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Stroke Care: Achieving Recommended Door to Computed Tomography Times in Ambulatory Patients Presenting to the Emergency Department of a Rural Hospital through the Application of American Stroke Association Guidelines

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Stroke Care: Achieving Recommended Door to Computed Tomography Times in Ambulatory Patients Presenting to the Emergency Department of a Rural Hospital through the Application of American Stroke Association Guidelines

A DNP Project Submitted to the
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Doctor of Nursing Practice

By

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Abstract

Background: Time matters in stroke care, and every second counts because the extent of irreversible neuronal damage increases over time (Saver, 2006). Therefore, the American Stroke Association (ASA) recommends a door to computed tomography time of 20 minutes or less for patients presenting with signs of acute ischemic stroke. This time metric in stroke care is often not met, resulting in the delay of care of patients which translates to poorer outcomes, including death and a decreased quality of life in patients who have suffered an acute ischemic stroke (Kamal, Sheng, et al., 2017).

Purpose: The purpose of this DNP project was to improve stroke care at a rural hospital, by increasing staff awareness of the triage process for ambulatory patients presenting to the emergency department with signs of acute ischemic stroke to achieve door to computed tomography times of 20 minutes or less.

Methods: This practice improvement project consisted of process mapping, optimizing, streamlining stroke triage procedures, and education of staff. The nursing staff were introduced to a streamlined stroke triage process to achieve the ASA recommendation. A visible representation of the triage process was displayed in the triage area of the emergency department to provide a consistent reference for staff.

Results: Door to CT times increased from 29 minutes (n=32) to 35 minutes (n=7).

Conclusion: In opposition to its set out goals, prolonged rather than decreased DTCTs were noted with the likelihood of confounding factors playing a role in the obtained results. The project invigorated quality improvement efforts in stroke care and resulted in identifying several future process improvement ideas.

Keywords: Stroke, door to computed tomography time, stroke triage, process mapping

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Table of Contents

Stroke Care: Achieving Recommended Door to Computed Tomography Times in Ambulatory Patients Presenting to the Emergency Department of a Rural Hospital Through the Application of American Stroke Association Guidelines

Stroke Care in the United States (U.S.) has seen tremendous advances over the past two and a half decades. Beginning with the Federal Food and Drug Administration's (FDA) approval of tissue plasminogen activator (tPA) for the treatment of acute ischemic stroke (AIS) in 1996, the potential of achieving better patient outcomes, decreased disability, and improved quality of life after acute ischemic stroke was born (Snelling et al., 2019). In 2015, several randomized controlled trials explored the benefits of mechanical thrombectomy (MT) in patients with large vessel occlusions (LVO) with the intervention showing great promise (Snelling et al., 2019). However, these interventions have time limits with tPA having to be administered within 4.5 hours of stroke symptom onset and MT needing to be completed within 24 hours of stroke symptom onset. These time limits mandate healthcare personnel to act swiftly (Saver, 2006). The first step in stroke care is completing a non-contrast head computed tomography (CT) scan. Completing the head-CT effectively rules out intracranial hemorrhage (ICH), which would exclude the patient from being a candidate for tPA and MT. The absence of an ICH makes the patient a candidate for tPA and MT under certain conditions. If administered in a timely manner, both interventions hold the potential to decrease the occurrence and severity of lifelong disability in patients suffering from acute ischemic stroke. Therefore, to steer treatment as quickly as possible, the American Stroke Association (ASA) recommends obtaining a non-contrast head CT within 20 minutes of patient arrival (Powers et al., 2018).

This project aims to address prolonged door to CT times in adult patients arriving to the emergency department (ED) by private vehicle. Addressing the staff members involved in stroke

triage, namely emergency department nurses and registration liaisons, offers a unique opportunity to address current stroke triage deficits, which leads to increased door to CT times.

Background

According to the Centers for Disease Control and Prevention (CDC) stroke affects more than 795,000 individuals in the U.S. per year (Centers for Disease Control and Prevention, 2021b). The organization notes that stroke risk is twice as high for blacks as it is for whites. According to Virani et al. (2020), stroke is a major cause of long-term disability. The authors add, AIS count for 87% of strokes. AIS is the very type of stroke eligible for reperfusion therapy, via tPa administration or MT, under certain conditions (Powers et al., 2018). In treating AIS, benefits are time-dependent, with increased odds of permanent disability correlating to prolonged symptom onset-to-treatment-times (Siarkowski et al., 2020). The direct and indirect costs of stroke to society is estimated to be $103.5 billion per year with indirect costs due to underemployment and premature death accounting for 66% of that estimate (Girotra et al., 2020).

Treatment Modalities in the Treatment of Acute Ischemic Stroke

In treating AIS, two major modalities exist: thrombolytic therapy with tPA and MT (Snelling et al., 2019). Time limits for both modalities exist with the potential for significant treatment benefit if administered in a timely manner and no benefit after the expiration of those time limits. The aim of thrombolytic therapy with tPA is to dissolve a blood clot within the cerebral perfusion network to allow reperfusion of ischemic areas in the brain. This type of reperfusion therapy is more likely to be beneficial for distal or small vessel occlusions and must be administered within 4.5 hours of symptom onset to be beneficial (Grossberg et al., 2018). MT is utilized to treat large vessel occlusions and retrieves larger blood clots from bigger-caliber

cerebral blood vessels with a catheter. This type of therapy has to be performed within 24 hours of symptom onset to benefit the patient (Snelling et al., 2019).

Door-to-computed tomography time—why it matters

The non-contrast head CT scan is one of the first steps performed in patients with signs of acute stroke. The purpose of the scan is to rule out intracranial hemorrhage (ICH) as the underlying cause of stroke symptoms. This is essential as ICH is an absolute contraindication to tPA administration (Hurford et al., 2020). Additionally, MT will not be performed in cases of active ICH; therefore, all treatment decisions depend on the initial non-contrast head CT results. Since stroke care is time-sensitive, the ASA recommends this initial CT scan be completed within 20 minutes of patient arrival (Powers et al., 2018)

Needs Analysis

Several themes came to light before project implementation in discussing stroke triage with emergency department nurses at the facility for this practice improvement project (PIP). A lack of a unified stroke triage process, misconceptions regarding stroke triage, and the addition of unnecessary steps in the triage of suspected stroke patients were identified as potential barriers to achieving ASA recommended door-to-CT times. Though a stroke care map for patients suspected of suffering from an acute stroke has been present for quite some time, and is readily available to all nurses, it lacks details related to the initial triage process of patients arriving to the emergency department by private vehicle. Therefore, the triage of these patients has become rather individualized and is performed differently, and with more or less efficiency, depending on the nurse's experience triaging the patient suspected of suffering an acute stroke. Nurses' individualized approach to stroke triage reinforces the need for a streamlined and uniformed process to stroke triage.

Another barrier to achieving ASA guidelines consisted of common misconceptions amongst nursing staff in the healthcare setting addressed by the PIP. In interviewing nurses regarding stroke triage, several themes became apparent. Some nurses were under the impression that time metrics in acute stroke care became irrelevant in patients not eligible for tPA. Another theme that came to light was that patients who presented to the emergency department and reported transient stroke symptoms that had entirely resolved at the time of presentation should not be considered acute stroke patients. These misconceptions mandated the re-education of nursing staff.

The addition of unnecessary steps in stroke triage was also identified as a potential barrier to achieving ASA recommended door to CT times. Some of the unnecessary steps include returning the patient to the waiting area when another patient was occupying the triage area and rooming the patient in a treatment room until triaged. Furthermore, conducting a detailed triage was identified as a time-consuming step in triaging patients suspected of suffering an acute stroke.

The hospital is a 205-bed rural healthcare facility serving several surrounding counties. Several risk factors associated with stroke are widely present in the geographical location in which this practice improvement was implemented. These risk factors include hypertension, obesity, and diabetes, which are present in disproportionally high numbers in the southeastern states of the United States (Centers for Disease Control and Prevention, 2019, 2021a). The facility has been certified as a Joint Commission- certified Primary Stroke Center since 2019. The certification recognizes consistent excellence in stroke care. Furthermore, the organization is recognized by the ASA with the Award Gold Plus designation, and the Target: Stroke Honor Roll. This award recognizes a 24 month or longer consecutive history of meeting “Get with the

Guidelines" stroke care metrics. Additionally, the award reflects door to thrombolytic administration times of 60 minutes or less in at least 85% of eligible patients. Maintaining the designation of Primary Stroke Center requires biennial recertification. Showing evidence of continuous quality improvement processes in stroke care constitutes a partial recertification requirement. Prolonged door to CT times in ambulatory patients arriving at the emergency department via private vehicle has been recognized as a practical aspect of quality improvement in stroke care at the facility by its own stroke council. A retrospective chart review for the months of October 2021 through December 2021 revealed a mean door-to-computed tomography (DTCT) time of 29 minutes (n=32) for ambulatory patients suspected of suffering from an acute stroke who arrived at the emergency department via private vehicle. During the same period of time, suspected stroke patients arriving via emergency medical services (EMS), experienced a DTCT time of 22 minutes (n=15). Therefore, the recommended door-to-CT time of 20 minutes or less was unmet for both cohorts, with the private vehicle group suffering far worse DTCT times. In the practice site chosen for this PIP, an inconsistent triage process results in widely varying door to CT times in patients presenting with signs and symptoms of acute ischemic stroke.

SWOT Analysis

Strengths of the facility include being certified as a Primary Stroke Center by the Joint Commission. The stroke center has a dedicated stroke coordinator who oversees stroke care at the facility. Furthermore, the facility employs a stroke council that meets quarterly.

Identifiable internal factors considered weaknesses include the facility's computed tomography (CT) scanner, which is not located on the same floor as the emergency department. Traveling to the CT scanner from the emergency department takes approximately three to four

minutes, leading to less efficient use of time. Furthermore, there is no formal triage protocol for patients with stroke symptoms arriving at the emergency department by private vehicle. Additionally, as of the beginning of this practice improvement project, nurses are not empowered to call a code stroke themselves. Though, nurses have the ability to call code strokes in the inpatient setting, in the ED this capability is reserved for physicians, which often is the case in the ED setting as physicians are readily available.

External opportunities arise through this facility's national stroke certification as a Primary Stroke Center by the Joint Commission who mandates continued quality improvements in stroke care as part of the biennial recertification process. This project lends itself well as a part of the recertification process as its implementation can be viewed as quality improvement. Furthermore, as other steps in stroke care depend on the result of the non-enhanced head computed tomography (CT) scan, its timely completion will enable the facility to meet other time metrics, including door-to-needle time more easily.

External threats to accomplishing this practice improvement project consist of an ongoing surge in a COVID-19 pandemic during the implementation of this practice improvement project. High staff turnover and general staffing shortages due to underemployment and illness from the pandemic mentioned above constitute further threats to the implementation of a practice improvement project as staff adherence may be hindered.

Problem Statement

In patients suspected of suffering from AIS, the non-enhanced head computed tomography (CT) scan is key in devising a care plan. Treatment for patients suffering from AIS cannot start until after it has resulted. Additionally, treatment options for patients suffering from AIS are time-sensitive with a 4.5-hour time window from acute stroke symptom onset to

administration of tissue plasminogen activator and a 24-hour time limit in cases of large vessel occlusion treated with MT. Overall, both interventions promise significant benefits when administered in a timely manner, but no benefits if administered after the expiration of those time limits. Therefore, the ASA recommends obtaining the initial non-contrast head CT within 20 minutes of patient arrival, and this time metric is often not met.

The question this practice improvement project aims to answer is: In adult patients with acute ischemic stroke signs and arriving by private vehicle (P), will applying ASA guidelines (I) versus the current triage process (C) reduce door to CT times (O) over an eight-week period (T)?

Aims and Objectives

1. Improve stroke care for adult patients suffering from acute ischemic stroke arriving to the emergency department by private vehicle by decreasing DTCT times to 20 minutes or less.
    a. Improve adherence to ASA guidelines by educating staff nurses in the emergency department on ASA recommended DTCT times.
    b. Create an easily understandable reference map outlining necessary steps in stroke triage and display the map in the triage area.
2. Improve the efficiency and timely completion of stroke triage in the emergency department to meet DTCT times of 20 minutes or less.
    a. Identify and eliminate redundant steps in stroke triage.
    b. Streamline stroke triage utilizing proven, evidence-based methods.
3. Communicate performance metrics to emergency department nurses.
    a. Display reported time metrics in stroke care on a designated stroke board monthly.

Literature Review

For the purpose of this PIP, the literature was reviewed for existing interventions utilized to decrease DTCT times in patients presenting with acute stroke. Articles addressing topics such as decreasing DTCT times, decreasing door-to-needle (DTNT) times, and streamlining stroke triage were identified and reviewed for potential strategies.

A database search was performed through the Cumulative Index to Nursing and Allied Health Literature (CINAHL) and PubMed. The search terms utilized were "door to CT," "stroke AND triage," and "stroke AND triage AND door to CT." The PubMed search resulted in 645 articles with the search term "door to CT." These were narrowed down to 298 articles after applying a filter of five years and full text. The search term "Stroke AND Triage" resulted in 1253 articles, reducing to 685 after using the same filter. The search term "stroke AND triage AND door to CT" resulted in 15, remaining the same after narrowing them to full-text articles from the past five years. The PubMed result headings were filtered further by utilizing the advanced search feature and searching for articles with the search terms in the title, and 23 articles were identified to support this PIP's aims and objectives. In CINAHL, the search term "door to CT" resulted in 19 results after being filtered to full-text articles from the past five years with no relevant articles for this PIP. The search term "stroke AND triage" resulted in 219 full-text results from the past five years, with five contributing articles identified after filtering articles for relevance by reading the article abstracts and titles. The CINHAL search term of "stroke AND triage AND door to CT" resulted in 2 results, neither of which were relevant.

Based on a meta-analysis of existing evidence in the treatment of acute stroke, Powers et al. (2018) recommend a DTCT time of 20 minutes or less to maximize proportional benefits to patients including lower levels of permanent disability, increased quality of life, and decreased

mortality, by decreasing the time to treatment initiation. The authors note this time metric is achievable in most settings. Another meta-analysis by Baskar et al. (2021), identified in-hospital interventions and workflow optimization as necessary in achieving quicker treatment times and improved outcomes in patients with acute stroke. The authors specifically address multi-system interventions such as transporting patients suspected of suffering from acute stroke directly to the CT scanner. The author further mentioned staff education and the elimination of redundant testing as fostering improved time metrics in stroke care. A meta-analysis by Siarkowski et al. (2020) identified successful interventions in decreasing DTNT in patients suffering from AS and lists direct-to-CT as the single most effective intervention in reducing DTNTs. The authors add triage protocols to further assist in achieving decreased DTNTs. These interventions apply to this PIP as any project aimed at reducing DTNTs necessitates the rapid acquisition of the non-contrast head CT. Two single-center studies by different authors note process mapping, staff education, and visual aids in stroke care to be beneficial in finding and eliminating redundant steps in stroke triage (Barbour & Thakore, 2017; Kalnins et al., 2017). A single-center study by Candelaresi et al. (2017) illuminates the benefit of initially assessing the patient in the triage area and proceeding directly to CT-scan after a brief neurological examination and the acquisition of necessary blood samples.

Two studies support the significance of this PIP by acknowledging prolonged treatment times in patients suffering from AS who arrive by private vehicle (Davis et al., 2021; Kinsella et al., 2018). Davis et al (2021), in a single center retrospective analysis of AIS patients that included the analysis and comparison of time metrics in stroke care for said AIS patients, concluded that patients arriving by private vehicle experienced significantly prolonged treatment times. Kinsella et al (2018), in a multicenter retrospective analysis of AIS patients concluded

with similar findings, noting that patients arriving via EMS rather than private vehicle received quicker stroke care after arrival to the ED.

Theoretical Model

In support of the proposed PIP, Lippitt's Phases of Change Theory (LPCT) was identified as a suitable theoretical model that provides structure to the phases of planning, implementation, and sustainability of change. The theory guides and reminds of essential aspects to assess when change is warranted. LPCT includes seven steps. The first step is to diagnose the problem (Bourne, 2018). For this author's PIP, identifying the problem was completed during the initial planning stages. The second and third steps include the assessment of the organization's willingness, ability, and commitment to change (Bourne, 2018). For this author, this step was achieved by speaking with relevant stakeholders at the facility of the PIP. These conversations resulted in support from stakeholders. The fourth step in LPCT involves the layout of potential steps that can be taken to create the needed change (Bourne, 2018). This was achieved by identifying what needed to be done based on available evidence. Role identification is the fifth step in LPCT. During this phase, the *who will do what?* question is answered. Maintaining change is the 6th step in LPCT (Bourne, 2018), and this author chose to support continued change through displaying a visual representation of performance for relevant stakeholders. This display will be maintained by the stroke coordinator of the facility for this PIP. The final step in LPCT is to terminate and withdraw from the helping relationship (Bourne, 2018). To foster progress and maintain potential gains, average DTCT times for patients arriving by private vehicle will be displayed on the stroke board which is highly visible to all ED Nurses as it is displayed openly. This has the advantage of facilitating recognition of worsening DTCT times rather quickly.

Methodology

The primary intervention for this PIP was aimed at providing ED nursing staff with a standardized and easily executable triage protocol for ambulatory patients with signs and symptoms of AIS arriving to the ED by private vehicle to achieve ASA recommended time metrics in stroke care. To assess the pre-intervention system of stroke triage for ambulatory patients arriving to the ED via private vehicle, process mapping was used to provide a visual depiction of the baseline stroke triage (Appendix A). The literature was reviewed for methods aimed at streamlining stroke triage and stroke care in general. Redundant steps in stroke triage were identified and removed (Appendix A-2), creating a new step by step triage protocol (Appendix A-3). Common misconceptions of ED nursing staff, leading to delays in stroke care, were identified with the help of the on-site stroke coordinator through review of retrospective root cause analyses in cases of delayed stroke care. (Appendix B). A newly devised triage protocol, along with identifiable delays including redundant steps and misconceptions were included in teaching material. A Power-Point that included the findings of redundant steps discovered during process mapping, common misconceptions amongst ED-nursing staff regarding stroke triage, rationales as to why DTCT times matter, and the new stroke triage process was created for teaching purposes (Appendix A-4). Lastly, a mnemonic to aid rapid information recall and provide structure to the new stroke triage process was created and designed with the assistance of the stroke coordinator (Appendix C). Registration liaisons who register patients and are the initial contact for ED patients arriving by private vehicle, were reminded to notify the triage RN immediately of patients who arrive with signs and symptoms of AIS.

Setting

The setting for this PIP is a Level III trauma center ED in a rural setting with a total of 205 inpatient beds. The ED patient volume averages to 2,661 patients per month during a time frame of 2 months pre-intervention and 2 months intra/post-intervention. This averages to 88 patients every 24 hours. The facility is certified as a Primary Stroke Center with the added achievement of Award Gold Plus designation, and the Target: Stroke Honor Roll by the ASA. The patient population consists of patients from surrounding counties presenting with emergent and non-emergent health complaints to the ED.

Population

The population addressed during this PIP consisted of an all-inclusive cohort of registered nurses working in the ED on all shifts, regardless of employment status (full-time, part-time, and per diem). Additionally, registration liaisons working during the time of the educational intervention were engaged as participants in this study.

Inclusion/Exclusion Criteria for Nurses

Charge nurses and the unit manager were included in the sample. Furthermore, temporary staff such as agency staff and travel nurses were included in the intervention group.

All nurses from all shifts were included in the PIP including:

- Dayshift nurses
- Nightshift nurses
- Travel nurses
- Charge nurses
- Unit Managers

No nurses meeting inclusion criteria were excluded from this sample.

Inclusion/Exclusion Criteria for Registration Liaisons

- Convenience sample of registration liaisons present on days during which didactic session for nurses were performed

No registration liaisons meeting inclusion criteria were excluded from this sample.

Recruitment

Nurse recruitment was accomplished during shift huddles at the beginning of shift. Nurses were asked by the author if they would like to volunteer to participate in an educational intervention aimed at improving stroke care. No sign-up or prior advertisement was needed as the design of the intervention ensured all staff nurses were engaged simply by being in the present for pre-shift staff huddle every day for a week. End of shift sessions were avoided due to an already higher than usual workload in nurses working during a COVID-19 surge.

Consent

All participants were informed of the goals of this PIP, and consent was obtained prior to the educational intervention (Appendix E). It was conveyed that participation is voluntary and this was a student-run PIP with facility support. Participants were assured the implementation of the new triage protocol was approved by relevant stake holders including ED physician, chief neurologist, stroke coordinator, and chief executive officer. Participants were told privacy would be maintained and no personal identifiers would be utilized during the implementation of the PIP.

Design

After initial Institutional Review Board (IRB) approval (Appendix I), and Collaborative IRB Training Initiative completion (Appendix H) a collaboration between the stroke coordinator and the author of this DNP manuscript was formed. During this, common nurse reported delays

in stroke care were identified through reviews of root cause analyses of retrospective cases during which delays in stroke triage occurred. Initial process mapping (Appendix A) for the system of pre-intervention stroke triage was utilized to depict and identify redundant steps in stroke triage. Following this, a PowerPoint was created addressing the issue of prolonged DTCT times in ambulatory patients arriving to the ED via private vehicle. The PowerPoint went through several revisions and was approved and finalized with the support of the stroke coordinator who also served as mentor to the PI. Staff were engaged during shift huddle prior to beginning of shift on multiple occasions to include all staff nurses working in the ED. A didactic session including the presentation of a streamlined process aimed at patients presenting with signs and symptoms of AIS was offered to nursing staff on a voluntary basis. The RACES (Appendix C) mnemonic was introduced to nursing staff as a memorable version of the new stroke triage protocol. A printed version of the new stroke triage process was laminated and placed in the triage area of the ED for easy on-the-go reference. Additionally, registration staff members were engaged during working hours and reminded of the need for immediate nurse notification in cases of patient presentation with signs and symptoms of AIS. Several FAST (similar to the one presented in Appendix D) posters are on constant display in the registration area of the ED for easy reference regarding signs and symptoms commonly found in patients with AIS. To measure average pre-intervention DTCTs, a pre-intervention cohort was selected. This cohort was an all-inclusive cohort of stroke patients arriving to the ED via private vehicle. The time frame chosen was a two-month time frame preceding the month of project implementation. To measure average post-intervention DTCTs an all-inclusive cohort of stroke patients arriving to the ED via private vehicle was selected. The time frame chosen was a four-week period following the month of project implementation.

Chart Review

The facility for this PIP is a Primary Stroke Center. As such, it participates in the GWTG mandatory reporting of stroke measures. The stroke coordinator logs data, including time metrics in stroke care. Data was obtained from individual chart reviews, deidentified by the stroke coordinator to remove all personal identifiers, entered into an Excel spreadsheet in a deidentified format, and reviewed by the PI. Patients who presented with signs and symptoms of AIS and arrived by private vehicle were identified via a retrospective review of the GWTG stroke data. Following the intervention, a prospective cohort consisting of patients with AIS and arriving by private vehicle was analyzed over an eight-week time-period following the educational intervention. Post intervention data was gleaned from the electronic medical record, EPIC Hyperspace, and data was placed in Excel and reviewed by the PI using the same approach as baseline assessments.

Risks and Benefits

The project contained minimal inherent risks to participants. Confidentiality was maintained for all individuals who participated. Chart reviews for the retrospective and prospective cohorts were performed after deidentification of data sets and charts. Participants were assured that participation in the practice improvement project would not adversely affect their role in the hospital. Nursing staff benefited from the PIP by being able to streamline stroke triage in order to meet ASA recommendations. Since treatment benefits are time-dependent, nurses and patients benefit from improved patient care outcomes, including, decreased odds of disability.

The organization also has the potential to benefit from the PIP. The hospital currently holds the Award Gold Plus, and the Target: Stroke Honor Roll designation, which is impacted by

DTCT at the institution (American Heart Association, 2018). Further, this PIP constitutes a partial recertification requirement towards this designation. In addition, having identified prolonged DTCT times in ambulatory patients arriving at the emergency department via private vehicle has been recognized as a practical aspect of quality improvement in stroke care at the facility for this PIP by its very own stroke council.

Compensation

No compensation was provided to participants. Staff was provided with information through a PowerPoint presentation and a permanent poster with the RACES mnemonic placed in the stroke triage area.

Timeline

A timeline was established during the planning phase of the project to depict the evolution of the project and to assist with timely PIP implementation **(**Appendix F).

Budget and Resources

An itemization of projected costs and required resources was established in order to gauge the feasibility and costs of the PIP **(**Appendix G).

Evaluation Plan

Statistic Considerations

As this PIP deals with a simple comparison of pre- and post-time metrics in stroke care, specifically DTCT times, the mean time was utilized to assess the impact of the intervention. Descriptive statistics were utilized and performed by the PI.

Data Maintenance and Security

Nurses who participated were not identified except through signed consent forms. Registration liaisons were not consented as no formal education regarding stroke care was

provided to the registration liaisons but rather a simple reminder to notify triage nurses of any FAST signs immediately, and with high urgency. These forms were kept in a locked locker that was accessible to the PI only and will be destroyed at the conclusion of this PIP. Data from the GWTG stroke database were de-identified by removal of all patient characterizing information including medical record number, age, date of birth, date of admission, and race. Original Data sets with patient identifiers included were viewed on a password protected institution owned and managed computer before deidentification. Only deidentified data was transcribed to this author's personal password protected computer. In cases of individual chart reviews, to identify reasons for delays in stroke triage in the post-intervention time frame, identifiable data was not transcribed, copied, or taken off-site for any reason, and the EMRs were accessed and reviewed in conjunction with the stroke coordinator.

Results

Utilizing the above noted inclusion/exclusion criteria, a total sample of 25 registered nurses were included in the population for this PIP. For the purposes of the PIP effect on DTCTs, pre- and post-intervention DTCT times were reviewed, averaged, and compared. The post-intervention size was relatively small compared to the available data from the pre-intervention cohort. Only two instances of meeting DTCT of 20 minutes or less were observed.

Pre-intervention DTCTs:

The average pre-intervention DTCT was noted to be 29 minutes (n=32).

Post-intervention DTCTs:

The average DTCT was noted to be 35 minutes (n=7).

Discussion

The overall goal of this PIP was to improve stroke care. Specific aims included streamlining stroke triage and decreasing DTCT to below 20 minutes as recommended by the AHA/ASA.

Significant findings of the PIP included the presence of redundant and unnecessary steps in stroke triage during the pre-intervention period. The utilization of process mapping was identified as a valid tool to identify redundancies and factors causing delays in stroke triage which subsequently delay every other step in stroke care. Findings further suggest a visual representation of a streamlined stroke triage process may help with decreasing variation caused by individuality amongst triage nurses in the execution of stroke triage. This is especially true in a time of high staff turnover, and the presence of temporary staff such as agency and travel nurses.

Effect of Internal Factors

Throughout, and following the implementation period of this PIP, a relative staffing shortage not only persisted but intensified. Combined with extraordinarily high patient volumes, the scenario of ED overcrowding unfolded for the month following the implementation of the PIP, on a daily basis. The experienced staffing shortage in the ED led to delays within ED care itself. Close to half of the compliment of staff nurses at the ED during the implementation period were temporary travel or agency nurses who participated in the educational intervention but were likely much less in tune with workflow in this particular ED than permanent staff nurses. Eight of the study participants addressed left shortly after the time of PIP implementation, preventing assessment of impact of their education on DTCT. Furthermore, staffing shortages experienced throughout the hospital led to the complete closure of several units within the hospital. This, in

turn intensified the issue of overcrowding in the ED. Specifically, boarding times increased dramatically. Boarding times are identified as minutes spent in the ED for patients who have a designated disposition to be admitted to the hospital but do not or cannot leave the ED for various reasons (Potts et al., 2018). The effects of overcrowding and excessive boarding times in the ED are well established and include longer wait times, serious complications caused by delayed care of time sensitive acute illnesses such as acute myocardial infarction and AIS, decreased quality of care, and increased frequency of medical errors (Salway et al., 2017).

For the month of February during which post-intervention measurements were obtained, total boarding minutes were reported as 509,229 minutes. This equates to 8,487 hours of boarding time, or 354 days of boarding time for the month of February. To put this in perspective, the month of March 2022 is reported as having 61,280 minutes of boarding time. For the month of February, the triage area became so congested that patients were seen by providers in the parking lot of the ED in their cars and admitted to the hospital from there with nowhere to go. Therefore, the study time can be described as atypical, plagued by confounding factors, and extraordinary conditions that are inconsistent with standard circumstances encountered. This could very well have impacted the nurse's ability to implement new protocols effectively and efficiently.

Implications for Clinical Practice

The PIP validated process mapping to be a valid tool in assisting with streamlining stroke tirage identifying time delays and redundancies within the process. Considering the presence of relative variability in stroke triage during the pre-intervention phase, the post-intervention stroke triage process provides a reference to a streamlined model of stroke triage with decreased variability. It can be argued process mapping can be applied to other patient care procedures.

As the PIP decreased the number of steps in stroke triage and removed processes, the relative failure of the PIP to achieve its goal of decreasing DTCTs may in part be attributable internal factors such as ED overcrowding, validating the detrimental effects of overcrowding on patient care. Furthermore, ED staffing shortages combined with a high temporary to permanent staff ratio, may inhibit the swift execution of stroke protocols as many of the temporary staff members have had limited experience with the practical application of stroke triage.

Implications for Healthcare Policy

Though not a mandatory requirement for certification, DTCT is an important predictor of meeting overall time metrics in stroke care as it affects the timely execution of all subsequent steps in stroke care, including DTNT. As the ASA/AHA have outlined specific time metrics in stroke care, the Joint Commission on Accreditation of Healthcare Organizations designates stroke centers largely based on meeting these time limits. As more and more facilities improve stroke care, continued improvement measures aimed at achieving timely stroke care are essential in maintaining relative quality in stroke care compared to other facilities.

Implications for Quality and Safety

Stroke care is a highly specialized field of medicine. It includes many moving parts and as neuronal damage positively correlates with time; patient outcomes may vary greatly depending on the time to successful reperfusion. Therefore, continued efforts to streamline stroke triage and achieve faster reperfusion times will always be indicated. Continued quality improvement should be a primary goal in any stroke program.

Implications for Education

Stroke specific education geared toward healthcare personnel involved in the delivery of stroke care is essential in achieving high quality care and improved outcomes (Jones et al.,

2018). For the purpose of this PIP, staff education was a primary intervention aimed at raising awareness, providing rationales, and combating common misconceptions. As the site for the PIP experienced a major staff turnover, repeat education seems essential in training new hires. This becomes even more important as half of the staff employed during the immediate post-implementation period were temporary/agency staff who do not routinely experience a full-fledged orientation. Targeting agency staff during working hours then becomes a good strategy to ensure all staff members remain informed regarding the proper steps to take during stroke triage.

Limitations

Limitations of this PIP consist of the small post-intervention sample size. The time frame utilized was a four-week period following the intervention. The sample size was rather small and less than predicted. There were only seven measurable instances of DTCT in the post-intervention group. Combining the small sample size with catastrophic overcrowding, extreme boarding times, and severe staff shortages, during the post-implementation time lends to severe limitations of this PIP. Therefore, a true representation of the effects of this PIP may not have been observable under the conditions mentioned. Continued tracking of DTCTs seems appropriate to ascertain the effect of the PIP. The short time frame of post-intervention data would have shown short-term benefits at best and excluded the possibility to assess long term change brought forth by the PIP.

Dissemination

The findings of the PIP will be disseminated according to the guidelines for dissemination by Jacksonville State University and will include dissemination through this paper, a poster, and a presentation at the annual DNP dissemination conference day. The DNP

manuscript will also be placed in the JSU Library's Public Repository system. The findings of this practice improvement project will also likely be utilized on a facility level at the site for this PIP.

Sustainability

Sustainability of the project is fostered by the permanent display of the newly designed stroke triage process and the RACES mnemonic on display in the triage area. The streamlined stroke triage process remained in use even after the discontinuation of the PIP. Furthermore, educational materials utilized during the implementation of the PIP will likely be utilized for new staff members in the future.

Plans for Future Scholarship

As the initial implementation of this PIP did not achieve its primary goal of decreasing DTCTs, re-implementation of the project once the dire staffing situation experienced during and after the implementation phase of the PIP has been identified as a viable plan for future scholarship. Furthermore, the process of root cause analysis has can be utilized in all instances of failure to meet DTCTs of 20 minutes or less. This can be assisted by triage staff themselves with a simple note of the underlying reasons DTCT goals were not met. Of course, this must be addressed as to not blame individuals for failure to meet the DTCT goal. Emphasis should then be placed on staff's assistance in identifying factors leading to delays in DTCT. Furthermore, this PIP may show the effects of ED overcrowding, high staff turnover, and staff shortages. Steps in stroke triage were decreased yet the average time taken to complete fewer steps increased significantly.

The implementation of this PIP seems to have had the added benefit of identifying of practice improvement opportunities in stroke care. As stroke care benefits from continuous

quality improvement, other ideas of improving stroke care have been identified. The utilization of nurse activated code strokes is one example of this. Nurse activated code strokes in the ED are commonplace in other facilities and have been proven to benefit the timely execution of stroke care (Liang et al., 2022). Therefore, the decision has been made to allow nurses to call code strokes once the current staffing shortage has improved.

Conclusion

Continued quality improvement measures in stroke care are needed as care for patients with stroke is time sensitive. Healthcare facilities must have processes in place that address the urgency and time sensitive nature of stroke care. As every minute of delay in care, increases the odds and magnitude of permanent disability, healthcare facilities owe their served population, timely care. This study aimed to decrease the time taken to perform one of the initial steps in stroke care, the non-contrast head CT, for every subsequent treatment decision hinge on its results. Limitations of the study, including a small post-intervention sample size, and confounding factors resulted in an opposing effect on DTCTs, causing a prolongation rather than a reduction in DTCTs. Therefore, the issue of decreasing DTCTs remains with the possible necessity of renewed focus on combating confounding issues such as ED overcrowding, high staff turnover rates, and staffing shortages.

Further application of evidence-based time saving measures in stroke care should remain a priority. Optimizing the process of stroke care is a continuous effort entailing continuous quality improvement.

References

American Heart Association. (2018). Phase III Target: Stroke. 14860.

Barbour, V., & Thakore, S. (2017). Improving door to CT scanner times for potential stroke thrombolysis candidates – The Emergency Department's role. *BMJ Quality Improvement Reports, 6*(1), https://doi.org/10.1136/bmjquality.u211470.w4623

Baskar, P. S., Chowdhury, S. Z., & Bhaskar, S. M. M. (2021). In-hospital systems interventions in acute stroke reperfusion therapy: A meta-analysis. *Acta Neurologica Scandinavica, 144*(4), 418–432. https://doi.org/10.1111/ane.13476

Bourne, P. A. (2018). Implementing change in an organization: A general overview. *Scholarly Journal of Psychology and Behavioral Sciences, 1*(1), 7–18. https://doi.org/10.32474/sjpbs.2018.01.000102

Candelaresi, P., Lattuada, P., Uggetti, C., Daccò, R., Fontana, G., & Frediani, F. (2017). A high-urgency stroke code reduces in-hospital delays in acute ischemic stroke: a single-centre experience. *Neurological Sciences, 38*(9), 1671–1676. https://doi.org/10.1007/s10072-017-3046-y

Centers for Disease Control and Prevention. (2019). BRFSS Prevalence & Trends Data: Explore by Topic | DPH | CDC. https://nccd.cdc.gov/BRFSSPrevalence/rdPage.aspx?rdReport=DPH_BRFSS.ExploreByTopic&irbLocationType=StatesAndMMSA&islClass=CLASS10&islTopic=TOPIC31&islYear=2019&islLocation=

Centers for Disease Control and Prevention. (2021a). Diabetes and Obesity Maps | CDC. https://www.cdc.gov/diabetes/data/center/slides.html

Centers for Disease Control and Prevention. (2021b, May 21). Stroke Facts | cdc.gov. https://www.cdc.gov/stroke/facts.htm

Davis, N. W., Bailey, M., Buchwald, N., Farooqui, A., & Khanna, A. (2021). Factors that influence door-to-needle administration for acute stroke patients in the Emergency Department. *Journal of Neuroscience Nursing, 53*(3), 134–139. https://doi.org/10.1097/JNN.0000000000000590

Girotra, T., Lekoubou, A., Bishu, K. G., & Ovbiagele, B. (2020). A contemporary and comprehensive analysis of the costs of stroke in the United States. *Journal of the Neurological Sciences, 410*(June 2019), 116643. https://doi.org/10.1016/j.jns.2019.116643

Grossberg, J. A., Rebello, L. C., Haussen, D. C., Bouslama, M., Bowen, M., Barreira, C. M., Belagaje, S. R., Frankel, M. R., & Nogueira, R. G. (2018). Beyond large vessel occlusion strokes: Distal occlusion thrombectomy. *Stroke, 49*(7), 1662–1668. https://doi.org/10.1161/STROKEAHA.118.020567

Hurford, R., Sekhar, A., Hughes, T. A. T., & Muir, K. W. (2020). Diagnosis and management of acute ischaemic stroke. *Practical Neurology, 20*(4), 306–318. https://doi.org/10.1136/practneurol-2020-002557

Jones, S. P., Miller, C., Gibson, J. M. E., Cook, J., Price, C., & Watkins, C. L. (2018). The impact of education and training interventions for nurses and other health care staff involved in the delivery of stroke care: An integrative review. *Nurse Education Today, 61*(October 2017), 249–257. https://doi.org/10.1016/j.nedt.2017.11.024

Kalnins, A., Jake Mickelsen, L., Marsh, D., Zorich, C., Casal, S., Tai, W. A., Vora, N., Olalia, G., Wintermark, M., & Larson, D. B. (2017). Decreasing stroke code to CT time in

patients presenting with stroke symptoms. *Radiographics, 37*(5), 1559–1568. https://doi.org/10.1148/rg.2017160190

Kamal, N., Holodinsky, J. K., Stephenson, C., Kashayp, D., Demchuk, A. M., Hill, M. D., Vilneff, R. L., Bugbee, E., Zerna, C., Newcommon, N., Lang, E., Knox, D., & Smith, E. E. (2017). Improving door-to-needle times for acute ischemic stroke: Effect of rapid patient registration, moving directly to computed tomography, and giving alteplase at the computed tomography scanner. *Circulation: Cardiovascular Quality and Outcomes, 10*(1), 4–11. https://doi.org/10.1161/CIRCOUTCOMES.116.003242

Kamal, N., Sheng, S., Xian, Y., Matsouaka, R., Hill, M. D., Bhatt, D. L., Saver, J. L., Reeves, M. J., Fonarow, G. C., Schwamm, L. H., & Smith, E. E. (2017). Delays in door-to-needle times and their impact on treatment time and outcomes in Get with the Guidelines-Stroke. *Stroke, 48*(4), 946–954. https://doi.org/10.1161/STROKEAHA.116.015712

Kinsella, D., Mosley, I., & Braitberg, G. (2018). A Retrospective Study Investigating: Factors associated with mode of arrival and emergency department management for patients with acute stroke. *Australasian Emergency Care, 21*(3), 99–104. https://doi.org/10.1016/j.auec.2018.07.001

Liang, X., Gao, W., Xu, J., Saymuah, S., Wang, X., Wang, J., Zhao, W., Xing, X., Wang, C., Liu, F., Feng, L., & Li, S. (2022). Triage nurse-activated emergency evaluation reduced door-to-needle time in acute ischemic stroke patients treated with intravenous thrombolysis. *Evidence-Based Complementary and Alternative Medicine, 2022*. https://doi.org/10.1155/2022/9199856

Potts, L., Ryan, C., Diegel-Vacek, L., & Murchek, A. (2018). Improving patient flow from the emergency department utilizing a standardized electronic nursing handoff process. *Journal of Nursing Administration, 48*(9), 432–436. https://doi.org/10.1097/NNA.0000000000000645

Powers, W. J., Rabinstein, A. A., Ackerson, T., Adeoye, O. M., Bambakidis, N. C., Becker, K., Biller, J., Brown, M., Demaerschalk, B. M., Hoh, B., Jauch, E. C., Kidwell, C. S., Leslie-Mazwi, T. M., Ovbiagele, B., Scott, P. A., Sheth, K. N., Southerland, A. M., Summers, D. V., & Tirschwell, D. L. (2018). 2018 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, 49*(3), e46–e99. https://doi.org/10.1161/STR.0000000000000158

Salway, R., Valenzuela, R., Shoenberger, J., Mallon, W., & Viccellio, A. (2017). Emergency department (Ed) overcrowding: Evidence-based answers to frequently asked questions. *Revista Médica Clínica Las Condes, 28*(2), 213–219. https://doi.org/10.1016/j.rmclc.2017.04.008

Saver, J. L. (2006). Time is brain - Quantified. *Stroke, 37*(1), 263–266. https://doi.org/10.1161/01.STR.0000196957.55928.ab

Siarkowski, M., Lin, K., Li, S. S., Al Sultan, A., Ganshorn, H., Kamal, N., Hill, M., & Lang, E. (2020). Meta-analysis of interventions to reduce door to needle times in acute ischaemic stroke patients. *BMJ Open Quality, 9*(3). https://doi.org/10.1136/bmjoq-2020-000915

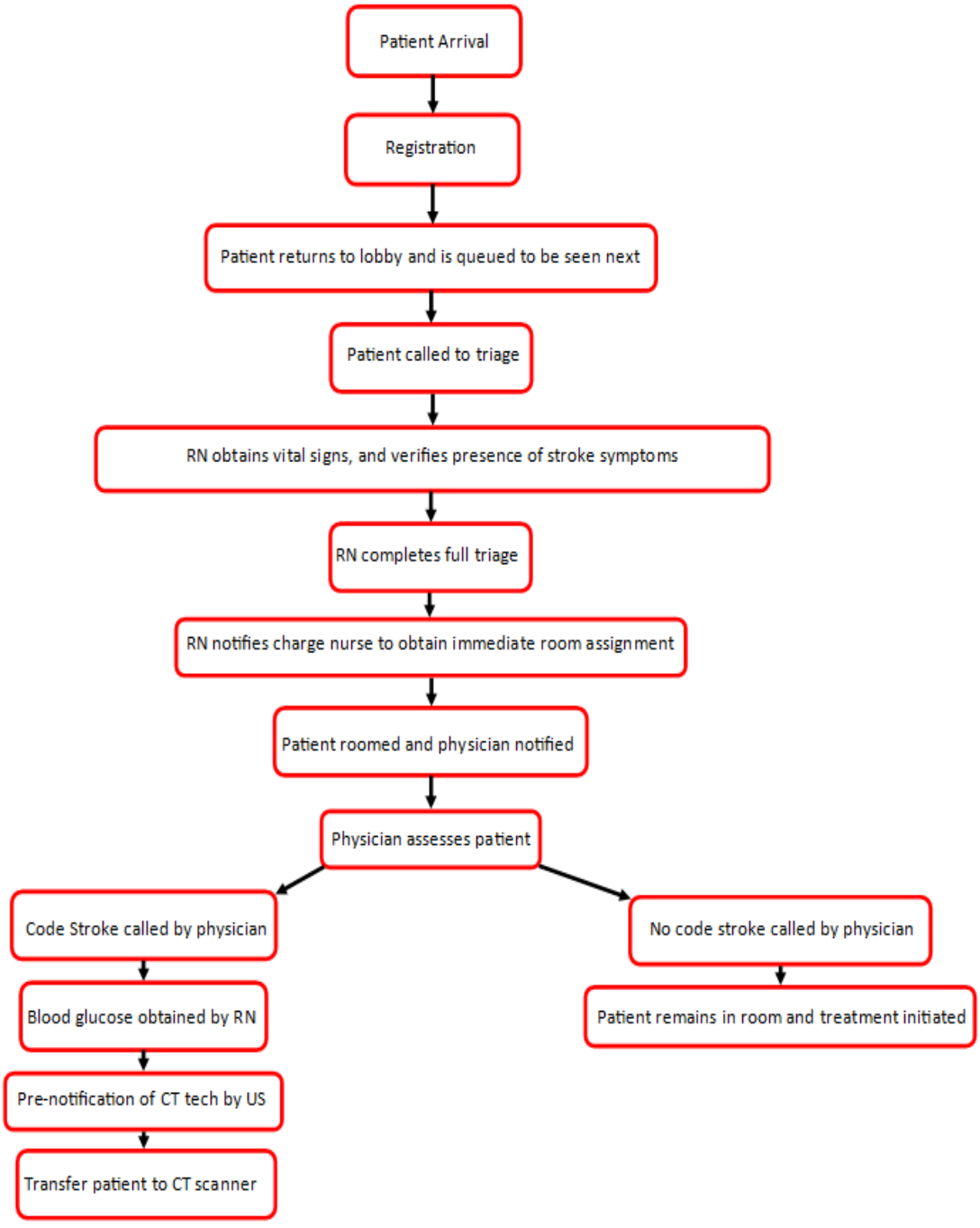
Snelling, B., McCarthy, D., Chen, S., Sur, S., Elwardany, O., Sheinberg, D., Yavagal, D., Peterson, E., & Starke, R. (2019). Extended window for stroke thrombectomy. *Journal of*

Neurosciences in Rural Practice, 10(2), 294–300. https://doi.org/10.4103/jnrp.jnrp_365_18

Virani, S. S., Alonso, A., Benjamin, E. J., Bittencourt, M. S., Callaway, C. W., Carson, A. P., ... & American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. (2020). Heart disease and stroke statistics—2020 update: a report from the American Heart Association. *Circulation, 141*(9), e139-e596. https://doi.org/10.1161/CIR.0000000000000757

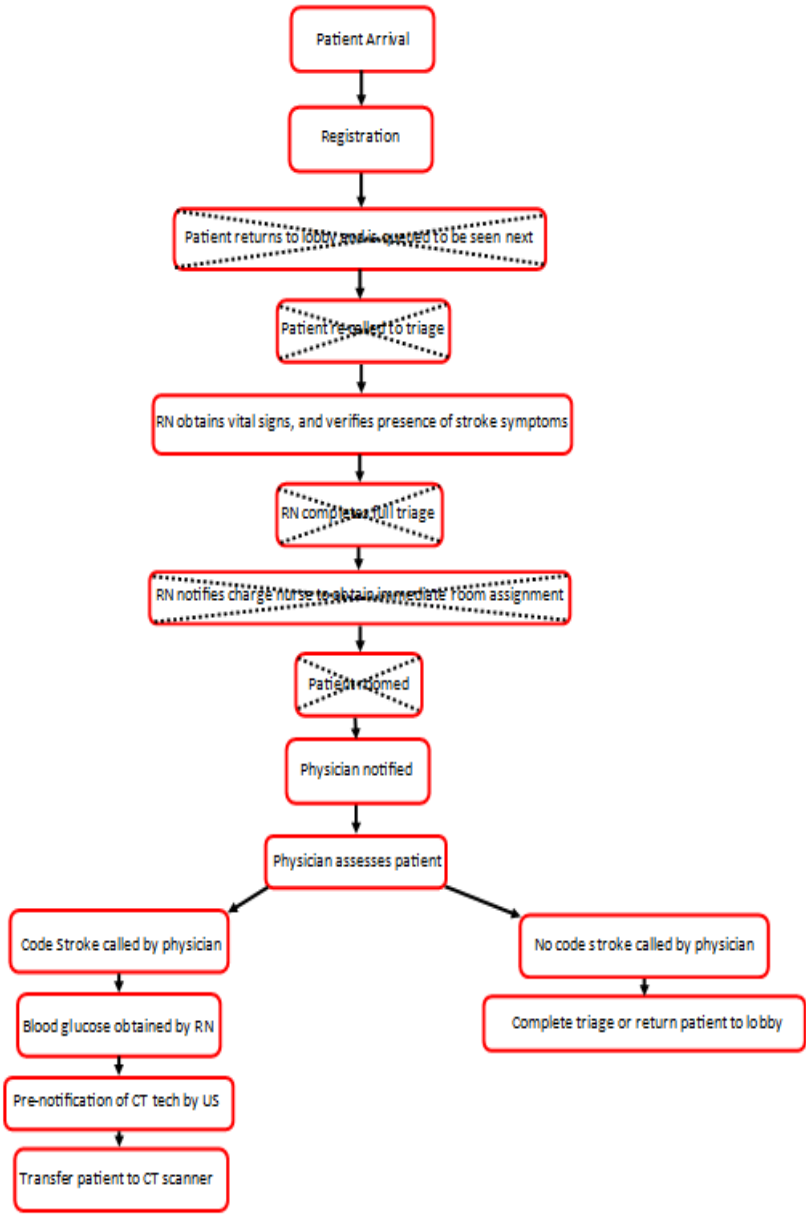
Appendix A

Pre-Intervention Stroke Triage Workflow



Appendix A-2

Pre-Intervention Removal of Redundant Steps in Stroke Triage



Appendix A-3

Streamlined Workflow Chart after Removal of Redundancies

Appendix B

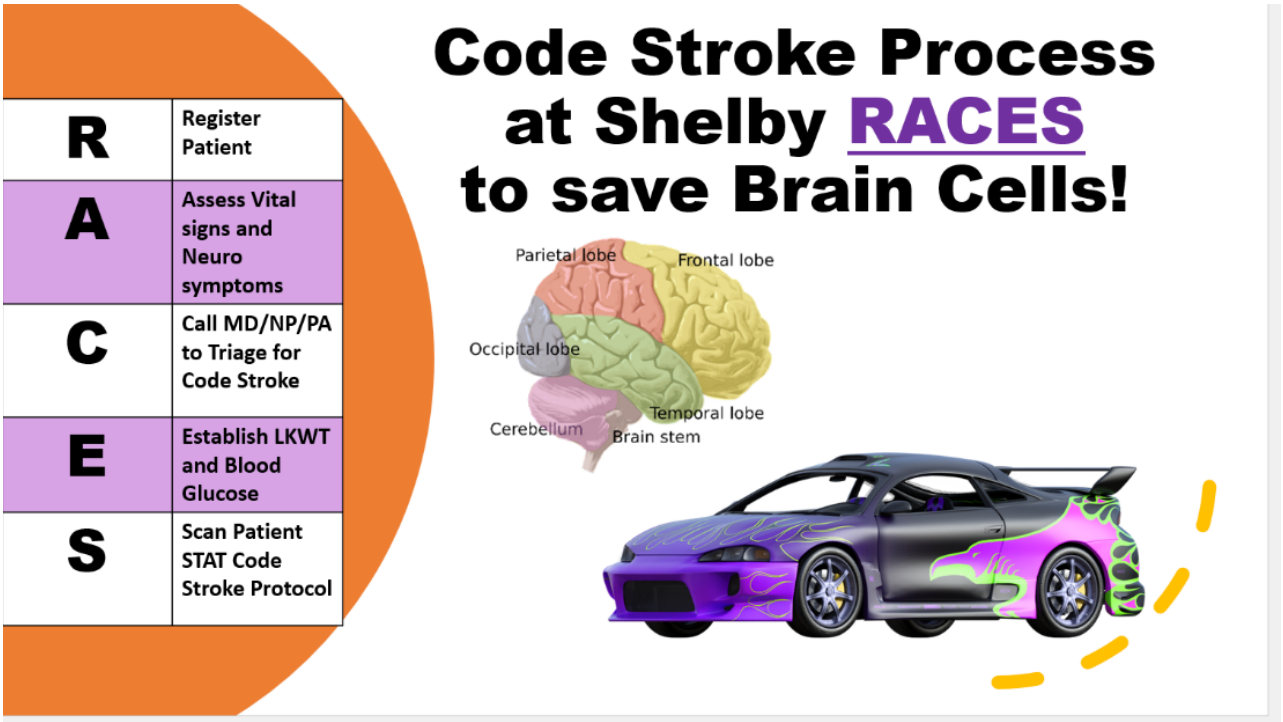
Identified Misconceptions Among Nurse Regarding Stroke Triage

Misconceptions about stroke triage	Redirection
- DTCT time does not matter in patients not eligible for tPA*	- DTCT of 20 minutes or less has been identified by the ASA* as an achievable time metric in stroke care and should be achieved to guide treatment (Powers et al., 2018)
- Patients with stroke symptoms that have resolved at the time of triage do not need to be evaluated by a physician right away and may return to the lobby	- Identification of transient ischemic attack (TIA*) constitutes a stroke and patients should be worked up for stroke without delay
- Patients need to be roomed prior to assessment by a physician	- Rooming patients with signs and symptoms of AIS is unnecessary and delays treatment (Kamal, et al., 2017)

* tPA-tissue plasminogen activator
* ASA-American Stroke Association
* TIA-transient ischemic attack

Appendix C

Stroke Triage Mnemonic



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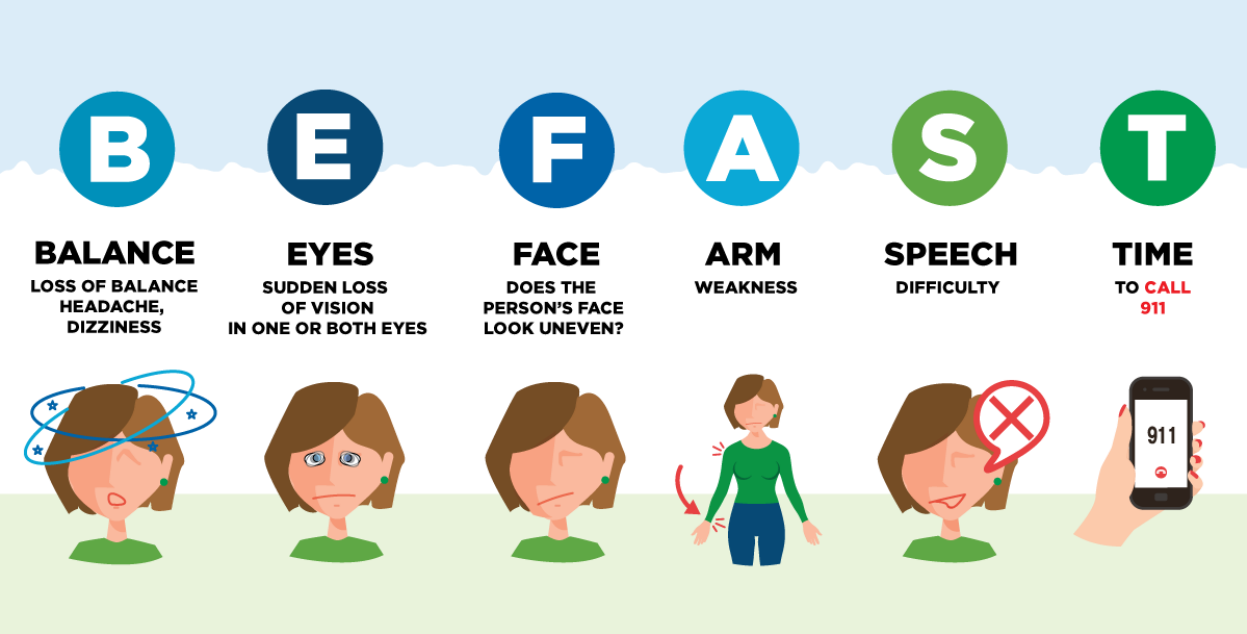
Appendix D

FAST Signs and Symptoms of Stroke



Appendix E

Consent Form

Participant Consent Form

Title of Study: Stroke Care: Achieving recommended door to computed tomography times in ambulatory patients presenting to the emergency department of a rural hospital through the application of American Stroke Association guidelines.

Principal Investigator: Ricardo Paitz
This consent form is a partial fulfillment of a consent process for a Doctor of Nursing Practice student project and will inform participants as to the purpose of this practice improvement project enabling participants to decide if they wish to volunteer for this project.
In case of any questions that may arise during this practice improvement project you should feel free to ask the principal investigator at any time and be provided with answers you clearly understand in their entirety.
After all your questions have been answered, you may participate in the educational session if you still wish to participate in the practice improvement project.

Purpose:
The purpose of this practice improvement project is to ensure proper stroke triage procedures to achieve the American Stroke Association recommended time window of 20 minutes from door to computed tomography scanner in patients presenting with sings of acute ischemic stroke to the emergency department via private vehicle. The identified practice gap is a prolonged door to CT time for ambulatory patients presenting to the emergency department with acute onset of stroke symptoms. The American stroke association recommends a door to CT time of 20 minutes or less. A retrospective data review reveals a mean time of 39 minutes for patients arriving to the emergency department by private vehicle. This project was selected because the stroke council identified the prolonged door to computed tomography times in their quarterly meeting as a problem needing to be addressed. The problem in current practice is an inefficient stroke triage process.

What will you be asked to do if you take part in this practice improvement project?
Nursing and registration staff will be asked to participate in a 15-minute educational session and will be provided with educational material related to stroke triage. A visual reference map related to the triage of patients presenting with sings of acute ischemic stroke to the emergency department via private vehicle will be displayed in the triage area. Door to computed tomography times will be assessed prior to and after the educational sessions, and the display of the stroke triage process in the triage area of the emergency department.

Location:
Emergency department of a rural hospital emergency department

Length of time of participation:
Less than 15 minutes

Potential risks:
Participation in this project is voluntary. No foreseeable risks to participants have been identified. All information obtained during the practice improvement project will be kept confidential and destroyed after the completion of the process improvement project.

Confidentiality:
No confidential or identifiable information will be collected.

Benefits of the practice improvement project:
The benefit to participants will be an increase in their ability to meet American Stroke Association guidelines. The benefit to society will be a positive impact on patient outcomes.

What will happen if you do not wish to participate in the project or if you later decide not to stay in the project?
Participation in this project is voluntary. Participants are given a choice to participate and may change their minds at any time and withdraw from participation. If you wish to not participate or withdraw from the project at any time, you may do so without fear of penalty or loss of benefits to which you are otherwise entitled.

Who can you call if you have any questions?
If you have any questions about your participation in this practice improvement project, please call the principal investigator:

Ricardo Paitz, RN, MSN, ACNPC-AG
(205)821-6512

1. Subject consent:

I understand the purpose and implications of the discussed process improvement intervention. My questions have been answered, and I agree to take part in this practice improvement project.

Subject Name:_____

Subject Signature:_____ Date:_____

2. Signature of Investigator/Individual Obtaining Consent:

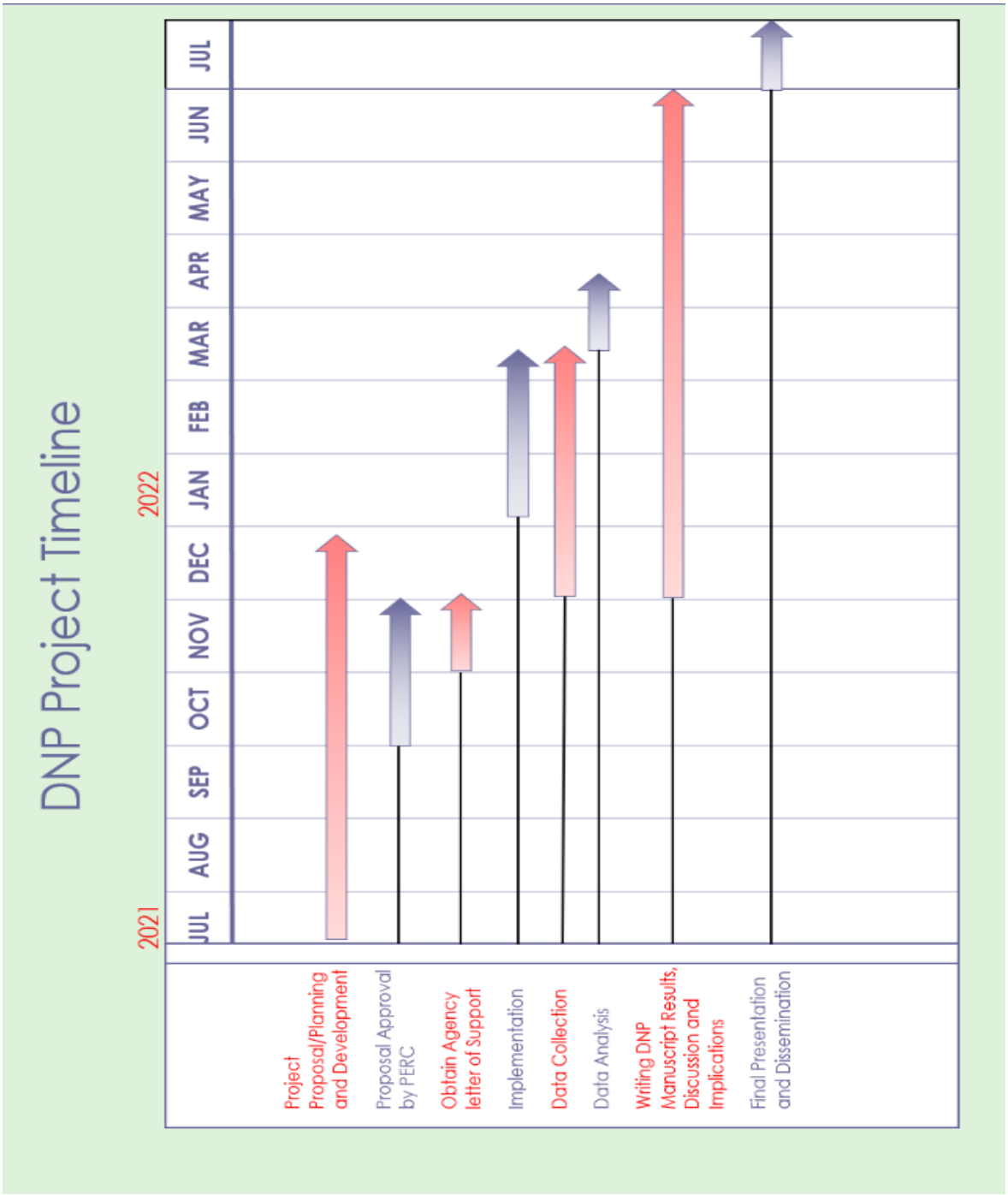
I have explained the purpose, mechanics, and implications of this practice improvement project to relevant stakeholders to the best of my ability. I have addressed concerns with the parties involved.

Investigator/Person Obtaining Consent (printed name): Ricardo Paitz, RN, MSN, ACNPC-AG

Signature:_____ Date: _____

Appendix F

DNP Project Timeline



Appendix G

Budget and Resources

Resource	Cost
Paper	$ 10.00
Laminated RACES Mnemonic	$ 2.00
Time metric posters	$ 5.00

*All resources provided through hospital funding

Appendix H

CITI Training Certificate

CITI PROGRAM

Completion Date 23-Sep-2021
Expiration Date 22-Sep-2024
Record ID 45110713

This is to certify that:

Ricardo Paitz

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

Social and Behavioral Responsible Conduct of Research
(Curriculum Group)
Social and Behavioral Responsible Conduct of Research
(Course Learner Group)
1 - RCR
(Stage)

Under requirements set by:

Jacksonville State University

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?weeaacbfe-4a79-492a-a35f-59eefdd8a099-45110713

Appendix I

IRB Approval Letter

JSU | INSTITUTIONAL REVIEW BOARD
JACKSONVILLE STATE UNIVERSITY

Institutional Review Board for the Protection of Human Subjects in Research
203 Angle Hall
700 Pelham Road North
Jacksonville, AL 36265-1602

December 9, 2021

Ricardo Paitz
Jacksonville State University
Jacksonville, AL 36265

Dear Ricardo:

Your protocol for the project titled "Stroke Care: Achieving recommended door to computed tomography times in ambulatory patients presenting to the emergency department of a rural hospital through the application of American Stroke Association guidelines" 120920201-05 has been granted exemption by the JSU Institutional Review Board for the Protection of Human Subjects in Research (IRB). If your research deviates from that listed in the protocol, please notify me immediately. One year from the date of this approval letter, please send me a progress report of your research project.
Best wishes for a successful research project.

Sincerely,

Lynn Garner
Associate Human Protections Administrator, Institutional Review Board