



**REDUCING DOOR TO NEEDLE
TIMES AND EXPEDITING
TRANSFER FOR ENDOVASCULAR
CARE FOR ACUTE ISCHEMIC
STROKE PATIENTS**

**UPMC Susquehanna Williamsport Regional
Medical Center TeleStroke Program**

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Background

When it comes to caring for patients who present with symptoms of a stroke, the phrase “time is brain” summarizes the urgent need for delivering lifesaving and brain saving interventions. Immediate medical care following the first onset of stroke symptoms has been shown to minimize the functional and cognitive deficiencies that many stroke patients experience as a result of brain damage.

In 2015, new guidelines were introduced by the American Heart Association/American Stroke Association that addressed the early management of patients presenting with Acute Ischemic Stroke (AIS) regarding endovascular treatment. This same year, the Joint Commission updated their Disease Specific Certification Manual to include a measure that requires Primary Stroke Centers to administer Alteplase (tPA) to eligible patients within 60 minutes or less of arrival to the Emergency Department (ED).

Williamsport Regional Medical Center (WRMC) in Williamsport, PA, is the only designated Primary Stroke Center within the UPMC Susquehanna four-hospital health system. Following release of the new guidelines, WRMC looked to take immediate action to improve door to needle times (DTN) for administering tPA and to establish a relationship with a respected regional medical center for transferring patients who met the criteria for endovascular intervention.

This whitepaper will demonstrate the challenges WRMC faced in improving DTN times and in coordinating endovascular care for appropriate patients, describe processes put into action to tackle these challenges, and highlight the WRMC-Specialists on Call (SOC) teleStroke Program.

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Partnering in teleStroke Care

How WRMC Utilizes Telemedicine and Specialists On Call (SOC) to Advance Stroke Care Delivery

According to Staci Mondell, BSN, RN, SCRNP, Stroke Program Coordinator/Quality and Safety for WRMC, the hospital's ED initiated its teleStroke program with SOC in 2011 for acute ischemic stroke assessments. Mondell explained, "By 2011, neurology was advancing and the use of tPA for appropriate stroke patients was becoming more standardized. There was also a shortage of neurologists on staff, which was detrimental to our stroke care response times in the ED. Bringing SOC into the fold really helped us meet the growing need for timely emergency neurology assessments."

How did DTN Times Improve as a Result of TeleStroke Assessments?

- In 2011, the ED administered tPA only three times.
- By 2016, thanks to a higher rate of stroke evaluations and diagnoses in the ED through SOC, tPA was administered 32 times, including to patients who presented with mild stroke symptoms to avoid any deficits in function.

"Utilizing Specialists On Call's teleStroke services has had a huge impact on our response times," added Mondell. "Today, our ED's time-of-arrival to time-seen-by-a-neurologist rate is about 20 minutes with SOC. Before, we'd wait hours for an attending neurologist to become available to assess an emergency patient, and during that wait time we couldn't treat the patients. Telemedicine has helped us treat emergency stroke patients in a timely manner."

Addressing Challenges in Acute Stroke Care

Because time is of the essence when it comes to administering lifesaving interventions and treatments for stroke patients, WRMC was presented with several challenges for reducing door to needle (DTN) and door in door out (DIDO) times.

- **Reducing DTN times** to ≤ 60 minutes for all patients receiving tPA; Before the action plan was implemented, DTN times were more than 92 minutes in 2014 for patients presenting to WRMC's ED.
- **Decreasing Door In Door Out (DIDO) times** for patients transferred to Lehigh Valley Cedar Crest (LV) in Allentown, PA, the closest Joint Commission Certified Comprehensive Stroke Center (CSC) in the area, for endovascular intervention. Target DIDO times were within 90 minutes; however, this criterion was not being met and DIDO times in some cases exceeded three hours.

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Identifying the Underlying Causes of the Challenges

The neurological assessment and tPA medication administration:

Delays in tPA administration were putting stroke patients at risk for functional deficits. There were several reasons for these delays—from waiting for lab results for the neurological assessment to take place, to not having tPA pulled from the Pyxis, to not having supplies to administer the medication at the bedside when the patient was brought into the ED.

Previously, obtaining the teleStroke consult and assessment when patients presented to the ED was a source of delay. This included internal lag time in setting up the SOC telemedicine cart at the patient bedside, establishing an Internet connection to quickly connect to a tele-neurologist as soon as the patient was placed in a room, and being added to the queue for the SOC neurology consult.

Transporting appropriate patients to Lehigh Valley for endovascular intervention:

Delays in patient transfers for endovascular care were causing a negative impact on patient flow in the endovascular suite at LV and putting patients at risk for functional deficits as a result of delays in intervention. Previously, WRMC did not have a standardized process in place that outlined the eligibility criteria for endovascular transfer, nor was there a checklist or treatment algorithm that could guide nurses and providers in decision making for treatment and/or endovascular transfer.

The transfer delays were also posing a potential risk to patients who arrived at LV outside the window of eligibility (six hours) for endovascular treatment, putting them at risk for suboptimal functional outcomes. Delays in patient transfers were also causing a negative impact on patient flow in the endovascular suite at LV.

Tackling Barriers to Emergency Stroke Care by Implementing a Step-by-Step Process Improvement Plan

By 2016, WRMC had an interdisciplinary rapid cycle improvement team in place to address the processes for diagnoses of AIS and for administering lifesaving treatments and interventions.

Led by Mondell, the process improvement team included ED nurses from WRMC as well as the Clinical Nurse Specialist and the Director of Medical Operations for the Neuroscience Service Line at Lehigh Valley Cedar Crest. The team also included the Regional Director of Geisinger Medical Center's LifeFlight for endovascular transfers and EMS personnel bringing stroke patients to WRMC's ED.

With well-defined goals in place, Mondell's team established a comprehensive action plan for improving the delivery of acute ischemic stroke care by addressing each challenge head on.

Door to Needle Time Improvements—Actions to Achieve Success

The tPA Alert Process

The first step in the process improvement was to issue a standard tPA alert for all patients suspected of stroke coming to WRMC's ED. The protocol stated that a tPA alert was to be called on all patients who present to the ED with stroke like symptoms and a Time Last Known Well (TLKW) of 4.5 hours or less. This alert system began with EMS, if the patient came to the ED by ambulance. Re-education of EMS crews on WRMC's new stroke protocols included this new alert process.

Expediting the Neurological Assessment with SOC's SpeedPass

The next step in the alert process was to ensure a SOC cart was immediately placed into the patient room to expedite the process of calling a neurologist. This addressed the challenge of long wait times for a neurological assessment. To further expedite the neurological assessment process, the ED nursing staff initiated SpeedPass with SOC to create a consult in the SOC queue with a high priority designation for suspected stroke patients who are deemed possible candidates for tPA administration. SpeedPass created an emergent status for possible stroke patients and decreased the wait time for a tele-neurologist evaluation. This process also helped WRMC better meet the time metric of the SOC evaluation to tPA administration of approximately 30 minutes.

According to Mondell, "The utilization of the tPA SpeedPass through SOC had a huge impact on improving our door to needle times."

Breaking the 60 Minute Barrier for tPA Administration

To meet the Joint Commission goal of administering tPA to eligible patients within 60 minutes of arrival to the ED, for an incoming patient for whom a tPA alert was issued, the stroke team proactively pulled tPA from the Pyxis and placed it at the bedside to ensure it was available for immediate administration after the SOC tele-neurologist evaluation.

A tPA supply box was also developed to ensure all materials for administering the medication were ready and at the bedside. This eliminates the back and forth to the supply room for materials necessary for tPA administration.

As a result of this new alert process:

- ✓ Possible stroke patients were identified before reaching the ED, which allowed the ED staff to mobilize the SOC cart for a timely neurological assessment
- ✓ tPA administration became easier for the nursing staff as the medication and all supplies were at the bedside and easily accessible
- ✓ Door to needle times decreased

Door In Door Out Improvements – Eliminating Delays for Endovascular Intervention

The second challenge the WRMC team faced was how to improve the transport process and eliminate delays in the transport of stroke patients deemed candidates for endovascular intervention at Lehigh Valley Cedar Crest.

“With the new stroke protocol, we have 90 minutes or less to coordinate the transfer of appropriate stroke patients to Lehigh Valley for endovascular intervention,” explained Mondell. “Before, there was no real sense of urgency to get these major stroke patients transferred and there was no real process for doing so, which was a major challenge.”

The Multi-Healthcare Center Approach to Transport

Developing an efficient workflow between multiple medical centers and stroke teams was critical to providing expedited transport of major stroke patients for timely endovascular treatment at Lehigh Valley. The process began with the creation of a new workflow process between WRMC, LV, and Geisinger Medical Center’s LifeFlight (LF).

Key Aspects of the New Process

To begin this process, SOC neurologists help identify endovascular candidates by reviewing CT scans and CT angiograms and providing necessary guidance on which patients are appropriate candidates for endovascular intervention.

Once patients are identified as endovascular candidates, the WRMC stroke nurses make simultaneous calls to LV to alert and coordinate endovascular care and to LifeFlight to arrange for air transport.

The new process has had a positive impact on patient transport and coordination of endovascular intervention.

As a result of this new process:

- ✓ Within minutes of WRMC placing the transfer call, Lehigh Valley is better able to prepare for the arrival of the patient for treatment
- ✓ LifeFlight has the ability to mobilize immediately after receiving the stroke alert from WRMC’s ED
- ✓ Patients in need of endovascular intervention arrive in the endovascular suite at LV within the six hour window for intervention. DIDO times have also improved significantly (by almost 29%). This improvement increases the patient’s chance of receiving revascularization of the brain in a timely manner
- ✓ This revised process positively impacts patient throughput in the endovascular suite at Lehigh Valley Cedar Crest

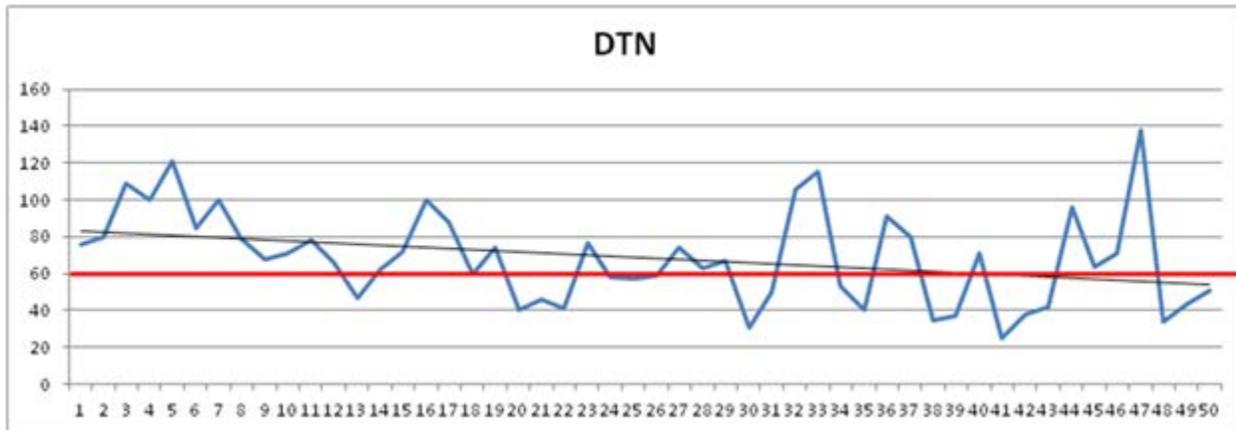
Mondell noted that with re-education of the WRMC ED staff and the roll-out of a multi-healthcare system approach to the transfer process, WRMC started sending patients to LV in the beginning of 2016 with a more coordinated workflow.

As a result, the medical center went from transferring two patients in 2015 to 27 patients in 2016 for endovascular interventions.

Results and Outcomes

Door to Needle Times:

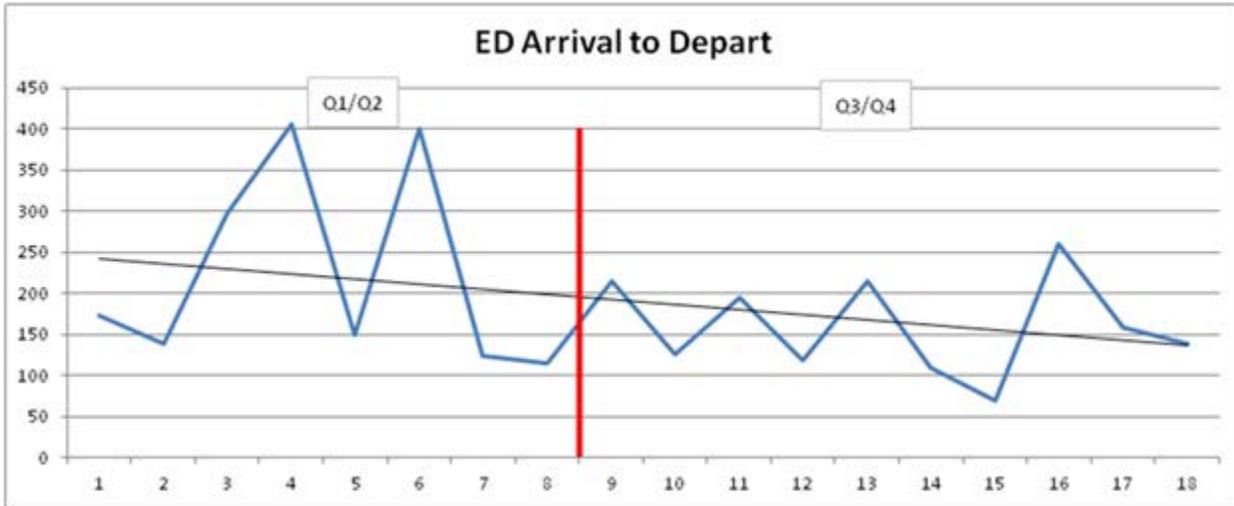
- Focus: DTN times ≤ 60 minutes for all patients receiving tPA
- **Goal: At least 50% of eligible tPA patients**
 - 2015 - 19% of patients under 60 minutes
 - 2016 - 55% of patients under 60 minutes
 - **Improvement - 36% more patients receive tPA within 60 minutes**



Door to Needle Time (Min)

Door In Door Out Times:

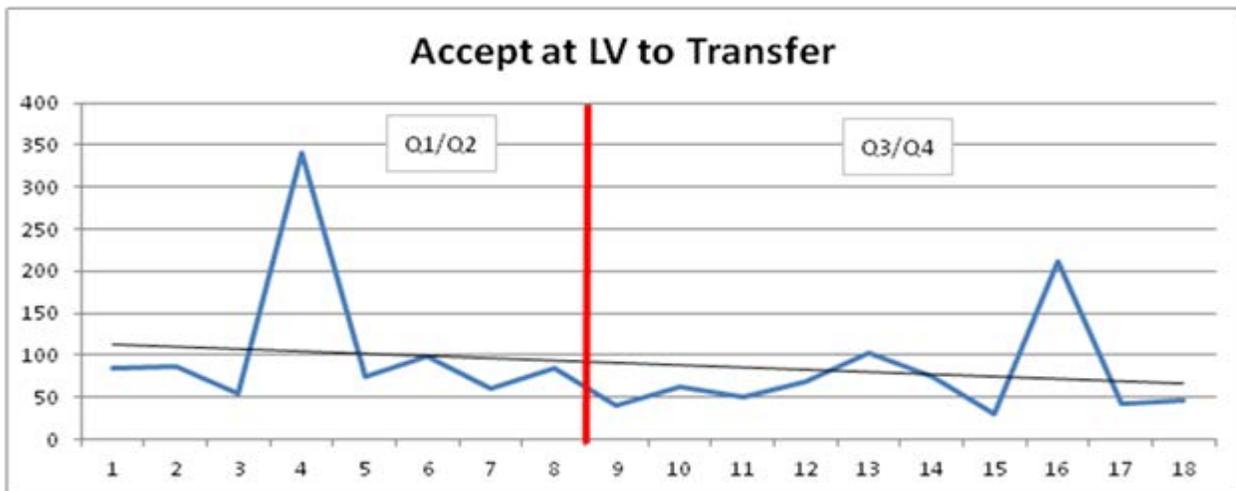
- Focus: Decrease DIDO times for patients who are transferred to LV
- Goal: **Decrease to 90 minutes or less**
 - 2016 Q1/Q2 - 225 minutes
 - 2016 Q3/Q4 - 160 minutes
 - **Improvement - 65 minutes or 29%**



ED Arrival to Depart to LV (Min)

Transfer Accepted from WRMC to LV:

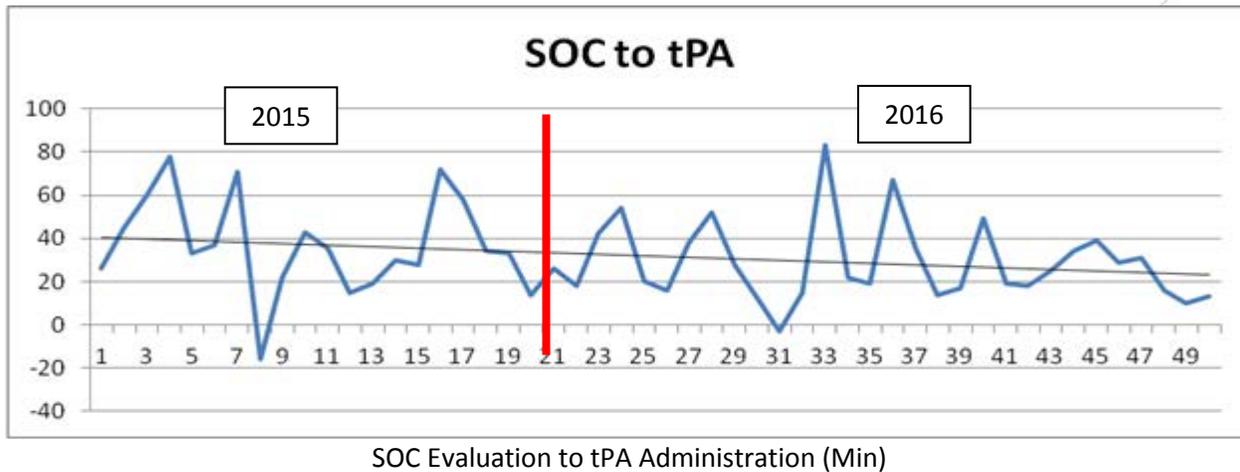
- Focus: Time of Transfer from ED to Accepted at LV
- Goal: **Decrease to 45 minutes or less**
 - 2016 Q1/Q2 - 110 minutes
 - 2016 Q3/Q4 - 73 minutes
 - **Improvement - 37 minutes or 34%**



Time of Transfer from ED to Accepted at LV (Min)

SOC Neurological Evaluation to tPA Administration:

- Focus: Time of SOC evaluation to tPA administration
- **Goal: 30 minutes or less**
 - 2015 - 36.33 minutes
 - 2016 - 28.69 minutes
 - **Improvement- 7.64 minutes or 21%**



Summary

Improving DTN and DIDO times for acute ischemic stroke patients has been a top priority and a work in progress at WRMC. With new guidelines and Joint Commission protocols, the quality and safety/stroke team at WRMC has continued to make strides in improving the delivery of emergency stroke care through the implementation of new, standardized processes and the development of close partnerships with regional healthcare systems.

The utilization of Specialist On Call's teleNeurology program has greatly expedited the assessment of patients coming into the ED with suspected stroke symptoms. Through SOC's tPA SpeedPass program, DTN times greatly improved and more stroke patients received comprehensive assessments and administration of tPA in a timely manner to improve outcomes.

This, coupled with the team's development of processes for ease in accessing tPA and supplies, and, having the SOC telemedicine cart waiting for the patient at the bedside, greatly improved the DTN times. The WRMC ED has seen DTN times improve significantly between 2015 and 2016, with 36% more patients receiving tPA within 60 minutes.

Further, with the transfer process for endovascular candidates standardized, WRMC's ED staff is able to act swiftly to initiate the transfer to Lehigh Valley's endovascular suite through Geisinger Medical Center's LifeFlight air transport, with a 29% improvement in DIDO times between 2015 and 2016.

Looking Ahead

WRMC's teleStroke program and new protocols for acute stroke patients has been making marked progress since 2016 and continues to move in the right direction to improve the care, as well as the clinical outcomes, for emergent stroke patients.

Mondell and WRMC's interdisciplinary process improvement team are determined to continue the good work to maintain and improve upon the results that they have accomplished to date.

"The challenge for us now is to maintain the improvements we have put in place and simultaneously continue to track, analyze, and determine what other changes we would like to implement," says Mondell. "We remain committed to continually improving our processes and workflows to provide the best possible care, outcomes and experience for our patients."