee Schwamm, MD, FAHA  
Chairperson, Quality Oversight Committee

Ivan Benjamin, MD  
President, American Stroke Association

\*For more information, please visit [heart.org/GWTQQualityAwards](http://heart.org/GWTQQualityAwards).



# Getting Connected

Follow Us On LinkedIn:

[www.Linkedin.com/company/nhrmcstroke](http://www.Linkedin.com/company/nhrmcstroke)

