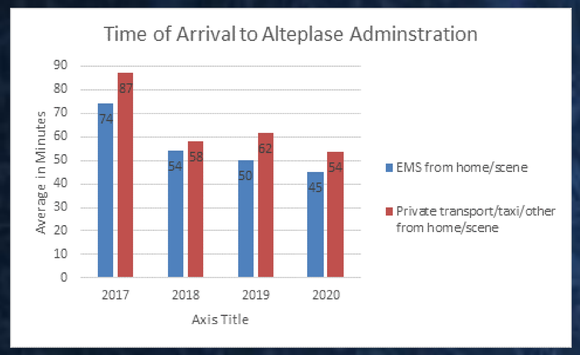
Workflow of Stroke Patients Arriving by Personal Vehicle

Bethany Costello, BSN, RN, CCRN

Background

- Every 40 seconds someone in the United States sustains a stroke, and every four minutes an individual dies from this stroke (Rhew et al., 2017).
- For each minute that a large-vessel occlusion, or ischemic stroke, goes untreated 1.9 billion neurons and 13.8 billion synapses are lost which in one hour is equivalent to the same loss that would occur in 3.6 years of the natural aging process (Speirs & Mitchell, 2015).
- The door-to-needle time (DNT) is the time that lapses between the time a patient arrives in the emergency department (ED) and the time that intravenous recombinant tissue plasminogen activator (tPA), otherwise known as the pharmaceutical drug Alteplase is administered.



Hypothesis Statement

- In patients with acute ischemic stroke symptoms arriving via personal vehicle to the emergency department, does the use of an improved stroke workflow and a standardized order set as opposed to the use of the current stroke workflow and no order set decrease the average time from door to Alteplase administration as measured in minutes?

Objectives

- The overall aim of my capstone project is to decrease the time from door to Alteplase (tPA) administration in applicable patients arriving to the emergency department via personal vehicle in a community hospital.
- This overarching goal was to be met through the following objectives:
  - Identify the areas of delay throughout the previous stroke process
  - Find solutions to overcome these delays to insert logically into the workflow
  - Reorganize the workflow to prioritize obtaining the head CT before any other menial tasks
  - Improve interdisciplinary communication throughout the department about stroke patient arrivals and treatment.

Setting

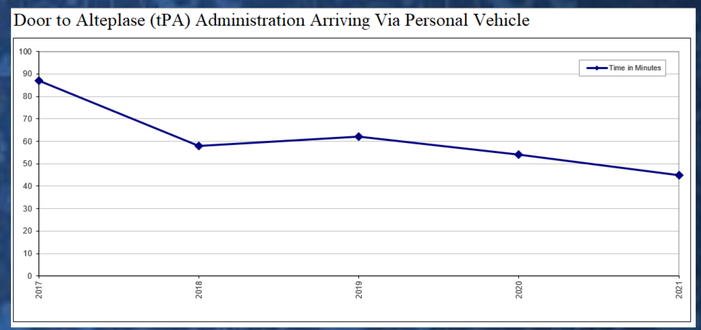
- The emergency department at this small Pennsylvania rural hospital contains 18 beds and 4 triage suites contained in an area known to staff as the pit.
- The layout of the ED is thoughtfully done with the radiology department directly outside the doors to the unit which allows for easy access and transport of critical patients, namely those suspected of having a stroke.

Literature Synthesis

- Stroke is identified as the third leading cause of death by Rhew et al. (2017), however Elder et al. (2015) and Speirs & Mitchell (2015) identify stroke as the fourth leading cause of death in the United States. The implication of this inconsistency is that through the years, stroke prevalence has increased such that is has moved up from the fourth leading cause in 2015 to the third leading cause in 2017, meaning that there must be a focus today on more education about stroke and prevention measures.
- Recombinant tissue plasminogen activator (tPA), otherwise known as the Food and Drug Administration (FDA) approved pharmacological intervention, Alteplase, was unanimously stated to be the primary standard treatment for acute ischemic stroke (Emberson et al., 2014; Yang et al., 2014; Elder et al., 2015; Speirs & Mitchell, 2015; Yoo et al., 2018; Zerna et al., 2018; Campbell et al., 2019; Tennyson et al., 2019; Tran et al., 2019; Jaffe et al., 2020; Kamal et al., 2020 Man et al., 2020).
- Zerna et al. (2018) identified that approximately 25% of all ischemic strokes are eligible for thrombolysis, however Rhew et al. (2017) states that fewer than 5% of patients who are eligible for acute treatment actually receive intravenous thrombolytic drugs.
- Zerna et al. (2018) states that they have found no average benefit of Alteplase administration after 270 minutes, or 4.5 hours, from stoke symptom onset and feel that to be the time as which the medication approaches a neutral effect, as where Emberson et al. (2014) estimated the time at which Alteplase has no effect to be 6.3 hours.
- Risk versus benefit of Alteplase administration was not as heavily discussed throughout the literature as one would assume given that it carries severe and potentially life-threatening side effects such as bleeding and subsequent intra-cranial hemorrhage (Genentech USA, 2020). Campbell et al. revealed that "the number of patients with symptomatic intracerebral hemorrhage was significantly higher in the alteplase group than the placebo group [...] however, no significant differences were identified in mortality" (2019, p. 143)

Methods

- (Plan) The cycle begins with observing the current process and creating a new workflow for approval by the stroke committee and emergency department management.
- (Do) Once this is approved, education can be dispersed, and the implementation can be brought about.
- (Study) After a short period of implementation, the new workflow should be observed again and feedback from staff as well as metrics should be collected and assessed.
- (Act) Finally, utilizing this data and staff feedback, the workflow should be modified as needed, if applicable, and new education provided throughout.
- The projection as shown in the run chart is that the current door to Alteplase time frame, while currently acceptable, continues to trend shorter to ensure the best possible patient outcomes to a goal of 45 minutes or under by 2021



Results & Outcomes

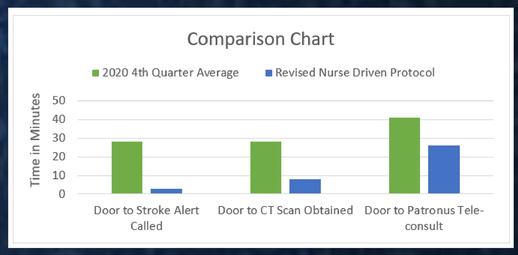
- The new workflow was developed, but in further discussion with the hospital stroke committee it was suggested that we look into a nurse driven approach which would allow the triage nurse to initiate the stroke alert process and take the patient to CT.
- Identifying exact roles for each team member involved proved to be a setback as the emergency department is an ever-changing environment in which staff availability and patient acuity can fluctuate from hour to hour.
- It was determined that flexibility will be paramount in this workflow; staff knowing the steps of the new process in order will allow whichever staff is available to complete the next chain in the process.
- At this point in the implementation process the Covid-19 pandemic had begun to consume the microsystem's resources.
- Over the following weeks as cases continued to rise, the ED management enacted a change that all staff would be required to wear full personal protective equipment (PPE) garb to enter the unit and such precious resources were understandably not to be utilized by students.
- Mental fatigue and staff burnout were also taken into consideration within this phase of the PDSA cycle, and with Covid-related policy changes occurring sometimes daily we ascertained that this was not the time to proceed with a major process change.

Discussion

- The implementation of this project was not abandoned - we developed written and virtual education in the form of a pocket card for staff with the streamlined new workflow and a more in-depth power-point presentation explaining the reason for the change and the semantics of the workflow.
- This education and all steps from this point will be set aside and held for future implementation after the Covid-19 pandemic subsides.

Significance

- A single walk-through of the new workflow was completed by the primary stroke coordinator with the unit educator on a single patient and had successful outcomes.
- As shown in the comparison chart below, the revised workflow significantly reduced the times from door to intervention as compared to the previous quarter's average times.
- This project has also empowered triage nurses to identify and call a stroke alert independently without relying on a physician to confirm their suspicions or write orders in the electronic medical record.



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