

## **Sigma's 30th International Nursing Research Congress Implementation and Improvement of Stroke Systems of Care to Improve Patient Outcomes**

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Background:

New Hanover Regional Medical Center is a certified stroke center with its primary service area encompassing the seven-county region of Southeastern North Carolina. The region sits in the buckle of the stroke belt and stroke ranks third as cause of death in the county. As the stroke hub of our region, the organization recognized the need to create a highly functional stroke center to provide optimal care to our community. Current research emphasizes the importance of early, timely treatment with tPA with the goal of treatment less than 60 minute door-to-needle. Despite the proven benefits, recommendations, and goals for timely administration there is evidence of variation prompting our organization and stroke team to evaluate the time between presentation and treatment or door-to-needle time and utilization of tPA during ischemic stroke. Utilizing lean methodology the stroke team evaluated the current state of stroke treatment at New Hanover Regional Medical center. During 2010 to 2014 the team identified that NHRMC admitted nearly 1000 stroke patients annually. Additionally, during the same timeframe tPA was rarely given (8-30 patients per year) and patients were usually treated beyond the recommended guidelines of 60 minutes.

Objectives:

The focus of the team was to examine the stroke care process from the initial activation through the continuum. The team mapped out the flow of stroke patients and completed a value-stream analysis by examining each step in the process. The stroke team care goals were to:

- Increase the percentage of eligible stroke patients who received treatment with tPA.
- Decrease the mean time to treatment below the national standard of 60 minutes from hospital arrival, ideally below 45 minutes.

The goals were accomplished through the development and improvement of the stroke systems of care.

Methods:

1. Use of Lean problem solving and PDSA methodology to identify opportunities for improvement and implement countermeasures.
2. Multidisciplinary Stroke Team established with representation from the interdisciplinary team.
3. A Code Stroke process was developed and refined with specific patient activation criteria.
4. Key strategies implemented included to reduce treatment times:
  - Pre-hospital activation of Code Stroke by EMS, promotes streamlined process for assembling the stroke team prior to the patient's arrival.
  - Establishment of IV access and collection of labs in the field prior to hospital arrival.

- Evaluation by dedicated, specially trained stroke team to include: stroke RNs, pharmacists, ED physicians, and neurologists.
  - Creation and implementation of rapid “pit stop” assessment and evaluation immediately upon ED arrival. The stroke patient is left on the EMS stretcher, assessed by the multidisciplinary team and then taken straight to CT.
  - Pharmacists prepare and administer IV tPA in the CT suite. Weekly “Stroke Huddle” was implemented to review cases from the previous week.
5. Representatives from the interdisciplinary stroke team gather to review cases, identify opportunities for improvement, and celebrate successes. The stroke huddle supports team development and serves as a platform to recognize members or processes that improve patient outcomes and support excellent care. The weekly huddle allows for a “real-time” assessment of clinical care while allowing the team to follow-up on current issues, creating a rapid PDSA mechanism.
6. Presentation and review of cumulative data monthly by the interdisciplinary stroke committee to identify trends.

**Results:**

The number of patients who were treated with tPA significantly increased 500%, from 30 patients per year (2014) to 147 patients (2017). During this period, mean tPA treatment times were reduced by 45%, from 63 minutes (2014) to 35 minutes (2017). The percentage of patients who received tPA in less than 45 minutes at NHRMC was 73.4% from 2016 – Feb 2018, compared to 38% nationally and 37.8% in NC hospitals participating in AHA Get With the Guideline Stroke registry. Risk adjusted mortality during the same period was 1.5% for NHRMC, 2.6% for all hospitals and 3.5% for NC hospitals. Bleeding complications from tPA were 3% for NHRMC, 3.9% nationally and 3.8% in NC.

**Conclusion:**

Utilizing Lean process improvement methodology and rapid cycle PDSA, the NHRMC stroke team advanced stroke care and patient outcomes without compromising safety. Integrating strategies that engage the interdisciplinary team, support collaboration, and clearly define roles and responsibilities is critical to the success of the program. Incorporation of data collection and analysis with evidence-based recommendations the stroke team translated guidelines into clinical practice. Increasing treatment rates while decreasing treatment times improved patient outcomes and eliminated the fragmentation previously observed in the system of care. The continued goal of the NHRMC Stroke Team is to improve mortality and outcomes due to stroke and improve the care of stroke in our region.

**Title:**

Implementation and Improvement of Stroke Systems of Care to Improve Patient Outcomes

**Keywords:**

Clinical Outcomes, Lean Methodology and Stroke

**References:**

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### **Abstract Summary:**

New Hanover Regional Medical Center recognized that despite the proven benefits, recommendations, and goals for timely administration of tPA that there was evidence of variation in treatment prompting the organization and stroke team to eliminate clinical variation through the development and improvement of the stroke systems of care.

### **Content Outline:**

#### **1. Introduction**

New Hanover Regional Medical Center (NHRMC) in New Hanover County, NC, is in the Stroke Belt region of the United States (US). This region in the southeastern part of the country has the highest stroke incidence and mortality. Stroke is the fifth leading cause of death in the US. However, it ranks third in New Hanover County.

For two decades, we have known that early treatment with the thrombolytic or “clot busting” medication, tPA, improves the neurological outcomes of patients with acute ischemic strokes.<sup>[i]</sup> Time to treatment is paramount, and when a patient suffers a large vessel stroke, approximately 1.9 million neurons die per minute.<sup>[ii]</sup> The American Heart/American Stroke Association (AHA) gave a Class IA indication to treating acute ischemic stroke patients with tPA in < 60 minutes from arrival at the hospital.<sup>[iii]</sup> Despite knowing that tPA improves patient outcomes, studies completed by AHA Target Stroke showed that even in 2010, only 30 percent of patients were treated with tPA in less than 60 minutes. Delays in timely treatment are often due to fragmentation or lack of coordination in the systems of care.

The NHRMC Stroke team recognized the need to develop a high functioning Stroke Center to provide optimal care to our community. From 2010 to 2014, NHRMC admitted nearly 1000 stroke patients annually. However, tPA was rarely given (8-30 patients per year) during that period, and patients were usually treated beyond the recommended 60 minutes.

### **Body**

1. *Goal:* Increase the percentage of eligible stroke patients who received treatment with tPA.

1. Early treatment with the thrombolytic or “clot busting” medication, tPA, improves the neurological outcomes of patients with acute ischemic strokes.
2. From 2010 to 2014, NHRMC admitted nearly 1000 stroke patients annually. However, tPA was rarely given (8-30 patients per year) during that period.
1. Development of a clearly defined patient activation criteria for Code Stroke.
2. Development of a system wide response to Code Stroke Activation.
3. Development of Pit Stop assessment and team response to care.
4. Stroke Huddle weekly to review and discuss cases from the previous week and to provide feedback for the system of care.
2. *Goal:* Decrease the mean time to treatment below the national standard of 60 minutes from hospital arrival, with an ideal state below 45 minutes.
1. Studies completed by AHA Target Stroke showed that even in 2010, only 30 percent of patients were treated with tPA in less than 60 minutes. Delays in timely treatment are often due to fragmentation or lack of coordination in the systems of care.
2. From 2010 to 2014, NHRMC admitted nearly 1000 stroke patients annually with the treatment time beyond the recommended 60 minutes.
1. Prehospital activation of Code Stroke by EMS.
2. Lab work and intravenous lines established in the field.
3. Development of standard work to define all team members’ roles and responsibilities during a Code Stroke.
4. tPA administration in the CT suite with physician and pharmacist at bedside.
5. Stroke Huddle weekly to review and discuss cases from the previous week and to provide feedback for the system of care.III.

### **Conclusion**

1. Utilization of Lean, rapid cycle PDSA, multidisciplinary collaboration, data collection, analysis, and evidence-based recommendations can be translated into clinical practice.
  - Number of patients who were treated with tPA significantly increased 500%, from 30 patients per year (2014) to 147 patients (2017).
  - Mean tPA treatment times were reduced by 45%, from 63 minutes (2014) to 35 minutes (2017).
  - The percentage of patients who received tPA in less than 45 minutes at NHRMC was 73.4% from 2016 – Feb 2018, compared to 38% nationally and 37.8% in NC hospitals participating in AHA Get with the Guideline Stroke registry.
  - Risk adjusted mortality during the same period was 1.5% for NHRMC, 2.6% for all hospitals and 3.5% for NC hospitals.
  - Bleeding complications from tPA were 3% for NHRMC, 3.9% nationally and 3.8% in NC.

### First Primary Presenting Author

#### **Primary Presenting Author**

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**Author Summary:** Member of a stroke team that strives to improve the mortality and

outcomes of stroke patients through utilization of lean methodology and evidence based research.

Second Secondary Presenting Author

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**Author Summary:** Provides leadership in identifying resource utilization, cost-efficiencies and programs or processes that are data-driven with ongoing program evaluation. Professional expertise has supported a system of stroke care for the region.