

NK5a – EVIDENCE-BASED PRACTICE

IMPLEMENTING REVISED POST-STROKE MONITORING GUIDELINES DURING THE COVID-19 PANDEMIC SURGE

Provide one example, with supporting evidence, of how a clinical nurse(s) implemented an evidence-based practice that is new or a revision to existing practice within the organization.

The primary intervention for acute stroke is intravenous thrombolysis (IVT) with recombinant tissue plasminogen activator (tPA). However, it carries an inherent risk of systemic and intracranial hemorrhage, a potentially life-threatening complication. Consequently, current recommendations advocate for close monitoring of all post-IVT patients for at least 24 hours, involving frequent vital sign checks and neurological assessments. The frequency of checks is precisely outlined by consensus guidelines, with protocols dictating assessments every 15 minutes for the initial two hours, followed by intervals of 30 minutes for the subsequent six hours, and hourly thereafter, an established standard of care adopted by NewYork-Presbyterian/Columbia University Irving Medical Center (NYP/Columbia). This post-IVT monitoring, although essential, demands considerable resources, often necessitating one-to-one nursing, thereby contributing to the escalating burden of COVID-19. [NK5a.1—SOC 160 Ischemic Stroke Standard of Care Policy, Appendix A](#)

Revising the Post-Stroke Monitoring Guidelines, An Evidence-Based Practice

Since the start of the COVID-19 pandemic in early March 2020, members of the NYP/Columbia Stroke Performance Evaluation in Every Department (SPEED) Committee engaged in multiple discussions to strategize on operations, resource distribution, staff utilization, ICU bed management, telemedicine integration, and other crucial aspects. These deliberations aimed to ensure the delivery of optimal care for stroke patients in the setting of the COVID-19 pandemic.

Due to the overwhelming strain of the COVID-19 pandemic, it became apparent to the SPEED Committee that adjustments needed to be made for judicious and safe stroke care. Joshua Willey, MD, MS, Medical Director, Comprehensive Stroke Center, became aware of a study first published in 2019, involving patients with acute stroke who received IVT who were safely care for utilizing a low-intensity monitoring protocol. He shared the research, *Safety Trial of Low-Intensity Monitoring After Thrombolysis: Optimal Post Tpa-iv Monitoring in Ischemic STroke (OPTIMIST)*, with SPEED Committee members Cris Perdomo, MSN-Ed, RN, Program Administrator, Neurology Administration, and Allie Pacsi, PhD, DNS, FNP, RN, CCRN, CEN, clinical nurse, ED (606045-46-48) [ED]. This was the only evidence available at the time that could support a temporary revised stroke protocol. Ms. Perdomo and Dr. Pacsi reviewed the research to determine the relevance to nursing practice and the role of nurses in the safe implementation of the temporary revised protocol. The key points from their review of the OPTIMIST trial (Faigle et al, 2020) included the following:

- The low-intensity monitoring protocol is identical to the standard of care protocol only in the first two hours after IVT bolus administration, and thereafter transitions to every one-hour monitoring for one hour, every two-hour monitoring for eight hours, followed by every four-hour monitoring until 24 hours post IVT are complete.
- Complications requiring ICU care are relatively uncommon in patients with a National Institutes of Health Stroke Scale (NIHSS) score of less than 10, which signifies moderate stroke.
- Frequent vital sign checks and neurological assessments, in line with current standards of care, demand one-to-one nursing care in an intensive care, step-down, or stroke designated unit. During periods of growing resource limitation, adopting a low-intensity protocol may release nursing resources and allow for the redistribution of critical care resources.

With nursing input from Ms. Perdomo and Dr. Pacsi, Dr. Willey and Babak Navi, MD, MS, Medical Director, Stroke Center, NewYork-Presbyterian/Weill Cornell Medical Center, drafted the NewYork-Presbyterian (NYP) Post-Stroke Monitoring During COVID-19 Pandemic Surge Guidelines on March 24, 2020. The temporary revised post-stroke monitoring protocol recommended neurological and vital sign checks every 30 minutes for two hours, then every hour for two hours, then every two hours for eight hours. After the first 12 hours, the monitoring could be conducted every two to six hours depending on patient status. If the patient was COVID-19 positive, less frequent neurological and vital sign checks might be done as appropriate. Furthermore, the temporary revised post-stroke monitoring protocol established criteria for patient disposition and introduced adjusted patient monitoring parameters. Dr. Willey and Dr.

Navi proposed the temporary revised protocol to the Departments of Neurology, Emergency Medicine, Interventional Neuroradiology, Neurocritical Care, and Neurosurgery, and the organization's leaders, legal staff, and nursing leader throughout the NYP enterprise. The temporary revised protocol was approved and took effect on March 30, 2020. [NK5a.2—OPTIMIST Study and NYP Revised Post-Stroke Monitoring Guidelines](#)

On March 31, 2020, the American Heart Association/American Stroke Association (AHA/ASA) Stroke Council published *Temporary Emergency Guidance to U.S. Stroke Centers During the Coronavirus Disease 2019 (COVID-19) Pandemic*:

The AHA/ASA Stroke Council (2020), "...wish to reassure stroke teams—that in the setting of the pandemic full compliance has become a goal, not an expectation. Across the wide variety of health care delivery systems in our country, full compliance with all guidelines cannot happen at all times in every locality. We further wish to distinguish patient selection/treatment from logistic or process compliance. Patients who qualify for treatment will benefit, even if every single vital sign cannot be acquired post thrombolysis, for example. Teams must use their judgement, guided by local realities, and continue to try to treat as many acute stroke patients as possible."

This further supported NYP's Post-Stroke Monitoring Guidelines. The temporary revised protocol was communicated to all teams at tier huddles. On April 2, 2020, Haofei (Faye) Wang, DNP, RN, NEA-BC, Senior Director, Professional Nursing Practice, NewYork-Presbyterian, released a practice alert via email to all nurses across the NYP enterprise, including NYP/Columbia regarding the revisions. The implementation of NYP's Post-Stroke Monitoring During COVID-19 Pandemic Surge Guidelines was reported at the SPEED Committee meeting on April 22, 2020. [NK5a.3— AHA/ASA Temporary Emergency Guidance, NYP Practice Alert, and April 2020 SPEED Committee Meeting Minutes](#)

Clinical Nurses Implementing the Revised Post-Stroke Monitoring Guidelines

On May 3, 2020, Ms. XX, a 54-year-old woman, recent former smoker with hypertension and hyperlipidemia, presented to the ED at NYP/Columbia via Emergency Medical Services (EMS) at 9:22 pm with sudden onset of right sided deficit and loss of speech 30 minutes prior to arrival. The patient was triaged to an Emergency Severity Index (ESI) level 2, signifying high risk of deterioration or a time-critical problem. Von Patrick Esmana, BSN, RN, clinical nurse, ED (at the time), activated a stroke page at triage. Sasha Reynoso, BSN, RN, clinical nurse, ED, completed the initial vital signs monitoring, neurological assessment, and the National Institutes of Health (NIH) Stroke Scale assessment. The patient was then evaluated by a neurologist. A computed

tomography (CT) scan was completed, which was negative for acute bleed or signs of acute stroke. The patient met eligibility criteria for thrombolysis and was treated with IV alteplase at 10:02 pm (door-to-treatment was 42 minutes from arrival).

Ms. Reynoso and Rebecca Goldstein, MSN, RN, clinical nurse, ED (at the time), monitored the patient in the ED using the revised Post-Stroke Monitoring Guidelines between 10:00 pm and 2:00 am on May 4, 2020, with monitoring frequency of every 30 minutes for two hours, and every hour for two hours. The patient was then admitted to the Surgical Stepdown (5GN-605427) [5GN] Unit (a cardiac stepdown unit) at 2:42 am. At this point, the clinical nurses were implementing every two-hour monitoring. Sara Radmard, MD, neurology resident, assisted the clinical nurses on 5GN with the neuro assessments at 4:11 am and 6:00 am, including the care of the stroke patient post-IVT as this unit was not one of the neurology or stroke designated units. This MD/RN collaboration was part of the workflow during this unprecedented time when stroke patients were admitted to non-neurology or stroke-designated units. Clinical nurses Anjana Mathew, BSN, RN, PCCN, and Margaret Quattlander, BSN, RN, 5GN, completed the first 12 hours of monitoring at 9:00 am as per the revised Post-Stroke Monitoring Guidelines. The monitoring frequency then changed to every six hours and was completed at 4:00 pm by Ms. Quattlander.

Once a patient bed became available on a neurology unit, the patient was transferred to the Neuro Medical (8HN-605128) [8HN] Unit at 9:00 pm. Samuel Yoo, BSN, RN, CNRN, clinical nurse, 8HN, completed the revised post-stroke monitoring at the time of transfer. The patient continued to be monitored per physician orders. She did not require transfer to a higher level of care nor did she develop hemorrhagic transformation. She had mild residual right arm/hand weakness 24 hours post-IVT and was subsequently discharged to home on May 5, 2020. [NK5a.4—Documentation of Implemented Revised Guidelines](#)

The NYP Post-Stroke Monitoring During COVID-19 Pandemic Surge Guidelines, an evidence-based temporary revised stroke protocol, remained in effect until June 30, 2020.

Clinical Nurses Retrospectively Evaluate the Revised Post-Stroke Monitoring Guidelines

Ms. Perdomo, Dr. Pacsi, Dr. Willey, and Kyra Lizardo, MSN, RN, FNP-BC, stroke nurse practitioner, conducted a retrospective data review of patients who presented in the ED with stroke symptoms and were treated with IVT between March 30, 2020, and June 30, 2020. The goal of this quality improvement project was to retrospectively evaluate patient outcomes after the implementation of the revised Post-Stroke Monitoring Guidelines during the COVID-19 pandemic surge. They focused on whether patients required a higher level of care or developed hemorrhagic transformation post

IVT. The sample consisted of 10 patients (60 percent female) with a median age of 54 years (range 37 to 73 years old). The length of stay ranged from two to 12 days. Two patients (20 percent) were SARS-CoV-2 positive. The findings were that zero patients developed hemorrhagic transformation and zero patients admitted to non-ICU units required critical care transfer or interventions within 24 hours of receiving IVT. Six (60 percent) of the patients were discharged to home. From the study, Ms. Perdomo, Dr. Pacsi, Dr. Willey, and Ms. Lizardo concluded that the temporary guidelines were effective, safe, feasible, and could be adopted again should there be another public health emergency. They presented their findings at the 2021 International Stroke Conference in March 2021. [NK5a.5—2021 ISC Poster](#)

Key References

AHA/ASA Stroke Council Leadership. (2020). Temporary Emergency Guidance to US Stroke Centers During the Coronavirus Disease 2019 (COVID-19) Pandemic: On Behalf of the American Heart Association/American Stroke Association Stroke Council Leadership. *Stroke*, 51(6), 1910–1912.
<https://doi.org/10.1161/STROKEAHA.120.030023>

Faigle, R., Butler, J., Carhuapoma, J. R., Johnson, B., Zink, E. K., Shakes, T., Rosenblum, M., Saheed, M., & Urrutia, V. C. (2020). Safety Trial of Low-Intensity Monitoring After Thrombolysis: Optimal Post Tpa-Iv Monitoring in Ischemic STroke (OPTIMIST). *The Neurohospitalist*, 10(1), 11–15.
<https://doi.org/10.1177/1941874419845229>

TITLE: ISCHEMIC STROKE STANDARD OF CARE

APPLICABILITY:

Population Served:

- Adult**
- Psychiatry
- Obstetrics
- Pediatrics

Care Setting

- Ambulatory Care (clinic based)
- Critical Care-including PACU**
- Emergency Department**
- Inpatient Non-Critical Care**
- Procedure/Diagnostic Area
- Periop
- Step-down**

NURSING DIAGNOSIS/PROBLEM DESIRED OUTCOME

1. Nursing Diagnosis:

Ineffective tissue perfusion, due to interruption of arterial flow.

Outcome: Patient will have adequate cerebral tissue perfusion.

Interventions:

- 1) Assess neurologic status per Physician/NP/PA orders (refer to appendix A) including but not limited to:
 - Level of consciousness
 - Mental status/alertness/sedation
 - Pupillary responses
 - Motor function/symmetry
 - Sensory function/symmetry
 - Speech pattern
 - Monitor patient's ability to swallow
 - Notify Physician/NP/PA of changes in neuro status
- 2) Perform the National Institute of Health Stroke Scale (NIHSS) on admission, and with any change in neurologic status. (The NIHSS can be completed by an RN, Physician, NP or PA).
- 3) Maintain BP, HR, temperature parameters in collaboration with medical team. Monitor for arrhythmia. Place patient on telemetry as ordered.
- 4) Monitor for fever, elevated WBCs. Monitor serum sodium levels.
- 5) The stroke patient's head must be positioned in neutral alignment with the body and elevate head of bed at 25-30 degrees to aid patient in handling oral secretions unless ordered otherwise by Physician/NP/PA.

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

- 6) Administer antithrombotic (anticoagulants or antiplatelet) or thrombolytic as ordered. Refer to **Nursing Clinical Standard [PROT 1802 Bleeding Precautions Protocol](#)**.
- 7) For IV thrombolytic (alteplase/tPA) or IA Thrombectomy patient monitoring refer to Appendix A. Additionally, refer to **Hospital Policies [S180 Alteplase tPA Guidelines for Acute Ischemic Stroke \(refer to Appendix A\)](#)** and **[S196 Acute Stroke Endovascular Therapy Algorithm](#)**.
 - Monitor patient for signs and symptoms of angioedema and bleeding following thrombolytic treatment.
- 8) VTE prophylaxis: Apply mechanical/sequential pneumatic compression stockings and/or pharmacological prophylaxis per Physician/NP/PA order upon admission.
- 9) Monitor hemodynamics and administer anti-hypertensive to maintain BP parameters as ordered.
- 10) Anticipate imaging studies: CT, MR, TTE, TEE. Patient is maintaining NPO status for TEE as ordered.
- 11) Monitor for increased intracranial pressure, cerebral edema.
 - a) Early signs of increased ICP: decreased level of consciousness, deterioration in motor function, headache, visual disturbances, changes in blood pressure or heart rate, changes in respiratory pattern
 - b) Late signs of increased ICP: pupillary abnormalities, more persistent changes in vital signs, changes in respiratory pattern.

Notify Physician/NP/PA with any change in neurological status and perform NIHSS, neurological assessment and vital signs.

2. Nursing Diagnosis:

Ineffective airway and breathing pattern, related to stroke.

Outcome: Patient will have a patent airway and adequate oxygenation.

Interventions:

- 1) Assess airway, breathing, and circulation. Assess vital signs, refer to **Nursing Clinical Standard [CC 1825 Adult Patient Protocol](#)** or as per Physician/NP/PA orders, including
 - respiratory rate
 - breath sounds
 - shortness of breath
 - skin color
 - level of consciousness

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

- 2) Verify bag mask valve is present.
- 3) Obtain pulse oximetry. Keep pulse oximetry $\geq 94\%$ as appropriate.
Administer oxygen as ordered.
- 4) Suction as needed.
- 5) Obtain at least 2 PIV, especially prior to alteplase administration.

3. Nursing Diagnosis:

Potential for ineffective glycemic control, related to altered metabolism/stress/ inability to take oral and imbalanced nutrition: less than body requirements related to dysphagia.

Outcome: Patient will have adequate nutritional intake and maintain optimal blood glucose.

Interventions:

- 1) Obtain initial blood glucose as per Physician/NP/PA order and notify Physician/PA/NP. Treat glucose according to blood glucose goal determined by care team.
- 2) Perform dysphagia Screen (by RN or Physician/NP/PA) upon admission prior to any oral intake (including medications) and with any neurological decline, refer to **Hospital Policy [S182 Dysphagia Screen](#)**.
- 3) Follow speech language pathology consult recommendations related to swallowing, safe feeding strategies, and possible need for dysphagia diet. Recommendations such as diet changes require a Physician/NP/PA order. Provide parenteral or enteral nutrition as ordered.
- 4) Assess Intake and Output as ordered by Physician/NP/PA.
- 5) Position patient in high Fowler position for meals and at least 30minutes after intake. Avoid allowing patient to drink thin fluid from straw while lying flat in bed.
- 6) Perform oral care 30 minutes prior to intake to facilitate sensation and saliva production. Provide oral care after oral intake to minimize microbial count and observe for food pocketing.
- 7) Obtain weight at least once a week to assess for adequate nutrition
- 8) Determine need for nutritional consult.

4. Nursing Diagnosis:

Impaired physical mobility related to stroke.

Outcome: Patient will achieve optimal level of mobility.

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

Interventions:

- 1) Assess patient mobility and level of function every shift and as needed. Passive or active range of motion can be started for first 24-hours post-stroke with approval of provider.
- 2) Position patient to minimize dependent edema.
- 3) Refer to **Nursing Clinical Standard [PROT 1860 Pressure Injury Prevention Protocol](#)** and **Hospital Policy [F200 Fall and Injury Prevention](#) (inpatient)**.
- 4) Assist with mobilization as early as feasible and progressive ambulation in conjunction with care team, occupational and physical therapy
- 5) Obtain Blood Pressure reading when lying, sitting, and standing the patient for the first time. Monitor for changes in vital signs.
- 6) Encourage patient and family members to assist with activities of daily living.
- 7) Prevent complications from immobility such as VTE and muscle atrophy.
- 8) Collaborate with PT/OT to maintain neglected/affected extremities in functional position, and institute mobility plan to functional limb recovery. Collaborate with PT/OT to maintain splints and orthotic devices as ordered.
- 9) Promote quiet environment with pain management, refer to **Hospital Policy [P101 Pain Management](#)**

5. Nursing Diagnosis:

Impaired verbal communication, related to cerebral injury.

Outcome: Patient will be able to communicate.

Interventions:

- 1) Assess patient communication abilities every shift & with any neurological change
- 2) Obtain order for speech therapy consult when indicated.
- 3) Implement appropriate methods for communication (i.e. alphabet board, flash cards).

6. Nursing Diagnosis:

Risk for urinary retention, related to neuromuscular impairment.

Outcome: Patient will maintain bladder regimen appropriate to neurological status.

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

Interventions:

- 1) Assess patient for urine retention and incontinence **every 4 hours** and as needed. Use bladder scanner if available to assess residual volumes.
- 2) Monitor for fever, elevated WBCs.
- 3) Offer bedpan/urinal **every 4 hours** and as needed.
- 4) Consider intermittent catheterization for patients with urinary retention in discussion with Physician/NP/PA.
- 5) Refer to **Nursing Clinical Standards [PROT 2006 Urinary Catheter: Application/Insertion, Removal, Management, and Irrigation](#) and [PROC 617 Bladder Scan Procedure](#)** as appropriate.

7. Nursing Diagnosis:

Constipation related to decreased activity and neuromuscular impairment.

Outcome: Patient will regain/maintain usual bowel pattern.

Interventions:

- 1) Assess and record character and frequency of bowel movements every shift and as needed.
- 2) Encourage early mobilization to bathroom as early as feasible, in conjunction with patient's recovery regimen.
- 3) Collaborate with team to institute a bowel regimen appropriate to current patient status.
- 4) Encourage adequate fluid intake, if not contradicted and as ordered.

8. Nursing Diagnosis:

Disturbed body image related to loss of body function.

Outcome: Patient will adapt to an altered appearance and disabilities.

Interventions:

- 1) Assess patient/family/significant other for fears of loss of independence, loss of control of body functions, depression, suicidal ideation, and permanent disabilities.
- 2) Encourage verbalization and expression of feelings.
- 3) Explain to the patient/family/significant other that the rehabilitation process is gradual.
- 4) Discuss with interdisciplinary team referral to appropriate services/social services as needed i.e., Psychiatry, Social Work/Care Coordination, Home Care, rehabilitation facilities, pastoral care and education.

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

9. Nursing Diagnosis:

Deficient knowledge, related to the disease process, treatment and discharge plan.

Outcome: Patient/family will articulate and demonstrate understanding of disease process, treatment and discharge plan.

Interventions:

- 1) Assess the knowledge base of the patient/family for capacity and readiness for learning.
- 2) Using teach back educate the patient/family regarding the following:
 - a. Use the "BE FAST" acronym:
 - **B**alance: Does the person have a sudden loss of balance
 - **E**yes: Has the person lost vision in one or both eyes
 - **F**ace: Does the person's face look uneven
 - **A**rms: Is one arm hanging down
 - **S**peech: Is the person's speech slurred. Does the person have trouble speaking or seem confused?
 - **T**ime: Call 911, stroke is a medical emergency
 - b. Personal modifiable risk factors
 - Education should be individualized based on the patient's history and stroke risk factors.
 - c. How to activate EMS in case of stroke/TIA.
 - d. Verify that the patient/family is competent with medication management at home: Name, purpose, dosage, route of administration, frequency and side effects of medications. Emphasize adherence.
 - e. Patient/family should fully understand progressive activity plan.
 - f. Current diet and when appropriate aspiration risk.
 - g. Follow up plan.
- 3) Refer to appropriate services for continuing care needs.
- 4) Reinforce the importance of follow-up appointments.
- 5) Reinforce interventions suggested by therapists used for sensory and motor deficits as appropriate to patient condition.
- 6) Provide Stroke Education Materials.
- 7) Document stroke education in the Patient in the Education Flowsheet.

RESPONSIBILITY: Neuroscience Nursing, Critical Care

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

Related Policy Link:

Hospital Policy S181 [Algorithm For The Evaluation Of Acute Stroke For Adults](#)

REFERENCES:

Tadi, P., Lui, F., & Budd, L. A. (2021). Acute Stroke (Nursing). In: StatPearls. StatPearls Publishing, Treasure Island (FL); Available from <https://www.ncbi.nlm.nih.gov/books/NBK568693> PMID: 33760452. Accessed January 4, 2022

https://cpr.heart.org/-/media/CPR-Files/CPR-Guidelines-Files/Highlights/Hghlights_2020_ECC_Guidelines_English.pdf

Powers WJ, Rabinstein AA, Ackerson T, et al. Guidelines for the early management of patients with acute ischemic stroke: 2019 update to the 2018 guidelines for the early management of acute ischemic stroke. Stroke. (2019);50:e344-e418.

Urden, L.D., Stacy, K.M., Lough, M.E., (2021). Critical Care Nursing: Diagnosis and Management, 9e (Thelans Critical Care Nursing Diagnosis) Mosby.

KEY WORDS: Stroke, Ischemic Stroke, CVA, TIA, Immobility, Speech Impairment, dysphagia, IV TPA, IA TPA, INR, thrombectomy

APPROVALS:

Department	Approver's Name	Title	Date
Nursing	Wilhelmina Manzano, MA, RN, NEA-BC, FAAN	Group Senior Vice President Chief Nursing Executive Chief Operating Officer, Perioperative Services	1/2023

Committee	Date approved
Cross-Campus Nursing Practice Council	1/2023

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

TITLE: ISCHEMIC STROKE STANDARD OF CARE

APPENDIX A: Stroke Patient Assessment/Reassessment:

Post Procedure / Admission Orders	Vitals Signs (BP/HR/RR/SPO2)	Puncture/Site Checks/ Pulse/Extremity Checks	Neuro Assessment	NIHSS
IV tPA (1st 24 hrs)	Q 15mins x2 hrs Q 30mins x6 hrs Q 1h x16 hrs Then follow admission orders	N/A	Q 15mins x2 hrs Q 30mins x6 hrs Q1h x16 hrs Then follow admission orders	On Admission, Change in Neuro status
Thrombectomy/IA tPA (1st 24 hrs)	Q 15mins x2 hrs Q 30mins x6 hours Q 1h x16 hours Then follow admission orders	Q 15mins x 4 Q 30 mins x 4 Q 1 hr x 4 Then Q 12hrs	Q 15mins x2 hrs Q 30mins x6 hrs Q 1h x16 hrs Then follow admission orders	On Admission, Change in Neuro status
Stroke Admission Orders: Ischemic/TIA	Q 1 hr ICU	N/A	Q 1 hour ICU	On Admission, Change in Neuro status (Ischemic and TIA)
	Q 2 hrs Step-down	N/A	Q 2 hrs Step-down	On Admission, Change in Neuro status (Ischemic and TIA)
	Q 4 hrs Floor (for 1 st 24 hrs) Q 6 hrs (after 1 st 24 hours) Or as per Physician/NP/PA orders	N/A	Q 4 hrs Floor (for 1 st 24 hrs) Q 6 hrs (after 1 st 24 hours) Or as per Physician/NP/PA orders	On Admission, Change in Neuro status (Ischemic and TIA)

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

Pre/Post Procedure Orders	Vitals Signs (BP/HR/RR/SPO2)	Puncture/Site Checks/ Pulse/Extremity Checks	Neuro Assessment	NIHSS
<p>IN INR</p> <p>Thrombectomy/IA tPA</p>	<p>Pre Procedure Per Unit Protocol</p> <p>Post procedure Q 15mins x2 hrs Q 30mins x6 hrs Q 1h x16 hrs</p>	<p>Prior to start of procedure Pulse check</p> <p>Post procedure: Puncture/Site, Pulse/Extremity checks Q15 mins x4 Q30 mins X4 Q1 1hr x4</p> <p>And Documentation of hemostasis post procedure</p>	<p>Prior to start of procedure</p> <p>Post procedure: Q 15mins x2 hrs Q 30mins x6 hrs Q 1h x16 hrs</p>	<p>Prior to start of procedure, Change in Neuro status</p>

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

ISCHEMIC STROKE STANDARD OF CARE, CONT'D

Peripheral vascular (puncture/site, pulse/extremity) checks include but not limited to:

- Site check
- Distal pulses
- Temperature of digits
- Color of extremity
- Sensation of extremity
- Capillary refill
- Movement of digits
- Integrity of dressing

Policy Dates:

New: N/A

Supersedes Policy Number: SOC 160

Revised: N/A

Reviewed: 1/2023 (Adopted by NYP-BMH 10/2022)

Date Approved: 1/2023

Last approved date: 1/2022

Safety Trial of Low-Intensity Monitoring After Thrombolysis: Optimal Post Tpa-Iv Monitoring in Ischemic Stroke (OPTIMIST)

The Neurohospitalist
2020, Vol. 10(1) 11-15
© The Author(s) 2019
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/1941874419845229
journals.sagepub.com/home/NHO


Roland Faigle, MD, PhD¹, Jaime Butler, RN, MS¹, Juan R. Carhuapoma, MD²,
Brenda Johnson, DNP, CRNP-BC, ANVP¹, Elizabeth K. Zink, MS, RN³,
Tenise Shakes, RN³, Melissa Rosenblum, RN, BSN, CNRN³,
Mustapha Saheed, MD⁴, and Victor C. Urrutia, MD¹

Abstract

Background and Purpose: At present, stroke patients receiving intravenous thrombolysis (IVT) undergo monitoring of their neurological status and vital signs every 15 minutes for the first 2 hours, every 30 minutes for the next 6 hours, and every hour thereafter up to 24 hours post-IVT. The present study sought to prospectively evaluate whether post-IVT stroke patients with low risk for complications may safely be cared for utilizing a novel low-intensity monitoring protocol. **Methods:** In this pragmatic, prospective, single-center, open-label, single-arm safety study, we enrolled 35 post-IVT stroke patients. Adult patients were eligible if their NIH Stroke Scale (NIHSS) was less than 10 at the time of presentation, and if they had no critical care needs by the end of the IVT infusion. Patients underwent a low-intensity monitoring protocol during the first 24 hours after IVT. The primary outcome was need for a critical care intervention in the first 24 hours after IVT. **Results:** The median age was 54 years (range: 32-79), and the median pre-IVT NIHSS was 3 (interquartile range [IQR]: 1-6). None of the 35 patients required transfer to the intensive care unit or a critical care intervention in the first 24 hours after IVT. The median NIHSS at 24 hours after IVT was 1 (IQR: 0-3). Four (11.4%) patients were stroke mimics, and the vast majority was discharged to home (82.9%). At 90 days, the median NIHSS was 0 (IQR: 0-1), and the median modified Rankin Scale was 0 (range: 0-6). **Conclusion:** Post-IVT stroke patients may be safely monitored in the setting of a low-intensity protocol.

Keywords

thrombolysis, critical care needs, low-intensity monitoring, safety study

Introduction

Ischemic stroke is a leading cause of disability and mortality in the United States.^{1,2} Intravenous thrombolysis (IVT) with recombinant tissue plasminogen activator is the cornerstone of acute stroke therapy, however, harbors the risk of systemic and intracranial hemorrhage as a potential life-threatening complication.³ Therefore, it is currently recommended that all patients undergoing IVT are closely monitored for at least 24 hours with frequent vital sign checks and neurological assessments.⁴ Not uncommonly, post-IVT care occurs in a critical care environment, such as an intensive care unit (ICU) or a stroke unit with ICU-like capabilities. The frequency of vital sign checks and neurological assessments is strictly protocolized as per consensus guidelines on post-IVT care, mandating checks every 15 minutes for the first 2 hours, every 30 minutes for the next 6 hours, and every hour thereafter as part of the current

standard of care.^{5,6} Post-IVT monitoring is resource intensive and commonly requires one-to-one nursing, resulting in increased health-care costs. In resource-limited settings,

¹ Department of Neurology, Johns Hopkins University School of Medicine, Baltimore, MD, USA

² Division of Neurosciences Critical Care Medicine, Department of Anesthesiology and Critical Care Medicine, The Johns Hopkins Hospital, The Johns Hopkins University, Baltimore, MD, USA

³ Department of Neuroscience Nursing, The Johns Hopkins Hospital, The Johns Hopkins University, Baltimore, MD, USA

⁴ Department of Emergency Medicine, Johns Hopkins University, Baltimore, MD, USA

Corresponding Author:

Victor C. Urrutia, Department of Neurology, Johns Hopkins University, 600 N Wolfe Street, Phipps 481, Baltimore, MD 21287, USA.
Email: vurruti1@jhmi.edu

post-IVT monitoring may tie-up valuable hospital resources, including critical care beds.

At present, it is unknown if high-intensity monitoring is necessary for all post-IVT patients. In a previous retrospective study, we have shown that complications and need for ICU care are exceedingly rare in post-IVT patients presenting with an NIH Stroke Scale (NIHSS) <10 and who are otherwise free of complications by the end of their IVT infusion.⁷

The present study sought to prospectively evaluate whether post-IVT stroke patients with low NIHSS who do not require critical care by the end of the IVT infusion may safely be cared for by utilizing a low-intensity monitoring protocol. We hypothesized that these patients are at low risk for complications and that monitoring these patients under a low-intensity monitoring protocol will be feasible and safe.

Methods

Study Design, Setting, and Participants

The Optimal Post Tpa-Iv Monitoring in Ischemic STroke trial is a pragmatic, prospective, single-center, open-label, single-arm safety study conducted at Johns Hopkins Hospital. The study site is a comprehensive stroke center certified by The Joint Commission, and IVT is administered in the emergency department (ED) according to American Heart Association guidelines.⁴ We enrolled 35 patients with acute stroke who received IVT between March 1, 2014, and March 31, 2018 (Supplemental Figure 1). Patients were eligible if they were between ages 18 and 80, if their NIHSS was less than 10 at the time of presentation and at the end of the IVT infusion, and if they had no critical care needs by the end of the IVT infusion. The practice at our institution has been that only patients with disabling symptoms are offered IVT. Patients who underwent endovascular therapy were excluded. This study was approved by the institutional review board of Johns Hopkins University School of Medicine. This study was registered at clinicaltrials.gov (NCT02039375).

Low-Intensity Monitoring Protocol

During the IVT infusion and in the first hour after IVT completion, patients underwent vital sign checks and neurological assessments every 15 minutes according to the current standard of care. Patients were then transferred to our stroke unit, a telemetry unit with a nurse-to-patient ratio of 1:3, but without critical/intermediate care capabilities. Our stroke unit is staffed by stroke-trained nurses; however, nurses do not have expertise, training, or experience in critical/intermediate care. Monitoring under the low-intensity protocol commenced at the time of the patients' arrival in our stroke unit. The protocol is comprised of vital sign checks and neurological assessment on admission to the stroke unit, then 1 hour after admission, then every 2 hours for another 8 hours, followed by vital sign checks and neurological assessments every 4 hours until 24 hours post IVT are complete. We aimed to transfer all patients to our stroke unit

from the ED by the end of the first hour after IVT completion. Patients who could not immediately be transferred to our stroke unit by 1 hour post IVT (ie, due to bed availability) were monitored in the ED under the current standard of care until the time of transfer. At completion of the protocol, 24 hours post IVT, patients were cared for according to the current standard of care. Figure 1 outlines the low-intensity monitoring schedule and juxtaposes the current standard of care post-IVT monitoring schedule for the first 24 hours after IVT.

Primary Outcome, Follow-Up, and Secondary Outcomes

The primary outcome was need for a critical care intervention in the first 24 hours after IVT, or perceived need to transfer the patient to the ICU even if no actual critical care intervention was performed. Secondary outcomes included NIHSS at 24 hours, NIHSS and modified Rankin Scale (mRS) at discharge, and NIHSS and mRS at 90 days.

Infarct Volume Measurements

Quantitative analysis of infarct volumes on post-IVT magnetic resonance imaging was performed by using a commercially available segmentation software integrated into Picture Archiving and Communication System (PACS) (Carestream Health, Rochester, New York) to obtain a semiautomated infarct segmentation. In this approach, the user measures the longest diameter of each lesion on the diffusion-weighted MR image, and then the software segments the lesion volumetrically. This is followed by visual inspection and manual correction by the user to obtain the final infarct volume.

Statistical Analysis

Baseline demographics, comorbidities, medication use, stroke severity measures, physiological/laboratory parameters, and outcome data were assessed using descriptive statistics. Frequencies are reported for categorical variables; continuous variables are presented as medians with interquartile range (IQR), means, or range. Statistical analysis was performed using Stata version 15 (Stata Statistical Software: Release 15, College Station, Texas).

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Results

Patient Characteristics

The median age was 54 years (range: 32-79; Table 1); 21 (60.0%) patients were male. The median pre-IVT NIHSS was 3 (IQR: 1-6; range 0-9), and the median admission systolic blood pressure was 157 mm Hg (IQR: 140-177 mm Hg). Twenty-three

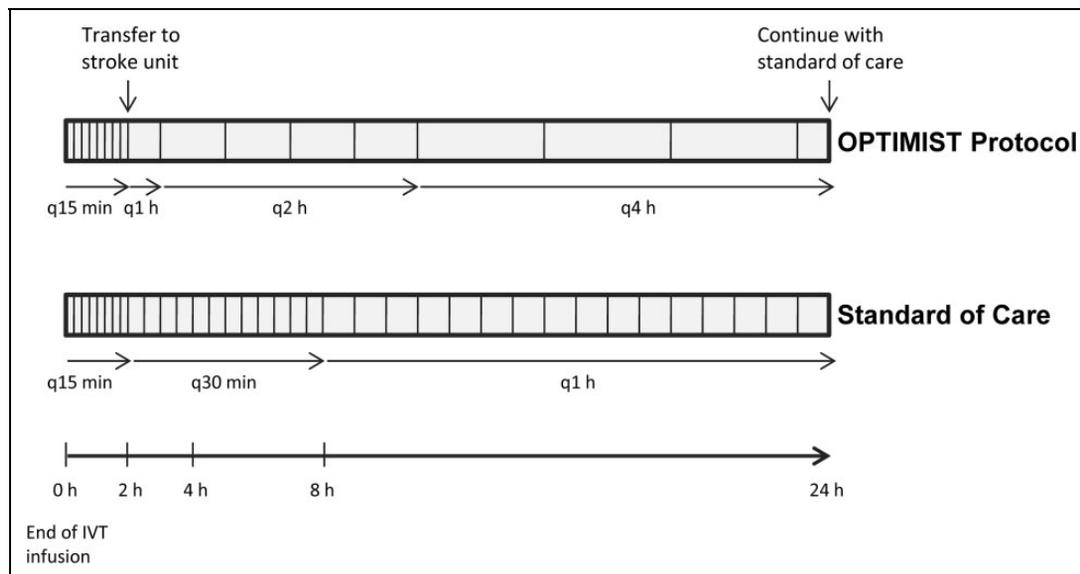


Figure 1. Diagram illustrating the frequency of vital sign checks and neurological assessments under the Optimal Post Tpa-iv Monitoring in Ischemic Stroke (OPTIMIST) low-intensity monitoring protocol versus current standard of care.

(65.7%) of 35 patients were treated within 3 hours from last known well. The median time from end of IVT infusion to transfer out of the ED was 109 minutes (IQR: 60-153 minutes). There were no intracranial large vessel occlusions; however, one patient had an extracranial occlusion of the internal carotid artery (ICA) in the setting of a dissection, and another had a symptomatic high-grade ICA stenosis. Four (11.4%) patients were stroke mimics, and the vast majority was discharged home (82.9%). There were no in-hospital deaths. Further characteristics of the study population are presented in Table 1.

Primary and Secondary Outcomes

Study outcomes are summarized in Table 2. None of the 35 patients required transfer to the ICU or a critical care intervention in the first 24 hours after IVT. Two patients required ICU care later in the hospital course: one for routine post-operative care after carotid endarterectomy, and one on hospital day 4 after hemorrhagic transformation in the setting of a heparin drip for carotid dissection.

The median NIHSS at 24 hours after IVT was 1 (IQR: 0-3; Table 2), and the median improvement in NIHSS at 24 hours from baseline was 2 (IQR: 0-4). The median NIHSS and mRS at discharge were 1 (IQR: 0-2) and 1 (range: 0-4), respectively. One patient died several weeks after discharge due to a cardiovascular event unrelated to his stroke. At 90 days, the median NIHSS was 0 (IQR: 0-1), and the median mRS was 0 (range: 0-6).

Discussion

In the present study, we show that it is feasible and safe to care for a subset of post-IVT patients in a low-intensity monitoring environment. Our low-intensity monitoring protocol is

identical to the standard of care protocol only in the first 2 hours after IVT bolus administration, and thereafter transitions to every 1-hour monitoring for 1 hour, every 2-hour monitoring for 8 hours, followed by every 4-hour monitoring until 24 hours post IVT are complete. Patient selection based on critical care needs at the end of the IVT infusion and NIHSS were informed and supported by prior data by us, and others suggesting that complications requiring ICU care are relatively uncommon in patients with NIHSS less than 10; and if complications occur, they are typically apparent by the end of the IVT infusion or shortly thereafter.⁷⁻⁹ Patients with large vessel occlusion nowadays routinely undergo mechanical thrombectomy in conjunction with IVT.¹⁰ At our institution, post-thrombectomy patients are routinely monitored in the ICU, and these patients were not included in our study. Therefore, we do not suggest that post-thrombectomy patients be monitored in a low-intensity monitoring environment, even if their NIHSS is less than 10.

The monitoring location of post-IVT patients under the current standard of care may vary by institutions, that is, post-IVT monitoring may occur in an ICU, an intermediate care unit, or a designated stroke unit. However, regardless of physical location, all patients are presently required to undergo high-intensity monitoring in order to comply with current guidelines.^{5,6} High frequency vital sign checks and neurological assessments as per the current standard of care typically require one-to-one nursing care and therefore dictate resource-intensive monitoring regardless of physical patient location. Thus, in times of increasing financial constraints and limited resources, the implementation of our low-intensity protocol may free up nursing resources and may allow for reallocation of critical care resources in institutions where post-IVT patients are presently monitored in the ICU. The pragmatic approach of this trial was intended to facilitate swift

Table 1. Characteristics of the Study Population.^a

Characteristics	Value
Age, years: median (range)	54 (32-79)
Male, n (%)	21 (60.0)
Black race, n (%)	22 (62.9)
Pre-IVT NIHSS: median (IQR)	3 (1-6)
Pre IVT mRS: median (range)	0 (0-4)
IVT window <3 hours, n (%)	23 (65.7)
BP systolic, mm Hg: median (IQR)	157 (140-177)
BP diastolic, mm Hg: median (IQR)	86 (75-100)
Glucose, mg/dL: median (IQR)	119 (94-138)
Hypertension, n (%)	28 (80.0)
Hyperlipidemia, n (%)	15 (42.9)
Diabetes mellitus, n (%)	7 (20.0)
Atrial fibrillation, n (%)	5 (14.3)
Smoking, n (%)	10 (28.6)
Antiplatelets, n (%)	14 (40.0)
Anticoagulation, n (%)	1 (2.9)
Statin, n (%)	13 (37.1)
Hemorrhagic transformation, n (%)	
Symptomatic	0 (0)
Asymptomatic	4 (11.4)
Infarct volume, mL: mean (range)	3.4 (0-44.8)
Diagnosis, n (%)	
Stroke	31 (88.6)
Conversion disorder	3 (8.6)
Seizure	1 (2.9)
Length of stay, days: median (IQR)	2 (2-3)
Discharge destination, n (%)	
Home	29 (82.9)
ACIR	4 (11.4)
SA	1 (2.9)
Prison	1 (2.9)
In-hospital death, n (%)	0 (0)

Abbreviations: ACIR, acute inpatient rehab; BP, blood pressure; IQR, interquartile range; IVT, intravenous thrombolysis; mRS, modified Rankin Scale; NIHSS, NIH Stroke Scale; SA, subacute rehab.

^an = 35.

Table 2. Study Outcomes.

Outcome	Value
Primary outcome	
ICU need by 24 hours, n (%)	0 (0)
Secondary outcomes	
NIHSS at 24 hours: median (IQR)	1 (0-3)
NIHSS at discharge: median (IQR)	1 (0-2)
mRS at discharge: median (range)	1 (0-3)
NIHSS at 90 days: median (IQR), n = 28	0 (0-1)
mRS at 90 days: median (range), n = 33	0 (0-6)

Abbreviations: ICU, intensive care unit; IQR, interquartile range; mRS, modified Rankin Scale; NIHSS, NIH Stroke Scale.

and effortless implementation of our low-intensity monitoring protocol across other institutions.

The median NIHSS of our study population was relatively low; however, patients with low NIHSS comprise a

significant proportion of all acute strokes eligible for IVT,¹¹ and there is increasing evidence that IVT is efficacious in these patients.^{12,13} Similarly, stroke mimics constitute a not-insignificant and unavoidable subset of all IVT-treated patients, and IVT is generally considered safe in this patient population.¹⁴⁻¹⁷ Patients with low NIHSS and/or stroke mimics may therefore not require the same intensity of post-IVT monitoring as more severe strokes, that is, due to large-vessel occlusion. Since stroke mimics typically present with low NIHSS,^{14,17} the criteria for inclusion in our monitoring protocol may enrich for stroke mimics and strokes with low NIHSS to be monitored under low-intensity conditions. Our data may suggest that low intensity, and thus cost- and resource-effective, monitoring of a subpopulation of IVT patients is feasible and safe, and we propose to reserve high-intensity post-IVT care only for those patients deemed at high risk for post-IVT complications.

Our study is limited by the relatively small sample size. Although our results are generalizable to eligible post-IVT patients in other institutions, it is unknown whether high-intensity monitoring provides additional benefits beyond detection of complications and hemorrhages that may impact functional outcome. Although we did not have any in-hospital deaths and over 80% of patients were discharged to home, our study was not sufficiently powered to show that long-term functional outcomes under the low-intensity protocol are comparable to outcomes with standard-of-care monitoring. Lastly, our results are not generalizable to patients undergoing mechanical thrombectomy.

We propose that the current “one size fits all” approach of post-IVT monitoring may be unnecessary for a subset of post-IVT patients. Patients with an NIHSS of less than 10 and no critical care needs during the IVT infusion may be safely cared for in a low-intensity monitoring environment post IVT. This may allow for more cost-effective utilization of critical care and nursing resources, reduce the number of hand offs, and potentially shorten length of stay. Future studies with larger patient numbers will have to confirm the safety and efficacy of our protocol.

Acknowledgments

The authors thank Dr Hans Adrian Puttgen for serving as the safety officer of this study.

Declaration of Conflicting Interests

The authors declared the following potential conflicts of interest with respect to the research, authorship, and/or publication of this article: Victor C. Urrutia has served as the principal investigator for the investigator-initiated trial Safety of Intravenous Thrombolytics in Stroke on Awakening (SAIL ON), funded by Genentech Inc.

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Dr Faigle was supported by an institutional KL2 grant from the Johns Hopkins Institute for Clinical and Translational Research (ICTR), which is funded in part by Grant Number KL2TR001077 from the National

Center for Advancing Translational Sciences (NCATS) a component of the National Institutes of Health (NIH), and the NIH Roadmap for Medical Research.

Supplemental Material

Supplemental material for this article is available online.

References

1. Go AS, Mozaffarian D, Roger VL, et al. Executive summary: heart disease and stroke statistics—2014 update: a report from the American Heart Association. *Circulation*. 2014; 129(3):399-410.
2. Lawrence ES, Coshall C, Dundas R, et al. Estimates of the prevalence of acute stroke impairments and disability in a multi-ethnic population. *Stroke*. 2001;32(6):1279-1284.
3. Hacke W, Donnan G, Fieschi C, et al. Association of outcome with early stroke treatment: pooled analysis of ATLANTIS, ECASS, and NINDS rt-PA stroke trials. *Lancet*. 2004; 363(9411):768-774.
4. Jauch EC, Saver JL, Adams HP Jr, et al. Guidelines for the early management of patients with acute ischemic stroke: a guideline for healthcare professionals from the American Heart Association/American Stroke Association. *Stroke*. 2013;44(3): 870-947.
5. Braimah J, Kongable G, Rapp K, et al. Nursing care of acute stroke patients after receiving rt-PA therapy. The NINDS rt-PA Stroke Study Group. *J Neurosc Nurs*. 1997;29(6):373-383.
6. Summers D, Leonard A, Wentworth D, et al. Comprehensive overview of nursing and interdisciplinary care of the acute ischemic stroke patient: a scientific statement from the American Heart Association. *Stroke*. 2009;40(8):2911-2944.
7. Faigle R, Sharrief A, Marsh EB, Llinas RH, Urrutia VC. Predictors of critical care needs after IV thrombolysis for acute ischemic stroke. *PLoS One*. 2014;9(2):e88652.
8. Fernandez-Gotico H, Lightfoot T, Meighan M. Multicenter study of adverse events after intravenous tissue-type plasminogen activator treatment of acute ischemic stroke. *J Neurosci Nurs*. 2017;49(1):31-36.
9. Strbian D, Meretoja A, Ahlhelm FJ, et al. Predicting outcome of IV thrombolysis-treated ischemic stroke patients: the DRAGON score. *Neurology*. 2012;78(6):427-432.
10. Goyal M, Menon BK, van Zwam WH, et al. Endovascular thrombectomy after large-vessel ischaemic stroke: a meta-analysis of individual patient data from five randomised trials. *Lancet*. 2016;387(10029):1723-1731.
11. Barber PA, Zhang J, Demchuk AM, Hill MD, Buchan AM. Why are stroke patients excluded from TPA therapy? An analysis of patient eligibility. *Neurology*. 2001;56(8):1015-1020.
12. Kohrmann M, Nowe T, Huttner HB, et al. Safety and outcome after thrombolysis in stroke patients with mild symptoms. *Cerebrovasc Dis*. 2009;27(2):160-166.
13. Smith EE, Fonarow GC, Reeves MJ, et al. Outcomes in mild or rapidly improving stroke not treated with intravenous recombinant tissue-type plasminogen activator: findings from get with the guidelines-stroke. *Stroke*. 2011;42(11):3110-3115.
14. Chernyshev OY, Martin-Schild S, Albright KC, et al. Safety of tPA in stroke mimics and neuroimaging-negative cerebral ischemia. *Neurology*. 2010;74(17):1340-1345.
15. Faigle R, Marsh EB, Llinas RH, Urrutia VC. Critical care needs in patients with diffusion-weighted imaging negative MRI after tPA—does one size fit all? *PLoS One*. 2015;10(10):e0141204.
16. Winkler DT, Fluri F, Fuhr P, et al. Thrombolysis in stroke mimics: frequency, clinical characteristics, and outcome. *Stroke*. 2009;40(4):1522-1525.
17. Zinkstok SM, Engelter ST, Gensicke H, et al. Safety of thrombolysis in stroke mimics: results from a multicenter cohort study. *Stroke*. 2013;44(4):1080-1084.

NEWYORK-PRESBYTERIAN HOSPITAL

POST-STROKE MONITORING DURING COVID19 PANDEMIC SURGE, VERSION 7.0

New York City is an epicenter for the 2019-2020 COVID19 pandemic. As of March 30, 2020, there have been over 30,000 confirmed cases in the city, resulting in over 2,500 hospitalizations. Many of these patients are admitted to ICUs and this has resulted in impending drastic shortages of ICU beds, resources, and staff. These shortages are expected to continually worsen over the next several weeks. Resource allocation is crucial during this unprecedented crisis. Therefore, new monitoring protocols will be implemented to protect and preserve staff, resources, and ICU beds, while providing the best possible care to stroke patients during the crisis. These new protocols represent the expert opinion of stroke leadership at NYPH and are based on the minimum monitoring felt to be necessary to safely care for complex stroke patients while balancing the substantial need to preserve resources during this drastic shortage for incoming critically ill patients with COVID19 and other medical disorders. These new protocols were reviewed by stroke leadership, nursing leadership, hospital leadership, and legal staff before implementation.

Acute Ischemic Stroke Patients Treated with IV TPA

Disposition

- Admit to Step Down Unit (SDU) UNLESS also received thrombectomy (see separate thrombectomy policy below), mechanically ventilated, or requiring IV vasopressors
- Admit to ICU ONLY if also received thrombectomy and meets thrombectomy criteria below for ICU admission, mechanically ventilated, or requiring IV vasopressors

Monitoring and Procedures

- Neurological and vital sign checks: Q30 minutes X 2 hours, Q1 hour x 2 hours, Q2 hour x 8 hours; after first 12 hours, Q2-6 hour checks depending on patient status
- Nicardipine drips for blood pressure control allowed on SDU as long as physicians manage titration, however, serial labetalol pushes preferred; if nicardipine drip used, start oral labetalol or captopril early to transition off drip
- If patient is COVID19 positive, perform hospital-recommended isolation protocol and less frequent neurological and vital sign checks as appropriate

Acute Ischemic Stroke Patients Treated with Mechanical Thrombectomy Disposition

- Admit to SDU UNLESS mechanically ventilated, NIHSS>12 or reduced level of consciousness after treatment completed (signifies higher risk for early neurological and medical deterioration), or requiring IV vasopressors; patients intubated for the procedure should be extubated in the angiography suite immediately after the procedure is completed unless they are PUI or COVID19 positive where hospital procedures will be followed instead
- Admit to ICU ONLY if mechanically ventilated, NIHSS>12 or reduced level of consciousness after treatment completed, or requiring IV vasopressors

Monitoring and Procedures

- Neurological and vital sign checks: Q30 minutes X 2 hours, Q1 hour x 2 hours, Q2 hour x 8 hours; after first 12 hours, Q2-6 hour checks depending on patient status
- Groin puncture checks: Q30 minutes X 2 hours, Q1 hour x 2 hours, Q2 hour x 4 hours; after first 8 hours, no further checks required unless a groin blood vessel injury identified
- Nicardipine drips for blood pressure control allowed on SDU as long as physicians manage titration, however, serial labetalol pushes preferred; if nicardipine drip used, start oral labetalol or captopril early to transition off drip
- If patient is COVID19 positive, perform hospital-recommended isolation protocol and less frequent neurological and vital sign checks as appropriate

Acute Ischemic Stroke Patients NOT Treated with IV TPA or Mechanical Thrombectomy Disposition

- Admit to Floor UNLESS hemodynamically unstable, neurologically fluctuating or deteriorating, PUI or COVID19 positive, or mechanically ventilated or requiring IV vasopressors
- Admit to SDU IF hemodynamically unstable, neurologically fluctuating or deteriorating
- PUI and COVID19 patients will be admitted to the appropriate isolation room as per NYP policy
- Admit to ICU IF mechanically ventilated or requiring IV vasopressors

Monitoring and Procedures

- Neurological and vital sign checks: Q2-6 hour checks depending on patient status; less frequent checks preferred for patients who are NOT hemodynamically unstable or neurologically fluctuating or deteriorating
- For COVID19 positive patients, Q6H or Qshift neurological and vital sign checks preferred

Acute Intracerebral Hemorrhage

Disposition

- Admit to SDU UNLESS mechanically ventilated, GCS<8, active or impending cerebral herniation, severe coagulopathy (treatment-dose anticoagulants, platelets<50, INR>1.7), or external ventricular drain in place
- Admit to ICU ONLY if mechanically ventilated, GCS<8, active or impending cerebral herniation, severe coagulopathy (treatment-dose anticoagulants, platelets<50, INR>1.7), or external ventricular drain in place

Monitoring and Procedures

- Neurological and vital sign checks: Q2 hour for 24 hours; Q2-6 hour checks thereafter depending on patient status though less frequent checks preferred
- Nicardipine drips for blood pressure control allowed on SDU as long as physicians manage titration, however, serial labetalol pushes preferred; if nicardipine drip used, start oral labetalol or captopril early to transition off drip
- If patient is COVID19 positive, perform hospital-recommended isolation protocol and less frequent neurological and vital sign checks as appropriate

Non-Traumatic Subarachnoid Hemorrhage

Disposition

- Admit to SDU UNLESS mechanically ventilated, Hunt-Hess score>2, GCS<8, active or impending cerebral herniation, severe coagulopathy (treatment-dose anticoagulants, platelets<50, INR>1.7), or external ventricular drain in place
- Admit to ICU ONLY if mechanically ventilated, Hunt-Hess score>2, GCS<8, active or impending cerebral herniation, severe coagulopathy (treatment-dose anticoagulants, platelets<50, INR>1.7), or external ventricular drain in place

Monitoring and Procedures

- Neurological and vital sign checks: Q2 hour x 24 hours or longer until aneurysm, if present, is secured; Q2-6 hour checks thereafter depending on patient status though less frequent checks preferred
- Nicardipine drips for blood pressure control allowed on SDU as long as physicians manage titration, however, serial labetalol pushes preferred; if nicardipine drip used, start oral labetalol or captopril early to transition off drip
- If patient is COVID19 positive, perform hospital-recommended isolation protocol and less frequent neurological and vital sign checks as appropriate

Initially drafted March 24, 2020 by Babak Navi, MD, MS and Joshua Willey, MD, MS, the Stroke Directors of NewYork-Presbyterian Hospital at Weill Cornell Medical College and Columbia University, respectively.

Reviewed by: Physician and Nursing leadership from the Cornell and Columbia campuses of NewYork-Presbyterian Hospital's Departments of Neurology, Emergency Medicine, Neurointerventional, Neurocritical Care, and Neurosurgery; Hospital leadership; and Hospital legal staff.

Implemented on March 30, 2020.

NYP Post-Stroke Monitoring during the COVID-19 pandemic

Post Procedure / Admission Orders	Disposition	Vitals Signs (BP/HR/RR/SPO2) and Full Neuro Assessment	Puncture / Site Checks/ Pulse / Extremity Checks
IV tPA given (1st 24 hrs)	SDU unless pt also received thrombectomy and meets ICU post-thrombectomy criteria below, mechanically ventilated, or requiring IV vasopressors	Q 30 mins x 2 hrs Q 1 hr x 2 hrs Q 2 hrs x 8 hrs, then Q 2-6 hrs depending on pt's status	N/A
Thrombectomy / IA tPA (1st 24 hrs)	SDU unless mechanically ventilated, NIHSS >12 or reduced LOC post procedure, or requiring IV vasopressors	Q 30 mins x 2 hrs Q 1 hr x 2 hrs Q 2 hrs x 8 hrs, then Q 2-6 hrs depending on pt's status	Q 30 mins x 2 hrs Q 1 hr x 2 hrs Q 2 hrs x 4 hrs, no further checks unless blood vessel injury identified
Acute Ischemic Stroke <u>NOT</u> treated with IV tPA or Thrombectomy	Floor unless hemodynamically unstable, fluctuating or deteriorating neuro exam, PUI or COVID-19 positive, or mechanically ventilated or requiring IV vasopressors	Q 2-6 hrs depending on patient status; less frequent checks preferred for patients who are NOT hemodynamically unstable or neurologically fluctuating or deteriorating. For COVID-19 positive, Q 6 hrs or Q shift VS and neuro checks preferred.	N/A
Intracerebral Hemorrhage (ICH)	SDU unless mechanically ventilated, GCS < 8, active or impeding cerebral herniation, severe coagulopathy, or EVD in place	Q 2 hrs x 24 hrs, then Q 2-6 hrs depending on pt's status. For COVID-19 positive, less frequent VS and neurological checks as appropriate	N/A
Subarachnoid Hemorrhage (SAH)	SDU unless mechanically ventilated, Hunt-Hess score > 2, GCS < 8, active or impeding cerebral herniation, severe coagulopathy, or EVD in place	Q 2 hrs x 24 hrs or longer until aneurysm, if present, is secured; Q 2-6 hrs depending on pt's status. For COVID-19 positive, less frequent VS and neurological checks as appropriate	N/A

NOTE:

- Patient intubated for the thrombectomy should be extubated in the INR suite immediately after the procedure is completed, unless patient is PUI or COVID-19 positive
- PUI and COVID-19 patients will be admitted to the appropriate isolation room as per NYP policy
- Severe coagulopathy defined by treatment-dose anticoagulants, platelets < 50, INR > 1.7
- Nicardipine drip for BP control allowed on SDU as long as physicians manage titration, however, serial labetalol pushes preferred
- Start oral labetalol or captopril early to transition off nicardipine drip

Temporary Emergency Guidance to US Stroke Centers During the COVID-19 Pandemic
On Behalf of the AHA/ASA Stroke Council Leadership

Running Title: Temporary Emergency Guidance to US Stroke Centers

Address for Correspondence:

Patrick Lyden
Department of Neurology
Cedars-Sinai Medical Center
127 S San Vicente Medical Center
Los Angeles, CA 90048
lydenp@cshs.org



Stroke

March 31, 2020

During this unprecedented time of extraordinary stress on the US healthcare system, the AHA/ASA Stroke Council—as individuals in our localities and together as an entity at the national level—acknowledge the mounting concern regarding optimal stroke care during the COVID-19 pandemic among vascular neurologists and those clinicians who care for patients with stroke. We therefore seek to provide guidance for the care of stroke patients in the midst of the crisis. Ordinarily, national recommendations go through a rigorous process of development, refinement, peer review, and thoughtful promulgation. None of that is possible at this time, yet we believe there is a substantial need for a broad policy statement that reflects both the commonality of the pandemic across the US and the individual variability necessary at local sites. We issue this temporary statement as an interim stopgap opinion, pending a more thorough and considered process.

1. COVID-19 and Cerebrovascular Disease

Although 80% of patients infected with the virus remain non-hospitalized, in full form, COVID-19 is a severe acute respiratory syndrome caused by a novel coronavirus now named Severe Acute Respiratory Syndrome (SARS) CoV-2¹. In the past few weeks it has become clear that patients infected with the SARS-CoV-2 virus may present in a number of ways, including with neurological symptoms that are coincident with, or could potentially precede, pulmonary symptoms and fever. To date, no comprehensive survey of neurological manifestations of coronavirus viremia has been published, but two retrospective case series have been posted without peer review on pre-print servers. In these descriptions of convenience samples from three hospitals in Wuhan, China, up to 36% of COVID-19 patients manifest neurological symptoms^{2,3}. The most common neurological manifestations were dizziness (16.8%), headache (13.1%), and encephalopathy (2.8%). The most common peripheral signs and symptoms were anosmia (5.1%), dysgeusia (5.6%), and muscle injury (10.1%, detected by elevated creatine kinase). Stroke complicated COVID-19 infection in 5.9% of patients at median 10 days after symptom onset. Patients with stroke were older, had more cardiovascular comorbidities, and more severe pneumonia. Stroke mechanisms may vary and could include hypercoagulability from critical illness and cardioembolism from virus-related cardiac injury⁴. Some of these observations reflect the known biology of the virus, as the obligate receptor for the virus spike protein, human angiotensin converting enzyme, ACE2, is expressed in epithelial cells throughout the body, including in the central nervous system, raising the possibility of a direct role in viral infection⁵. Other coronaviruses, including SARS-CoV-1 and MERS-CoV have been identified in the brains of patients (case reports) and heavily in the brains of mice that express human ACE2^{6,7}. However, at this time there are no peer-reviewed published reports of clinical signs of SARS CoV-2 encephalitis or meningitis.

2. Exigencies

We seek to describe here the impact of the pandemic on the delivery of acute stroke treatment.

- a. Personal Protective Equipment (PPE). Most immediately, stroke teams may encounter difficulty responding to Code Strokes due to PPE shortages in the Emergency Department (ED) and on inpatient units. In the ED, the Code Stroke patient often arrives with limited available history and few or no family members or witnesses. Many acute stroke patients are confused, aphasic or otherwise unable to provide the necessary information for COVID-19 screening. Ideally, every Code Stroke patient would be treated as potentially infected; the Code Stroke response

team would don full PPE at the highest level. Such an approach is generally not possible, however.

Stroke patients may have asymptomatic SARS-CoV-2 infection or develop COVID-19 after admission and treatment for stroke. Stroke patients frequently develop fevers due to other complications of stroke, such as aspiration pneumonia and UTI, and they will need to be evaluated quickly for COVID-19. These realities will stress the system even further.

Stroke teams across the country have shared with us a variety of creative and novel solutions to the PPE shortage. Prior to sharing these with the stroke community, we feel compelled to vet them and seek permission to publish them. Over the coming days we seek to post helpful solutions and suggestions. For example, some hospitals have partnered with local industry to create PPE with 3D Printers or repurposing of other technology to produce PPE items. We are aware that many teams have begun using telemedicine both within their own ED and regionally. This solution avoids the use of needed PPE, allows a reasonable stroke evaluation, avoids unnecessary inter-facility transfers, and reduces exposure risk for the stroke team.

- b. Hospital Personnel. Either through prophylactic quarantine or direct illness, most stroke teams will be forced to function with fewer staff members. Neurologists and other health care workers may be redeployed to other settings to respond to the increasing demands of COVID-19, particularly as other colleagues become ill. In some centers, ED staff are trained and competent to evaluate Code Strokes, and with stroke team guidance, to administer intravenous thrombolysis or transfer patients for possible mechanical thrombectomy. Some centers have non-stroke team staff available to monitor patients and arrange for post rt-PA or post-thrombectomy care. In other centers, the loss of stroke team members may create a significant gap in care. We are aware of many stroke teams across the country expressing concern as to whether they can or will be able to continue to function.

We believe that all stroke teams should endeavor to adhere to all published guidelines regarding patient selection for therapy; treatment times (e.g., door-to-needle and door-to-groin puncture); and post-recanalization monitoring. However, we wish to inform regulatory authorities—and we wish to reassure stroke teams—that in the setting of the pandemic full compliance has become a goal, not an expectation. Across the wide variety of health care delivery systems in our country, full compliance with all guidelines cannot happen at all times in every locality.

We further wish to distinguish patient selection/treatment from logistic or process compliance. Patients who qualify for treatment will benefit, even if every single vital sign cannot be acquired post thrombolysis, for example. Teams must use their judgement, guided by local realities, and continue to try to treat as many acute stroke patients as possible.

- c. **Hospital Beds.** Most, if not all, medical centers will likely fill all intensive care beds in the setting of COVID-19. Patients with large intracerebral hemorrhages, subarachnoid hemorrhage, or large ischemic strokes at risk for herniation must be monitored in intensive care unit settings with appropriately trained personnel, where possible. We are aware of situations in which NeuroICU beds may be requested for COVID-19 patients, to the exclusion of stroke patients. Although we recognize that hospitals and critical care administrators will need to prioritize ICU resources during the pandemic, we want to encourage appropriate resource allocation for critically ill stroke patients. In each locality specialists from all intensive care specialties—e.g., pulmonary, cardiology, neurology, neurosurgery—must discuss the relative merits of prolonged ICU care for any particular patient.

In the US, stroke patients may be observed in an ICU setting for 24 hours after thrombolysis or thrombectomy, regardless of their status, with rigid intervals for regular vital signs and neurological assessments. There is no evidence base underlying this practice. In the absence of data supporting current practice, we suggest that it is feasible to move stable stroke patients to step-down or other units if an intensive care unit bed is needed⁸.

In general, patients with intracerebral hemorrhage (ICH) and subarachnoid hemorrhage (SAH) have higher mortality and are more likely to undergo an interventional or surgical procedure and require intubation and prolonged time in an intensive care unit, compared to ischemic stroke patients. Physicians and other health care personnel should follow the most up-to-date and evolving guidelines regarding intubation, interventional procedures, and critical care for these patients in setting of the pandemic. Appropriate intensive care of these seriously ill patients with hemorrhagic stroke, some of whom are also young and with an excellent long-term outcome, should be maintained.

Finally, to protect staff, facilitate infectious disease evaluations, and conserve PPE, many hospitals have made the decision to admit all COVID-19 positive patients and those patients still under evaluation, regardless of other co-incident disease, to specialized COVID-19 units. Many of the staff on these units will not have stroke care training. Stroke Medical Directors and Coordinators should provide guidance to staff unfamiliar with managing acute ischemic and hemorrhagic stroke patients.

- d. **Emergency Medical Services (EMS).** We are aware of anecdotal reports that stroke admission volumes have declined in some communities. This observation requires rigorous confirmation before we can offer sensible recommendations. If true, it can be asked whether the public anxiety around COVID-19 discourages some patients, especially those with mild stroke and stroke-mimics, from accessing the EMS. A testable hypothesis would be that in the face of declining total stroke volume there would persist a constant rate of moderate/severe stroke and thrombectomies. We therefore ask all participating stroke centers to contribute their data to the GWTC database vigilantly as this will be the simplest way to document any decrement in stroke volume. We also encourage stroke leaders and advocates to work with local

media and public marketing to encourage patients to continue seeking emergency care if experiencing acute stroke symptoms.

3. Provisional Guidance

We can offer very limited guidance to stroke teams in the US at this time. We do pledge to continue to collect your individual protocols and best practices and to evaluate and post them as appropriate. In very broad terms we recommend the following:

- a. Guideline Adherence. Continue treating stroke patients as appropriate. Full adherence to guidelines may be challenging but needed treatment should be offered to the extent possible.
<https://www.ahajournals.org/doi/pdf/10.1161/STR.0000000000000211>
- b. PPE. Seek ways to minimize the use of scarce PPE in your medical center. Send fewest possible team members to see Code Stroke patients, and into rooms for follow up visits.
- c. Telemedicine. Telemedicine began with telestroke. The NIHSS can be performed efficiently via telemedicine⁹. Televideo is superior to telephone¹⁰. Yet telephonic consultation is superior to no consult.
- d. Health and Safety. Take care of yourselves, your families, and your teammates. Follow protocol (local, CDC and WHO), including guidelines for hand washing, PPE use, COVID-19 testing and evaluation, and self-quarantine as needed.
- e. Teamwork. Stroke care has always been a multispecialty, collaborative effort among EMS, physicians and nurses from the Emergency Departments to the Stroke Units, ICUs and Rehabilitation Centers. Collaboration, collegiality, and compassion for one another are crucial to making it through this challenge. A true sense of a unified Stroke System of Care is needed now more than ever.



4. Caveat

Our recommendations and anecdotal advice are offered to the general stroke community in the context of the gravest public health threat in our country's recent history. Nothing in this document has been submitted to the normal guideline development and peer review, although we will begin such a process immediately and update this statement continuously during the crisis. Please keep checking the AHA/ASA website.

Disclosures: None

References

1. Lipsitch M, Swerdlow DL, Finelli L. Defining the Epidemiology of Covid-19 — Studies Needed. *New England Journal of Medicine*. 2020;382:1194-1196
2. Mao L, Wang M, Chen S, He Q, Chang J, Hong C, et al. Neurological Manifestations of Hospitalized Patients with COVID-19 in Wuhan, China: a retrospective case series study. *medRxiv*. 2020:2020.2002.2022.20026500
3. Li Y, Wang M, Zhou Y, Chang J, Xian Y, Mao L, et al. Acute Cerebrovascular Disease Following COVID-19: A Single center, Retrospective, Observational Study (3/3/2020). 2020. Available at <http://dx.doi.org/10.2139/ssrn.3550025>
4. Guo T, Fan Y, Chen M, Wu X, Zhang L, He T, et al. Cardiovascular Implications of Fatal Outcomes of Patients With Coronavirus Disease 2019 (COVID-19). *JAMA Cardiology*. 2020. doi:10.1001/jamacardio.2020.1017
5. Li YC, Bai WZ, Hashikawa T. The neuroinvasive potential of SARS-CoV2 may be at least partially responsible for the respiratory failure of COVID-19 patients. *Journal of Medical Virology*. 2020
6. Bao L, Deng W, Huang B, Gao H, Liu J, Ren L, et al. The Pathogenicity of SARS-CoV-2 in hACE2 Transgenic Mice. *bioRxiv*. 2020:2020.2002.2007.939389
7. Arbour N, Day R, Newcombe J, Talbot PJ. Neuroinvasion by Human Respiratory Coronaviruses. *Journal of Virology*. 2000;74:8913-8921
8. Faigle R, Butler J, Carhuapoma JR, Johnson B, Zink EK, Shakes T, et al. Safety Trial of Low-Intensity Monitoring After Thrombolysis: Optimal Post Tpa-Iv Monitoring in Ischemic STroke (OPTIMIST). *The Neurohospitalist*. 2020;10:11-15
9. Alashev AM, Andreev AY, Gonysheva YV, Lagutenko MN, Lutskovich OY, Mamonova AV, et al. A Comparison of Remote and Bedside Assessment of the National Institute of Health Stroke Scale in Acute Stroke Patients. *Eur Neurol*. 2017;77:267-271
10. Meyer BC, Raman R, Hemmen T, Obler R, Zivin JA, Rao R, et al. Efficacy of site-independent telemedicine in the STROKE DOC trial: a randomised, blinded, prospective study. *Lancet Neurol*. 2008;7:787-795

From: Faye Wang <haw9004@nyp.org>
Sent: Thursday, April 2, 2020 9:49 AM
To: Nursing All <NURSE-ALL@nyp.org>; Nurse Management <NURSE-MGMT@nyp.org>; NYPBMH - Registered Nurses <NYPBMH-RN@nyp.org>; NYQRNS <NYQRNS@nyp.org>; HVH - NYPHVNursingCommunity <HVH-NYPHVNursingCommunity@nyp.org>
Cc: Matthew Baird <mab9327@nyp.org>
Subject: COVID-19 and stroke

Message from the Center for Professional Nursing Practice

Dear Professional Nurses,

Given the pressures created by COVID-19, the stroke teams across NYP have developed revised guidelines for the management of stroke patients.

The attached guidelines (detail and summary) are designed to promote the most efficient utilization of staff, resources, and ICU beds, while providing the best possible care to stroke patients during this extraordinary time.

These guidelines are a departure from our current approved protocols but are based on current evidence and the expert opinion of stroke leadership at NYP.

If you have any questions on these guidelines please contact your local stroke teams, details below, or Matt Baird, Director, Neurosciences Service Line, mab9327@nyp.org

Campus	Stroke Director		Stroke Manager	
NYP-AH	Dr. Jason Diamond	jd2648@cumc.columbia.edu	Melody Madera	mem9044@nyp.org
NYP-BMH	Dr. Ji Chong	jic9002@med.cornell.edu	Jonathan Muller	jsm9013@nyp.org
NYP-CU	Dr. Joshua Willey	jzw2@cumc.columbia.edu	Cris Perdomo	cap9075@nyp.org
NYP-HV	Dr. Douglas Sankar	dos9067@nyp.org	Susan Schwerner	sms9034@nyp.org
NYP-LH	Dr. Ugo Paolucci	ugp9001@nyp.org	Melody Madera	mem9044@nyp.org
NYP-LMH	Dr. Saad Mir	sam9235@nyp.org	Cinthia Holland	cih9010@nyp.org
NYP-Q	Dr. Feliks Koyfman	fek9008@med.cornell.edu	Ana Ghelechkhani	amg9030@nyp.org
NYP-WC	Dr. Babak Benjamin Navi	ban9003@med.cornell.edu	Cinthia Holland	cih9010@nyp.org

Confidential Information subject to NYP's (and its affiliates' | Information management and security policies (<http://infonyet.nyp.org/QA/HospitalManual>).

NEWYORK-PRESBYTERIAN/COLUMBIA UNIVERSITY MEDICAL CENTER

SPEED Committee Minutes

Meeting Date: April 22, 2020

Time: 2:00 PM

WebEx <https://nyp.webex.com/nyp/j.php?MTID=m1da93727062db5e176e68f32c0ea62f5>

Meeting number: 470 418 938

ATTENDANCE: SEE ATTENDANCE RECORD

TOPIC	DISCUSSION	ACTION/FOLLOW-UP	STATUS
Follow Ups	None		
Stroke Workflow COVID-19	<p>Everyone thanked our front line clinicians for all they are doing each day during the COVID-19 pandemic</p> <p>NYP Stroke Medical Directors, Service Line Directors and Stroke Managers held several meetings in March/April to discuss operations, resource allocation, efficient utilization of staff, ICU beds, telemedicine use, etc in order to provide the best possible care for stroke patients during this extraordinary time.</p> <p>As a result of the ongoing public health emergency related to COVID-19, interim Post Stroke Monitoring Guidelines were developed. This was a collaborative effort from NYPH Stroke Centers, medical directors, physician and nursing leadership with expedited approval from Legal. These guidelines establish patient disposition criteria and provide modified patient monitoring parameters, effective March 30th. These guidelines are a departure from our current approved protocols.</p> <p>The AHA/ASA Stroke Council published Temporary Emergency Guidance to U.S. Stroke Centers (early release March 30th) which support our interim Post Stroke Monitoring Guidelines, in addition to the OPTIMIST Trial, low intensity monitoring after thrombolysis</p>	Communicated to all teams, posted on Infonet and NYP Protocols App	Completed

NEWYORK-PRESBYTERIAN/COLUMBIA UNIVERSITY MEDICAL CENTER

SPEED Committee Minutes

TOPIC	DISCUSSION	ACTION/FOLLOW-UP	STATUS
	<p>Additionally, the group created an ED Telemedicine Workflow Algorithm applicable to Columbia, Allen and Lawrence, implemented April 9th. IT and equipment issues (ie camera, sound, connectivity issues) have been reported and continue to be addressed. Dr. Willey congratulated the ED staff for their flexibility in dealing with the issues, coming up with innovative ways to address while avoiding delays to consult.</p> <p>NYS issued Executive Order related to Record Keeping Waiver, effective March 26th citing minimum requirements for Medical Record documentation</p> <p>NYP Centers will be participating in the AHA’s COVID-19 Registry</p>	<p>Plan to continue with Telemed workflow through June as Neuro Residents have been re-deployed to assist in the ICUs</p>	<p>Waiver remains in effect</p>
<p>Regulatory Updates</p>	<ul style="list-style-type: none"> • The Joint Commission has suspended survey activity as of March 16th. Postponed surveys will occur once operations resume. We do not have an anticipated restart date • NYS Department of Health issued the following guidance to Stroke Centers April 14th: • 2019 HERDS Annual Submission, deadline extended to August 7th. The NYSDOH will make a determination about further extensions to this submission deadline by July 1st. • Reporting for Q1 and Q2 of 2020 will be optional. For hospitals that submit data for this time period, the NYSDOH will review data but will not use these data for quality improvement activities. • 2020 HERDS Annual Submission that will be due in 2021 will not require submission of Q1 and Q2 2020 data. • The three year transition period, which began on March 20th, 2019 and which is required by NYCRR 405.34 for certification of stroke center programs, will be reevaluated over the summer of 2020. The NYSDOH anticipates an extension to this transition period and are considering what an appropriate time extension would be. 		

NEWYORK-PRESBYTERIAN/COLUMBIA UNIVERSITY MEDICAL CENTER
SPEED Committee Minutes

TOPIC	DISCUSSION	ACTION/FOLLOW-UP	STATUS
2019 Data Summary	<p>2019 data finalized TJC CMIP completed and submitted</p> <p>2019 was another great year for the Stroke Program, refer to data slides</p> <p>Trends:</p> <ul style="list-style-type: none"> • Increase total volume (751 to 797) • Median time to treatment/IV tPA 35 mins (decrease from 37 mins) • Met PI goals except door to puncture > 90 mins, decreased transfers for thrombectomy • Slight decrease IV tPA and Thrombectomy volumes • Door to MD time aggregate compliance below 75% 	<p>Met all TJC, NYS DOH volume eligibility criteria</p> <p>Send data slides to the group</p>	Completed
2020 Stroke Awards	<p>Received Awards criteria notification from AHA. NYP/Columbia is eligible for Gold Plus Target: Stroke Elite Plus Honor Roll, Target: Stroke Advanced Therapy Honor Roll Awards</p> <p>Which are the highest awards given to Stroke Centers based on 2019 data and Target: Stroke Phase III criteria which includes new door to treatment time achievements and the new Advanced Stroke Therapy Award.</p> <p>Of note, we did not qualify for the new Target: Type 2 Diabetes award, implemented late in 2019. The criteria was reviewed, scored 82%, falling slightly below the required 89.5% or higher on the “Overall Diabetes Cardiovascular Initiative Composite Score” measure. Data analyzed and identified the following two measures with lower scores:</p> <ol style="list-style-type: none"> 1. Diabetes Treatment (Glycemic control - diet or Meds or F/U apptmt) 2. Therapeutic Lifestyle Recommendations (Wt, activity, or diet) <p>For abstraction purposes, in Epic, the F/U appointment documentation is more readily available.</p> <p>For January 2020, both measures are at 100% compliance.</p>	<p>Await formal Award certificate from AHA. Usually occurs in May but may be delayed due to the COVID-19 pandemic</p> <p>Measures will be monitored throughout 2020</p>	Pending

NEWYORK-PRESBYTERIAN/COLUMBIA UNIVERSITY MEDICAL CENTER
SPEED Committee Minutes

TOPIC	DISCUSSION	ACTION/FOLLOW-UP	STATUS															
2020 PI Goals	<table border="1"> <thead> <tr> <th>Measure</th> <th>Goal</th> <th>Jan 2020</th> </tr> </thead> <tbody> <tr> <td>Door to Treatment \leq 45 mins</td> <td>75%</td> <td>N/A</td> </tr> <tr> <td>Door to Treatment \leq 30 mins</td> <td>50%</td> <td>N/A</td> </tr> <tr> <td>Door to Skin Puncture (median time) CSTK-09</td> <td>90 mins</td> <td>1:52</td> </tr> <tr> <td>Overall Hemorrhagic Transformation (sICH) Rate CSTK-05</td> <td>< 5%</td> <td>0%</td> </tr> </tbody> </table>	Measure	Goal	Jan 2020	Door to Treatment \leq 45 mins	75%	N/A	Door to Treatment \leq 30 mins	50%	N/A	Door to Skin Puncture (median time) CSTK-09	90 mins	1:52	Overall Hemorrhagic Transformation (sICH) Rate CSTK-05	< 5%	0%	Refer to Dashboard	
	Measure	Goal	Jan 2020															
Door to Treatment \leq 45 mins	75%	N/A																
Door to Treatment \leq 30 mins	50%	N/A																
Door to Skin Puncture (median time) CSTK-09	90 mins	1:52																
Overall Hemorrhagic Transformation (sICH) Rate CSTK-05	< 5%	0%																
<p>Other focus areas based on the 2019 data:</p> <ul style="list-style-type: none"> • Door to skin puncture: Group discussed creating an INR working group, similar to our ED Penumbra group to develop strategy to address INR specific issues in more detail. Dr Meyers proposed also developing a set of criteria (patient selection, inclusion/exclusion) for attending notification • Door to MD: Group discussion centered on exploring potential documentation opportunities especially with the Epic implementation. February 2020 will provide first month of Epic implementation data 	<p>Dr Stillman has been tasked with this initiative. For further discussion after Public Health Emergency / COVID-19 pandemic</p> <p>Will monitor this measure in 2020</p>	<p>Pending</p> <p>Ongoing</p>																
Quality: Stroke Data January 2020	<p><u>26</u> Patients within 6 hours <u>8</u> IV tPA / <u>1</u> IV tPA mimics / <u>8</u> INR Procedure (<u>5</u> extended window)</p> <p>Stroke Measures – refer to dashboard</p>	Refer to Log																
Data Analysis and Deviations December 2019	<p>Delays/Outliers</p> <p>As per discussion last month, full data review of the Dec 2019 cases was completed by Dr. Stillman, summary discussed in this meeting. Refer to Log</p> <p>MRN 4050444 delay to skin puncture</p>	Reviewed by Neurology	Completed															

NEWYORK-PRESBYTERIAN/COLUMBIA UNIVERSITY MEDICAL CENTER
SPEED Committee Minutes

TOPIC	DISCUSSION	ACTION/FOLLOW-UP	STATUS
January 2020	<p>ASP cancelled and re-activated; patient actively seizing in ED, given Ativan prior to CT</p> <p>Case presented at this meeting after review by Dr Stillman: Standard of care met as patient had competing primary diagnosis.</p> <p>There is an opportunity for improvement related to stroke page cancellation responsibility and documentation. Protocol updated clarifying providers responsible for cancellation.</p> <p>Lab delays: MRN 4251146, 4862998 & 8993092</p> <p>MRN 1203565457 all times delayed – atypical presentation, explainable CC: Syncopal episode, witnessed.</p> <p>Patient was confused and unaware of where he was, became increasingly alert over time. Then started c/o headache, right sided numbness and weakness, chest pain. ASP activated with MD evaluation. Patient also adamantly refusing IV sites due to “fear of needles” then agreed to insertion (in one location, multiple providers had to attempt)</p> <ul style="list-style-type: none"> • Explainable IV tPA cases - refer to Log • Coding: <ul style="list-style-type: none"> ○ 6 cases submitted to Coding for review – all cases re-coded 	<p>(Dr Waldman, case discussed with Dr. Willey)</p> <p>Referred to Lab for review, Lab met TATs from specimen receipt</p>	Completed
Stroke Protocols	Stroke protocols approved in March by Med Board Protocols are posted on Infonet and NYP Protocols App		Completed
Stroke NP	Start date 04/18 Working on orientation plan	Start date changed to May 18 th	Completed
Next meeting	May 20th, 2020 at 2:00pm Plan on WebEx meetings through June 2020		

NEWYORK-PRESBYTERIAN/COLUMBIA UNIVERSITY MEDICAL CENTER
SPEED Committee Minutes

ATTENDANCE RECORD

NAME	DEPT	April 2020
J. Stillman, MD	ED	P
J. Willey, MD	Neurology	P
G. Waldman, MD	Neurology	P
Stroke Fellow*	Neurology	P
P. Meyers, MD	Neurosurgery/INR	P
C. Perdomo, RN	Neurology	P
Clinical Manager*	ED	P
M. Kaufman, RN	ED	E
N. Christian, RN	ED	E
F. Baluja	Clinical Labs	P
R. Roman	Radiology	E
K. Herrera	EMS	E
A Virgo	Transfer Center	P
C. DirNirghossian, PharmD	Pharmacy	E
Linda Georges, RN	Quality, QMS	P
K. Pascual	Quality	P
M. Baird	Neuro Service Line	P

P = Present, E = Excused

One representative from each department (ED, Neurology, etc) is acceptable to monthly SPEED meeting

ED Clinical Manager*: Ashley Caceres

Stroke Fellow*: Maria D. Zambrano

MINUTES REVIEWED/APPROVED BY: <u>J. Stillman, MD</u> ED Stroke Medical Director
--

Recorder: C. Perdomo

ED to Hosp-Admission (Discharged) from 5/3/2020 in MIL 8 HUDSON NORTH						
5/4/2020						
	0411	0500	0600	0800	0850	0900
Neurological						
☒ Neuro (WDL)	☒ Exception...		☒ Exceptions t...			☒ Exceptions t...
☒ Level of Consciousness	☒ Alert		☒ Alert			☒ Alert
Reason Unresponsive						
Orientation Level	Oriented X3		Oriented X3			
Cognition	Appropriate jud...		Appropriate jud...			Appropriate jud...
Speech	Slurred		Slurred			Clear
Facial Symmetry	Symmetrical		Symmetrical			Symmetrical
Tongue Deviation	None		None			None
Swallow						
☒ Pupil Assessment						
R Pupil Size (mm)	3		3			
R Pupil Shape	Round		Round			
R Pupil Description	Normal		Normal			
R Pupil Reaction	Brisk		Brisk			
L Pupil Size (mm)	3		3			
L Pupil Shape	Round		Round			
L Pupil Description	Normal		Normal			
L Pupil Reaction	Brisk		Brisk			
Visual Field Right						
Visual Field Left						
Extraocular Movement Right						
Extraocular Movement Left						
Limb Ataxia						
☒ Hand Grasp/Motor Function/Sensation Assessm...						
R Hand Grasp	Weak		Weak			Weak
L Hand Grasp	Strong		Strong			Strong
R Foot Dorsiflexion	Weak		Weak			Weak
L Foot Dorsiflexion	Strong		Strong			Strong

5GN clinical nurses Anjana Mathew, BSN, RN, PCCN and Margaret Quattlander, BSN, RN completed the neurological assessments at 4:11 am and 6:00 am. The first 12 hours of monitoring was completed at 9:00 am as per the revised Post Stroke Monitoring Guidelines.

Stroke Patient Monitoring used in Adult Emergency Department during COVID-19: Acting both Rapidly and Safely

Alsacia Pacsi, RN, Crismely Perdomo, RN, Kyra Lizardo, RN, Joshua Willey, MD

NewYork-Presbyterian/Columbia University Irving Medical Center



Abstract #5224

International Stroke Conference

Posters



March 2021



INTRODUCTION

The healthcare system was facing two challenges: acute patients presenting to the adult emergency department diagnosed with Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2)/ COVID-19 and how to treat life-threatening emergencies (1).

Emergency, neurovascular and multidisciplinary teams, therefore, had to be ready to treat these emergencies rapidly and safely. The goals were to balance substantial needs and preserve resources during this drastic shortage for incoming acutely ill patients with COVID -19 and other medical emergencies.

BACKGROUND AND PURPOSE

The World Health Organization (WHO) defined COVID-19 as a pandemic (2). Globally, the total number of COVID-19 positive cases was 21,982,155 and number of deaths 776,765 (3). Nationally, the total number of U.S. positive cases was 5,474,630 and number of deaths 171,516 (3). New York City was the epicenter for the 2019-2020 COVID -19 pandemic (3). There were 30,000 confirmed cases resulting in over 2,500 hospitalizations as of March 30, 2020 (3). Hence, it was vital to develop new monitoring protocols, based upon the expert opinion of the stroke and multidisciplinary leadership at New York Presbyterian Hospital, that required minimum monitoring and criteria for admission believed necessary to safely care for complex stroke patients.

The purpose of this quality improvement project was to retrospectively evaluate patient outcomes after the implementation of the modified stroke assessment protocol during the COVID-19 pandemic surge.

CONTACTS

Alsacia Pacsi, RN, DNS, CCRN, CEN, FNP alp9015@nyp.org
Crismely Perdomo, MSN-Ed, RN cap9075@nyp.org
Kyra Lizardo, MS, APRN, FNP-BC kyl9017@nyp.org
Joshua Willey, MD, MS jzw2@cumc.columbia.edu

DISCLOSURES

All Authors: no disclosures

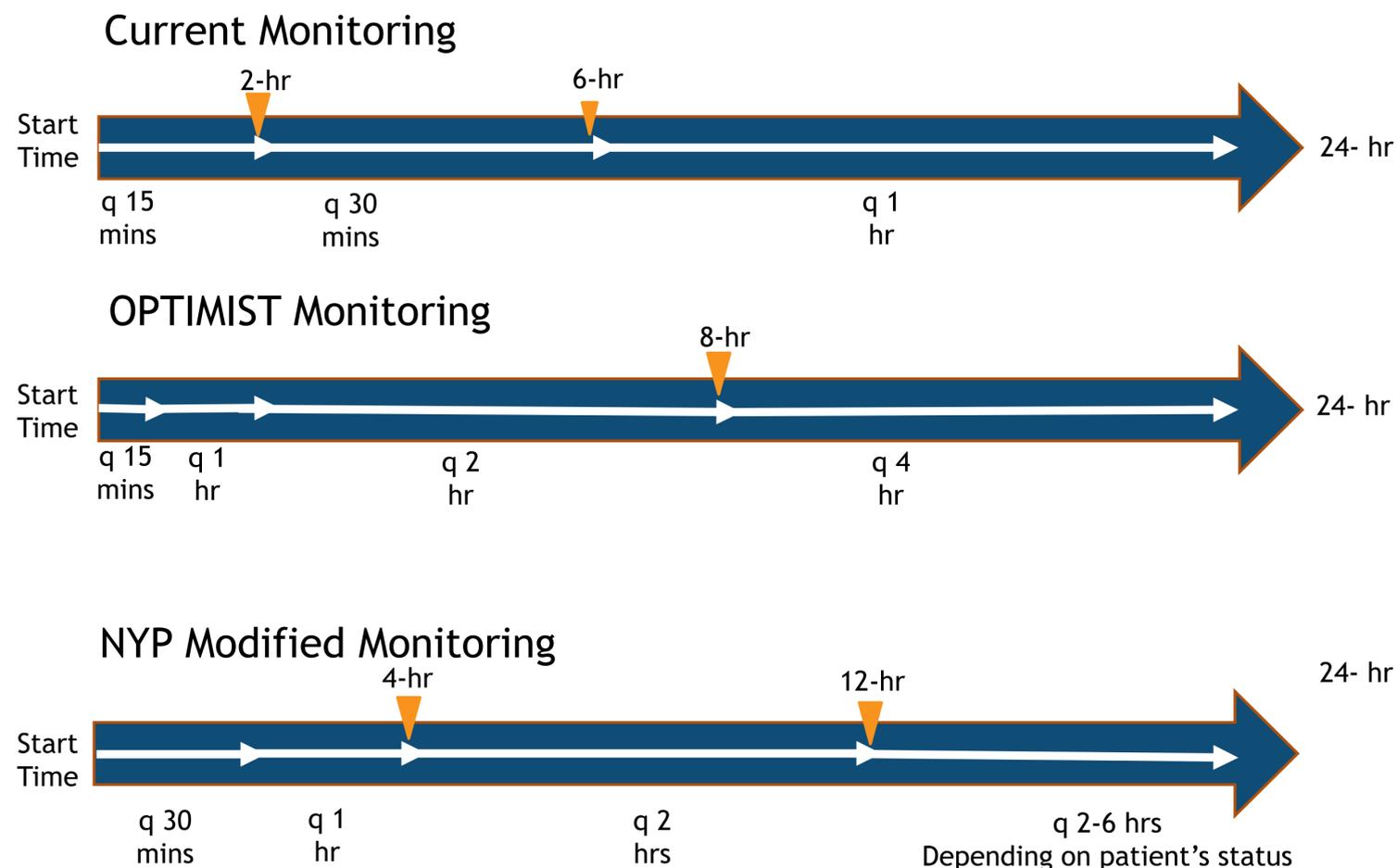
METHODS

Retrospective data review was conducted for patients who presented via the Emergency Department with stroke symptoms, and were treated with IV alteplase/tPA between March 30, 2020 and June 30, 2020, focusing on whether patients required a higher level of care or developed hemorrhagic transformation post IV alteplase/tPA administration.

RESULTS

The sample consisted of 10 patients (60% female) with a median age of 54 (range 37-73). Length of stay ranged from 2 to 12 days. Two patients (20%) were SARS-CoV-2 positive. None (0%) of the patients developed hemorrhagic transformation. None (0%) of the patients admitted to non-ICU units required critical care transfer or interventions within 24 hours of receiving IV alteplase/tPA (4). Six (60%) of the patients were discharged to home.

DIAGRAM COMPARING MONITORING PROTOCOLS



CONCLUSIONS

Using the new, modified patient monitoring protocol post IV alteplase/tPA patients, none of the patients developed symptomatic hemorrhagic transformation and did not require transfer to higher level of care within 24 hours.

NEXT STEPS

1. This protocol could be adopted again should there be another public health emergency.
2. The effectiveness and safety of this modified monitoring protocol would continue to be evaluated for its validity and reliability.

REFERENCES

- (1) Pedicelli, A., Valente, I., Pilato, F., Distefano, M., & Colosimo, C. (2020). Stroke priorities during COVID-19 outbreak: Acting both fast and safe. *Journal of Stroke and Cerebrovascular Diseases*, 104922. doi: 10.1016/j.jstrokecerebrovasdis.2020.104922
- (2) World Health Organization. Coronavirus disease 2019 (COVID19) situation report - 512020. Retrieved on August 18, 2020, from <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- (3) John Hopkins Coronavirus Resource Center. (2020). US Map. Retrieved on August 18, 2020, from <https://coronavirus.jhu.edu/usmap>
- (4) Faigle, R., Butler, J., Carhuapoma, J.R., Johnson, B., Zink, E., Shakes, T., Rosenbum, M., Saheed, M., & Urrutia, V. (2020). Safety trial of low-intensity monitoring after thrombolysis: Optimal post tPA-IV monitoring in ischemic stroke (OPTIMIST). *The Neurohospitalist*, 10(1), 11-15.