Fall 11-15-2022

# Transient Ischemic Attack and Admission to a Dedicated Unit

Bandi Davini
*University of St. Augustine for Health Sciences*

DOI: https://doi.org/10.46409/sr.CDTC4729

# Transient Ischemic Attack and Admission to a Dedicated Unit

Bandi Davini, DNP, MSN, RN, APRN-BC
School of Nursing, University of St. Augustine for Health Sciences

This Manuscript Partially Fulfills the Requirements for the

Doctor of Nursing Practice Program and is Approved by:

Dr. Brann, DNP, RN

Ashley Bolling, DNP, AGPCNP-BC, SCRN

November 15, 2022

**University of St. Augustine for Health Sciences**
**DNP Scholarly Project**
**Signature Form**

| **Student Last Name:** | **First Name:** | **Middle Initial:** |
|---|---|---|
| Davini | Bandi | L |

**E-mail:**
B.Davini@usa.edu

**Title of DNP Project:**

Transient Ischemic Attack and Admission to a Dedicated Unit

*My signature confirms I have reviewed and approved this final written DNP Scholarly Project.*
*DocuSign electronic signature or wet signature required.*

| Type Name in Blue Box Below | Signature | Date |
|---|---|---|
| DNP Project Primary Faculty: Mary Brann RN, DNP | [redacted] | 11/29/2022 |
| DNP Project Preceptor: Ashley Bolling, DNP, APRN, AGPCNP-BC, SCRN | | 11/29/22 |
| DNP Project Preceptor: | | |

## Abstract

Transient ischemic attacks account for admissions of approximately 70% of patients who present to the emergency department with transient vascular symptoms, with an average length of stay of one to seven days, costing, on average, $22,087 (Qureshi et al., 2013). A hospital organization's bed efficiency directly affects quality metrics. Reducing the length of stay in TIA patients by having them admitted to a dedicated unit with whom the staff has experience managing stroke patients and the understanding of specific criteria needing to be met before discharge can directly impact quality metrics and provide cost-effective delivery of care. The PICOT question that guided this project was, in patients who present to the emergency department with a transient ischemic attack (TIA), how does the implementation of a rapid, protocol-based pathway for admission to a dedicated stroke unit versus conventional admission methods decrease the length of stay over eight weeks? The evidence for this project revealed several articles establishing that a protocol-based pathway initiated in the emergency department could reduce the length of stay in the specified group. Additional evidence indicated the use of an algorithm and $ABCD_2$ scoring in conjunction with meeting 'Get with the Guidelines' criteria provided a reduction in cost to the organization (see Table 2). Using a rapid, protocol-based pathway, in collaboration with emergency department physicians, general neurologists, and other clinicians, and the $ABCD_2$ score assisted with diagnosis and direct admissions. A checklist was provided to the dedicated unit staff to ensure all criteria for admission and discharge were met. The results of this project demonstrated patients were being discharged at 2.84 days, slightly above the national average of 2.24 days. These results indicated an increase but withstanding efficacy of assessment and treatment. The reason for the subtle increase was secondary to patients with incidental findings requiring intervention increasing the length of stay for recovery.

## Transient Ischemic Attack and Admission to a Dedicated Unit

Approximately 70% of all patients presenting to the emergency department are admitted with a diagnosis of transient ischemic attack (TIA). Length of stay can range from less than one day to greater than seven days and costs an average of $22,087 (Qureshi et al., 2013). Quality metrics are a health systems proxy of efficient hospital management and are a significant indicator of an organization's bed efficiency control. The necessity of reducing LOS in TIA patients is to provide cost-effective care delivery, thereby reducing costs to the organization and beneficiary receiving appropriate care. Patients who present to the emergency department with a TIA require focused attention via a rapid, protocol-based pathway for admission to a dedicated stroke unit to avoid the increased length of stay provided cost-effective care.

## Significance of the Practice Problem

The length of stay (LOS) is a central indicator of the proficiency of hospital management. The significance of lessening the number of inpatient days improves patient outcomes by decreasing the risk of opportunistic infections, improving treatment quality, and increasing profit by lowering fees to the patient and productive bed management for the hospital. No matter the length of time, admission to the hospital can impact the quality of life. For those of working age, this increases the prospect of unearned income. Insured adults face sizeable exposure to unfavorable economic consequences upsetting their earning potential. Those uninsured patients have comparable financial risks secondary to an inability to pay medical expenses (Dobkin et al., 2018). In addition to the lack of possible patient monetary earnings, it can also add or create a burden on the family (i.e., those who are dependents, required to care for the patient).

The financial impact on the healthcare system is directly related to LOS. Diagnosis-related groups (DRGs) have been founded as Medicare’s hospital reimbursement system, directly

related to evaluating hospital services and effects hospital repayment. Strokes have been added to the Centers for Medicare and Medicaid Services (CMS) 30-day risk-standardized mortality measures and directly affect reimbursement to the hospital. Suppose a patient with a stroke is readmitted to the hospital within 30 days of discharge. In that case, the hospital will be reimbursed at a lower rate, even if the readmission has nothing to do with a stroke diagnosis (Centers for Medicare & Medicaid Services, 2020).

There is an estimated yearly cost of approximately $50 billion on societal costs in patients with ischemic stroke. This includes hospitalization, rehabilitation, clinic follow-ups, prescriptions, long-term care, and income loss. Policymakers consider new stroke therapies and determine costs and benefits when justifying payment (Majersik & Woo, 2020).

A medical facility and its five sister hospitals are located in South Florida and are centrally located, catering to the South Broward District. This hospital has observed an increase in the length of stay of patients admitted with a TIA, with an average length of stay ranging from one day to approximately ten days. The national mean average LOS is 2.4 for hospitals noted in 2014 (Bedaiwi et al., 2018).

There is an inherent risk of discharging patients with minor symptoms versus admitting patients. Releasing a patient too soon who presents with a transient ischemic attack (TIA) can pose a safety risk for the patient. They are at a 10-20% risk of recurrent stroke in the first 90 days after the initial presentation and are less likely to follow up in a clinic than those admitted for workup (Kapral et al., 2016). Understanding the factors that influence the hospital LOS in ischemic stroke patients must be assessed to develop approaches for discharge planning, thus decreasing the hospital stay and cost of care (Somerford et al., 2004).

## PICOT Question

In patients who present to the emergency department with a transient ischemic attack (TIA), how does implementation of a rapid, protocol-based pathway for admission to a dedicated stroke unit versus conventional admission methods decrease length of stay over eight weeks?

The population included all adult patients ages 18 and older without regard to race or gender. The focus of the project was to implement a rapid-based protocol directed towards admitting patients who meet the TIA criteria to a dedicated neurology unit. The dedicated unit is staffed by an experienced team of nurses who are well-versed in TIA, stroke assessment, and protocols versus conventional admission methods to a general ward staffed by inexperienced stroke nurses, unfamiliar with identification or protocols associated with a TIA or stroke. The expectation was to decrease the length of stay (LOS) during eight weeks, thereby decreasing the length of stay (LOS) and reducing the cost to both the patient and organization by way of an algorithm.

## Evidence-Based Practice Framework & Change Theory

The Johns Hopkins Evidence-Based Practice Model (JHEBP) (2022) is an effective problem-solving method for clinical decision-making. Its framework has a core of practice and learning among the interprofessional team through questioning practice, finding evidence, and translating it into practice. The structure is based on inquiry, best practice, improvements, and constant reflection on practice and learning. The Johns Hopkins model guided the development and application of implementing a rapid, protocol-based pathway to decrease LOS by helping to define each step succinctly over a specific time frame. For example, each section (i.e., practice question and project planning, evidence, and translation) of Appendix A helps to set goals for how long it will take to accomplish each step. It also provides a decision tree to assist in determining the need for the project.

A change theory that would fit the implementation of this project is Kurt Lewin's Force Field Model. The Force Field Model theorizes three stages for changing a process, identifying the restraining energies, and discovering a method to release the old habits to instill new behaviors to enforce the new pattern (Udod & Wagner, 2018). This change theory helped guide this project by identifying the old routine of admitting patients to general wards (old habits) and admitting to patient-specific areas (new practices). This required an algorithm (change process) to introduce and create the recent change or expected outcome. Lewin's change theory is simplistic and allows for new stability without making a large volume of chaos.

## Evidence Search Strategy

The evidence-based search strategy used to find evidence for the practice recommendation of implementing a rapid protocol-based pathway for admission to a dedicated stroke unit versus conventional admission methods to decrease the length of stay was conducted through CINHAL, ProQuest, and PubMed. The use of specific keywords and identifiers with the help of "or" produced limited articles of the search terms—the use of "and" to expand on the topic increased the search results. The keywords used in this search consisted of protocols, TIA, ischemic stroke, length of stay, and emergency services. PubMed MeSH headings did not produce a quest to build upon and were inconclusive. The inclusion criteria used in the PubMed search were patients, stroke, CVA, ischemia, TIA, transient ischemic attack, hospital, emergency medical care, medical imaging, protocol, non-protocol, LOS, and length of stay. Exclusion criteria consisted of hemorrhage, intracranial bleeding, and intracranial hemorrhage. PubMed had a low yield for articles relating to keywords. A five-year search yielded five pieces; expanding the search to ten years only provided one additional paper. CINHAL provided one article result with only keywords; however, using the PICO search provided several more articles

totaling seven over the past ten years. ProQuest had a significant yield of articles with an initial search total of 27,763,689 in the last ten years using keywords with “or” as the separator. This was changed to “and” as the filter, which further defined the intervention topic to 238 articles over ten years. Further restricting the subject written in English only decreased the results by one. Additional breakdown of the articles and exclusion was due to the studies were not relevant to the main subject and not randomize clinical trials which narrowed the search to five primary articles.

## Evidence Search Results

The evidence-based search results provided many articles relating to the identified keywords between the three databases used (i.e., CINHAL, PubMed, and ProQuest), totaling 237 articles. Two hundred and thirty-seven articles were screened. One hundred and sixty-six articles were reduced immediately secondary to geographical location, and the settings were based in rehabilitation facilities post-discharge without regard to hospitalization length of stay. Of the seventy-one articles, further exclusions were due to no randomized-controlled trials, redundant publications, language limitations, and reports not localized to the U.S., leaving 66 more excluded due to irrelevance to the main topic, leaving five pieces for evaluation towards project goals (see Table 1).

The five remaining articles have supporting evidence based on the author's opinion and supported by peer review. These pieces present quantitative research with cohort support to examine if the risk of implementing a protocol for TIA patients in the emergency department would assist with decreasing the length of stay by using retrospective and prospective information (Johns Hopkins Medicine, n.d.). The investigation establishes links between current patient presentation and outpatient follow-up with no changes to neurological outcomes and risk

stratification.

All the articles were true experimental studies consisting of investigation of decreasing length of stay by way establishing a link between TIAs, risk factors, and outcomes. These pieces are level I, providing quantitative randomized controlled trials, and established significant results in decreasing LOS in a time frame over six months with a quality grade of 'A' providing consistent, generalizable results, with a sufficient sample size for the study design (Johns Hopkins Medicine, n.d.). These pieces demonstrated adequate control and a definitive conclusion and reference to scientific evidence without meta-synthesis (Dahlquist et al., 2020; Garg et al., 2021; Jarhult et al., 2018; Nahab et al., 2012). The mean patient average was 158.5, ranging from 138 to 180. Results for these five pieces equates to reduced length of stay, a reduction in cost to the organization and beneficiary using algorithms, "Get with the Guidelines" (GWTG), and $ABCD_2$ and $ABCD_3$ scoring (see Table 2).

## Themes with Practice Recommendations

Three themes were identified among the five articles examined. Among these articles, two focused on population, two focused on intervention, and one was trend related. Relative to the PICOT question (decreasing length of stay in a patient-specific population admitted to a dedicated unit).

### Population

The first two articles (randomized control trial [RCT] & systematic review [SR]) provided quality evidence focusing on admission to a dedicated unit lends to decreased length of stay, and efforts were focused on acute stroke care. The differences between these two articles were using a TIA accelerated diagnostic protocol (ADP) adapted from the chest pain ADP used in emergency departments (ED) to rapidly triage patients with chest pain using a focused

algorithm. The emphasis was on a dedicated area to assess and ensure all measures were completed (e.g., imaging, screenings, and antithrombotic therapy) and demonstrated a significant decrease in cost for the duration of admission compared to those who were not admitted with the use of the TIA-ADP. The second article was focused on comparison groups with inclusion and exclusion criteria to prove value to policymakers for financial purposes and comparison to The Cochrane review on organized inpatient care when using a standard set of measures to reduce the length of stay, dependency, and morbidity. The statistical significance of these articles was $p = <0.01$; see Appendix A and B (Nahab et al., 2012; Sun et al., 2013).

**Intervention**

The third and fourth articles (RCTs) focus on implementing a rapid, protocol-based pathway for admission to a dedicated unit, and both were centralized at one facility. Statistical evidence demonstrated both articles had decreased length of stay and no untoward effects from early discharge and rapid clinic follow-up. Both articles focused on the $ABCD_2$ score to triage patients. However, one site used this score to safely discharge patients as the other site did not; it was used only to meet the clinical pathway algorithm. There was a significantly high statistical analysis of $p = < 0.0001$ & $p = < 0.001$ for both articles; see Appendix A (Garg et al., 2021; Jarhult et al., 2018). It is suggested by the American Heart Association (AHA) to utilize rapid imaging for evaluation of TIA for stroke prevention and management and the use of the $ABCD_2$ (originally for non-specialists), and $ABCD_3$-I (use in secondary care) scores are for diagnostic investigation. (Kelly et al., 2012).

**Trend**

A current trend is using the $ABCD_3$-I score and rapid neuroimaging with a pathway to evaluate patients who present with TIA symptoms and provide evidence of decreased hospital

admissions with good risk stratification results (Dahlquist et al., 2020). Although this article focused on patient management using rapid imaging and scoring, in addition to outpatient follow-up, it did not discuss further necessary imaging (i.e., carotid ultrasound), nor did it mention the administration or initiation of antithrombotic therapy or screenings for prevention. Given this study was the first of its kind, its statistical significance was high at $p = <0.001$; see Appendix A.

In comparing these articles, implementing an algorithm compared to traditional admission protocols resulted in the rapid evaluation of patients with TIA symptoms and reduced overall length of stay. Of the four RCTs and one SR of good quality, all were conducted within a hospital setting and consistently reported decreased length of stay or reduced hospital admissions of TIA patients. After reviewing the available best evidence (i.e., findings, results, and recommendations), the quality and applicability of these studies combined demonstrated consistency in results, and it is plausible that patients with a TIA would benefit from direct admission to a dedicated unit, thereby decreasing LOS and reducing overhead. The evidence has shown when patients are admitted to a dedicated stroke unit, implementation of treatment occurs directly, and delays in care are decreased. Recommendations for implementing a TIA rapid, protocol-based pathway in the ED would increase awareness for the execution of specific imaging and admission orders directly for the specialized unit and would be consistent with the GWTG initiative and clinical practice guidelines (see Figure 2).

## Setting, Stakeholders, and Systems Change

The setting for this project took place in a 36-bed, telemetry-neuroscience-focused unit within an academic medical center. The typical patient involved in this project was anyone ages 18 and older who had presented with transient unilateral weakness of the face, arm, or legs,

slurred speech or aphasia, visual disturbances, vertigo, loss of balance, or incoordination. These patients can have preexisting or no vascular risk factors. Patients who had a patent foramen oval (PFO), severe intracranial or extracranial stenosis, or atrial fibrillation were excluded from this project, secondary to preexisting conditions subjecting them to high risk for future ischemic events. The focus of this project aligns with the organizations' mission and vision of healing the body, mind, and spirit of those they touch. And its focus is on being the premier clinically integrated delivery system providing access to exceptional patient and family-centered care, medical education, research, and innovation to the community served (Memorial Healthcare System, 2022).

Length of stay is a central indicator of the use of medical services and is used to identify the efficiency of hospital management. This organization has identified an increased length of stay in patients who present with a TIA ranging from 2-7 days during quality improvement initiatives. Some of the factors attributing to this are delays in obtaining brain imaging and waiting for cardiac workups to be completed. The identifiable stakeholders for this project were the ED director; his role is essential in collaborating with staff to ensure care delivery is achieved and is paramount in developing, maintaining, updating, and implementing policies, procedures, and protocols. His role helped ensure providers were aware and compliant with methods and protocols. This was extremely important in the success of this project. The DON was responsible for leading the telemetry-neuroscience unit through collaboration with the unit manager through goal development and compliance. Their role assisted in ensuring the patient-specific population was admitted to the correct unit versus a general ward in conjunction with the nurse practitioner. The nurse practitioner was the first to see the TIA patients in the ED; her role was to establish those patients who fit the criterion for admission to the dedicated unit in collaboration with the

neurologist. The neurologist was the primary focal point. Ultimately, it was their responsibility to establish if the patient had a TIA or if the presentation is a TIA mimic (i.e., hypertensive urgency, complicated migraine, hypo/hyperglycemia). The stroke coordinator assisted in planning, implementing, and evaluating clinical programs for high-quality achievement. She was beneficial in ensuring patient-focused outcomes had been achieved and assisted with data retrieval and coordination with data analytics. Data analytics helped define and interpret the specific patient population through retrospective reports to compare to present data during the project. Finally, the nursing staff helped implement patient-specific lab monitoring, imaging, and patient clinical status to ensure hyperacute treatment was completed to meet the project's goals. Full support was obtained from all parties involved. The decreased length of stay was evident during the project's sustainability through ongoing performance assessments and measurements, continued stakeholder participation, and adaptability of staff.

The level of system change was a micro-level implication. SWOT performance analysis demonstrated several strengths and weaknesses to implementing the project. Strengths were improved patient care, subsequent cost reduction, and utilization of bed management with subsequently increased profit. Identified weaknesses were high staff turnover secondary to COVID-19 staffing opportunities, creating a shortage of inexperienced nurses within the dedicated unit. There were also barriers to discharge from untimely imaging or uninsured patients (see Appendix C).

## Implementation Plan with Timeline and Budget

This project aimed to minimize extended hospital stays in the defined group of TIA patients presenting to the ED and ensure antiplatelet treatment, statin therapy, blood pressure reduction, and smoking cessation (if applicable) are addressed within the first 24 hours of

admission. Achieving this goal of reduced length of stay in the specific population provided focused care regarding neurological symptoms and education to immediately return to the hospital for any symptoms associated with balance, headache, or dizziness, blurry vision, unilateral face, arm, or leg weakness, or speech difficulties, with lifestyle modification, medical intervention, and establishment of close neurological follow-up in stroke clinic. Evidence showed a clinical pathway decreasing the length of stay and provided early rapid neurovascular imaging for prompt diagnosis and pathogenesis of an event to provide specific treatment intervention. The implementation of this project occurred over of eight weeks.

Execution during the task phase; configuration of the project began and was defined at this stage with the release of the information required to implement the plan. This entailed laying out roles and descriptions of how the project would move forward.

## Practice Change

Patients who would typically be admitted with TIA symptoms were now directed to the observational unit through an algorithm. The algorithm guided admission to the specific unit by using the $ABCD_2$ score with collaboration between the ED physician and neurologist. Further education was provided to nursing staff with a checklist and ensured all identified parameters were met (i.e., antiplatelet before 24 hours, statin therapy, etc.). This instilled the novel change forming new habits with the use of the checklist clarifying all discharge needs had been met. Collaboration for implementation included the director of neurosciences, ED physician director, ED nursing director and manager, neurologists, stroke nurse practitioner, nursing staff, and imaging staff.

### *Assessment, Imaging, Scoring, and Contact*

The ED physician examined patients immediately to establish a timeline and

symptoms. Based on the presentation, if the patient met the criteria, they were taken for urgent imaging, and simultaneous scoring and neurology consult was initiated. If the patient had a predefined comorbidity (e.g., atrial fibrillation), the patient was deferred for general admission.

### *Advanced Imaging and Decision Process*

Presenting symptoms decided if advanced imaging warranted stat vessel imaging with computer tomography arteriogram determined by the neurologist. This advanced imaging was delineated if the patient required further workup secondary to findings of severe carotid disease requiring intervention versus visualized established stroke.

### *Discharge Process*

Once imaging had been completed, and the diagnosis of TIA was established, the patient resided in an observational status to initiate antiplatelet therapy, statin management, education, and stroke clinic follow-up.

## Implementation Plan

The project followed Johns Hopkins evidence-based practice model of problem-solving and decision-making as core learning through interprofessional collaboration, and based on current practice, searching for current best practices, and translation into goals. Project initiation began with cooperation between all stakeholders: preceptor consultations were ongoing, at least every other week or more, and as needed for project development and assistance. By week 11 (March), a meeting with the ED director of nursing and manager was completed to describe the project, goals and gain initial support. Week 12 was a meeting with the neurology director and the emergency department physician director explaining the purpose of the project, goal and gain buy-in and demonstration of a sample algorithm for project implementation by the second week of September 2022. A meeting with the director of nursing for neurosciences was completed the

following week. In this meeting, the identified project needs for the organization, goals, and implementation and all interprofessional collaboration was obtained for go-live by September 2022. Finally, staff meetings occurred with the clinical managers and nurses to advise of project, algorithm, and nursing checklist for TIA patient management for admission to an observational unit (i.e., dedicated unit) and tool place in August and again in September to ensure a full complement of education. All stakeholders agreed and approved of the project, the implementation process began the first week of October and was completed at the end of September for a total of eight weeks (see Appendix D). Measurement of success was through final evaluation of patient's length of stay.

The practice included all patients presenting with TIA symptoms being evaluated, emergent imaging obtained, advanced imaging was crucial, and collaboration between team members for the decision-making process of diagnosis. After the diagnosis had been established, the staff nurse would then proceed with seeing all points were met on the checklist (see Figure 3) in collaboration with the stroke nurse practitioner or neurologist (i.e., initiation of antiplatelet and statin therapy [primary goals]), etc.).

The project manager took the lead role (stroke nurse practitioner) in planning, executing, monitoring, controlling, and closing the project. She was responsible for managing the team and resources and any budgetary needs for the success of the project. There were no budgetary needs secondary to this being an integrated project (see Figure 1).

## Results

The facility Stroke Manager collected statistical data via information technology (IT) reports, and analyzation of data and storage was performed by the principal investigator (project manager). The information was stored on the hospital's protected server and collected just before

the project's initiation and at the end of eight weeks to compare reports and outcomes. Minimal HIPPA identifying markers were used during the data collection process (i.e., admission and discharge date, discharge diagnosis, and average hospital stay) and were not associated with names, birth dates, or other identifiable markers. One occurrence of missing data among current patients was observed, resulting from the patient leaving against medical advice from the emergency room after admission was completed. Data integrity was maintained since minimal information was collected for primary tags; no outliers were observed during the data collection and evaluation (Tables 3 and 4).

The evaluation design was structured to produce an unbiased appraisal of the rapid triage and evaluation of those patients who presented with transient stroke-like symptoms, obtainment of rapid imaging and future prevention education, and allowed for scheduled outpatient follow-up in a stroke clinic before discharge. The retrospective length of stay data demonstrated extended evaluation secondary to wait times for advanced imaging to rule out an ischemic event and incidental findings of other comorbidities on advanced brain and vessel imaging (i.e., aneurysms, arterial venous malformations, or high-grade intra-extracranial stenosis).

The tools used to evaluate the project were a data spreadsheet providing information on all patients with a diagnosis of TIA and an individually created checklist addressing all points to be documented in the patient's chart as per hospital protocol before discharge. The IRB approval process initially included permission to use the extracted data spreadsheet. The validity was variable depending on the disease. However, using the ICD-10-CM for this project was beneficial as TIA does not refer to other disease processes. Approval to use ICD-10-CM data was obtained from administration and IT support for nominal data collection and reporting via IRB approval (Figure 3).

A two-tailed Mann-Whitney rank-sum test for the length of stay by the dedicated unit was conducted to examine whether significant differences in decreased LOS between patients admitted to a dedicated unit versus a standard ward. The principal investigator reviewed the results, which were expected to be substantial based on the alpha value of .05 and $p < .001$. However, the results were not significant based on an alpha value of .05 with a $p < .700$ for retrospective data and $p < .779$ among current data providing no statistically significant difference, this was likely due to the small sample size in addition to extended stay of patients with incidental findings during work-up. The clinical significance of this project demonstrated a mean length of stay of 2.24 in the retrospective group and 2.84 in the current data group. These averages fall close to the national mean average LOS of 2.4 days for hospitals noted in 2014 (Bedaiwi et al., 2018).

The search strategy yielded 70 patients within sixteen weeks with no overlapping information. After chart review, all patients received an evaluation for TIA; all the pre-and post-patients were worked up for TIA with the protocol implementation; however, only 29 patients were found to be true TIAs after reviewing neurology documentation. Overall, the intervention significantly impacted the practice problem, demonstrating that patients were directly admitted to the dedicated unit both pre- and post-intervention. Few patients were admitted to a general ward secondary to bed availability, no neurology consult, or leaving against medical advice.

Admission and discharge data and patient clinical work-up were examined to determine if the intervention was associated with any changes in care processes. The project discovered that patients admitted to a dedicated unit increased from approximately 87% to 90% with sustained efficient assessment and treatment. However, effectual bed management was skewed secondary to additional comorbidities or incidental findings discovered during the patient's clinical work-

up, demonstrating an increase in mean length of stay from 2.24 to 2.84 days. Separating the patients with incidental findings during work-up would leave minimal patients (approximately five) to evaluate any exactitude of data. There was minimal clinically significant change in inpatient admissions to a dedicated unit from the ED. Rapid triage and brain imaging with simultaneous contact with the neurology team demonstrated immediate follow-through for advanced brain imaging, resulting in direct admission to the dedicated unit and subsequent diagnostic testing. Organizational financial improvement was not seen over the sixteen weeks, likely secondary to the small sample size. Nevertheless, promises are to be seen over time with continued management and throughput of this sustainable protocol-driven process providing for financial growth through continued optimization of bed capacity and efficient rapid triage, lending to hospital and national cost savings (Lam et al., 2021) (see Appendix E).

The evidence-based project was reviewed and approved by the USAHS EBP Review Council (EPRC) and the facilities institutional review board (IRB). It did not meet the criteria for the definition of research with human subjects, not requiring IRB oversight; however, it must follow all applicable institutional policies and ethical guidelines.

## Impact

Overall, it was discovered that implementing a TIA clinical pathway provided increased consistency of admissions to a dedicated unit. Before implementation, there was a concern about patients admitted to departments other than a specialty ward who presented with a TIA or mini-stroke and not receiving adequate inpatient care or follow-up. After reviewing data from eight weeks before and eight weeks during the project implementation, we found patients were consistently being directed to the specialty ward for management. Although there were several outliers, this project has increased awareness among hospital staff to redirect patients to the

dedicated unit when called for report from the ED before unit arrival to avoid delays in patient-specific care. I believe if data were pulled from a few months before COVID-19, we would see consistently more patients admitted to a general ward. Another discovery was patients presenting with TIA symptoms also had other incidental findings such as unruptured aneurysms, carotid dissections, or unruptured arterial venous malformations requiring further hospitalization for treatment. This led to an increase in the length of stay for these patients. In addition, there were findings of patients who were not true TIAs, but whose diagnoses were not changed to the appropriate diagnosis before discharge, which skewed the average length of stay. Future implementation of this project should ensure accurate discharge diagnosis by providing education to the primary care team and continued direct admission to the dedicated unit. In addition to looking at retrospective data from several years before COVID-19 to compare to current 1-2 years of data for accuracy in the future.

The clinical significance of this practice change has heightened awareness throughout the hospital setting; this consisted of administration (i.e., CNO, DON for critical care and the neuroscience unit, administrative nursing officers) and nurses among general wards. During integral overflow, administration directives are to admit a patient wherever there is an available bed, however, the information discovered during the evaluation of patients and their recognized diagnoses has heightened the senses of faculty to the missed plans of care and documentation needed for these patients, providing changes to instructions requiring patients who meet the TIA criteria, decreasing the risk of outliers.

Decreasing the length of stay in patients with the specified criteria has created an awareness that will expand this project to include all other neurological symptoms to be only sent to the specified unit. Ongoing education will be crucial to maintaining this practice among

physicians and nurses. All team members must be on the same page to ensure accurate patient management and discharge within a timely fashion. The stroke coordinator/manager will maintain the success of this project with the assistance of the dedicated unit manager and staff. Continued data will be collected to ensure the accuracy of patient educational criteria, care plans, and discharge planning. Data collection will be reevaluated to determine if accurate terms are used to identify the specific patients and to exclude outliers.

A few limitations were found during project implementation. Data collection was insufficient to capture the actual length of stay secondary to COVID-19, inconsistencies in discharge diagnosis, and incidental discoveries on patient imaging. Additional time frames (e.g., at least one year or more) are needed to capture and identify the significance of decreasing the length of stay via a dedicated unit.

## Dissemination Plan

The result of this EBP wsd held at the practicum site via WebEx with a PowerPoint presentation and include all stakeholders, which is the preferred method of communication and dissemination. For an exhibition to the professional community, an oral poster presentation will be created to present to the USAHS staff and current and upcoming students. The dissemination of this project will demonstrate mastery of the DNP concepts, provide a level of directional clinical improvement of the project topic, and show evidence of synthesizing information. This project should be continued for approximately one year to gather more informational data to establish a reasonable timeline and efficacy of the project before dissemination to local, regional, or national platforms. The publication will be submitted to the Scholarship and Open Access Repository (SOAR) for future viewing and education of other DNP students, providing an open public showcase of scholarly work. This will allow the work to be discoverable and available for

others involved in project research. Long-term project dissemination will be to submit the findings of an extended project (i.e., at least one year's worth of data) to nursing journals for fellow colleagues and students to apply to their own practice.

## Conclusion

The intention of admitting patients to a dedicated unit is to decrease the length of stay, thereby improving patient outcomes, effectual bed management, and increasing profit. A significant number of patients presenting to the emergency department are admitted with a TIA diagnosis, lending to unnecessary admissions with subsequent increase in hospital metrics and efficacy of bed management. Attempting to reduce LOS of stay in TIA patients provides cost-effective care delivery and reduce costs to the beneficiary and the organization. A rapid, protocol-based pathway for admission to a dedicated unit can avoid unnecessary admissions and delayed patient care and increase cost-effective patient management.

Several studies have demonstrated a decrease in LOS using algorithm implementation for TIA patients with collaboration between physicians and the imaging department to obtain rapid tomography and initiate vascular risk factor management (i.e., education, medication, clinic follow-up). Proficiency in hospital bed management improves patient outcomes, decreases the risk of opportunistic infections, and provides productive bed management, improving the organization's financial impact.

## References

Bedaiwi, I. I., Alfaraj, S. Z., & Pines, J. M. (2018). National trends in stroke and TIA care in U.S. emergency departments and inpatient hospitalizations (2006-2014). *The American Journal of Emergency Medicine*, *36*(10), 1870–1873. https://doi.org/10.1016/j.ajem.2018.08.013

Center for Disease Control and Prevention. (2022, February 11). *International classification of diseases, tenth revision, clinical modification*. https://www.cdc.gov/nchs/icd/icd10cm.htm

Centers for Medicare & Medicaid Services. (2020, February 11). *Outcome measures*. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/OutcomeMeasures

Dahlquist, R. T., Young, J. M., Reyner, K., Farzad, A., Moleno, R. B., Gandham, G., Ho, A. F., & Wang, H. (2020). Initiation of the $ABCD_3$-I algorithm for expediated evaluation of transient ischemic attack patients in an emergency department. *American Journal of Emergency Medicine*, *38*(4), 741–745. https://doi.org/10.1016/j.ajem.2019.06.018

Dobkin, C., Finkelstein, A., Kluender, R., & Notowidigdo, M. J. (2018). The economic consequences of hospital admissions. *The American Economic Review*, *102*(2), 308–352. https://doi.org/10.1257/aer.20161038

Garg, A., Maran, I., Amin, H., Vlieks, K., Neuschatz, K., Coppola, A., Poskus, K., Johnson, J., Davis, M., Minja, F., Schindler, J., Sansing, L. H., Malhotra, A., Jasne, A. S., & Sharma, R. (2021). Expedited and comprehensive management of low-risk TIA patients in the emergency department is safe and less costly. *Journal of Stroke and Cerebrovascular Diseases*, *30*(10). https://doi.org/10.1016/j.jstrokecerebrovasdis.2021.106016

Jarhult, S. J., Howell, M. L., Barnaure-Nachbar, I., Yuchiao Chang, White, B. A., Amatangelo, M., Brown, D. F., Singhal, A. B., Schwamm, L. H., Silverman, S. B., & Goldstein, J. N. (2018). Implementation of a rapid, protocol-based TIA management pathway. *Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health*, *19*(2), 216–223. https://doi.org/10.5811/westjem.2017.9.35341

Johns Hopkins Medicine. (2022). *Johns Hopkins evidence-based practice model*. https://www.hopkinsmedicine.org/evidence-based-practice/ijhn_2017_ebp.html

Kapral, M. K., Hall, R., Fang, J., Austin, P. C., Silver, F. L., Gladstone, D. J., Casaubon, L. K., Stamplecoski, M., & Tu, J. V. (2016). Association between hospitalization and care after transient ischemic attack or minor stroke. *Neurology*, *86*(17), 1582–1589. https://doi.org/10.1212/WNL.0000000000002614

Kelly, A. G., Hellkamp, A. S., Olson, D., Smith, E. E., & Schwamm, L. H. (2012). Predictors of rapid brain imaging in acute stroke. *American Heart Association*, *43*(5), 1279–1284. https://doi.org/10.1161/STROKEAHA.111.626374

Lam, C., Ditkowsky, J., Sharma, V. K., & Stark, N. (2021). *Financial Impacts of ED Observation Units: Literature and Strategies Review EMRA*. Emergency Medicine Residents' Association. https://www.emra.org/emresident/article/lit-review-observation-units/

Majersik, J. J., & Woo, D. (2020). The enormous financial impact of stroke disability. *Neurology*, *94*(9), 377–378. https://doi.org/10.1212/WNL.0000000000009030

Memorial Healthcare System. (2022). *About Memorial Healthcare System*. https://www.mhs.net/about

Morgan, R. L. (n.d.). *Research Guides: Systematic reviews: results and PRISMA flow diagram*. https://guides.lib.lsu.edu/c.php?g=872965&p=6269176

Nahab, F., Leach, G., Kingston, C., Mir, O., Abramson, J., Hilton, S., Keadey, M., Gartland, B., & Ross, M. (2012). Impact of an emergency department observation unit transient ischemic attack protocol on length of stay and cost. *Journal of Stroke and Cerebrovascular Diseases*, *21*(8), 673–678. https://doi.org/10.1016/j.jstrokecerebrovasdis.2011.02.017

Qureshi, A. I., Adil, M. M., Zacharatos, H., & Suri, M. F. K. (2013). Factors associated with length of hospitalization in patients admitted with transient ischemic attack in United States. *Stroke*, *44*(6), 1601–1605. https://doi.org/10.1161/STROKEAHA.111.000590

Somerford, P. J., Lee, A. H., & Yau, K. K. W. (2004). Ischemic stroke hospital stay and discharge destination. *Annals of Epidemiology*, *14*(10), 773–777. https://doi.org/10.1016/j.annepidem.2004.02.003

Udod, S. A., & Wagner, J. (2018). Common change theories and application to different nursing situations. In *Leadership and Influencing Change in Nursing*. University of Regina Press. https://leadershipandinfluencingchangeinnursing.pressbooks.com/chapter/chapter-9-common-change-theories-and-application-to-different-nursing-situations/

Y., Paulus, D., Eyssen, M., Maervoet, J., & Saka, O. (2013). A systematic review and meta-analysis of acute stroke unit care: What's beyond the statistical significance? *BMC Medical Research Methodology*, *13*(1). https://doi.org/10.1186/1471-2288-13-132

Table 1

*PRISMA diagram*

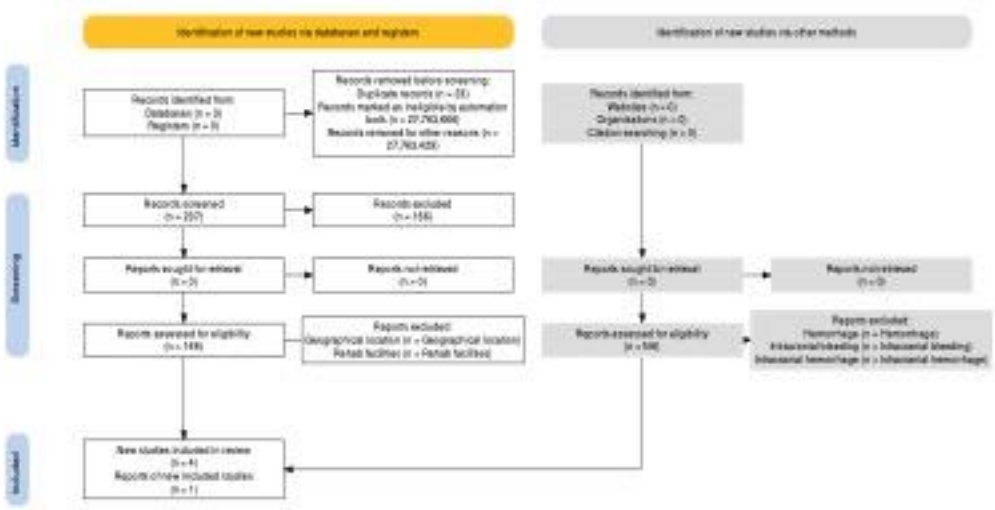


Table 2

*Evidence Search Results*

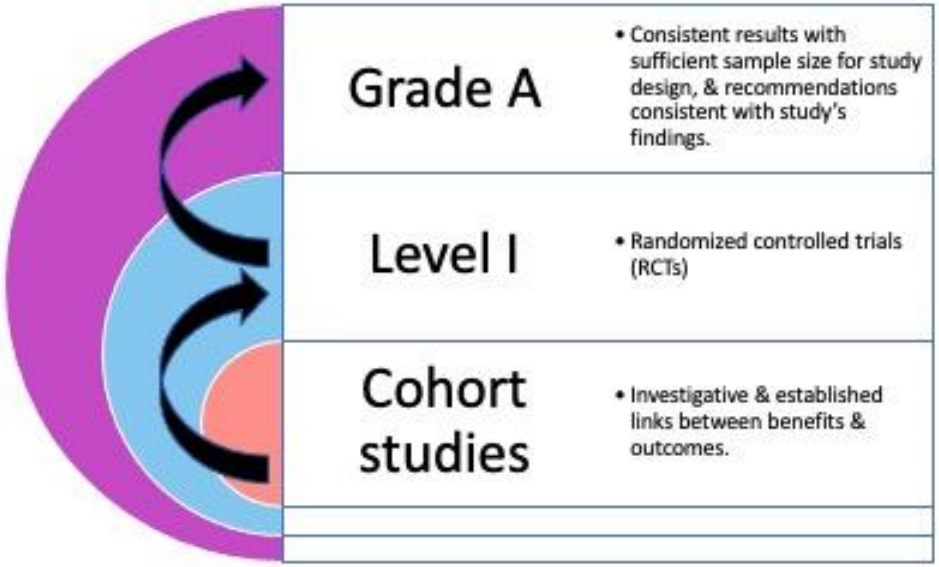
| | | |
|---|---|---|
| Cohort studies establishing decreased LOS between patients who present with TIAs, risk factors, & outcomes. RCTs, level I, grade A, establishing consistent, generalizable results with a sufficient sample size. |  | Grade A<br>• Consistent results with sufficient sample size for study design, & recommendations consistent with study's findings.<br>Level I<br>• Randomized controlled trials (RCTs)<br>Cohort studies<br>• Investigative & established links between benefits & outcomes. |

Table 3

*Frequency Table for Nominal Variables*

| Variable | *n* | *%* |
|---|---|---|
| Dedicated_Unit | | |
| Y | 33 | 86.84 |
| N | 5 | 13.16 |
| Missing | 0 | 0.00 |

*Note.* Due to rounding errors, percentages may not equal 100%.

Table 4

*Frequency Table for Nominal Variables*

| Variable | *n* | *%* |
|---|---|---|
| Dedicated_Unit | | |
| N | 2 | 6.45 |
| Y | 28 | 90.32 |
| Missing | 1 | 3.23 |

*Note.* Due to rounding errors, percentages may not equal 100%.

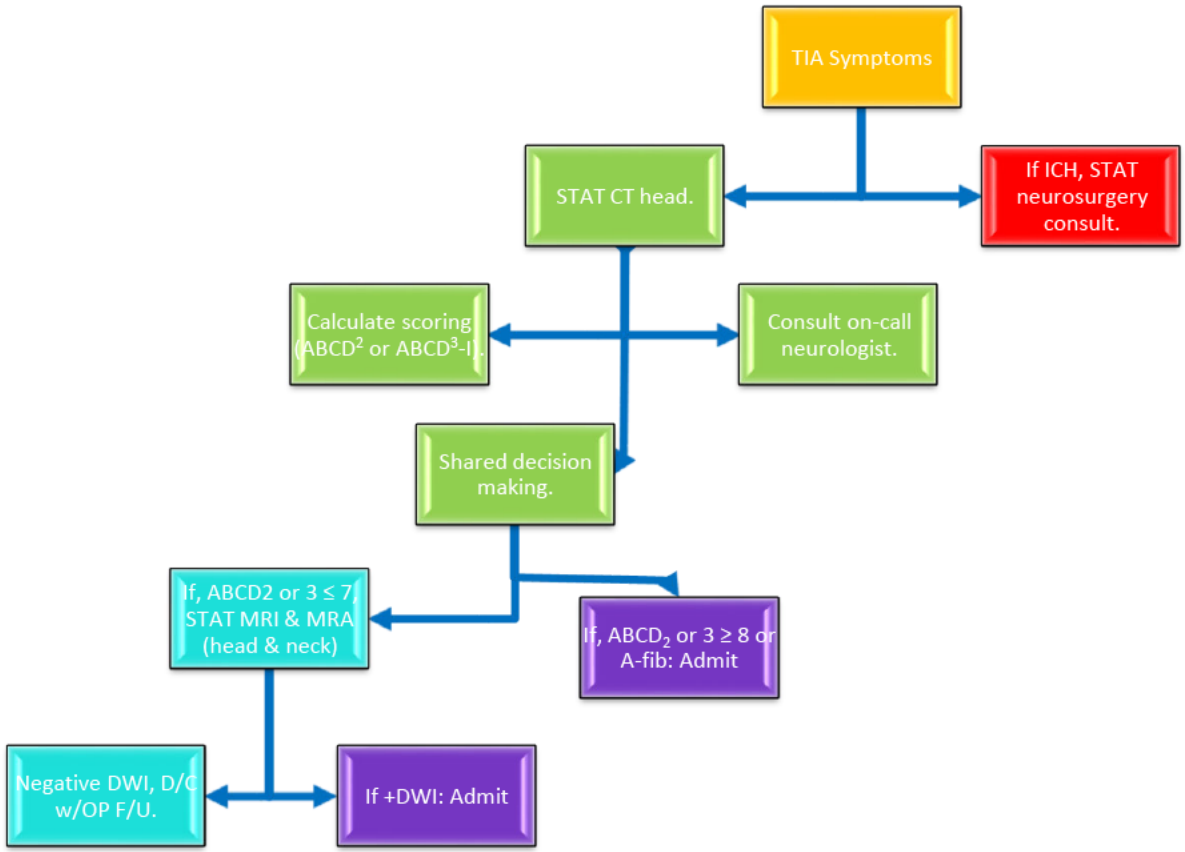
Figure 1

*Budget*

| Integrated Budget | | | | |
|---|---|---|---|---|
| **Expenses** | | **Revenue** | | |
| **Direct** | | **Billing** | | |
| Staff Salary | Ave $25/per RN | Observational Unit | | $1,610.50 |
| Supplies | $100.00 | General Admission | | $2,944.50 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| Total | Ave $25/per RN | TOTAL REVENUE PER PT | | $1,334.00 |
| | $100.00 | | | |

Figure 2

*TIA Algorithm*




Legend: TIA, transient ischemic attack; CT, computer tomography; ICH, intracranial hemorrhage; DWI, diffuse weighted imaging; OP, outpatient.

Figure 3

*TIA Checklist*

**TIA OBSERVATION CHECKLIST**

- ☐ **Antiplatelet(s) ordered and given.**
- ☐ **Statin therapy ordered and given.**
- ☐ **MRI brain completed.**
- ☐ **Lifestyle Modification Information Provided:**
  - ☐ **Diet & Exercise**
  - ☐ **Smoking Cessation**
- ☐ **Stroke Clinic appointment.**

# Appendix A

## Summary of Primary Research Evidence

| Citation | Design, Level<br><br>Quality Grade | Sample<br><br>Sample size | Intervention/ Comparison | Theoretical Foundation | Outcome Definition | Usefulness<br>Results<br>Key Findings |
|---|---|---|---|---|---|---|
| Dahlquist et al., 2020 | Cohort, Level I<br><br>A | TIA pt's & SLS<br><br>*n* = 31,032 (7/1/2011-12/31/11, pre scanner installation) SLS 362: Mean age: 52.9; age range: 19-94; M: 56<br><br>*n* = 33,299 (7/1/12-12/31/12, post scanner installation) SLS 448: mean age: 50.9; range: 7-94; male: 174 | Pre-intervention = suspected TIA<br><br>Intervention = protocol using $ABCD_3$-I score* for evaluation<br><br>Post-intervention = followed post-DC, decreased LOS/cost<br><br>*well-established risk stratification tool used for TIA pt's.<br><br>$p < 0.001$ | Lewin | Determine differences between hospital admission, ED LOS, & HC cost between 2 groups.<br><br>Secondary = pt return to ED & CVA w/in 90 days of DC. | Use of $ABCD_3$-I scoring and algorithm in pt's presenting with a TIA assists in decreasing hospital admissions thereby producing a cost reduction, no changes were noted in 90-day neurological outcomes when compared to admitted TIA pt's. Provides risk stratification and allows for safe DC. |
| Garg et al., 2021 | Cohort, Level I<br><br>A | TIA pt's<br><br>Pre-pathway cohort (*n* = 65)<br><br>Post-pathway | Pre-intervention cohort<br><br>GWTG database.<br><br>TIA protocol pathway | Lewin | Feasible, cost-effective, & safe. LOS reduced w/o pt outcome compromise. | GWTG is a good tool to follow to quickly obtain imaging for rapid diagnosis, in association with the $ABCD_2$ tool for determining risk of an ischemic event in the next 90 days. Using these 2 tools demonstrated |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | cohort (*n* = 73)<br><br>*n* = 138 | inclusion criteria.<br><br>$ABCD_2$ score <4, CT head, CTA head & neck, BG levels<br><br>*p* < 0.0001 | | | reduction in admissions and LOS. |
| Nahab et al., 2012 | Cohort, Level I<br><br>A | TIA pt's<br><br>Mean age: 67.9; F: 61%; mean $ABDC^2$, 4.3 ± 1.4<br><br>Pre-ADP (*n* = 57)<br><br>Post-ADP (*n* = 85<br><br>*n* = 142 | Pre & post comparison of LOS.<br><br>GWTG & $ABCD_2$ score<br><br>*p* < 0.01 | Lewin | Decreased LOS w/associated lower costs, and good clinical outcomes w/o compromise. | Again, GWTG & the use of the $ABCD_2$ tool prove to be useful in assisting with decreased LOS, admissions reduction, thus lowering cost to both the beneficiary and the organization. |
| Jarhult et al., 2018 | Cohort, Level I<br><br>A | Suspected TIA<br><br>1/2012-6/2012 Pre-intervention; *n* = 130 Mean age: 70 (range 58-79); M: 52%<br><br>1/2013-6/2013 Post-intervention; *n* = 150 | Implementation of a rapid, protocol-based pathway vs no pathway.<br><br>$ABCD_2$ tool<br><br>*p* < 0.001 | Lewin | Implementation of a clinical pathway & use of an observation unit of said pt's, decreased LOS w/o increased risk of subsequent stroke. | The $ABCD_2$ tool and use of risk factor scoring is a useful tool but in conjunction with urgent imaging. |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | Mean age: 68 (range 52-79); M: 49%<br><br>*n* = 180 | | | | |

Legend: TIA, transient ischemic attack; SLS, stroke-like symptoms; DC, discharge; ED, emergency department; LOS, length of stay; HC, healthcare; pt, patient; pt's, patients; w/in, within; GWTG, Get with the Guidelines Stroke database; CT, computerized tomography; CTA, computerized tomography arteriogram; BG, blood glucose; w/o, without; ADP, accelerated diagnostic protocol; CVA, cerebral vascular accident.

# Appendix B

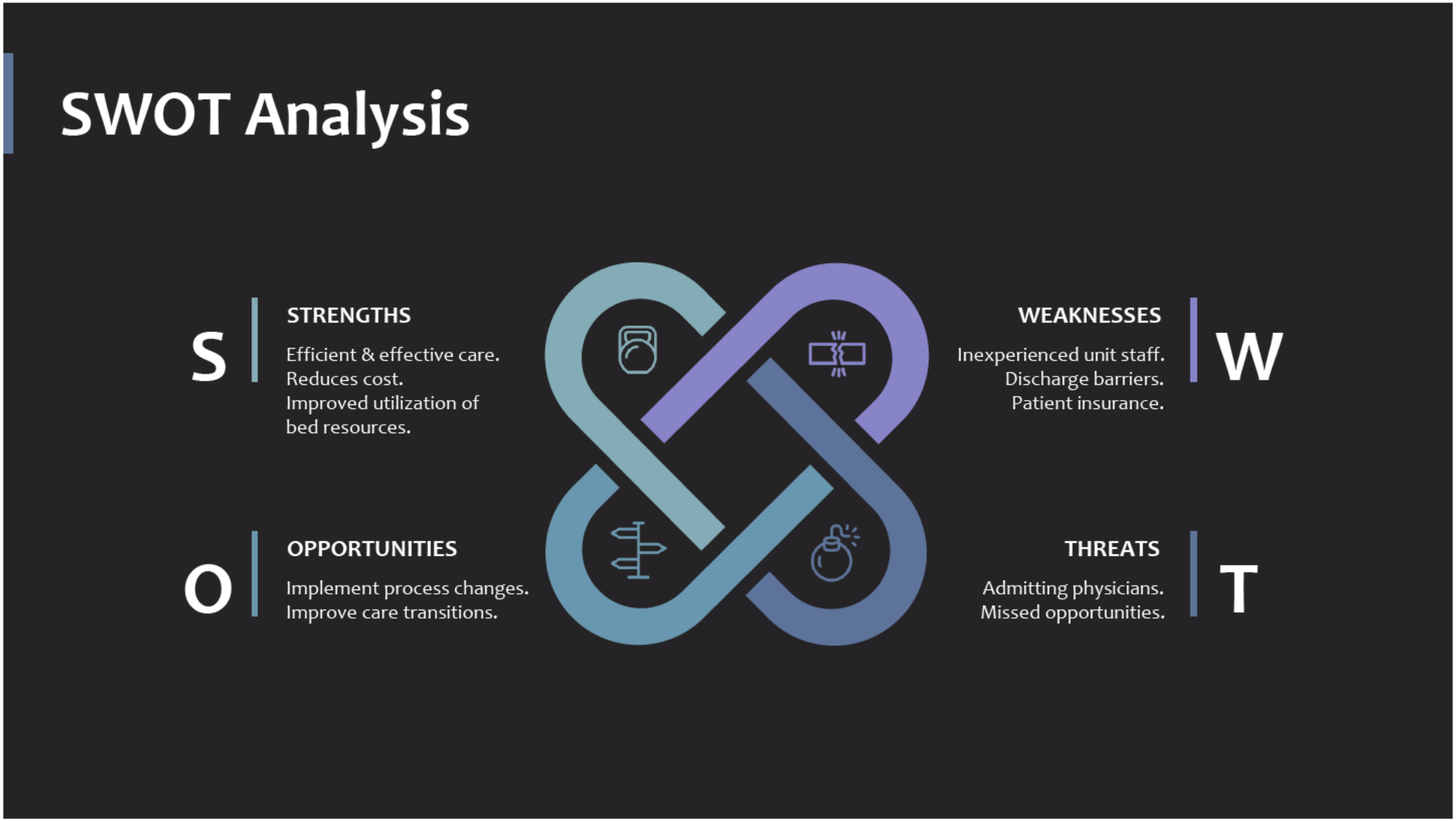
Summary of Systematic Reviews (SR)

| Citation | Quality Grade | Question | Search Strategy | Inclusion/ Exclusion Criteria | Data Extraction and Analysis | Key Findings | Usefulness/Recommendation/ Implications |
|---|---|---|---|---|---|---|---|
| Sun, Y., Paulus, D., Eyssen, M., Maervoet, J., & Saka, O. (2013). A systematic review and meta-analysis of acute stroke unit care: What's beyond the statistical significance? *BMC Medical Research Methodology*, *13*(1). https://doi.org/10.1186/1471-2288-13-132 | Level I<br><br>A<br><br>Meta-analysis | How can admission to an acute stroke care unit improve survival and independency, as well as reduce the chance of hospitalization and the LOS? | Medline, Embase, the Cochrane Central Register of Controlled Trials, and Physiotherapy Evidence Database (PEDro) to identify trials published since 2006. | Stroke or stroke-like patients who had their first symptoms during the past seven days prior to hospital admission.<br><br>Stroke patients who passed the acute phase (first seven days) on symptom onset. | Data extraction was performed by one investigator and later independently checked by another investigator concerning the pre-defined items (e.g., study description, study method, patient characteristics, intervention description, results on primary outcome, results on secondary outcomes and all other outcomes).<br><br>Subgroup analysis was performed on different types of acute stroke units and secondary analysis was performed on a scope of included trials which was comparable to the Cochrane review. | Acute stroke unit care can improve survival and independency, as well as reduce the chance of hospitalization and the LOS | The latest SUTC update concluded that stroke units have a significant impact on patient survival, their likelihood of returning to live at home, and their level of independence. The series of SUTC reviews is widely cited by clinical guidelines and national stroke strategies as the evidence base for their recommendations on stroke unit care. |
| | | | | | | | |

Legend: LOS, length of stay; SUTC, Stroke Unit Trialists' Collaboration.

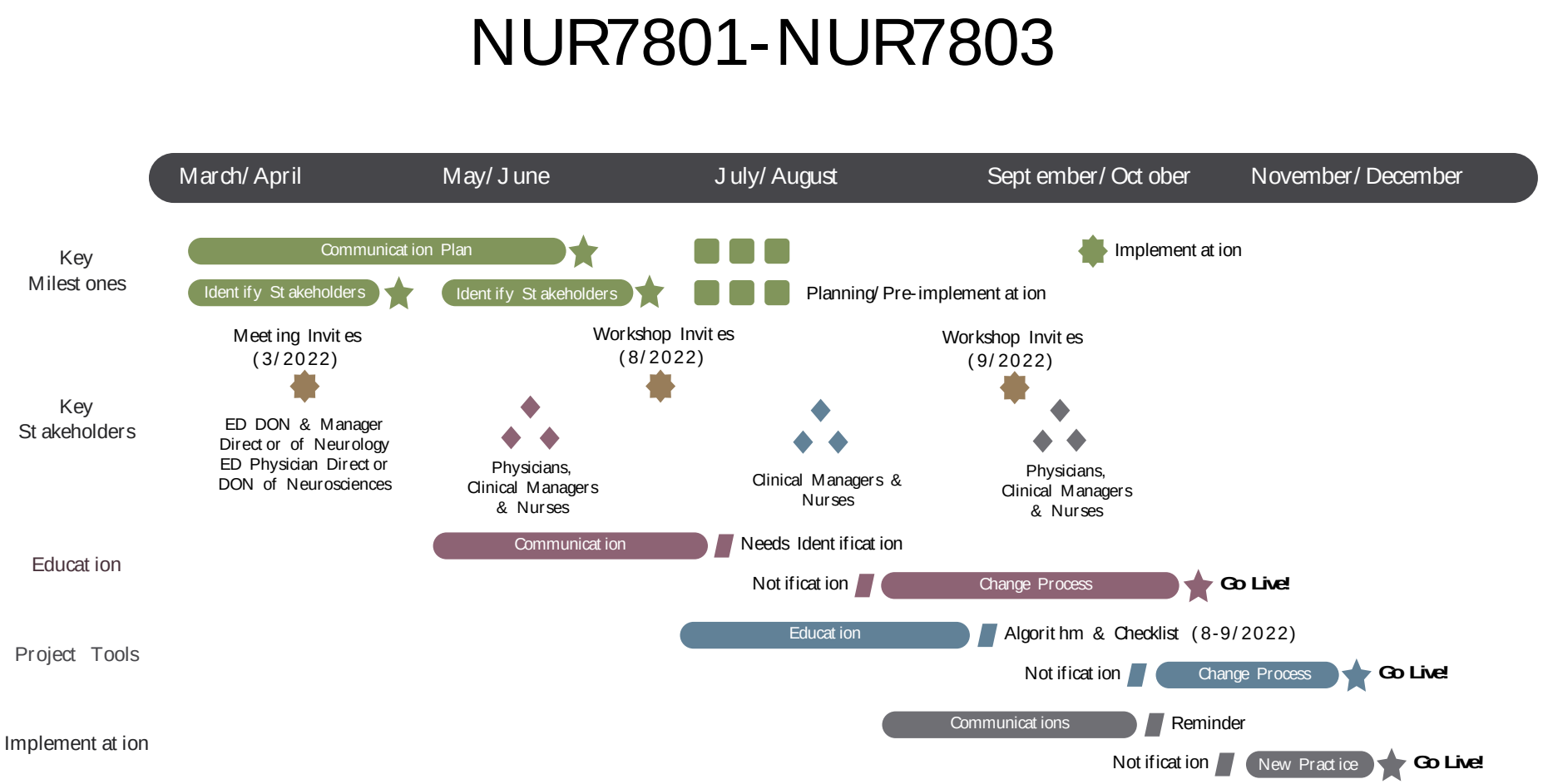
Appendix C

SWOT Analysis

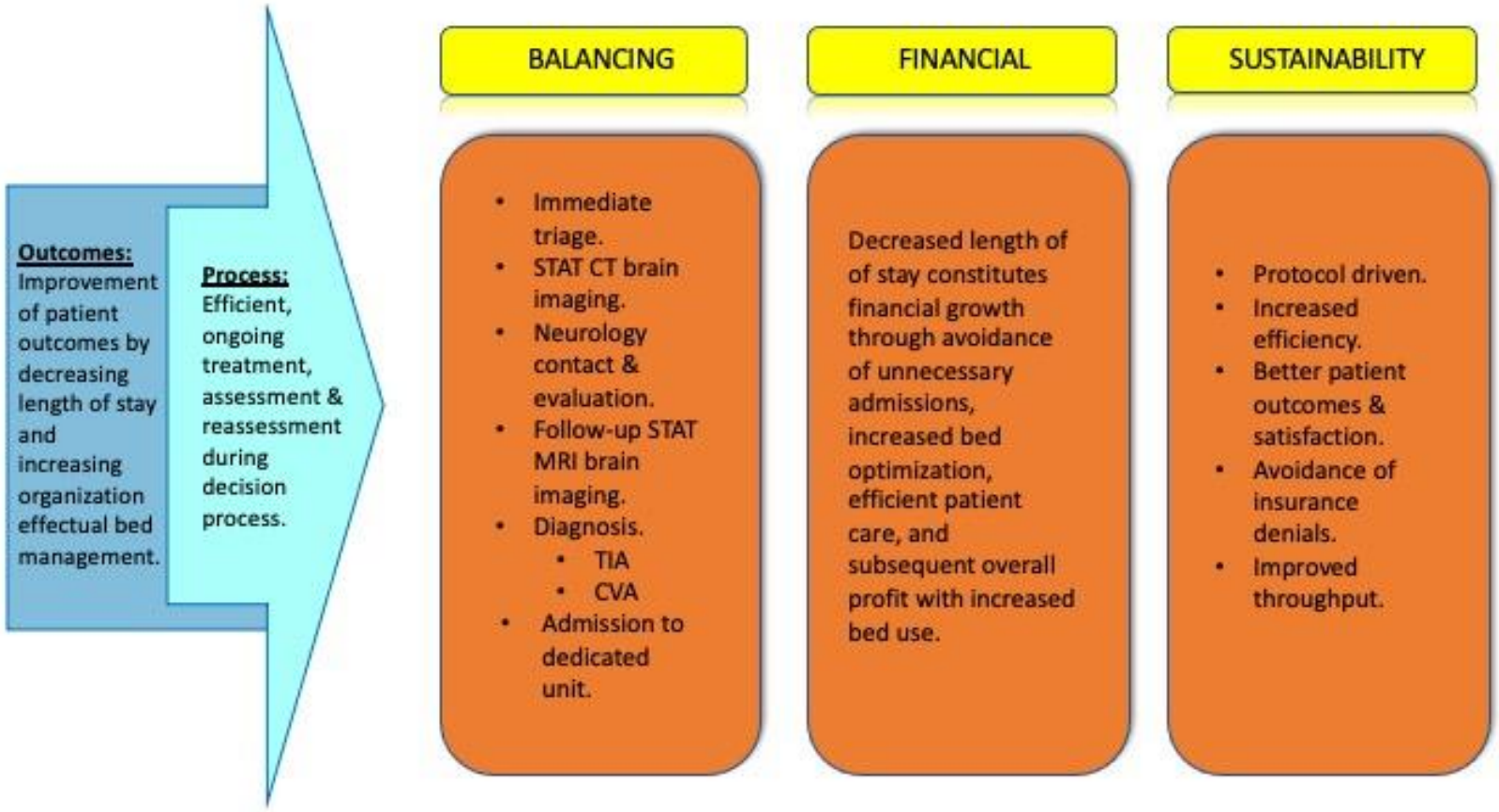


Appendix D

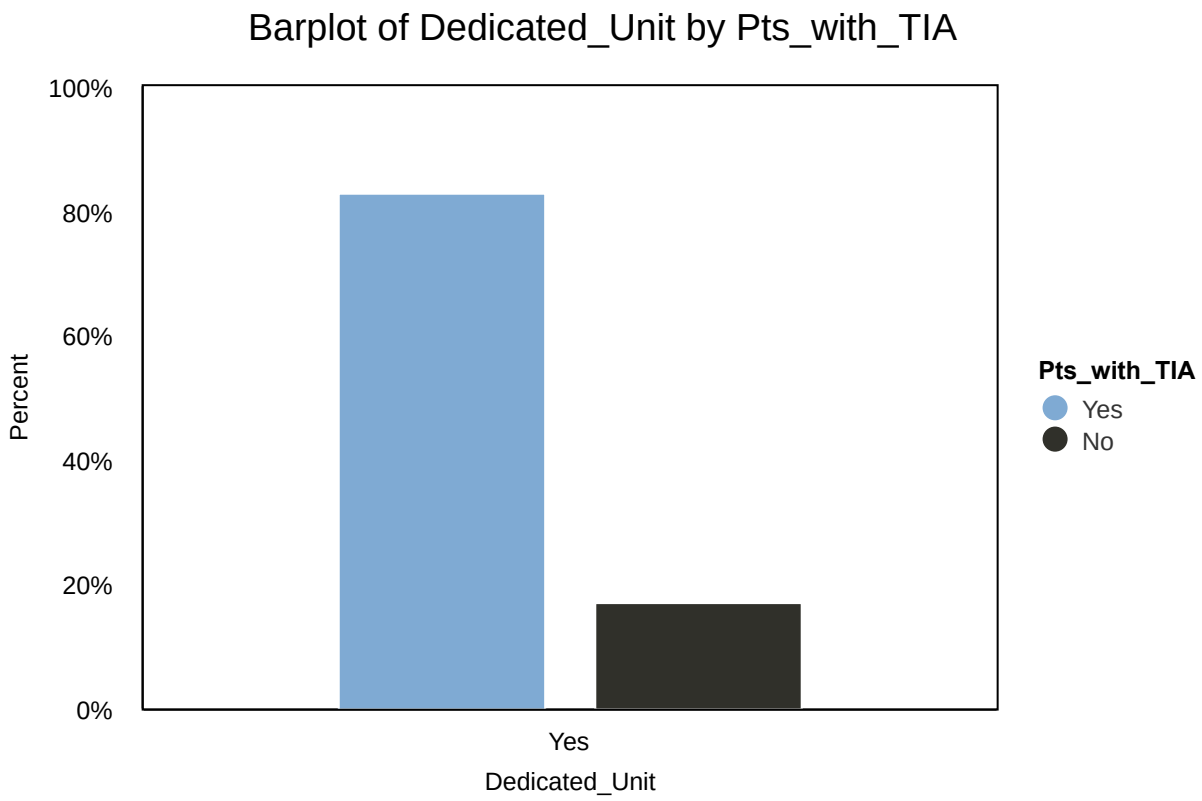
Project Schedule



Appendix E


Outcomes:
Improvement of patient outcomes by decreasing length of stay and increasing organization effectual bed management.
Process:
Efficient, ongoing treatment, assessment & reassessment during decision process.
BALANCING
Immediate triage.
STAT CT brain imaging.
Neurology contact & evaluation.
Follow-up STAT MRI brain imaging.
Diagnosis.
TIA
CVA
Admission to dedicated unit.
FINANCIAL
Decreased length of of stay constitutes financial growth through avoidance of unnecessary admissions, increased bed optimization, efficient patient care, and subsequent overall profit with increased bed use.
SUSTAINABILITY
Protocol driven.
Increased efficiency.
Better patient outcomes & satisfaction.
Avoidance of insurance denials.
Improved throughput.

Appendix F


Barplot of Dedicated_Unit by Pts_with_TIA
100%
80%
60%
40%
20%
0%
Percent
Yes
Dedicated_Unit
Pts_with_TIA
Yes
No