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Implementation of a Transitional Care Model to Decrease Readmissions for Ischemic Stroke and TIA Patients

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Doctor of Nursing Practice Program

DNP Project

TITLE: Implementation of a Transitional Care Model to Decrease Readmissions for Ischemic Stroke and TIA Patients

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Abstract

Background: Poor continuity of care after hospitalization can increase the risk of adverse health outcomes such as unplanned readmissions for stroke and transient ischemic attack (TIA) patients. Transitional care models (TCMs) can be used to improve the coordination of care post-discharge.

Objectives: The purpose of this doctoral Quality Improvement (QI) project was to develop, implement, and evaluate a TCM for ischemic stroke/TIA patients over a 3-month period. This project had four aims: 1) to decrease the unplanned 30-day readmission rate, 2) for all eligible patients to be enrolled after discharge, 3) to have all enrolled participants receive all components, and 4) for all participants to express satisfaction with the TCM.

Methods: A TCM was designed and piloted for adult patients discharged home from the project site hospital with a diagnosis of ischemic stroke or TIA. The TCM consisted of patient education materials, scheduling of a primary care provider appointment, and two phone surveys at 7-days and 30-days post-discharge. Unplanned 30-day readmission rates were compared before and after project implementation.

Results: Nine participants were enrolled. Five of these participants (55.6%) completed both the 7-day and 30-day surveys and comprised the intervention group. 100% of all eligible patients were contacted for enrollment. The post-intervention mean 30-day readmission rate of 3.7% (*SD* = 2.97) was significantly lower ($p < .05$) than the pre-intervention rate of 35.0% (*SD* = 13.39). All participants gave a score of 3 or higher ("agree" or "strongly agree") with regards to overall satisfaction with the TCM.

Conclusions: While this was a small pilot project, results demonstrated that the TCM may have had a positive impact on readmission rates. It was also well-received by participants and

provided useful feedback on the hospital's stroke program. Long-term implementation of a TCM may be of benefit in this patient population to improve health outcomes.

Implementation of a Transitional Care Model to Decrease Readmissions for Ischemic Stroke and TIA Patients

Introduction

Stroke is a significant cause of morbidity and mortality in the United States. It is the fifth leading cause of death in the U.S. and every year, almost 800,000 Americans experience a stroke (Centers for Disease Control and Prevention [CDC], 2020). According to the REGARDS study, 22.5% of the population aged greater than 45 years old reported stroke symptoms, a history of transient ischemic attack (TIA), or a recent or distant stroke in their medical history (Adeoye, et al., 2019). More than half of stroke survivors aged 65 and over have serious long-term disability as a result of their stroke (Elfassy, et al., 2019). About 185,000 strokes annually are recurrent events in those who have experienced a previous stroke (Vahidy, et al., 2017). Patients who experience a stroke or TIA often require admission to the hospital for acute treatment and extensive evaluation to determine the etiology of their cerebrovascular event, as well as evaluation and management of secondary stroke risk factors such as hypertension, diabetes, and hyperlipidemia (Powers, et al., 2019). For older patients with these chronic medical conditions, issues such as inadequate communication, limited follow-up, poor continuity of care, and lack of coordinated care amongst medical providers can put them at higher risk for poor health outcomes such as unplanned hospital readmissions (Hirschman, et al., 2015).

One well-established strategy for reducing poor outcomes such as readmission rates is improving the coordination of care at the time of discharge from the hospital (Groesbeck, et al., 2015). Transitional care models (TCMs) have been identified as a method for improving coordination of care by standardizing the discharge process and providing a link between inpatient and outpatient care (Groesbeck, et al., 2015). TCMs involve multidisciplinary teams

that manage and address different components of a patient's care and help prepare and implement a safe transition from hospital to home or care facility (Bradway, et al., 2012).

Currently, there is not a TCM in use with the vulnerable stroke patient population at the study site hospital. The intention of this quality improvement (QI) project was to develop and implement an evidence-based TCM for stroke and TIA patients, in alignment with the hospital network's current practices and goals, in order to reduce 30-day readmission rates through improved communication and coordination of follow-up care.

Background and Significance

Stroke-related hospitalizations and readmissions generate a significant cost and care burden in the U.S. healthcare system. Ischemic strokes are caused by an embolus or thrombus obstructing the flow of blood in the cerebrovascular circulation that causes an area of infarction, while hemorrhagic strokes are the result of a ruptured cerebrovascular blood vessel causing bleeding (American Stroke Association [ASA], 2021a). TIAs are temporary episodes of neurological dysfunction caused by a temporary restriction of blood flow to the brain that does not cause a permanent area of infarction (ASA, 2021b). The mean lifetime cost of an ischemic stroke is about $140,000 per patient and overall stroke costs in the U.S. total more than $65 billion per year (Nouh, et al., 2017). Stroke-related complaints are among some of the most common causes for emergency department (ED) visits and readmissions, such as falls, recurrent stroke events, dysphagia, exacerbation of residual stroke symptoms, poor balance, and aspiration pneumonia (Bushnell, et al., 2018). When patients are discharged from the hospital following an acute stroke or TIA, they usually face many new significant medical, social, and functional problems, such as modified diets, the need for rehabilitation services, new medications,

psychological issues such as depression, and new or worsened physical deficits (Puhr & Thompson, 2015). About 50% of all patients who survive a stroke or TIA have an increased risk for a recurrent stroke in the first few days and weeks following the initial event, and TIAs are associated with 19% risk of stroke over the next 10 years (Oza, et al., 2017). These new challenges and needs can create a complicated transition from the inpatient to the outpatient setting, and when there are gaps in communication or difficulties accessing care or resources, patients can have poor health outcomes, such as potentially avoidable hospital readmissions (Puhr & Thompson, 2015). Research has demonstrated that aggressive medical management following a stroke or TIA can reduce the risk of recurrent events (Amarenco, et al., 2018).

A community health assessment published in 2018 by the project site hospital and the local health department identified preventing chronic diseases such as stroke as their primary health priority (Clinton County Health Department [CCHD], 2018). Almost 45% of all residents in the county experienced chronic disease such as stroke, diabetes, and hypertension in 2017 (CCHD, 2018). The report recommended preventing chronic disease by implementing successful management strategies for existing chronic disease and related complications. Some of the strategies suggested included expanding access to care and improving care coordination (CCHD, 2018). Hospital and health network leadership previously expressed a strong interest in expanding stroke and neurology care across the hospital and the network affiliates, given the current limited access to neurological services in the region and the significant burden this places on the affiliated academic medical center. This project benefited the region's ischemic stroke and TIA patients through expanded access to post-discharge care and improved health outcomes. Additionally, the hospital may have benefited financially from this project, as a decrease in the readmission rate can result in higher reimbursement amounts from the Centers for Medicare and

Medicaid Services (CMS), which tracks and reports 30-day readmission rates for stroke and other medical conditions (Kripalani, et al., 2013). CMS penalizes hospitals by taking a percentage of their total CMS reimbursement if their rates are higher than expected, as CMS defines 30-day readmissions as indicative of poor inpatient care (Kripalani, et al., 2013; Nouh, et al., 2017). Both locally and nationally, this has led to an emphasis in healthcare to find ways to reduce excess hospital readmissions (Vahidy, et al., 2017).

Recent research has demonstrated that the use of TCMs, particularly those led by registered nurses and advanced practice nurses, can improve the coordination of care after discharge and potentially improve health outcomes such as hospital readmission rates for patients with stroke and TIA. There have been several pilot trials of different TCMs for stroke patients done in different health care settings across the country. The Transition Coaching for Stroke (TRACS) model uses NPs and RNs to provide a structured discharge and transition of care plan to stroke patients, and the use of the model resulted in a 48% reduction in 30-day readmission rates in the study population (Condon, et al., 2016; Poston, 2018). Stroke patients who were enrolled in a 4-week nurse-led TCM demonstrated a lower readmission rate than those who were not enrolled in the TCM (Wong & Yeung, 2015). Another study found that a NP-led stroke follow-up clinic may reduce 30-day readmission rates, with stroke clinic patients demonstrating a readmission rate of 1.5% versus non-clinic patients who had a readmission rate of 13.4% (McClain & Chance, 2019). The TCM implemented in this project aimed to improve the coordination of care for stroke and TIA patients after discharge from the acute care hospital setting, with the goal of improving health outcomes such as unplanned readmissions. This project also helped to contribute to the body of evidence regarding the use of TCMs with stroke patients, specifically models led by nurse practitioners.

Needs Assessment

A SWOT Analysis was conducted to determine the barriers and facilitators present at the organization that may have a direct or indirect impact on the project (Appendix A). The needs assessment determined that a standardized, evidence-based TCM would be of significant benefit to the hospital and its stroke patient population, in order to improve care coordination, patient communication, and patient engagement in self-management and secondary stroke prevention, in order to improve outcomes such as unplanned 30-day readmission rates. Potential barriers identified included: financial restrictions and limitations resulting from decreased overall hospital revenue and reimbursement over the past fiscal year; the COVID-19 pandemic and how this has affected the delivery of healthcare both locally and nationally; staffing issues and shortages; discontent between the clinical staff and administration; and the novelty of using a TCM for stroke patients at this hospital. Identified facilitators included: the important and influential relationship between the hospital and the local community; strong physician and unit leadership that support evidence-based practice initiatives; an established, collegial, and multidisciplinary stroke team; commitment from hospital and network leadership to improve and expand neurological and stroke care as part of the hospital and network's strategic plan; the recent recruitment of a neurologist with a greater presence at the hospital; a significant need and opportunity to expand access to stroke care in the geographical region; and the potential for this project to help improve the financial outlook of the hospital by decreasing CMS penalties related to readmissions. Stroke rates at the hospital in 2020 averaged about 30-40 hospitalized stroke/TIA patients per month, with 30-day readmission rates at or above the national average. Additionally, the hospital has an ongoing institutional goal of obtaining Acute Stroke Ready Hospital (ASRH) certification through The Joint Commission (The Joint Commission [TJC],

2021). This designation and certification process are focused on delivering evidence-based, standardized care to stroke patients, which aligned with the goals of this project.

Problem Statement

About 12% of patients with stroke are readmitted to the hospital or re-present to the ED in the initial 30 days following discharge (Vahidy, et al., 2017). Improving the coordination of care at the time of discharge from the hospital has been shown to decrease readmission rates (Groesbeck, et al., 2015). TCMs are an established method for standardizing the discharge process and providing a link between inpatient and outpatient care (Groesbeck, et al., 2015). For stroke and TIA patients, there is growing evidence that TCMs can have a positive effect on patient outcomes. There was not a TCM in place for stroke patients at the project site hospital, and the discharge and follow-up process for this patient population were incredibly fragmented. This lead to patients being lost to care or receiving inadequate follow-up care for management of their stroke deficits and/or secondary stroke risk factors. This project implemented a TCM for ischemic stroke patients discharged from the hospital that involved patient education materials, follow-up phone calls at 7-days and 30-days post-discharge, and coordination of a primary care provider follow-up appointment.

Purpose Statement

The purpose of this project was to implement a TCM at the time of discharge from the hospital after an acute ischemic stroke or TIA, in order to decrease readmission rates, expand access to follow up care, and improve the quality of care for this patient population. The project sought to answer the following practice question: does the use of a TCM decrease 30-day

readmission rates for patients discharged from an acute care hospital with a diagnosis of stroke or TIA over a 3-month period, compared to stroke or TIA patients who were not enrolled in the TCM?

Aims and Objectives

This project had four primary aims: to decrease the 30-day readmission rate for the project intervention group; to enroll all patients in the project who are discharged with a diagnosis of stroke or TIA and meet inclusion criteria; to have all enrolled participants receive all components of the TCM; and for participants to be satisfied with the TCM and the care received during the project. For each aim there was a specific analysis plan. Specific analysis measures for the aims and objectives of this project were described in the Data Collection/Evaluation and Analysis Methods (Appendix B, Table 1). Collected data were defined and coded in the Data Dictionary (Appendix B, Table 2).

Project Aims

1. *Decrease the 30-day readmission rate for the project intervention group by at least 50% over a 3-month period:* To obtain baseline readmission data, 30-day readmission rates for a 3-month period in 2020 (June-August 2020) were reviewed using the EMRs and the stroke program's patient database. Demographics data for this pre-intervention group were also obtained through chart review for comparison to the intervention group.
2. *Contact 100% of eligible patients discharged with a diagnosis of ischemic stroke or TIA for enrollment into TCM*: Once daily, the DNP Project Chair reviewed the hospital stroke program's master Excel database of all patients admitted and/or discharged from the hospital with a stroke or TIA diagnosis. The Project Chair had established access to this

database and patient information for performance review and quality data measures as part of her role with the stroke team. Inclusion/exclusion criteria were reviewed for each potential participant using the database and the electronic medical records (EMRs), Epic and Cerner Soarian, and then eligible participants were added to the project database. Eligible participants were contacted by phone (up to three attempts at contact) for the 7-day follow-up survey, and then once project consent was obtained, additional relevant information as well as survey responses were added to the project database for each participant. For eligible participants who were unable to be contacted (no working phone number, didn't answer or call back after three attempts, etc.), note of this was made in the project database, but no further information was collected for these patients.

3. *All enrolled participants receive all components of the TCM*: Components of the TCM: patient education materials, 7-day follow up phone call after discharge, 30-day follow up phone call after discharge, and scheduling of a PCP appointment. As each component was completed, pertinent information was added to the project database, such as the date of each phone call, survey responses, whether they received the education materials, etc.
4. *Participants express satisfaction with the TCM and the care received during the project:* At the conclusion of the 30-day follow-up phone call, a participant satisfaction survey was completed that utilized a 4-point Likert scale to determine participant satisfaction with the TCM's components and they received during the project, with a goal of an average score across all participants of a 3 or higher.

Objectives

1. Design an evidence-based TCM and create a DNP protocol by May 2021.
2. Receive project approval by DNP Proposal faculty and project advisors by Summer 2021.

3. Receive hospital IRB approval in June 2021.
4. Meet with stakeholders to discuss the TCM and project implementation plan during Summer 2021.
5. Implement the TCM from September through November 2021.
6. Evaluate process and outcomes measures related to the TCM and project in January/February 2021.
7. Analyze all project data in February 2021.
8. Disseminate project results by April 2021.

Review of Literature

Many different forms of TCMs have been developed and tested in the care of patients with chronic conditions such as cerebrovascular disease. A literature review was conducted to examine the current available research about TCMs and readmission rates. The articles were searched from CINAHL, MEDLINE, PubMed, and a general search of the Himmelfarb Health Sciences Library archives. The search process was facilitated by an analysis of the titles and abstracts of the articles retrieved from each database. Key search terms (keywords and MeSH terms) included “stroke,” “transient ischemic attack,” “readmission,” “rehospitalization,” “transitional care model,” “transitional care,” “transition coaching for stroke,” “chronic disease,” “chronic illness,” “discharge planning,” and “follow up.” The search yielded 13 appropriate articles that were selected for further analysis. The articles were appraised using the Johns Hopkins Nursing Evidence-Based Practice Evidence Level and Quality Guide tools (Dearholt & Dang, 2018). These tools are used to assess and grade both research and non-research studies based on their level of evidence (levels I-V) and quality of evidence (A – High Quality, B –

Good Quality, C – Low Quality or Major Flaws) (Dearholt & Dang, 2018). The results of the analyses and details about the studies can be found in Table 3 (Appendix C).

The type of evidence varied amongst the research articles included in this literature review. Seven out of the thirteen articles were qualitative and/or non-research studies (Adeoye, et al., 2019; Bradway, et al., 2012; Hirschman, et al., 2015; Kitzman, et al., 2017; Mora, et al., 2017; Puhr & Thompson, 2015; Verhaegh, et al., 2014). An overall limitation of this evidence review was that there is a relatively small amount of quantitative research about the use of TCMs in stroke patients available in the current published literature. Therefore, articles published more than five years ago as well as articles with study populations not specific to stroke/TIA patients and involving other health outcomes were included in the analysis in order to have a more robust body of evidence to appraise and evaluate. The selected articles demonstrated a good-to-high level of quality of evidence, with transparency about their individual limitations and how these may have affected the findings.

While the structure of the TCMs varied in the different studies, many had similarities in their different specific interventions. Multiple TCMs involved in experimental studies used post-discharge follow up phone calls as a key component or aspect of the model (Condon, et al., 2016; Gesell, et al., 2019; Kitzman, et al., 2017; McClain & Chance, 2019; Reeves, et al., 2019; Wong & Yeung, 2015). The appraised systematic or literature reviews also cited post-discharge phone calls as an important component of TCMs (Hirschman, et al., 2015; Mora, et al., 2017; Puhr & Thompson, 2015; Verhaegh, et al., 2014). Other types of care interventions were used as well, including home visits, clinic visits, and telehealth with video visits.

Many of the TCMs studied were nurse-led, meaning that RNs and/or APRNs/NPs were responsible for the various components (Condon, et al., 2016; Gesell, et al., 2019; McClain &

Chance, 2019; Wong & Cheung, 2015). Models utilizing nurses as the care providers had overall positive results in terms of decreasing readmissions, suggesting that nurse-led TCMs are effective for improving health outcomes. These results were supported from the findings of the policy statement and literature reviews as well, which overwhelmingly recommended that care be delivered by APRNs or other nurses to achieve positive outcomes (Adeoye, et al., 2019; Hirschman, et al., 2015; Mora, et al., 2017; Puhr & Thompson, 2015; Verhaegh, et al., 2014). Bradway et al. (2012) focused on APRN-led care for patients involved in a nurse-led TCM, in order to determine important barriers and facilitators related to the delivery of care, which could be helpful for the implementation of a new TCM. These findings strongly suggest that a nurse-led TCM is an effective model of care. Other models that utilized other care providers, such as social workers, community health workers, and physicians, did not demonstrate as strong of findings related to improvement in readmission rates, but did show some moderate success with improving other health outcomes (Kitzman, et al., 2017; Noel, et al., 2020; Puhr & Thompson, 2015; Reeves, et al., 2019).

One aspect noted across multiple studies was the importance of both phone and in-person follow-up in the achievement of the best outcomes, including readmission rates. Condon et al. (2016) demonstrated a 48% reduction in 30-day readmissions for patients enrolled in their TCM who received both a 7-day follow up phone call and a stroke clinic visit (odds ratio, 0.518; 95% CI, 0.272-0.986). They noted that the post-discharge call alone did not influence readmission independent of the clinic visit, but that patients who received a phone call did have a higher show rate to clinic appointments than those who did not receive a follow up call. McClain and Chance (2019) found that patients who were seen in the stroke clinic, as well as received a post-discharge call, had a 30-day readmission rate of 1.5%, compared to a rate of 13.4% for patients

who were not seen in the clinic (*P*=.003). The proposed TCM for this project did not include a stroke clinic visit, but did include the coordination of care to the primary care setting to ensure patients were scheduled for a PCP visit, so it was important to see if a phone call and care coordination had the same effect on readmission rates.

EBP Translation Model

The Iowa Model for Evidence-Based Practice to Promote Quality Care: Revised (the Iowa Model: Revised) was selected as the EBP model to guide the implementation of the TCM for stroke patients into the discharge process. The Iowa Model was developed by a team of nurses in the early 1990s at the University of Iowa Hospitals and Clinics (UIHC) and College of Nursing to provide a framework for the EBP process (Buckwalter, et al., 2017). The original Iowa Model was revised and updated in 2015 by the Iowa Model Collective, using feedback from nurses, to reflect changes in healthcare and EBP since its initial development (Buckwalter, et al., 2017; Iowa Model Collaborative, 2017). This model was selected because it most closely aligned with the EBP implementation process at the institution and it also provided a clear framework for the EBP process. The Iowa Model: Revised consists of multiple steps which incorporate decision making and feedback loops to guide the change process as a new EBP initiative or project is implemented (Appendix D; Buckwalter, et al., 2017; Iowa Model Collaborative, 2017). The steps, including the decision points and feedback loops, as well as the details of the project, are as follows:

1) Identify triggering issues or opportunities:

The hospital's service area had high rates of stroke, stroke-related hospitalizations, and stroke-related deaths (Clinton County Health Department [CCHD], 2018). Almost 45%

of all area residents experienced chronic disease such as stroke, diabetes, and hypertension in 2017 (CCHD, 2018). The report recommended preventing chronic disease by implementing successful management strategies for existing chronic disease and related complications. Some of the strategies suggested included expanding access to care and improving care coordination (CCHD, 2018). Stroke rates in 2019 averaged about 30-40 hospitalized stroke/TIA patients per month, with 30-day readmission rates at or above the national average of 12% (Vahidy, et al., 2017). In 2020, these readmission rates increased to an average of about 30%.

2) State the question or purpose:

PICOTS Statement/Question:

Population = patients discharged from the hospital with a stroke or TIA diagnosis

Intervention = use of a transitional care model at discharge

Comparison intervention = patients who did not receive the aspects of a transitional care model at discharge (no intervention)

Outcome = unplanned 30-day readmission rates

Time = 3 months

Setting = acute care hospital

3) Decide if the topic is a priority:

Preventing chronic disease such as stroke and improving health outcomes for these patients were identified as priority health needs by the county health department and the hospital in their 2018 Community Health Assessment. Hospital and network leadership expressed a significant interest and investment in increasing access to stroke care and improving stroke outcomes. The practice site and stroke program are part of a hub-and-

spoke hospital network model, as one of the "spoke" hospitals, with most of the higher-level stroke and neurology care centered at the academic medical center in a neighboring state.

4) Form a team:

Core team members included:

- Project Chair/DNP Student/Stroke Nurse Practitioner
- Stroke Coordinator/Clinical Quality Manager
- Outpatient Attending Neurologist (Project Chair's collaborating physician)
- DNP Project Advisor
- Stroke Medical Director at the project site and second DNP Project Advisor
- Network Stroke Program Manager
- Chief Nursing Officer (CNO)

Additional ancillary team members:

- Case Management Representative
- Hospitalist Physician Representative
- Inpatient Nursing Leadership Representative(s) (Unit Directors)
- Electronic Medical Record (EMR)/Medical Coding Representative
- Marketing Department Representative
- Quality Improvement/Data Specialist Nurse
- Interdisciplinary Stroke Committee members (includes representatives from inpatient medicine, neurology, pharmacy, radiology, ED, nursing, inpatient therapy, the Project Chair, the RN Stroke Coordinator, the Stroke Medical Director, and the Quality Improvement Nurse)

5) Assemble, appraise, and synthesize the body of evidence:

A literature review was completed to add qualitative and non-research studies to the body of available evidence related to this project topic. The details of this literature review can be found on page 15. Additionally, a systematic review titled *Decreasing Readmissions for Stroke and TIA Patients Through the Use of a Transitional Care Model: A Systematic Review* was completed by the Project Chair for the George Washington University (GWU) School of Nursing's Translating Research into Practice course in November 2020. This systematic review analyzed seven studies, which demonstrated that TCMs may be effective at decreasing readmission rates, with a moderate strength of evidence.

6) Decide if there is sufficient evidence (decision point):

Overall, the results of the systematic review and the literature review suggested that the use of a TCM may be effective at reducing readmission rates for stroke patients.

7) Design and pilot the practice change:

This pilot consisted of using a new TCM with stroke/TIA patients at the time of discharge from the hospital that included detailed discharge education materials, follow up phone calls at 7-days and 30-days post-discharge, and confirmation of a follow-up appointment with a primary care provider (PCP) scheduled within 2 weeks of discharge to ensure transition to outpatient care. The TCM was modeled after the transitional care process already in place at the affiliated academic medical center, with some additional elements modeled after the Transitional Coaching for Stroke (TRACS) model (Poston, 2018). Evidence shows that use of the TRACS model resulted in a 48% reduction in 30-day readmission rates (Poston, 2018).

8) Decide if the change is appropriate for adoption into practice (decision point):

After implementation as a pilot program, the new TCM was evaluated based on the outcome measures data collected as part of the DNP project. Feedback was also collected from team members, other staff, and patients/families. The data and feedback gained from this project was used to make modifications to the TCM, with the plan eventually to permanently implement it at the hospital.

9) Integrate and sustain the practice change:

The Project Chair educated providers and staff about the new stroke TCM on an ongoing basis and provide feedback to the involved team members as necessary, and will continue to do so when the TCM is permanently implemented at the hospital. The Project Chair also established open communication between team members to ensure that any concerns, issues, or questions about the new process will be addressed in a timely manner. The Project Chair also educated patients and families about the TCM. To promote continued buy-in from hospital leadership, the Project Chair met with members of administration as needed to ensure support. The Project Chair disseminated results and success stories related to the pilot program to staff and providers to promote success. The TCM was also discussed at the monthly interdisciplinary Stroke Committee meetings to gather feedback and additional suggestions from the team.

10) Disseminate the results:

The Project Chair, with assistance from other DNP project team members, will complete this step by publishing information about the project and the results on the hospital Intranet and the weekly hospital-wide newsletter. The Project Chair will also present the project and findings at the monthly Interdisciplinary Stroke Committee Meeting. The

Project Chair will also work with network leadership and marketing in order to promote the TCM and the project results at a network level.

Methodology

Study Design

This was a quality improvement (QI) project that utilized a pre-intervention/post-intervention design to evaluate the effectiveness of a TCM in the ischemic stroke and TIA patient population. The project site hospital's affiliated academic medical center uses follow-up phone calls for their stroke patient population, so implementing the model at the project site constituted a practice quality improvement intervention. As the primary outcome for the study was 30-day readmission rates, two different groups of participants were evaluated: patients discharged from the hospital with an ischemic stroke or TIA diagnosis from June through August 2020 and readmitted within 30 days, and patients discharged from the hospital with an ischemic stroke or TIA diagnosis from September through November 2021 (time period of project implementation). 2020 data was used for the pre-intervention group because this was the data available at the time of the project design and approval process.

Setting

This project was conducted at a 300-bed non-profit acute care community hospital in upstate New York. The hospital also has an attached 32 bed skilled nursing facility, as well as a 24-hour emergency department, a cancer center, and 20 associated outpatient offices and clinics. The hospital is a member of a health network comprised of six health care facilities, including an academic/tertiary care medical center.

Participants/Sampling

Participants were selected using convenience sampling from all patients 18 years of age or older discharged from the hospital with a stroke or TIA diagnosis during the duration of the study. Pre-intervention data included all ischemic stroke and TIA patients who were discharged from the hospital from June through August 2020 (n = 67).

Study inclusion criteria consisted of all patients diagnosed with ischemic stroke or TIA at discharge and admitted to the project site hospital during the study duration, and then discharged to home. Exclusion criteria included patients not diagnosed with ischemic stroke or TIA at discharge, even if the admitting diagnosis included stroke or TIA, pediatric patients, patients discharged to a location other than home, and patients who were only seen in the emergency department but not admitted to the hospital. Patients with hemorrhagic stroke were also excluded, as these patients are transferred from the project site to a tertiary care center due to the lack of neurosurgical services at the project site hospital, and therefore all post-discharge care is conducted by the hospital where they were admitted.

Based on previous pre-test/post-test studies with different participants groups, for a desired power of 0.80 and an alpha of 0.05, the desired sample size was n = 64 per group, or 128 total participants. However, as this was a pilot study, all eligible participants that met criteria were considered for the project, but there were significant and unanticipated limitations to participant enrollment that affected the final sample size of the intervention group. These will be discussed in further detail in the *Results* and *Limitations* sections.

Participant Recruitment

For the pre-intervention phase of the project, a retrospective chart review was conducted using the hospital's electronic medical records (EMRs) and readmission data to determine the 30-day readmission rate for the stroke/TIA patient population and patient demographics information for the months of June through August 2020. The original plan included using readmissions data for the same months as the project implementation period (September through November) from the previous year 2020 for consistency. However, due to the COVID-19 pandemic and a cyberattack in the fall of 2020 that affected the entire hospital network's EMR, readmission data was not available for September through November 2020. Demographics data for these stroke/TIA patients readmitted within 30-days to the hospital with a stroke or other diagnosis was obtained through the project site's stroke/TIA patient database that is used by the hospital's stroke team, including the DNP Project Chair for stroke program quality/performance improvement, patient care, and data analysis.

For the intervention phase of the project, all patients discharged from the hospital with a diagnosis of ischemic stroke or TIA who did not meet any project exclusion criteria were offered enrollment in the project intervention group at the time of the first follow-up phone call at 7-days post-discharge. Verbal and written consent were obtained prior to the collection of any survey responses or other data. Eligible participants were selected from the project site's stroke/TIA patient database by the DNP Project Chair. For the three months of the project, a substantial proportion of patients discharged with a stroke or TIA diagnosis met exclusion criteria, which significantly limited the sample size. There were 10 additional patients who met inclusion criteria, but either did not have a working phone number or did not answer calls after three contact attempts were made, and therefore could not be enrolled in the project. Nine patients

total completed the 7-day phone call and survey. One patient completed the 7-day phone call and survey but then did not respond despite three contact attempts for the 30-day phone call and survey. Four patients completed the 7-day phone call and survey, but then the timing for their 30-day phone call fell outside of the IRB approved time period for the project, so further contact could not be made by the project team. The total number of participants in the intervention group was five, who completed both 7-day and 30-day phone calls and associated surveys.

Consent Procedure

Informed consent was obtained from each participant or a close family member/friend who has detailed knowledge of the patient's current condition and hospitalization at the time of the 7-day post-discharge phone call before proceeding with the phone surveys and any further collection of data. The informed consent form and Health Insurance Portability and Accountability Act (HIPAA) research authorization form can be found in Appendix E.

Risks/Harms

A review of the project was conducted by the hospital's Institutional Review Board (IRB) prior to implementation and was approved in June 2021 (Appendix F). The project was also reviewed by the hospital's interdisciplinary stroke committee and DNP Team members prior to implementation. The only risk identified was the potential for psychological stress related to discussion of a participant's recent hospitalization and diagnosis. To decrease this potential psychological burden, participants were given the option to have a close family member or friend with knowledge of their medical condition(s) and hospitalization complete the TCM phone calls and surveys with the Project Chair (Appendix E, Figure 3).

Costs and Compensation

There were no costs to the participants associated with this project. There was no compensation offered for participation in this project.

Resources/Budget

There were no costs or expenses associated with this project. All data collection was done through the existing EMRs and saved on a secure internal private server. The printed patient education materials provided to patients at discharge were the current standard of care and were therefore covered by the departmental/unit budgets. The Project Chair had a dedicated private workspace with the necessary equipment to carry out the components of the project.

Project Development

This project was developed as a pilot TCM program that utilized resources already in use at the project site's academic medical center partner for their post-discharge patients. The hospital and hospital network has been working on streamlining and aligning stroke program goals and practices across all affiliate hospitals. Therefore, the standardized surveys utilized during the 7-day and 30-day follow-up calls were the surveys already in use at the academic medical center, with some slight modifications to make them specific to the project site hospital. An additional new patient satisfaction survey was created for this TCM as well. The phone call process was also created to be similar to the practices of the academic medical center, specifically that only three contact attempts were made at the time of each phone call, to maintain consistency and efficiency.

Additionally, the components of the TCM that were selected for inclusion in its design were chosen based on the available literature regarding effective TCM designs led by nurses and nurse practitioners. Most of these TCMs include components such as post-discharge calls, patient

education materials, and coordination of outpatient follow-up visits (Condon, et al., 2016; McClain & Chance, 2019). Using an evidence-based design aligned this new TCM with known best practices.

Project Intervention

The TCM used for this project involved the following components:

- *Detailed discharge education materials* given to patients and families at the bedside by the Project Chair, another member of the DNP Project Team, or the bedside registered nurse during their hospitalization, prior to discharge (Appendix G). This was the current standard of care at the hospital for all stroke and TIA patients.
- *One-week (7-day) follow-up phone call from Project Chair after discharge from the hospital -* This call was with the participant or a close family member/caregiver who had first-hand knowledge of the participant's current functional and medical status, and consisted of a short survey and discussion of their hospitalization and diagnosis (Appendix H).
- *Confirmation of a scheduled follow-up appointment with a primary care provider (PCP) within 2 weeks of hospital discharge* - This was discussed with the participant/family member during the 7-day phone call, and instructions/resources for scheduling an appointment were provided if necessary (Appendix H).
- *One-month (30-day) follow-up phone call from Project Chair -* This call was with the participant or a close family member/caregiver, and consisted of a short survey, questions about the participant's current functional status, and calculation of a modified Rankin Scale (mRS) score (Appendix I).

Outcomes

The measures for this project included process and outcomes measures (Appendix B). Outcome measures for the study included comparison of unplanned 30-day readmission rates before and after the intervention, comparison of mRS scores at the time of discharge and 30-days post-discharge for the intervention group, and participant satisfaction score ratings regarding the TCM and the care received during the project. Process measures included the percentage of participants added to the TCM database at the time of discharge, the percentages of participants who received each of the TCM components, and the percentage of participants with a mRS score calculated at 30-days post-discharge. Readmissions are defined any unplanned admission to the hospital overnight within 30 days of previous discharge after an index admission for stroke or TIA (ACP Hospitalist, 2018). The mRS score measures the degree of disability using an ordinal scale ranging from 0 (no symptoms) to 6 (death) and is a widely used primary outcome measure in trials for acute stroke interventions (Dijkland, et al., 2018; TJC, 2018). The mRS tool is shown in Appendix I. The score will be collected using the Modified Ranking Scale-Structured Interview (MRS-SI), as this has been demonstrated to have improved inter-rater reliability (Wilson, et al., 2002).

Project Timeline

The project was conducted from September 2021 through November 2021. A Gantt chart (Appendix J) was completed to show the steps of the project and the projected timeline for each phase of the study. The four phases for this study were: the project planning phase, the pre-test/pre-intervention phase, the implementation phase, and the post-test/post-intervention phase. Gantt charts are typically used in project management to track project schedules by visually demonstrating the activities of a project and the schedule, including the start date and duration of

each step (gantt.com, 2021). Data collection and analysis occurred in December 2021 through March 2022. Project results dissemination occurred in March and April 2022.

Tools/Instruments

Follow-up phone calls were conducted at about 7 days and 30 days post-discharge. Two different survey questionnaires were used during these phone calls. For the 7-day follow up call, an 11-question survey was adapted from a comparable questionnaire used by the stroke team at the health network's academic medical center, in order to make it specific to the project site hospital. This survey (Appendix H) was originally designed and validated by the academic medical center and the hospital network so that it would not have cross-over with the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey from CMS, as per hospital and CMS regulations, but does allow the team to collect stroke-specific information pertaining to the patient's hospital admission and discharge process (CMS, 2020). The patient education materials referenced in Question 4 are the standard evidence-based education materials used with stroke patients at the hospital, and were previously approved for use in 2019 by the hospital's patient education leadership and the multidisciplinary stroke committee (see Appendix G). This survey also included a field to record the patient's Modified Rankin Scale (mRS) score at the time of discharge, for comparison with the mRS collected in the subsequent 30-day phone call.

For the 30-day follow up calls, a validated questionnaire tool from Get With the Guidelines® (GWTG) was utilized (Appendix I). This questionnaire was available online as an open-access form. GWTG is a hospital-based quality improvement program developed by the American Heart Association (AHA), with registries for multiple cardiovascular diseases including stroke (AHA, 2021). GWTG-Stroke was developed as a national stroke registry with

the primary goal of improving outcomes and the quality of care for patients hospitalized with stroke and TIA (Healthy People, 2020). The project site hospital's stroke team uses this registry to track the facility's stroke/TIA patients and to monitor CMS stroke core measures through chart abstraction as part of the hospital's quality and performance review process. This single-page standardized form is a component of the current Patient Management Tool (PMT) that is used to collect patient data in GWTG, and is also the form used by the academic medical center for their 30-day post-discharge follow-up calls and data tracking (Ormseth, et al., 2017). A 30-day post-discharge mRS score was also collected as part of this standardized form. The mRS is typically collected at 90 days post-discharge, as per The Joint Commission (TJC) recommendations (TJC, 2018). However, research has demonstrated that global disability status as measured by the mRS at 1 month reliably estimates final 3-month (90 day) disability (Ovbiagele, et al., 2010). In addition to the GWTG standardized form, a patient satisfaction survey regarding the TCM (created specifically for this project) was also completed with each participant at the time of the 30-day phone call (Appendix I). This survey included 5 Likert-scale questions as well as a question regarding primary care appointment scheduling and a space for free-text comments.

Evaluation Plan

To effectively evaluate this project, a logic model was developed, which involved short-term, medium-term, and long-term outcomes, in alignment with the aims and objectives of the project (Appendix K, Figure 10). The logic model is a tool for "planning, describing, managing, communicating, and evaluating a program or intervention" (Centers for Disease Control Division for Heart Disease and Stroke Prevention, n.d., p. 1). This tool delineated the different resources,

proposed interventions, and actions needed to implement the TCM, as well as the results of those actions and short, intermediate, and long-term outcomes related to the project.

Data Maintenance and Security

Collected data, including survey results and patient demographics information, as well as results from the data analysis, was stored on a secure, encrypted internal hospital server, accessible only to the Project Chair. After follow-up phone calls were completed, the DNP Project Chair entered all survey and demographics data into the Excel project database by the end of the business day. Paper surveys were used at the time of phone calls to ensure that there was a record of responses that could be rechecked and referenced for accuracy before being entered into the project database. Additional required participant demographics data was collected following the phone calls and immediately entered into the project database, and this data was also cross-referenced with the information available in the hospital's stroke program database, as the Project Chair is an authorized user of this database. All data was then reviewed in Excel and double-checked by the Project Chair for accuracy. There was no missing data as all data was collected from the participants and the medical record at the time of the phone calls. While there were no significant outliers, four participants that completed the 7-day follow-up survey were unable or unavailable to complete the 30-day follow-up call, so this limits the data from these participants (this will be discussed in further detail in the Limitations section).

Data Collection

Pre-intervention monthly readmission rates from June-August 2020 were extracted from the Baseline clinical data including readmission data from 2020, mRS scores at discharge, and was extracted from the electronic medical record. Stroke/TIA patient readmission data will be collected monthly (every 30 days) from the EMR after the implementation of the project.

Appropriate patients will be identified through the medical coding and patients with a diagnosis of stroke or TIA at discharge will be tracked to see if they had subsequent readmission(s). After implementation of the new TCM, the Project Chair will track readmissions for the stroke/TIA patients who received the components of the TCM, using the EMR and the patient database.

Stroke data including readmission rates and patient demographics was tracked internally for the hospital by the stroke program team including the Project Chair, via medical coding and GWTG. However, for the purposes of this project, a separate, HIPAA-compliant patient database in Microsoft Excel was created to track discharged stroke/TIA patients to determine eligible participants, and ensure that participants received all aspects of the TCM correctly and on time. Survey data was collected on paper from participants by the DNP Project Chair at the time of the 7-day and/or 30-day post-discharge phone calls. The DNP Project Chair then entered all data from each day's phone calls into an Excel database. This database was stored in a secure internal hospital server with the other stroke data. Readmission rates for the intervention group, as well as pertinent participant medical information and demographics were collected from the two EMRs used by the hospital.

Pre-discharge modified Rankin Scale (mRS) scores were collected from the EMR and recorded in the project database at the time of the 7-day follow up phone call. Structured interview for the mRS as developed by Wilson, et al., (2002) was used during the 30-day post-discharge phone call (Appendix I), and scores were recorded in the database.
Demographics data and medical information collected from the EMR for both the pre-intervention and intervention groups included age, sex, marital status, race/ethnicity, history of previous stroke/TIA, NIH Stroke Scale (NIHSS) score at admission, and clinical diagnosis.

Data Analysis

Descriptive statistics was used to evaluate demographics data for both the pre-intervention and intervention groups (Appendix L). After completion of the project, the charts of the intervention group participants were reviewed for any 30-day readmissions that occurred during the months of project implementation (September-November 2021) to determine the readmission rates for this time period. An independent t-test was performed to compare the pre-intervention 30-day readmission rates against the 30-day readmission rates of the intervention group, as these data are from two independent groups of patients. The 30-day readmission rates for all stroke and TIA patients during the project's 3-month duration, regardless of individual enrollment in the project, were also compared to the pre-intervention 30-day readmission rates using an independent t-test, as these data are from two independent groups.

For the aim related to enrollment in the TCM, data was collected regarding the number of eligible versus non-eligible patients out of all patients discharged from the hospital with a stroke or TIA, and then if all these eligible patients were contacted for possible enrollment in the project. A run chart was used to analyze this data. A second run chart was made to analyze how many of the eligible patients were enrolled in the TCM each week.

For aim 3, regarding the percentages of participants who received each component of the TCM, a bar chart was used to analyze a) the percentage of participants who received all components of the TCM out of the total number of participants in the intervention group, and b) the percentages of participants who received each individual component.

Regarding aim 4 and the participant satisfaction survey results, individual question scores as well as mean scores were analyzed using descriptive statistics. Additional participant feedback was also included in Table 7 (Appendix M).

Alignment of Aims and Outcomes

The first aim, to decrease the 30-day readmission rate, was measured by comparing readmission rates of stroke and TIA patients before and after the TCM was implemented. Both the readmission rates within the intervention group sample as well as within the larger stroke/TIA patient population at the project site hospital were reviewed for the time period of the project intervention. Unplanned 30-day readmissions are a known potential consequence of poor transitions of care between the inpatient and outpatient settings. This is especially true for ischemic stroke and TIA patients, whose greatest risk for a recurrent stroke event is in the first few days and weeks following the index event (Oza, et al., 2017). The comparison between readmission rates before and after the intervention helped to demonstrate the effectiveness of the TCM on this primary outcome measure.

The second aim, that all eligible patients discharged with a diagnosis of ischemic stroke or TIA were contacted for enrollment in the project and the TCM, was a process measure that endeavored to create as large of an intervention group as possible from among potential participants to have statistically significant data related to outcomes. While there were multiple anticipated and unanticipated challenges to recruitment, the process for identifying potentially eligible participants ensured that all individuals meeting inclusion criteria were at least initially included in the project database. Whether they were enrolled in the project was determined by the initial 7-day phone call, and if they were able to be reached by phone and consented to be a participant in the project. While the actual sample size was smaller than planned and desired, early identification of all eligible participants allowed for the best opportunity to enroll as many of them as possible.

The third aim, that all enrolled participants received all components of the TCM, was also a process measure that helped assess whether receiving only some versus all the components had any effect on individual and group readmission rates. Evidence suggests that patients who receive a structured discharge and transition of care plan have better health outcomes, including reduced unplanned short-term readmission rates (Poston, 2018). Additionally, data related to this aim helped to provide constructive feedback on both the TCM and the hospital's stroke program, as it identified gaps in care and potential areas for improvement.

Finally, the fourth aim was for participants to express satisfaction with the TCM and the care provided during the project. This was also a process measure. Participant satisfaction was measured using Likert-scale questions as well as open ended questions, answered during the final survey administered during the 30-day follow-up phone call. The goal was to create a TCM that was organized, efficient, and effective, and provided better connection for participants between the inpatient and outpatient settings. Similar to aim three, information obtained from this survey also helped to provide program- and hospital-level feedback about the perceived quality of stroke care provided to the participants.

Another data set collected during the 7-day and 30-day post-discharge calls were modified Rankin Scale (mRS) scores for the participants (their scores at time of discharge and at 30-days post-discharge), as these scores demonstrated the degree of disability of the participants, which could influence their responses to the surveys. These scores also helped with assessing if the TCM had any effect on these scores, either positively or negatively. The goal was to have at least 50% of the participants have a mRS of 3 out of 6 or less. A paired t-test was used to analyze this data.

Software Analysis

A secured Excel spreadsheet database was created on the hospital's internal server to collect and analyze data for the project aims and objectives. Survey data was collected on paper from participants by the DNP Project Chair at the time of the 7-day and/or 30-day post-discharge phone calls. The DNP Project Chair then entered all data from each day's phone calls into an Excel database. When necessary, additional patient demographics information for both the pre- and post-intervention groups was collected through EMR chart review and also added to the project Microsoft Excel database. Microsoft Office Excel 2016 was used for all data analysis, including statistical analysis with descriptive statistics and the creation of charts and figures.

Data Entry Accuracy

After follow-up phone calls were completed, the DNP Project Chair entered all survey and demographics data into the Excel project database by the end of the business day. Paper surveys were used at the time of phone calls to ensure that there was a record of responses that could be rechecked and referenced for accuracy before being entered into the project database. Additional required participant demographics data was collected following the phone calls and immediately entered into the project database, and this data was also cross-referenced with the information available in the hospital's stroke program database, as the Project Chair is an authorized user of this database. All data was then reviewed in Excel and double-checked by the Project Chair for accuracy. There was no missing data as all data was collected from the participants and the medical record at the time of the phone calls. While there were no significant outliers, four participants that completed the 7-day follow-up survey were unable or unavailable to complete the 30-day follow-up call, so this limits the data from these participants (this will be discussed in further detail in the Limitations section).

Objectives/Aims and Analysis

Analysis measures for the project aims and objectives were described in the Data Collection/Evaluation and Analysis Methods Table (Appendix B). Collected data were defined and coded according to the Data Dictionary (Appendix B). Pre- and post-intervention readmission rates, as well as demographics information for both the pre- and post-intervention groups, were obtained by chart review for comparison and evaluated with further statistical analysis. Run charts were created to assess the process measures related to the TCM. Bar charts were used to depict the percentages of participants who received the various components of the TCM. A pie chart was made to demonstrate the multiple reasons that affected enrollment of participants, which resulted in a small sample size. Statistical analysis was also used to evaluate mRS scores.

Participant Demographics

Appendix L, Table 4 shows the demographics of the preintervention group (n = 24; patients readmitted to the hospital within 30 days from June-August 2020). The average age was 69.9 years, with a minimum age of 49 and a maximum age of 61, and a standard deviation (*SD*) of 12.9. Just over half of the group was female (n = 13, 54.2%). Regarding marital status, the majority of patients were married (n = 15, 62.5%), followed by single (n = 5, 20.8%), widowed (n = 3, 12.5%), and divorced (n = 1, 4.2%). All patients identified as white/Caucasian (n = 24, 100%). The majority of patients (n = 20, 83.3%) had no prior history of stroke or TIA. The average NIH Stroke Scale (NIHSS) score on admission was 2, with a range of 0 to 10 and a *SD* of 2.6. Over half of the patients in the sample were diagnosed with an ischemic stroke at discharge (n = 13, 54.2%), nine patients (37.5%) were diagnosed with a TIA, and two patients (8.3%) were discharged with a diagnosis of hemorrhagic stroke. Four patients (16.7%) were

readmitted with a stroke or TIA as their primary diagnosis, and one of these patients was readmitted twice within 30 days for stroke.

Appendix L, Table 5 shows the demographics of the intervention group (n = 9). Out of this group, there were five participants (55.5%) who completed both the 7-day and 30-day follow-up phone calls and surveys, and four participants (44.4%) who completed the 7-day phone call and survey, but were unable to be reached for the 30-day phone call. The average age was 61.7 years, with a minimum age of 39 and a maximum age of 78, and a standard deviation (*SD*) of 11.6. Just over half of the group was female (n = 5, 55.6%). Regarding marital status, the majority of participants were married (n = 6, 66.7%), followed by divorced (n = 2, 22.2%), and widowed (n = 1, 11.1%). No participants in this sample were single. All patients identified as white/Caucasian (n = 9, 100%). The majority of participants (n = 8, 88.9%) had no prior history of stroke or TIA. The average NIH Stroke Scale (NIHSS) score on admission was 2.1, with a range of 0 to 5 and a *SD* of 2. The majority of participants were diagnosed with an ischemic stroke (n = 7, 77.8%) and two participants (22.2%) were diagnosed with a TIA at discharge. No participants were diagnosed with a hemorrhagic stroke at discharge because that diagnosis was one of the exclusion criteria for the project.

Results

A total of nine participants were enrolled in the TCM. Out of these, only five completed both post-discharge follow-up phone calls, and thus were considered to have completed the entire TCM. This small sample size was due in part to the limited number of patients who met inclusion criteria out of all patients discharged with a stroke or TIA diagnosis. During the implementation period for the project, only about half of all patients discharged from the project

site hospital met all inclusion criteria, which was the first significant limitation of the potential sample size. In September, 17 out of 30 patients (56.7%) met all inclusion criteria; in October, 19 out of 34 patients (55.9%) met all inclusion criteria; and in November, 20 out of 36 patients met all inclusion criteria (55.6%).

To evaluate if the TCM intervention had a significant effect on 30-day readmission rates, an independent t-test was conducted, and compared readmission rates for a 3-month period that occurred prior to project implementation for which data was available (June-August 2020) to the three months following implementation (September-November 2021). Appendix M, Table 6 shows the results of this test. Two groups were compared against the pre-intervention group (n = 67) data: the intervention group (n = 9) and all patients discharged from the project site hospital with a stroke or TIA diagnosis over the same three month period (n = 71), in the interest of determining if the readmission rate trends in the intervention group were similar to those seen in the larger sample. This additional readmissions data was obtained through the hospital's stroke program database and did not include any identifying patient information, only the monthly readmission numbers and rates. For the independent t-test comparing the pre-intervention group and the intervention group, the post-intervention mean 30-day readmission rate of 3.7% (SD = 2.97) was significantly lower ($t(4) = 3.65$, $p < .05$) than the pre-intervention mean 30-day readmission rate of 35.0% (SD = 13.39). This supported that the mean 30-day readmission rate was lower following the intervention. Only one project participant had an unplanned readmission within 30 days following their index stroke/TIA. The goal for the project was to achieve at least a 50% reduction in the readmission rate following the intervention (goal readmission rate of 17.5% or less), which was achieved. For the independent t-test comparing the pre-intervention group and the group of all patients discharged with a stroke/TIA diagnosis during the project

timeframe, the post-intervention mean 30-day readmission rate of 11.4% (*SD* = 2.97) was also significantly lower ($t(4) = 2.98$, $p < .05$) than the pre-intervention rate. This finding suggested that there were possibly external factors involved in the decline in readmission rates during and after the time of the project implementation, independent from the effects of the pilot TCM. Run charts were also created to demonstrate the change in readmission rates over time (Appendix M, Figures 11 & 12).

Throughout the duration of the project, participants who met inclusion criteria were identified by chart review, and pertinent information related to their ischemic stroke or TIA admission and discharge were added to the project database. Forty-four patients who met all inclusion criteria were identified from the hospital's stroke and TIA patient population for the months of September, October, and November 2021, and added to the project database. 100% of these eligible participants were contacted by phone regarding the project and the TCM. A run chart was created to present the data from this metric (Appendix M, Figure 13). From this group, varying percentages weekly were able to be contacted by phone and enrolled (Appendix M, Figure 14). Overall, nine out of 44 potential participants were able to be contacted (20.5%). No patients who were reached by phone declined consent for enrollment. There were a variety of reasons the remaining 35 patients (79.5%) were unable to be contacted. Twenty patients (57.1%) were called three times on separate days, but did not answer or return the call. Five patients (14.3%) were admitted to the hospital for planned admissions for surgeries during their time period for phone follow up. Five patients (14.3%) did not have a working phone number listed in their chart. One patient had advanced dementia and had no family available that could consent to the project and help answer the survey questions (3%). For four patients, while their hospital discharge date fell within the time frame for the project and therefore they fulfilled inclusion

criteria, their due dates for phone follow up did not, and therefore had to be excluded from the project. A pie chart was done to demonstrate this data (Appendix M, Figure 15).

Regarding aim 3, that all enrolled participants received all components of the TCM, data was obtained from the phone surveys as well as chart review. As above, 100% of all participants received the 7-day follow up phone call and were consented for the project. Five out of nine participants (55.6%) were able to be contacted for the 30-day follow-up call and survey. Out of the nine total participants, three participants (33.3%) received the stroke/TIA patient education materials prior to discharge from the hospital. The standard of care was that the bedside nurses gave this education to patients prior to discharge and then charted its completion in a specific location in the chart. A member of the stroke team sent out daily reminders via the secure internal messenger application to nurses whose patients still needed charted patient education, which was also standard practice. If a participant confirmed that they did not receive the education materials at the time of the follow-up phone call, the DNP Project Chair mailed the materials to their home address with the participant's permission. While the goal was for participants to receive the materials prior to discharge, this additional step ensured that the remaining six participants received the materials shortly after discharge. Two of out nine participants (22.2%) had a PCP appointment scheduled for them prior to discharge from the hospital. When asked about a scheduled PCP appointment during the 7-day follow-up survey, the remaining seven participants stated that their discharge instructions included information on when to schedule the appointment (within 1-2 weeks), but that they scheduled the appointments themselves. No patients reported not having a PCP appointment within 2 weeks post-discharge. While no participants in the intervention group received all components of the TCM (patient education material before discharge, PCP appointment scheduled before discharge, and

completion of both 7-day and 30-day post-discharge calls and surveys), one participant scheduled their own PCP appointment within 2 weeks of discharge and received all other components per TCM design. A bar chart was created for analysis of the data related to aim 3 (Appendix M, Figure 16).

To measure how well the project met aim 4: participants express satisfaction with the TCM and the care they received during the project, a Participant Satisfaction Survey was completed at the time of the 30-day follow-up phone call. Five participants completed this survey (n = 5). Appendix M, Table 7 shows the results from this survey. Four of the questions were Likert-scale questions, with the answers coded as 1 (strongly disagree), 2 (disagree), 3 (agree), and 4 (strongly agree). There was one yes or no question coded as 1 (no) and 2 (yes). There was one question regarding stroke clinic attendance coded as 1 (would not attend), 2 (not likely to attend), 3 (would likely attend), and 4 (would very likely attend). There was also one open-ended question, and the answers were analyzed for themes.

For the four Likert-scale questions, all participants answered “agree” or “strongly agree” when asked about different aspects of the TCM and its components. On a scale of 1 to 4 for these questions, all of them had a mean score of 3 or above. Regarding overall participant satisfaction with the TCM, 60% of participants answered “agree” (score of 3) and 40% answered “strongly agree” (score of 4) when as asked if they were satisfied with the TCM and the care they received during the project, with a mean of 3.4 (SD = 0.55). For the dichotomous yes/no question about whether a PCP appointment was scheduled prior to discharge, or if they were able to schedule in a timely manner post-discharge, 40% of participants answered “no” and 60% answered “yes,” with a mean of 1.6 (SD = 0.55). For question 6, which asked about likelihood of attendance at a stroke/TIA follow-up clinic, 40% of participants answered “would likely attend” and 60%

answered “would very likely attend,” with a mean of 3.6 (*SD* = 0.55). A few themes were identified in the free text responses to question 7. Three participants mentioned the difficulty with obtaining a timely outpatient neurology clinic appointment, and that increased access to care, such as through a stroke/TIA follow-up clinic, would be beneficial. Three participants also mentioned that they had to set up follow-up appointments on their own and had varying degrees of difficulty in doing so. One participant also referenced their care in the hospital and felt that they were discharged before they were ready.

For the intervention group, mRS scores were compared between scores at the time of discharge and at 30-days post-discharge, to determine if there were any changes in scores, and to assess the degree of disability of the participants, which could impact survey responses and ability to complete the components of the TCM. 100% of participants had mRS scores calculated both prior to discharge and at 30-days post-discharge. Appendix M, Table 8 depicts the mRS scores for the intervention group. Four out of five participants (80%) had a mRS score of 1 on the 0 to 5 mRS scale. One participant (20%) had a score of 0 on the 0 to 5 mRS scale, as calculated by a rehabilitation therapist (PT or OT) at the time of their hospitalization. These scores demonstrate a very low degree of disability for the intervention group participants. These scores stayed the same for all participants when calculated by the DNP Project Chair at the time of the 30-day phone call, which demonstrated that there was no change in the level of their disability from their stroke or TIA despite enrollment in the TCM. The mean for both the discharge scores and the 30-day scores was 0.8 (*SD* = 0.45). A paired t-test for means was performed, however because there was no change in the scores between time points, a t-statistic and p-value could not be calculated, and the data was not considered statistically significant. This demonstrated that the TCM had no calculable impact on mRS scores.

Discussion

The results demonstrated an improvement in unplanned 30-day readmission rates in this small pilot project of a TCM for ischemic stroke and TIA patients. The mean readmission rate over a 3-month period decreased from 35% pre-intervention to 3.7% post-intervention, although interpretation of results is limited due to the small sample size of the intervention group. Readmission rates should be evaluated in the long-term and in a larger group of participants to determine if this trend persists. While there was good success with the process of identifying eligible participants, there were barriers to the process of enrolling them in the project and finding ways to address these challenges may help with expansion of the TCM to a larger population. Process measures related to the individual TCM components demonstrated that some improvements could be made to the practices currently used at the project organization for tasks such as patient education and follow-up appointment scheduling, as only the minority of participants received one or both components. Further refinements to the TCM design and how these components are completed may help to ensure that more patients are receiving these important interventions prior to discharge from the hospital. Overall, the TCM was very well-received by participants and responses to the satisfaction survey questions demonstrated that implementing the TCM as a permanent aspect of stroke care at the organization would be beneficial. There was also significant support for further enhancements to post-discharge care, such as a follow-up stroke/TIA outpatient clinic. This project adds to the body of evidence about the use of TCMs in stroke and TIA patients, and how TCMs can impact health outcomes.

Limitations

There were several limitations to this project. The sample size of the intervention group was much smaller than anticipated, due to multiple factors that affect recruitment and enrollment into the project (Appendix M, Figure 15). The intervention group was also much smaller than the pre-intervention group. While the results related to readmission rates between the pre- and post-intervention technically demonstrated statistical significance, they should be interpreted with the important caveat of the small sample size that considerably limits their generalizability and analysis. The intervention group was also homogenous with regards to race and ethnicity, as all participants identified as white/Caucasian, so the results cannot be generalized to more racially diverse patient populations. Participants were also of low stroke disability, as demonstrated by mRS scores of 0-1 for all participants, so it is difficult to determine if similar outcomes would be seen in a group with a greater degree of disability and neurological deficits. The COVID-19 pandemic, which started in early 2020, impacted hospitalization rates, staffing, and patient care at the project site hospital during all phases of this project. The notably high readmission rates seen in the summer of 2020 may have been at least partially due to the effects of the pandemic, but this is unable to be confirmed within the design and limitations of this project. Staffing shortages related to the pandemic have also necessitated the use of many traveling nurses, who are not as familiar with the hospital's practices and protocols as staff nurses, and this created an additional barrier to patients receiving the education materials, which is normally part of the bedside nurse workflow.

Additionally, much of the literature about the use of TCMs with stroke patients, that demonstrated success with decreasing readmission rates, utilized an in-person or virtual clinic visit within a few weeks of discharge as a component of the TCM to align with best practice

evidence (Condon, et al., 2016; McClain & Chance, 2019). A clinic visit was not able to be a part of the piloted TCM in this project, as a stroke/TIA clinic does not currently exist at the project site and the general neurology clinic has an extremely long waitlist for appointments, and therefore the TCM was sub-optimal in design compared to other stroke TCMs.

Implications for Practice

Despite some limitations related to this TCM design and implementation, the results from this project supported the recommendation for TCM implementation in hospital systems, including the project site hospital. The stroke TCM helped improve the discharge and follow-up care process for this vulnerable population of stroke patients. Findings suggested that a permanent TCM for stroke and TIA patients would be beneficial, and could help improve outcomes and stroke quality measures. The long-term goal of the project would be for the TCM to become the standard of care at the institution. Project results also demonstrated strong patient and community support for a stroke/TIA follow-up clinic at the project site hospital, which has been an ongoing organizational goal for a number of years, and starting this clinic along with a permanent TCM could help to further improve health outcomes including readmission rates.

Implications for Healthcare Policy

As hospitals can face financial penalties from CMS if they exceed the national 30-day risk-adjusted all-cause readmission rate for stroke patients, they should be particularly motivated to implement interventions that help to reduce readmission rates (Horwitz, et al., 2011). Given that this stroke TCM showed preliminary success in reducing readmission rates, it would be to the organization's benefit to support efforts to make it a permanent part of the patient care process for stroke and TIA patients, with updates to hospital discharge policies and procedures to include TCM methods.

This project also adds to the current body of literature pertaining to the use of TCMs to improve health outcomes for patients with chronic disease such as stroke, and may encourage more widespread adoption of similar programs. Further evidence of the effectiveness of TCMs should motivate policymakers to promote the development of public health policies and recommendations related to TCMs, and support hospital systems who develop and implement TCMs. This will especially be important as the U.S. healthcare system moves towards more quality-driven care.

Implications for Executive Leadership

This project demonstrated the quality and value of NP-led TCMs, and that involving NPs as leaders and clinicians in TCMs for stroke patients is of benefit to both patients and health care organizations. Additionally, at the project site hospital, dissemination of the results of this doctoral project will help engage stakeholders including hospital and network leadership to promote long-term implementation of a TCM for the stroke and TIA patient population, as results demonstrated the need for expansion of stroke systems of care including improvements to the discharge and post-discharge process. Findings also help demonstrate the need and desire for an outpatient stroke clinic to executive stakeholders who can assist with allocating the resources needed for this important initiative.

Implications for Quality/Safety

The project was developed with process measures that helped to ensure consistency of care for participants and involved elements of feedback via surveys that can help improve the quality of care in the hospital as well as after discharge. The components of the TCM were designed to decrease the number of patients who are lost to care in the post-discharge period, a time when stroke and TIA patients are the most vulnerable and at-risk for additional

cerebrovascular events. Results showed that a TCM may improve patient safety and health outcomes in the hospital's stroke and TIA patient population. The TCM could also be helpful with meeting quality measures such as the stroke education core measure. These quality measures are important for patient care as well as in initiatives such as achieving TJC stroke certification.

Plans for Sustainability and Future Scholarship

The results of this doctoral QI project will be disseminated throughout the practice organization to promote long-term implementation and sustainability of a stroke/TIA TCM as part of the hospital's stroke program. A follow-up project with more participants may be of benefit to determine if the outcomes seen in this project are validated in a larger population, as well as to determine what might need to be modified in the TCM design to ensure sustainability. It would also be of value to include patients discharged to other environments other than home in this larger group if possible, to determine if the TCM is as effective for these individuals. Additionally, evaluation of readmission rates in the stroke/TIA patient population in the months following the conclusion of the project would be of value to determine if the trends seen in the data were sustained. It would also be important to reevaluate outcomes, especially readmission rates, after a stroke/TIA clinic is implemented and integrated into the TCM to determine if this component has an additional effect on the results. Further alignment of TCM practices across the hospital network would also help to improve and expand stroke services and care coordination to a broader population of patients.

Conclusion

Ischemic stroke and TIA are significant medical conditions that affect millions of Americans. Unplanned hospital readmissions in this patient population can result in high rates of morbidity and mortality, as more than half of stroke survivors will have serious long-term disability, and patients readmitted for stroke or TIA are significantly more likely to expire during readmission than on index admission (CDC, 2020; Nouh, et al., 2017). Reducing readmissions has been identified as a health priority by the project site hospital as well as organizations such as the American Stroke Association, through the use of improved and expanded systems of care such as TCMs (Adeoye, et al., 2019).

This doctoral quality improvement project implemented a TCM for stroke/TIA patients that involved distribution of patient education materials, scheduled follow-up phone calls, and coordination of timely outpatient primary care follow-up, similar to other TCMs currently in practice at other hospitals. While the sample size for the project was very limited due to barriers to enrollment, this intervention did result in a statistically significant decrease in the mean 30-day unplanned readmission rate within the intervention group in the months following implementation, and the TCM was well-received by all participants. A follow-up project with a larger intervention group and long-term monitoring of readmission rates would be of benefit for sustainability of the TCM. Permanently integrating this TCM into the discharge planning process and post-discharge care at the project organization has the potential to continue to improve the quality of care and health outcomes for stroke and TIA patients in the region and beyond.

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Appendices

Appendix A

SWOT Analysis

Figure 1

SWOT Analysis

	Helpful To achieving the objective	**Harmful** To achieving the objective
Internal Origin {Attributes of the organization}	**Strengths** • Hospital is an integral part of the community • Strong unit leadership • Strong physician leadership • Collaborative and collegial stroke team • Invested in the health of the community • Good employee benefits such as competitive salaries and quality health insurance • Good communication between departments and teams • Commitment from CVPH and UVM Health Network leadership about prioritizing neurology/stroke care • The recent addition of a new neurologist to help spearhead and support initiatives	**Weaknesses** • Non-clinical administration is disconnected from the needs and concerns of the employees • Current union negotiations and conflict between nurses' union and administration • Limitations of available resources (i.e. staffing shortages) • COVID-19 pandemic changed the roles of many employees, including those on the stroke team • Current financial crisis resulting in staffing shortages, hiring freezes for certain categories of positions, and low employee morale

	Helpful To achieving the objective	**Harmful** To achieving the objective
External Origin {Attributes of the organization}	**Opportunities** • Significant opportunity to expand access to specialty care services in the region, given current lack of access to care • The move towards greater expansion and use of telehealth services, and how this could be used in the stroke clinic to expand access to care • The availability of loan forgiveness programs and the chance for the hospital to better market these in order to improve provider recruitment efforts • The dovetailing of this project with the network goal of achieving ASRH certification (aligns it with the strategic plan) • Proposed TCM has the potential to bring in revenue through decreasing readmission rates and thus resulting penalties	**Threats** • Current financial crisis affecting this organization as well as others nationwide • Decreased revenue leading to more difficulty obtaining resources for new projects • Staffing issues, low morale • Changes in the number of stroke patients over the past year • Currently not using any forms of TCMs for stroke patients in practice at the organization, so it will be a new process for all involved • Low health literacy in the North Country

Appendix B

Data Collection and Analysis Table and Data Dictionary

Table 1
Data Collection/Evaluation and Analysis Methods

Aims/Evaluation Questions	**Measures**	**Measure Type**	**Data Source**	**Recruitment Method/Population**	**Timing/Frequency**	**Calculation/Statistics**	**Goal/Benchmark**
Reduce the rate of 30-day readmissions for patients discharged from the hospital with a stroke or TIA diagnosis *Did the 30-day readmission rate decrease after implementation of the TCM?*	Percentage of patients readmitted to the hospital within 30 days of having a stroke or TIA	Outcome CMS Standard measure – CMIT 902	EMR chart review	Pre-intervention: All patients discharged from the hospital with an ischemic stroke or TIA diagnosis from September 2020 through November 2020 Post-intervention: All patients enrolled in the TCM from September 2021 through November 2021	Monthly data review for 3 months post-implementation	Percentage/Proportion; Independent t-test to compare pre- and post-intervention readmission rates; histogram	50% reduction in readmission rate
Patients added to the TCM database at the time of discharge from the hospital	Percentage of patients added to the TCM database at	Process	EMR chart review; Project database	All patients discharged from the hospital with an ischemic stroke or TIA diagnosis	Weekly data review for 3 months post-implementation	Percentage/proportion; run chart	100%

Was patient added to the project database for potential enrollment in the TCM at the time of discharge or immediately after?	the time of discharge						
Eligible participants received a 7-day follow up phone call from the Project Chair *Did potential participants receive a 7-day follow up phone call after discharge from the stroke NP/DNP Project Chair?*	Percentage of participants who received the 7-day post discharge phone call from the stroke NP (project leader).	Process	Project database	All patients discharged from the hospital with an ischemic stroke or TIA diagnosis	Weekly data review for 3 months post-implementation	Percentage/Proportion; run chart	100%
Participants were enrolled in the TCM at the time of initial contact.	Percentage of eligible participants who were reached by phone and	Process	Project database	All patients identified as eligible for the project by inclusion/exclusion criteria.	Weekly data review for 3 months post-implementation	Percentage/Proportion; run chart	100%

Were all eligible patients contacted and consented for enrollment into the TCM by the DNP Project Chair?	consented for the project.						
Participants received a 30-day follow up phone call from the Project Chair *Did patient receive a 30-day follow up phone call after discharge from the stroke NP?*	Percentage of patients who received a phone call from the Project Chair around 30 days after discharge.	Process	Project database	All patients discharged from the hospital with an ischemic stroke or TIA diagnosis	Weekly data review for 3 months post-implementation	Percentage/Proportion; run chart	100%
Patients scheduled for a primary care provider (PCP) appointment prior to discharge. *Did patient have a scheduled follow-up appointment with*	Percentage of PCP appointments made prior to discharge	Process	EMR chart review	All patients discharged from the hospital with an ischemic stroke or TIA diagnosis	Weekly data review for 3 months post-implementation	Percentage/Proportion; bar chart	100%

a PCP prior to discharge?							
Participants scheduled for a PCP appointment scheduled within 2 weeks after discharge *Did patient have a follow-up appointment with a PCP scheduled for a date within 2 weeks after discharge?*	Percentage of participants with a PCP appointment scheduled for a date within 2 weeks after discharge	Process	EMR chart review	All patients discharged from the hospital with an ischemic stroke or TIA diagnosis	Weekly data review for 3 months post-implementation	Percentage/Proportion; bar chart	100%
Patients received patient education materials prior to discharge from the hospital. *Did patient receive the printed patient education materials prior to discharge from the hospital?*	Percentage of participants who received patient education materials prior to hospital discharge	Process	EMR chart review	All patients discharged from the hospital with an ischemic stroke or TIA diagnosis	Weekly data review for 3 months post-implementation	Percentage/Proportion; bar chart	100%

Participants had a modified Rankin Scale (mRS) score calculated prior to discharge from the hospital *Did participant have a mRS score calculated prior to discharge from the hospital?*	Percentage of participants with a mRS score calculated prior to discharge	Process	Project database	All participants enrolled in the TCM	Weekly data review for 3 months post-implementation	Percentage/Proportion	100%
Participants had a modified Rankin scale (mRS) score calculated at the 30-day phone call *Did participant have a mRS score calculated at the time of the 30-day follow-up phone call?*	Percentage of participants with a mRS score calculated at 30-days post-discharge	Process	Project database	All participants enrolled in the TCM	Weekly data review for 3 months post-implementation	Percentage/Proportion; Bar chart	100%
Participant mRS scores before and after the intervention.	mRS scores calculated prior to discharge and at 30-	Outcome	Project database	All participants enrolled in the TCM	Weekly data for 3 months post-implementation	Percentage/Proportion; Paired t-test to compare mRS scores at discharge vs. 30-days post-discharge	mRS scores would stay the same or improve post-intervention

Did the TCM have any effect on mRS scores (either positively or negatively)?	days post-discharge						
Participant/family satisfaction with TCM after all elements are completed (at the conclusion of the 30 day phone call) *Was the patient/family satisfied with the care provided by the stroke TCM?*	Mean rating on patient satisfaction exit survey	Outcome	Project database	All participants enrolled in the TCM	Weekly data for 3 months during implementation period	Mean/descriptive statistics; bar chart	3 (4 point Likert scale)

Table 2
Data Dictionary

Aim 1: Decrease the rate of 30-day readmissions for participants in the project intervention group

Data Elements	**Variable Name**	**Definition**	**Data Type***	**Data Values & Coding**	**Restrictions/ Validation**
Patient Identifier	Pat#	System generated unique identifier	Continuous	N/A	

Index admission date	InAdmitDate	Date of index admission to the hospital	Continuous		Required
Readmission date	ReadmitDate	Date of readmission to the hospital	Continuous		Required
Index admission diagnosis	InAdmitDx	Diagnosis at discharge for index admission to the hospital	Categorical		Required
Readmission diagnosis	ReadmitDx	Diagnosis at readmission to the hospital	Categorical		Required

Aim 2: All potentially eligible patients will be identified and enrolled in the TCM if deemed to meet inclusion criteria.

Data Elements	**Variable Name**	**Definition**	**Data Type***	**Data Values & Coding**	**Restrictions/ Validation**
Patient Identifier	Pat#	System generated unique identifier	Continuous	N/A	
Patient identified as stroke/TIA patient	StrokeTIApt	Patient identified as discharged from the hospital with a stroke or TIA diagnosis through chart review	Categorical	N/A	
Patient enrolled in TCM database	PtEnrolled	Was a stroke/TIA patient enrolled in the TCM database?	Dichotomous	1, Yes; 0, No	Required

Aim 3: All participants will receive all components of the TCM

Data Elements	Variable Name	Definition	Data Type*	Data Values & Coding	Restrictions/ Validation
Patient Identifier	Pat#	System generated unique identifier	Continuous	N/A	
7-Day Phone call completed	PhoneCall7	Patients who received a 7-day follow up phone call	Dichotomous	1, Yes; 0, No	Required

Data Elements	Variable Name	Definition	Data Type*	Data Values & Coding	Restrictions/ Validation
Patient Identifier	Pat#	System generated unique identifier	Continuous	N/A	
30-day Phone call completed	PhoneCall30	Patients who received a 30-day follow up phone call	Dichotomous	1, Yes; 0, No	Required
Both phone calls completed	PhoneCalls7&30	Patients who received both 7-day and 30-day follow up phone calls	Dichotomous	1, Yes; 0, No	Required

Data Elements	Variable Name	Definition	Data Type*	Data Values & Coding	Restrictions/ Validation
Patient Identifier	Pat#	System generated unique identifier	Continuous	N/A	

PCP appointment scheduled prior to discharge	PCPAppt	Patients who had a PCP appointment within 2 weeks scheduled for them prior to discharge	Dichotomous	1, Yes; 0, No	Required

Data Elements	**Variable Name**	**Definition**	**Data Type***	**Data Values & Coding**	**Restrictions/ Validation**
Patient Identifier	Pat#	System generated unique identifier	Continuous	N/A	
Patient received stroke education materials prior to discharge	EduMaterials	Did the patient (or designated family member) receive the standard stroke/TIA patient education materials prior to discharge?	Dichotomous	1, Yes; 0, No	Required

Aim 4: Patients/families enrolled in the TCM will be satisfied with the care provided by the stroke TCM after completing all elements.

Data Elements	**Variable Name**	**Definition (taken directly from 30-day survey questions)**	**Data Type***	**Data Values & Coding**	**Restrictions/ Validation**
Patient medication self-management	Meds	Now that you have completed the transitional care model (TCM - 7-day phone call, 30-day phone call, and	Categorical	1: Strongly disagree 2: Disagree 3: Agree	

		care coordination), you clearly understand the purpose for taking each of the medications that were prescribed to you at discharge.		4: Strongly agree	
Patient understanding of self-management	SelfMgmt	Now that you have completed the TCM, you have a good understanding of the things you are responsible for in managing your health.	Categorical	1: Strongly disagree 2: Disagree 3: Agree 4: Strongly agree	
Appointment availability	Appt	Was a primary care provider appointment scheduled for you prior to discharge, or were you able to schedule a primary care provider appointment after discharge in a timely manner?	Categorical	1: Strongly disagree 2: Disagree 3: Agree 4: Strongly agree	
Follow up phone calls	PhoneCall	The 7-day and 30-day follow-up calls were helpful for understanding your health needs, your	Categorical	1: Strongly disagree 2: Disagree 3: Agree	

		medications, and your illness (stroke/TIA).		4: Strongly agree	
Satisfaction with TCM	TCMSatisfaction	Overall, you were satisfied with the stroke/TIA and medication education you received throughout your contact with the TCM team (during admission and phone calls).	Categorical	1: Strongly disagree 2: Disagree 3: Agree 4: Strongly agree	
Interest in stroke/TIA clinic appointment	StrokeClinic	If an outpatient stroke/TIA follow-up clinic with a stroke NP or neurologist was available, you would be interested in and likely to attend an appointment at this clinic, if an appointment was scheduled for you at discharge.	Categorical	1: Strongly disagree 2: Disagree 3: Agree 4: Strongly agree	
Suggestions	Pat_suggestions	Please share any additional comments or suggestions you may have about the	Text	N/A	

		TCM overall and/or its components.			

Appendix C

Evidence Table

Table 3

Evidence Table from Literature Review

Article #	Author & Date	Evidence Type	Sample, Sample Size, Setting	Study findings that help answer the EBP Question	Observable Measures	Limitations	Evidence Level & Quality
1	Adeoye, et al. (2019)	Clinical practice guidelines /Policy statement	Recommendations for stroke systems of care published by the American Heart Association and American Stroke Association (2019 update from the 2005 and 2013 guidelines)	- Evidence reviewed found that a TCM provided by NPs and RNs reduced 30-day readmissions - Recommend systems of care that target improvement in readmission rates	Policy statement/practice guidelines were created to improve stroke patient outcomes through stroke systems of care New/Revised Recommendations for stroke centers related to postacute/ postdischarge care: - Should use organized approaches such as stroke teams and stroke units	- Does not provide a recommendation about which TCM to use - Multiple authors had disclosures such as being on the advisory board of the Joint Commission or being a consultant to multiple medical technology companies - Recognized that transitions in care for stroke patients still remains a	Level IV A – High quality

					- Should adopt approaches to secondary prevention that address modifiable risk factors, and the focus of postacute care should be on reducing mortality, maximizing recovery, and preventing recurrent stroke and CV events - Should establish support systems that ensure all discharged patients have appropriate follow-up with stroke services - Should standardize postacute care after stroke discharge including using transitional care models/plans	significant practice and quality challenge	

2	Bradway, et al. (2012)	Qualitative review/analysis	Individual case summaries for each enrolled patient Fieldnotes from biweekly APN case conferences 15 patients 15 caregivers (CGs) (15 CG-patient dyads)	Identified challenges and facilitators that can affect optimal delivery of the TCM intervention – these challenges and facilitators are important to consider when developing and implementing a new TCM Challenges: - some patients and CGs lacked baseline knowledge about posthospital care needs or their chronic illnesses - some patients/CGs did not acknowledge or understand the severity of their illnesses or symptoms - all patients had some degree of cognitive impairment	Three themes were observed across the case summaries and fieldnotes: - patients and caregivers having the necessary information and knowledge - care coordination - the CG experience	- published in 2012, may not be as up-to-date as more recent research - each APN implemented their own style when determining the content of the case summaries - APNs were not directed to specifically note barriers or facilitators to implementing the study intervention - fieldnotes were not originally intended for this analysis - results and conclusions are only representative of the sample, but difficult to generalize	Level III B – Good quality

				- when CGs didn't understand the cognitive limitations of the patients, it was difficult for APNs to maximize potential of the interventions Facilitators: - identified knowledge and education gaps in order to address them - tailored information and individualized approaches to learning - helped patients/CGs set up systems to support record keeping of vital information			
3	Condon, et al. (2016)	Experimental pre-test/post-test Quasi-experimental	Sample and sample size: 510 stroke or TIA patients 2 phase study:	- Intervention used was a transitional care model that included a post-	- 30-day and 90-day readmissions, collected by telephone interview, medical	- single center study - patient population limited to those	Level II B – Good quality

			- 167 patients in phase 1 - 343 patients in phase 2 Setting: Single academic tertiary hospital (Wake Forest Baptist Medical Center)	discharge follow up phone call within 7 days by a nurse practitioner, as well as a stroke clinic visit - Phone call included medication reconciliation, reminders of scheduled appointments, and stroke signs/symptoms - enrollment in the TCM (with both the phone call and the clinic visit) was associated with a 48% reduction in 30-day readmissions	record review, or mailed questionnaire - follow-up phone call completed - days from discharge to readmission - Phase 1: implemented NP phone call for high-risk patients and follow up stroke clinic visit at 2-4 weeks - Phase 2: phone call performed by RN for all stroke/TIA patients, clinic visit within 1-2 weeks - data was collected following each of the phases: - 30-day readmissions: 18 patients in phase 1, 28 patients in phase 2 - 90-day readmissions: 30 patients in phase 1,	discharged home and not to rehab or skilled nursing facilities; therefore the analysis cohort was a small sample of overall stroke population at the practice site - number of patients readmitted was relatively small, which limited the power - unable to track readmissions to other hospitals - not randomized controlled trial - *posthospital call alone did not influence readmission independent of the clinic visit – however patients who were called had a higher show rate*	

					53 patients in phase 2		
4	Gesell, et al. (2019)	Randomized controlled trial	Sample and sample size: 40 hospitals were randomized for the study – 20 were assigned to the COMPASS care model group (IG) and 20 were assigned to the usual care group (CG) 2751 patients from the hospitals in the IG were enrolled in the TCM – 2079 received the intervention, 603 did not due to protocol criteria (out of window, not scheduled, etc.) Setting: hospitals in North Carolina	- Intervention included implementation of the COMPASS transitional care model: - 2-day follow up phone call from a NP or PA - clinic visit within 7-14 days post-discharge from the hospital - Patients who attended follow-up visits had improved physical function	Process measures data including the percentage of patients who received a 2-day follow up call and/or a clinic visit within 14 days, were collected using chart review - 75.9% received 2-day calls, 77.5% scheduled for clinic visits - 78% of clinic visits occurred within 14 days Primary outcome measure: physical function, which was measured using the Stroke Impact Scale (SIS-16) – score is out of 100, higher	- small sample sizes at the individual hospitals limited the ability to precisely estimate associations between hospital and patient characteristics - did not assess readmissions as an outcome measure - there were differences in the implementation of the TCM at the different sites - greatest challenge was reaching patients due to difficulties maintaining consistent delivery of follow up visits	Level 1 B - Good quality

					scores indicate higher function - mean SIS-16 score among patients with clinic visit = 83.0 - mean SIS-16 among patients without clinic visit = 78.7		
5	Hirschman, et al. (2015)	Literature review	Detailed summary of the evidence base for the TCM and the model's nine core components – screening, staffing, maintaining relationships, engaging patients and caregivers, assessing/managing risks and symptoms, educating/promoting self-management, collaborating, promoting continuity, and fostering coordination Partnership between the University of	Defines and outlines the components of a successful TCM Relevant components include: - care delivered and coordinated by APRNs - maintaining relationships with patients and caregivers through telephone calls - educating patients/caregivers and promoting self-management	Key outcomes that should be measured over time with TCMs include: - patient symptoms - quality of life - functional status - caregiver outcomes - time to first rehospitalization - number of ED visits prevented - *rehospitalizations prevented*	- not published by a professional organization, but by a team of experienced clinicians working with and researching TCMs over many years - doesn't provide levels of evidence - Some of the referenced articles are older (>5 years)	Level V B – Good quality

			Pennsylvania Health System and Aetna – translational research effort to develop and launch the Transitional Care Program service line	- promoting coordination and continuity of care from the inpatient to the outpatient setting Outcomes such as prevented readmissions can be valuable data to demonstrate the TCM's effects and utility in healthcare systems			
6	Kitzman, et al. (2017)	Qualitative non-experimental study	Sample and sample size: 30 participants (acute stroke survivors) who were discharged from the inpatient rehabilitation facility – intervention group (IG) 12 participants in the control group (CG) for hospital readmissions/ED visits (patients who chose not to	- Intervention was a transitions of care program for stroke survivors discharged from the hospital: trained community health workers (CHWs) who had an encounter with each participant a minimum of 1x/week for the first 3 months and	- To compare effectiveness of the TCM, de-identified 30-day readmissions data of 12 patients who chose to not participate in the TCM was collected through chart review (CG) - 30-day readmissions data was collected on participants in the	- The "encounters" as part of the intervention were not always the same (phone call vs. home visit vs. office visit, etc.) - Participants were only chosen from a very small geographic area (7 counties in rural Kentucky)	Level III B – Good quality

			participant in the TCM) Setting: Regional inpatient rehabilitation hospital in southeastern Kentucky	a minimum of 1x/every other week for months 4-6. - The majority of the encounters were telephone calls ("phone visits") due to the rural setting. - Reviewing education and the discharge plan with the patient/caregiver were part of these encounters	TCM (IG) through chart review - 1 readmission occurred in the IG (admission was unrelated to stroke) - 5 readmissions occurred in the CG (42% of the CG)	- Program only had one navigator which limited the sample size/the number of patients who could be enrolled in the program - No assessment of quality of life using standardized scales - The encounters were done by trained community health workers, not RNs or NPs - Not randomized controlled trial	
7	McClain & Chance (2019)	Quasi-experimental, retrospective, descriptive chart review	Sample and sample size: 403 adult patients diagnosed with ischemic or hemorrhagic stroke and discharged home from the hospital - 68/403 (~17%) were seen in the stroke clinic	Intervention: - Patients were seen in the stroke clinic by an APRN within 3 weeks of discharge - Patients also received the previous post-discharge standard of care	- Data regarding 30-day readmission rate for stroke/TIA patients was collected by medical chart review - 30-day readmission rate for clinic patients was 1.5%, vs.	- patients were seen in a stroke clinic with a neurology trained NP in the outpatient setting, difficult to determine if impact would have been the same if seen by only primary care	Level II B – Good quality

			Setting: Acute care hospital in northeast Ohio certified as a primary stroke center by the Joint Commission	which included a post-discharge phone call - Results demonstrated that a follow-up post-discharge call combined with timely outpatient follow up can affect readmission rates - Results suggested that an APRN-led transitional stroke clinic may reduce readmission rates	13.4% for patients not seen in the clinic (statistically significant results)	- study design was single-site and retrospective - sample size was relatively small and only included the first full calendar year after the stroke clinic's implementation - some eligible patients may have not been evaluated in the sample because of erroneous coding of their primary diagnosis - did not distinguish hemorrhagic from ischemic stroke patients - did not track missed clinic appointments and phone follow-ups in the	

						nonreadmitted group - could not capture/evaluate readmissions to different hospital systems - there were not enough available appointments in the stroke clinic to accommodate all stroke/TIA patients in a timely manner due to limited provider availability	
8	Mora, et al. (2017)	Integrative review/literature review	Search strategy: database search found 592 articles eligible for review, 25 were eligible for abstract review, with 17 excluded due to TCM interventions being led by clinicians other than NPs and/or low level of evidence	- 5 of the selected studies reported reductions in hospital readmission rates for adults older than age 60 with multiple comorbidities - Interventions that followed patients for at	Compared studies regarding NP-led TCMs aimed at reducing hospital readmissions among older adults to determine if TCM interventions had an effect on readmissions	- only 2 studies had statistically significant results - not focused specifically on stroke/TIA patients - it wasn't clear if the same specialty APNs were used in each study and across settings	Level V A - High quality

			- 8 articles were deemed eligible for integrative review Inclusion criteria: - written in English with full text - published between 2011 and 2016 - focus on NP-led transitional care interventions targeting older adults	least 2 months after discharge (with NP-led follow-up calls and home visits) were most successful in reducing readmissions - NP-led TCM interventions including follow-up phone calls and connection of care to primary care providers have potential to decrease readmissions		- did not include studies about patients discharged to other settings besides home which limited knowledge about TCMs in these patients - there was variability in study design, setting, sample characteristics, and interventions – made it difficult to determine if the outcomes were directly related to the NP's intervention - some studies included patients with multiple comorbidities, while others just had patients with one diagnosis - Some had RNs performing one or more of the interventions –	

						cannot differentiate if the contact with the RN or the skills/knowledge of the NP that resulted in decreased readmissions - level of evidence was insufficiently high to allow for generalizability	
9	Noel, et al. (2020)	Randomized controlled trial	Sample and sample size: 102 patients (Intervention group: n = 45; Control group: n = 57) Patients had an existing PCP within the health system and were discharged from an admission to the hospital Setting: Stony Brook Medicine, a 603-bed teaching institution in Long Island, NY	Intervention: use of telehealth transitions of care model (remote patient monitoring and weekly virtual video visits with physician) for 30 days after discharge from the hospital - Results demonstrated that telehealth interventions can improve transitions of care	Primary outcomes: hospital readmissions and ED visits within 30 days of the index hospitalization discharge - Data was collected using REDCap through medical records review - No statistically significant difference in 30-day readmissions (point estimate = 2.645, 95% Wald confidence limits:	- Did not demonstrate a statistically significant difference in ED utilization or hospital readmissions, but does demonstrate the need for further research in this area - Trial was underpowered to evaluate readmissions and ED utilization	Level I B – Good quality

				after hospital discharge by improving patient engagement and adherence to medications	0.404 – 17.328, p=0.311)	- Single site study - While telehealth interventions by definition include care by video or telephone, all visits conducted in this study included a video component	
10	Puhr & Thompson (2015)	Systematic review	Sample: 11 articles about the use of transitional care models in stroke patients were evaluated Inclusion criteria: - written in English - focused on adult patients aged 19 years and older with stroke - discharged from the hospital or acute rehab facility to home - published from January 2000 to December 2013	- 7 of the studies were considered successful interventions, in that the TCM(s) used in the studies demonstrated improved health outcomes for stroke patients - In particular, two of the reviewed studies demonstrated a decrease in hospital admission rates with the use of a TCM:	Health outcomes studied in the reviewed articles included: - ED use - hospital readmissions - neuromotor function - independence in activities of daily living - mood and depressive disorders - health risk management (e.g. BP, lipids, falls, or medication adherence)	- only two studies demonstrated a decrease in readmission rates using a TCM, but neither was statistically significant - each study used multiple outcome measures - there was a wide variety of models and interventions, and some studies had more than one intervention, which made it difficult to determine specific	Level II B – Good quality

				- One study used weekly telephone calls with patients by social workers for 3 months after discharge - The other study used telephone calls by nurses for 6 weeks after discharge	- For the studies involving readmission rates, data was collected using self-report survey and through nurse interview and chart review	cause and effects on any one action - this limited the ability of the authors to recommend translating the data into practice - their literature search revealed that there is relatively few published studies on TCMs in stroke, so they did not have a lot of articles to evaluate	
11	Reeves, et al. (2019)	Experimental study: 3-group parallel-design clinical trial	Sample and sample size: 265 total participants – adult acute patients with stroke returning home within 1 month of hospital discharge 3 groups: Usual care (control) group: n = 87 Social work case management (SWCM): n = 88	Interventions: - Patients received either: - the hospitals' standard postdischarge instructions - SWCM – in-home visits and follow-up phone calls - MISTT website – curated patient-oriented information and	90-day unplanned hospital readmissions were collected from patient records and by telephone call. Hospital readmission occurred in 55 (20.8%) of participants (P=0.85).	- used social workers to provide transitional care interventions, not NPs - phone interviewers weren't always blinded as intended to group assignment because patients would self-report	Level I A – High quality

			SWCM+MISTT website: n = 90 Setting: 3 stroke centers in 2 Michigan cities (Lansing and Ann Arbor)	support resource designed to complement the SWCM program Results showed that TCMs involving follow up phone calls and patient education materials can positively impact health outcomes Rates of hospital readmissions did not significantly differ between groups, but patients in the SWCM+MISTT website group did have greater gains in physical health and activation.		their experience with the social work interventions - the 3-arm design precluded the researchers from quantifying any potential interaction effects between the SWCM and MISTT website interventions - did not measure specific transition-related services that each participant received so unable to assess and compare the continuity of services provided to the control and intervention groups	
12	Verhaegh, et al. (2014)	Systematic review with meta-analysis	Review of 26 RCT articles about transitional care interventions and if	Analysis demonstrated that transitional care interventions ere	Short-term (30 days or less) readmission rates	- Only a few studies measured whether readmissions were	Level I B – Good quality

			they can improve short (30 days or less), intermediate (31 to 180 days), and/or long (181-365 days) term readmission rates Inclusion criteria: RCT Related to transitional care Readmission as primary outcome Published between January 1980 and May 2013	effective in reducing all-cause intermediate-term and long-term readmissions. Also demonstrated that high-intensity interventions delivered by a nurse (e.g. self-management education, discharge planning, primary care provider communication, and telephone follow-up) reduced short-term readmissions	Intermediate-term (31-180 days) readmission rates Long-term (181-365 days) readmission rates Transitional care high-intensity interventions (including self-management education, discharge planning, primary care provider communication, and telephone follow-up) were associated with reduced short-term (OR: 0.59; 95% CI: 0.38, 0.92; ARR: 5%), intermediate-term (OR: 0.69; 95% CI: 0.51 0.92; ARR: 7%), and long-term readmissions (OR: 0.57; 95% CI:	preventable or were for the same diagnosis - did not include recurrent readmissions, number of readmission days, or other outcomes - some of the included studies were published >10 years ago - patients had a variety of chronic illnesses such as COPD, CHF, and asthma	

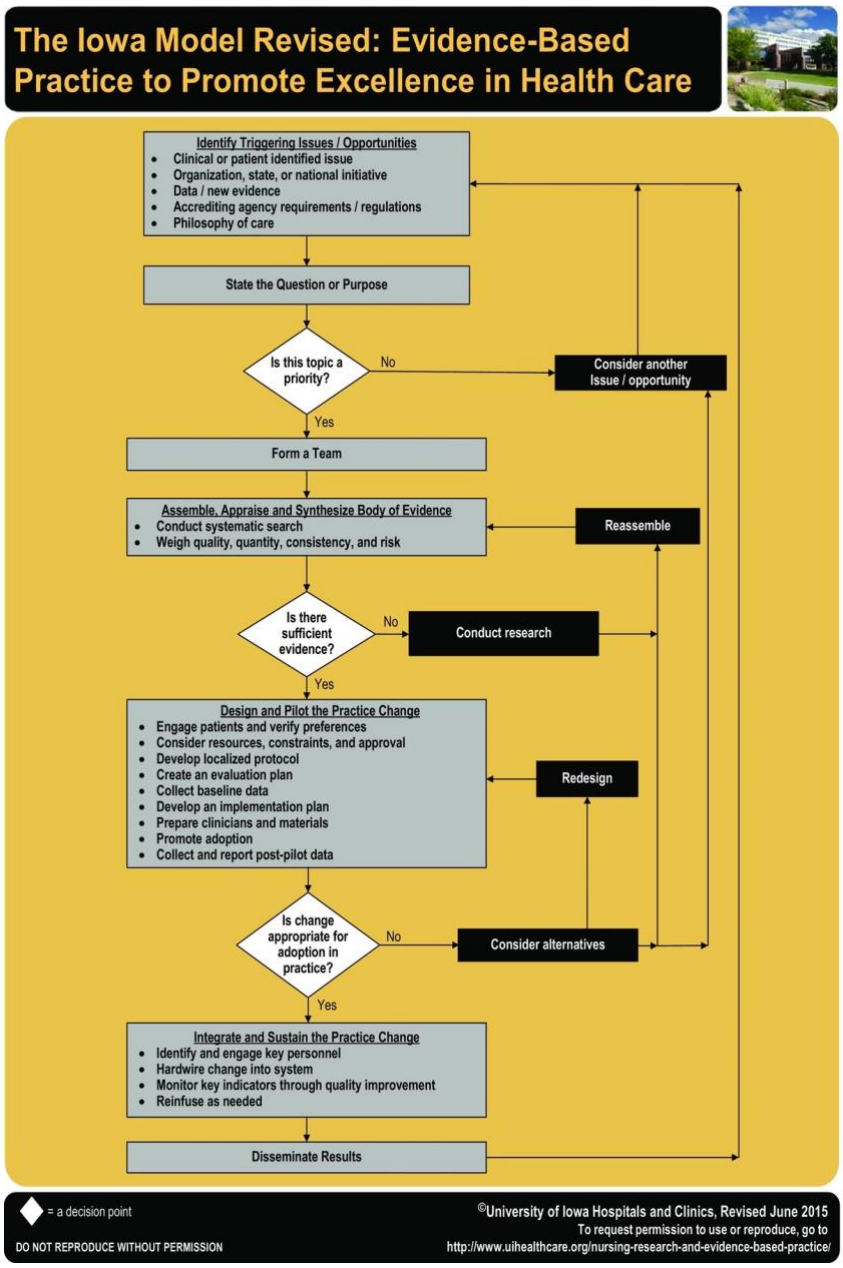
					0.35, 0.92; ARR: 13%)		
13	Wong & Yeung, (2015)	Randomized controlled trial	Sample and sample size: 108 total participants (stroke patients discharged from the hospital) - Intervention group: n = 54 - Control group: n = 54 Setting: Three regional hospitals in the same area of Hong Kong	- Intervention included a nurse-led transition of care program (TCP), which included weekly telephone calls for 1 month post-discharge - The intervention group had a lower observed rate of hospital readmission at 8 weeks (IG = 7.4% vs. CG = 14.8%).	- Outcomes measures were collected by questionnaires and medical records review at 4 weeks post-discharge after the completion of the TCP, and then again at 8 weeks post-discharge	- Conducted in Hong Kong - Need to further assess generalizability - In the data, missing values were replaced by group means - Only examined the outcomes without examining the process so it was not easy to identify with component made the most impact - Involved both ischemic and hemorrhagic stroke patients - Readmission data was not collected at 4 weeks post-discharge	Level I A – High quality

The evidence table is adapted from Dearholt, S. & Dang, D. (2018). *Johns Hopkins Nursing Evidence-Based Practice Model and Guidelines*. Indianapolis, IN: Sigma Theta Tau International, Chapters 5,6,7, Appendices D, E, F, and G.

Appendix D

The Iowa Model: Revised

Figure 2



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Appendix E

Participant Consent Forms

Figure 3

Informed Consent Form

CONSENT TO ACT AS A SUBJECT IN A RESEARCH STUDY

STUDY TITLE: Implementation of a Transitional Care Model to Decrease Readmissions for Stroke and TIA Patients

This is a quality improvement research study. Research studies include only those who choose to take part. Before agreeing to participate in this study, it is important that you read and understand the following explanation of the purpose, procedures, benefits, risks and discomforts, and precautions of the study. It also describes alternative procedures available and your right to withdraw from the study at any time. It is important to understand that we make no guarantee or assurance as to the results. Please take time to make your decision and discuss it with your family and friends.

You are being asked to participate in this trial because you were recently admitted to [redacted] and diagnosed with an ischemic stroke or transient ischemic attack (TIA).

WHO IS CONDUCTING THE STUDY?

Investigator: Sarah Baskind, MSN, FNP-BC, DNP candidate

WHY IS THIS STUDY BEING DONE?

The purpose of this project is to implement an evidence based transitional care model (TCM) for patients diagnosed with stroke or transient ischemic attack (TIA). TCMs are used to improve the coordination of care after discharge from the hospital.

HOW MANY PEOPLE WILL TAKE PART IN THE STUDY?

We are aiming to enroll about 128 total participants for this study.

WHAT IS INVOLVED IN THIS RESEARCH STUDY?

If you choose to take part in this project, you will receive phone calls from Sarah Baskind at about 7 days after discharge and about 30 days after discharge. These calls will include brief surveys and review of your care experience in the hospital. Discussion of your stroke signs and symptoms, risk factors, and persistent symptoms, if present, will also be discussed.

HOW LONG WILL I BE IN THE STUDY?

The study will run for about 3 months (90 days) total. Your direct involvement will be for about 30 days from your date of discharge from the hospital.

WHAT SIDE EFFECTS, RISKS, OR DISCOMFORTS CAN I EXPECT FROM BEING IN THE STUDY?

You may experience psychological stress due to discussion of your recent hospitalization and stroke/TIA diagnosis.

To alleviate this potential stress, phone calls may be conducted with either yourself or a close family member/friend who has detailed knowledge of your current condition and hospitalization to decrease the potential psychological burden.

ARE THERE BENEFITS TO TAKING PART IN THE STUDY?

You may benefit from this study by receiving improved coordination of your medical care and assessment of your level of functioning after discharge from the hospital. You may also have improved management of your personal stroke risk factors, which can decrease your risk for future stroke/TIA events.

WHAT OTHER CHOICES DO I HAVE IF I DO NOT TAKE PART IN THIS STUDY?

You will receive the current standard of care for discharged stroke/TIA patients which includes patient education materials and standard discharge instructions from your attending physician.

WILL MY MEDICAL INFORMATION BE KEPT PRIVATE?

Records of your progress while on this study will be kept in confidential written and electronic form at [redacted] and any designated cooperative group coordinating center. The confidentiality of the central computer is carefully guarded. However, absolute confidentiality cannot be guaranteed and your personal information may be disclosed if required by law. Your records will be disclosed in accordance with the HIPAA authorization attached hereto.

WHAT ARE THE COSTS OF TAKING PART IN THIS STUDY?

There are no costs involved in taking part in this study.

ARE THERE PAYMENTS TO ME OR ANYONE ELSE IF I PARTICIPATE IN THIS STUDY?

There are no payments to you or anyone else if you participate in this study.

WHAT ARE MY RIGHTS IF I TAKE PART IN THIS STUDY?

Taking part in this study is your choice. You may choose either to take part or not to take part in the study. If you decide to take part in this study, you may leave the study at any time. No matter what decision you make, there will be no penalty to you and you will not lose any of your regular benefits. Leaving the study will not affect your medical care. You can still get your medical care from our institution. Your doctor may also withdraw you from this study because further participation would not be in your best interest.

If any significant new information about the study or other therapies develops, the Principal Investigator will inform you and will discuss your options concerning therapy at that time.

WHAT HAPPENS IF I AM INJURED BECAUSE I TOOK PART IN THIS STUDY?

You will receive medical treatment if you are injured as a result of taking part in this study. The study will not pay for medical treatment. However, you will not be denied any medical treatment based on your ability to pay.

In the case of injury resulting from this study, you do not lose any of your legal rights to seek payment by signing this form.

For information regarding research related risks and injury, you may contact the Director of Risk and Insurance Management at [redacted]

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?

You can talk to the Principal Investigator about any questions or concerns you have about this study. Contact Sarah Baskind, MSN, FNP-BC at 518-314-3841.

For questions about your rights while taking part in this study contact the IRB Chairman at (518) 562-7330.
This protocol was approved by the [redacted] Institutional Review Board in a:
_____standard review.
_____expedited review.
_____urgent review.

SIGNATURE

I have read all the above or it has been read to me. I have had the opportunity to ask questions, and have received answers concerning areas I did not understand. I have had the opportunity to take this consent form home for review or discussion with my friends and family.

My signature below means that I have freely agreed to participate in this clinical study.

_____	_____
Date	Participant's Signature
_____	_____
Date	Witness' Signature

I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participation in this research study. I have answered any questions that have been raised.

_____	_____
Date	Investigator's Signature

Figure 4

HIPAA Research Authorization Form

Sarah Baskind, MSN, FNP-BC, Principal Investigator

HIPAA Research Authorization

Confidentiality and Privacy Rights

Federal Privacy Regulations provide safeguards for privacy and security of health information that may identify me. I will be provided with a copy of the Notice of Privacy Practices, which describes the [redacted] privacy practices. In certain circumstances, personal health information about me may be used or disclosed for research purposes. By signing this document I am permitting [redacted] to use personal health information collected about me for research purposes internally within the institution. I am also allowing [redacted] to disclose that personal health information to outside organizations or individuals that participate in this research study. This document will describe what health information will be obtained in the study, who will have access to that information (both inside and outside of the hospital), and my rights with regards to withdrawing my authorization and accessing the research information.

What personal health information is collected in the study?

The following **[check]** personal health information will be collected during my involvement with this study:

[ ] Name
[ ] Address
[ ] Telephone number

Appendix II

[ ] Family medical history
[X] Current and past medications or therapies
[ ] Information from a physical examination that generally also includes blood pressure reading, heart rate, breathing rate and temperature.
[ ] Results of the tests and studies performed such as x-rays, lab work, etc.
[X] Other: Patient satisfaction survey information; current and past signs and symptoms of stroke/TIA; information about hospitalization including medical record number, dates, diagnosis, and treatment plan

The personal health information described above is collected because I am in this study. The principal investigator may use the results of these tests and procedures to treat me and to complete this research project. The test and procedure results will be given to me or sent to my physician to be included in my medical record. In addition, this personal health information will be disclosed to outside organizations as described below. Results of all tests, studies and procedures done solely for this research and not as part of my regular care will be included in my medical record. Other than as described in this document, any information that could identify me will be kept strictly confidential and in accordance with current federal regulations under the auspices of the Health Information Portability and Accountability Act of 1996 (HIPAA).

The research records and health information collected for this study will be maintained indefinitely. [redacted] may not re-use or re-disclose the private health information collected in this study for another purpose other than the research described in this document unless:

(1) I have given written permission for Sarah Baskind, MSN, FNP-BC, Principal Investigator to do so.

OR

(2) The [redacted] Institutional Review Board has granted permission to Sarah Baskind, MSN, FNP-BC, Principal Investigator to do so after ensuring that appropriate privacy safeguards are in place.

Who may use or disclose my private health information?

The following individuals / organizations may use or disclose my private health information for this research project:

- The Principal Investigator and the Investigator's study team (other [redacted] staff associated with the study).
- The [redacted] Institutional Review Board (the committee charged with overseeing research on human subjects).
- The [redacted] business administrators or other authorized members of the hospitals workforce who may need to access my information in the performance of their duties (for example to ensure integrity of the research, risk management, accounting/billing matters).

To whom may my personal health information be disclosed?

As part of the study, Sarah Baskind, Principal Investigator and her study team will not disclose the results of study-related survey data and results that may identify me.

In addition to the list of individuals and organizations to whom my private health information may be disclosed, others may receive the information that are not currently known. For example, in cases where another corporation buys the study sponsor, or if the Principal Investigator of this study moves to another organization those new entities may also receive my information. Although this list is not exhaustive, Sarah Baskind - Principal Investigator or his/her study staff may inform me of any changes to the list above that occur during my active participation in this trial.

Also, the information from this research will be further disclosed by the sponsor of this study. In all disclosures I will not be identified by name, social security number, address, telephone number, or any other direct personal identifier in study records. If disclosed by the sponsor, the information is no longer covered by the federal privacy regulations. The [redacted] cannot guarantee the privacy of this information, or block further use or distribution after the information has left the hospital.

Can I change my mind?

I may choose not to be in the study. My decision not to participate will not involve any penalty or loss of benefits to which I am entitled, and it will not affect my access to health care at [redacted]. If I do decide to withdraw, I may be asked to contact Sarah Baskind, Principal Investigator in writing and let him/her know that I am withdrawing from the study. Her mailing address is shown on the first page of this consent form.

I may revoke my authorization in writing at any time; however, revocation of my authorization will result in being barred from continued participation in the study. All data collected prior to my decision to withdraw my authorization to use the data for research purposes – including my decision to withdraw – may still be used by the Principal Investigator and cannot be revoked. If medically indicated, the Principal Investigator or study staff may ask to follow-up with me for safety reasons. If I have decided to withdraw my authorization to use the data for research purposes this follow-up information cannot be used or disclosed for research unless required by law.

I understand that I will be provided a copy of this authorization and may inspect or copy the health information disclosed, but I may be charged a reasonable fee, not exceeding $0.75 cents per page, for copies.

Signature:

Patient's Signature	Date
Witness Signature	Date

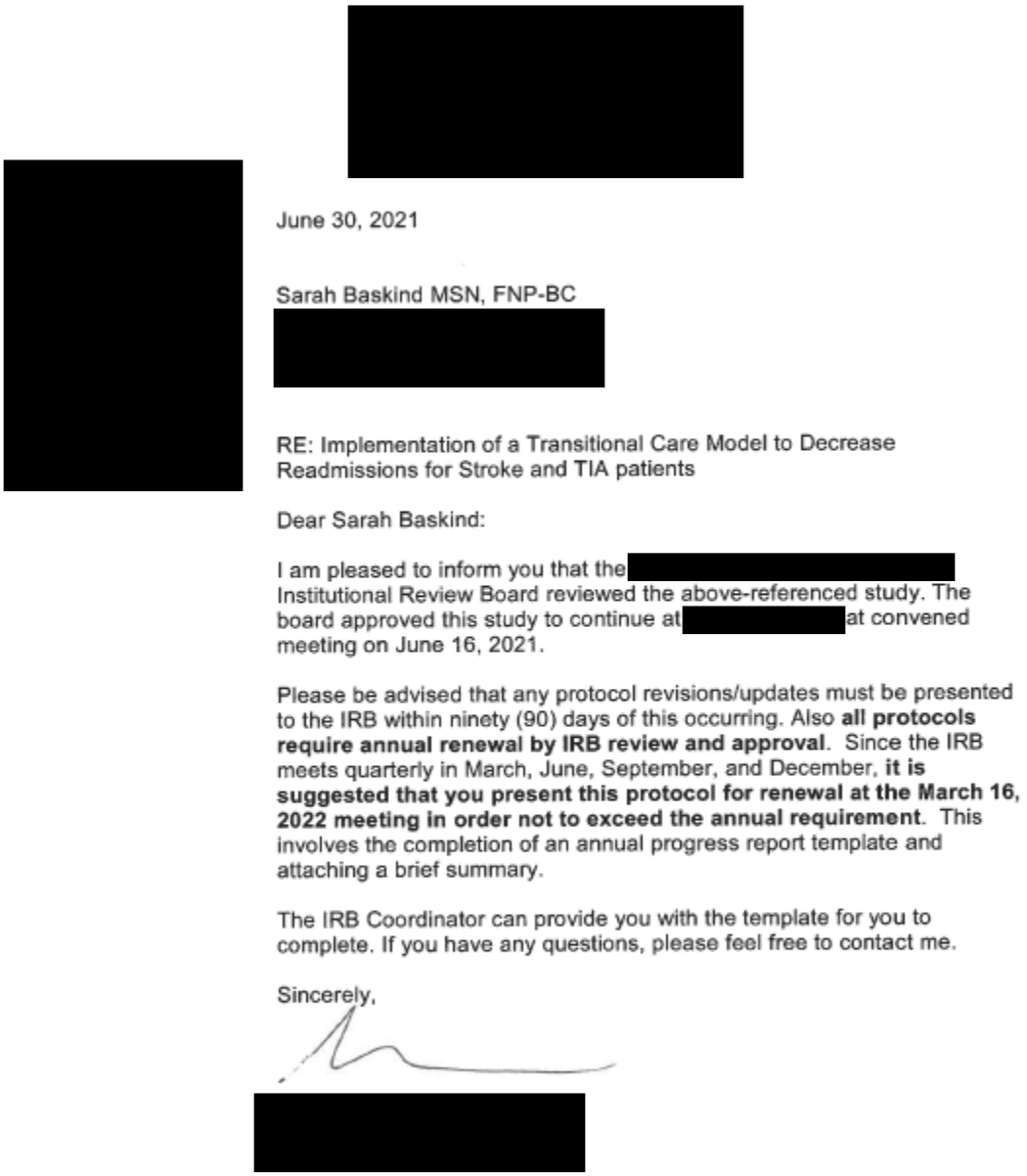
I certify that I have explained to the above individual the nature and purpose, the potential benefits, and possible risks associated with participation in this research study. I have answered any questions that have been raised.

Date	Investigator's Signature

Appendix F

Institutional Review Board Approval

Figure 5



[redacted]

June 30, 2021

Sarah Baskind MSN, FNP-BC
[redacted]

RE: Implementation of a Transitional Care Model to Decrease Readmissions for Stroke and TIA patients

Dear Sarah Baskind:

I am pleased to inform you that the [redacted] Institutional Review Board reviewed the above-referenced study. The board approved this study to continue at [redacted] at convened meeting on June 16, 2021.

Please be advised that any protocol revisions/updates must be presented to the IRB within ninety (90) days of this occurring. Also **all protocols require annual renewal by IRB review and approval**. Since the IRB meets quarterly in March, June, September, and December, **it is suggested that you present this protocol for renewal at the March 16, 2022 meeting in order not to exceed the annual requirement**. This involves the completion of an annual progress report template and attaching a brief summary.

The IRB Coordinator can provide you with the template for you to complete. If you have any questions, please feel free to contact me.

Sincerely,

[redacted]

Appendix G

Patient Education Materials

Figure 5

TIA/Stroke Patient Education Sheet

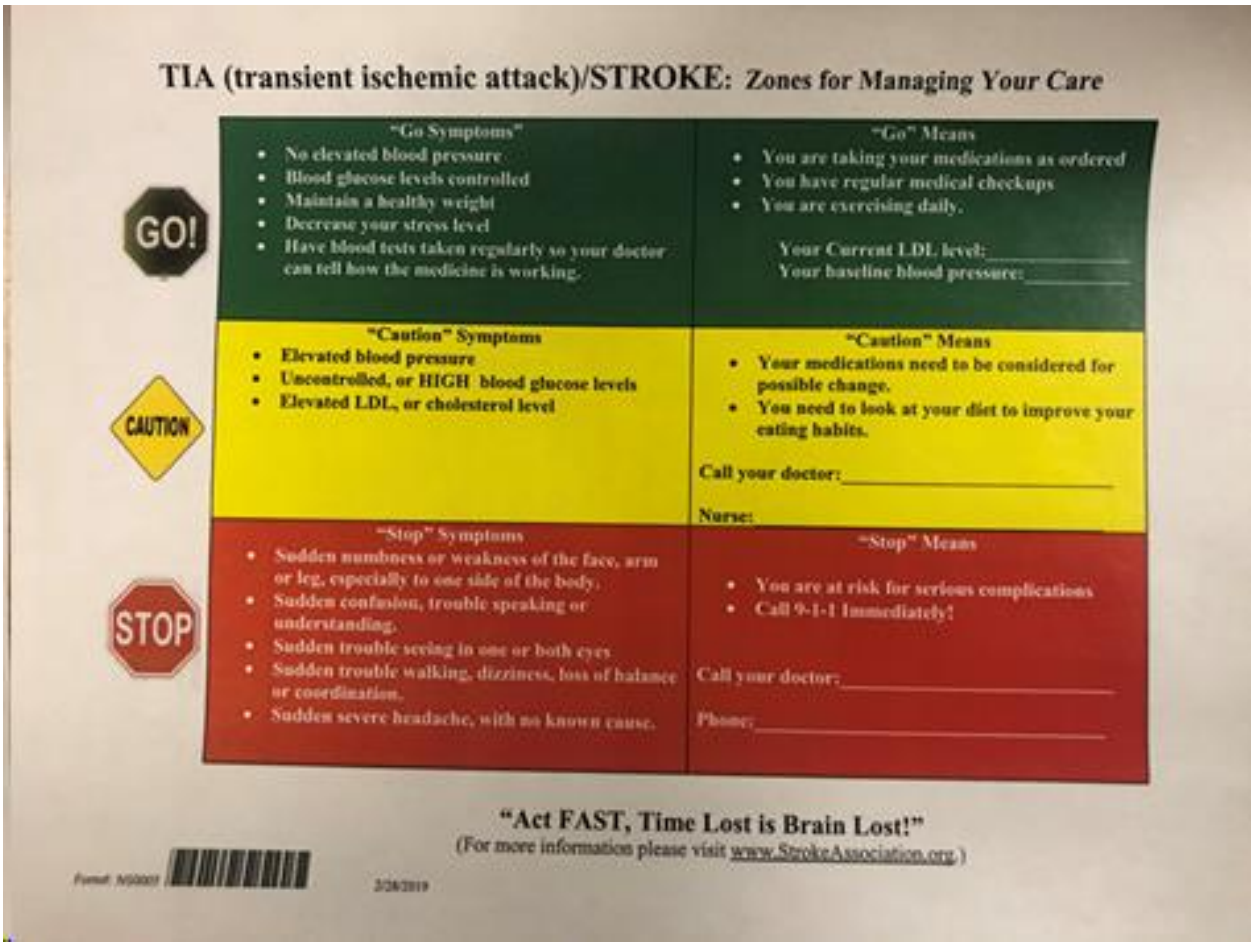
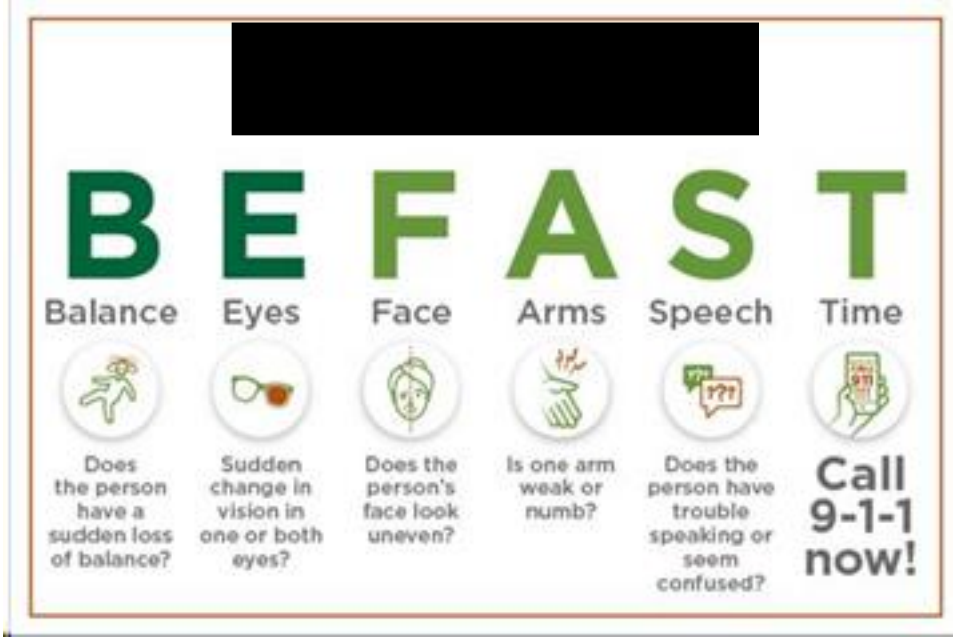


Figure 6

BEFAST Magnet (Patient Education Magnet)



Appendix H

Inpatient Stroke/TIA 7-Day Follow-Up Phone Survey

Patient MRN: _____

Date of Discharge:_____

Primary Service (hospitalist, academic team, etc.): _____

Discharge Floor/Unit: _____

Date Phone Call Completed: _____

Number of attempts to reach the patient (minimum of 3) and dates:

1.

2.

3.

Who is responding to the survey?

- The patient
- Family member
- Friend
- Other _____

Introduction: Hello, I am calling from [the project site hospital]. May I ask you a few questions about your/your family member's recent stay in the hospital for your stroke (or TIA)?

1. During your hospital stay did your physician/provider explain about the causes and nature of your stroke?

- Yes
- No
- Not in a way I could understand
- Don’t remember

Comments: _____

2. Did your physician or other health care worker discuss the long-term effects of your stroke?

- Yes
- No
- Not in a way I could understand
- Don’t remember

Comments: _____

3. During your hospital stay did the providers and nurses answer any questions you had about your stroke?

- Yes
- No
- Not in a way I could understand
- Don’t remember

Comments: _____

4. During your hospital stay were you given a stroke education sheet and BEFAST magnet?

- Yes

- No
- Don’t remember

Comments: _____

5. Did you find the educational materials helpful and easy to understand?

- Yes
- No
- Never received the materials

Comments: _____

6. When you left the hospital, did your provider/nurse explain your risk factors for stroke and how best to reduce your chances of having another stroke?

- Yes
- No
- Not in a way I could understand
- Don’t remember

Comments: _____

7. When you left the hospital, did you receive discharge instructions about what to do at home and how to take care of yourself?

- Yes
- No
- Don’t remember

Comments: _____

8. Are you satisfied with the type and amount of treatment the therapist(s) (Speech, Physical, Occupational) gave you while in the hospital?

- Yes
- No
- Don’t remember

Comments: _____

9. Was follow up care with your primary care provider arranged for you at discharge?

- Yes
- No

If No, Were you given instructions on when and how to access follow up care?

- Yes
- No

Comments: _____

10. Was follow up care with outpatient neurology arranged for you at discharge?

- Yes
- No

If No, Were you given instructions on when and how to access follow up care?

- Yes
- No

Comments: _____

11. Overall, were you happy with the stroke care you received from your medical team at the hospital?

- Yes
- No
- Don’t remember

Comments: _____

Modified Rankin Scale (mRS) Score at time of discharge: _____ (collected from the electronic medical record)

Appendix I

Inpatient Stroke/TIA 30 Day Follow-Up Phone Survey

Figure 7

Get With the Guidelines® Post-Discharge Follow-up Form and Patient Satisfaction Survey

GWTG® Post-Discharge Follow-up Form

Active Form Group(s): Limited **Updated January 2019**

Bold font = Required field

POST DISCHARGE MORTALITY & READMISSION TAB

Patient ID: _____

Date of Hospital Admission: ____/___/ _____ mm / dd / yyyy

Date of Hospital Discharge: ____/___/ _____ mm /dd / yyyy

Date Follow-up Completed: ____/___/ _____ mm / dd / yyyy

PATIENT LOGISTICS

Method used for Patient follow-up:
- ☐ Chart Review
- ☐ Health Facility
- ☐ Patient's current residence
- ☐ Phone Call
- ☐ Unable to reach
- ☐ Other, *please specify* _____

Source of Information (*select all that apply*):
- ☐ Caregiver
- ☐ EMS
- ☐ Family
- ☐ Home Health Aid
- ☐ Patient
- ☐ Chart Review
- ☐ Other, *please specify*_____

Patient location:
- ☐ Acute care facility/ Hospital
- ☐ Chronic Health Care Facility
- ☐ Home
- ☐ Rehabilitation Facility
- ☐ Skilled Nursing Facility
- ☐ Unknown/ND

PATIENT STATUS

Is patient deceased?
- ☐ Yes
- ☐ No

Date of death: ____/___/ _____ MM/ DD/ YYYY

☐ Unknown

Cause of Death:
- ☐ Cerebrovascular (Stroke [ischemic/ hemorrhagic])
- ☐ Cardiovascular
- ☐ Non-Vascular
- ☐ Unknown/ND

Post Discharge Modified Rankin Scale:
- ☐ Yes
- ☐ No/ND

Date Post Discharge Modified Rankin Scale Performed: ___/___/_____ mm/dd/yyyy ☐ Unknown

Modified Rankin Scale – Total Score:
- ☐ **0** – No symptoms at all
- ☐ 1 – No significant disability; despite symptoms; able to carry out all usual duties and activities
- ☐ 2 – Slight disability; unable to perform all previous activities, but able to look after own affairs without assistance
- ☐ 3 – Moderate disability; requiring some help, but able to walk without assistance
- ☐ 4 – Moderately severe disability; unable to walk without assistance and unable to attend to own bodily needs without assistance
- ☐ 5 – Severe disability; bedridden, incontinent, and requiring constant nursing care and attention
- ☐ 6 – Dead
- ☐ **Unknown/ ND**

READMISSIONS

Has patient been readmitted to a hospital since discharge?
Select Period:
- ☐ **Yes, Within 30 days post discharge**
- ☐ Yes, Within 60 days post discharge
- ☐ Yes, Within 90 days post discharge
- ☐ No readmissions =
- ☐ Unknown/ ND

Total number of readmissions since discharge:
- ☐ 1
- ☐ 2
- ☐ 3 or more
- ☐ Unknown/ND

Date of Readmission: ___/___/_____ mm/dd/yyyy

☐ Unknown

END OF FORM

Patient Satisfaction Survey

1. Now that you have completed the transitional care model (TCM – patient education materials, 7-day phone call, 30-day phone call, and care coordination), you clearly understand the purpose for taking each of the medications that were prescribed to you at discharge.

1 – strongly disagree

2 – disagree

3 – agree

4 – strongly agree

2. Now that you have completed the TCM, you have a good understanding of the things you are responsible for in managing your health.

1 – strongly disagree

2 – disagree

3 – agree

4 – strongly agree

3. Was a primary care provider appointment scheduled for you prior to discharge, or were you able to schedule a primary care provider appointment after discharge in a timely manner?

1 – No

2 – Yes

4. The 7-day and 30-day follow-up calls were helpful for understanding your health needs, your medications, and your illness (ischemic stroke or TIA).

1 – strongly disagree

2 – disagree

3 – agree

4 – strongly agree

5. Overall, you were satisfied with the stroke/TIA care and education you received throughout your contact with the TCM team (during admission and phone calls).

1 – strongly disagree

2 – disagree

3 – agree

4 – strongly agree

6. If an outpatient stroke/TIA follow-up clinic were available, how likely would you be to attend an appointment at this clinic with a stroke NP or neurologist, in addition to a follow-up appointment with your PCP, if an appointment was scheduled for you at discharge?

1 – would not attend

2 – not likely to attend

3 – would likely attend

4 – would very likely attend

7. Any other comments or suggestions about the TCM overall and/or its components?

Free text/comments

Figure 8

Modified Rankin Scale

The Modified Rankin Scale and Corresponding Sections of the Structured Interview

Modified Rankin Scale[3]	Structured Interview for the Modified Rankin Scale
5=Severe disability: bedridden, incontinent, and requiring constant nursing care and attention.	5=Severe disability; someone needs to be available at all times; care may be provided by either a trained or an untrained caregiver. Question: Does the person require constant care?
4=Moderately severe disability: unable to walk without assistance, and unable to attend to own bodily needs without assistance.	4=Moderately severe disability; need for assistance with some basic ADL, but not requiring constant care. Question: Is assistance essential for eating, using the toilet, daily hygiene, or walking?
3=Moderate disability; requiring some help, but able to walk without assistance.	3=Moderate disability; need for assistance with some instrumental ADL but not basic ADL. Question: Is assistance essential for preparing a simple meal, doing household chores, looking after money, shopping, or traveling locally?
2=Slight disability; unable to carry out all previous activities but able to look after own affairs without assistance.	2=Slight disability; limitations in participation in usual social roles, but independent for ADL. Questions: Has there been a change in the person's ability to work or look after others if these were roles before stroke? Has there been a change in the person's ability to participate in previous social and leisure activities? Has the person had problems with relationships or become isolated?
1=No significant disability despite symptoms; able to carry out all usual duties and activities.	1=No significant disability; symptoms present but not other limitations. Question: Does the person have difficulty reading or writing, difficulty speaking or finding the right word, problems with balance or coordination, visual problems, numbness (face, arms, legs, hands, feet), loss of movement (face, arms, legs, hands, feet), difficulty with swallowing, or other symptom resulting from stroke?
0=No symptoms at all.	0=No symptoms at all; no limitations and no symptoms.

(Wilson, et al., 2002)

Appendix J

Gantt Chart

Figure 9

Gantt Chart of Project Timeline

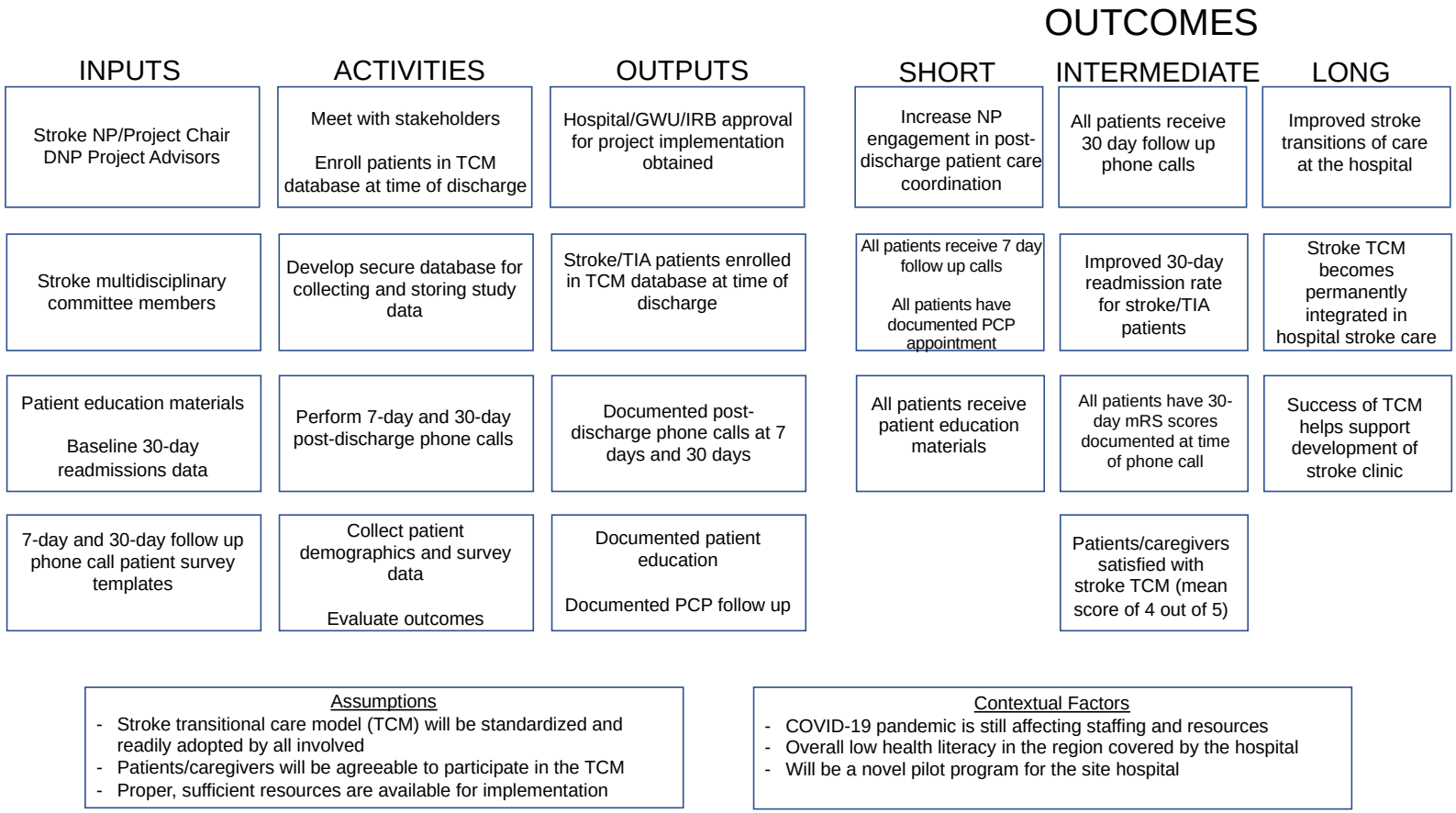
	Tasks	Timeline											
		2021								2022			
		May	June	July	August	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	March	April
Phase 1: Planning	Design TCM & Meet with Project Team												
	DNP Project Proposal approval (by faculty & advisors)												
	IRB approval												
Phase 2: Pre-Intervention	Pre-intervention data collected from EMR												
Phase 3: Implementation	TCM intervention implemented												
Phase 4: Post-Intervention	Post-intervention data collected												
	Data analysis												
	Evaluation of DNP Project outcomes												
	Dissemination of project results to DNP team and hospital stakeholders												
	Further Dissemination of results via poster presentation; Plans for sustainability												

Appendix K

Logic Model

Figure 10

Logic Model for Stroke TCM



The logic model is adapted from the template outlined in the CDC Division for Heart Disease and Stroke Prevention Program's *Evaluation Guide: Developing and Using a Logic Model* (n.d.) (p. 13)

Appendix L

Participant Demographics Tables

Table 4
Characteristics of Preintervention Group (n = 24)

Characteristics	N	Percent	Mean	SD	Minimum	Maximum
Age in years, mean (SD)			69.9	12.9	49	92
Sex, n (%)						
Male	11	45.8				
Female	13	54.2				
Marital Status, n (%)						
Single	5	20.8				
Married	15	62.5				
Widowed	3	12.5				
Divorced	1	4.2				
Race/Ethnicity, n (%)						
White/Caucasian	24	100				
Hispanic/Latino	0	0				
Black/African-American	0	0				
Asian	0	0				
Other race/ethnicity	0	0				
History of Previous Stroke and/or TIA, n (%)						
Yes	4	16.7				
No	20	83.3				
NIH Stroke Scale score on admission, mean (SD)			2	2.6	0	10
Diagnosis at Discharge, n (%)						
Ischemic Stroke	13	54.2				
TIA	9	37.5				
Hemorrhagic Stroke	2	8.3				
Reason for Readmission, n (%)						
Stroke or TIA	4*	16.7				
Other diagnosis	20	83.3				

*One patient was readmitted 2 times within 30 days for stroke/TIA

Table 5
Characteristics of Intervention Group Participants (n = 9)

Characteristics	N	Percent	Mean	SD	Minimum	Maximum
Age in years, mean (SD)			61.7	11.6	39	78
Sex, n (%)						
Male	4	44.4				
Female	5	55.6				
Marital Status, n (%)						
Single	0	0				
Married	6	66.7				
Widowed	1	11.1				
Divorced	2	22.2				
Race/Ethnicity, n (%)						
White/Caucasian	9	100				
Hispanic/Latino	0	0				
Black/African-American	0	0				
Asian	0	0				
Other race/ethnicity	0	0				
History of Previous Stroke/TIA, n (%)						
Yes	1	11.1				
No	8	88.9				
NIH Stroke Scale score on admission, mean (SD)			2.1	2	0	5
Diagnosis at Discharge, n (%)						
Ischemic Stroke	7	77.8				
TIA	2	22.2				
Hemorrhagic Stroke	0	0				
30-day Readmissions (within this group), n (%)	1	11.1				
Survey Completion, n (%)						
Both 7-day and 30-day surveys	5	55.5				
7-day survey only	4	44.4				
30-day survey only	0	0				

Appendix M

Data Analysis Tables and Figures

Table 6

Monthly 30-day readmission rates pre- and post-intervention

	Pre-Intervention						Post-Intervention						Independent t-test		
	June 2020	July 2020	August 2020	**Totals (*n*)**	**Mean**	**SD**	Sept. 2021	Oct. 2021	Nov. 2021	**Totals (*n*)**	**Mean**	**SD**	**df**	***t***	***p***
All discharged stroke/TIA patients															
Number of Readmissions	4	9	11	**24**	8	3.6	3	3	2	**8**	2.7	0.6			
Number of Cases	20	23	24	**67**	22	2.1	22	24	25	**71**	23.7	1.5			
Readmission Rate	20.0%	39.1%	45.8%		**35.0%**	**13.39**	13.6%	12.5%	8.0%		**11.4%**	**2.97**	4	2.98	.02
Intervention Group															
Number of Readmissions							0	0	1	**1**	0.3	0.6			
Number of Participants							3	4	2	**9**	6.3	3.1			
Readmission Rate							0%	0%	11.1%		**3.7%**	**6.4**	4	3.65	.01

p < .05

Figure 11

Preintervention group readmission rates

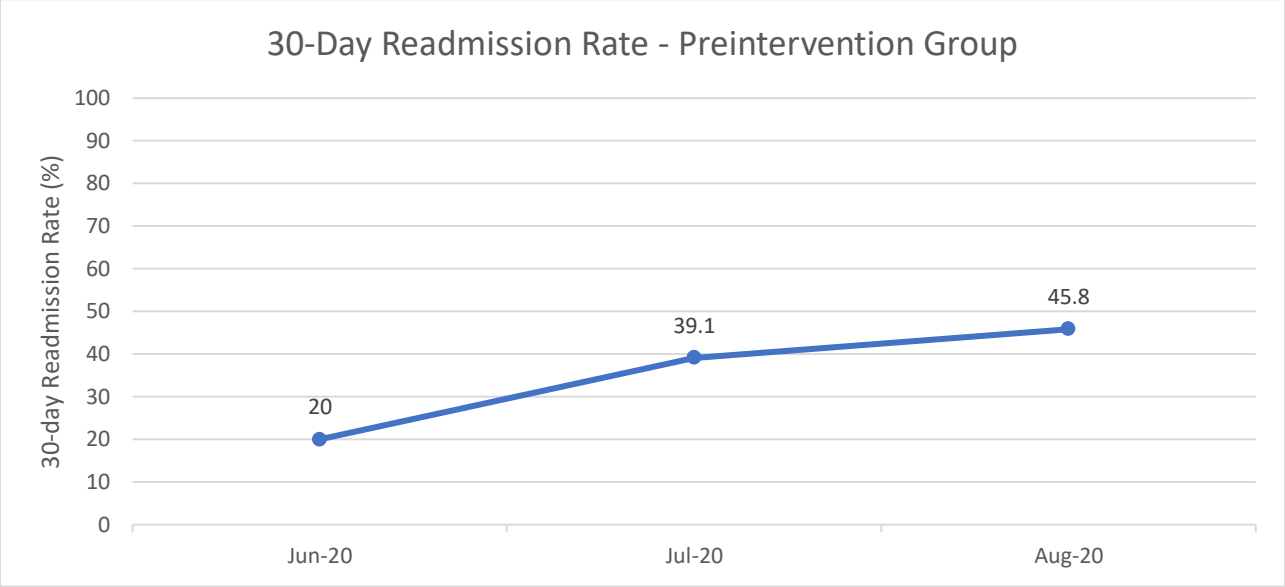


Figure 12

Post-intervention group readmission rates

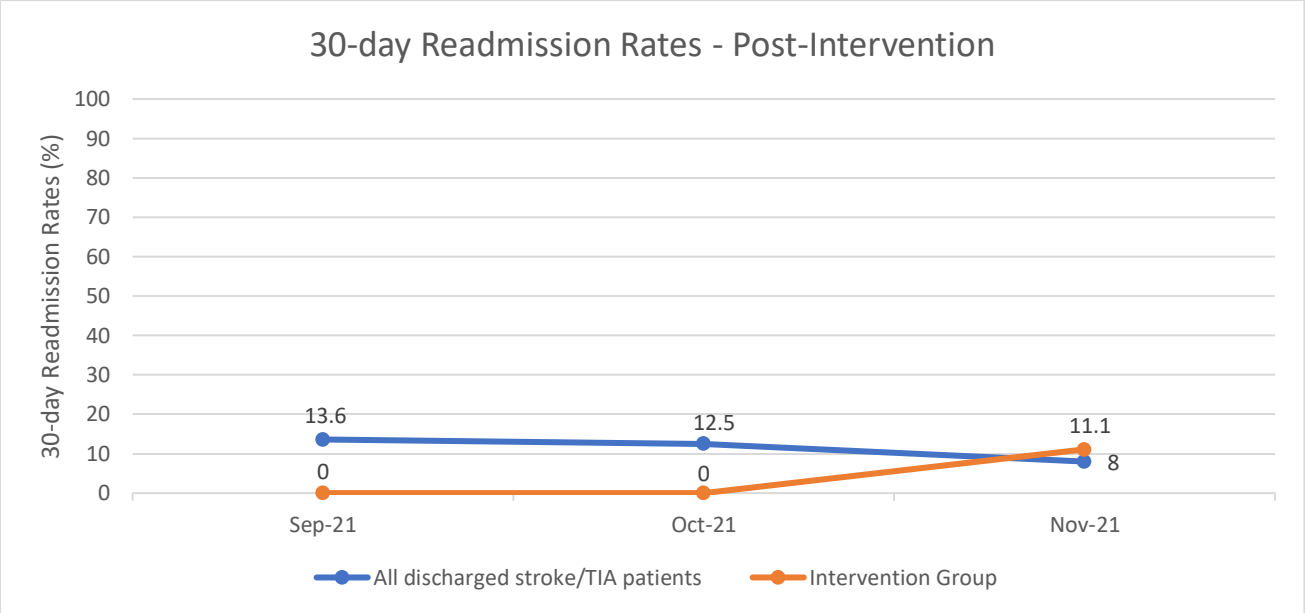


Figure 13

Percentage of eligible patients identified and added to project database

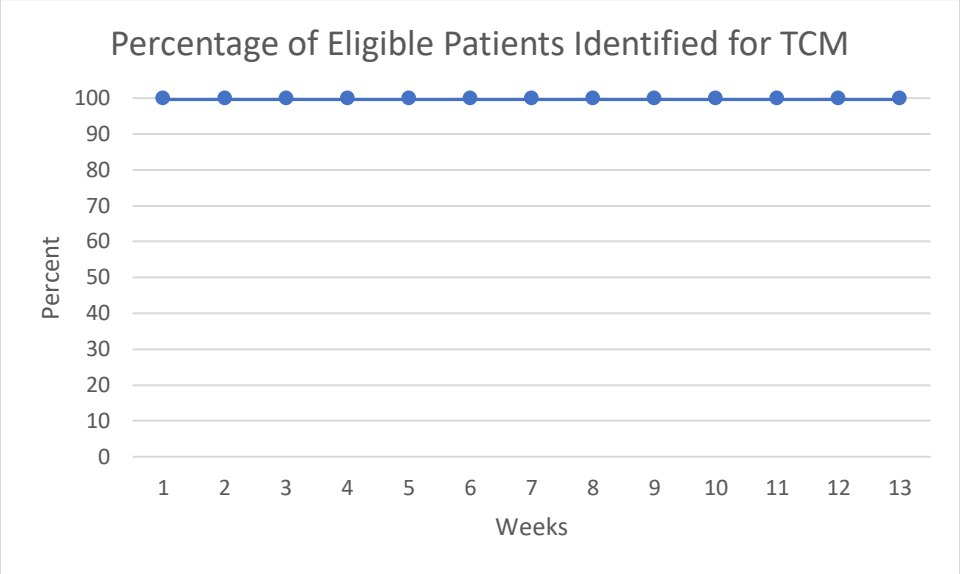


Figure 14

Percentage of patients able to be reached by phone and enrolled in the project

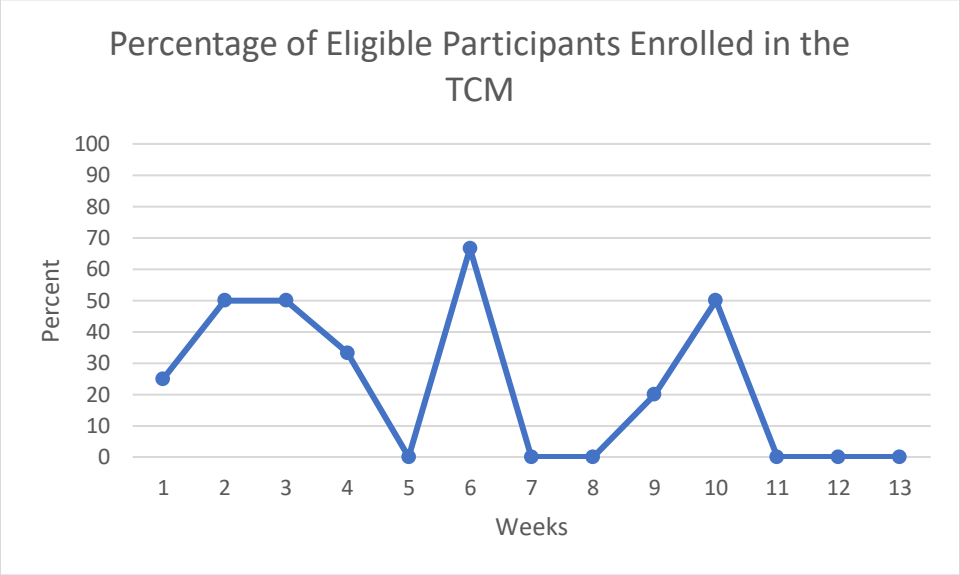
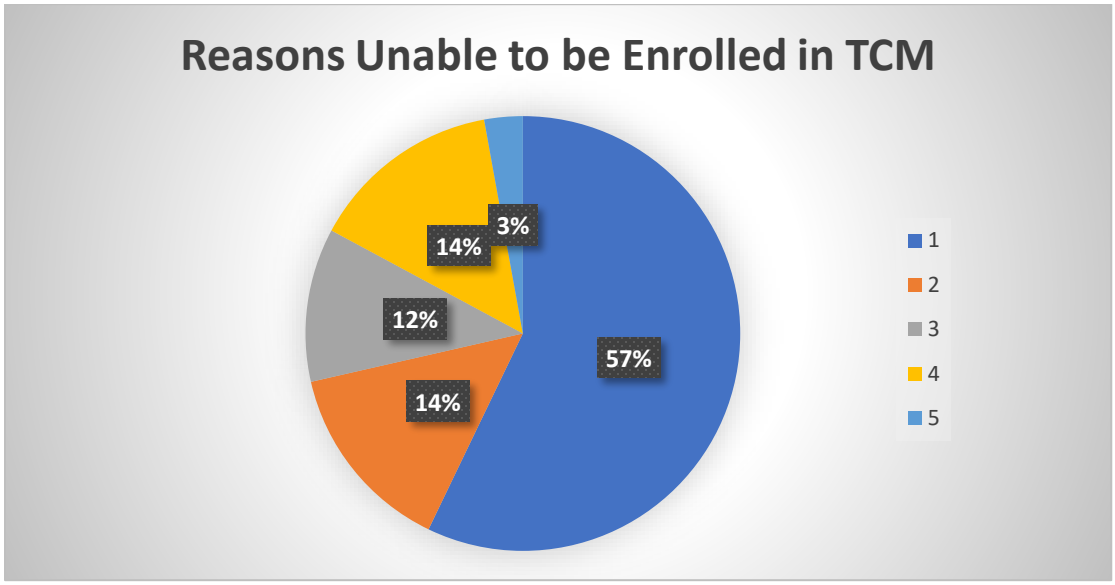


Figure 15

Reasons eligible patients were unable to be enrolled in the TCM



Legend:

1 = Unable to be contacted x3

2 = No working phone number

3 = Follow up date beyond dates of project

4 = Planned admission to hospital

5 = Unable to consent to project

Figure 16

Percentages of participants who received the components of the TCM

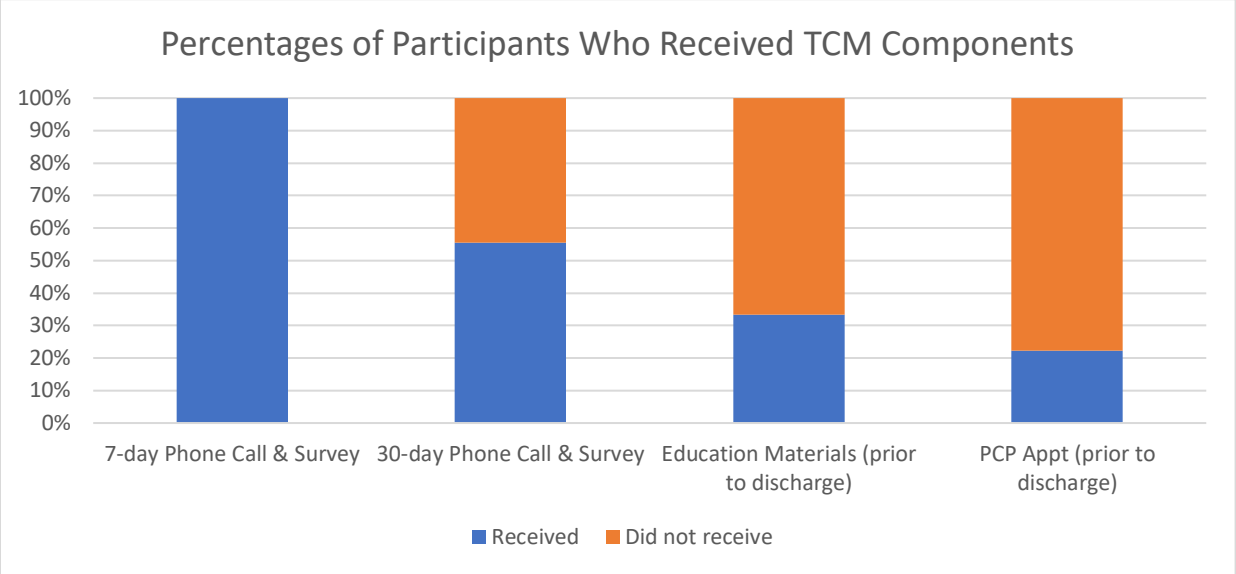


Table 7

Participant satisfaction data from 30-day survey (n = 5)

Questions	N	Percent	Mean	SD
Q1: Now that you have completed the TCM, you clearly understand the purpose for taking each of the medications prescribed to you at discharge:				
1- Strongly Disagree	0	0%	3	0
2- Disagree	0	0%		
3- Agree	5	100%		
4- Strongly Agree	0	0%		
Q2: Now that you have completed the TCM, you have good understanding of the things you are responsible for in managing your health:				
1- Strongly Disagree	0	0%	3	0
2- Disagree	0	0%		
3- Agree	5	100%		
4- Strongly Agree	0	0%		
Q3: Was a primary care provider (PCP) appointment scheduled for you prior to discharge, or were you able to schedule a PCP appointment after discharge in a timely manner? :				
1- No	2	40%	1.6	0.55
2- Yes	3	60%		
Q4: The 7-day and 30-day follow-up calls were helpful for understanding your health needs, your medications, and your illness (ischemic stroke or TIA):				
1- Strongly Disagree	0	0%	3.2	0.45
2- Disagree	0	0%		
3- Agree	4	80%		
4- Strongly Agree	1	20%		
Q5: Overall, you were satisfied with the stroke/TIA care and education you received throughout your contact with the TCM team.				
1- Strongly Disagree	0	0%	3.4	0.55
2- Disagree	0	0%		
3- Agree	3	60%		
4- Strongly agree	2	40%		
Q6: If an outpatient stroke/TIA follow-up clinic were available, how likely would you be to attend an appointment at this clinic with a stroke NP or neurologist, in addition to a follow-up appointment with your PCP, if an appointment was scheduled for you at discharge?:				
1- Would not attend	0	0%		

2- Not likely to attend	0	0%	3.6	0.55
3- Would likely attend	2	40%		
4- Would very likely attend	3	60%		

Q7: Free text/comments: Any other comments or suggestions about the TCM overall and/or its components?

"A stroke follow-up clinic would be wonderful, outpatient neurology has a really long waitlist for appointments."

"I had to set myself up for a neurology appointment [out of town] in order to get in with a neurologist; better outpatient follow-up would be good."

"I felt that I was pushed out of the hospital while I still had symptoms because they needed the bed."

"I was referred for home PT, OT, and speech therapy, and I had some difficulty scheduling these appointments."

"I would like to be seen by a neurologist soon, I cannot work until I am cleared by a neurologist and the next appointment isn't until January 2022."

"I had to arrange my own PCP follow up appointment."

Table 8

mRS scores at 7-days and 30-days post-discharge (n = 5)

mRS score	At time of discharge	At 30-days post-discharge	Paired t-test				
			Mean	SD	df	t	p
5 = Severe disability	0	0	0.8	0.45	4	*	*
4 = Moderately severe disability	0	0					
3 = Moderate disability	0	0					
2 = Slight disability	0	0					

1 = No significant disability despite symptoms	4 (80%)	4 (80%)					
0 = No symptoms at all	1 (20%)	1 (20%)					

*The t-statistic and p-value were unable to be calculated because the scores did not change.