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Walden University

College of Health Professions

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Antoinette Simone Dyer

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Dr. Shawn Munford, Committee Chairperson, Public Health Faculty
Dr. Mountasser Kadrie, Committee Member, Public Health Faculty
Dr. JaMuir Robinson, University Reviewer, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2022

Abstract

The Outcome of Stroke Education and Management on Cerebrovascular Accident Patients in Bermuda

by

Antoinette Simone Dyer

MSc ANP, Cumbria University, 2014

BScN, The University of the West of Scotland, 2010

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

February 2022

Abstract

Incidence of cardiovascular accident (CVA), also referred to as a stroke, has increased in Bermuda. Understanding key contributing factors is necessary to reduce incidences that are associated with this disease process. This dissertation examined the outcome of stroke education and management on CVA patients in Bermuda. The health belief model, incorporating a reflection of the public health framework, guided the analysis of a quantitative dataset obtained through Bermuda Hospitals Board's Neurology Department. A cross-sectional study design was used to sample 253 stroke patients over a 2-year period (2019 -2021). The Wilcox test was employed to compare two groups – stroke education (yes or no) and length of stay (continuous outcome). The results revealed that stroke education on risk factors, warning signs, and activation of emergency medical service (EMS) significantly reduced the length of stay on CVA patients in Bermuda. The chi-square test assessed the association between patients accepting medical strategies and management and the discharging decision (home or rehab) process but indicated there was no association between patients accepting medical strategies and management and the discharging decision (home or rehab) process. Logistic regression assessed potential significance between tissue plasminogen activator administration and the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender. The null hypothesis was accepted, indicating no statistical significance between these variables. Specific changes in the education campaigns and guidance for policymakers regarding the importance of health literacy and lifestyle changes being incorporated in stroke knowledge could result in positive social change.

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Dedication

This dissertation is dedicated first and foremost to my Heavenly Father, Jesus Christ; without you, I would not have existed. Second, my beloved mother, Thereasa Wilson, and brother Donovan Dyer have empowered, motivated, and inspired me through my academic trajectory. The zenith of my existence was attainable with their invaluable support. But, more importantly, they have molded me into the person I am today. I am holistically grateful.

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Chapter 1: Introduction to the Study

Cerebrovascular accident (CVA), also referred to as a stroke, has been increasing in Bermuda. The American Heart Association (2018) has recognized that more than 7 million stroke survivors have neurological deficits involving complete or no emotional, cognitive, and physical regions. The high mortality rate associated with stroke could be a critical public health issue in Bermuda that requires immediate attention (Institute for Metrics and Evaluation, 2017). This study dissected the importance, potency, and efficacy of stroke education and management in Bermuda. Additionally, this study may impact the public health system, the economy, and family dynamics. There has not been a study of this nature in Bermuda because of the past lack of resources. Since the conception of this study, the Neurological Department in the Bermuda Hospitals Board (the only hospital in Bermuda) has initiated a Stroke Unit to address the education, medical management, and other issues related to CVA in Bermuda.

Nevertheless, the incidence rate has increased, which necessitates an epidemiological study in this department. This study has added to the historical background of the development of the Stroke Unit with statistical findings. In addition, promoting and implementing preventive measures at the community level will be paramount to ensure a favorable outcome. This chapter clarifies various subsections of the study, including the study's background, the problem statement, the study purpose, the research questions, and the hypotheses.

Additionally, the chapter addresses an overview of the theoretical/ conceptual framework, nature of the study, definitions of the variables, assumptions, scope, delimitations, limitations, significance, summary, and introduction to chapter 2. Finally,

this study's contribution may provide a continuous social change, focusing on Bermuda and other countries' healthcare systems. The social changes would incorporate health literacy on stroke and its management within every household, affecting stroke incidence on the island and other countries. The governments then may undertake the appropriate measures to facilitate the process of continuous social change.

Background

A stroke could be critical due to its pathophysiological pathway. According to the America Stroke Association (ASA, 2019), there are three main types of strokes: (a) ischemic, (b) hemorrhagic, and (c) transient ischemic attack (TIA). Approximately 85% of all strokes could be related to ischemic stroke (ASA, 2019). Ischemic stroke occurs due to a blockage in the blood vessel, which supplies blood to the brain, while hemorrhagic stroke involves a rupture or leaking of the blood vessel in the brain that creates damage to the brain cells. ASA (2019) further added two main types of hemorrhagic stroke, intracerebral and subarachnoid. The most common of the two is intracerebral bleeding; it incorporates bleeding from the ruptured or leaking blood vessel into the brain's surrounding tissues. Hence, subarachnoid hemorrhage would be a result of bleeding occurring between the brain and the covering tissues. TIA often refers to a "mini-stroke," and a warning of a stroke occurring in the future emerges with a 5-minute blockage of blood flow to the brain.

The global incidence of stroke has been decreasing (ASA, 2019). Still, the Institute for Metrics and Evaluation (2017) stated the opposite about Bermuda's incidence rate. The outcome of stroke education and management on CVA patients in Bermuda could be associated with awareness care towards stroke patients. Stroke education on risk

factors, warning signs, and the Emergency Medical Service activation would be paramount. Notwithstanding, an association with the effect it could have on the hospital stay of CVA patients in Bermuda. Donkor (2018) highlighted that stroke in the 21st century could become a burden, affecting CVA patients' quality of life. Stroke research and treatment would then be deemed necessary to combat this crisis issue of CVA, especially in Bermuda. Agyeman et al. (2017) added that nonexistent stroke care facilities and lack of knowledge allied with the patients' and caregivers' stroke risk factors could also contribute. Bermuda did not have an existing stroke facility; however, they have recently opened a Stroke Unit, which has been extraordinarily active due to increased incidence rates.

Bermuda consists of diverse cultures and different ethnic groups resulting in racial disparities. Green et al. (2019) comprehensively identified and described the impact of ethnic/racial status on access to care after the onset of stroke symptoms. They further added that reducing health-related disparities could improve treatment outcomes among ethnic stroke patients. There are common significant markers related to this, which would help navigate the ethnic inequalities related to stroke education and discharge planning within Bermuda. People aged 65 and older have a higher prevalence of stroke, but Bermuda’s statistics include a more mixed age group. There are two classification risk factors for stroke, modifiable and nonmodifiable (Goldstein et al., 2011). Gender, age, and race are associated with the nonmodifiable risk factors, while obesity, hypertension, diabetes mellitus, cigarette smoking, and physical inactivity are modifiable risk factors. These are vital indices, which affect the results of the prevalence of stroke.

Overall, this study has been the first in Bermuda to underscore other related tasks and further contribute to the effectiveness of stroke management and education in Bermuda. This study's results have increased awareness specific to Bermuda and set some examples for other countries to emulate. The stroke problem has been ongoing, necessitating prompt adjustments and implementations to practices and policies for favorable outcomes.

Problem Statement

Bermuda's island has been experiencing a 13.6% increased incidence of CVA, which creates a strain on the country's public health system related to the third leading cause of death (Institute for Metrics and Evaluation, 2017). Hence, the population's medical management, psychosocial aspects, and physical status have also been negatively affected. There are long-standing health problems that are contributing factors associated with CVA. An example of these problems is obesity, diabetes, and hypertension. CVA patients' perceptions should be paramount to lifestyle practices; hence, this study has acknowledged discharge decisions as a variable to be studied. In addition, CVA patient's perception of the role of the rehabilitation process, their family's decision to take them home, and lastly, their perception of their activities of daily living skills usually are an issue. This issue could negatively affect their recovery process since it would focus on achieving and managing their next discharge decision. To develop a quantitative instrument, Alexandrov et al. (2019) explored patients' and families' lived experiences during acute stroke hospitalization. The patients' perceptions of healthcare quality were also a key factor examined. Alexandrov et al. (2019) concluded, and I endorse, that no

study ever explored before on stroke perception report enables understanding patients' and families' beliefs about acute stroke care quality in essential new domains.

English et al. (2019) evaluated the clinical stroke guidelines and how practical these guidelines are in managing stroke. They found that clinical guidelines were paramount in facilitating evidence-based clinical care to patients. Since we are in an ever-increasing research evidence-based era, keeping guideline policies could be a challenging resource-intense process. English et al. (2019) added that technological advances provide opportunities to develop new guideline development models, facilitating recommended updates as new evidence emerges. The National Institute of Health Stroke Scale (NIHSS) guidelines play an integral part in managing stroke patients in Bermuda. Emergency care is paramount in the recovery process of stroke patients. For example, Chikafu and Chimbari (2019) underlined the care patients sought within 24 hours of suffering a stroke, which shortened the length of stay in hospital range. The results revealed a rising trend in cardiovascular disease admissions within total hospital admissions. There has been an increasing trend in CVA in Bermuda, with the need for methodological approaches related to the length of stay.

Anticoagulation medication should be considered vital in the management of stroke patients. Oliveira-Kumakura et al. (2019) highlighted the relationship between anticoagulation medication adherence and satisfaction in CVA patients. Accepting medical strategies and management is a variable that this study would explore for its effect through patients' compliance and adherence. Often relatives or caregivers are asked to be involved in the medical management decision-making process. The study by Pokorney et al. (2019) could relate to this since they identified the importance of relatives

being advocates in the medical decision-making process. They had a positive reaction through that methodological process of relatives' involvement. Life after stroke is essential and inevitable, incorporating discharge planning, be it home or rehab. Wray et al. (2019) highlighted how stroke survivors communicate, which aids in their recovery process.

The Bermuda Hospitals Board (BHB) has reported that acute stroke in Bermuda could be an epidemic contributing to adult disabilities and significant public health issues including economic costs. Inevitably, the mortality rate would also be affected, resulting in psychological and psychosocial problems island wide. Approximately 2% of the population in Bermuda suffers an acute stroke (BHB, 2019). According to the Institute for Health Metrics and Evaluation (IHME; 2017), stroke is the third leading cause of death in Bermuda and ranked second in the list of premature death. This study has addressed the gap in stroke education and management that exists in CVA in Bermuda. There are also gaps in the literature, which did not include Bermuda in their studies, nor did these specific variables acknowledge or analyze an epidemiological study report. Nonetheless, through this and other studies' assistance, I identified and addressed these gaps.

Purpose of the Study

Stroke education on risk factors and warning signs has become a fundamental subject matter highlighted by the Neurological Department to inform the Bermuda public. They believe this will assist in reducing the incidence rate of stroke. The activation of the Emergency Medical Service (EMS), accompanied by the treatment methodologies, which could affect the length of stay of CVA patients in Bermuda, are paramount. To the best of

my knowledge, no study has researched stroke education and management outcomes on CVA patients in Bermuda. This quantitative study explored the association between stroke education (prevention, compliance, and post-stroke care), length of stay, stroke management, procedures completed, IV tPA assessment, and IV tPA administered.

Furthermore, in this study, I investigated the medical strategies and management, which are associated with the decision to discharge the patient home or rehab. Pending on-time medical procedures commence and how effective the command would be on the patient, their bodies' response could determine their home or rehab outcome. This study investigated tPA administration regarding the odds of complications among the elderly aged 60 and above in Bermuda. Powers et al. (2015) highlighted that tPA administration has a window period and specific medical instructions before usage for all age groups. The elderly, aged 60 and above, have a narrow margin to receive tPA administration than their younger counterparts (Powers et al., 2015). Therefore, this was addressed and examined in this study. This study's independent and dependent variables are vital to achieving an accurate epidemiological outcome that may benefit the current and future of CVA treatment in Bermuda.

In this study, the independent variables are stroke education on risk factors, warning signs; activation of EMS; age; gender; and tPA administration. In addition, the dependent variables included the length of stay on CVA patients, accepting medical strategies and management, patient discharging decisions (home or rehab), and complications among the elderly aged 60 and above.

This quantitative study underscores the potency of knowledge, attitudes, and practices, which could significantly contribute to evidence-based medical practice.

Hence, this study has disseminated scientific understanding of this subject to other Caribbean countries to underscore the effects of stroke management and outcomes on CVA patients. Notwithstanding, implementing specific preventative measures has been country specific.

Research Questions and Hypotheses

There is currently a gap in Bermuda's research on the outcome of stroke education and management. Hence, the purpose of this quantitative study was to explore the association between stroke education and length of stay, discharge decision, stroke management, procedures completed, tPA assessment, and tPA administered with odds of complications among the elderly (60 and above). In addition, this study addressed the following research questions and hypotheses:

Research Question 1 (RQ 1): Does stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) reduce the length of stay for CVA patients in Bermuda?

H_o1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) does not reduce the length of stay on CVA patients in Bermuda.

H_a1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) significantly reduce CVA patients' length of stay in Bermuda.

Research Question 2 (RQ 2): Is there any association between patients accepting medical strategies and management and the discharging decision (home or rehab) process?

H_o2: There is no association between accepting medical strategies and management and patient discharging decision (home or rehab).

H_a2: There is an association between accepting medical strategies and management and patient discharging decision (home or rehab).

Research Question 3 (RQ 3): Does tPA administration significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender?

H_o3: tPA administration does not significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

H_a3: tPA administration significantly reduces the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

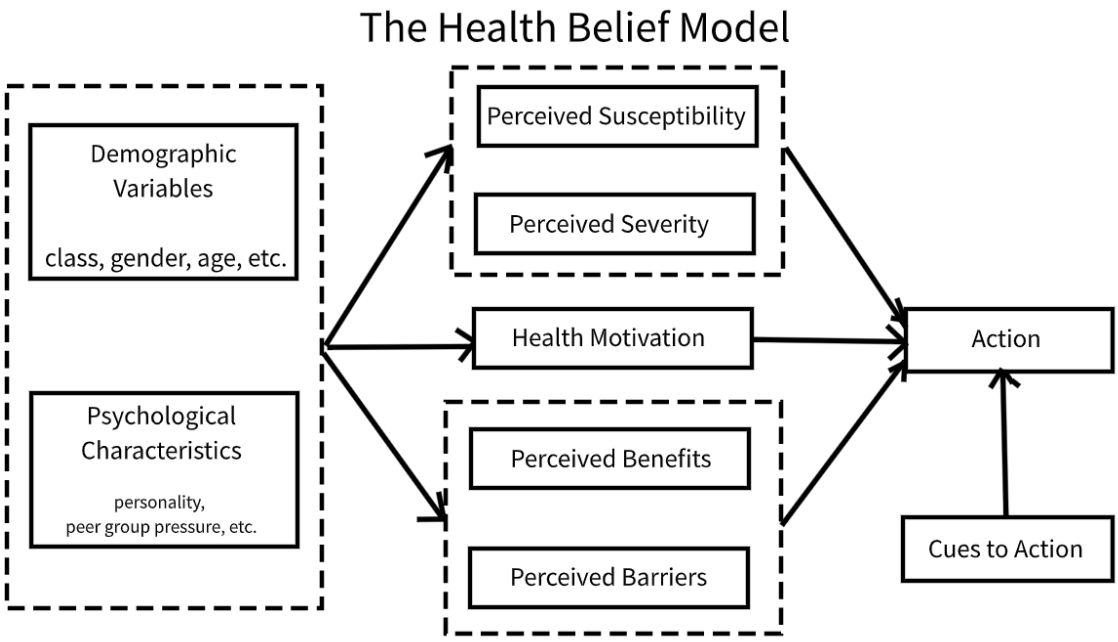
Theoretical and Conceptual Framework for the Study

This study's theoretical and conceptual framework is the health belief model and the public health framework. The public health framework sets out a vision for public health, eliciting improvement and protection for the nation's health and improving the most inadequate health (Public Health England, 2020). Additionally, the outcome of public health framework has increase health, life expectance, and reduce differences in the life expectancy and healthy life expectancy between communities (Public Health England, 2020). My study also included the reduction of differences between people and organizations from different backgrounds. The health belief model addressed Bermuda's health behaviors concerning self-efficacy, perceived barriers, benefits, and threats (Jones et al., 2016). Rosenstock (1974) further added that individuals would have to believe they were susceptible (perceived susceptibility) for an individual to take full responsibility for

their life. Besides, they would have to think that having CVA would severely impact their life (perceived severity), and their action would be beneficial (perceived benefit). As a result of their efforts to prevent or manage stroke, no barriers (perceived barriers) would be encountered.

Figure 1

Health Belief Model Assessment of Public Knowledge



Note. From "Health Belief Model for the Assessment of Public Knowledge and Household Preventive Practices in Karachi, Pakistan, a Dengue-Endemic City", by Siddiqui et al., 2016, *PLOS Neglected Tropical Diseases,* 10(11), e0005129. (https://doi:10.1371/journal.pntd.0005129).

Stroke Education and management outcomes on CVA patients' hospital stay in Bermuda could affect all age groups, especially those at high risk and the elderly. In addition, patients' involvement in their care through the initial pre-stroke education and

screening phase (Lowres et al., 2019), followed by the emergency room treatment, and further medical management in maintenance, could be advantageous in Bermuda. Therefore, the public health framework was used in this study to explain the result. In addition, it incorporated the public's responses to the CVA epidemic situation (Tang et al., 2018).

Nature of the Study

This study was a quantitative cross-sectional study since a quantitative design could extricate empirical data on the effect of stroke education and management on CVA patients in Bermuda. The cross-sectional design was then capitalized for cost-effectiveness and was not time-consuming, which was advantageous to prove and disprove this study's assumptions within a specific point in time. In addition, the cross-sectional research highlights multiple variables at the time of the data snapshot; hence, various research types would utilize the data retrieved. To address my research questions and hypotheses, I examined the association between the independent and dependent variables in the study analyses. I carefully selected these variables to address the study topic holistically. My study variables were stroke education on risk factors (such as a family history of stroke, lifestyle factors – high blood pressure, diabetes, high blood cholesterol levels, diet with high salt and high fat, heavy drinking and smoking, and lack of exercise); warning signs; activation of EMS; length of stay; tPA administration; age; gender; and length of stay as the independent variables. The dependent variables included discharge decisions (home or rehab); accepting medical strategies and management; tPA administration; and tPA administration complications among the elderly aged 60 and above. The covariates were age and gender. Overall, I detected associations regarding the

effect of stroke education and management on CVA in Bermuda. I intend to utilize the data retrieved from this study for further research.

The Study Variables

The Independent Variables

1. *Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS):* Stroke education on risk factors, warning signs, and activation of EMS. This variable indicates if the patients had received any stroke educated, specifically on risk factors, warning signs, and how to activate the EMS.
2. *tPA Administration:* tPA Adm - tPA administration variable indicated whether they accept tPA. tPA (tissue plasminogen activator) is a protein involved in the breakdown of blood clots. tPA is a treatment administered within a window period to be effective. This window period measures from the initial onset of the patient accessing the EMS, where the nurse would obtain their history from the hospital's arrival door.

The Dependent Variables

1. *Discharging Decision - home or rehab:* DD H or R – Discharging decision for home or rehabilitation variable identifies whether the patient was discharged home or rehab.
2. *Length of Stay:* LOS – Length of stay variable incorporated admission date and admission time. LOS variable included admission date and admission time. The admission date identifies the patient’s admission day to the hospital. Admission time acknowledges the patient’s time of arrival in the hospital.

3. *Accepting Medical Strategies and Management (AMS and AMM):* Accepting medical strategies and management acknowledged hospital procedures during a patient's hospital stay. This variable indicated whether medical procedures were utilized for care.
4. *Complications*: There are possible complications from the tPA administration among all age groups; however, advancing age is associated with increased comorbidities. Bearing in mind that the elderly, age 60 and above, could have worse outcomes regardless of tPA-related complications. Examples of these complications are intracerebral hemorrhage, major systemic bleeding - from other areas of the body vulnerable to weak blood vessels, such as gastric bleed (American Stroke Association, 2019). Additionally, angioedema from the possible use of angiotensin-converting enzyme inhibitor, congestive heart failure, large areas of early ischemic change, atrial fibrillation, and leukoariosis is hypoxia-ischemia a result of diseases of the small vessels (American Stroke Association, 2019).

Covariates

1. *Age:* Age group variable highlighted different age groups within the study.
2. *Gender:* Gender variable identified different gender groups.

Assumptions

The initial assumptions were concerning the tools and instruments incorporated to collect the data, the study design, variable selection, and the appropriate statistical test. I assumed the patients would be truthful with their history and signs and symptoms of their clinical illness of CVA upon admission since it could provide pertinent data for the study.

I assumed that the study findings' generalization, incorporating sample size, was adequate to disseminate the information to the broader population. This information to the more general population would focus on the effect of CVA education and medical management. CVA could also be related to the nervous system and stress from internal (family) or external (job, community, and country). These assumptions are necessary for the aspect of this study since they would be proven or disproven with evidence and statistical findings. Education may not be considered essential in prevention and management, but this was made evident with empirical data.

Scope and Delimitations

I ensured the granting of appropriate permission to utilize the data from the hospital's Neurology Department. Timing was essential and was a constant critical factor to guarantee study completion within a specific timeframe. The need to address particular variables was highlighted and secured for dissertation usage. I did not address health literacy, socioeconomic factors associated with stroke management, and the choice in discharge decision – home or rehab. Also, this study did not address religion, financial aids, and psychological needs.

Limitations

The limitations were the small size of the sample. Bermuda is a small country with a population of 6,000; however, CVA's incidence has increased recently. There could be a challenge with the institution publishing the reputation since it is not a renowned publishing company. The information obtained could be incomplete and not proprietary. Another limitation existed in terms of external validity. The study was based in Bermuda and not generalized to other developing and developed countries. Findings

were specified only for Bermuda; however, this could also have a positive side. There may be adjustments made to this study's findings for other countries with Bermuda as an example of the possibilities of achieving the desired outcomes. Information bias was a limitation related to the study participants providing erroneous or incomplete information. This information bias threatened the validity of the study findings. In minimizing this bias, I maintained confidentiality of the study's participants' data and the importance of accurate answers. Finally, there was minimum measurement bias even though the checklist questions were appropriate for my research. Nevertheless, barriers that I encountered would be permitted to use the hospital data on time.

Significance

The main objective was to explore the association between stroke education, stroke medical strategies, length of stay, patient discharging decision (home or rehab), and the effect of warning signs and activation of EMS for CVA patients in Bermuda. Acute stroke in Bermuda is an epidemic that has contributed to adult disabilities and economic costs; hence, the care and treatment of stroke have become a top priority.

This study has never been done before in Bermuda; therefore, it highlights island-wide public knowledge's effectiveness in stroke education and stroke management. Additionally, this study incorporates education on prevention, the early signs and symptoms of acute stroke, the outcome of medical management (tPA administration), the reintegration of stroke survivors into the community through rehabilitation, and introduced policies and procedures. The policymakers could incorporate new guidelines for the public health system in Bermuda by incorporating this measure from a community level.

This project has acted as a catalyst for positive social change by disclosing the result and public education campaigns. Bermuda's populace will inevitably become more aware of their lifestyle practices, measures to undertake and correct unhealthy lifestyle practices, and identify when a CVA emergency occurs. Other Caribbean countries would adopt this principle and approach, with adjustments to address their countries' jurisdictions. This research has empowered further studies to be undertaken in this area, especially where the limitations surfaced.

Summary

The incidence rate of CVA has been escalating in Bermuda compared to other countries within the same hemisphere. More importantly, Bermuda could soon have the highest incidence of stroke per capita in the world. Education and stroke management is a crucial tool in combatting and reducing the incident rate. Therefore, this study is an essential component for the new Stroke Unit in Bermuda. Additionally, other countries globally have become aware of the significance of stroke education and management.

Chapter 2 will concentrate on a literature review of stroke education and CVA patients' management and their relatives/ caregivers. Through the literature review, articles on related CVA cases have been acknowledged, referenced, and compared. It has also highlighted this study's research system gap and birth on CVA education and Bermuda management. Additionally, the effect of stroke education and CVA management in other countries, socioeconomic status, and ethnicity has also been highlighted and compared.

Chapter 2: Literature Review

The American Heart Association (2015) has rated stroke as the third leading cause of death and long-term disability in the United States. Due to high incidence in Bermuda as well, this study focused on stroke education and cCVA patients in Bermuda. This quantitative research study explored the relationship between stroke education and length of stay on CVA patients in Bermuda and the association between medical strategies and management and the discharging decision (home or rehab) process. The study also examined whether tPA administration reduces complications among the elderly aged 60 and above in Bermuda.

This literature review highlights research studies and methodology that are related to this study. Additionally, it analyzes similar problems researched in the past and the gaps in the research. This study's independent variables are stroke education on risk factors, warning signs; activation of EMS, age, gender, tPA administration, and accepting medical strategies and management. The dependent variables are the length of stay on CVA patients, accepting medical strategies and management, patient discharging decisions (home or rehab), and complications among the elderly aged 60 and above. The data underwent various analyses and modeling techniques to produce the outcome of this study. This literature review provides the credibility, validity, and feasibility with data collection constraints, where applicable, to complete the task.

This section on the literature includes several areas. The first is the literature review strategy. The second is a discussion of this study's theoretical and conceptual framework, the health belief model, and the public health framework. The chapter concludes with a literature review related to stroke education and management on risk

factors; warning signs; activation of EMS, age, gender, tPA administration, accepting medical strategies and management, length of stay on CVA patients, accepting medical strategies and management, patient discharging decision (home or rehab), and odds of complication among the elderly aged 60 and above

Past research was examined for their purpose and implication on understudied topics, with recommendations for further studies. This comprehensive summary of previous research on this current topic concludes by enumerating, summarizing, describing, objectively evaluating, and clarifying the recent study's actions. For the future, clinical personnel will have knowledge built in this field of medicine through the previously collected evidence base data. Chapter 2 has then conclude with a summary as a segue to Chapter 3 on research methodology.

Literature Review Method/ Strategy

The literature review on stroke education and management outcomes on CVA patients considered diverse geographic locations and economic conditions. Achieving this literature review required gathering articles from many sources. The primary sources for this literature review were from the Walden University Library. This study incorporated the Walden online library for current peer-reviewed papers from the following databases: Medline, CINAHL, ProQuest Dissertation and Thesis Global, World Health Organization, Medline Plus, and Thoreau multi-database search. The American Heart Association, as well as National Stroke Association, were also advantageous search engines. The investigation purposely focused on the literature on stroke education and management outcomes on hospital stay, CVA patients in Bermuda with stroke, stroke education, stroke medical management, developing countries, and Bermuda in several

databases. Nonetheless, the study also incorporated age, ethnicity, gender, quality of life, health belief theory, and public health model.

This study engineered the literature search strategy and search methods to limit articles within the past 5 years, but intermittently, some classic pieces were interjected within and beyond 10 years. Acquiring skills and synthesizing the selected research articles would be the focal aspect of a doctoral education; hence, studies focusing on stroke were not limited. Some empirical data were analyzed and evaluated for quality and similarity towards this study's aim and purpose. The literature review concluded with eight key variables: length of stay, stroke education on risk factors, warning signs and activation of EMS, discharging decision for home or rehabilitation, accepting medical strategies and management, tPA administration reducing the odds of complication among the elderly age 60 and above, age, and gender. The literature review also embraced a seminal article on the theoretical framework.

Length of Stay

Chikafu and Chimbari (2019) systematically searched the literature from 2008 to 2018 in major databases for studies on cardiovascular diseases, including stroke. Eight countries were involved in this review, and 18 studies were selected. Of the studies, 88.8% followed quantitative methodology, which primarily focused on inpatient stroke care. Additionally, two-thirds of patients sought care within 24 hours of suffering stroke, and the length of stay in hospital range between 6 and 81 days. The results revealed that the trend in LOS was negatively affected by health policy shortcomings and limitation of physiotherapy availability. There has been a rising trend in CVA trend, and cardiovascular disease is a major contributing factor. Physiotherapy (PT) would not be an

issue in Bermuda since the Stroke Unit has PT active involvement. The study outcomes shed light on my study since I researched some variables using the measurement method. Notwithstanding, length of stay incorporates admission date and time.

Stroke Education on Risk Factors, Warning Signs, and Activation of Emergency Medical Service (EMS)

Stroke education is essential to everyone since it can provide health literacy in this high prevalence arena. Individuals' information would be processed and necessary health information on stroke and services provided to make appropriate health decisions. In contrast, limited information on stroke could add to increased medical services and increase stroke incidence. Notwithstanding, there are many barriers to encounter with little stroke education. Stroke education on risk factors, warning signs, and Emergency Medical Service (EMS) activation could influence ethical/racial status. Bermuda has a diverse population, which could affect their health literacy. Green et al. (2019) study was a systematic review that comprehensively identifies and describes the impact of ethnic/radical status on access to care after the onset of stroke symptoms. There are common significant markers that relate to my studies, such as stroke education and decision making.

Nonetheless, the Bermudian population consists of diverse, different ethnic groups. This study under review has highlighted how reducing health-related disparities could improve treatment outcomes among ethnic stroke patients. This study could assist my dissertation by underscoring the potential hindrances in navigating through the ethnic differences related to stroke education and discharge planning within Bermuda. So, tweaking the strategies and outcomes would be necessary for my study population.

Discharging Decision - Home or Rehab

Discharge decision for home or rehab is a paramount aspect of a CVA patient's journey. Discharge decision-making is a part of the recovery process, which must be actualized to achieve a thriving quality of life post CVA. Relatives of CVA patients could play an integral role in this process. To develop a quantitative instrument, Alexandrov et al. (2019**)** explored patients' and families' lived experiences during acute stroke hospitalization. The patients' perceptions of healthcare quality were also a key factor examined in their study and incorporating electronic pads to maintain confidentiality. Overall, their research has reinforced the significant value of the family in the recovery process. Their study's insight has highlighted the efficacy of patient perception and its effect on stroke management. However, no authors have ever explored stroke perception reports, enabling understanding of patients' and families' beliefs about stroke care, an essential new domain. This revelation has created a gap investigated in this study since discharge decision is a variable to be understudied and paper surveys, structured ideally in a patient-friendly manner and accessible for future computer-based login.

Life after stroke is essential, Wray et al. (2019) studied the importance of discharge planning, home, or rehab. This study highlighted how stroke survivors with communication difficulties manage life after stroke in the first year. Life after stroke in the first year could be challenging due to possible significant changes in lifestyle practices. This study's limitation was only the first year after stroke would be reviewed and expound upon for this study.

Accepting Medical Strategies and Management

English et al. (2019) evaluated clinical stroke guidelines and how practical these guidelines are in managing stroke. The NIHSS guidelines are one such guideline that plays an integral part in managing stroke patients in Bermuda; therefore, this study has brought about affirmative recommendations. For example, allowing patients to accept medical strategies and management with confidence identifies and acknowledges hospital procedures during their hospital stay. Notwithstanding, the relevant authorities would tweak these guidelines to patient specificity.

Their descriptive qualitative study conducted by Pokorney et al. (2019) further explored patients' and physicians' decision-making regarding oral anticoagulants (OACs) for stroke prevention in atrial fibrillation. Patient involvement in decision-making facilitated engagement in the decision-making process. However, this study was only limited to patients' and physician's involvement in the decision-making process. Therefore, my dissertation would not be limited to the patient but incorporate relatives and caregivers since the relatives and caregivers would assist with decision-making if the patient was severely affected by stroke (unconscious).

tPA Administration

tPA administration plays a critical role in patients diagnosed with a CVA significantly related to ischemia, a blockage in an artery that supplies blood to the brain. tPA is a time-sensitive treatment efficacious within a specific window period achieved through an effective response team. Wiske et al. (2020) study emphasize this fact in evaluating time to cure and in-hospital outcomes of pulmonary embolism response teams. They further added that a multidisciplinary discussion is also critical for successful

results. They found out that the delay in tPA administration resulted in poor outcomes. Overall, the involvement of an interdisciplinary team approach in managing a time-sensitive condition, CVA, has proven to be advantageous.

Notwithstanding, there are challenges of tPA administration in developing countries due to the drug's limited availability. Abanto et al. (2020) expounded on this fact in Peru, where the burden of disability due to ischemic stroke is highest. They found out that the administration of tPA had similar safety and outcomes compared to developed countries. Hence, the non-administration of tPA had adverse effects on patients, resulting in long-term disabilities with personal and national economic burdens.

tPA Administration Complications Among the Elderly, Age 60 and Above

Sanchez et al. (2020) did a cross-sectional study using prospective collected patient data through a “tele-stroke” network from 2013-2015 across 29 community hospitals. Their target population was >80 years or younger. Their primary focus for the study was to examine the outcomes after intravenous tissue plasminogen activator (tPA) administration in elderly patients with acute ischemic stroke. Their research revealed that tPA administration is higher than those reported in the literature, and the rate was not different in octogenarians compared to younger patients. These patients (octogenarians) were not at risk for deterioration after tPA administration; however, they had a higher chance of poor outcomes. Sanchez et al. (2020) study's limitation was that their focus was primarily on octogenarians and tele-stroke networks. This dissertation was focused on elderlies 60 years and older admitted and treated in the hospital setting as an in-patient.

Age

Nacu et al. (2016) aimed to evaluate how stroke subtypes and vascular risk factors vary with age in a western Norway stroke population. The population age ranged between 15- 100 years over six years (2006-2012). Age has three categorical sections: 15-49 years for young, 50-74 years for middle-aged, and 75 and above for elderly. The mean age was 70.8 years, and 228 patients were classified as young. The elderly results were higher with cardioembolism, and the proportion of stroke from other determined causes was highest among the young. In sum, the study revealed that the proportion of stroke subtypes and vascular risk factors are an age-dependent limitation. Nacu et al. (2016) reviewed that their stroke test was only for a particular population, with MRI only given to specific individuals. The author did not explore other determined causes for stroke. For this dissertation, all patients had an equal opportunity for stroke treatment and management, eliminating bias.

Gender

Ciardi et al. (2020) study identified gender differences with ischemic stroke. Their research aimed to explore gender differences regarding 90 days outcomes in large vessel occlusion (LVO) strokes receiving treatment. A total of 288 patients comprised the study population. One hundred forty-eight were females, and 140 were males. The study overall revealed females to be more likely to achieve good outcomes after treatment than their counterparts. In their research, as a part of their management strategy, the NIHSS was utilized. The limitation to their study was that they only focused on LVO. This dissertation's focus has been on all types of strokes and the effect on gender.

The limited research studies on stroke in Bermuda are insufficient to reduce the high stroke rate and postulate awareness of this disease. Notwithstanding, stroke education and management outcomes on CVA patients' hospital stay in Bermuda could affect all age groups, especially those at high risk and the elderly. Pokorney et al. (2019) endorsed this statement and added that improved access to decision aids could increase patient engagement in the decision-making process. There has been a rising trend of CVA patients in Bermuda, acknowledging the importance of appropriate stroke management and clinical guidelines.

Theoretical Framework Foundation

This study's theoretical framework employed the H Belief Model (HBM) and the Public Health Framework. During the mid-20th century some, social psychologists in the Public Health Services developed the HBM to explore the rationale for a widespread failure of individuals not taking the initiative to be active towards healthy living (Champion & Skinner, 2008). The HBM study an individual’s response in their behavior towards a symptom and diagnosis of a disease and their adherence to medical management (Champion & Skinner, 2008). Four constructs compose the HBM: (a) perceived susceptibility to an adverse condition, (b) perceived severity, (c) perceived benefit, and (d) perceived barriers. This theory has further explain the association between the knowledge base and social development in determining epidemiology profiles.

Public health problems are diverse and incorporate infectious diseases, chronic diseases, emergencies, environmental threats to health, and other general health-related abnormalities. For example, community sanitary measures were practiced in 500 BCE by

the Greeks and Romans. In the 1840s, the United Kingdom established the Public Health Act and founded the Environmental Protection Agency in 1970. Winslow (1920) believed that public health was the science and art of preventing disease, prolonging life, and promoting health. He further added that organized efforts and informed choices of society, organizations, public and private communities, and individuals would be possible. Similarly, the Institute of Medicine (1988) highlighted the Mission of Public Health to be fulfilling society's interest in assuring conditions in which people can live a healthy life. On the other hand, WHO (2019) stated that the world faces multiple health challenges and reaching the goal could require an approach from various angles to address the health threats.

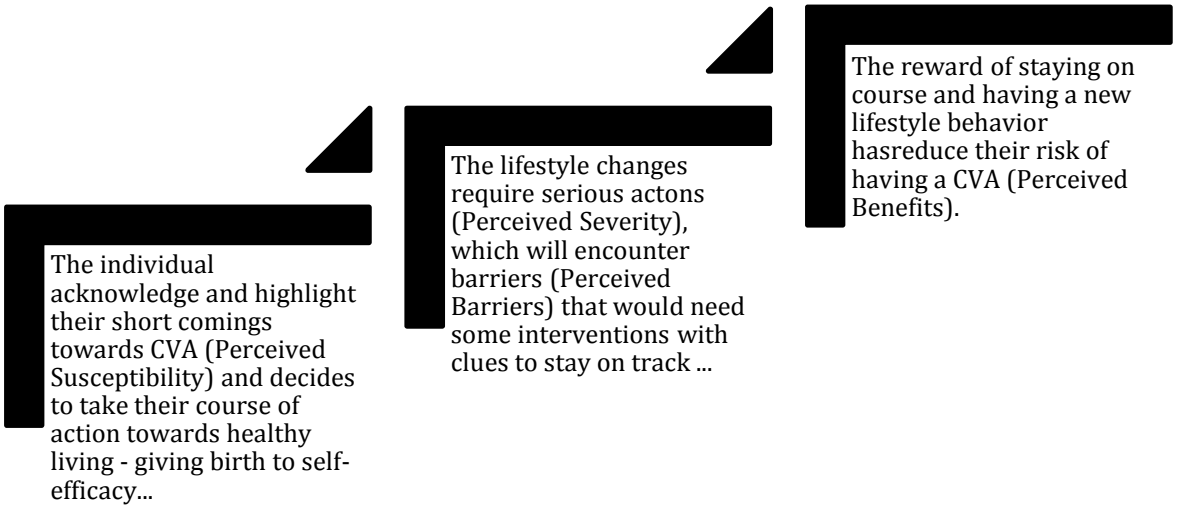
The Public Health Framework focuses on two key elements, the problem and the response (CDC, 2019). Notwithstanding, there are steps to achieve the key segments and obtain desired goals and successful outcomes. The initial step would be to fo the current problem presented to the public, followed by the problem's possible cause (identifying risk factors). Practical intervention evaluation (testing prevention strategies) for the population underscored the final step of implementing these strategies by assuring widespread adoption of the new policy and procedures (CDC, 2019). Epidemiologists incorporated the public health framework to combat pandemics such as Influenza - 500 million infected worldwide in 1918, Polio – 1955 vaccination launched an eradication initiative in 1988, and HIV - 34 million living with this disease worldwide with a 20% decline in new infections since 2001 (CDC, 2019). John Snow, the Father of Epidemiology, utilized the public health framework for the cholera outbreak source. During the early 1800s in London, Cholera, a fatal intestinal disease, was rampant.

The health belief model recognized the significance of health behaviors in Bermuda concerning self-efficacy, threat, perceived barriers, and perceived benefits (Jones et al., 2016). Rosenstock (1974) further added that individuals would have to believe they were susceptible (perceived susceptibility) for an individual to take full responsibility for their life. As it relates to Bermuda, the individuals have to believe that they could severely impact their life (perceived severity); due to their actions to prevent or manage stroke, no barriers would be encountered (perceived barriers). Their efforts would then be beneficial (perceived benefit) and practical for individuals to become overcomers. The HBM has also integrate cues to action, which could assist individuals remember the critical steps in living a healthy lifestyle and identifying stroke—resulting in eliciting elements and maintaining a pattern of behavior, especially in high-risk stroke individuals (Grizzel, 2003).

Stroke Education and management outcomes on CVA patients' hospital stay in Bermuda varied based on these demographic variables: class, gender, ethnicity, and age groups, especially those at high risk and the elderly. Therefore, Patients in Bermuda involved in their care could be advantageous through the initial pre-stroke education and screening phase (Lowres et al., 2019), followed by the emergency room treatment, which would accompany further medical management in maintenance. However, the responsibility to improve and protect our health ultimately lies with the government, communities, and eventually individuals (Department of Health, England, 2012). Thus, various factors influence public health throughout a lifetime, which requires prompt attention for successful outcomes (Figure 2). The Public Health Framework has assisted in executing this job.

Figure 2

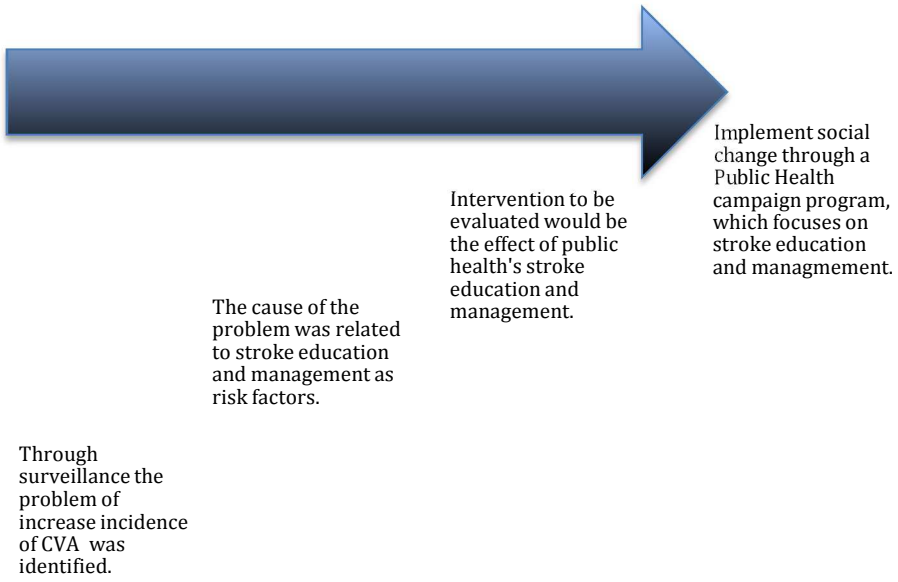
Health Belief Model for Stroke Education and Management



This study has reflected the Public Health Framework and its result since it incorporated the public's responses to the CVA epidemic situation (Tang et al., 2018). Inevitably, this has assisted the nation's health and wellbeing and bring about social change by improving its health, emphasizing the low socio-economic group. Thus, health life expectancy would increase and reduce life expectancy differences and healthy life expectancy between communities (Department of Health, England, 2012). The Government's involvement has been paramount to ensure continued success. Nonetheless, public health values should incorporate equity, social justice, participation, efficiency, effectiveness, acceptability, affordability, and accessibility. The aim of the Public Health Framework has been to reduce the current stroke incidence in Bermuda (Figure 3).

Figure 3

The Public Health Framework for Stroke Education and Management



Background Information

Current Stroke Situation in Bermuda

Stroke is the third leading cause of death in Bermuda, creating a critical public health issue with a high mortality rate (Institute for Metrics and Evaluation, 2017). Bermuda has never tabulated or investigated the rationale behind the increased incidence of stroke in the country. Several research pieces published articles on stroke mortality rate and incidence in the United States, but none to the best of my knowledge has analyzed Bermuda's. Approximately 2 to 3 patients visit the hospital (BHB, 2018), representing new and old stroke cases. The research failures create an incumbent investigation, and analysis to address this issue would result in this study's inauguration.

Numerous advances in modern medicine, medical technologies, and medications have not reduced the incidence of a stroke in individuals, especially in Bermuda. Thus, stroke has increased Bermuda's public health and economic burden while imposing a substantial mortality risk to individuals. Patients are surviving stroke with disabilities; hence, the possibility of poststroke depression could be considered inevitable. Hamid and Mackenzie (2017) believe that this undeniably could be possible, and the solution would be depression screening immediately post-stroke. Patient’s perception of the stroke services quality is imperative since this could alleviate anxiety towards their physical, mental, and emotional needs.

There is a plague in Bermuda in the low socioeconomic group with hypertension and cardiac diseases such as atrial fibrillation and other cardiac-related illnesses. Inevitably this has placed them at a higher risk of having a stroke with these underline chronic illnesses. Epidemiology reports have proven that the treatment of hypertension,

anticoagulation for patients with atrial fibrillation and elderly individuals (particularly those of low socioeconomic background) would benefit from primary health interventions about stroke (Prior & Suskin, 2018). Besides lifestyle changes, such as exercising, economic dieting, and family support in medical education management plus post-stroke care (Prior & Suskin, 2018).

Length of Stay (LOS) on CVA Patients

Adherence to all medication is principal, especially in patients with stroke since it could contribute to hospital length. Some complications are non-compliance to drugs, which creates more medical issues for prolonging hospitalization. Oliveira-Kumakura et al. (2019) highlighted the relationship between anticoagulation medication adherence and satisfaction in CVA patients. Their study has addressed this issue and explore its effect through medical management and patient compliance. Adherence and compliance are fundamental in the direction of stroke patients to accomplish the desired results. The National Stroke Association (2019) highlighted some comorbidities: hypertension, diabetes, hypothyroidism, hypercholesterolemia, and smoking history were not significantly associated with higher LOS in intensive care.

LOS could be positively affected by improving treatment modalities and strategies regarding prevention and the present clinical complications. The stroke complications have affected LOS in ICU, hospitalization cost, and outcome after a stroke (Wangqin et al., 2018). Bathini et al. (2020) added that the economic burden could worsen with more acquired medical complications that patients cannot afford treatment. The hospital would then have to provide the necessary treatment, which has inevitably negatively affected the budget. A stroke could increase morbidity and produce an

economic burden to patient families (Quin et al., 2020). Therefore, careful assessment of the patients and the immediate introduction of a treatment, especially tPA, could affect a patient's LOS in the hospital. Mayo Clinic (2019) believed that stroke symptoms and causes are paramountly requiring effective management. Nonetheless, a specific window period needs to be adhered to and activate a prompt response.

Stroke Education on Risk Factors, Warning Signs, and Activation of EMS

Cardiac disease has been the number one leading cause of death in the United States and Bermuda. Cardiovascular disease such as atrial fibrillation could predispose an individual to stroke. Hence non-compliance to stroke education and medical management could significantly contribute to an individual having a stroke. (Lowres et al., 2019). Stroke education has been affected by health literacy; a fundamental component often overlooked. This process has harmed stroke literacy since stroke education would affect the prevention and management of CVA in an individual. According to WHO (2013), low levels of literacy associates with more inferior health status. Therefore, it is paramount that the health care provider appropriately assesses an individual's literacy level before proceeding to stroke education and management.

Chikafu and Chimbari (2019) underlined the care patients sought within 24 hours of suffering stroke and the length of stay in hospital range. The results revealed a rising trend in cardiovascular disease admissions within total hospital admissions. Patients' involvement in their care through the initial pre-stroke education and screening phase (Lowres et al., 2019), followed by the emergency room treatment, further medical management could be advantageous globally. They would maintain some autonomy in the care delivered to them. Additionally, functional capacity and social support to

individuals affected by stroke are vital in the stroke education phase (de Lima et al., 2019). The patient's quality of life could decrease, accompanied by morbidity and mortality rates increasing due to non-compliance to education and other medical management.

Stroke is a significant emergency that can cause substantial morbidity and mortality. A stroke is a time-sensitive emergency that requires a high level of coordination, commencing from the prehospital phase (Alabdali et al., 2020). The quality of stroke service and treatment methodologies are essential for individuals suspected of having a CVA. American Heart Association (2018) believes that the Emergency Medical Services are critical for the early treatment of patients with CVA. Patients loved ones and caregivers are apprehensive about the disease process, and its management patients loved ones and caregivers are anxious about the disease process and its direction.

In recent years, the advancement in stroke management has facilitated access to more treatments delivered to patients by stroke teams (Alabdali et al., 2020). Hence, EMS transportation plays an integral part in reducing prehospital delay and the likelihood of early arrival and timely treatment for CVA patients. Triage will be shorter with positive affected resulting in accelerated patient management. Stroke education is vital to facilitate and activate this service for this to be apparent and practical. Hong-Qui et al. (2019) added that developing an efficient EMS system and promoting culture-adapted education efforts should be adopted and executed for improving EMS activation.

Discharging Decision (Home or Rehab) Process

Communication is an indispensable tool that would benefit stroke survivors and their loved ones/ caregivers. There are stroke survivors who present with communication

difficulties, which could be hindrances to complete recovery. Wray (2019) article would attest to this fact on being integral with stroke survivors. Their study relates to the research study because it could connect with my variables: discharge planning, home, or rehab. Life after stroke is essential; hence, this article would offer awareness to my study. Stroke survivors should not feel inferior and incompetent to recover from their current physical disabilities. They should instead feel empowered and motivated to return to their original state before the stroke.

Post-stroke care will benefit from a structured and evidence-based program. Elchner et al. (2019) believe this is promising because it would inevitably improve stroke care after hospital discharge. Notwithstanding, the impact of gender and age could accompany stroke prevalence, stroke mortality and ultimately affect post-stroke care, especially in Bermuda. Although Bermuda has a diverse population since a third of the people are expatriates, the local population consists of a mixed race. This study did not examine ethnicity and race, impacting access to care and outcomes (Green et al., 2019). An individual's knowledge, attitude, and lifestyle practice could be an asset or liability to their stroke care process after discharge from the hospital (Jenkins et al., 2018). An individual's age is of paramount importance in their stroke care process.

Accepting Medical Strategies and Management

Stroke management must follow clinical guidelines to achieve maximum affordable outcome evidence-based medicine. Notwithstanding, the fundamental factor in stroke is time, since the brain ages 3.6 years for every hour deprived of blood supply (Saver, 2006). These guidelines' effectiveness would be crucial as they are chief in the delivery of stroke patients. English et al. (2019) evaluated the clinical stroke guidelines

and how practical these guidelines are in managing stroke. The NIHSS guidelines are one such guideline that plays an integrated part in the management of stroke patients in Bermuda; therefore, this study has brought about affirmative recommendations with these guidelines. English et al. (2019) added that adopting clinical practice guidelines would infuse patients' evidence-based clinical care.

Chugh (2019) added that intravenous thrombolysis and mechanical thrombectomy are two treatment modalities for ischemic stroke. Management of stroke is time-dependent; Hugh (2019) stated that efficient and effective stroke care requires a well-functioning team from the emergency room to the neurologist and the interventional neurologist. Therefore, stroke treatment succession would depend on the entire team working smoothly and efficiently (Khathaami, 2018). The length of stay on CVA patients would be affected by the accurate diagnosis, emergent management to stabilize the stroke, and the correct imaging choice. It is bearing in mind that every minute lost in wrong imaging or lab testing results could decrease the functional outcome (Chugh, 2019). Further leading to ultimately irreversible paralysis.

tPA Administration Reducing the Odds of Complication Among the Elderly, Age 60 and Above

A window period involves a detailed prompt assessment of a CVA patient before administering tPA. This period would commence upon the first encounter with the patient until they arrive in the emergency room. Time to treatment has become a dominant factor with a high impact on a stroke patient's outcomes. Reperfusion therapies are critical for stroke patients, pending on the type of stroke they are diagnosed with, and as such, the development of scales is utilized (American Heart Association, 2018). Over the years,

intravenous recombinant tissue plasminogen activator (IV rt-PA or tPA) remains the ultimately proven therapy for acute ischemic stroke (Lima et al., 2019).

Relatives play a significant role in advocating for loved ones with stroke supporting patients in decision-making, treatment, and management. Not forgetting that stroke could clinically present with patients' comatose and unconscious features to speak or comprehend. Pokorney et al. (2019) stressed the importance of relatives being advocates in the medical decision-making process. Therefore, relatives must know the risk and benefits of accepting this treatment, tPA, since they play a focal part as advocates in the decision-making medical management process. tPA dramatical could improve the functional outcomes through reperfusion therapy, which has changed the stroke care landscape.

Age

Age is a significant factor in the incidence of stroke. The National Stroke Association (2019) emphasized that stroke could occur at any age; however, younger persons often deny this fact. Advancements in medical technologies such as CT Scans, MRIs, and MRAs have increased the detection of a stroke at an earlier stage, particularly among the younger age group (American Heart Association, 2018). CDC (2019) report revealed that the incidence of stroke increases significantly with age. Fang et al. (2012) acknowledge that more than two-thirds of stroke hospitalizations occurred in individuals 65 and older. In contrast, there has been an increased incidence of stroke, 3 to 23 per 100000 over the past 30 years, in the younger age group (Kissela et al., 2012). The major contributing factor could be poor lifestyle practices, predisposing them to obesity, diabetes, and other cardiac-related illnesses.

The CDC (2019) suggested that healthy lifestyle practices such as proper dieting and exercise could prevent a stroke at any age. Nonetheless, Sealy-Jefferson et al. (2012) study revealed that individuals over 75 years would experience half of all strokes. One-third of the stroke population would be from the 85 years and above age group. Fang et al. (2012) study revealed that the stroke rate could double every ten years, in both males and females, after 55.

Gender

Gender difference could be a critical factor in stroke occurrence since males and females have different therapeutic responses and medical treatment (Baird et al., 2015). Therefore, significant gender differences could emerge in the incidence, severity, and recovery from stroke. Tian et al. (2012) study reveals that males have a higher risk of stroke than females. Still, this disparity changes after menopause as stroke outcomes reverse to female's incidence increases compared to males of the same age. Hence, the stroke risk would double after menopause, but the premenopausal phase would protect the females from having an ischemic stroke instead of their male counterparts (Palm et al., 2011).

There is a difference noted in both clinical and laboratory parameters related to gender and stroke. Stroke is a disease that affects women unequally more than men (Bautista et al., 2020). Furthermore, the global aging population will enhance stroke prevalence, particularly among elderly females (Bautista et al., 2020). In contrast, Pizova (2018) study highlighted men had a higher incidence of stroke than women. They believe the contributing factor would be a lifestyle, and they associate only older women with

being in that category. Hence, genetic factors and hormonal changes could also be causative factors to be considered in patients with stroke, especially in Bermuda.

Jefferson et al.'s (2012) study reveals that a significant contributing factor for females' cardiovascular changes could be associated with menopause. On the other hand, exposure to endogenous estrogen would be a protective factor for stroke in premenopausal women (Lisabeth & Bushell, 2012). These findings are still debatable and not fully understood. However, gender differences should be recognized and considered integral in managing and administering stroke education and treatment (CDC, 2019).

Summary

The reviewed literature comprised research studies that concentrated on various risk factors associated with stroke (CVA). Additionally, the reviewed literature encompassed the association between stroke education and length of stay, education (prevention, compliance to stroke care), stroke management, tPA administration, tPA administration complications to the elderly, procedures done, age, and gender. Additionally, the Emergency Medical Service (EMS) activation has been critical with the treatment methodologies, affecting CVA patients' length of stay in Bermuda. Complications associated with length of stay in the hospital are possible and would acquire during the hospital stay. These complications would inevitably burden the patient, hospital, and nation (in general); notwithstanding, the non-compliance of medical treatment.

Notwithstanding, medical strategies and management has been associated with discharging the patient home or rehab. Pending on-time medical procedures commence and how effective the command would be on the patient; their bodies’ response could

determine their home or rehab outcome. tPA administration could affect the odds of complications among the elderly aged 60 and above Bermuda. tPA administration has a window period and specific medical instructions before usage for all age groups (Powers et al., 2015). However, the elderly, aged 60 and above, would have a narrow margin to receive tPA administration than their younger counterparts (Powers et al., 2015).

Kim et al. (2019) have revealed a reduction of stroke globally despite being the second leading cause of death after cardiovascular disease. However, Bermuda has been experiencing an increased incidence of stroke despite medical management. There has also been an increase in the aged population, which Kim et al. (2019) believe could predispose an individual to stroke. They think that approximately 50% of all strokes occur at age 75 and 30% over aperiod83.

The current study aimed to underscore stroke education and management on Bermuda's populace through various variables. The knowledge achieved from this study will explain the impact of stroke education and leadership and address the gap that exists in the system. Nevertheless, the Neurological Department of Bermuda Hospitals Board believes that stroke education on risk factors and warning signs has played an integral role in reducing the incidence rate on the island. Chapter 3 has addressed the study design, methodology, sample size, and instrumentation.

Chapter 3: Research Design, Methodology, and Analysis of Evidence

This quantitative study used previously collected data from the only hospital in Bermuda. This study's purpose was multifold, addressing stroke education and management in Bermuda and, by extension, to other adjacent countries. This study addressed a gap in the literature base regarding the outcome of stroke education and management on CVA patients in Bermuda. To address this gap in the literature, I explored the association between stroke education (prevention, compliant, and post-stroke care) and length of stay, stroke management, procedures administered to stroke patients, and tPA assessment, administration, and complication – especially among the elderly age 60 and above. The purpose of this study involved assessing stroke education on risk factors and warning signs.

This chapter includes the methodology section, research design, sample or participants, instrumentation, data sources, data collection, data analysis plan, and how to achieve the sample size in the methodology section. A description of the study's participant recruitment process is explained. A step-by-step interpretation demonstrates how to analyze the task through the data sources, data collection, and data analysis sections. The step-by-step process incorporated informed consent procedures obtained from participants.

Research Design

This study was quantitative research incorporated to test objective theories by examining the relationship among variables (Creswell, 2009). The variables were then measured, and the study's theoretical foundation, the health beliefs model, accompanied by the public health framework, was applied. Chapter 3 explored the methodology

utilized in this study to collect data required to address the research questions and test the associated hypotheses.

Participants or Variables in the Study

The study's source was secondary data from the Bermuda Hospitals Board (BHB) Neurology Department. Therefore, the complete dataset has been from BHB's Neurology Department. The hospital collected these data and saved them daily for hospital and patient administration purposes. Data is initially collected primarily from patients assessed by the Nurse and the Doctor from the CVA checklist. This checklist on the NIHSS and American Stroke Association provides a CVA guide for questions and treatment modalities. These CVA patients was from the emergency department or transferred from the ward to ICU. This survey was hospital-wide and nationwide since there is only one hospital on the island; it involved administering questionnaires to all stroke patients. The stroke manager had collected this initial data and placed them in different categories. I retrieved the Stroke Manager's data and put them in a secured file that required a password to be unlocked. This file then provided an analysis of the necessary variables for my dissertation. I initially extracted the files from the Bermuda Hospitals Board Neurology Department database.

The survey obtained data on stroke education, length of stay, stroke management, procedures administered, tPA, assessment, tPA administered with odds of complication among the elderly (60 and above), age, and gender. In addition, these variables were employed for descriptive purposes. Tables 1, 2 and 3 presented the operationalization of the dependent and independent variables for each research question. Table 1 displays the variables for research question 1 in 5 different categories: type of variable; name of

variable; definition and operationalization; recoded value; and the test used for the analysis.

Table 1

Variables for Research Question 1

Type of Variable	Name of the Variable	Definition and Operationalization	Recoded Values	The test used for the Analysis
IV** (nominal)	Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS)	The participants will state whether they receive stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) via social media, nationwide health advertisement, or stroke workshops.	1=No 2=Yes	Wilcoxon Test
DV* (nominal)	Length of stay	The participants' length of stay will begin from their initial walk into the hospital to their discharge date.	1= 0 - 7 weeks 2= beyond 7 weeks	Wilcoxon Test

Note. RQ: Research Question; *DV: Dependent Variable; **IV: Independent Variable.

RQ1: Does stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) significantly reduce the length of stay on CVA patients in Bermuda?

Table 2 displays the dependent variables for research question 2 in 5 different categories: type of variable; name of variable; definition and operationalization; recoded value; and the test used for the analysis.

Table 2

Dependent Variables for Research Question 2

Type of Variable	Name of the Variable	Definition and Operationalization	Recoded Values	The test used for the Analysis
DV * (nominal)	Accepting medical strategies and management	Whether participants are willing to take medical strategies and management	1=accepting medical strategies and management 2=not accepting medical strategies and management	Chi-square test
DV * (nominal)	Discharging (home or rehab)	If participants will be discharged home or rehab	1=discharge home 2=discharge to rehab 3=remain in hospital	Chi-square test

Note. RQ: Research Question; *DV: Dependent Variable; **IV: Independent Variable.

RQ2 Is there any association between patients accepting medical strategies and management and the discharging decision (home or rehab) process?

Table 3 displays the variables for research question 3 in 5 different categories: type of variable; name of variable; definition and operationalization; recoded value; and the test used for the analysis.

Table 3

Variables for Research Question 3

Type of Variable	Name of the Variable	Definition and Operationalization	Recoded Values	The test used for the Analysis
IV * (nominal)	tPA administration	The participants recorded as received tPA administration	1=Yes 2=No	Logistic Regression
DV * (nominal)	Complications among the elderly	The participants' recorded reaction to the tPA administration	1=no complication 2=complications	Logistic Regression
Covariate (categorical)	Age	The participants' age group	1=40-50 2=51-60 3=61-beyond	Logistic Regression
Covariate (nominal)	Gender	The gender of the participants	0=male 1=female 2=other	Logistic Regression

Note. RQ: Research Question; *DV: Dependent Variable; **IV: Independent Variable.

RQ 3: Does tPA administration significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender?

Operationalization of the Dependent and Independent Variables

I will incorporate the Wilcoxon Test for RQ1. RQ1 asked: Does stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) significantly reduce the length of stay on CVA patients in Bermuda? Wilcoxon Test has allowed me to compare the length of stay between the two groups – stroke education (*yes*

or *no*) and length of stay (continuous outcome) to measure the reduction of the length of stay.

H_o1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) does not reduce the length of stay on CVA patients in Bermuda.

H_a1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) significantly reduce CVA patients' length of stay in Bermuda.

In RQ 2, there was nothing to predict; hence, the Chi-square test of independence was the most appropriate test. RQ2 asked: Is there any association between patients accepting medical strategies and management and the discharging decision (home or rehab) process?

H_o2: There is no association between accepting medical strategies and management and patient discharging decision (home or rehab).

H_a2: There is an association between accepting medical strategies and management and patient discharging decision (home or rehab).

I incorporated Logistic Regression for RQ 3. RQ 3 asked: Does tPA administration significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender? The Logistic Regression test predicted the probability of difficulty.

H_o3: tPA administration does not significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

H_a3: tPA administration significantly reduces the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

The Stroke education on risk factors, warning signs, and activation of Emergency Medical Service was a nominal variable. Participants indicated with a yes or no response on whether they got any stroke education before administration. Length of stay was a continuous variable. The participants' discharge date incorporated day one of admission to 52 weeks pending discharge. The discharge decision was a dichotomous variable measured on the demographic survey and scaled as nominal. Participants' responses reviewed data collected on their decision on care, home, or rehabilitation. Accepting medical strategies and management was a nominal variable. Participants indicated whether they would receive treatment, yes or no. tPA administration was a nominal variable. A yes or no answer from participants after being assessed by tPA administration is required. tPA administration complications among the elderly, age 60 and above was a nominal variable. This variable was measured from participants' hospital records responding with a yes or no to tPA complications. Age was classified as a categorical variable with an age range of between 40 to 90. Gender was a dichotomous variable with nominal scaling.

Time and Resources Constraints

The study took place at the only hospital in Bermuda. The data was obtained from the Neurology Department health records. They incorporated a survey from the patient, which took approximately 30 to 45 minutes to complete. This survey merged with the admission database for CVA patients. Time and resource constraints were then negligible for this study.

Research Design Required to Advance Knowledge in the Discipline

This study uses a cross-sectional design to collect existing data and answer the research questions. This research design had the advantage of proving and disprove my assumptions and provide CVA evidence-based data. In addition, cross-sectional was cost-effective and did not require much time while capturing a specific point in time. Therefore, multiple variables at the data snapshot were analyzed, highlighting the prevalence of CVA patients in Bermuda. This process has advanced knowledge in the disciple and produce new awareness for all caregivers and patients.

This study was quantitative research, which focuses on the association between accepting medical strategies and management and the discharging decision (home or rehab) process. I employed the HBM to address the research questions through the data collected from the Neurology Department. The variables tested are represented within the data collected. The NIHSS was utilized, by the department, to assess the medical strategies and management. The research design provided the framework for using the Wilcoxon Test, Chi-square test of independence, and Logistic Regression to examine the association among the variables using a sample. Results from these statistical tests was then generalized to a larger population.

Methodology

Population

The target population included all the socio-economic levels in Bermuda. Incorporate all patients admitted to the hospital with CVA. Participants recruited was between 40 to 90 years of age over two years (2019 -2021). They did not have to be Bermudian citizens since the population comprises expatriates and locals.

Sampling and Sampling Procedures

Bermuda is a small country with 65,000; hence, I selected a manageable version of the people. Representing a subset containing the characteristics of the study under review was selected. Accordingly, a convenient sampling method was established and incorporated to acquire the data for this study. Due to my dissertation's time restriction, a suitable sample was applied, data was restricted and only available in Bermuda. It was uncomplicated, economical – no funds for elaborate resources, and research-friendly – retrospective data. The sample size was relatively small due to the population size; therefore, the participants were selected based on the clear inclusive criterion (Vogt & Johnson, 2016).

Notwithstanding, the sample size for selecting participants for the study was calculated to detect a 95% confidence interval, a statistically significant association between patients accepting medical strategies and management, and the discharge decision (home or rehab) process. The Neurology Department census data estimated a 100% acceptance rate and use the average number of 120 patients (mixed gender). Thus, approximately 120 patient records were available to collect from the Neurology Department, bearing in mind that not all CVA patients entered the hospital was selected since they may not have met the criteria. I obtained permission to access the data from the relevant Heads of the Department and Research Committee.

Power Analysis

I used a convenient sample in this study—a power analysis calculated to ensure that the investigation has enough selection to address the research questions. There are three elements to consider before activating the power analysis. These elements include

effect size, alpha, and the desired power for the statistical analysis. The effect size defines a quantitative measure of the strength of a phenomenon and emphasizes the size of the relationship or difference.

Other elements considered were alpha and power. Alpha is generally established beforehand as 0.05 or 0.01. Larger alpha values would result in a more negligible probability of committing a type II error that could increase the power (Chow et al., 2017). The power rises when a researcher increases sample size, effect size, and significance levels. In my study, G*Power was utilized as a priori calculation for logistic regression, given an alpha level of 0.05 (two-tailed) and 90% power for an estimated odds ratio of 2.3. From this calculation, I determined that a total of 120 participants would be required to detect a statistically significant difference between tPA administration and the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

Recruiting Procedures

Participants selected from the Neurology Department were patients diagnosed with CVA. Data were routinely collected from these participants to achieve the statistics on assessed and diagnosed patients with CVA. The Nurses obtained informed consent during the admission phase, which would be upon arrival to the hospital. All participants were selected automatically until the desired sample size was achieved, approximately 253 participants.

Ethical Procedures

The Chief of Medicine, the head of Neurology, and the Research Appraisal Team (this team functioned like an IRB) were approached to acquire permission to use hospital

data. Walden University IRB was the next step on the list. The Stroke Manager would initially store the data collected from the Neurology Department patient then further transfer it to the hospital's Health Information Management Service (HIMS) department for other medical purposes. I had access to this data on my personal computer, password-protected, and data encrypted for hospital data privacy. Bearing in mind that this data would contain patient information for the analysis of this study. The Stroke Manager played an integral role in the Neurology Department since a significant part of the job description was data collection within the hospital (from the emergency department to patients discharged to home or rehab). Hence, I had to liaise with the Stroke Manager for any required additional assistance.

Instruments and Operationalization of Constructs

The Neurology Department utilized the NIHSS and American Stroke Association checklist to develop questions and treatment modalities. All stroke patients encountered a questionnaire that primarily assists with medical intervention and data collection. The variables for this study were from this questionnaire. Therefore, all the instruments were validated and tested for reliability. The NIHSS checklist/survey's reliability and validity have proven successful by Neurologists and Neuroscience Nurses (Hinkle, 2014). Hence, the NIHSS was a measurement instrument that was reliable, dependable, stable, consistent, predictable, and accurate across time. However, it was an observational scale associated with a physical examination, which was relatively safe and reliable to measure and produce the same results when utilized by different individuals (Hinkle, 2014)—referring to inter-rater or interobserver reliability, using an intraclass correlation coefficient.

The validity of the NIHSS in behavioral measures referred to how efficiently the instrument measures the construct measured. Additionally, there are various ways in which the NIHSS can study. Hinkle (2014) identifies the validity of the NIHSS as a factor analysis, which is a statistical process. This process incorporated establish how individual items cluster around a dimension. The clinical predictive validity of the NIHSS practiced by the Neuroscience Nurses has become functional, especially when working with families on discharge planning (Hinkle, 2014). The NIHSS provided pertinent information proven through many clinical studies since it has validity.

Threats to Validity

The primary threat to the design's internal validity was collecting, managing, and analyzing the data. During the collection process, the possibility of incorrect volunteer data from participants and death arises. Hence, managing the data collected presented a challenge with the recording of complete responses from participants. In addition, threats to validity in the data analysis process arrived through participants' initial interview results based upon fear of the unknown. This could be based on a lack of resources to fund hospitalization or medical treatment/s. Therefore, their information could be bias.

Data Analysis

The relevant data from the survey was analyzed by IBM SPSS version 27. All data collected was included to determine the statistical outcome. Hence, the Wilcox test, Chi-square test, and Logistic Regression were employed to conclude the results. In addition, I incorporated descriptive statistics and inferential statistics into the study.

Descriptive Statistics

The descriptive statistics provided brief descriptive coefficients, which summarized the entire population's data set. Therefore, I measured the central tendency, variability, standard deviation, kurtosis, and skewness. In addition, I was able to obtain range, quartiles, absolute deviation, and variance. The ranges provided baseline data to the scale variables on stroke education and management, accepting medical strategies, and discharge decisions (home or rehab).

Inferential Statistics

Inferential statistics, on the other hand, allowed for predictions from the data. Data from the samples were retrieved for generalizations about the population. Inferential statistics utilized the statistical model and compared the selection obtained to other examples or previous research. Logistic regression was used as an analysis for inferential statistics to be actualized.

Summary

This research study examined the association between stroke education, stroke medical strategies, the effect of warning signs and activation of Emergency Medical Service for CVA patients, length of stay, and patient discharging decision (home or rehab). To conclude, this study would be a significant contributor to evidence-based medical practice. Hence, it would be paramount in disseminating scientific knowledge of this subject to other Caribbean countries to underscore the effects of stroke management and outcomes on CVA patients.

Chapter 4: Results

The purpose of my quantitative dissertation was to explore the association between stroke education and length of stay, discharge decision, stroke management, procedures completed, tPA assessment, and tPA administered with odds of complications among the elderly (60 and above). This chapter contains the results of the analysis. I restated the research questions and the hypotheses in this first section. The second section discusses the content of the quantitative dataset utilized for the study, incorporating the sample's baseline descriptive and demographic characteristics. Finally, in the last quarter, I reported the study results for each research question. Chapter 5 then included the discussion, conclusion, and recommendations following the results of the analysis.

Research Questions and Hypothesis

The research questions and their respective hypotheses were as follows:

Research Question 1 (RQ 1): Does stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) reduce the length of stay for CVA patients in Bermuda?

H_o1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) does not reduce the length of stay on CVA patients in Bermuda.

H_a1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) significantly reduce CVA patients' length of stay in Bermuda.

Research Question 2 (RQ 2): Is there any association between patients accepting medical strategies and management and the discharging decision (home or rehab) process?

H_o2: There is no association between accepting medical strategies and management and patient discharging decision (home or rehab).

H_a2: There is an association between accepting medical strategies and management and patient discharging decision (home or rehab).

Research Question 3 (RQ 3): Does tPA administration significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender?

H_o3: tPA administration does not significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

H_a3: tPA administration significantly reduces the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

Origin and Description of the Dataset

I conducted the secondary data analysis for the dissertation by utilizing a subset of quantitative data collected from the Neurology Department of The Bermuda Hospitals Board. The Stroke Checklist led the initial evaluation in collaboration with the Medical Stroke Director and the Stoke Manager to produce this dataset.

Discrepancy from Original Plan

I calculated a power analysis to ensure that the investigation had enough selection to address the research questions. In my study, G*Power was utilized as a priori calculation for logistic regression, given an alpha level of 0.05 (two-tailed) and 90% power for an estimated odds ratio of 2.3. Hence from this calculation, I determined that a total of 120 participants would be required to detect a statistically significant difference between tPA administration and the odds of complications among the elderly aged 60 and

above in Bermuda, controlling for age and gender. I adjusted the initial 120 sample size due to the data collected from 2019 – 2021; I decided to increase my sample size to 253.

The total number of patients seen between April 2019- April 2020 amounted to 103 individuals, and for April 2020 – April 2021, it was 150 individuals. Therefore, the total sample size for the dissertation was 253 individuals. The data revealed eight deaths before evaluation, reducing the total sample size was 245. The variable of discharge decision (home or rehab) was not exclusive to the sample size of 253 patients but instead was further divided fractionally. These included death (33), air vac (27), and palliative care (27). The inclusion criteria for the variable age were age 60 and above; however, one participant was 37 years of age. This would then fall outside the original categories resulting in a total sample calculated being 252 due to this one default person.

Descriptive and Demographic Characteristics

Data collected over the allotted 2 years (April 2019 – April 2021), resulted in the following findings:

Table 4 displays the data collected over the two years period (April 2019 – April 2021). Three categories were incorporated in this table: name of variable; coded values; and number of patients.

Table 4

Data collected for April 2019 – April 2021

Name of Variables	Coded Values	Number of Patients
Stroke Education	1 = No	30
	2 = Yes	215
Length of Stay	1 = 0-7	236
	2 = Beyond 7 weeks.	17
Accepting Medical Management	1= accepting medical management	1 = 247
	2 = not accepting medical management	2 = 6
Discharge Home or Rehab	1 = home	1 = 169
	2 = rehab	2 = 10
	3 = remain in hospital	3 = 12
tPA Administration	1 = yes	1 = 33
	2 = no	2 = 3
tPA Complications	1 – no	1 = 32
	2 = yes	2 = 1
Age	1 = 40 – 50	1 = 8
	2 = 51-60	2 = 49
	3 = 61- beyond	3 = 195
Gender	0 = Male	0 = 151
	1 = Female	1 = 102
	2 = Other	2 = 0

Analysis

Research Question 1 (RQ 1): Does stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) reduce the length of stay for CVA patients in Bermuda?

H_o1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) does not reduce the length of stay on CVA patients in Bermuda.

H_a1: Stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) significantly reduce CVA patients' length of stay in Bermuda.

Table 5 shows descriptive statistics of two variables: stroke education on risk factors, warning signs, activation of EMS, and length of stay for 2019 - 2021. There was a total of 253 patients utilized for the sample. The variable stroke education on risk factors, warning signs, and activation of EMS has a mean of 1.88 (94%) with a minimum value of 1 (50%) and a maximum of 2 (100%). Thus, approximately everyone had some form of stroke education. Additionally, the variable length of stay has a mean of 1.07 (53.5%) with a minimum of 1 (50%) and a maximum of 2 (100%). The size of stay was coded as 1 = *0 – 7 weeks* and two = *beyond seven weeks*. Therefore, the results in Table 4 identify that majority of the patients were in hospital within the 7 weeks.

Table 5

Descriptive Statistics of Stroke education

						Percentiles		
	N	Mean	Std. Deviation	Minimum	Maximum	25th	50th (Median)	75th
Stroke Education on risk factors, warning signs, and activation of EMS	253	1.88	.329	1	2	2.00	2.00	2.00

Length of Stay	253	1.07	.258	1	2	1.00	1.00	1.00

Table 6 the Wilcox test was utilized to reveal a comparison between the length of stay between the two groups – stroke education (or *no*) and length of stay (continuous outcome) to measure the reduction of the length of stay. A rejection of the null hypothesis since the *p*-value is less than 0.05 (.000) was concluded. Hence, ***s***troke education on risk factors, warning signs, and activation of EMS is associated with CVA patients' length of stay in Bermuda.

Table 6

Test Statistics on two variables in RQ 1.

	Length of Stay - Stroke Education on risk factors, warning signs, and activation of EMS
Z	-14.077[b]
Asymp. Sig. (2-tailed)	.000

Note. a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Research Question 2 (RQ 2): Is there any association between patients accepting medical strategies and management and the discharging decision (home or rehab) process?

H_o2: There is no association between accepting medical strategies and management and patient discharging decision (home or rehab).

H_a2: There is an association between accepting medical strategies and management and patient discharging decision (home or rehab).

Table 7 includes the nominal variables Accepting Medical Strategies and Management and Discharge Decision (Home or Rehab) over two years (2019 - 2021).

The survey for this category included 194 patients with 165 accepted medical strategies and management and was discharged home. In contrast, four did not accept medical design and managing, but they were released home. Ten patients who received medical strategies and management were discharged to rehab, and 15 remained in hospital. None of the four who did not accept medical strategies and management were discharged to rehab or remained in hospital.

Table 7

Crosstabulation on two variabes in RQ2.

			Discharge Decision (Home or Rehab)			
			discharge home	discharge to rehab	remain in hospital	Total
Accepting Medical Strategies and Management	accepting medical strategies and management	Count	165	10	15	190
		Expected Count	165.5	9.8	14.7	190.0
	not accepting medical strategies and management	Count	4	0	0	4
		Expected Count	3.5	.2	.3	4.0
Total		Count	169	10	15	194
		Expected Count	169.0	10.0	15.0	194.0

Table 8 displays the result from the Chi-Square Test conducted. The Pearson Chi-square significance value of .739 indicated that the null hypothesis was retained. Thus, there is no association between patients accepting medical strategies and management and the discharging decision (home or rehab) process.

Table 8

Chi-Square Tests

	Value	Df	Asymptotic Significance (2-sided)
Pearson Chi-Square	.604[a]	2	.739
Likelihood Ratio	1.116	2	.572
Linear-by-Linear Association	.543	1	.461
N of Valid Cases	194		

Note. a. 3 cells (50.0%) have an expected count less than 5. Therefore, the minimum expected count is .21.

Research Question 3 (RQ 3): Does tPA administration significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender?

H_o3: tPA administration does not significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

H_a3: tPA administration significantly reduces the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender.

Table 9 displays the case processing summary for the total number of patients in the entire survey, 253—a total of 220 patients missing (87%) with 33 active participants (13%). Hence, there was only data on tPA administration for 33 patients (13%).

Table 9

Case Processing Summary related to RQ 3.

Unweighted Cases		*N*	Percent
Selected Cases	Included in Analysis	33	13.0
	Missing Cases	220	87.0
	Total	253	100.0
Unselected Cases		0	.0
Total		253	100.0

Note. a. If weight is in effect, see the classification table for the total number of cases.

Table 10 displays categorical variables codings. For example, the number of patients between the age of 51-60 was three patients in number, and for the age group 61 and beyond, there were 30 patients. Thus, three (3) and 30 reflected the number of patients in the sample between the age group 51-60 and 61 – over, respectively, who had tPA administration.

Table 10

Categorical Variables Codings

			Parameter coding
		Frequency	(1)
Age	51-60	3	1.000
	61-beyond	30	.000

Table 11 displays variables in the equation. The Sig value (.001) has assisted in rejecting the null hypothesis that tPA administration does not significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for

age and gender. The odds ratio represented in Exp(B) (.031) unstandardized beta B (-3.466) is an intercept in the model, which reveals that there are no predictors. An the Exp(B) is actually derived from 32/1 (from table 6) = .031. Meaning there is .031 or a 96% less chance (1-.031 X 100) of patients with no tPA administration complications.

Table 11

Variables in the Equation

		B	S.E.	Wald	*Df*	Sig.	Exp(B)
Step 0	Constant	-3.466	1.016	11.647	1	.001	.031

Table 12 displays the following variables and their statistical values: tPA Administration (.858), Age (.748), and Gender (.691). Again, the association was not statistically significant.

Table 12

Variables not in the Equation

			Score	*df*	Sig.
Step 0	Variables	tPA Administration	.032	1	.858
		Age(1)	.103	1	.748
		Gender	1.400	1	.237
	Overall Statistics		1.464	3	.691

Table 13 presents the results of the hypothesis analysis to determine any predictive capacity in the regression equation. Again, the Chi-square values are the same (1.911), and the Statistical significance is the same (Sig = .591). This reveals there is no statistical value present in the equation.

Table 13

Omnibus Tests of Model Coefficients

		Chi-square	*Df*	Sig.
Step 1	Step	1.911	3	.591
	Block	1.911	3	.591
	Model	1.911	3	.591

Table 14, Hosmer and Lemeshow Test, displays a statistical value of Chi-square .000 and Sig 1.000, revealing no statistical significance.

Table 14

Hosmer and Lemeshow Test

Step	Chi-square	*df*	Sig.
1	.000	2	1.000

Table 15, Variables in the equation: tPA Administration (Sig =1.000 and Exp(B) = .858); Age (Sig = .999 and Exp(B) = .000); Gender (Sig = .998 and Exp(B) = .000). All three variables have a Sig (significance level) of above .000; hence, there are no statistical value within the variables. Bearing in mind that a Sig of .000 would indicate that there is a significant relationship. The Exp(B) (exponentiation of the B coefficient) is an odds ratio. If the value is less than 1, as displayed below, means that the odds of the variables having any significant involvement would be a low chance (less than 1). Hence, there are no statistical value within the variables.

Table 15

Additional Variables in the Equation

		B	S.E.	Wald	*df*	Sig.	Exp(B)
Step 1[a]	tPA Administration	-.153	41256.879	.000	1	1.000	.858
	Age(1)	-17.344	20218.394	.000	1	.999	.000
	Gender	18.565	9308.866	.000	1	.998	11553998 3.230
	Constant	-20.897	44295.543	.000	1	1.000	.000

Note. a. Variable(s) entered on step 1: tPA Administration, Age, Gender.

Summary

The analysis of the results in Chapter 4 revealed that CVA was indeed a critical issue in Bermuda, which would benefit from tailored public health interventions. However, stroke education on risk factors, warning signs, and activation of Emergency Medical Service (EMS) does significantly reduce CVA patient's length of stay in Bermuda. There was also no association between patients accepting medical strategies and management and the discharge decision (home or rehab) process. tPA administration significantly does not reduces the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender. This study has highlighted pertinent variables that could be further studied in the future.

Chapter 5: Discussions Conclusions, and Recommendations

A stroke could be critical due to its pathophysiological pathway. The high mortality rate associated with stroke is a critical public health issue in Bermuda that requires immediate attention (Institute for Metrics and Evaluation, 2017). This study dissected the importance, potency, and efficacy of stroke education and management in Bermuda. The global incidence of stroke has been decreasing (ASA, 2019). Still, the Institute for Metrics and Evaluation (2017) stated the opposite about Bermuda's incidence rate. Stroke education on risk factors and warning signs has become a fundamental subject matter highlighted by the Bermuda Hospitals Board's (BHB) Neurological Department to inform the Bermuda public. They believe this could assist in reducing the incidence rate of stroke in Bermuda. I retrieved the data from this department for this study.

The purpose of my quantitative dissertation was to explore the association between stroke education and length of stay, discharge decision, stroke management, procedures completed, tPA assessment, and tPA administered with odds of complications among the elderly (60 and above) in Bermuda. There are five sections in Chapter 5, and I summarize the interpretations of the findings for each research question. Followed by a section on limitations of the study, I provide recommendations based on the analysis results. Finally, I present the implications for social change and provide a conclusion.

Interpretations of the Findings

In RQ 1, this quantitative study examined the significance between stroke education on risk factors, warning signs, and activation of EMS and reducing the length of stay on CVA patients in Bermuda. The Wilcoxon Test showed the comparison

between the two groups – stroke education (*yes* or *no*) and length of stay (continuous outcome) to measure the reduction of the length of stay. In addition, the Wilcox Signed Ranks Test disclosed that I could reject the null hypothesis. Hence, stroke education on risk factors, warning signs, and activation of EMS is associated with length of stay among elderly CVA patients in Bermuda.

Based on the results from the study, the knowledge base on stroke is principal and could substantially contribute to the hospital's recovery and length of stay. According to WHO (2019), low levels of literacy are associated with lower health status. A gap in the study could be related to health care providers appropriately assess an individual's literacy level before stroke education and management. It is paramount that patients are involved in their care through the initial pre-stroke education and screening phase (Lowres et al., 2019). This process would also encompass emergency room treatment and further medical management procedures, which could be beneficial. Patients and caregivers would utilize the relevant measures deemed essential for the stroke process and procedure. There is indeed a window for treatment that is vital and critical for recovery.

RQ 2 in this quantitative study employed the Chi-square test to examine the association between patients accepting medical management and those not accepting medical management. The results revealed that most of the patients in the study accepted medical strategies and management and were discharged home. In addition, the ones who did not accept medical strategies and management were also discharged home. Therefore, I could not reject the null hypothesis since there is no association between patients

accepting medical strategies and management and the discharging decision (home or rehab) process.

Post-stroke care would benefit from a structured and evidence-based program, which would incorporate patients accepting medical strategies and management associated with the discharge decision process. Elchner et al. (2020) confirm this fact and believe it would be promising as stroke care could improve after hospital discharge. Nonetheless, Jenkins et al.'s (2018) study attest that an individual's knowledge base, attitude, and lifestyle practice would be an asset or liability to their stroke care process after discharge from the hospital. In Bermuda, the neurology team would mirror a well-functioning team. Hence, Hugh's (2019) statement that efficient and effective stroke care requires a well-functioning team from the emergency room to the neurologist and the interventional neurologist would reflect their current practice.

RQ 3 incorporated logistic regression to examine the significance between tPA administration reducing the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender. The results revealed that the null hypothesis would be accepted. Hence, tPA administration was not found to significantly reduce the odds of complications among the elderly aged 60 and above in Bermuda, controlling for age and gender. The sample size was only 30 from the total population size of 253; therefore, there were not many instances of tPA being administered. Missing cases were 220.

The outcome for stroke patients has a high-dependence on-time treatment of tPA was delivered. Despite not many tPA being administered to patients in this study, the fact still stands and endorses the American Heart Association (2018) statement that

reperfusion therapies and the development of scales being utilized are critical for stroke patients. Age remains a crucial element in the stroke process; hence, CDC (2019) report would be credited on incidences of stroke increases significantly with age. It was interesting to note that majority of the patients in this study were male and above 50 years. Bautista et al. (2020) showed the contrary, with stroke affecting women unequally more than men.

The incidence of stroke has increased in the above 50 age group, in comparison to American Heart Association (2018) study that more than two-thirds of stroke hospitalizations occurred in individuals 65 and older. However, in contrast to American Heart Association (2018) study leveling out the field, the stroke rate could double every ten years, in both males and females, after 55. Additionally, Bautista et al. (2020) believed that the global aging population would enhance stroke prevalence, particularly among elderly females. Bautista et al. (2020) further elaborated that the contributing factor would be a lifestyle associated only with older women. In this study, Pizova (2018) and Tian et al. (2012) revealed that stroke incidence rates in males were higher than in females.

Limitations of the Study

For this existing study, there were several limitations. First, the sample size was adequate, but there was not enough representative sample from participants opposing the research question. For example, within the following variables:

1. Many of the patients admitted to the hospital had some form of education, with a minuscule sample not having any form of education.

2. Accepting medical strategies and management had a larger sample size than patients who did not accept medical strategies and management.
3. Not enough patients did not accept tPA administration versus patients who received tPA administration.

Overall, this created a large sample size in one category as opposed to the other. Despite this being a convenient sample with the correct data collected, there could be limited generalizability. A purposive sampling method of extreme (or deviant) case sampling could have been appropriate in research question #3. This purposive sampling method of extreme (or deviant) cases focuses on unusual or atypical individuals. Since the goal of this dissertation is to improve best practice guidelines and highlight the dos and don'ts. The research could be looking for variations in cases and the effects of recovering significantly faster or slower from tPA administration or not to patients who required it but opted not to receive treatment. The aim would be to identify variations in these cases to explain why their recoveries were atypical. This sampling method would have taken more time and resources to conduct a randomized selection since there could be a significant uncertainty towards the selected participants. In addition, these selected participants would need to cooperate, which could pose a challenge given the sensitive nature of their condition.

The study revealed another limitation within research question # 2. A Type II error of failing to reject the null hypothesis when making a statistical decision could involve uncertainties, and the errors are unavoidable in hypothesis testing. A noticeable measurement error was a systematic and random error in recorded data reducing power in the variable with patients accepting medical strategies and management (165) and those

who did not (4). I could reduce the risk of Type II error by increasing the sample size or significance level, but this would not be a true example of the data collected. The study would then compromise validity.

Notwithstanding, the Chi-square test was appropriate for research question #2 since this hypothesis test was about whether the data was as expected. The idea behind the trial was to compare the observed values in the data to the expected values, and the null hypothesis was confirmed. In Bermuda, this is the case with patients accepting medical strategies and management, but it is not associated with them being discharged home or rehab.

Another significant limitation to the study was determining the level of health literacy among the participants. Low health literacy could have created a bias with the participant's answers (yes or no) to specific questions about stroke education, accepting medical strategies and management, and tPA administration. A complete understanding in this area could also result in some compromised. Finally, one could be considered an internal and external threat to validity inevitably in any research. Internal validity focuses on the accuracy and quality of the research findings. I maintained a high degree of internal validity in this current study; hence, future research could replicate this study to verify conclusions.

Recommendations

I would recommend further studies in the immediate future, building on the results of this study. For example, the following variables could be explored: health literacy of stroke patients, the perception of patients and caregivers for being discharge home or remaining in hospital, and the impact of tPA administration with patients who

have multiple comorbidities. In addition, there are numerous stroke survivors in Bermuda; therefore, I would suggest further studies in life after stroke and reoccurrences of stroke among stroke survivals. This type of research would require qualitative and quantitative studies, which would incorporate interviews, questionnaires, and surveys to integrate personal experiences, discussions, and trends.

Policies associated with stroke should focus on awareness of the patients' lifestyle, financial abilities, and personal and national (the economic and income of stroke patients). This research has created awareness by highlighting areas of detail development and appropriate screening. Another study could address stroke among socioeconomic status in Bermuda. This study's methodology would apply to adjacent countries, but proper tweaking would also be paramount due to varying countries' economic qualities (developed versus developing countries).

Implication for Social Change

Stroke education on risk factors and warning signs has become a fundamental subject matter highlighted by the Bermuda Hospitals Board's Neurological Department to inform the Bermuda public. The Bermuda Hospitals Board's Neurological Department believes this will assist in reducing the incidence rate of stroke. Additionally, the Emergency Medical Service (EMS) activation, accompanied by the treatment methodologies, which could affect the length of stay of CVA patients in Bermuda, has become a crucial component in the stroke process. From this study, the revelation of accumulating evidence suggests that positive social change could be available and offered through the current practice and policy in the hospital from the Neurology Department. However, a SWAT analysis was invigorated due to this study, and the

Neurology Department would make relevant adjustments to the current practice, procedure, and policies.

This study would act as a catalyst for positive social change by disclosing the result and inaugurating specific, focused public education campaigns. Health literacy on stroke would be paramount in all the movements, in-hospital teachings, and other public sources and outlets. Bermuda's populace will inevitably become more aware of their lifestyle practices, measures to undertake and correct unhealthy lifestyle practices, and identify when a CVA emergency occurs. I would introduce other Caribbean countries and International Stroke Centers to the findings and areas adopting a new principled approach in policymaking, procedure, and practice. Notwithstanding, adjustments to address their countries' jurisdictions would be encouraged, tweaked, and recommended. This research has already empowered further studies currently being undertaken in this area and scoop of practice.

The quantitative methodology underpinning this study has identified areas that required more robust data collection and processes. This recommendation would be vital to the Neurology Department as they embark upon the inauguration of the first Stroke Centre in Bermuda. The Health Belief Model and The Public Health Framework, both theoretical frameworks employed, have positively influenced this study. They both underscored a dynamic process in which personal factors are principal in effecting and sustaining change. Future research in this area would be encouraged to emulate this approach for long-term success in this area.

Conclusion

The incidence rate of CVA has been escalating in Bermuda compared to other countries within the same hemisphere. More importantly, Bermuda could soon have the highest incidence of stroke per capita in the world. Education and stroke management is a crucial tool in combatting and reducing the incident rate. Therefore, this study has been an essential component with perfect timing for the New Stroke Unit in Bermuda. Additionally, other countries globally would become aware of the significance of stroke education and management.

To the best of my knowledge, no study ever researched stroke education and management outcomes on cerebrovascular accident patients in Bermuda. Therefore, this study has created history on the grounds of stroke in Bermuda. The development of stroke education and management on cerebrovascular accident patients in Bermuda could also be associated with awareness care towards stroke patients. Stroke education on risk factors, warning signs, and the Emergency Medical Service activation should always be essential in campaigns. Notwithstanding the importance of health literacy when disseminating information on stroke, especially during public campaigning.

The information gathered from this study would provide pertinent knowledge and guidance for the policymakers to organize appropriate resources and identify target groups/ populations for more efficient health promotion and services. Socioeconomic status and lifestyle conditions are critical population indicators for stroke risk factors. Society could benefit from having a health literate population through better health outcomes and reducing medication costs. I could classify health literacy as the most potent tool and defense against medical costs and poorer health outcomes. Health literacy

could also eliminate the thought that being poor would always result in more impoverished health conditions. Instead, working with a budget could assist in economizing ways to attain a healthy lifestyle. Active community involvement, especially in low-socioeconomic areas, could answer a healthier lifestyle and poor health crisis.

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