Stroke Nursing Certification & Systems of Care

The Path to Nursing Certification and Acute Stroke Workflow at a Single Comprehensive Stroke Center

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Faculty Disclosure
Kiffon M. Keigher

- Conflict of interests: *None*

- Employer: *Rush University Medical Center, Rush College of Nursing, The Joint Commission*

- Sponsorship/commercial support: *None*

Stroke Nurses
Specialized vs. Certified

- **<u>Specialized:</u>** Stroke Unit, ED and Neuroscience ICU Registered Nurse at Stroke Centers
  - Non-certified RN's but recognized specialists in the field of Stroke Nursing working in Stroke hospitals treating ischemic and hemorrhagic stroke patients
  - Requires certain number of stroke education hours per year
  - Requires ongoing neuroscience annual competencies
  - Requires annual certification in NIHSS

- **<u>Certified:</u>** Stroke Certified Registered Nurse
  - Official certification for professional nurses involving the specialty practice of Neuroscience Nursing.
  - Formal recognition of demonstration of unique body of knowledge necessary for the practice of Stroke Nursing.
  - Candidate is required to take and pass an exam with a minimum score to attain SCRN certification

Stroke **Specialized** Registered Nurse

- Dependent on hospital requirements for RN and what type of stroke certification the hospital has (i.e. Primary or Comprehensive Stroke Center)

- Requirements include:
  - Annual Stroke **Education**
    - Varies among hospitals
    - 2-8 hours of stroke related education classes/lectures/conference sessions
    - Must provide proof of attendance to these sessions/classes

  - Annual Neuroscience & **Stroke Skills Competencies** (applies to ICU's only in CSC's). Shows proof of proficiency in:
    - Neurologic and cardiovascular assessment
    - Nursing assessment and management of ventriculostomy devices (external ventricular pressure monitoring and drainage)
    - Treatment of intracranial pressure
    - Nursing care of hemorrhagic stroke patients (intracerebral hemorrhage and subarachnoid hemorrhage)
    - Nursing care of patients receiving intravenous thrombolytic therapy and intra-arterial thrombolytic therapy
    - Management of malignant ischemic stroke with craniectomy
    - Use of thermoregulation protocols
    - Use of intravenous vasopressor, antihypertensive, and positive inotropic agents
    - Methods for systemic and intracranial hemodynamic monitoring
   - Methods for invasive and noninvasive ventilator management

Stroke **Certified** Registered Nurse (SCRN)

- American Board of Neuroscience Nurses (ABNN)

- Developed in 2013

- Formally recognizes professional achievement and to promote excellence in Stroke Nursing

- Designed for Registered Nurse with at least 2 years of direct or indirect Stroke Nursing Care and Practice

- Exam consists of 170 multiple–choice questions with a total testing time of 3 hours

- Participant who passes exam achieves SCRN title

Stroke Nursing Certification
Demonstration of Expertise

- Focus primarily on 8 separate components surrounding stroke care:
    1. Anatomy and Physiology
    2. Preventative Care
    3. Hyperacute/Emergency Care
    4. Stroke Diagnostics
    5. Acute Care
    6. Medications
    7. Post Acute Care
    8. Systems & Quality Care
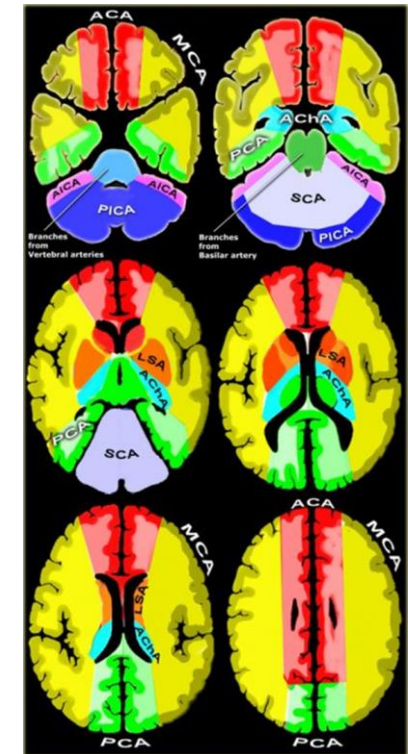
Anatomy & Physiology
Key Element of Certification

- Stroke Pathophysiology
  - Ischemic Stroke
  - Subarachnoid Hemorrhage
  - Intracranial Hemorrhage

- Basic Understanding of Vascular Anatomy and Brain Structures
  - Cerebral metabolism
  - Arterial blood supply: Anterior and Posterior
  - Venous anatomy: Venous channels, venous sinuses, confluence
  - Structures: Cerebrum (Cortex: frontal, temporal, parietal, occipital lobes; Basal Ganglia; Limbic System), Diencephalon, Cerebellum Brainstem

Anatomy & Physiology
Key Element of Certification

Understanding of Stroke Syndromes

- Intracranial Hemorrhage (ICH)
  - Hypertensive bleed, venous thrombosis, trauma
- Subarachnoid Hemorrhage (SAH)
  - Trauma, Aneurysmal, Non-Aneurysmal (perimesencephalic), venous thrombosis
- Ischemic Stroke (IS)
  - Large Vessel Occlusions (LVO): Understand stroke syndromes related to vascular territory
    - **Carotid Artery** (Amaurosis fugax, central retinal artery occlusion),
    - **MCA** (aphasia, gaze deviations),
    - **ACA, PCA**(Webers),
    - **PICA** (Wallenberg),
    - **AICA, Basilar** (Locked-In, INO,Millard-Gubler)
  - Small Vessel Strokes
    - Lacunar stroke
    - Thrombus/embolus (vasculitis, amyloid angiopathy)
  - Other: syndromes from hypotension and/or hypoxia resulting in watershed infarct
    - RCVS=reversible cerebral vasoconstriction syndrome

Anatomy & Physiology
Key Element of Certification

- Identify Stroke Mimics:
  - Seizures
  - Metabolic syndromes
  - Complex migraines
  - Degenerative neurologic conditions
  - Other (CNS tumors, drug toxicity, CNS abscess)
- Understand Neuroplasticity and Stroke Recovery
  - Process of remodeling
  - Types of plasticity: adaptive or maladaptive
  - Factors affect plasticity in stroke recovery
  - Rehab believed to affect neuroplasticity in stroke recovery

Phases of Stroke Code Care

Phase I: Hyperacute/ Emergency	Phase II: Acute Care	Phase III: Post Acute Care	Phase IV: Rehabilitative	Phase V: Preventative Care

Hyperacute Phase
Key Element of Certification

- Initial Triage's
  - Establish ABC
  - Differentiate ischemic vs hemorrhagic
    - Describe and facilitate interventions for ischemic stroke
    - Describe and facilitate interventions for hemorrhagic stroke
  - Differentiate between anterior vs posterior—match the symptom to the vascular territory
  - Neuro diagnostics
  - Neuro assessment
  - Manage blood pressure
  - Check blood glucose
  - Administer thrombolytics OR Reverse coagulopathy

Hyperacute Phase

- Triage
  - Prehospital stabilization
  - EMS Assessment & Management
- Recognition of signs and symptoms
  - Anterior vs Posterior Circulation
- Ischemic vs Hemorrhagic
  - Role of CT head imperative to differentiate type of stroke
  - Ischemic: focal deficits (FAST=FACE, ARM, SPEECH, TIME)
  - Hemorrhagic: similar to IS plus severe headache ("worst headache of life"), neck pain, photophobia, nausea/vomiting

EMS Collaboration Goals

❖ Pre-Notification of stroke patient arrival to Emergency Department
  ❖ Early mobilization of stroke teams

❖ Improved communication to allow for efficient and early transfer of patient and reduce transport delays

❖ Creation of destination protocols utilized by EMS during transport that outlines goals of care of stroke patient in accordance with local transport laws and regulations
  ❖ Example: blood pressure goals during transport
  ❖ Currently: bypass and diversion protocols in states to determine bypass of PSC and patient direct to CSC hospital

❖ Provision of educational events to EMS personnel

❖ Feedback to EMS crews

Hyperacute Phase

- ED Door
  - Stroke Alert, Diagnostic Testing
  - Imaging: CT, CTA/CT Perfusion, MRI/MRA/DWI/"RAPID"
  - Neuro Assessments
    - NIHSS, Hunt and Hess, Fisher, ICH
- Ischemic Stroke Thrombolytic
  - Indications/Contraindications/Treatment Window/Administration/Dosing
  - Complications
- Ischemic Stroke IA Thrombectomy
  - Treatment Window, Inclusion/Exclusion Criteria/ Complications/Consent
  - Patients within 6 hours should be considered for thrombectomy (supported by multiple randomized control trials)
- Stabilization
  - Blood pressure, blood glucose, cardiac monitoring, coagulopathies
  - NPO, swallow screen
  - Consider transfer to higher level of care hospital

Emergency Department Goals for Stroke Care

ED Personnel Training

- ❖ Trained to recognize and treat acute and subacute stroke
- ❖ Participates in capturing core measure data
  - ❖ Time of onset or last known well
  - ❖ NIHSS assessment
  - ❖ Inclusion/Exclusion of IV tPA
  - ❖ Inclusion/Exclusion of IA thrombectomy
- ❖ Participates in 2 stroke related education activities annually
- ❖ • 80% of ED practitioners can:
  - ❖ Demonstrate knowledge of EMS to ED protocols
  - ❖ Location and use of stroke protocols
  - ❖ Care of the patient with acute stroke
  - ❖ Diagnose acute stroke
  - ❖ Utilize protocols for acute stroke
  - ❖ Understand treatment options for acute stroke
  - ❖ Monitor acute stroke

ED Requirements

- Assessment within 15 minutes of arrival to ED of suspected stroke patient
- Activation of Stroke Alert-Nurse Driven Stroke Alert Process in ED
- Timely completion of diagnostic testing within set guidelines
- NIHSS assessment prior to administration of IV tPA

ED-Based Care and Response Times for AIS & IV tPA

Action	Time
Door to physician	$\leq$ 10 minutes
Door to stroke team	$\leq$ 15 minutes
Door to CT initiation	$\leq$ 25 minutes
Door to CT interpretation	$\leq$ 45 minutes
Door to drug	$\leq$ 60 minutes
Door to stroke unit admission	$\leq$ 3 hours

Jauch et al., Stroke, 2013

Stroke Diagnostics
Key Element of Certification

- Understand importance of stroke diagnostic tests
  - Radiology studies
    - CT/CTA/CTP
    - MRI/MRA
    - Angiogram
    - Carotid Doppler
  - Lab studies: BMP, CBC, Coags, Hg A1c, cholesterol panels, pregnancy test,
  - Other
    - Transcranial Doppler
    - TTE
    - EEG
    - Lumbar puncture-informed consent complete

- Know the risks and benefits of diagnostic testing
  - Ex. IV Dye/Contrast administration and renal injury

- Understand nursing care needed surrounding pre and post care of testing
  - Education to patient and family (pre and post care)

Acute Care
Key Element of Certification

- Stroke Care Overview:
  - ✓ Blood pressure—manage depending on type of stroke, use Clinical Practice Guidelines to guide treatment, individualize care
    - ✓ SAH-less than 140 until aneurysm secured then permissive HTN
    - ✓ ICH-less than 160
    - ✓ IS-post tPA parameters less than 180/105 or if no tPA less than 220/110
  - ✓ Hydration-protect renal function, vascular hydration
  - ✓ Post IV thrombolytic/post IA thrombectomy management
    - ✓ Determine frequency of post tPA and IA assessments (vital signs, neuro checks and peripheral vascular/groin site checks)
  - ✓ Antiplatelet—solid evidence aspirin within first 48 hours decrease death rate, initiate early, lifelong antiplatelet post stroke
  - ✓ Afib –determine need and timing for anticoagulation
  - ✓ Fever-Goal for normothermia
  - ✓ DVT-prevent blood clots, Stroke=high risk DVT
  - ✓ Cholesterol management-start statin during hospital stay

Acute Care
Key Element of Certification

- For Hemorrhagic Strokes in particular
  - Seizure prophylaxis for SAH
  - TCD's
  - Nimotop
- Surgical procedures to consider:
  - Angiogram for thrombectomy
  - Angiogram for aneurysm coiling
  - Craniotomy for aneurysm clipping or AVM resection
  - Craniotomy for hematoma evacuations
  - CSF Shunting—placement of external ventricular drain
  - Radiosurgery for AVM
  - Carotid Endarterectomy or Carotid Artery Stenting

Other Core Elements for Stroke Program

- Stroke Log
  - Captures all stroke cases and data

- Participation in Stroke Registry
  - Stroke data that allows tracking of outcomes and benchmarking program outcomes to other hospitals/regions

- Stroke Order Sets
  - TIA, Ischemic Stroke (post tPA and non-tPA patient), SAH, ICH, post angiogram

- Dysphagia Screen
  - Evidence based tool (i.e Toronto Bedside Swallowing Screen Tool, The Guggling Swallowing Screen…)

- Depression Screening
  - Approved tool such as PHQ-2, PHQ-9

- Staff Education Plan
  - Compliance with required annual education hours

- Patient Education
  - Core education before hospital discharge: recognizing signs and symptoms of stroke, review stroke risk factors, patient understands when to call 911
  - On-going/daily patient education

- Stroke Program Team Meetings=Collaboration & Review of Processes
  - Review of Data and Quality=Prospective or Retrospective=Patient Outcomes Data

HEMORRHAGIC STROKE EDUCATION CHECKLIST

1. ACUTE	TITLE OF EDUCATION	DATE	RN	PT	FAMILY
☐					
☐					
☐					
☐					
☐					
☐					

2. PF

☐					
☐					
☐					
☐					
☐					

3. ST

ISCHEMIC STROKE EDUCATION CHECKLIST

1. ACUTE	TITLE OF EDUCATION	DATE	RN	PT	FAMILY
☐					
☐					
☐					
☐					
☐					
☐					

2. PROCEDURE, SURGERY, AND DIAGNOSTIC TESTING	DATE	RN	PT	FAMILY
☐				
☐				
☐				
☐				
☐				
☐				
☐				

3. STROKE PATHOLOGY	DATE	RN	PT	FAMILY

Patient Education Documentation

Data Process

Paging Log
- Log all acute stroke pages in Excel log
- Information on medical record number, date, time, message, and unit
- Initial page and response page(s)

Access Database
- Log of confirmed strokes (confirmed by stroke service)
- Demographic information and Rush-specific information

Stroke Registry
- Get With the Guidelines
- No sampling, include inpatient strokes
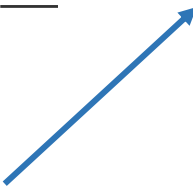- Fill in all fields in comprehensive stroke layers

Reports
- Daily report cards for tPA, ED Hemorrhagic Stroke, and acute stroke outlier
- Monthly reports to Stroke Performance Improvement Committee, and Rush staff
- Quality reports put on Stroke Team Webpage on Rush Intranet

Reliability Audits
- Historical bi-annual random audits on entire stroke registry record for 20 patients
- Current focus on hemorrhagic transformation for each tPA and IAT to ensure accuracy

Acute Care
Key Element of Certification

- Identify Other Associated Stroke Disorders
  - TIA
  - Venous Thrombosis
  - Moyamoya Disease
  - Carotid stenting or cerebrovascular CEA
  - Hypercoaguable states
  - Vasculitis
  - Dural AV Fistula
  - Cavernous Angiomas

Medications
Key Element of Certification

- Describe and understand the implications for different classes of medications for the stroke patient
- Stroke nurse should be able to recognize the indication, dosage and administration of commonly used medications for stroke patients
- Must be able to educate patient and families about the medication name, dose, schedule, route, technique of administration (oral, g-tube), expected response, adverse effects, drug-drug and food-drug interactions.
- Be able to identify indications for use, mechanism of action of drugs, timing and duration of therapy for selected medications, discuss dosage

Medications
Being Familiar With Primary Classes of Drugs

- Antiplatelets
- Anticoagulants
- Thrombolytics
- Antihypertensives and diuretics
- Vasopressors and Inotropes
- Lipid-lowering agents
- Nimodipine
- Osmotic agents
- Anticonvulsants

- Diabetes medications
- Antispasmodics
- Antidepressants
- Neurostimulants
- Atypical neuroleptics
- Analgesics
- Sedatives
- Antipyretics

Post Acute Care
Key Element of Certification

- Describe the role of the multidisciplinary team
  - Collaboration, team that works toward common goal focused on patient needs, communication between team members, shared decision making
  - Multi-discipline professionals

- Know RN role within the interdisciplinary team
  - Primary Role: Caregiver and Expert Practitioner
  - Teacher, coordinator of care, patient advocate

- Describe the levels of rehabilitation care (Acute, Subacute, Long-Term, Assisted Living, Home Health)

- Establish nursing diagnoses and develop plan of care

- Participate in early rehabilitation and discharge planning
  - Include evaluation on ADMISSION order set!
  - Engage family in care, evaluate caregiver support
  - Assist patient in performing activities of daily living (ADL)
  - Utilize assessment scales (Barthel, Modified Rankin Score)

- Advocate for patients safe return to home and engaging in healthy lifestyle
  - Evaluate patient for: need for walking assist, , recommended rehab therapies, diet/nutrition, exercise, psychosocial issues, medications, exercise
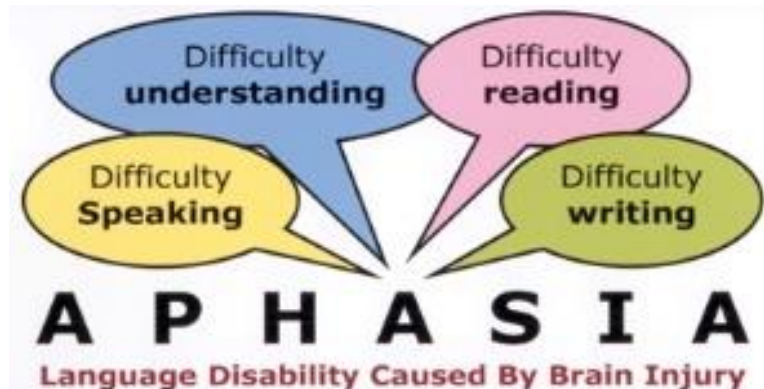
Preventative Care
Key Element of Certification

- Identify patients with risk factors for stroke, set goals
  - Hypertension: less than 130/80
  - Diabetes-HgbA1c less than 6.5
  - Atrial Fibrillation-anticoagulation and/or ablation
  - Smoking-cessation of smoking
  - Obesity-diet and exercise (healthy Body Mass Index)
  - Hyperlipidemia: LDL less than 70

- Develop nursing diagnosis and develop plan of care

- Individualize the care and education

- Participate in community resources that promote health education and lifestyle changes

Rehabilitation Therapies, Case Managers, APN Comprehensive Stroke Clinic

- Initiate early==Post Stroke Day 1

- Program provides physical therapy (PT), occupational therapy (OT) and speech therapy (ST) team evaluations 7 days a week

- Case managers/discharge planners available 7 days a week to begin early evaluation of patient discharge needs

- Out-Patient Comprehensive Stroke Clinic==transition of care from acute hospital stay to return back to home and community

Difficulty understanding

Difficulty reading

Difficulty Speaking

Difficulty writing

A P H A S I A

Language Disability Caused By Brain Injury

Systems & Quality Care
Key Element of Certification

- Understand rationale for using the following:
  - Protocols or pathways
    - Provides the "roadmap" to care; standardizes care; identifies who is eligible, how care is delivered, who is responsible for delivery of care
    - Should provide a guide to care but needs to be individualized to the patient
    - Should be evidence-based (i.e follow your Clinical Practice Guidelines)
    - Examples: SAH, ICH, INR Reversal, Hypothermia/Normothermia, Ischemic Stroke IV tPA and non IV tPA, Mechanical Thrombectomy, TIA
  - Stroke units and Neurocritical Care ICU
    - Provides <u>"specialized"</u> nursing care and management by stroke designated team
    - Decreased mortality and improved functional outcome
  - Acute stroke team
    - Clearly Identify Who Is Acute Stroke Code Team

Systems & Quality Care
Key Element of Certification

- Regular review and Analysis of stroke data
- Core Measure Data

The Joint Commission Primary Stroke Center Measures

Measure		
STK-1 VTE Prophylaxis by day 2		
STK-2 Antithrombotic at discharge		
STK-3 Afib discharged on anticoagulation		
STK-4 t-PA initiation		
STK-5 Antithrombotic Tx by day 2		
STK-6 Statin upon discharge		
STK-8 Stroke education docu		
STK-10 Rehab consult		

The Joint Commission Comprehensive Stroke Center Measures

Measure			
CSTK-01: NIHSS for Ischemic Strokes			
CSTK-02: 90 Day mRS			
CSTK- 03: Hunt/Hess and ICH Scores			
CSTK-04:Procoagulant for ICH			
CSTK-05: Hemorrhagic Transformation			
CSTK-06: Nimodipine Administration			
CSTK- 07: Median Time to Revascularization			
CSTK- 08: TICI Reperfusion Grade			

Embolization/Intervention Complications

RUSH UNIVERSITY MEDICAL CENTER
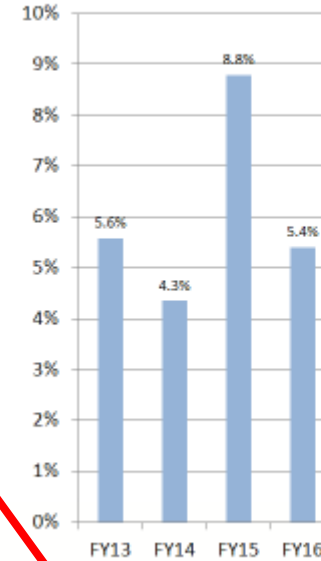
- **Numerator definition**
  - Patients with hemorrhagic or ischemic stroke, unexpected re-treatment of target lesion, or death due to stent/flow diverter/stent & coil for aneurysm, and AVM
- **Denominator definition**
  - Patients who undergo stent/flow diverter/stent & coil for aneurysm, and AVM
- **Sample size**
  - 37 patients in FY16 Q1
- **Metric goal**
  - Less than or equal to 8% aggregate complication rate

STK-5 Antithrombotic Therapy by End of Hospital Day 2
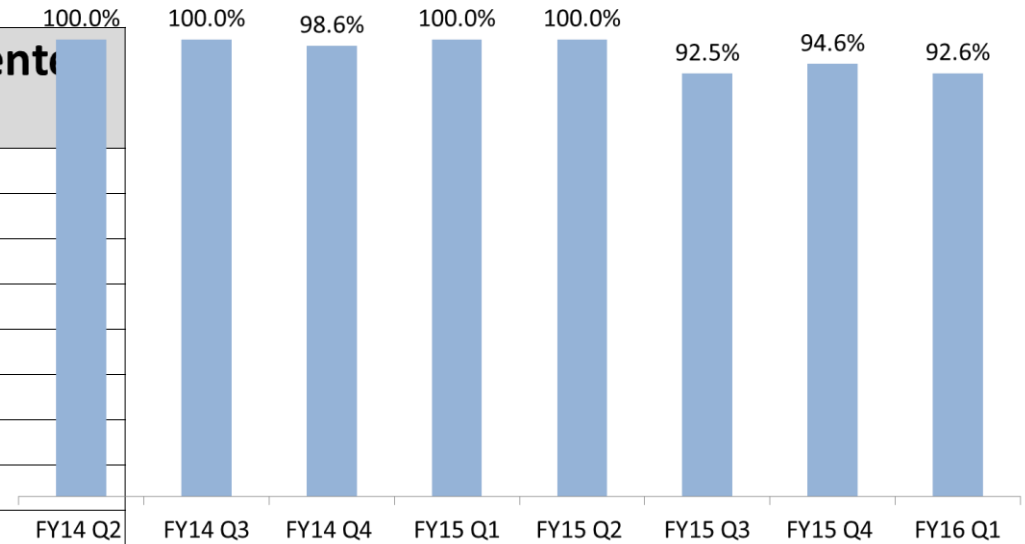
Systems & Quality Care
Key Element of Certification

- Know how to implement quality improvement projects to improve stroke outcomes
  - Methodology
  - Organization
  - Measurement
  - Action Plan

- Different PI Tools
  - LEAN
  - Six Sigma
  - RUSH Way
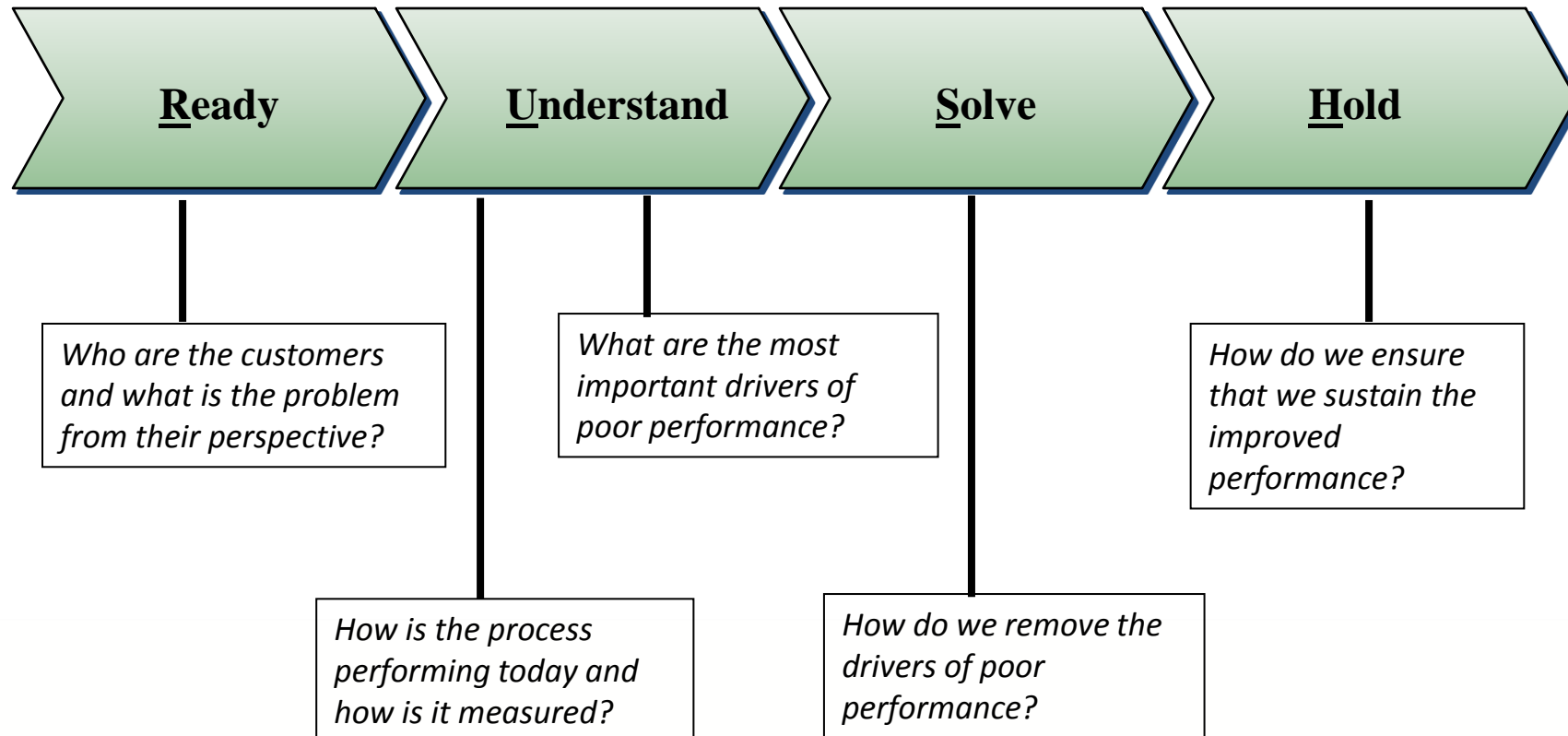
Stroke Burden in the United States

- Almost 800,000 strokes per year
  - 75% are first time stroke events
  - 25% are recurrent strokes
- 80% of strokes are preventable
- Approximately 1 death every 4 minutes from stroke
  - 1 in every 20 deaths due to stroke

5th Leading Cause of Death in the United States

What Is the Impact Of Stroke on Society

COST OF STROKE

$34 Billion Annually

Hospital Costs, Medications, Lost Wages

Leading Cause of Disability

Rehabilitation Services for Disabled

$17,000 Annually per person

Stroke Death Rates, 2008-2010
Adults, Ages 35+, by County

Age-Adjusted
Average Annual
Rates per 100,000

- 13.5 - 72.7
- 72.8 - 81.2
- 81.3 - 88.9
- 89.0 - 100.1
- 100.2 - 300.1
- Insufficient Data

Alaska

Hawaii

Rates are spatially smoothed to enhance
the stability of rates in counties with small
populations.

Data Source:
National Vital Statistics System
National Center for Health Statistics

CDC

Centers for Disease Control, 2015
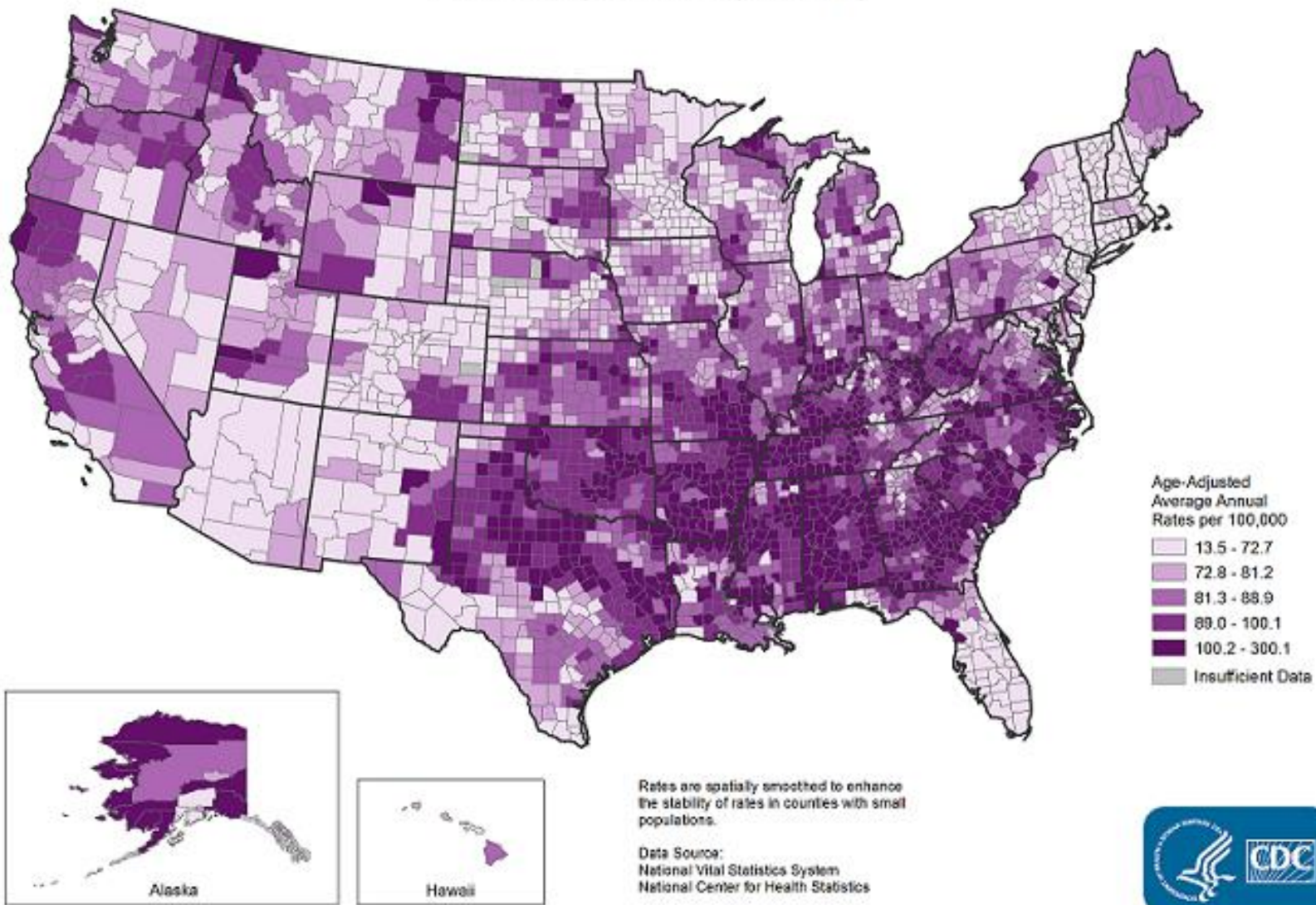
Death, Disability & Disparity

- Over 50% of stroke patients do not know how to recognize stroke symptoms and understand the need to call 911 (to activate Emergency Medical Services response team)

- Poor stroke risk factor prevention in certain populations
  - Black and Hispanic communities with higher incidence of second stroke event and poor control of risk factors
  - Poor control of diabetes, HTN, cholesterol, poor diet, lack of access to primary care doctors

- Access to care varies widely based on where stroke patient resides
  - Rural communities
  - Underserved populations (low income and poorly educated)
  - Inadequate coordination and fragmented care leave many organizations <u>providing stroke care in isolation</u>

POOR ACCESS TO CARE PROMPTED MOVEMENT FOR STRUCTURED SYSTEMS OF CARE FOR STROKE PATIENTS

Stroke Systems of Care

- ASA guidelines established guidelines that stroke systems of care should **coordinate** patient access to **acute care** and treatment, **prevention**, and **rehabilitation**. Key components include:
  - ➢ Primary Prevention
  - ➢ Community Education
  - ➢ Notification and response of emergency medical services
  - ➢ Acute stroke treatment
    - ➢ Including hyperacute phase and emergency department care
  - ➢ Subacute stroke treatment and secondary prevention
  - ➢ Rehabilitation
  - ➢ Continuous quality improvement (QI) activities

Task Force Members., Schwamm, Lee H. et al. Stroke. 2005; 36, 690-703

Figure 2. Geospatial Information Systems (GIS) map displaying TJC primary stroke centers and state-certified or other stroke centers and the distance to the nearest TJC primary stroke center for the US population by county
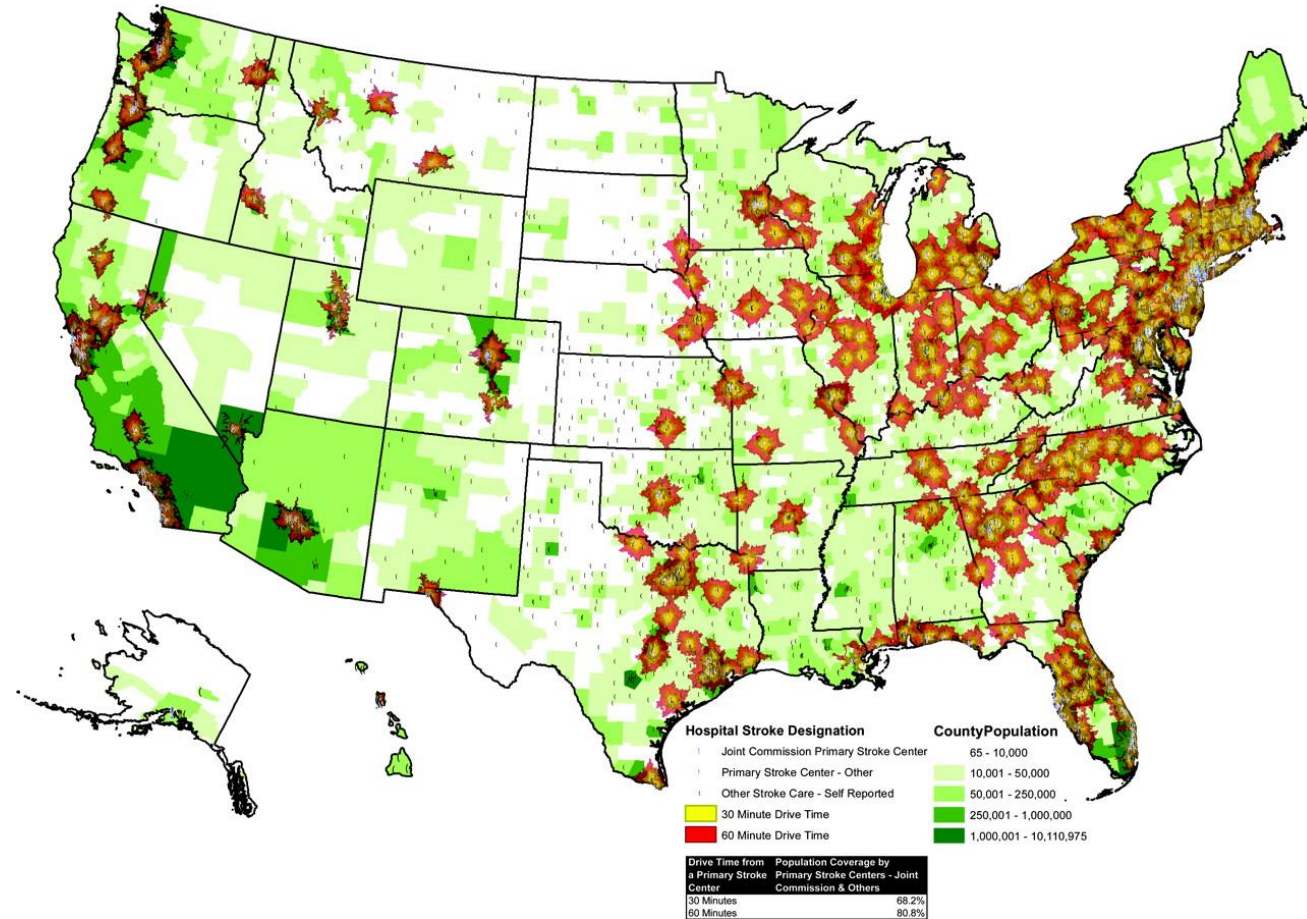
Lee Schwamm et al. Stroke. 2010;41:1051-1065

Stroke Systems of Care: A Teamwork Approach

Increased collaboration focused on improving outcomes

Rush University Medical Center (RUMC)
Stroke Code Workflow at Comprehensive Stroke Center

Pre-Notification via EMS/911 or Transfer Drip and Ship

- Neuro assessments completed already
  - In the field by EMS
  - At transferring hospital with a working diagnosis and possible initiation of treatment
- Early initiation of stroke protocol for treatment and management
- Provides advance notice to mobilize stroke team early
- Early identification of ischemic versus hemorrhagic stroke
- Early decision if patient possible candidate for IA thrombectomy
- Mobilization of neurosurgical services

Emergency Department: Walk In

- Neuro assessments by ED triage nurse or ED physician within 15 minutes of arrival
- Stroke Code Alert by ED RN
- Completion of diagnostic testing
- Diagnosis: ischemic vs hemorrhagic vs stroke mimic
- Initiation of appropriate stroke pathway and acute treatment and management
- Mobilization of stroke teams
  - Ischemic
    - IV tPA
    - IA Thrombectomy
  - Hemorrhagic: SAH or ICH
    - Neurosurgical services initiated

Initial Evaluation in ED at RUSH

Acute Neuro Deficit: weakness of face, arm or leg, trouble speaking, change in vision **OR** Worst headache of life **OR** Decreased level of consciousness

Initiate Stroke Code Page, STAT CT head, Document NIHSS, Cardiac monitor, Labs, Large Bore IV, Prepare to administer IV tPA, Prepare to send patient to Neuro IR, prepare for neurosurgical intervention

SAH Pathway

ICH Pathway

AIS Pathway

RUMC: Acute Stroke Team & Response

Stroke Program Team

- Core stroke team identified in writing
  - Medical Co-Director: Stroke Neurologist
  - Surgical Co-Director: Neurosurgeon
  - Stroke Coordinator: Advanced Practice Nurse (APN) or Registered Nurse (RN)
  - Clinical APN Manager: Neurosurgery Cerebrovascular APN
- Stroke neurologist on-call 24 /7
- Neurosurgery on-call 24/7 for open vascular emergencies
- Neuroendovascular on-call 24/7 for emergent thrombectomy and aneurysm coiling
- Emergency Department Providers

Written Stroke Protocols

- Goal of Protocols Are To:
  - Standardize care
  - Improve efficiency and early treatment
  - Improve outcomes
  - Reduce complications
- Designed, utilized and reviewed annually by stroke team members
- Reflect evidence based care outlined in chosen Clinical Practice Guidelines (CPG's)

Managing simultaneous strokes:
-establish an algorithm
-have a plan in place
-clearly define team member roles

Stroke 1 Alert & Response Team

- Stroke Team Alert-see algorithm
- Stroke 60 page if eligible for IA
- Stroke 60 Initiated-see algorithm
- NIV On Call Team Initiated

Stroke 2 Alert: Evaluation & Mobilization

- Stroke Team Alert-see algorithm
- If NIV needed, discussion from Stroke attending with MD or APN regarding possible Stroke 60
- Stroke 60 page sent if IA eligible (see guidelines)
- Alerts anesthesia possible 2nd stroke case
- APN with Stroke team to evaluate patient
- ER RN to care for patient until handoff to NIV or ICU RN (if stroke patient is transfer from OSH or walk in to ED)
- ICU or RRT RN to care for patient until handoff to NIV RN (if in-house stroke)
- If determined 2nd stroke with emergent NIV needs, will mobilize 2nd stroke team (if timing requires 2 patients to be treated in angio in parallel)

Stroke 2 Response Team

- Patient to 4T procedure room with APN and Stroke team
- Anesthesia team #2 (if no team available proceed under local)
- NIV RN on call will handoff Stroke #1 to Anesthesia and take over care for Stroke #2 (handoff from ED RN or ICU/RRT RN)
- NIV Attending On Call/Fellow/Backup NIV MD

RUMC: IA Thrombectomy Inclusion/Exclusion Protocol

RUMC ACUTE STROKE GUIDELINES :
INTRA-ARTERIAL (IA) THERAPY

PURPOSE: Ex
- Goal for IA should be early re-vascularization without significant delay

INCLUSION CRITERIA:
1) **Overall:**
   a. CT brain negative for hemorrhage [I II III IV]
   b. Clinical syndrome suggestive of large artery acute stroke (M1 or carotid T)
   c. Able to treat endovascularly within 6 hours of last seen normal [I II IV]
   d. NIHSS $\geq$ 6 [IV]
   e. CT brain ASPECTS $\geq$ 6 [II IV]
   f. Pre-Modified Rankin Score ((modified Rankin score) $\leq$ 2 [I II III IV]
   g. $\geq$ 18 years, adults. No specific upper age cut off [I II III]

1) **Lesion** - carotid T or M1. M2 subgroups showed no significant difference [IV]

1) **Time window 6 hours**. Extending beyond the time window can be considered on a case-by-case basis if the clinician treating the patient feels there is additional data to suggest a more favorable risk/benefit ratio. This may include young age, basilar artery occlusion, favorable imaging results, or other special circumstances that should be documented by the treating physician. For example, ESCAPE treated within 12 hours with good collateral on multiphase CTA [II]

1) **Device**. Retrievable stents should be first line [I II III IV]
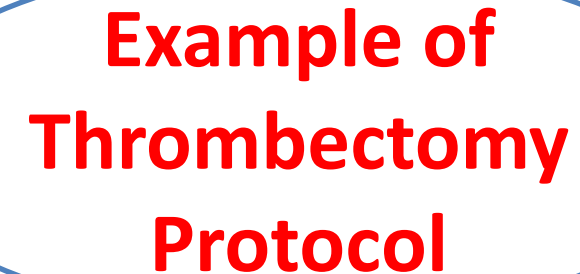
1) **General anesthesia** should be avoided unless there is a clear clinical indication for intubation/anesthesia

1) **Consent-** As intra-arterial therapy in select patients is considered the standard of care, treatment can be given on an emergency basis even if there is no explicit consent (i.e. the default should be to treat).

1) **Pre-Modified Rankins Scores** (mRS) to be discussed on a case-by-case basis

ADDITIONAL NOTES:
- IV tPA:
  o Patients may be taken directly to cerebral angiogram after IV tPA
  o There is no requirement to wait for clinical improvement after IV tPA

Example of Thrombectomy Protocol

Acute Stroke 60 Team at RUMC

- Neurointerventionalist: Neurosurgeons and neurologists
- Neurology Stroke Attending
- Neurointerventional and Neurology Stroke Fellow
- Acute Care Nurse Practitioners
- Neuroendovascular Registered Nurse
- Neuroendovascular Technologist
- Stroke Research Coordinator
- Anesthesia
- Radiology Technologist
- Rush Transfer Center
- EMS Crew
- RUSH ER and NSICU RN's

What Is Stroke 60?

- Stroke 60 is the official name of Rush Neuroendovascular Team response to Acute Ischemic Strokes for patients eligible for mechanical thrombectomy (IA) therapy

- Stroke 60 Initiated:
  - For Patients Deemed Eligible for Intra-arterial Therapy
  - For Acute Ischemic Stroke cases only

Creation of Stroke 60 Team

- Identified group/team required to respond for patient eligible for thrombectomy

- Required a workflow for response

- Encouraged closer look at neurointerventional data and core measures

- Working group to capture core measures and data in "real-time"

- Platform to participate in IRB approved research trials

- Opportunity to improve time to treatment and patient outcomes

Limitations of Workflow

- Inconsistent communication between Stroke Neurologist, transferring hospital and patient/families
- No structure
  - Where does patient go upon arrival (ED, CT, ICU..)
  - How are we communicating with the EMS and Transferring Hospital?
  - Who is making decision patient is acceptable candidate for IA thrombectomy
- Multiple team members without clear roles
  - Duplicating work
  - Delaying patient to procedure
- Coordinating care with multiple departments within the hospital
  -CT, ED, Transfer Center, IR, Neuro ICU
- Simultaneous and In-House strokes—inconsistent team response

Solutions to Improve Workflow

- Defined algorithm of workflow

- Defined team member roles

- Defined IA Goals

- Initiated real-time report card feedback

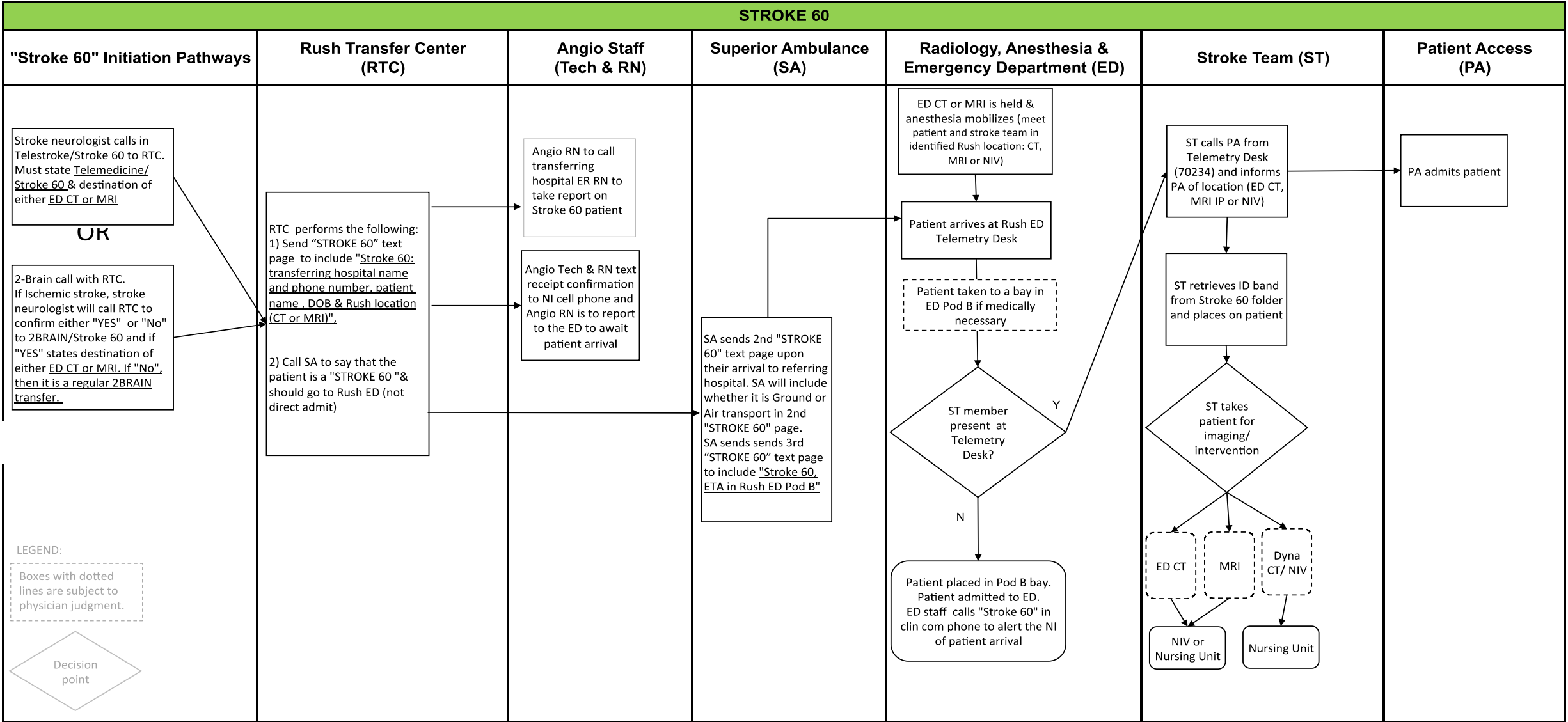# Solutions to Improve Workflow

- Defined algorithm of workflow
  - Defined team member roles
    - Defined IA Goals
- Initiated real-time report card feedback

Stroke 60 Pathway & Workflow

STROKE 60

"Stroke 60" Initiation Pathways	Rush Transfer Center (RTC)	Angio Staff (Tech & RN)	Superior Ambulance (SA)	Radiology, Anesthesia & Emergency Department (ED)	Stroke Team (ST)	Patient Access (PA)

Stroke neurologist calls in Telestroke/Stroke 60 to RTC. Must state Telemedicine/Stroke 60 & destination of either ED CT or MRI

OR

2-Brain call with RTC. If Ischemic stroke, stroke neurologist will call RTC to confirm either "YES" or "No" to 2BRAIN/Stroke 60 and if "YES" states destination of either ED CT or MRI. If "No", then it is a regular 2BRAIN transfer.

RTC performs the following:
1) Send "STROKE 60" text page to include "Stroke 60: transferring hospital name and phone number, patient name , DOB & Rush location (CT or MRI)".

2) Call SA to say that the patient is a "STROKE 60 "& should go to Rush ED (not direct admit)

Angio RN to call transferring hospital ER RN to take report on Stroke 60 patient

Angio Tech & RN text receipt confirmation to NI cell phone and Angio RN is to report to the ED to await patient arrival

SA sends 2nd "STROKE 60" text page upon their arrival to referring hospital. SA will include whether it is Ground or Air transport in 2nd "STROKE 60" page. SA sends sends 3rd "STROKE 60" text page to include "Stroke 60, ETA in Rush ED Pod B"

ED CT or MRI is held & anesthesia mobilizes (meet patient and stroke team in identified Rush location: CT, MRI or NIV)

Patient arrives at Rush ED Telemetry Desk

Patient taken to a bay in ED Pod B if medically necessary

ST member present at Telemetry Desk?

Y

N

Patient placed in Pod B bay. Patient admitted to ED. ED staff calls "Stroke 60" in clin com phone to alert the NI of patient arrival

ST calls PA from Telemetry Desk (70234) and informs PA of location (ED CT, MRI IP or NIV)

ST retrieves ID band from Stroke 60 folder and places on patient

ST takes patient for imaging/ intervention

ED CT

MRI

Dyna CT/ NIV

NIV or Nursing Unit

Nursing Unit

PA admits patient

LEGEND:

Boxes with dotted lines are subject to physician judgment.

Decision point

Solutions to Improve Workflow

- Defined algorithm of workflow

- **Defined team member roles**

- Defined IA Goals

- Initiated real-time report card feedback

①TC RUSH

Stroke 60 Team Member Roles During Stroke 60 Admission

Neurointerventional Attending

- Conference Call with NP/Research Coordinator On Call for trial consent if patient meets criteria—to be determined by Research Coordinator on call
- Obtain patient baseline mRS and complete MRI questionnaire during consent phone call
- Await confirmation from all team members they have received page: Fellow, NIV RN, NIV RT, NP/Research Coordinator on Call
- Confirm with Fellow that they have notified anesthesia
- Sign in time of arrival on Arrival Log
- Communicate patient information and plan to team members
- Meet patient in CT and/or MRI
- Communicate BP parameters to anesthesia team during time out

Anesthesia

- Mobilize a team and prepare NIV room for patient arrival
- Discuss with NIV attending: type of anesthesia, blood pressure goals and other parameters for the patient
- Meet patient in ER if following criteria: patient intubated, posterior circulation stroke, concern for airway compromise, or requiring continuous drips/IV meds for hemodynamic management, at request of NIV team

Stroke 60 RN Workflow Algorithm

NIV Team

- All Stroke 60 team notified via JOIN and page of Stroke 60 code and team mobilized
- NIV RN calls for report to transferring hospital (will provide handoff report to ICU RN after procedure) Will share report with rest of NIV team and Anesthesia team
- Meets patient at ED ambulance bay. Assumes Initial care of patient and admission of patient
- Will notify ED Charge RN if delay in mobilization of NIV team. Will request ED provide bay and RN to admit and care for patient until NIV team ready to assume care of patient

ER Team

- ED Charge Nurse receives page of Stroke 60 transfer
- ED Charge Nurse will receive notification IF NIV RN/staff unable to meet patient in time and assume care for Stroke 60 patient. Will be contacted by NIV RN or NIV APN
- ED charge RN will assign Stroke 60 patient an ED bay and ED RN upon patient arrival. (Short interim only while NIV team being mobilized)
- ED RN may need to travel with stroke patient to continue stroke goals of care including transport and care of patient to CT or MRI
- Will work with NeuroStroke and Neurosurgery/NIV MD/APN for orders and goals of care for patient on arrival

ICU Team

- ICU Charge RN receives page of Stroke 60 transfer
- Assigns ICU RN to care for patient upon arrival to the unit
- Will receive patient report from NIV Team NOT the transferring hospital. ICU team NOT to call for report. (NIV Team is first care team and receives report on all Stroke 60 patients and will provide full report at handoff to ICU RN)
- Bedside handoff with NIV RN and anesthesia (when appropriate)
- Goals of care in ICU per ICU team, neuro stroke, neurosurgery/neurointerventional

Solutions to Improve Workflow

- Defined algorithm of workflow

- Defined team member roles

- **Defined IA Goals**

- Initiated real-time report card feedback

Time To Treatment Goals for IA Patient Drip and Ship

CT Pathway

- Door to CT complete: less than 10 min
- Door to Puncture: less than 30 minutes
- Door to Recanalization: less than 45 minutes

MRI Pathway:

- Door to MRI complete: less than 35 minutes
- Door to Puncture: less than 45 minutes
- Door to Recanalization: 60 minutes

- Recanalization of: TICI 2b or TICI 3

Solutions to Improve Workflow

- Defined algorithm of workflow

- Defined team member roles

- Defined IA Goals

- Initiated real-time report card feedback

Feedback to Staff Caring for Stroke Patients

- Encourages staff engagement in the stroke process

- Identifies stroke workflow deficits and opportunities for process improvement

- Provides a method for capturing stroke data goals and core measures
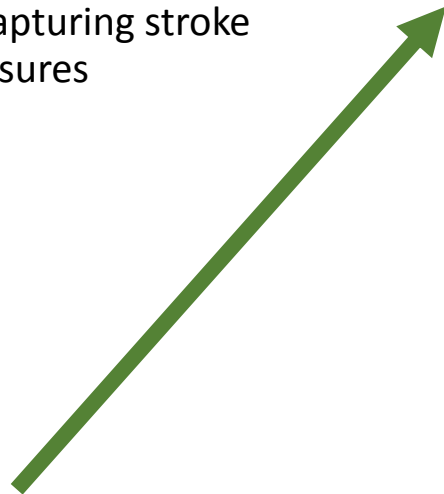
IA Thrombectomy
Report Card

"Stroke 60" Report Card

Date:

	Data	Comments/Goals
Patient Overview		
Transfer, IN-Patient, ED		
Time of Stroke 60 Page		
Location to Meet Patient		
Team arrival w/i 60 min		
Time of Onset/LKW		
IV tPA Administered		
Time of tPA and Dose **Goal: <60 min**		
Time of Arrival to RUMC **(Door Time)**		
NIHSS: OSH/Arrival to RUMC		
Time to CT (for IV tPA) **Goal: < 25 min**		
Total time in CT/MRI **Goal: CT <25 min, MRI <45min +5 min for tx decision**		
Time Into Angio Suite		
Time of Puncture **Goal Door-Puncture: <60 min**		
Time of Recanalization **Goal Door-Recan: <90 min**		
Site of Vessel Occlusion		
Initial TIC Score		
Post TICI Score **Goal: TICI 2b or 3**		
Enrolled in Trial/Name		
Kudos		
Issues To Improve		

SAMPLE REPORT to EMS and Transferring Hospital Staff

➢ Encourages continued teamwork and collaboration with EMS personnel

Neurointervention Team:
Dr. Demetrius Lopes
Kiffon Keigher, APN

RUSH UNIVERSITY MEDICAL CENTER

Telephone: 312-942-5000

Initial Angiogram
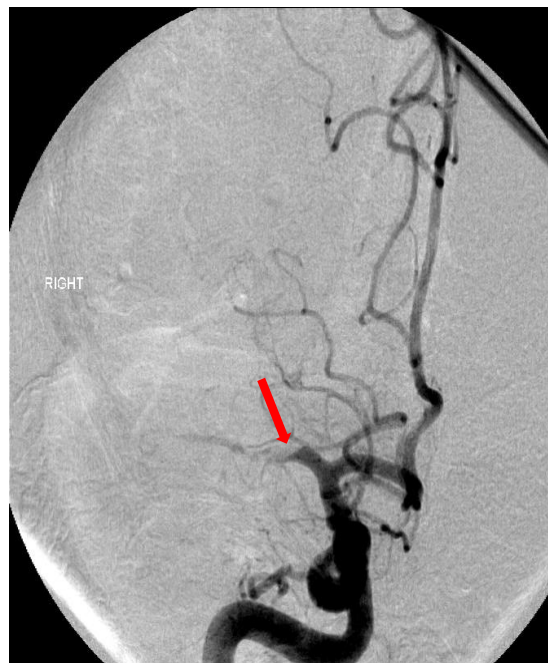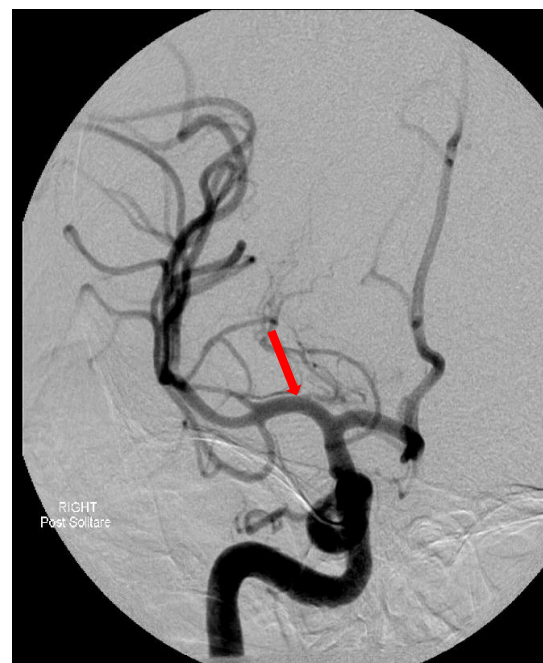
Final Angiogram

PATIENT PRESENTATION:
NIHSS:
Time since symptom onset:
Patient History:

NEUROINTERVENTION DISCUSSION:
Pre TICI:
Clot Location:
Devices used:

PATIENT OUTCOME:
Number of Passes:
Final Angiographic Score:
Time to Recanalization:
Post Procedure NIHSS:
Comments:

KEY PARTICIPANTS:
EMS:
Transferring Hospital:
ER Physician:
Neurologist:
Stroke Coordinator:

| Last Known Normal 7:15 PM | → | Presented to Metro South Medical Center 8:15 PM | → | Arrived at Rush University Medical Center 10:37 PM | → | Procedure Begins 11:38 PM | → | Full Recanalization 12:35 AM |

Stroke Code: Ms. KC

- 43 Year old female
- Fully functioning pre-stroke-Modified Rankin Score=0
- Wife and Mother of two children
- Medical History Includes: None

1815=Time of Stroke Onset

- HPI: Normal health, was sitting in her home with sudden onset of right eye pain and left-sided weakness
- Called 911 and EMS responded to patient home
  - Taken to nearest PSC hospital
  - HUB and Spoke Model
- Rush Neurologist Consulted via Telestroke Robot
  - NIHSS at PSC=12
  - Deemed good candidate for IV tPA

2021: Time of IV tPA (2 hours 6 minutes post onset)

- Time of IV tPA administration (bolus followed by drip)
- IV tPA bolus: 4.7 mg (2021)
- IV tPA drip: 42 mg (2023)
- Total Dose: 46.7 mg
- Dose Completed at: 2123

- Patient at Spoke Hospital→needs to transfer to Mother Ship (Hub) Hospital (i.e. Rush)

2024: Stroke 60 Team Notified at Rush (2 hours 9 minutes post onset)

- Rush Team receives Stroke 60 Alert page

- Rush Team receives JOIN alert

- Patient registered

- Rush team begins communication/"chat" on important patient data and treatment information..

MOBILIZATION OF STROKE 60 TEAM=IA THROMBECTOMY

2143: Patient Arrival to Rush (3 hours 28 minutes post onset)

- Team Meeting Patient: RN, NP, Neuro IR Physician
- Patient arrives to Rush University Medical Center
- **Patient arrives 1 hour 9 minutes after notification=need to move fast, losing brain cells**
- Meet EMS crew and go DIRECT to CT
- DO NOT STOP IN Emergency Department
  - Acute care management and treatment assumed by the Stroke 60 Team
    - Neurointerventional Physician
    - Neurosurgery Nurse Practitioner (APN)
    - Neuro IR Nurse

2144: NIHSS completed
2150: CT Complete (3 hours 35 minutes post onset, 7 minutes Rush door to CT complete)

- NIHSS Completed at Rush on arrival post IV tPA and prior to consideration of IA thrombectomy

NIHSS=14
BP: 128/56 mmHg

Pulse: 62

Resp: 18

SpO2: 100 %

- **Direct to CT**
- CT Head, CTA Head and Neck, CT Perfusion

2155: Arrival to Angio Lab (3 hours 40 min post onset, 12 minutes from arrival to Rush)
2201: Groin Puncture (3 hours 46 min post onset, 18 minutes from arrival to Rush)

- Patient arrival to Angio Lab
- Angio Lab Team Waiting for Arrival
  - Technologist
  - Scrub Technologist
  - Anesthesia
- Right femoral artery puncture

2210:Time to First Pass (3 hours 55 minutes post onset, 27 minutes Rush door-to-first pass)
2215: Recanalization (4 hours post onset, 33 minutes Rush door-to-recanalization)

- Time to First Pass and Reaching the Lesion

- TICI 0

- Deployment of Trevo stentretriever plus aspiration

- 1 pass of device

- Recanalization to TICI 3

- **Post thrombectomy NIHSS: 3 (immediate improvement in exam)**

Ms. KC: Acute Stroke Drip and Ship

Time of Onset to Treatment with Core Measure Time Goals
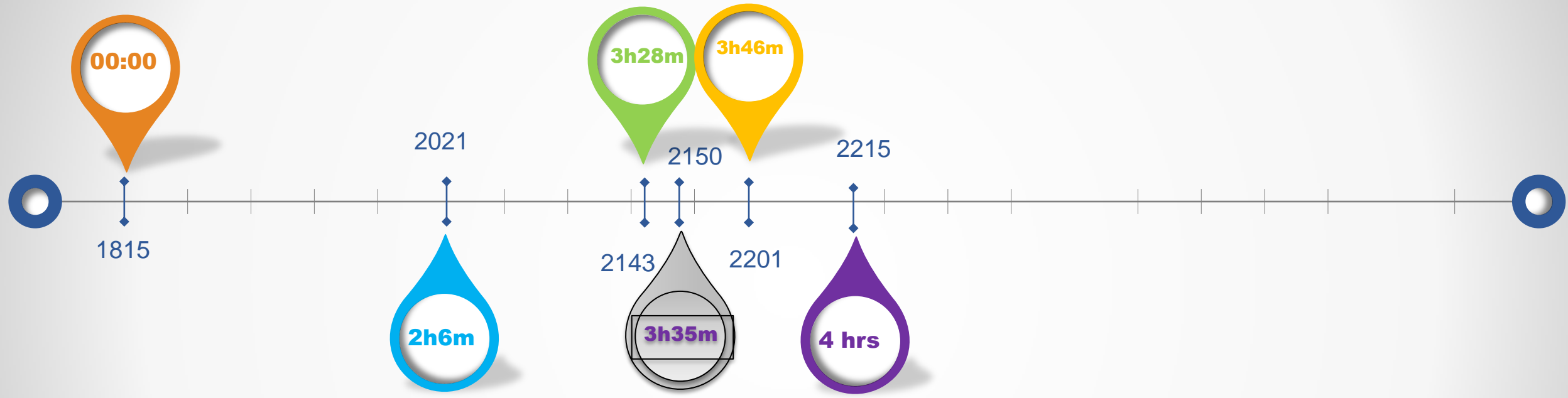
Stroke 60 Keys To Success
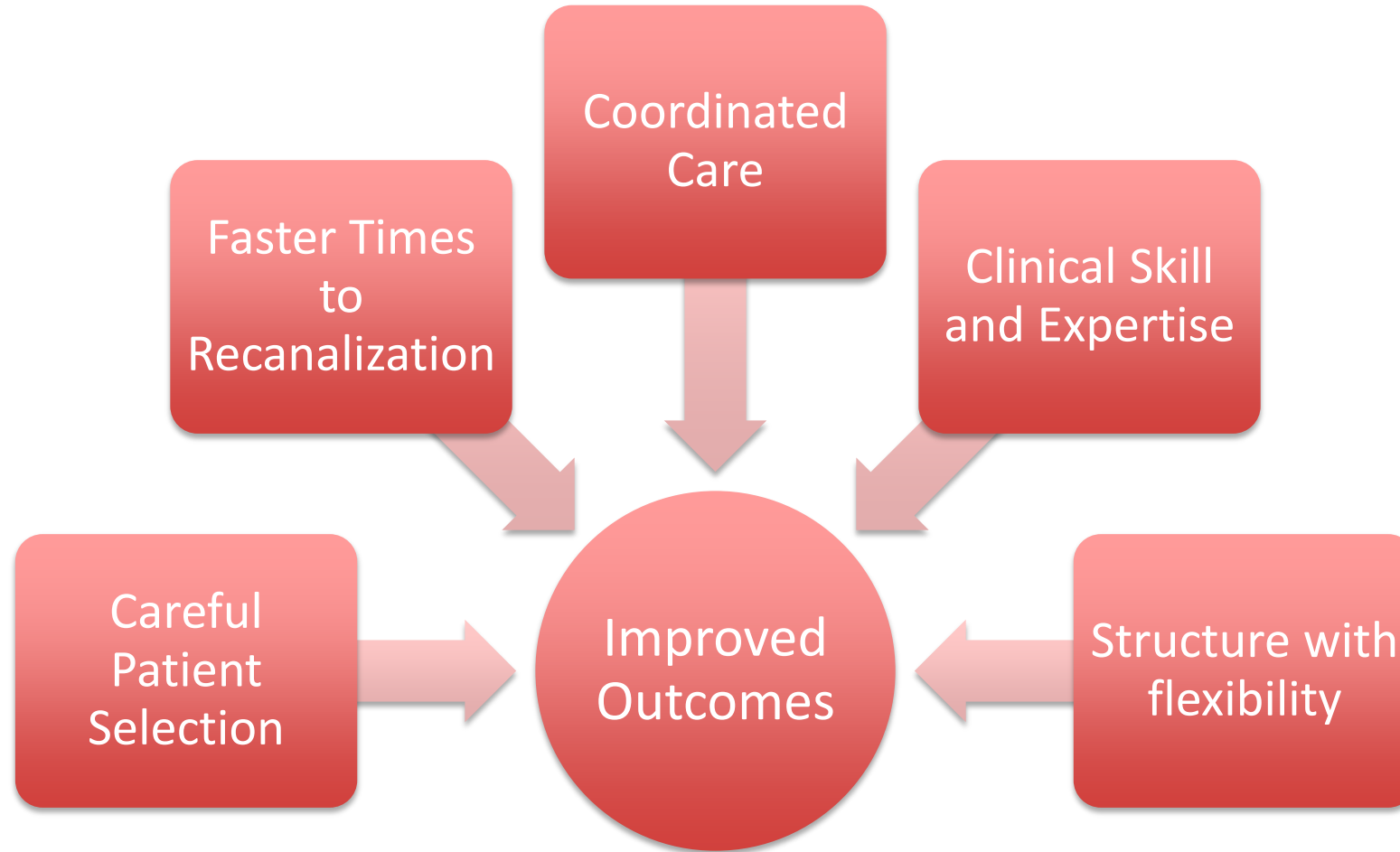
The Advanced Practice Nurse Practitioner….my role in Stroke Care

- Advance Practice Nurse
  - Practices independently of physician
  - Collaborative physician required
  - Assess (out-patient clinic and acute in-patient codes), Order Diagnostics, Manage and Treat
- Educate: Patients, Families and Staff
- Participate in Program Development
  - Evaluate core metrics and analyze data
  - Develop protocols and order sets
- Manage Stroke Comprehensive Clinic after hospital discharge
- Responds to all stroke codes and coordinates patient workflow, provides treatment and management of stroke patient
- Participate in research
- Initiate and participate in performance improvement projects

Stroke Certification Preparation Resources to take the SCRN Exam....

- AANN Comprehensive Review for Stroke Nursing

- Core Curriculum for Neuroscience Nursing

- SCRN Self-Assessment Examination

- Pearls of Stroke Education Webcast

- Adventures in Neuroscience DVD's

Study Materials found at: www. aann.com and www.abnn.com

Thank You!

Contact: info@cure4stroke.com

NEUROVASCULAR EXCHANGE

www.neurovascularexchange.com

CURE 4 STROKE