IMPROVING TRANSITION OF CARE FOR STROKE SURVIVORS WITH

HOSPITAL AND POST-ACUTE EDUCATION

by

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As members of the DNP Project Committee, we certify that we have read the DNP project
prepared by Nina Raeleen Herrera Bajaj, titled Improving Transition of Care for Stroke
Survivors with Hospital and Post-Acute Education and recommend that it be accepted as
fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission
of the final copies of the DNP project to the Graduate College.

I hereby certify that I have read this DNP project prepared under my direction and recommend
that it be accepted as fulfilling the DNP project requirement.

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ACKNOWLEDGMENTS

DEDICATION

I would like to dedicate this project to all stroke/TIA survivors. Living with stroke can be difficult and challenging but I hope that through this project, you can all learn something about your stroke.

Lastly, I would like to dedicate my project to my family, especially to my parents, Ramon Herrera and Evelyn Herrera. They believed in me and never doubted me. They supported me from the very beginning of my journey towards my doctorate degree and fulfill my goal of becoming a nurse practitioner. All my hard work paid off because of them. It is now my turn to return the favor to them. This project is for you all.

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ABSTRACT

Background: Transitioning from the hospital to home is linked with emotional, social, and health-related problems (Reeves et al., 2017). These transitions are ultimately and importantly linked to the safety of post-acute stroke survivors A basic strategy in improving challenges related to transitional care is providing better stroke education to patients and caregivers (Sanders et al., 2014; Reeves et al., 2017).

Purpose: The purpose of this project is to evaluate stroke knowledge retention among Transient Ischemic Attack (TIA), stroke survivors or caregivers when they return home (14-30 days after discharge). Specifically, this project analyzed selected demographics (age, gender, type of stroke, discharge location) and assessed 1) stroke knowledge (stroke type and risk factors) and 2) the impact of the stroke education book (did they remember receiving the book and if so did they refer to it and was it helpful) that was provided to the patient and caregivers by the Comprehensive Stroke Center.

Design and Methods: A quality improvement project which performed a secondary analysis of data that has been previously collected by a Comprehensive Stroke Center Transition of Care program +/- 30 days post hospital discharge. Data that has been collected included patient demographics, stroke knowledge and usefulness of a newly developed stroke education book.

Results: Reponses of patients and caregivers (N=105) were included. The sample included mostly ischemic stroke and TIA patients. Less than half of the participants said they received stroke education or the newly developed stroke education book even though, according to the stroke coordinator, there is nearly 100% compliance in providing stroke education book documented in patients' charts. Further, more than half of the participants who said they received

a stroke education book did not refer to the book for any reason. Some of the participants who read the book reported not understanding it.

Conclusion: There is lack of knowledge regarding stroke diagnosis and risk factors despite having educational material provided to patients/caregivers. A stroke education book is likely necessary but is not sufficient. There is a need for developing active, individualized in-hospital education as well as a need for early discharge follow up to reinforce education in order to ensure safe transitions when patients return home after experiencing stroke.

INTRODUCTION

Stroke is classified as ischemic, hemorrhagic, and transient ischemic attack (TIA). Ischemic stroke is due to a clot, either thrombus or emboli, that disrupts blood circulation in the brain. Hemorrhagic stroke, on the other hand, is caused by a ruptured blood vessel leading to brain bleed (American Stroke Association, n.d.). TIA, also known as a mini stroke, is a result of temporary blockage from a blood clot that dissolves on its own or gets dislodged (American Stroke Association, n.d.). In about 15% of patients, TIA happens prior to the occurrence of stroke (American Stroke Association, 2018). The American Stroke Association (2018) reports TIA occur in roughly 240,000 Americans every year. Each year, approximately 610,000 people suffer from new stroke and 185,000 people experience recurrent stroke (Benjamin et al., 2019). Stroke accounts for almost 142,000 deaths per year (Benjamin et al., 2019). It is the fifth leading cause of death in the United States and is a leading cause of long-term disability (American Heart Association, 2019).

Background and Significance of the Problem

Transitioning from the hospital to home is linked with emotional, social, and health-related problems (Reeves et al., 2017). These transitions are ultimately and importantly linked to the safety of post-acute stroke survivors and encompasses clinical issues such as falls, medication errors, infection, inability to understand and perform self-care, adverse events related to non-compliance to prescribed medication regimen, or lack of resources. (Reeves at al. (2017) added that providing stroke education is one of the strategies to address challenges of transitional care including patient safety. However, it was recognized that providing stroke education to stroke patients and caregivers during their hospital stay is not the most effective time to learn as

these problems among this population are exacerbated by the sudden changes from stroke, short inpatient hospital stay and transitioning to multiple health care settings such as rehabilitation facility, skilled nursing facility and home health care (Reeves et al., 2017).

As a result, the educational needs of stroke patients and caregivers become unmet (Reeves et al., 2017). Caring for stroke survivors also causes burden and increased levels of stress on the caregivers related to the difficulties in providing care, as they can have limited knowledge about post-acute stroke care (Reeves et al., 2017). In a study by Lutz et al. (2017), the authors describe how stroke caregivers felt about taking care of their family members after a stroke. Most of these caregivers verbalized feelings of unpreparedness and lack of knowledge and training on how to provide appropriate care at home after hospital discharge. In addition, there is a lack of knowledge and understanding about stroke among patients and their caregivers that may result in an inability to identify warning signs of stroke or delayed response of stroke were to re-occur and could lead to the recurrence of stroke (Saengsuwan, Suangpho, & Tiamkao, 2017).

Lack of knowledge may also influence the patient's recovery process. According to Sanders et al. (2014), inadequate health literacy may influence risk of stroke due to their failure to understand their medical condition. In addition, inadequate health literacy may decrease utilization of preventive services, delay diagnosis, result in an inability to understand medical instructions, decrease compliance with treatment, and decrease self-management skills (Sanders et al., 2014). However, the focus of this project is not on health literacy, but rather, on the amount of knowledge retained from the in-hospital stroke education and when the patients are home and are living with stroke. Although health literacy is not at the center of attention of this

project, it may influence knowledge retention at discharge (Naylor & Keating, 2008). Adverse

events among post-acute stroke survivors after hospital discharge can be prevented by managing

the modifiable risk factors of stroke such as diabetes, hypertension, hyperlipidemia, smoking,

and physical inactivity. Management of these modifiable risk factors could lead to the

development of effective prevention strategies (Johnson, Onuma, Owolabi, & Sachdev, 2016).

The basic strategy in preventing stroke, increasing treatment compliance, and in improving

challenges related to transitional care is providing better education (Sanders et al., 2014; Reeves

et al., 2017). However, more studies are needed to examine the overall effectiveness of these

education interventions.

Local Problem

Tucson Medical Center (TMC) is a not-for-profit hospital in Tucson, Arizona and at the

time of this project, is the only Comprehensive Stroke Center in Tucson and Southern Arizona.

From 2017 to 2018, the Comprehensive Stroke Center cared for 369 patients with TIA (17%),

ischemic stroke (75%) or hemorrhagic stroke (8%). Of those patients, 64% were discharged to

home, 27% were discharged to an acute rehabilitation facility and the others to a chronic

rehabilitation facility or hospice. Achieving and maintaining Comprehensive Stroke Center

status requires that stroke education be provided to patients and caregivers during their hospital

stay. Prior to June 2018, the Tucson Comprehensive Stroke Center's stroke education consisted

of nurses and physicians informally explaining stroke diagnosis and stroke risk with patients

during their hospital stay and, at discharge, providing an electronic medical record generated

printed copy (the After Visit Summary or AVS) about stroke. The AVS describes TIA definition

and causes, definitions of and risk factors for stroke diagnosis, signs and symptoms of TIA and

stroke, actions to take in case of symptoms and an explanation of alteplase and mechanical thrombectomy. As part of the stroke center certification, stroke education for families and caregivers is required (personal communication, Renee McAloney, Coordinator, TM C Comprehensive Stroke Center).

In 2017, the Comprehensive Stroke Center developed a novel Stroke Transition of Care Program to extend their care to stroke families when they returned home. The program is still active. As part of this program, a community stroke nurse makes telephone calls to all patients discharged with TIA or stroke within days after hospital discharge, a time in which the patient has likely returned home and is learning to live with their stroke. The community stroke nurse collects information on readmissions, medications, functional status, depression, and quality of life. Information on patient or caregiver knowledge of stroke diagnosis and stroke risk is also collected. Summary data about patient or caregiver knowledge was obtained after one year. Summary data showed that 5% of TIA and 14% of stroke patients did not know their diagnosis. Further, the data showed that 18% of TIA patients and one-third of all stroke patients (30%) did not know their stroke risk factors. Given the formal and informal education provided to the patients in the hospital, these findings were surprising to the stroke program leadership and as a result, the stroke program developed a new education initiative. The initiative involved developing and publishing a 50-page stroke education book. The book is 8-1/2 in x 11 in, spiral bound and plastic covered and printed in vibrant colors and type. The book contains complete information on stroke types, risk factors, symptoms, consequences of stroke and medications important for stroke and cardiovascular health as well. It also contains several pages of local community resources for stroke. The stroke education book is given to each TIA and stroke

patient on admission. Nurses and physicians may refer to the book during their informal stroke education. There is no requirement to document in the EMR that the stroke book was given and explained to the family, nor is there a process by which the location of the book is tracked upon discharge (personal communication, Renee McAloney, Coordinator, TMC Comprehensive Stroke Center). The stroke book education initiative began in May 2019. To date, information about the usefulness of the stroke education book has not been collected. Therefore, as part of a quality improvement process for the Comprehensive Stroke Center, this DNP project aims to assess both stroke knowledge and the usefulness of the stroke education book initiative.

Purpose

The purpose of this quality improvement project was to evaluate stroke knowledge retention among TIA, stroke survivors or caregivers when they return home (14-30 days after discharge). Specifically, this project analyzed selected demographics (age, gender, type of stroke, discharge location) and assessed 1) stroke knowledge (stroke type and risk factors) and 2) the impact of the stroke education book (did they remember receiving the book and if so did they refer to it and was it helpful) that was provided to the patient and caregivers by the Comprehensive Stroke Center.

Stakeholders

The stakeholders include those with a diagnosis of TIA or stroke and their families and caregivers. Stakeholders also include the healthcare providers of the Comprehensive Stroke Center such as physicians, advanced practice registered nurses (APRNs), registered nurses (RNs), case managers, social workers, physical therapists, occupational therapists, swallow/speech therapists as well as the post-acute TIA and stroke survivors, and their

families/caregivers. Partners of the comprehensive stroke center including community organizations that support stroke and senior services are also stakeholders.

Project Question

For TIA and post-acute adult stroke survivors or their caregivers, how does the stroke education provided by the Comprehensive Stroke Center affect their knowledge of stroke risk factors, symptoms, treatment, and post-care resources after returning home?

Significance to Practice

Transition of care, according to the Centers for Medicare and Medicaid Services, is the transfer or movement of a patient from one care environment to another such as hospital, nursing facility, primary care physician, long-term care, home health care, specialists care, or patient's home (Mansukhani, Bridgeman, Candelario, & Eckert, 2015). According to Naylor and Keating (2008), an important component of transitions of care is patient and caregiver education. Poor transition of care, which may include poor education, can result in increased hospital readmission, patient dissatisfaction, and increased healthcare costs; however, effective transition of care can improve or reduce hospital readmissions and healthcare costs by improving the outcomes-based patient delivery (Mansukhani, Bridgeman, Candelario, & Eckert, 2015). Every year, there is approximately 2.6 million older adult patients, discharged from the hospital, who are readmitted within 30 days; this cost about $26 billion annually (Centers for Medicare & Medicaid Services, 2018). Improving transition of care by evaluating stroke education provided by the hospital may be significant as effective education may not only prevent readmission, it can also prevent medical errors, identify problems for early intervention, prevent duplication of utilizing resources, and it supports client choices and preferences (Medicaid.gov, n.d.).

Theoretical Framework

Transitional Care Model (TCM)

The Transitional Care Model (TCM) guided this project. TCM focuses on older adults who are at increased risk for poor outcomes, such as post-acute stroke survivors, as they transition from the hospital to their homes. The goal of TCM is to improve care, as well as patient and family/caregiver outcomes through identification of health goals for patients, creating and implementing a plan of care specific to their needs, and providing continuity of care after hospital discharge (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). TCM has nine components: screening, staffing, maintaining relationships, engaging patients and caregivers, assessing/managing risks and symptoms, educating/promoting self-management, collaborating, promoting continuity, and fostering coordination; these core components are connected to each other and are part of a holistic care process (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). TCM could aid in guiding post-acute stroke survivors transition safely from the hospital to home, with the goal to increase awareness on stroke signs and symptoms, and risk factors, to reduce adverse events and to improve quality of life, which are the purpose and aims of this DNP project.

Authors and History of the Model

Dr. Mary Naylor created TCM together with a multidisciplinary team at the University of Pennsylvania (University of Pennsylvania School of Nursing, n.d.). Mary Naylor is a professor of gerontology; she is also the director of New Courtland Center for Transitions and Health (Fierce Healthcare, n.d.). Since 1989, TCM has been tested and refined through clinical trials (Shaid, Bixby, Hirschman, McCauley, & Naylor, 2016).

How and Where the Model has Been Used in the Past

TCM was used in three federally funded randomized clinical trials (RCTs). Outcomes from these RCTs showed decreased hospital readmission among patients with preventable health conditions and decreased length of inpatient hospital stay for those who are readmitted (University of Pennsylvania School of Nursing, n.d.). TCM improved health outcomes as well as patient satisfaction as patients reported improved quality of life; TCM is cost-effective and cost saving as the total health care costs have decreased (University of Pennsylvania School of Nursing, n.d.). In addition, TCM was also used in a comparative study, which revealed that TCM, compared to other evidence-based interventions, reduced the number of readmissions among older adults with cognitive impairment (University of Pennsylvania School of Nursing, n.d.).

Components of TCM

Screening. The patient population who would benefit from TCM interventions are adults at high risk for adverse events, who are going through transitional care process such as discharge from the hospital to home (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). The target population for this DNP project would be post-acute adult stroke survivors, transitioning from the hospital to their homes.

Staffing. A nurse, usually an APRN, leads TCM. APRNs are responsible in managing the care of patients during their acute illness (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). An APRN, as a transitional coach, will be the one to follow up with post-acute stroke survivors and their caregivers after hospital discharge.

Maintaining relationships. A trusting relationship is built and maintained between healthcare providers, patients and their families/caregivers (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). Establishing good relationship with patients and their families/caregivers will start in the hospital and will be maintained until post hospital discharge.

Engaging patients and caregivers. Patients and caregivers will be involved in their care, as they will be part of the planning and implementation of a plan of care, which incorporates their own preferences, values, and goals (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). It is important to ask what the needs of the patients are and whether they understand the value of the services being provided to them, as well as to engage them by asking for their ideas for improvement (IHI, 2018).

Assessing and managing risks and symptoms. Symptoms and risk factors will be recognized and will be managed accordingly (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). Assessment and management of risk factors and symptoms will start in the hospital and will be continued after hospital discharge through continued care at home, with the guidance of a transitional coach.

Educating and promoting self-management. Education will be provided to patients and their families/caregivers, which will help increase their knowledge on how to quickly act when symptoms get worse (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). Necessary education about proper care at home that includes diet, physical activity, medication compliance, and risk factors of stroke will be provided to patients and caregivers. This DNP project will focus on this component of the model to fulfill the purpose and aims of the project.

Collaborating. Plan of care will be discussed between patients and healthcare providers involved in their care (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). Patients and their families/caregiver will be updated on their plan of care, as well as other healthcare providers involved in their care, such as MDs, APRNs, RNs, case manager, social worker, physical therapists, occupational therapists, and swallow/speech therapists

Promoting continuity. Patients will be followed after discharge from the hospital by a transitional coach, which will prevent interruptions in care (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). This can be done either by a follow up telephone call, or by home visitation.

Fostering coordination. Communication between providers will be promoted (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). Care of patients will be coordinated with other healthcare providers, for a more organized plan of care.
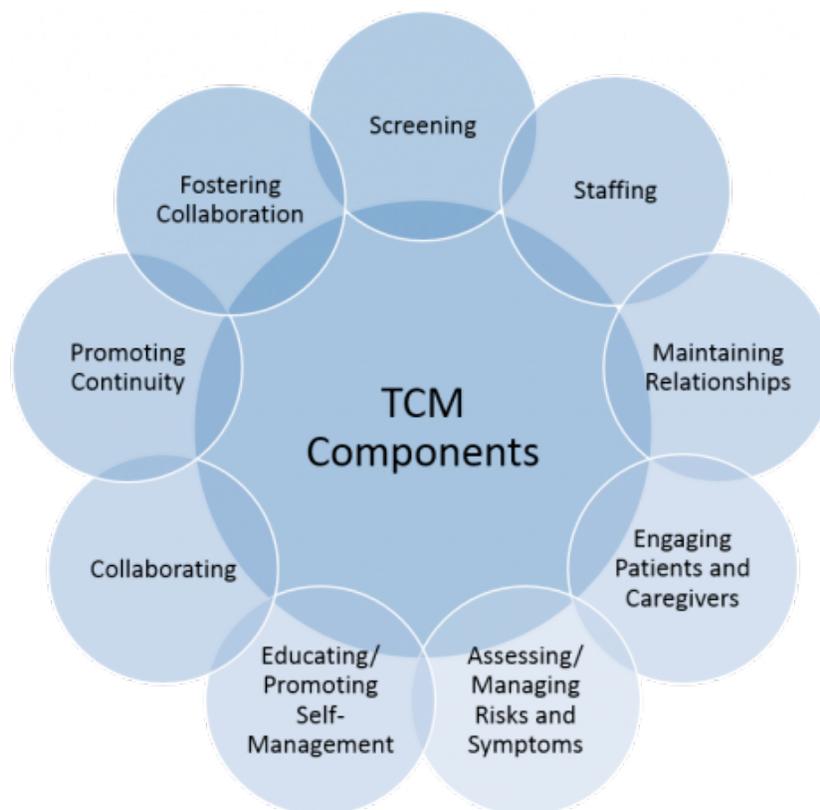
FIGURE 1. TCM components. (From About the TCM, by University of Pennsylvania School of Nursing, n.d., https://www.nursing.upenn.edu/ncth/transitional-care-model/about-the-tcm/)

Three of these TCM components will be utilized in this DNP project: engaging patients and caregivers, assessing/managing risks and symptoms, and educating/promoting self-management. This DNP project will be focusing on these TCM components to guide in answering the project question and to address the purpose and aims of this project.

Literature Synthesis

A literature review was conducted using PubMed and CINAHL databases. Keywords and phrases used were "knowledge retention among stroke survivors after 30 days of hospital discharge," "stroke awareness, hospital discharge," "stroke and knowledge retention," "stroke knowledge and discharge," and "stroke hospital knowledge and discharge." The following limits

were applied: free full text, published within 5 to 10 years, and in humans. A total of 13 relevant articles were gathered: eight relevant articles were found from PubMed, four from CINAHL, and one from a manual search of Google. Two of the 13 gathered articles are still ongoing studies; however, they are included because both are relevant to the project question and assess stroke knowledge following education interventions. Two themes emerged from this literature search: stroke knowledge retention after hospital discharge and association of stroke knowledge with health literacy and knowledge retention. A detailed appraisal of evidence is provided in Appendix A.

Knowledge Retention

Studies that assessed knowledge retention among stroke patients or their caregivers revealed that stroke knowledge either did not improve or is not retained after hospital discharge despite education provided in the hospital and education provided post discharge (Ing, Linton, Vento, & Nakagawa, 2015; Davis, Martinelli, Braxton, Kutrovac, & Crocco, 2009; Dombrowski et al., 2014; Haynes, Gallek, Sheppard, Drake, & Ritter, 2013; Olaiya et al., 2017). However, the use of an educational video intervention showed increased stroke knowledge, self-efficacy in stroke symptoms recognition and patient satisfaction with education and is maintained at 30 days after hospital discharge (Denny, Vahidy, Sharrief, & Savitz, 2017). Olaiya et al. (2017) demonstrated poor stroke knowledge among patients in their intervention group. The authors reported that knowledge could have diminished between their education sessions at baseline, three months, and 12 months, and the final outcome assessment at 24 months (Olaiya et al., 2017).

Health Literacy

Two studies reported adequate health literacy or adequate stroke knowledge is associated with higher education level (Sanders et al., 2014; Wang et al., 2018). Education provided in the hospital were recalled by patients, such as the ACT FAST elements; in the study by Haynes, Gallek, Sheppard, Drake, and Ritter (2013), most of the patients verbalized understanding of the discharge instructions. However, it was found that after hospital discharge, there was a lack of understanding of the education provided, and the ACT FAST education and discharge instructions did not have any impact on recognizing stroke symptoms and response measures (Dombrowski et al., 2014; Haynes, Gallek, Sheppard, Drake, & Ritter, 2013).

Gaps

Overall, the evidence on hand suggests that knowledge from stroke education provided at hospital discharge is not being retained by stroke survivors or caregivers. In addition, no specific stroke education strategies have been reported as significantly improving retention. There is a knowledge deficit among stroke survivors and caregivers, which reflects a need for an effective stroke education strategy that is easily accessible and understood by this population. These gaps in stroke awareness can negatively influence the stroke recovery process. Stroke survivors and their caregivers have reported being unprepared to transition to their home environments due to a significant lack of stroke knowledge and training to identify stroke risk factors, warning signs, and symptoms (Kitzman, Hudson, Sylvia, Feltner, & Lovins, 2018). The study by Olaiya et al. (2017) provides compelling evidence that knowledge retention is poor among stroke survivors. These authors suggest using long-term strategies such as reminders or frequent education delivery, which may increase and strengthen retention.

Summary

The literature supports the need for improved education strategies that promote long-term knowledge retention among stroke survivors. There is likely not a strategy that is effective. Further, the education strategy must align with the facility preferences and resources, which will vary. The literature reports that knowledge retention can increase stroke awareness, which can help prevent recurrent stroke or adverse events that could lead to hospitalization. Lastly, the literature also supports the need to assess knowledge retention among stroke survivors or their caregivers to evaluate whether received education is adequate to meet their needs after hospital discharge. Some studies suggest that there is the need for further study regarding effective stroke education strategies, which are necessary to improve and retain stroke knowledge among patients and their families/caregivers.

METHODS

Project Design

This quality improvement project was a secondary analysis of data that has been previously collected by a Comprehensive Stroke Center Transition of Care program. The community stroke nurse employed by the Comprehensive Stroke Center's Transition of Care Program called patients discharged from the hospital with a diagnosis of TIA or stroke, 14-30 days after hospital discharge, when the patients are home. Since May 2019, the community stroke nurse has collected data regarding the stroke education book initiative. With regards to evaluation of stroke knowledge (stroke diagnosis & stroke risks), the community stroke nurse asked the patients/caregivers to verbalize their stroke diagnosis and stroke risk factors. Answers of patients/caregivers who were able state their stroke diagnosis and identify their stroke risks

were translated into a "yes" category/answer, while those who were not able to verbalize their stroke diagnosis and stroke risks were translated into a "no" category/answer. Selected demographic information and the information about the stroke knowledge as it relates to the stroke education book initiative was analyzed by the PI of this project. As part of the quality improvement process, the results of the project will be presented to the Comprehensive Stroke Center's Transition of Care Program team.

The Plan-Do-Study-Act (PDSA) cycle guided the methodology of this DNP project to achieve its purpose and aims and to answer the project question. The Agency for Healthcare Research and Quality (AHRQ) (2013) describes the PDSA cycle as a method or tool for testing a change, which involves planning the change or intervention, carrying out the plan, analyzing or studying the results of the intervention, and acting on or applying the findings into practice to promote quality improvement. The post-discharge phone call survey done by the community stroke nurse was chosen as it is appropriate for the evaluation of a stroke education that was provided by the stroke team members of the stroke center. Since May 2019, the hospital distributes a new stroke booklet to their stroke patients as part of their stroke education. Data from the phone call survey, guided by the PDSA cycle, helped in the evaluation of the new stroke booklet, and to assess its effectiveness in increasing stroke knowledge among post-acute stroke survivors and their family/caregivers.

Plan-Do-Study-Act (PDSA) Cycle

Plan

Permission to conduct the project was obtained from the University of Arizona Institutional Review Board (IRB) (Appendix B) and from the Comprehensive Stroke Center

(Appendix A). Discharge phone call data that was collected by the community stroke nurse, who is employed by the Comprehensive Stroke Center Transition of Care Program. The community stroke nurse entered data into an Excel spreadsheet. The community stroke nurse collected comprehensive data required by the hospital, for example, demographics, readmission history, discharge location, follow up appointments, medication understanding, depression and quality of life. The community stroke nurse also collected information about stroke knowledge (type of stroke and stroke risks) and as of summer of 2019, the nurse collected information about the stroke centers' new stroke education book initiative, specifically, if the patients received the stroke education book, if they referred to the book after discharge and if so, did the book help them. Only a portion of the data that community stroke nurse collected was used for this study. The data that was used for this study included selected demographic information (e.g., age, stroke type, gender & discharge location) and the stroke knowledge and stroke education book data.

Do

Stroke education was initiated while post-acute stroke survivors are admitted in the hospital. The neurology nurses at the stroke center provided the stroke education to post-acute stroke survivors or their family/caregivers using their new stroke booklet. Prior to transitioning home, patients and caregivers were directed to resources that includes educational programs, support groups, and physical, occupational, and speech therapies that will help them meet their needs after hospital discharge.

Study

The community stroke nurse from the Comprehensive Stroke Center Stroke Transition of Care Program conducted follow-up phone calls and which included data pertinent to this project. In brief, only the data related to stroke knowledge (stroke diagnosis & stroke risks) and the stroke education book and selected demographic data were used for this project, as described above.

Act

Data from the project will be shared with the Comprehensive Stroke Center. Refinements on the stroke education in general and specifically education related to the stroke education book, if needed, will be made by the stroke center based on the outcomes received from patients and caregivers and based on this project's evaluation of the data.

Setting

The patients included in this project have been under the care of Tucson Medical Center's Comprehensive Stroke Center, Stroke Transition of Care Program. Tucson Medical Center (TMC), Tucson, Arizona is a 600-bed nonprofit regional hospital that is locally governed in Tucson, Arizona (TMC Healthcare, n.d.). It is a "certified comprehensive stroke center providing the highest level of stroke care available to the people of Southern Arizona" (TMC Healthcare, n.d.). TMC's comprehensive stroke certification is awarded by an independent, nationally recognized accreditation authority, the Healthcare Facilities Accreditation Program (HFAP) (TMC Healthcare, n.d.). The American Heart Association/American Stroke Association also awarded TMC the Stroke Gold Plus and Target: Stroke Elite Quality Achievement Award (TMC Healthcare, n.d.). TMC's neurology unit or neuroscience center consists of 30 inpatient beds

with neuro-certified registered nurses (TMC Healthcare, n.d.). The stroke center cares for approximately 370 TIA and stroke patients a year (personal communication, R. McAloney, RN, Stroke Coordinator).

Participants

As part of the Stroke Transition of Care Program, the community stroke nurse made phone calls to all adult patients or their family/caregivers, male and female, >18 years of age, who were admitted to TMC with a diagnosis of TIA, acute ischemic or acute hemorrhagic stroke. Patients or family/caregivers <18 years of age, and patients who were transitioned to hospice care were excluded. The patient data analyzed by the PI of this study were de-identified.

Intervention and Data Collection

No intervention was done by the PI of this project, as this project is a secondary analysis of data that was collected by the stroke program's community stroke nurse. As described previously, stroke education, including the new stroke booklet, is provided by the hospital stroke team while patients are in the hospital and prior to discharge. At 14 to 30 days after discharge from the hospital, stroke knowledge and impact of the stroke education book are among a bigger data set assessed by the community stroke nurse during a telephone call. The community stroke nurse entered all data into an excel sheet during the telephone call. Only the data pertaining to this project were copied to a separate excel sheet by the community stroke nurse; this data did not include patient identifiers and each patient was referenced by chronologic numbering. Data from all patients that were reached by telephone was analyzed from the period of May 1, 2019 through September 15, 2019. The de-identified data was then placed on a flash drive and given to

the PI by the community stroke nurse. The PI kept the flash drive and a computer in a locked home office.

Tools for Data Collection

Data for this project included demographic data (Appendix C) and data about stroke knowledge and impact of the stroke education book (Appendix D). Demographic data includes who the learner is (patient or family/caregiver), patient's age, gender, type of stroke, and discharge disposition. Data also included stroke knowledge (stroke diagnosis & stroke risk) and the impact of stroke education (if they received the book, if they read or referred to the stroke book and if the stroke book helped answer any questions or concerns they had).

Data Analysis

Excel was used to describe the dataset; descriptive data were presented as mean, standard deviation, and percentages.

Ethical Considerations

Permission to conduct a project was obtained from Tucson Medical Center (Appendix A) in Tucson, Arizona, the Comprehensive Stroke Center and University of Arizona Institutional Review Board (IRB) (Appendix B). The ethical principles that were addressed in this project are respect for persons, justice, and beneficence. A de-identified data set collected by the stroke program were analyzed; no patient or healthcare worker in the stroke program at the hospital were contacted. The data set collected by the stroke program community stroke nurse includes a population of adult stroke patients who had either ischemic or hemorrhagic stroke and are discharged from the comprehensive stroke center. The discharge phone calls are approved by the hospital as part of the hospital stroke transition of care program and as such patients are informed

on discharge that they will receive a call from the community stroke nurse. The data collected were anonymous and were used to improve the quality of the stroke program at this hospital. This project will be beneficial to the target population, as this will assess whether the education provided helps to meet their needs after discharge. The selection of participants was fair as phone calls were made to all patients discharged with a diagnosis of stroke or TIA. All participants were treated equally and no one participant benefited the most from this project. This addresses the ethical principle of justice, which implies fairness in the selection of subjects (Office for Human Research Protections, 2018). There is no risk/harm associated with this project and wishes to improve stroke education to maximize its benefits to improve patient outcomes after discharge, thus meeting the requirements of beneficence. (Office for Human Research Protections, 2018).

RESULTS

As planned, the community stroke nurse followed up with patients or caregivers at $\pm$ 30 days after hospital (Tucson Medical Center, Tucson, AZ) discharge. The community stroke nurse collected data relevant to this project from June 1, 2019 to September 15, 2019 and a secondary analysis of that data was performed for this quality improvement project. Demographic information, stroke knowledge and information related to Tucson Medical Center stroke education book initiative are described in the tables below.

TABLE 1. *Demographic information*.

Total N=105	N	%
Learner: Patient	73	69.52%
Caregiver	32	30.48%
Patient's Age	Mean age (Years): 70.13 ± 14.46	
	Range: 29-96	
<60 years	21	20%
>60 years	84	80%
Patient's Gender		
Male	50	47.62%
Female	55	52.38%
Type of Stroke:		
TIA	21	20%
Ischemic	75	71.43%
Hemorrhagic	9	8.57%
Patient's Discharge Disposition:		
Home	65	61.90%
Acute Rehabilitation Facility	29	27.62%
Skilled Nursing Facility	11	10.48%

For the most part, information was obtained from the stroke/TIA survivor (patient=69.52%). The majority of the patients (80%) in the sample were over 60 years old. The sample size included similar numbers of male (47.62%) and female (52.38%) patients. The majority of the patients had ischemic stroke (71.43%) and TIA (20%) while very few patients had hemorrhagic stroke (8.57%). Most of the patients (61.90%) were discharged to home from the hospital.

TABLE 2. *Stroke knowledge*.

N=105	N	%
Do you know what type of stroke you had?		
YES	38	36.19%
NO	26	24.76%
Uncertain (no answer or was not asked)	41	39.05%
Do you know your stroke risk factors?		
YES	41	39.04%
NO	24	22.86%
Uncertain (no answer or was not asked)	40	38.10%

About one-third (36.19%) of the patient/caregiver population sample knew the type of stroke the patient had and knew about their stroke risks (39.04%), while a fourth of the population (24.76%) did not know what type of stroke they had and did not know their stroke risks (22.86%). About one-third of the stroke knowledge questions (39.05% & 38.10%) were categorized as "uncertain" because the patient/caregiver did not definitively answer 'yes' or 'no,' or, the questions were not asked by the community stroke nurse (for reasons that were not clearly documented).

TABLE 3. *Stroke education book.*

Total N= 105	N	%
Did you receive stroke education prior to discharge?		
YES	30	28.57%
NO	13	12.38%
Uncertain (no answer, does not remember or was not asked)	62	59.05%
Do you remember receiving the spiral bound stroke education book from the hospital?		
YES	70	66.66%
NO	20	19.05%
Uncertain (no answer, does not remember or was not asked)	15	14.29%
If patients answered yes to the above question, then they were asked (N = 70): Did you read the book for any reason?		
YES	22	31.43%
NO	10	14.29%
Uncertain (no answer or was not asked)	38	54.28%
If patients answered yes to the above question, then they were asked (N = 22): Did the book answer any questions or concerns you had about your stroke?		
YES	5	22.73%
NO	4	18.18%
Uncertain (no answer or was not asked)	13	59.09%

Table 3 summarizes the questions regarding the stroke education book. Although 28.57% of the participants confirmed that they received stroke education, 66.66% of the participants received the stroke education book. However, only 31.43% of the surveyed patients/caregivers who stated that they received the book reported reading it and only a few of these participants

(22.73%) stated that the stroke book helped and answered their questions or concerns about stroke. Patients/caregivers who read the book made positive statements such as: "there are no questions that need to be answered, it is a great book," "very helpful," "got lots of info," "book pretty good," "really like it." One of the patients said that the book helped her with eating healthy while another patient stated that caregiver needs caught her attention. On the other hand, other patients/caregivers who read the book had some negative comments such as "nothing stood out in the book," "did not get anything out of it," "does not understand a lot of it," "I read some of it, I have a hard time reading, my eyes get watery." A few reasons for why they did not read the education book: "I use the internet," "I do not need a book, I have an iPad and use the internet," "I need someone to read the book to me," "I did not look through it, it scares me," and "we do not need information on stroke, this is not his first stroke."

DISCUSSION

Previous studies regarding stroke education showed lack of understanding among patients and caregivers that could lead to the recurrence of stroke because of delayed response or inability to identify warning signs of stroke (Saengsuwan, Suangpho, & Tiamkao, 2017). Because of these data, Tucson Medical Center, a comprehensive stroke center in Tucson, AZ, undertook a stroke education book initiative to improve stroke knowledge and to answer questions and concerns about stroke. Along with this new initiative and in compliance with the hospitals' previous primary stroke center and current comprehensive stroke center certification requirements, staff nurses provide and document daily stroke education (including type of stroke, stroke risks) with patients and family during their hospital stay (personal communication, R. McAloney, RN, TMC Stroke Coordinator, via Dr. Leslie Ritter).

The new stoke education book initiative implemented in June 2019 included the development of an 8½" x 11" in spiral bound book containing 100 pages of stroke information. The book is 80 pages with five sections, including Stroke/TIA Diagnosis and Treatment, Effects of Stroke, Stroke Families and Caregiver, Stroke and TIA Related Information and Stroke/TIA Risk Factors. The book contains large colorful images and uses bullet point and Question and Answer formatting and replicates the American Heart Association fact sheets. The book includes some information regarding stroke resources (local support groups & a community stroke resource center). Starting June 1, 2019, nearly 100% of patients were given a stroke education book prior to discharge (personal communication, R. McAloney, RN, TMC Stroke Coordinator, via Dr. Leslie Ritter). In order to evaluate stroke knowledge in general and the stroke education book initiative in particular, the purpose of this project was to evaluate stroke knowledge retention and perceptions of the stroke education book among TIA, stroke survivors or caregivers when they return home.

The distribution of strokes from the participants in this project reflect the general stroke population in the United States. According to the Center for Disease Control and Prevention (2017), about 87% of the stroke population in the United States were reported as ischemic strokes. The data of this project showed that 71.43% of this population had ischemic stroke which is consistent with the general stroke statistic that ischemic stroke is more common than TIAs and hemorrhagic stroke. Overall, about 60% of the participants in this project were discharged to their homes. Some 20% of this population were TIA patients, leaving about 40% of stroke patients (ischemic & hemorrhagic) who were discharged directly from the hospital to their homes. The rest of the population (about 40%) were discharged to either inpatient

rehabilitation facility (IPR) or skilled nursing facility (SNF). This data also reflects the usual discharge disposition of stroke patients and is consistent with the study by Cho et al. (2017) who reported that 67.5% of their participants were discharged to their homes while 32.5% of their population were discharged to a facility such as IPR and SNF.

The results of this project demonstrate several factors. In general, it is thought that stroke risk education could potentially reduce the risk of stroke complications and stroke recurrence (U.S. Department of Veterans Affairs, 2014) and thus, stroke centers provide education to patients and their families while they are in the hospital. The data from this project indicate that at 30 days after discharge, when patients were home and living after their stroke, accurate stroke knowledge (to include stroke diagnosis & risk) could only be verified in less than half of the patient/caregivers. This data suggests that although stroke education is provided in the hospital, the hospital education alone is not sufficient for the majority of patients/caregivers and points to the need for follow up education.

Second, the results regarding the stroke book education initiative mirror the stroke knowledge data. Specifically, the majority of the participants did not remember receiving the education book and those that did receive it indicated they did not utilize it. This is consistent with Ing, Linton, Vento, and Nakagawa's (2015) finding that educational materials provided in the hospital are not utilized by patients/caregivers. Taken together, these data demonstrate that there are unmet educational needs for stroke patients in regards to their stroke knowledge and retention despite having been provided with stroke education, including materials (stroke education book) prior to hospital discharge at TMC. This data is consistent with the findings (Ing, Linton, Vento, & Nakagawa, 2015; Davis, Martinelli, Braxton, Kutrovac, & Crocco, 2009;

Dombrowski et al., 2014; Haynes, Gallek, Sheppard, Drake, & Ritter, 2013; and Olaiya et al., 2017) that stroke knowledge did not improve or knowledge retention is poor even after stroke education has been provided prior to hospital discharge among patients/caregivers.

On the other hand, we did not specifically ask if patients/caregivers had questions or concerns regarding their stroke knowledge, so it is possible that stroke knowledge as we defined it (diagnosis, risk & the usefulness of a book) was not the most pressing need of this sample. To this point, others have reported that on discharge, patients and caregivers' priorities for example is preparing the home environment for stroke survivors when they come home, caregiver readiness and commitment to assume caregiver role when the stroke survivor gets home, and skills learning or training to meet the everyday needs of a stroke survivor at home (Lutz et al., 2017).

Some patients/caregivers who read the stroke education book commented they liked the book or that it is a great book, but it is unclear whether they understood and learned anything from the book. In addition, some patients talked about the difficulty of the book. Although we did not collect data on health literacy, it is possible that health literacy or language barriers played a role in these data (Sanders et al., 2014; Wang et al., 2018; Dombrowski et al., 2014; and Haynes, Gallek, Sheppard, Drake, & Ritter, 2013).

The data about the usefulness of the stroke notebook may have some practical implications for the hospital stroke program with respect to their continued publication and distribution of their stroke education book. More importantly, with the process they use for the book. Perhaps providing the stroke education book is passive, vs. active, meaning there is no formal process by which nurses or other providers interact with the book during the patient stay.

Rather, the book is mostly just placed at the bedside and/or placed in the discharge bag along with other discharge materials (personal communication from R. McAloney via Dr. L. Ritter). Furthermore, there is not a requirement to document in the EMR that the stroke book was given and explained to the family nor is there a process by which the location of the book is tracked upon discharge (personal communication, Renee McAloney, Coordinator, TMC Comprehensive Stroke Center). Further quality improvement projects relative to this book could look at active ways to engage the patient and caregiver with the stroke education book, based on individual needs at the time of discharge, and then re-evaluate the usefulness of the book once the patient/caregiver went home. At minimum, there could be a formal documentation in the hospital EMR regarding delivery of and interaction with the stroke notebook.

In the sample studied, four patients were between ages of 20-40. Younger stroke populations may have distinct needs with respect to stroke education. Smajlovic (2015) suggest more aggressive management of hypertension, smoking, and dyslipidemia as primary prevention education of stroke among younger population. However, there are few recommendations and guidelines in managing stroke risk education among younger population (Smajlovic, 2015). Future quality improvement studies in this area might include age-specific education.

Finally, the data from this project yielded a large number of "Uncertain" responses to the questions. The "uncertain" category was assigned when the community stroke nurse indicated that the patient/caregiver was not able to provide a clear 'yes' or 'no' to the question OR when the community stroke nurse did not make any comment at all about the question. At times, it was difficult to ascertain which the case was, so this category needs further investigation. Future studies could specifically include a category of "uncertain" as articulated by the

patient/caregiver. In doing so, it may be possible to identify a large number of people who are incapable of distinguishing yes or no responses, which would be an area that could be targeted for education.

DNP Essentials

This project aligns with several DNP Essentials. Regarding DNP Essential III (clinical scholarship and analytical methods for evidence-based practice), this project relied on evidence-based resources such as randomized controlled trials, cross sectional studies, qualitative studies, literature reviews, and retrospective studies, and contained analytical methods commensurate with a quality improvement project. It also aligns with DNP Essential VII (clinical prevention and population health) as it involves and discusses prevention of stroke recurrence through evaluating stroke knowledge retention among TIA and stroke survivors post hospital education.

Theoretical Framework and Future Studies

This project was grounded in the Transition of Care Framework as it focused on adult stroke survivors' safety in transitioning home from the hospital by evaluating their stroke knowledge post hospital education. Transitional Care Model (TCM) has nine components that help in improving care and patient/caregiver outcomes (Hirschman, Shaid, McCauley, Pauly, & Naylor, 2015). Three of these components were utilized in this project: engaging patients and caregivers, assessing/managing risks and symptoms, and educating/promoting self-management. Engaging patients and caregivers was demonstrated in this project during their participation in the discharge phone call by the community stroke nurse. During the discharge phone call, patients and caregivers were asked whether they know their risk factors of stroke, which illustrated assessment of risks and symptoms. Education/promotion of self-management was

provided through the stroke education book, which contains information about post-acute stroke care. The methodology of this project followed a step-by-step approach in answering the project question and in achieving its purpose and aims which aligns with the PDSA cycle. PDSA cycle involves planning, implementing the plan, analyzing the results of an intervention, and application of the results into practice for quality improvement (AHRQ, 2013). Planning for this project included obtaining collected data from the community stroke nurse, obtaining IRB approval as well as obtaining permission from the Comprehensive Stroke Center to conduct this project. Implementing the plan of this project involved providing stroke education to post-acute stroke survivors/caregivers by the neurology nurses at the stroke center as well as providing educational material such as the stroke education book. In addition, the community stroke nurse gathered data pertinent to this project through discharge phone calls. Analyzing the results of an intervention was demonstrated through analysis of the collected data by the community stroke nurse which was presented in three different tables above. Lastly, with respect to sustainability, the results of this project will be applied into practice as the results will be shared with the TMC Transition of Care Stroke Program team with discussions focusing on potential future quality improvement studies by the stroke program, which might include focusing on the following areas: Individualized and active ways to engage patients and caregivers with the stroke education book, formal documentation in the hospital EMR regarding delivery of and interaction with the stroke notebook, age-specific education (e.g., younger population), including a category of "uncertain" in the answer choices, as articulated by the patient/caregiver who may be incapable of distinguishing 'yes' or 'no' responses as well as requiring a comment by the community stroke nurse as to why an answer of uncertain was provided.

Conclusion

Stroke education is important because it increases stroke knowledge and awareness which may eventually address overall safety when patients transition home (e.g., avoiding post stroke complications: falls, medication errors, new or second stroke) and readmissions. The purpose of this project was to evaluate stroke knowledge retention among TIA, stroke survivors or caregivers when they return home. A secondary analysis of 30-days post discharge surveys that was collected by a local hospital's community stroke nurse was performed. The surveys identified patient demographics, stroke knowledge and usefulness of a newly developed stroke education book. Responses of patients and caregivers (N = 105) were included. The sample included mostly ischemic stroke and TIA patients. Overall, this quality improvement project found that despite having educational material such as the stroke education book provided to patients and caregivers, there is lack of knowledge regarding stroke diagnosis and risk factors. Less than half of the participants said they received stroke education or the newly developed stroke education book. Further, more than half of the participants who said they received a stroke education book did not refer to the book for any reason. Some of the participants who read the book reported not understanding it. These barriers to stroke education need to be addressed to increase stroke knowledge and awareness, and to promote safety as well as prevent stroke recurrence in this population. The data indicate that stroke education in the hospital and the "passive" provision of education materials, in this case a stroke education book, is likely necessary, but is not sufficient. The data point to the need for developing active, individualized in-hospital education plus a need for early discharge follow up to reinforce that education in order to ensure safe transitions when patients return home after experiencing stroke.

OTHER INFORMATION

Budget

There is no cost to this project.

APPENDIX A:

TUCSON MEDICAL CENTER LETTER OF SUPPORT

))TMC
HEALTHCARE

Date: September 18, 2019

To: University of Arizona Institutional Review Board
c/o Office of Human Subjects
1618 E Helen St
Tucson, AZ 85721

Re: Research Project – Nina Raeleen H. Bajaj, University of Arizona

To Whom It May Concern:

Tucson Medical Center (TMC) supports Nina Raeleen H. Bajaj's DNP quality improvement project, "Improving Transition of Care for Stroke Survivors with Hospital and Post-Acute Education." Pending University of Arizona IRB approval, TMC hereby grants permission for Ms. Bajaj to conduct a secondary analysis of data that has been previously collected and de-identified by the TMC's Comprehensive Stroke Center Transition of Care Program.

The purpose of this DNP project will be to evaluate stroke knowledge retention and perceived usefulness of stroke education among TIA, stroke survivors or caregivers from Tucson Medical Center when they return home (14-30 days after discharge). Specifically, the project will assess 1) what stroke knowledge was retained from the education provided by the Comprehensive Stroke Center at Tucson Medical Center and 2) the impact of the stroke education book that was provided to the patient and caregivers by the Comprehensive Stroke Center at Tucson Medical Center.
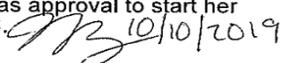
The proposed methods and study procedures for this project are as follows:

The community stroke nurse employed by the Comprehensive Stroke Center's Transition of Care Program at TMC calls patients that are discharged from the hospital with a diagnosis of TIA or stroke, 14-30 days after hospital discharge, when the patients are home. In May 2019, a stroke education book initiative was begun by the Comprehensive Stroke Center Transition of Care program. For this project, anonymous demographic data and data about the stroke knowledge and perceptions of the usefulness of the stroke education book initiative will be analyzed. Data collected by the Comprehensive Stroke Center is entered into an Excel sheet. For this quality improvement study, only data pertinent to the study will be copied from the larger Comprehensive Stroke Center data set to a separate Excel sheet. This study data will then be transferred to a flash drive and handed to the Ms. Bajaj. All data on the flash drive will be anonymous and the flash drive will be kept in a secure location in her office. The results of the study will be presented to the Comprehensive Stroke Center's Transition of Care Program team at Tucson Medical Center at the completion of the project.

TMC requests that Ms. Bajaj provide to TMC via TMCH Research (Research@tmcaz.com) a copy of UA IRB approvals.

Please feel welcome to contact me with any questions.

Sincerely,
Natalia Elias Calles, MPH
Associate Director of Clinical Research

Addendum: Nina Bajaj sent the UA IRB correspondence to TMCH Research on 10/3/2019. The UA IRB determined that Human Subjects Review is not required. Nina Bajaj has met all requirements and has approval to start her project here at TMC. 10/10/2019

5301 East Grant Road • Tucson, Arizona 85712 • 520.324.5512

APPENDIX B:

THE UNIVERSITY OF ARIZONA INSTITUTIONAL REVIEW BOARD APPROVAL

LETTER

<table>
<tr><td>THE UNIVERSITY OF ARIZONA
Research, Discovery & Innovation</td><td>Human Subjects
Protection Program</td><td>1618 E. Helen St.
P.O.Box 245137
Tucson, AZ 85724-5137
Tel: (520) 626-6721
http://rgw.arizona.edu/compliance/home</td></tr>
</table>

Date:	October 03, 2019
Principal Investigator:	Nina Raeleen Bajaj
Protocol Number:	1909009461
Protocol Title:	Improving Transition of Care for Stroke Survivors with Hospital and Post-Acute Education
Determination:	Human Subjects Review not Required

Documents Reviewed Concurrently:

    HSPP Forms/Correspondence: *BAJAJ_DHR_Sept 19.pdf*

Regulatory Determinations/Comments:

- Not Research as defined by 45 CFR 46.102(l): As presented, the activities described above do not meet the definition of research cited in the regulations issued by U.S. Department of Health and Human Services which state that "Research means a systematic investigation, including research development, testing, and evaluation, designed to develop or contribute to generalizable knowledge. Activities that meet this definition constitute research for purposes of this policy, whether or not they are conducted or supported under a program that is considered research for other purposes. For example, some demonstration and service programs may include research activities. For purposes of this part, the following activities are deemed not to be research."

The project listed above does not require oversight by the University of Arizona.

If the nature of the project changes, submit a new determination form to the Human Subjects Protection Program (HSPP) for reassessment. Changes include addition of research with children, specimen collection, participant observation, prospective collection of data when the study was previously retrospective in nature, and broadening the scope or nature of the study activity. Please contact the HSPP to consult on whether the proposed changes need further review.

The University of Arizona maintains a Federalwide Assurance with the Office for Human Research Protections (FWA #00004218).

APPENDIX C:

DEMOGRAPHIC INFORMATION

Learner (Patient or family/caregiver)	
Learner's Age	
Learner's Gender (male or female)	
Type of stroke of patient	
Patient's discharge disposition (home, skilled nursing facility, or inpatient rehabilitation facility)	

APPENDIX D:

STROKE KNOWLEDGE ASSESSMENT QUESTIONNAIRE

	Yes	No
Did you receive stroke education prior to discharge?		
Do you know what kind of stroke you had? If yes, what type of stroke did you have?		
Do you know your stroke risks? If yes, what are your stroke risk factors?		
Do you remember receiving the spiral bound stroke education book from the hospital? If yes, did you read the book for any reason?		
Did the book answer any questions or concerns you had about your stroke? If yes, what questions or concerns did it answer?		

APPENDIX E:

EVIDENCE APPRAISAL TABLE

Practice Question: For TIA and post-acute adult stroke survivors or their caregivers, how does the stroke education provided by the comprehensive stroke center affect their knowledge of stroke risk factors, symptoms, treatment, and post-care resources after returning home?

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
Appalasamy et al., (2018) The effectiveness of culturally tailored video narratives on medication understanding and use self-efficacy among stroke patients: A randomized controlled trial study protocol	Hypothesis: video narrative induces a positive behavior change towards stroke risk factor control via enhanced medication understanding and use self- efficacy	Not reported	Single-blind, randomized controlled trial	Total of 200: 100 intervention group 100 control group Eligible patients are recruited from the neurology tertiary outpatient clinic.	Patients will be assigned to a standard education intervention or to a video narrative intervention	Ongoing study, results not available yet
Clarke et al., (2014) Introducing structured caregiver training in stroke care: findings from the TRACS process evaluation study	Evaluation of the implementation of the modified London Stroke Carers Training Course (LSCTC)	Not reported	Process evaluation, non-participant observation, documentary analysis and semi-structured interviews	Stroke patients (n=38) Caregivers (n=38) Stroke unit staff (n=53) From 10 stroke units who participates in the TRACS trial in Yorkshire, North West, South East and South West, Peninsula.	LSCTC have 14 components; 6 of these components were delivered to all of the participants, and 8 of these components were only delivered based on the participants' individual assessment and caregiver need	Caregivers did not show development of knowledge and stroke-specific skills

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
Davis, S.M., Martinelli, D., Braxton, B., Kutrovac, K., & Crocco, T. (2009) The Impact of the Extended Parallel Process Model on Stroke Awareness	Hypothesis: Extended Parallel Process increases stroke knowledge compared with a standard control	EPP model	Single-blinded, randomized, pre-test, post-test study	2 age cohorts in West Virginia: Younger cohort- 18 to 35 years old (222 participants), average age is 20.68 Older cohort- 50+ years old (52 participants), average age is 76.37 Total participants: 274	JMP software was used to randomly assign participants to view either a standard stroke education poster or a modified, extended parallel process (EPP) poster. The strength of the EPP poster was tested using a likert scale. Student t test was used in analysis the differences in answers provided by participants who viewed either posters. A 28-item Stroke Action Test (STAT) was used to assess the effect of each poster on stroke knowledge.	Extended Parallel Process did not increase stroke knowledge (negative study)
Denny, M.C., Vahidy, F., Vu, K.Y.T., Sharrief, A.Z., & Savitz, S.I. (2017) Video-based educational intervention associated with iproved stroke	Video-based education may be effective in improving stroke literacy among stroke patients	Not reported	Prospective study utilizing a pre- and post-test design	>18 years of age, diagnosed with acute ischemic stroke (AIS) and intracerebral hemorrhage (ICH). Exclusions include patients who are not able to understand the consent process. Patients under hospice care, and not able to	A 4th grade reading level 10-item questionnaire was used to evaluate stroke knowledge and patient satisfaction, and self-efficacy in recognizing stroke symptoms after a stroke education. The questionnaire consists of 8 multiple choice questions and 2 questions were assessed using a likert scale. The questionnaire was	The study reported that the stroke education video post viewing and at 30 days post hospital discharge can improve stroke knowledge, self-efficacy, and satisfaction.

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
literacy, self-efficacy, and patient satisfaction				speak English 250 screened, 102 consented, 93 completed the video intervention	administered before and after the 5-minute video education is viewed and after 30 days. Demographics and 5-minute Montreal cognitive assessment were collected	The 5-minute Montreal Cognitive Assessment screening tool is found to be associated with stoke knowledge pre-video, post-video, and at 30 days post hospitalization, but was not correlated with stroke knowledge retention.
Dombrowski et al. (2014). The Stroke 'Act FAST' campaign: Remembered but not understood?	Hypothesis: knowledge of FAST acronym increases accurate recognition and response in stroke scenarios	Not reported	Population-based, cross-sectional survey	Randomly selected 5000 individuals from the electoral register in 2012. Power analysis was used to determine sample size needs.	The questionnaire with a leaflet of the FAST campaign and the questionnaire alone were equally and randomly distributed to participants	Study shows greater recall of specific "Act FAST" elements but no impact on stroke recognition and response measures
Haynes, H.N., Gallek, M.J., Sheppard, K.G., Drake, K.W., & Ritter, L.S. (2013) Transitions of care	Identification of elements of stroke population that can affect transitions of care	Not reported	Retrospective analysis	Patients with a diagnosis of acute ischemic stroke, TIA, subarachnoid hemorrhage, or intracerebral hemorrhage, and who	Telephone surveys 1-month post discharge. Survey consists of 9 questions.	Stroke knowledge after hospital discharge was assessed in this study and the authors reported that there was lack of

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
for stroke and TIA				were in the stroke center's Get With The Guidelines (GWTG) stroke database over an 8-month period were included in the study.		understanding with the education provided at discharge.
Ing, M.S., Linton, K.F., Vento, M.A., & Nakagawa, K. (2015) Investigation of Stroke Needs (INVISION) Study: Stroke Awareness and Education	Qual: Assessing knowledge gap in stroke survivors post discharge	Not reported	Qualitative study	18 years of age or older, Hawaii residents of at least 3 months, diagnosed with intracerebral hemorrhage (ICH) 30 caregivers and stroke patients were screened. 21 participants (11 caregivers, 10 patients) were enrolled in the study. Male: 6 caregivers, 3 patients. Female: 5 caregivers, 7 patients Mean age for both caregivers and patients is 61	Interviews: face-to-face, semi-structured, utilized a script which consists of open-ended questions.	3 major concerns were found from interviews: 1. Lack of stroke knowledge, 2. Need for stroke education, 3. Fear of stroke recurrence Authors concluded that hospital experience and education were not recalled by patients and caregivers and are not effective.

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
Kitzman, P., Hudson, K., Sylvia, V., Feltner, F., & Lovins, J., (2018) Care Coordination for Community Transitions for Individuals Post-stroke Returning to Low-Resource Rural Communities	The KC^{3}T program was developed to get the healthcare disparities among stroke patients under control and to help with the transition of care	Not reported	Program assessment	30 patients with acute stroke at a regional inpatient rehabilitation hospital in southeastern (Appalachian) Kentucky were enrolled between July 1, 2015 and May 31, 2016. Female=17 Male=13 Ages between 38 and 88 years, mean age=65.	The Kentucky Care Coordination for Community Transitions (KC^{3}T) program has a trained community health worker (CHW) who serves as a navigator and help with the transition of care of patients with stroke. CHW focuses on in-patient rehabilitation and discharge planning and assesses healthcare and community resource needs and provides follow-up education. Patient encounter= home visit, telephone visit, office visit, offsite visit, or service facilitation. CHW assist in completing paperwork for agency or community resource access, education and discharge planning, and assessment of patient's compliance to rehabilitation and discharge plans.	The KC^{3}T program is found to be effective in the transition of care of stroke survivors in the rural Kentucky
Martin, J.D. (2014) Interventions that Promote Stroke Awareness: A Literature Review	Evaluation of different types of education interventions from different studies to assess the impact of	Not reported	Literature review	Research and peer-reviewed journal articles from 1995 to January 2013	Systematic search for research and peer-reviewed journal articles from Western Carolina University Library databases. Full text articles from 1995 to January 2013.	The use of mass media through radio and television have reached more people compared to other interventions such as

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
	education on stroke awareness and knowledge retention					presentations, printed materials, stroke screening, and children's programs. However, the presentations and in-person opportunities showed longer retention of knowledge among the other interventions.
Olaiya et al., (2017) Effectiveness of an Intervention to Improve Risk Factor Knowledge in Patients With Stroke: A randomized controlled trial	Impact of nurse-led intervention in improving knowledge among patients with stroke and transient ischemic attack	Not reported	Randomized controlled trial	268 total participants, adults >18 years Intervention group (usual care plus an individualized management plan and 3 nurse home education visits:140 Control group (usual care):128 Median age is 68.7 years; 66% were men	Computer-generated, blocked randomization procedure was used to randomly assign patients to either the intervention group or control group.	34% of participants were unable to identify any risk factors at 24 months Increased functional ability is associated with better knowledge, however, knowledge is poor in general, and old age and increased number of comorbidities are linked with poorer knowledge

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
Reeves et al., (2017) Improving transitions in acute stroke patients discharged to home: the Michigan stroke transitions trial (MISTT) protocol	Test impact of social worker home-based case management program, online information and resource on patient/caregiver outcomes after discharge home	Chronic Care Model (CCM)	Randomized, pragmatic, open, 3-group parallel study	Stroke patients and their caregivers who were directly discharged home or discharged from a rehabilitation facility within 4 weeks Target sample size is 214	Participants are assigned to either a usual care, a home-based social worker stroke case management (SWSCM) program or a combination of SWSCM program and online access to an information and support resource. Outcomes data were collected through telephone interviews at 7 days and at 90 days	Ongoing study results are not available yet
Sanders et al. (2014) Assessing the Impact of Health Literacy on Education Retention of Stroke Patients	Qual: The relationship of health literacy to retention of knowledge regarding stroke education	Not reported	Prospective cross-sectional	101 patients with acute ischemic stroke (AIS) at UF Health's inpatient stroke unit – Jacksonville. 18 years and older. Patients with cognitive dysfunction such as dementia, global and receptive aphasia were excluded. 189 screened, 70 excluded, 18 refused to participate, 1 withdrew consent, 100 completed the study.	S-TOFHLA was used to assess health literacy level Education. Conducted by RNs Retention of the education provided was assessed using Stroke Patient Education Retention (SPER) score which consists of 5 questions Data was analyzed using SAS version 9.3 software	Stroke patients who had adequate health literacy had higher education level

Author/Article	Qual: Concepts or Phenomena Quan: Key Variables Hypothesis Research Question	Theoretical Framework	Design	Sample	Data Collection (Instruments/Tools)	Findings
Wang et al., (2018) Acute stroke patients' knowledge of stroke at discharge in China: a cross-sectional study	Hypothesis: stroke-related knowledge can benefit good behaviors and compliance with preventative treatment in patients with acute ischemic stroke	Not reported	Cross-sectional study	Patients in 36 hospitals in Hubei province, China, with acute ischemic stroke (AIS), hospitalized between November 1 2014 and January 31 2015, ages 18 years and older, and AIS patients who were cognitively and mentally normal, and linguistically competent to answer interview questions at discharge. A total of 1863 patients were eligible and were given questionnaires, 332 did not respond, and 1531 responded.	Trained investigators interviewed participants using a questionnaire that was pilot-tested on 25 patients to make sure questions are clear and easy to understand; the questionnaire consists of 2 parts: 1. Demographic characteristics 2. Knowledge about stroke – contains 25 questions. Data collected was statistically analyzed using the Statistical Analysis System (SAS) 9.4 for Windows	Stoke-related knowledge is positively associated with socioeconomic status, physical health and education level.

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