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Stroke Prevention Through Education

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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2021

Abstract

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by

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MSN, Walden University, 2008

BSN, Aquinas College, 2002

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Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

This project focused on two concepts: a need for a stroke prevention program and what should be included. The problem with early identification of stroke is not formally addressed at the project site, physician's office. A physician's office can play a beginning key role in minimizing the risk of stroke. The purpose of this project was to explore the evidence to support the need for and to determine ideal content for a stroke prevention education program. This program focused on early detection and identification of risk factors to prevent stroke occurrence. The theoretical framework of Pender's health promotion model aligns with individualized plan of care for nutrition and exercise for each patient that needs stroke prevention coaching. Data were collected on a form centered around each individual patients' current medical history that relates to stroke. Descriptive statistics for modifiable and nonmodifiable data were obtained from medical charts (n = 56) using a mixed methodology for a convenience sample (M = 50 years; SD = 16.8). The following risk factors were most prominent: high Body Mass Index (M = 30.7; SD = 6.1), high glucose (M = 115; SD = 23.4), high LDL cholesterol (M = 135; SD = 24.9) along with diagnoses of hypertension (32%), type 2 diabetes (16%), anemia (12.5%), and angina (10.7%). This program targets diet modification, medication regimes, and daily exercise to enhance the patients' interest in behavioral changes based on modifiable risk factors. A staff education program has the potential to bring about positive social change in an internal medicine practice by providing an early prevention approach.

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Dedication

This study is dedicated to my mother, who had two ischemic strokes and finally succumbed to heart failure at the age of 83 in July 2019. She was a fighter in all ways imaginable. She hoped that this project would be completed before she passed away, but nonetheless, it is even much more dedicated to her now.

Finally, I would like to thank my children, grandchildren, and friends for their support throughout the countless hours spent caring for Mom while I was writing yet another very important paper or discussion.

Lastly, I want to thank all the nurses, physicians, emergency medical services personnel, firefighters, police officers, and those who have donated countless hours and resources worldwide for their dedication to COVID-19 patients and their families.

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Section 1: Nature of the Project

Introduction

The history of stroke began in the seventeenth century with Hippocrates, who referred to stroke as *apoplexy*, which means "struck down by violence." During this time, physicians had "no knowledge of anatomy and physiology" or "the function of the brain;" they also had "no idea of what the cause of the stroke was or how to treat it" (John Hopkins Medicine, n.d.). During the mid-1600s a pathologist named Jacob Wepfer discovered that apoplexy was caused by bleeding and lack of oxygen in the brain due to blocked blood vessels (John Hopkins Medicine, n.d.). As medical scientists continued to study the cause, symptoms, and treatment of apoplexy, they were able to divide apoplexy into several categories affecting large arteries, small arteries, venous arteries and cardiovascular disorders that led to the creation of the terms *stroke* and *cerebral vascular accident* (Engelhardt 2017). Apoplexy is a concept that was determined to be established before Christ (BC) but penned by Hippocrates. Hippocrates identified the clinical manifestations of apoplexy as pain, inability to speak or presents with groaning and garbled speech with inability to stop urinating or defecating, and inability to walk. According to the World Health Organization (WHO), a stroke is defined as a neurological deficit that is rapidly developing and is presumed to be of vascular origin, which can last over 24 hours and lead to death. The term *transient ischemic attack* (TIA) is often used interchangeably with *stroke*.

TIA is an expression used for comparable neurological deficits that last for less than 24 hours. Cerebrovascular diseases such as stroke are acknowledged as the second leading cause of mortality and burden of illness among individuals aged more than 60 years (Donkor, 2018). Almost 5% of the individuals experiencing a TIA or minor stroke carry a risk of recurrent stroke in the following year (Donkor). Moreover, studies have suggested that the risk of cardiovascular events in stroke patients remains for at least 10 years after a TIA or stroke (Donkor).

Various authors have highlighted the need for secondary prevention strategies in mitigating the risk of stroke and other cardiovascular complications in poststroke patients as well as across at-risk populations. Secondary prevention strategies include identification and screening of underlying clinical conditions that predispose individuals to the risk of stroke. The major aim of secondary prevention strategies is to develop patients' awareness of and control over modifiable risk factors. Modifiable clinical risk factors for stroke include hypertension, hyperlipidemia, atrial fibrillation, diabetes mellitus, and obesity. Modifiable lifestyle factors for stroke include smoking, physical inactivity, poor dietary behavior, and excess consumption of alcohol (Bridgwood et al., 2018). Stroke services and education to improve awareness of secondary prevention strategies have the primary aim of improving patient adherence to medications and healthy lifestyle behaviors. Studies suggest that medication compliance in stroke patients could reduce the incidence of secondary vascular events by at least 25% (Bridgwood et al.).

Moderate to high physical activity levels, coupled with moderate alcohol consumption and reduced salt intake, can significantly lower the risk of stroke and other cardiovascular complications in at-risk individuals. A study identified at least five modifiable risk factors (both clinical and lifestyle) for stroke in the geriatric population (Bridgwood et al., 2018). These findings suggested the need for implementing secondary prevention strategies to improve outcomes in stroke patients as well as those who are at risk of stroke (Bridgwood et al.). Among different secondary strategies, education awareness and behavioral control are speculated to play a significant role in mitigating the risk of stroke or its complications in the geriatric population.

Although various studies have highlighted the need for educational awareness in reducing the risk of stroke in target populations, most of them have failed to identify any changes in modifiable risk factors as a function of educational awareness and behavioral interventions (Bridgwood et al., 2018). In contrast, organizational interventions through multidisciplinary teams have shown promising results in improving lifestyle behavior and medication compliance in stroke patients (Yan, et al, 2016). Such organizational interventions include redefining the professional roles of nonphysician staff members in stroke prevention clinics or physicians' offices. They may also involve collaboration among the members of a multidisciplinary team, especially involving the relationship between primary and secondary care services and integrated care services.

Finally, effective implementation of knowledge management systems across all healthcare professions, as well as populations at risk, holds promise in mitigating the risk

of stroke. In this regard, professional nurses who are employed in physicians' clinics or practicing independently as a community of family nurse practitioners could play a significant role in ensuring the success of stroke education programs. Various studies and regulations suggest that professional nurses should be empowered to manage stroke patients as well as reduce the risk of stroke and its complications across all vulnerable populations (Bridgwood et al., 2018).

Problem Statement

Before the initiation of the current stroke prevention project, it became evident that a program of this nature was needed at the study site facility. The study site lacked an education program to help patients understand stroke causes and prevention. Stroke is a debilitating illness that may cause paralysis, blindness, speech problems, or an inability to speak. Benjamin et al. (2017) highlighted that the highest death rates from stroke are in the southeastern United States. Stroke rehabilitation can take months or years. Poststroke data indicate that most patients who experience stroke have physical and psychological effects that either prevent or delay a return to work. Daniel, Charles, Wolfe, Busch, & McKevitt's (2009) review of three studies on poststroke return to work revealed that slightly more than half of the stroke patients had returned to their paid employment at 6 to 12 months following a stroke.

Hospitals often provide stroke education videos to stroke patients. The education includes the instruction to call 911 when signs and symptoms of a stroke appear, along with guidance in understanding disease processes, risk factor management, and follow-up

care. However, many patients report that they do not receive adequate education (Meighan, 2018). Three phases of stroke care can be identified: prevention, acute care, and rehabilitation. Each phase involves a different level of care. Prevention should involve primary care, and education should address preventive efforts before a stroke. In the acute care stage or secondary care with a specialist, the patient is treated for having a stroke. In contrast, appropriate rehabilitation helps stroke patients to regain strength and learn adaptive measures that are required for everyday living.

The potential for stroke should be considered in every patient by providers in all professions and subspecialties such as gastroenterology, dermatology, ophthalmology, urology, oncology, pharmacology, dietary, and bariatric treatment. Providers in all specialties and subspecialties should want to incorporate stroke prevention education for all patients who visit them. Due to the urgency of a potential stroke crisis, the patient must receive immediate treatment in the emergency department.

Entities that would be interested in this study include the Centers for Disease Control and Prevention (CDC), *Stroke*, the American Heart Association (AHA), and primary care physician (PCP) offices. As mentioned earlier, hospitals are providing educational awareness to help members of vulnerable populations to identify the signs and symptoms of a stroke. It would be helpful for medical offices to provide personalized as well as have materials for reading in the waiting room that give ideas and education for their patients regarding stroke prevention. Because of the aging population, the American Association of Retired Persons (AARP), formerly known as the American

Association for Retired Persons, could benefit readers for information to follow regarding stroke. AARP caters to those at retirement age with valuable information on exercise, nutrition and other steps to take to help avoid a stroke.

Sharrief, A. Z., Johnson, B. and Urrutia, V. C. (2015) performed a study on the use of educational outreach programs for stroke prevention in African American males. A stroke education goal in a physician's office may also help to decrease the risk of stroke, thereby reducing costs for necessary care of stroke victims. Assessment of patient data in the primary care environment would identify those patients who are at risk for stroke through the evaluation of all relevant data. When education is provided, all assessment data may return to a normal range, thereby decreasing the costs of potential inpatient emergent stroke care.

The CDC supports multiple organizations such as the AHA, *Stroke*, Million Hearts 2022, and Well-Integrated Screening and Evaluation for Women Across the Nation (WISEWOMAN) nationwide in preventing strokes. The goal of these organizations is to reduce the impacts of stroke by decreasing risk factors and addressing healthcare inequities in vulnerable populations. These programs have been implemented in hospitals, long-term care facilities, and even mental health facilities, but I have not witnessed them in physicians' offices. Without this project, patients might continue to be unaware of assessment data that indicate the potential for a stroke. Learning about modifiable lifestyle factors such as diet and smoking, as well as learning the "FAST"

assessment tool, could help to decrease the risk for stroke and alert individuals as to when to receive immediate medical attention should signs and symptoms of stroke appear.

Motivation

The clinical domain of stroke has always attracted me because my mother was affected. However, she was a proud survivor of stroke, as she received immediate attention. The only residual symptoms that she faced were mild to moderate speech impairment, especially when she became anxious. Her second stroke caused blindness in her left eye. Unfortunately, it was not recognized as a stroke until we went to the emergency department, and it was diagnosed as left optic nerve stroke. The ophthalmologist informed us that perhaps something could have been done if we had been seen immediately. Additionally, working on a cardiac rehabilitation unit reinforced the need for a stroke prevention education program. These experiences helped me to realize the importance of managing stroke patients within the golden hours and helped me to understand that the prognosis of referred patients is dependent on their age and comorbid clinical conditions.

Stroke is described as a family illness because it affects not only the individual concerned, but also family members. Survivors of stroke often become vegetative, which reduces their quality of life and imposes a burden on their family members in terms of assisted living (Sundin, Pusa, Jonsson, Saveman, & Östlund, 2018). Caregivers must often find someone to stay with their loved ones while they work or take care of family and personal business away from home such as grocery shopping and doctors'

appointments. Leisure time away from stroke victims causes anxiety for caregivers, who ultimately may view their time away as a negative experience. Cameron, Cheung, Streiner, Coyte, & Stewart (2011) highlighted that caregiving might create long-term problems for caregivers of chronic patients such as stroke survivors because they face time constraints for participating in valued activities and social engagement. When stroke victims feel guilt about the necessary life changes of their caregivers, it may impede their recovery.

Purpose Statement

The purpose of this study was to determine if there was a need for a stroke education program among patients in a busy private practice. Additionally, I sought to determine which type of stroke prevention information would be most beneficial to patients, based on the prevalence of modifiable and nonmodifiable risk factors. Chart reviews were conducted to identify the prevalence of modifiable and nonmodifiable patient risk factors. This study is significant in that it assisted in identifying educational topics that may reduce patients' risk factors, based on the prevalence of modifiable and nonmodifiable risk factors present among the patient population. This approach may help doctors provide more targeted stroke prevention education to patients and thus reduce patients' risk for the disease.

Healthcare Problem

The evidence suggests that there is a lack of stroke prevention education at physicians' offices. There is hardly any literature that has explored or endorsed the need

for stroke educational programs offered by private physicians' offices. Although educational placards about stroke have been strategically placed in hospitals in Florida metropolitan areas, this knowledge-promoting effort is primarily passive. Recognizing the signs and symptoms of stroke is essential for alerting patients, family, and friends so that concerned stakeholders can access relevant healthcare services within the golden hours. Moreover, awareness of the risk factors for stroke may have a significant role in preventing the incidence of stroke, especially across vulnerable populations.

The field of healthcare has changed dramatically in the last two decades, with most of this change relating to advances in information and communication technology. Individuals are more sensitive to their health problems. As a result, concerned stakeholders try to remain informed regarding best practices for enabling a healthy lifestyle. The significant increase in evidence-based knowledge mandate that healthcare professionals, including physicians, nurses, and paramedics, must remain informed and extend the highest standards of evidence-based (CDC, n.d.) for prevention, and treatment of stroke.

The CDC and National Institutes of Health (NIH) goals for preventing and controlling heart disease and stroke require prevention, detection, and treatment of risk factors; early identification and treatment of heart attacks and stroke; and prevention of recurrent cardiovascular events (Gerberding & Zerhouni, n.d.). The focus of this doctoral project was the prevention and detection of risk factors for stroke via patient education on modifiable and nonmodifiable risk factors in the geriatric population.

Significance

Heart disease and stroke are among the nation's leading causes of death and disability, costing $351.2 billion in 2014-2015. (Benjamin & Muntner et al, 2019). These conditions affect the population without regard to age, race, culture/ethnicity, gender, or income class. These diseases are mostly preventable, and the CDC's goal is prevention.

Summary

This project focused on preventing stroke, identifying risk factors for stroke, and providing education to help individuals recognize stroke. The accessible population was the geriatric population in a private office.

Section 2: Background and Context

Literature Review

There are many reasons to educate the selected population on how to prevent a stroke. Risk factors are just one reason for education of the patient population in a busy office regarding stroke. Unfortunately, some risk factors cannot be modified. The National Institute of Neurological Disorders and Stroke (NINDS, n.d.) has identified unmodifiable and modifiable risk factors for stroke. Nonmodifiable risk factors include age, gender, race, and family history of stroke. Modifiable risk factors for stroke include high blood pressure or hypertension (HTN), cigarette smoking, heart disease, warning signs or history of TIA or stroke, diabetes, cholesterol imbalance, and physical inactivity and obesity (NINDS, n.d.).

The importance of educational and behavioral interventions in mitigating the risk of stroke and its complications was reported by Bridgwood et al. (2018). The authors conducted a meta-analysis study that reflected that there was no significant difference in mean systolic and diastolic blood pressures, mean body mass index (BMI), glycosylated hemoglobin target levels, lipid profile, medication adherence, and recurrent episodes of cardiovascular and cerebrovascular incidents in individuals who received educational and behavioral interventions as compared to control peers who did not receive such responses that included nonphysician staff-based stroke awareness and effective coordination between multidisciplinary teams. Improvements in blood pressure control had odds of 1.44 (95% CI: 1.09 to 1.90; Bridgwood et al., 2018). These findings suggest that

organizational interventions could mitigate some of the modifiable risk factors for stroke. However, there is inconclusive evidence as to whether nurse-based educational awareness of stroke in physicians' offices for at-risk individuals could minimize the incidence of cardiovascular and cerebrovascular events in the geriatric population. Although organizational initiatives could play a significant role in ensuring stroke prevention education, the nonphysician staff and nurses employed in physicians' offices might not be competent in providing evidence-based stroke prevention education to the target population (Bridgwood et al., 2018).

Jeon and Jeong (2015) acknowledged that stroke primary prevention programs should ensure awareness of the risk factors for stroke. The authors evaluated the effectiveness of a nurse-based stroke education program in minimizing the risk of stroke among at-risk elderly populations living at home. The study included 93 individuals who were living in their homes with one or more risk factors for stroke, including high blood pressure, diabetes mellitus, hyperlipidemia, obesity, smoking, and alcoholism. The intervention was a 12-week education program that involved stroke education once per week, a nutrition management class once per week, and guidance on physical exercise three times per week, with each of these sessions lasting for 50 to 70 minutes.

This disease education program and nutrition management sessions were conducted for 20 minutes, and each exercise session lasted for 30 to 50 minutes. The BMI, systolic blood pressure, serum triglyceride, and total cholesterol levels of the participants significantly decreased after administration of the educational intervention (p

< 0.01). The educational intervention also significantly reduced depression scores ($p <$ 0.001) and increased high-density cholesterol levels in the program participants ($p =$ 0.005). These findings suggest that a nurse-administered stroke prevention educational program could enable at-risk elderly individuals residing in home settings in rural areas to participate in health promotional behaviors, which could help to minimize the risk factors for stroke. However, the stroke prevention program did not explain any reductions in the blood sugar level of the participants ($p = 0.700$).

These findings suggest that healthy dietary and lifestyle behaviors could minimize the chances of stress and depression, thereby alleviating high blood pressure levels. On the other hand, engaging in routine physical activity might have helped to burn excess calories to reduce BMI and obesity. Additionally, physical exercise might have contributed to mobilizing fats from adipose tissues in minimizing the bodyweight of the participants. Moreover, compliance with healthy dietary behaviors such as avoiding dietary fats helped to address hyperlipidemia.

The educational program on dietary behavior included guidance on salt, sugar, and fat-restricted diets. The instructional exercise program focused on aerobic, balance, and muscle-strengthening exercises. Although Jeon and Jeong (2015) conducted a study on primary prevention strategy for stroke, they did not report the incidence of stroke in the participants over the long run. The effectiveness of a stroke prevention education program should be evaluated based on the odds of stroke over a specified period. Nevertheless, the mitigation of risk factors, as reflected by Jeon and Jeong, justified the

importance of nurses in extending stroke prevention education programs to populations that are vulnerable in terms of age and timely access to appropriate and quality healthcare.

Jeon and Jeong (2015) did not discuss the role of a secondary stroke prevention program for mitigating the risk of recurrent stroke. However, the study highlighted the content and approach of an effective primary stroke prevention program across vulnerable populations. Jeon and Jeong further identified that primary stroke prevention programs involving educational awareness and engagement in routine physical activity might not be enough for achieving glycemic control. Therefore, concerned stakeholders should comply with their hypoglycemic medications along with healthy dietary and lifestyle behaviors. Although the study showed the added benefits of educational awareness in achieving control of blood pressure and lipid profiles, individuals need to comply with their antihypertensive and lipid-lowering medications if they suffer from hypertension and dyslipidemia.

The study by Jeon and Jeong (2015) did not highlight the optimal level of routine physical activity that would be safe in the target population. The duration and frequency of physical activity could impose an additional risk of stroke in patients presenting with comorbid diseases such as myocardial ischemia (MI) and chronic obstructive pulmonary disease (COPD). The Jeon and Jeong study provided conclusive evidence that nurses practicing in community settings or physicians' offices can effectively administer stroke prevention across vulnerable populations. However, they should sensitize their patients

that the educational program or the practice of healthy dietary and lifestyle behaviors do not represent an alternative to the medications that are prescribed to them. The advantage of complying with a healthy lifestyle and nutritional habits is that this is helpful in preventing or mitigating the risk factors that predispose individuals to stroke.

Ibrahim and Soliman (2016) complemented the findings of Jeon and Jeong (2015) because they also showed that educational awareness of stroke could mitigate the risk of stroke in high-risk populations. The authors acknowledged that lack of appropriate knowledge among at-risk populations regarding modifiable and nonmodifiable risk factors predispose individuals to a risk of stroke. The concerned stakeholders are often unaware of the signs and symptoms of a stroke, which makes them more vulnerable to incapacity and mortality. Most of the participants (68.3%) in the Ibrahim and Soliman study lived in rural areas, and 45% of them were illiterate. Most of the participants suffered from hypertension (80%), while 65% of the stakeholders were diabetic. Additionally, 65% of the participants had a BMI higher than 30kg/m^2. These findings suggest that comorbidity is a major risk factor for stroke across vulnerable populations, and the major comorbid risk factors include diabetes, hypertension, and obesity. However, there was significant improvement in awareness of the warning signs of a stroke and modifiable risk factors for stroke across the target population during and after 2 months of educational intervention. The participants were more competent to identify the warning signs and symptoms of stroke as well as stroke risk factors after exposure to the 2-month stroke prevention program.

The Ibrahim and Soliman (2016) and Jeon and Jeong (2015) studies reflected that a stroke education program that lasts for 8 to 12 weeks can be useful in alleviating the modifiable risk factors for stroke. Both studies suggested that a stroke education program should be made mandatory across vulnerable populations. The vulnerable people who emerged from both studies included people in rural communities and populations affected by comorbidity. Individuals presenting with two or more risks that are related to poor dietary and lifestyle behaviors, the elderly population, individuals who are either illiterate or lack health awareness, and individuals who exhibit poor compliance with their medications are at high risk for stroke. These findings suggest that primary stroke prevention education programs should sharpen the awareness of the population regarding the possible risk factors and signs of stroke, along with the instructions for complying with a healthy lifestyle and dietary habits. Secondary stroke prevention education programs should emphasize the importance of the pharmacological interventions prescribed to individuals who have suffered a stroke or are at a high risk of stroke.

Ibrahim and Soliman (2016) further highlighted that educational interventions on stroke prevention developed positive attitudes across the target population. The authors concluded that stroke prevention education should be introduced to high-risk people across diverse settings. Because Ibrahim and Soliman also endorsed that stroke prevention education programs should be provided in various settings, it could be inferred that such programs might be provided by professional nurses at physicians' offices or in community settings when they are practicing as community or family nurse

practitioners. However, nurses entrusted with providing stroke prevention education programs must be trained to minimize the chances of complications and adverse events in concerned stakeholders. The findings further indicated that the content and approach of primary and secondary stroke prevention education will vary because their objectives are different.

In this case, a stroke prevention education program should be tailored to the individual. For example, the frequency and duration of physical activity that is recommended for one individual might impose an additional risk for stroke in another individual. The content of stroke prevention education could be designed by the physician, especially if an individual has already suffered a stroke, and the nurses associated with the physician's office may be entrusted with the implementation of the program. Stroke prevention education programs must not be restricted to awareness programs. Patients should receive continuous education and follow-up during and after the implementation of the program. The structure and approach of follow-up and measures introduced for gauging the compliance of the respective individuals with the recommended dietary, physical activity, and therapeutic regimes may ensure the success of stroke prevention education programs in the long run.

Another study by Aslani, Alimohammadi, Taleghani, & Khorasani (2016) acknowledged that nurses could provide stroke prevention education that could assure self-care and self-efficacy in stroke patients. The authors also underscored the importance and feasibility of empowering nurses to provide stroke education. In this

regard, the authors emphasized the need to pursue nursing practice improvements, nurture evidence-based knowledge, advocate for attitude changes in nurses, and enhance abilities to respond against routinization to ensure effective stroke prevention education (Aslani et al.). The observations of Aslani et al. are very pertinent because most stroke education programs provide routine and general information that is often ignored by stroke patients. Therefore, nurses should acknowledge the modifiable and nonmodifiable risk factors in the target population before they impart stroke prevention education. Modifiable and nonmodifiable risk factors and their implications for stroke are presented in Tables 1 and 2.

Table 1

Nonmodifiable Risk Factors for Stroke

Modifiable risk factor	Description
Age	Stroke can occur in children, adolescents, adults, and elderly individuals. The risk of stroke is highest in the perinatal stage of pregnancy.
Gender	Men have a higher likelihood of stroke, but more women die from stroke.
Race	Stroke in African Americans (AA) is more prevalent and more deadly. Stroke is twice as high in AA and Hispanic Americans as in Caucasians.
Family history	Stroke runs in some families. There appears to be a genetic tendency for HTN or diabetes. A typical lifestyle may also contribute to familial stroke.

Note. Information from NINDS (2014).

Table 2

Modifiable Risk Factors for Stroke

Modifiable risk factor	Description
HTN	A most potent risk factor for stroke, with 2 to 4 times the risk of stroke before age 80. HTN is modifiable through weight, diet, exercise, and medications.
Cigarette smoking	Two times increased risk of ischemic stroke. Four times increased risk of hemorrhagic stroke. Atherosclerosis in the carotid artery is the primary cause. Nicotine raises blood pressure (BP); oxygen to the brain is decreased. Cigarette smoke causes blood to be thicker and more likely to clot. Cigarette smoking promotes aneurysm formation.
Heart disease	Coronary heart disease (CHD), valve defects, irregular heartbeats such as atrial fibrillation (AF), and enlargement of any heart chambers can cause blood clots that may break loose, causing a blockage that is associated with high mortality and disability. Atherosclerosis is the most common CHD. Blood-thinning medications such as aspirin (ASA) and Coumadin are most often prescribed.
Warning signs or history of TIA or stroke	TIAs require immediate attention. If there is a history of stroke, the risk of repeat stroke is many times greater than for those who have not had a stroke. The part of the brain that was not affected by a stroke works hard to help the stroke victim to recover. The next stroke could be twice as bad as the first one.
Diabetes	Diabetes is the equivalent of aging 15 years. Diabetes causes adverse changes in the blood vessels, including the brain. Brain damage is much more severe if glucose levels are elevated during the time of a stroke. HTN is common in diabetes and accounts for the increased risk of stroke.
Physical inactivity and obesity	Both are associated with stroke and HTN, diabetes, and heart disease. Waist and hip circumference equal to or above the mid-value increase the risk of ischemic stroke threefold.
Cholesterol imbalance	Low-density lipoprotein cholesterol (LDL) carries cholesterol (a fatty substance) through the blood and delivers it to cells. LDL can cause atherosclerosis when it builds up in the blood vessels. Atherosclerosis causes blood vessel narrowing, leading to both heart attack and stroke.

Note. Information from NINDS (2014).

Relevance to Nursing Practice

Strokes are debilitating and life-changing not only for the patient but for their loved ones and friends. According to Malewezi (2011), stroke recurs in up to 20% of patients, and from the moment a person has an acute cerebrovascular event of any sort, that person is at an increased risk for further incidents. According to Lee, Somerford, & Kelvin (2004), the outcomes for new events are more unfortunate than those after a stroke, and patients are likely to have increased disabilities, which incur additional hospitalization costs over the long-term. For these reasons, it is of primary importance for education programs to be established in physician's offices for the prevention of stroke. The primary care physicians' staff is in a prime position for this education.

The FAST program is destined to provide educational awareness for alerting patients, family members, and friends on the signs and symptoms of a stroke. The physician's office or the community health nurses' office could provide effective stroke education programs because they have access to the electronic health records of the patients as well as they can review any relevant laboratory tests that could detect the risk for complications of a stroke. The physician usually orders an electrocardiogram (EKG), which could alert the physician to atrial fibrillation (AF), which is a leading cause of ischemic stroke (IS). According to Shorten, AF increases a patient's stroke risk five-fold. Also, one in five patients with stroke is found to have AF (2015). The National Institute for Health and Care Excellence Heart Rhythm Association (EHRA) et al.,

found that the prevalence of AF increases with age and is estimated to be at least double in the next 50 years as the population ages (2010). Also, patients with uncontrolled blood pressure are at increased risk of stroke. Physicians and community health nurse practitioners could easily access the vital statistics that are markers for stroke.

Theory

The educational awareness of stroke and its potential risk factors is based on the Health Promotion Model developed by Nola J. Pender. Pender's model promotes a "positive dynamic state rather than merely the absence of disease" and describes the "multidimensional nature of persons as they interact within their environment to pursue health" (Pender et al., 2011). According to Pender, Murdaugh, and Parsons (2011), nurses must accept the challenge of designing and providing high-quality health promotion services in every health care setting. This theory will be utilized while providing education in the physician's office setting. It is designed to help patients prevent illness through behavior modifications such as diet changes, medication adherence, and follow-up appointments to provide the patient assurance that their plan of care is working to help prevent stroke.

Pender's model was based on seven assumptions that patients are creative in their living conditions. She discussed that patients have the capacity for self-reflection and self-awareness as well as competencies. Pender also found that they value and strive for active growth and balance; seek to self-regulate; interact to become one with their environment; considers nursing and other medical professionals for assistance, guidance,

and support. Patients realize that it is through their search for the promotion of health that change is necessary for their behavior (Pender).

Needs Assessment

CVA was ranked number five as the leading cause of death. Cancer ranked number one, and chronic liver disorders such as cirrhosis of the liver ranked number 10 in the state of Florida (Vital Statistics, 2012). In 1970, there was a total of 8,541 deaths related to CVA; 3,497 were a Caucasian male, and 3,814 were Caucasian female. African Americans experienced 570 male deaths and 642 female deaths. In other ethnicities, four were men, and three were women. In 2002, there were 10,243 total deaths, with 3,646 being Caucasian male and 5,275 Caucasian females. AA deaths decreased in 2002 to 509 (male), and female deaths rose to 740. These figures steadily declined, and in 2012, there was a total of 8,372. The Caucasian population experienced 2,905 (male) deaths, and the female population decreased to 3,175 while the AA community for men was 491 deaths compared to the female population of 617 deaths (Florida Vital Statistics, 2012).

From these figures, it appears that Caucasian women have a higher risk of CVA than does the male counterpart and the AA. These numbers are significant for reviewing charts to assess the need for stroke education in the physician's office. The community for evaluation is the patient population within a private physician's office. The scope of the problem is assessed through data collection of modifiable and nonmodifiable risk factor to determine critical findings, set priorities, and create a treatment plan for

effectiveness in preventing stroke (Ezekowitz, J. A., Straus, S. E., Majumdar, S. R. & Mcalister, F. A. 2003). Gender, culture/ethnicity, age, co-morbidities, diet, weight, and other lifestyle habits such as unemployment, working, how many children, as well as lab values, were assessed and evaluated for a commonality that was the focus for a prevention plan. The assessment also includes a possible gap in the physician's knowledge of the most current treatment, such as medications for improved safety of the patient for the prevention of stroke. A needs assessment designed by (National Institute of Neurological Disorders and Stroke, NINDS) was used as a measurement guide for men and women for stroke risk for the next ten years. (Table 3). Women's needs assessment is slightly lower than men.

Data from charts were evaluated on information contained from tools in Tables 3, 4, and 5 for the risk of stroke. For example, if a male is 60 to 62 years of age, the score is +2. If he is treated for systolic blood pressure (SBP) and it runs between 118 and 123 and smokes cigarettes, then he is scored +3 for each. If he has diabetes, +2, CVD, and AF are scored +4 each, and left ventricular hypertrophy (LVH) is scored +5. Total points are 23 for a 52% 10-Year Probability for Stroke. Women's scores are slightly different and evaluated on their point scale. See Table 3 through 5 for scoring stroke risk for men:

Table 3

Scoring Stroke Risk for Men

Points	0	1	2	3	4	5	6	7	8	9	10
Age	55-56	57-59	60-62	63-65	66-68	69-72	73-75	76-78	79-81	83-84	85
Untreated Systolic BP	97-105	106-115	116-125	126-135	136-145	146-155	156-165	166-175	176-185	186-195	196-205
Treated SBP	97-105	106-112	113-117	118-123	124-129	130-135	136-142	143-150	151-161	162-176	177-205
Diabetes	No		Yes								
Cigarettes	No			Yes							
CVD	No				Yes						
AF	No				Yes						
LVH	No					Yes					

Note. Information from NINDS (2014).

Table 4

Points and Percentage of Risk for Stroke in Men

Points	Ten-year probability	Points	10-year probability	Points	10-year probability
1	3%	11	11%	21	42%
2	3%	12	13%	22	47%
3	4%	13	15%	23	52%
4	4%	14	17%	24	57%
5	5%	15	20%	25	63%
6	5%	16	22%	26	68%
7	6%	17	26%	27	74%
8	7%	18	29%	28	79%
9	8%	19	33%	29	84%
10	10%	20	37%	30	88%

Note. Information from NINDS (2014).

Table 5

Compared Age Groups and Average 10-Year Probability of Stroke

Compared age groups	Average 10-year probability of stroke
55-59	5.9%
60-64	7.8%
65-69	11.0%
70-74	13.7%
75-79	18.0%
80-84	22.3%

Note. Information from NINDS (2014).

The above table compares the sample total with the same age group, for an average 10-year probability of stroke in men. Points = 23; Probability of Stroke in 10-Years is 52%.

Stakeholders

Stakeholders are those that are affected by and have a direct stake in a proposed project. Stakeholders may consist of individuals, groups, or an entire institution that may or may not be affected positively. Stakeholders may also influence a project's outcome either negatively or positively. Stakeholders must believe that they have a role in the creation of the project. The stakeholder's interest in their patient's well-being required a strategy for involving stakeholders in the planning process of the project. At this site, the staff participated in the decision-making process. The team was given the opportunity to

take part in the creation of a mission statement, goals, and objectives for patients that are at a potential risk of stroke.

The project involved four stakeholders who participated in the program. Three office staff members make individual appointments in a timely fashion. While there are two physicians at this office that see patients, only one participated in this program. The office manager schedules appointments and works with the insurance companies for financial coverage and payments for each patient's visit. The medical office assistant escorts patients to the examining room to take their vital signs and weight and ask questions about how they are doing and the purpose of their visit.

The physician performs a routine assessment for complaints and complications of the patient. The second physician in this office is an Ophthalmologist that sees patients for any retinal issues they may have. Hodges and Videto (2011) stated that initial visits with the primary physician should focus on organizing data and its processes and that all patients should have a clear understanding of the educational needs for stroke prevention.

Mission Statement

According to Hofstrand (2009), a mission statement is a roadmap for achieving the deliverable related to a business or growth of the organization. The mission statement is aligned with the vision statement of the organization. A mission statement is created with three entities: vision, mission, and core values. The core values of an organization include the humanitarian and ethical business values such as patient outcomes, respect for

people, teamwork, standards of care, and patient safety. The office manager and the assistants had three questions to answer before for this project. These issues were:

1. What is your vision for helping patients to avoid a stroke?
2. How might we decrease the patients' risks for a stroke?
3. How would we impart the knowledge to reduce stroke risk in your patients?

A timeframe was provided for completion of three questions, and from their answers, a mission statement was created. Below is the adopted mission statement:

Our vision is to provide opportunities for patients at risk of stroke as well as patients that are not at risk of stroke to participate in the learning process through education that provides improved lifestyle habits that will significantly reduce the likelihood of stroke.

The goals and objectives were developed to satisfy the answers to the three questions that create a mission statement. What is essential to achieve is a healthy lifestyle that decreases the risk of stroke. Goals that need to be resolved are weight loss, dietary changes, blood pressure control, abnormal laboratory values within normal limits, and an exercise program tailored to each patient's individual needs. The goals must be suitable, acceptable, understandable, and flexible for the needs of the patients, according to Hofstrand (2009). Meeting these objectives are satisfied when patients' laboratory values, weight loss, exercise program, blood pressure, and dietary habits are modified.

Objectives

The objectives were directed to both the staff and patients in this busy physician's office. According to Hodges and Videto (p. 169, 2011), there are four elements for

creating objectives. These objective factors include who, what, how much, and by when components. The goals that are measured involve the patients' vital signs (VS) to be within normal limits (WNL). Also, if they have increased their exercise habits to walking, laboratory values are WNL, and weight loss is occurring by the following physician's office visit. This appointment would need to be scheduled at least every 30 to 60 days for staff to review the progress made by patients.

Logic Model

Hodges and Videto (2011) highlighted the need for following a conceptual and logical approach to describe the activities of the project and the deliverables required based on the conceptual approach to describing relationships among the activities the theoretical foundations of the program, and the program's goals and objectives are to develop a logic model. Table 6 below outlines a Logic Model for a Stroke Prevention Education Program for patients in a busy physician's office. This example describes variables for inputs, processes, outputs, short-term goals, and long-term goals. The variables included, in this case, are abnormal laboratory values, alcohol consumption, co-morbidities, and a personal desire to change less healthy habits to healthier habits.

Table 6

The Logic Model for Stroke Education

Inputs	Processes	Outputs	Short-term goals	Long-term goals
Patients' abnormal laboratory values	Laboratory value education	Discuss medications with the patients	Increased knowledge of necessary changes for decreased stroke	Lab values within normal limits
Patients' diet evaluated	Lab value A1C assessed the history of dietary intake		Diet modification education to include fruits and vegetables in the diet is understood	A1C lab values within normal limits after following a healthier diet
Patient understands the signs and symptoms of stroke	Discuss the acronym "FAST" with patients		The patient verbalizes the meaning of "FAST"	Patient verbalizes that they will be able to call 911 if any "FAST" symptoms appear
Family members involved in the learning process	Discuss the acronym "FAST" with family members		Family members verbalize the meaning of "FAST"	Family members verbalize that they will be able to call 911 if any "FAST" symptoms appear
Permission gained for telephone contact	Discuss with patients and family members that the nurse would like to stay in phone contact with them			

Timeline

According to Hodges and Videto (2011), constructing timelines for the general needs' assessment process for specific tasks within the process helps to keep the project on task. Table 6 reflects a chronological sequence of the events that were considered for this project. It defines the measures and tracks durations of events and activities. Many are ongoing; however, the mission statement, needs assessment, and educational materials are complete.

The Gantt chart is a popular method of representing and planning the timeline of a task. Karol Adamiecki created the Gantt chart in the 1980s. According to Hodges and Videto (2011), Gantt charts are visual depictions of activities that are to occur over time that help us to see these relationships in graphic form. The table reflected the weekly events for needs assessments. The Gantt chart was also necessary for providing the stakeholders associated with the project regarding the deliverable and their responsibilities.

Evaluation

Hodges and Videto (2011) identified evaluation designs selected that can best answer the questions given the resources and logistics. Patient assessment is focused on the support provided to the patients, patients' demographics, and values representing health assessments, which included the identification of both modifiable and nonmodifiable risk factors. The data collection tool (Appendix D) are provided to the physician and staff members.

Section 3: Program Design

Introduction

This study explored the contents and context of an ideal stroke prevention education program that could help at-risk individuals to identify the symptoms of stroke as early as possible as well as prevent risk factors to avoid the long-term consequences of stroke, including its recurrence. Long-term effects of stroke may include paralysis and deficits in cognition, which can lead to emotional lability and problems in intellectual functioning. The study further explored whether there is a need for a stroke education program in the target population. Studies suggest that a stroke prevention education program should be specific to the target population based on the risk factors to which members of this population are exposed. A lack of tailor-made stroke prevention education programs may reduce the compliance of the at-risk population with the referred plans. Most stroke prevention education programs have been generalized and exhaustive, which makes it difficult for concerned stakeholders to comply with such programs. Moreover, there are rarely structured stroke prevention education programs in terms of content and approach that are extended by nurses attached to physicians' offices or those who are practicing independently as community nurses and family nurse practitioners.

Practice-Focused Question

The practice-focused question was the following: Is there a need for a stroke education program for patients in a busy private practice? If so, what information for patients would be beneficial?

In England, the Department of Health's (2007) National Stroke Strategy was developed to include a 10-year program to ensure improvement in all aspects of stroke prevention and management. This strategy has made it possible for physicians and nurses to work with patients in promoting healthier lifestyles to avoid the risk of stroke and associated economic burdens. The aims of Chapter 1 of the National Stroke Strategy are to improve public and professional awareness of the risk factors and symptoms of a stroke, and the initiatives that should be taken to mitigate risk factors (Department of Health).

Although the incidence of stroke has significantly increased in high-income countries, the prevalence of stroke in low- and middle-income countries as well as across specific populations in high-income countries remains a significant concern for healthcare professionals and others in the field of public health. The evidence suggests that surveillance, screening, and timely diagnosis of stroke signs and symptoms remain the primary prevention strategies for reducing the incidence of stroke in the target population. The beneficial effects of a stroke prevention education program such as FAST could be realized in middle-school students as they grow older. The implementation of the program by schoolteachers and parents could enhance the awareness and self-efficacy of the target population for identifying the cardinal signs and symptoms of a stroke. Therefore, middle-school students could be sensitized on the risk factors for stroke, and well-structured stroke prevention education programs might be

equally effective across populations who are at risk of stroke or its associated complications, including the recurrence of stroke.

Individuals belonging to populations in high-income countries, as well as those within the general population in middle- and low-income countries, experience health and healthcare inequalities, along with poor lifestyle and dietary behaviors such as heavy consumption of tobacco and caffeine, which predispose them to the risk of stroke. Lack of routine physical activity and ignorance of the importance of complying with antihypertensive and antidiabetic medications aggravate the risk of stroke in the target population. Primary prevention strategies for stroke, including those incorporated into stroke prevention education programs, have emphasized controlling high blood pressure, preventing polypharmacy, and managing atrial fibrillation. Additionally, accessing digital technology and receiving appropriate follow-up from primary care physicians are important in mitigating the incidence of stroke across at-risk populations. Rehabilitation programs or secondary stroke prevention education programs have emphasized the importance of improving physical vitals, speech, motor function, and cognitive functioning in stroke patients apart from compliance with the therapeutic regimes that were prescribed at discharge from inpatient settings. In this regard, STEPwise stroke surveillance screening programs have significantly reduced the risk of stroke in individuals in middle- and low-income countries.

These findings suggest that well-structured and effectively monitored stroke prevention education programs could minimize the risk of stroke in vulnerable

populations. The incidence of stroke has been reduced in high-income countries, there is however, a lack of adequate and appropriate stroke prevention education programs across vulnerable people. The evidence also suggests that stroke prevention education programs are certainly warranted in specific populations. Because most stroke patients or those presenting with the risk factors for stroke access primary care services for routine follow-up, the structure and content of a stroke prevention education program provided through such settings remain active areas of interest in the field of community medicine (Yan et al., 2016).

Sources of Evidence

Sources of evidence included quantitative and qualitative data retrieved from evidence-based practice studies as well as from data gathered from charts. Data included laboratory values, BMI, disease process, medications, vital signs, age, gender, family, and social history. These data identified healthy versus nonhealthy lifestyles. One of the significant elements of the stroke prevention program involves patients recognizing the signs and symptoms of a stroke. These signs and symptoms can be taught using the FAST acronym, which identifies what to assess if an individual is experiencing problems with face drooping, arm weakness, or difficulty with speech that signifies emergency medical services (EMS) must be activated. However, the signs and symptoms of stroke, along with the risk factors for stroke in the target population, could be different from those reported in evidence-based literature.

Evidence-based literature was the primary purpose of conducting the analysis. The secondary data were compared with evidence-based literature for answering the questions undertaken in this project. The evidence-based literature was obtained through keyword search strategies, in a similar manner as the literature review. However, the evidence-based information that was accessed for comparing secondary data pivoted to the specific variable that was related to the risk of stroke.

Analysis and Synthesis

According to Mallidou (2014), knowledge synthesis is the cornerstone of knowledge translation for healthcare professionals and policymakers. Fundamental analysis of the literature for a stroke prevention program identified theoretical contributions of publications retrieved from the Walden University Library through the Cumulative Index of Nursing and Allied Health (CINAHL), MEDLINE, PubMed, Science Direct, internet or Google searches, and magazine publications. Synthesis of data from 1994 through 2019 was used for a comprehensive overview of stroke from Hippocrates to organizations such as the WHO, CDC, and AHA and the journal *Stroke*. Gantt charts were discovered through an internet search for Mind Tools. Peer-reviewed articles were retrieved through the Walden University Library and federal agencies. This comprehensive overview allowed for the consideration of several study designs, such as experimental and nonexperimental exploration(Whittemore & Knafl, 2005). For this project, chart reviews provided qualitative and quantitative data for a mixed methodology study.

Analysis was conducted on data retrieved from 56 patient charts. Data were collected using a form (Data Collection Tool, Appendix D) to record the following for each patient: age, gender, height and weight, ethnicity, and family and social history. The form also allowed space to collect medical and psychosocial history data, including medical and psychiatric diagnoses, vital signs, medications, and laboratory values, as well as the dates that the patient visited the physician's office. Data collection occurred between October 5, 2018, and January 18, 2019. The Statistical Package for Social Sciences (SPSS) version 25 software was used to perform the statistical analysis for exploring the outcomes of the project. The calculations for each data point included descriptive statistics such as the mean, median, mode, standard deviation, variance, minimum, and maximum range. Descriptive statistics also included frequencies and percentages for summarizing the qualitative and quantitative data collected.

I evaluated modifiable and nonmodifiable variables such as age, height, weight, ethnicity, gender, vital signs, laboratory values, medications, family history, and social history related to risk of stroke. The median score was considered one of the major measures for assessing the risk of stroke because it helped identify the cutoff values for members of the population who were at risk and those who would not identify with the risk of contracting a stroke or its recurrence. Therefore, the data analysis for this study involved a mixed-methodology approach because the survey included both quantitative and qualitative variables, and the respective variables were integrated to answer the project questions. The endpoints not only evaluated the risk factors for stroke such as

hypertension, lipid profile, obesity, and blood sugar levels, but also assessed the mitigation strategies such as physical exercise and pharmacological interventions that patients would be encouraged to use.

Public Health Initiatives and Budget

According to the American Speech-Language-Hearing Association (ASHA, 2020), the American Medical Association (AMA) defines health literacy "the ability to obtain, process, and understand basic health information and services needed to make appropriate health decisions and follow instructions treatment (n.d). The AMA also stated that a recent government study estimated that over 89 million American adults have limited health literacy skills. The AMA supports the U.S. Department of Health and Human Services' Million Hearts® program to prevent 1 million strokes by 2017 (AMA). Patients in this busy physician's office must be educated on stroke prevention strategies to help the AMA reach its goal in the Million Hearts® program to prevent strokes and further expenditures post stroke. Brochures represented a beginning strategy and were placed in the physician's waiting room for patients to read and take home.

For this stroke prevention program, a direct revenue and expense budget was developed. This budget may be adjusted each month, as some costs may not need to be repeated. The staff is paid hourly, working 40 or 20 hours per week. Providing the educational material to patients should neither interfere with existing routines nor cause the staff to go into overtime. See Appendix A for projected revenue and expenses of a stroke prevention program.

A stroke prevention education program, whether for primary or secondary stroke prevention, is not an awareness campaign or a pamphlet that is offered at the physician's office when prospective or established stroke patients visit the healthcare professional but includes nonphysician staff and nurses. Additionally, evidence suggests that effective stroke prevention education programs should be conducted for at least 2 months and should incorporate sessions related to physical activity, dietary recommendations, and identifying signs and symptoms. It is necessary to evaluate the financial implications and staffing needs for implementing tailored and well-structured stroke prevention education programs in a physician's office in a patient-focused manner. The budgetary implications are essential for adopting the stroke prevention education program as a public health policy initiative.

Financial Analysis

There are four main types of financial analysis: profitability, solvency, liquidity, and stability. Profitability, according to Nossa (2010), is the "company's ability to generate profit while liquidity measures the company's ability to meet its financial obligations promptly, without affecting normal operation" (p. 47). Solvency addresses the capacity of a company to pay debts and in what fashion if the company dissolves. The stroke prevention program will not focus on financial profit or loss; rather, patients will benefit from the education provided for a healthier lifestyle in the prevention of strokes as well as recognizing the signs and symptoms of a stroke. The basis of this study was the assessment of stroke risk on the basis of age, gender, ethnic background, medical

diagnoses, laboratory values, BMI, sedentary lifestyle or active lifestyle, family and social history, and medication usage. This program requires changes for the patients' health.

A stroke prevention program would create solvency through the education of patients to reduce the risk of stroke, thereby allowing for longer and more productive lives and improvement in disability, with the potential to continue relationships between patients and their caregivers, including physicians and staff. Decreasing the potential risk for stroke and allowing a more extended connection may increase the number of patients who visit this office, possibly creating profits. The stroke prevention program developed for this study could be viewed as an essential initiative for improving public health as well as for reducing the burden of healthcare costs on the government. The content and approach of the stroke prevention education program identified through this study could be subjected to a pilot project whereby the incidence of stroke or its recurrence would be compared in the study population both before and after implementation of the planned program. The success of a pilot study would motivate the implementation of the tailored stroke prevention education program in the target population in the long run.

Section 4: Findings and Recommendations

Introduction

This chapter presents the approach to data collection, analysis of data, description of the sample, and the findings of the report based on the project questions. The purpose of this study was to determine whether there was a need for a stroke education program among geriatric patients in a busy private practice. The objective was to determine which type of stroke prevention information would be most beneficial to patients, based on the prevalence of modifiable and nonmodifiable risk factors. The questions guiding this study were the following: Is there a need for a stroke education program in a busy private practice? If so, what information would be beneficial? This section provides a description of the environment, patient demographics, data collection and analysis, and study results.

A convenience sampling technique identified 56 charts. Charts included detailed health records and the clinical history of patients. The data focused on identifying the modifiable and nonmodifiable factors that increase the risk of stroke. Modifiable variables included BMI, vital signs, social history, laboratory data, medical diagnoses (HTN, obesity, and diabetes mellitus), medication use, diet, and physical activity. Changes to modifiable risk factors are the most effective ways to reduce stroke risks (Romero, Morris, & Pikula, 2008).

Environment

The study took place in a busy private physician's office in a business complex along an interstate in Jacksonville, Florida. I was provided with space to conduct the study, as well as with complete access to patients' charts. Fifty-six patient charts were randomly chosen for review. The medical assistant for the internal medicine physician kept all records for my mentor. The "office" was in the break room where the data were stored. Data collection occurred once or twice per week, in the early afternoon. During the exploration stage of this project, the goal was to protect data, so that promotion of patient health was not compromised. Collected data were kept under lock and key in a cabinet in the facility break room "office." At no time was this information at risk for a Health Insurance Portability and Accountability Act (HIPAA) violation.

Data Collected

According to Banks (1998), data collection strategies are an essential part of performance measurements. Banks identified which parts of a medical record are used. Record reviews are aimed at obtaining retrospective data to address clinical problems (Sarkar & Seshadri, 2014). Banks' study was used to develop a form to collect data for the current study; a data collection form was approved by the Institutional Review Board (IRB). This form included space to record the following data for each patient: age, gender, height and weight, ethnicity, and family and social history. The data collection tool also allowed space to collect medical history data, including medical diagnoses, vital

signs, medications, and laboratory values. Data collection occurred between October 5, 2018, and January 18, 2019. See Table 7.

Table 7

Number of Charts Reviewed by Month

Month, year	Number of charts reviewed
October 2018	8
November 2018	10
December 2018	15
January 2019	23

Charts were randomly selected. There were approximately 300 charts that were alphabetized in a cabinet. I started my project with last names which started with an "A" and randomly pulled them out for review. During this stage of the project, the goal was to protect data so that promotion of patient health was achieved. The Framingham Heart Study and Framingham Risk Score for Stroke were utilized to identify the patients' risk for stroke. Permission was obtained to conduct the project from The American Heart Association and the IRB of Walden University.

Findings and Implications

The Patient Data Collection Tool was reviewed and approved by the IRB and is included in Appendix D. This tool ensured that charts were systematically identified, reviewed, and organized. Collection dates were noted on a separate piece of paper, and

data on the patients' visits to the physician were indicated on the collection tool. Age, date of birth, gender, height, weight, vital signs, laboratory values, medical diagnoses, medications, family history, and social history were identified for each patient. SPSS version 25 was used to analyze data gathered in this project to conclude that there was a need for stroke education. Data collection occurred in a comprehensive and unbiased manner.

Summary of Statistics for Patient Data

Characteristics of the Sampling Distribution

The sample that was considered for the secondary data analysis was tested for its distribution in the population. The sampling distribution was tested for normalcy to ensure that the findings were reliable and reproducible so that the data were equally represented in the sample. The conformation with normal distribution was evaluated based on the coefficient of skewness. Skewness is a statistic of dispersion that evaluates the relative positions of the mean, median, and mode. If the mean, median, and mode have the same scores, the sampling distribution is considered to conform to a normal distribution. However, if the positions of the mean, median, and mode are not the same, then the sampling distribution suffers from skewness. The skewness coefficient for the physical and chemical variables that were considered in this study was estimated from the following formula: Skewness coefficient = 3* (Mean-Median)/standard deviation.

The skewness coefficient could be either positive or negative for skewed distribution while it is 0 for a normal distribution. Positive skewness is present when the

magnitude of the mean is more than that of the median and the mode (Kim, 2013). However, negative skewness indicates that the magnitude of the mean and the mode is less than that of the median. Attributes of physical vitals in terms of the relative positions of the mean, median, and mode are presented in Figure 1. In contrast, the skewness coefficients for the referred variables are presented in Figure 2.

A positively skewed distribution further suggested that the proportion of the scores is more toward the higher tail, so the mean is shifted right compared to its position in the normal distribution. However, a negatively skewed distribution indicates that the scores are more concentrated toward the lower tails, and the mean shifts left compared to its position in the normal distribution. A positively skewed distribution refers to a bias in a study due to the overrepresentation of higher scores. Additionally, a negatively skewed distribution indicates a bias in a study because of the overrepresentation of higher scores.

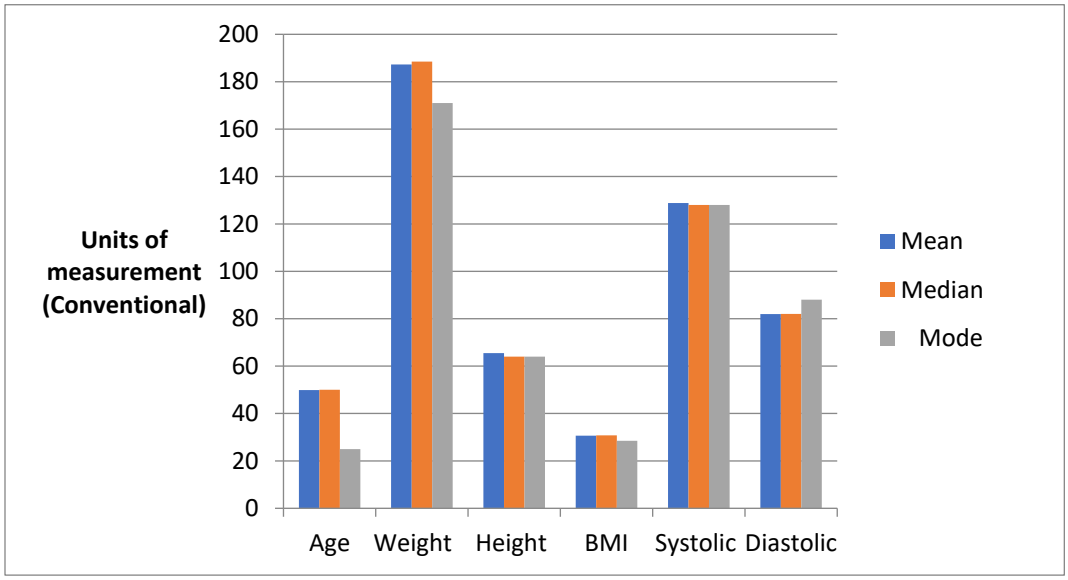

Figure 1. Distribution of physical data.

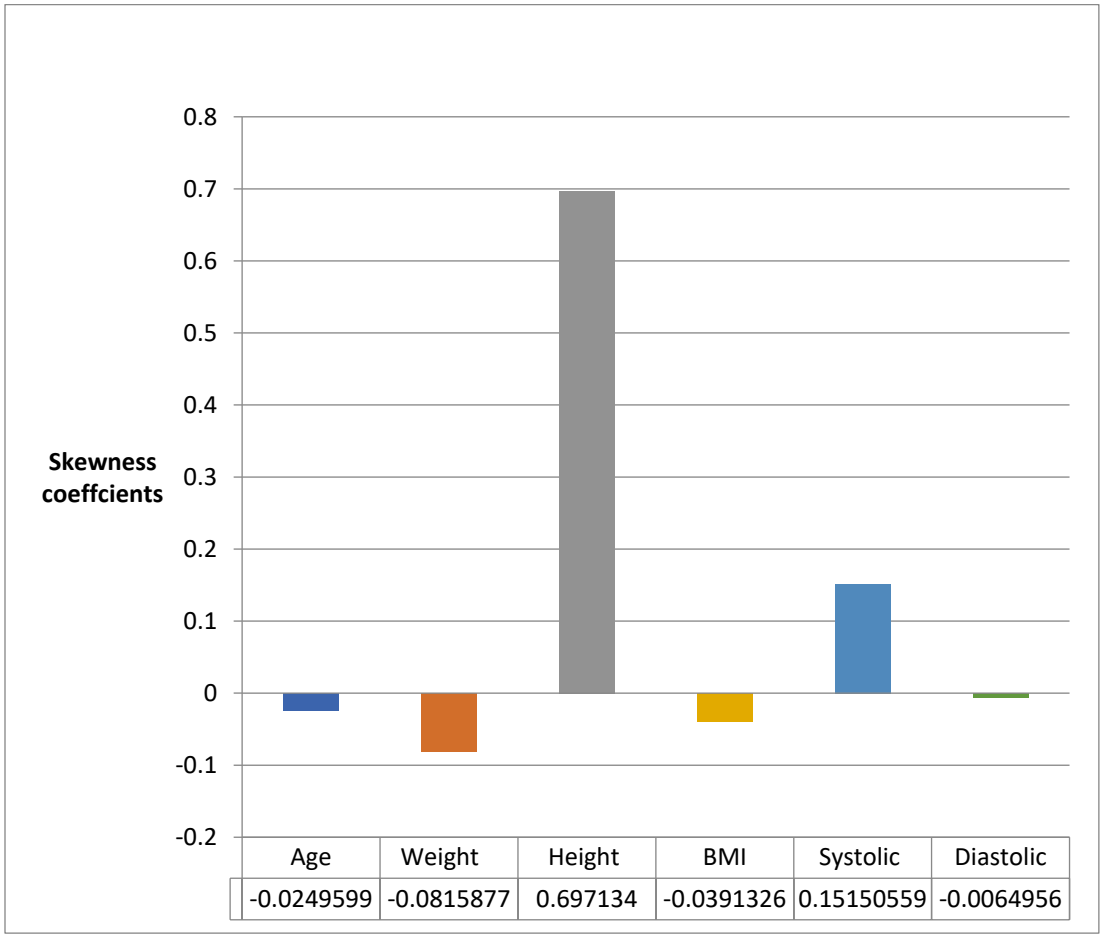

Figure 2. Skewness coefficients of physical data.

Figures 1 and 2 reflected that apart from height and systolic blood pressure, all of the physical attributes considered in this study exhibited a negative skewness coefficient. Because of this, there could be a significant proportion of obese individuals and individuals from a higher age group underrepresented in the sample considered for this study. Therefore, the risk for stroke as a function of obesity and age could be underrepresented in the study population for whom the secondary data analysis was taken. However, the skewness coefficient of systolic blood pressure was positive, which

indicated that individuals with high systolic blood pressure could be overrepresented in the sample. These attributes made the baseline data strong because hypertension is a significant risk factor for stroke, so it was justified to serve more individuals with high systolic blood pressure in the sample. Individuals with low or normal blood pressure in the population of interest could be substantial because they might be complying with antihypertensive medication. Skewed distribution of some of the laboratory values was assessed and represented (Figures 3 and 4):

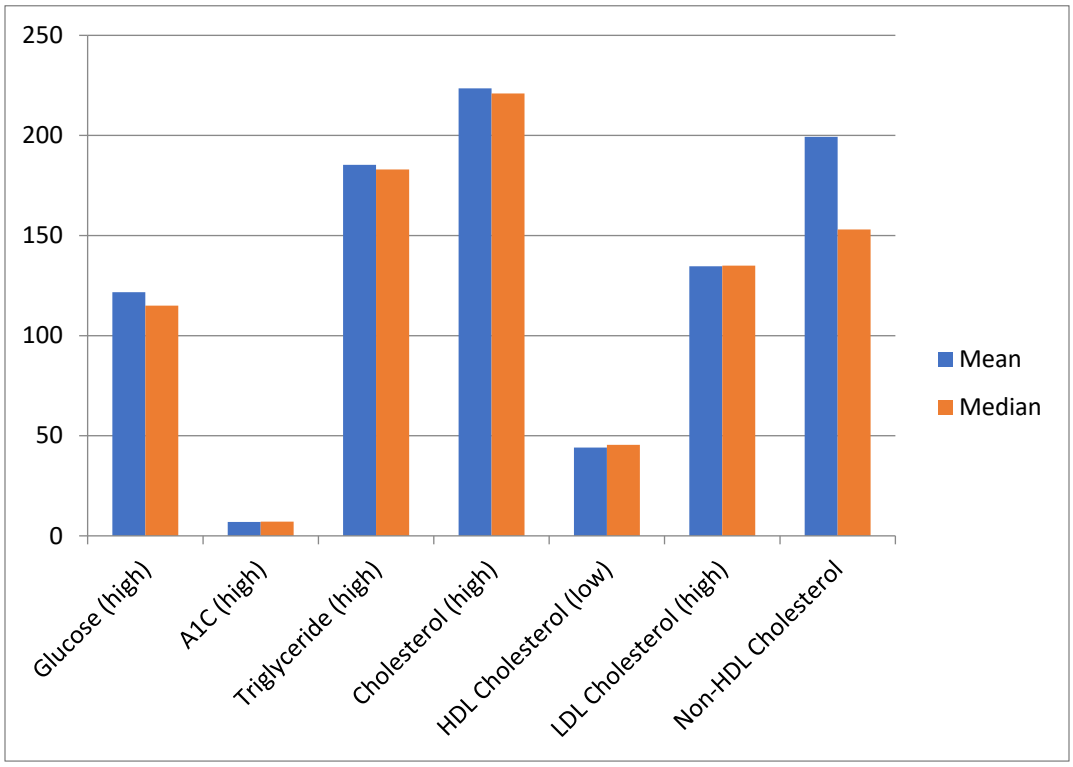

Figure 3. Distribution of laboratory values.

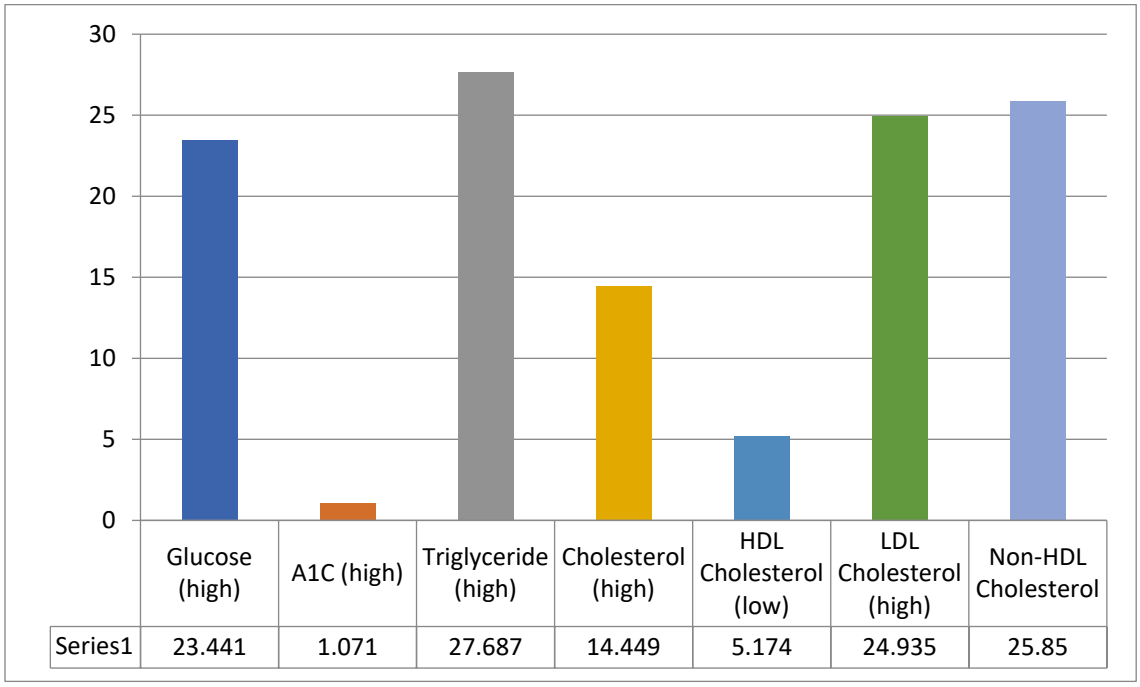

Figure 4. Skewness coefficients of the laboratory values.

Figures 3 and 4 eliminated apprehensions related to sampling distribution based on obesity and body weight. Statistics reflected the means for all of the laboratory values to be more than the mode, which reflected that all of the laboratory values considered for the sample were positively skewed. The sample considered for this study exhibited higher scores for blood glucose, Hb1Ac or A1C, serum triglyceride levels, HDL cholesterol, LDL cholesterol, nonHDL cholesterol, and total cholesterol levels. These findings implicate that the sample for this study was at high risk of stroke because all the laboratory values that are risk factors for stroke were significantly elevated. The positive skewness of the laboratory values also indicated that the patients were not managed with the therapeutic regimen prescribed for preventing the risk of stroke. These findings required an in-depth analysis of the physical and laboratory values that increased or

decreased the risk of stroke. In that the HDL cholesterol levels were positively skewed, it could be that it was the only laboratory variable that reduced the risk of stroke in this population.

Necessary demographic information collected for each patient is described in Table 8. These data included patient age, weight (in pounds), height (in inches), BMI, and systolic and diastolic blood pressure (BP). The sample consisted of 56 individuals; some had missing data. The mean is the average value, such as the average age or average weight. The median represents the value of a variable below and beyond which 50% of the values fall. Mode represents the value of the variable that is obtained by the highest number of individuals within the sample. Standard deviation and variances are statistics of dispersion as they measure the extent to which the raw scores of a distribution deviate from the sample mean. Finally, minimums and maximums used identify the lowest and highest values for each category.

Table 8

Descriptive Statistics

Variable	*N*	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Age	56	49.86	50.00	25.0*	16.827	19.0	83
Weight	54	187.29	188.50	171.0	44.492	103.0	332
Height	42	65.50	64.00	64.0	6.455	53.0	97
BMI	42	30.67	30.75	28.5*	6.133	16.4	45
Systolic	55	128.80	128.00	128.0	15.841	98.0	172
Diastolic	55	81.98	82.00	88.0	9.237	58.0	100

Note. $N = 56$.
*More than one mode exists in the data; the lowest is reported.

Table 8 provides an overall summary of descriptive statistics, mode included. Descriptive statistics are used for summarizing the raw data as well as for conducting statistical tests. The mean and median age group of the participants approximated 50 years, while the mode score indicated a mode of 25 years. Therefore, it is possible that the findings of this study were biased toward individuals belonging to younger age groups in which the risk of stroke is lower compared to older individuals. The position of the mean, median, and mode on the unit normal curve indicated that the sample considered for this study did not conform to a normal distribution and was skewed. The finding further raised apprehension that the risk factors identified could be skewed toward those in the younger age groups. In most instances, such risk factors are not significantly related to the risk of stroke.

However, the lowest mode is reported in Table 8 for all variables. The median is a strong measure of the sample characteristics as well as the maximum value. In this regard, the median and maximum ages of the patients were 50 years and 83 years, respectively. This finding implied that 50% of the patients belonged to age groups where the risk of stroke was higher. The findings were similar for BMI where the median and maximum values were 30.76 kg/m^2 and 45 kg/m^2, respectively. This finding suggested that more than 50% had different grades of obesity, and the mode score for BMI was 28.5%, which signified that most of the patients were at least overweight. Therefore, the obesity and overweight population emerged as one of the major modifiable risk factors that identified this population.

In contrast, the mean and maximum systolic blood pressure was 128 mm Hg and 172 mm Hg, making the median and mode systolic blood pressure 128mm Hg. These findings identified that 50% of the patients exhibited a blood pressure higher than 128/88 mm Hg, which could go up to 172/100 mm Hg. As per the JNC VI guidelines, the risk of stroke or myocardial infarction of the SBP/DBP is higher than 140 mm Hg in individuals without comorbid cardiovascular conditions (such as obesity, dyslipidemia, and diabetes) and above 135/90 mmHg with the referred comorbid risk factors (Moawad & Hassan, 2005). Since most of the patients exhibited overweight or obesity, it could be implied that uncontrolled hypertension was another risk factor for stroke in the target population. However, the median SBP and DBP of the target population were 128/82 mm Hg, which suggested that 50% of the concerned stakeholders had a blood pressure level that did not

predispose the risk of stroke in them. The finding further implicated that hypertension was not a significant risk factor for stroke in the target population in comparison to other risk factors such as for overweight and obesity.

Table 9

Summary Statistics for Females

Variable	*n*	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Age	47	48.91	50.00	25.0	17.174	19.0	83
Weight	45	176.98	175.00	171.0	37.784	103.0	262
Height	34	64.32	64.00	64.0	6.568	53.0	97
BMI	34	29.70	29.25	28.5	5.996	16.4	43.5
Systolic	46	128.09	128.00	118.0	14.712	98.0	161
Diastolic	46	82.61	83.00	88.0	8.212	64.0	100

Note. $N = 47$.

In this regard, the descriptive statistics for females on the parameters such as age, MI, and blood pressure were almost similar for the general population. The median and maximum ages of the patients were also 50 years and 83 years, respectively. Thus, 50% of the patients belonged to age groups, where the risk of stroke was higher. The findings were different for BMI where the median and maximum values were 29.7 kg/m^2 and 43.5 kg/m^2, respectively, which were less than the general population. BMI was also considered as a significant risk factor for stroke in females, just like the general population because 50% of the females had different grades of obesity and the mode

score for BMI at 28.5%, which signified that most of the patients were at least overweight. Therefore, obesity and overweight emerged as one of the major modifiable risk factors in the female participants too.

The mean and maximum systolic and diastolic blood pressure of the female population was 128 mm Hg and 161/100 mm Hg making the median SBP and DBP of the female patients 128 mm Hg and 83 mm Hg. These findings signified that 50% of the patients exhibited a blood pressure higher than 128/88 mm Hg. The mode score for SBP in female patients was 128 mm Hg, which meant that hypertension was not a risk factor for stroke in them. It also inferred that the female patients' blood pressure levels did not predispose them to risk of stroke. This finding also implicated that hypertension might not be a significant and major risk factor for stroke in females in comparison to other risk factors such as for overweight and obesity.

Table 10

Summary Statistics for Males

Variable	*n*	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Age	9	54.78	50.00	38.0	14.771	38.0	81
Weight	9	238.89	238.00	187.0*	40.849	187.0	332
Height	8	70.50	70.50	70.0*	2.330	55.0	73
BMI	8	34.78	34.35	34.5	5.199	28.4	45
Systolic	9	132.44	128.00	128.0	21.413	102.0	172
Diastolic	9	78.78	77.00	58.0*	13.516	58.0	99

*More than one mode exists in the data; the lowest is reported.

Descriptive statistics in Table 10 for males on the parameters such as age, BMI, and blood pressure differed from the general population. The median and maximum ages of the patients were also 50 years and 81 years, respectively. Half of the male population belonged to the age group, where the risk of stroke was higher. However, the mean age was 54.78 years, which was much higher than the mean age of female patients or the general population. Therefore, age was undoubtedly a risk factor for stroke in male patients, and most of the patients are detected with stroke in higher age groups compared to their female counterparts. This finding implied that a stroke prevention education program is mandatory in male patients who are at risk of stroke as depicted from other comorbid risk factors.

The evidence suggests that patients who are at risk of stroke tend to ignore the cardinal signs and symptoms of stroke as well as the risk factors of stroke. Therefore, an effective stroke education program is necessary for male patients to avoid mortality due to stroke as well as contracting the cerebrovascular disease at older ages than their female counterparts. It could also imply that the incidences of a stroke at higher age groups in male patients could have a poor prognosis and fatal consequences. A stroke prevention education program is appropriate for female patients who are at risk of stroke because they tend to contract a stroke at least ten years before than their male counterparts. This is interesting because females have a lower risk of cardiovascular diseases, such as myocardial infarction compared to their age-adjusted male counterparts because of the cardioprotective role of estrogen. However, obesity and dyslipidemia might cause the narrowing of the cerebral artery, which is unrelated to cardiac functioning.

These findings suggest that the reduction of the arteries or their poor functional status due to the lack of glucose owing to diabetes mellitus might increase the risk of stroke in female patients compared to their male counterparts. The number of male patients considered in this analysis was too small compared to the female patients (7 versus 46). As a result, other parameters found in this study should be analyzed. The BMI of male patients could partially challenge their assumptions because the mean, median, and mode of the BMI in the male population were much higher (> 34kg/m^2) than that of the females or the general population. From this perspective, it could have been possible that males have been predisposed to stroke at lower age groups compared

to their female counterparts. However, it could be possible that obesity and dyslipidemia were more evident in males at higher age groups compared to their female counterparts.

BMI was also considered as a significant risk factor for stroke in males just like the general population and females because the mode score for BMI was 34.5 $kg/m^{2,}$ which signified that most of the male patients for this analysis were obese. Therefore, obesity emerged as one of the major modifiable risk factors in the male population too. The mean systolic blood pressure of the males was 132.4 mm Hg. This finding signified that not only 50% of the patients exhibited a blood pressure than 128/77 mm Hg, but the blood pressure in some of the patients was so high that mean blood pressure was more than the median or the mode. Obesity emerged as one of the major modifiable risk factors in the male population too. Although the mode score for SBP/DBP in male patients was 128/58 mm Hg, which meant that hypertension was not a risk factor for most of the male patients, it is considered that male patients also had a blood pressure level that did not predispose the risk of stroke for them.

However, as the mean systolic blood pressure of the males was significantly higher (> 132 mm Hg), it could be that some of the patients might have higher blood pressure levels beyond 135 mm Hg. These findings suggest that more percentage of male patients had uncontrolled hypertension compared to their female counterparts for the study population that was considered. The result further implicated that hypertension is significant for stroke in males, along with other risk factors such as overweight and obesity.

Table 11

Summary Statistics for Caucasians

Variable	*N*	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Age	43	50.74	50.00	25.0*	17.103	19.0	83
Weight	41	191.26	190.00	160.0*	42.806	118.0	332
Height	32	65.59	64.00	62.0*	6.997	53.0	97
BMI	32	31.71	32.00	28.5*	6.022	16.4	45
Systolic	42	130.88	130.00	128.0	16.589	98.0	172
Diastolic	42	83.17	84.50	88.0	8.958	64.0	100

Note. $N = 43$.
*More than one mode exists in the data; the lowest is reported.

The ethnicity-based differences in age, BMI, and blood pressure were considered for Caucasians (the predominant race in this study) and other ethnicities. The median and maximum ages of Caucasian patients were 50 years and 83 years, which was equal to the general population. This age grouping means that 50% of the patients belonged to age groups, where the risk of stroke was higher. The median BMI in Caucasians was significantly higher than that in the general population (32 kg/m^2 versus 29.5 kg/m^2). While 50% of the general population considered in this study was either overweight or obese, 50% of the Caucasian patients were obese. Therefore, obesity emerged as a significant risk factor for stroke in Caucasians. Also, the median SBP and DBP of Caucasian patients were 130 mm Hg and 84.5 mm Hg.

These findings showed that 50% of the patients exhibited a blood pressure that could increase the risk of stroke in the concerned stakeholders. Therefore, a stroke prevention education program for male and Caucasian patients should place emphasis on stringent control of blood pressure along with obesity. At the same time, the female population and other ethnicities should focus primarily on reducing the BMI levels and dyslipidemia. All concerned stakeholders would need to know how to recognize the cardinal signs and risk factors for stroke.

Table 12

Summary Statistics for Other Ethnicities

Variable	*N*	Mean	Median	Mode	Standard deviation	Minimum	Maximum
Age	12	46.42	41.50	38.0*	16.8	25.0	81
Weight	12	174.867	186.50	103.0*	51.3	103.0	332
Height	9	65.33	64.00	64.0	4.8	59.0	97
BMI	9	27.022	27.00	17.7*	5.7	17.7	45
Systolic	12	122.75	123.50	118.0*	11.4	105.0	172
Diastolic	12	77.5	78.00	77.0*	9.5	58.0	100

Note. $N = 12$.
*More than one mode exists in the data; the lowest is reported.

Table 12 substantiated the assumptions portrayed for Table 10 because both females and individuals belonging to ethnicities other than Caucasians are predisposed to the risk of stroke at early age groups, as evident by the mean (46.42 years versus 53 years/50.74 years). Like the mean, median, and mode BMI scores across individuals

belonging to ethnicities other than Caucasians were significantly less than that for the Caucasian female or male patients (27 kg/m^2 versus > 29.5 kg/m^2). The findings signified that obesity or overweight might not be the sole or the significant risk factor for stroke in them. The results of BMI were equally applicable to their SBP and DBP levels, which were significantly lower than the other patient sub-populations. These findings suggested that there could be other significant risk factors apart from hypertension and obesity in individuals belonging to ethnicities different than Caucasians for predisposing them to the risk of stroke.

Frequency distribution for categorical variables of patient genders are found in Table 13. Most patients were female (n = 47, 83.9%). The assumptions related to gender by the frequency distribution for patient gender, ethnicity, and BMI. Since most of the patients considered in this analysis were females, the risk factors identified, and the stroke prevention education might have been skewed toward the female patients.

Table 13

Gender Distribution

Gender	Frequency	Percent
Female	47	83.9
Male	9	16.1
Total	56	100

Most patients identified as Caucasian (n = 43, 78.2%). The sample represented an ethnically diverse population of African American, Asian, Caucasian, Hispanic, and Indian (See Table 14). The minority group in the data were Hispanics (n = 7, 12.7%). One patient chart was missing ethnic information.

Table 14

Ethnic Distribution

Ethnicity	Frequency	Percent
African American	3	5.5
Asian	1	1.8
Caucasian	43	78.2
Hispanic	7	12.7
Indian	1	1.8
Total	55	100.0
Missing	1	--

Since most of the patients considered in this analysis were Caucasians (n = 43, 78.2%), the risk factors identified for the stroke prevention education needs might have been toward Caucasians. However, the findings do not suggest that the risk of stroke is higher in Caucasians compared to other ethnicities. Instead, the population considered in this study has a higher proportion of Caucasians compared to different ethnicities.

Figure 5 illustrates the frequency of BMI categories present in the patient data, which include underweight, healthy weight, overweight, obese, and extremely obese. Of the 56 patients, only 42 had complete height and weight data. Two patients had missing weights; 14 were missing heights. Most patients were overweight, obese, or extremely obese.

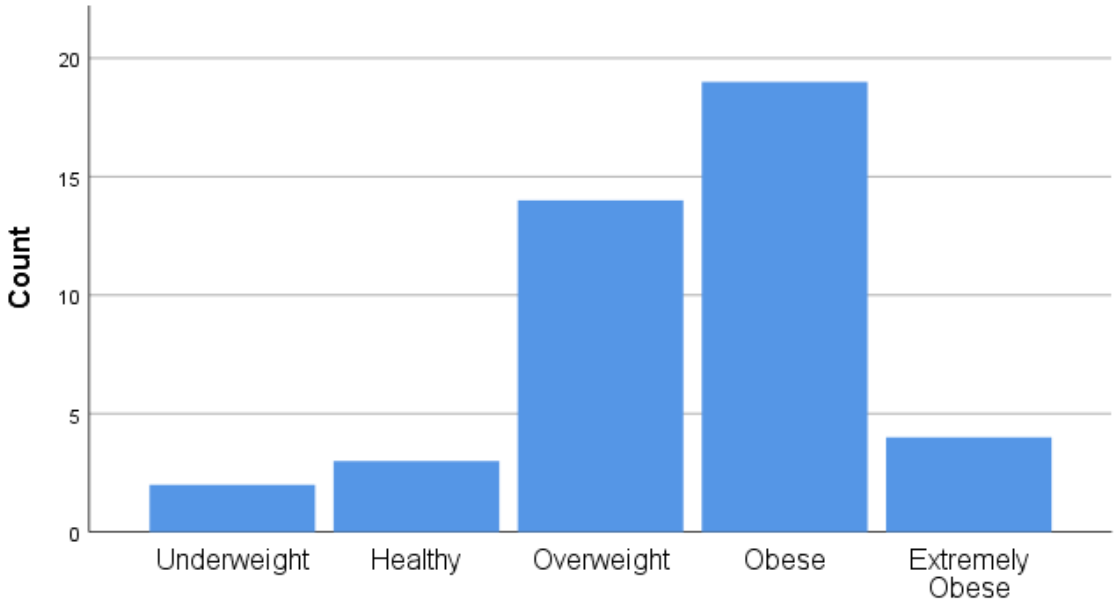

Figure 5. Body mass index description.

According to the Obesity Action Coalition (n.d), obesity and overweight are primary risk factors for stroke in men and women of all ethnicities and races. Excess body weight is also associated with secondary risk factors for stroke, such as high blood pressure, sleep apnea, diabetes, left ventricular hypertrophy, and a metabolic condition known as "Syndrome X." As depicted in Table 15, patient charts were missing either height or weight data required to calculate BMI. Most of the patients for BMI were

either overweight (*n* = 14, 33.3%) or obese *(n* = 19, 45.2%). Only three patients were at a healthy weight, and two were underweight. Accordingly, patient charts indicated that high BMI was a modifiable risk factor that was present for most patients, and thus should be included in the stroke prevention education program.

Table 15

Body Mass Index Distribution

BMI descriptor	Frequency	Percent
Underweight	2	4.8
Healthy	3	7.1
Overweight	14	33.3
Obese	19	45.2
Extremely obese	4	9.5
Total	42	100.0
Missing	14	--

The BMI depicted in Figure 1 and Table 15, substantiates the descriptive statistics that most of the patients that were considered in the analysis had a BMI that was itself an independent risk factor for stroke.

Table 16

Laboratory Values

Measure	Low	Midrange	High	Total
Hemoglobin (Hgb)	3 (6.8%)	41 (93.2%)	0 (0.0%)	44
Hematocrit (Hct)	4 (7.1%)	41 (89.1%)	1 (2.2%)	46
White blood cell (CBC)	1 (2.2%)	43 (93.5%)	2 (4.3%)	46
Platelet	0 (0.0%)	45 (97.8%)	1 (2.2%)	46
Potassium (K)	2 (4.3%)	43 (94.5%)	1 (2.2%)	46
Glucose	1 (2.2%)	36 (78.3%)	9 (19.6%)	46
A1C	0 (0.0%)	41 (89.1%)	5 (10.9%)	46
Triglyceride	0 (0.0%)	40 (87.0%)	6 (13.0%)	46
Iron (Fe)	1 (2.2%)	45 (97.8%)	0 (0.0%)	46
Ferritin	2 (4.3%)	44 (95.7%)	0 (0.0%)	46
International normalized ratio (INR)	0 (0.0%)	45 (97.0%)	1 (2.2%)	46
Cholesterol	0 (0.0%)	37 (80.4%)	9 (19.6%)	46
HDL cholesterol	10 (21.7%)	35 (76.1%)	1 (2.2%)	46
LDL cholesterol	0 (0.0%)	33 (71.7%)	13 (28.3%)	46
NonHDL cholesterol	0 (0.0%)	39 (84.8%)	7 (15.2%)	46
Blood urea nitrogen (BUN)	1 (2.2%)	45 (97.8%)	0 (0.0%)	46

Alkaline phosphatase (ALP)	0 (0.0%)	45 (97.8%)	1 (2.2%)	46

In Table 16, areas with large proportions of patients who were not considered mid-range risk included patients with LDL cholesterol (28.3% of patients were high), HDL cholesterol (21.7% of the patients were low risk). Cholesterol levels (19.6% of patients are at high risk). Nine patients with glucose results were considered high risk (19.6%). Glucose levels and cholesterol (both HDL and LDL) are modifiable risk factors that were present for about one-quarter of patients. Accordingly, education on these risk factors and ways to control glucose and cholesterol levels should be in the stroke prevention education program.

There were 17 different lab values collected from patient charts (Table 16). The patients' results classified into risk categories of low, medium, and high. Table 11 identifies the frequency distribution of lab results. Laboratory values were not recorded in the medical charts for all 56 patients because laboratory work had not been completed yet or the patient did not go to the laboratory to get them completed.

Since the hematocrit and hemoglobin blood value percentages fell in the mid-range in most of the patients (89.1% to 93.2%), it could be that the risk of ischemic stroke was not very high. These findings further substantiated the platelet count of the participants, where only 2.2% of the concerned stakeholders had platelet count in the higher range. From these findings, it could be that the risk of platelet adhesion and the platelet aggregate was not very high, at least in levels that are required to produce a

cerebrovascular stroke. It might be possible that the participants in this study were confirmed stroke patients, which prompted them to comply with their antiplatelet medications that prevented the rise in the platelet count.

Since only 4.3% of the patients exhibited, hypokalemia could be because the low blood potassium levels did not predispose the risk of ischemic stroke in this population. Medications such as Furosemide could also be a cause of low potassium due to excessive amounts of urinary output. Johnson et al. (2017) reported that low potassium levels in the blood could predispose the risk of stroke in patients suffering from hypertension, diabetes mellitus, and dyslipidemia. If the potassium levels in the blood in most of the patients in this study were low, then it could be considered that the risk of stroke would have been higher.

Most of the patients (97.9%) exhibited blood glucose levels between the mid- and high-range, which is also indicated by the glycosylated hemoglobin levels, ranged from mid- to high-range at 100% of the patients. These findings suggested that the population considered for this study was at a high risk of diabetes mellitus. Diabetes mellitus is one of the major risk factors for stroke. Glycosylated hemoglobin (Hb1Ac) levels signify the amount of glucose present with hemoglobin during the last three months up to the time of the assessments. Since red blood cells have a lifespan of three months, the A1C level is a reliable estimate of blood glucose levels over the previous three months.

Some studies have suggested that stroke increases the risk of iron overload, which is evident as high plasma iron and ferritin levels. However, neither the iron levels nor the

ferritin levels in the population for this study fell in the upper range, which suggested that iron overload is not a significant complication of stroke. The evidence suggests that the International Normalized Ratio (INR) is a good indicator of recurrent stroke in at-risk individuals. INR refers to the clotting ability of the blood. With the use of blood thinners, the INR should fall between 2 to 3, while in other cases, the ratio is usually less than 2. In this study, most of the participants (97%) had an INR in the mid-range, while only 2.2% had an INR in the high range.

These findings suggest that the stroke risk population have a hypercoagulable hematological status. Studies also indicate that an INR of less than 1.5 predisposes the risk of recurrent stroke. Therefore, the people in this study had a higher risk of recurrence of stroke. It could also be possible that the target population might exhibit poor compliance with antiplatelets or blood thinners, which caused the INR to fall in the mid-range.

The major parameters that predisposed the risk of stroke or its recurrence were hyperlipidemic values. The total cholesterol and the serum triglyceride levels of the participants (100%) fell between mid- and high-range. Also, an equal percentage of the participants exhibited LDL cholesterol levels within the middle- and high-range. 28.3% of the participants showed LDL cholesterol levels within the high-range. A similar percentage of the patients (21.6%) exhibited HDL cholesterol within the low-range. These findings suggest that high blood glucose and dyslipidemia to be the significant risk factors for stroke in the target population. The blood urea nitrogen and alkaline

phosphatase levels in most of the patients (> 97.8%) fell within the mid-range, which suggested that the study population might carry a risk of renal failure or myocardial infarction.

The overall descriptive statistics on the laboratory parameters suggested that the stroke prevention education program should prioritize and ensure stringent control over the blood sugar levels and dyslipidemia. These assumptions are congruent with the evidence that high blood sugar levels, dyslipidemia, and obesity predispose the risk of ischemic cerebrovascular stroke. The deposition of excess subcutaneous fat along with high cholesterol levels reduces the fluidity of the plasma membrane. These attributes prevent the regulation of GLUT-4 receptors in the plasma membrane of myocardial cells, and endothelium causes not only diabetes mellitus but also prevents the entry of glucose from the blood to the referred cells and tissues. Glucose is one of the major fuels of the body cells, and the lack of glucose might prevent the contractile properties of the myocardium as well as the endothelium within the blood vessels. The flow of the blood compromises cardiac output through the blood vessels. Both situations reduce the perfusion within cerebral arteries and coupled with diabetes mellitus, the brain tissues causing ischemia due to the lack of oxygen, which predisposes the risk of transient ischemic attack and stroke.

The laboratory values most strongly associated with stroke risk are in Table 16. These values included cholesterol, triglyceride, A1C, glucose, nonHDL cholesterol, and

LDL cholesterol. The lowest lab value related to stroke was A1C, indicating that education is necessary to improve A1C levels and reduce risks of stroke.

Table 17

Summary Statistics of Lab Test Result Measures

Measure	*N*	Mean	Median	Std. deviation	Min	Max
Glucose (high)	9	121.67	115.0	23.441	100.0	177.0
A1C (high)	5	6.98	7.1	1.071	5.7	8.2
Triglyceride (high)	6	185.33	183.0	27.687	153.0	235.0
Cholesterol (high)	9	223.56	221.0	14.449	204.0	249.0
HDL cholesterol (low)	10	44.10	45.5	5.174	33.0	50.0
LDL cholesterol (high)	13	134.62	135.0	24.935	102.0	173.0
NonHDL cholesterol	7	199.29	153.0	25.850	133.0	203.0

The assumptions framed from Table 16 substantiated the laboratory values on the referred variables in Table 17. The findings suggest that the mean and median fasting blood glucose levels were high (121.67 mg/dL and 115 mg/dL) from the perspective that the fasting blood glucose levels in healthy individuals fall between 90 to 120 mg/dL. Table 16 further showed that not only the fasting blood glucose levels were high in the participants but were elevated in a sustained manner because the mean and median

Hb1Ac levels were high (6.98 moles and 7.1 moles) and matched the scales for the diagnosis of diabetes mellitus. As per the American Diabetic Association (n.d), diabetic patients who are taking oral hypoglycemic agents should exhibit Hb1Ac levels below 7.0 for men and 6.5 for women. However, the median A1C levels were more than the ADA recommendation. Because 80% of the patients were females, poor glycemic control, as well as the importance of complying with the oral or injectable hypoglycemic regimens, needs reinforcement. Because diabetes mellitus is a significant and predisposing risk factor for stroke and its recurrence, these findings suggest that the stroke prevention education program should provide adequate emphasis on glycemic control.

The observations related to glycemic control matched the considerations related to the lipid profile of the patients. The mean and median total cholesterol levels were significantly higher than the normal levels (223.53 mg/dL and 221 mg/dL against 200 mg/dL). The mean and the median LDL cholesterol levels were significantly higher than the normal levels (134.62 mg/dL and 135 mg/dL against 100 mg/dL). The mean HDL cholesterol levels were comparable to higher than normal levels (44 mg/dL versus 40 mg/dL). Although the median HDL levels were significantly higher than the normal levels (45.5 mg/dL versus 40 mg/dL), it indicated that 50% of the patients had HDL cholesterol levels less than 45.5 mg/dL.

These findings suggest that those in this study suffer from hyperlipidemia as well as dyslipidemia. Dyslipidemia is considered one of the significant risk factors for stroke and its associated complications. As mentioned earlier, LDL cholesterol is often referred

to as "bad cholesterol" because it carries cholesterol from the liver to the extrahepatic tissues, such as the endothelium of the blood vessels. The deposit of LDL cholesterol causes narrowing of the arteries to cause atherosclerosis and arteriosclerosis, both of which impedes blood flow to the myocardium and the brain. The effects of increased LDL cholesterol increase the risk of cerebrovascular, as well as ischemic stroke.

Conversely, HDL cholesterol is often referred to as "good cholesterol" because it carries cholesterol from the extrahepatic tissues such as the endothelium of the blood vessels to the liver, reducing the risk of stroke and its associated complications. While high levels of HDL cholesterol are good for health, the excess deposits of HDL cholesterol in hepatocytes increases the risk of hepatomegaly and cirrhosis. Therefore, the target population should be educated to avoid the risk factors that could lead to hyperlipidemia and dyslipidemia.

Thirteen of the patients had elevated levels of low-density lipoproteins, also known as LDL Cholesterol levels, hyperlipidemia, or hypercholesterolemia (Figure 2). When a patient has high LDL, educating the patient on ways to reduce LDL levels and avoid a stroke will be performed by their physician and staff. Because 13 patients had a stroke risk factor of high LDL, education on ways to reduce LDL would be included in the patient stroke education program. However, some patients who had LDL in the mid-range could be predisposed to high levels of LDL cholesterol with time if the concerned stakeholders do not comply with the statin group of drugs or healthy dietary behavior.

Therefore, it is essential to design a stroke education program for helping at-risk individuals to meet with their lipid-lowering medications and healthy nutritional habits.

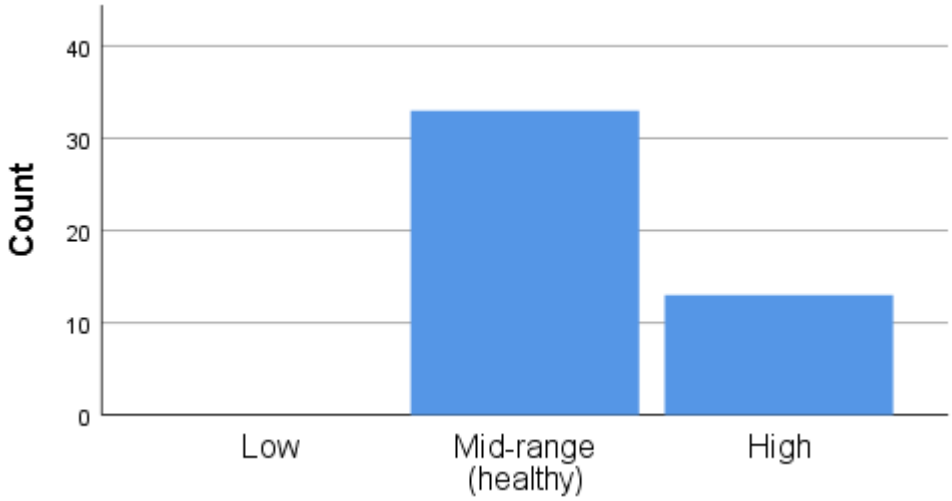

Figure 6. Distribution of low LDL cholesterol.

As illustrated in Figure 7, 10 patients had low levels of HDL cholesterol, which is also a stroke risk factor. However, most of the patients had HDL cholesterol levels in a healthy range. Thus, stroke prevention education on HDL cholesterol may not be as important as education on LDL cholesterol.

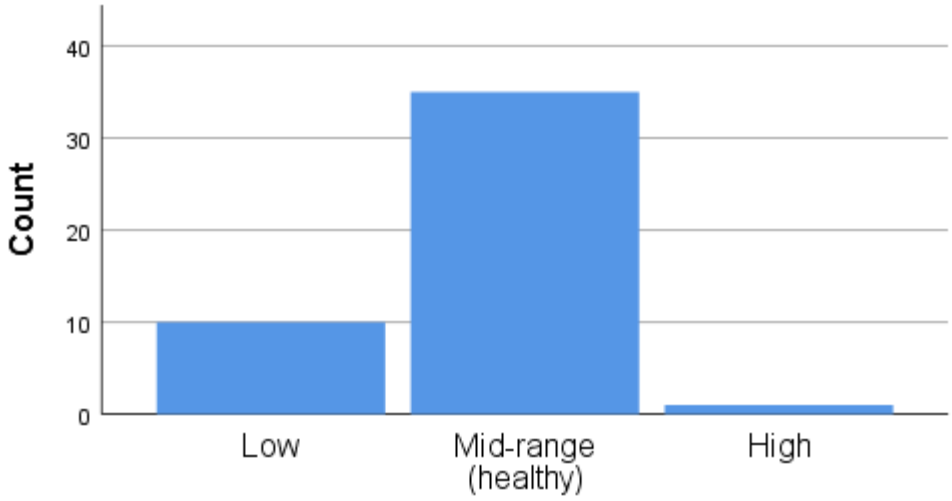

Figure 7. Distribution of HDL cholesterol.

The overall distribution for cholesterol values is in Figure 8. Most patients had cholesterol levels in the mid-range.

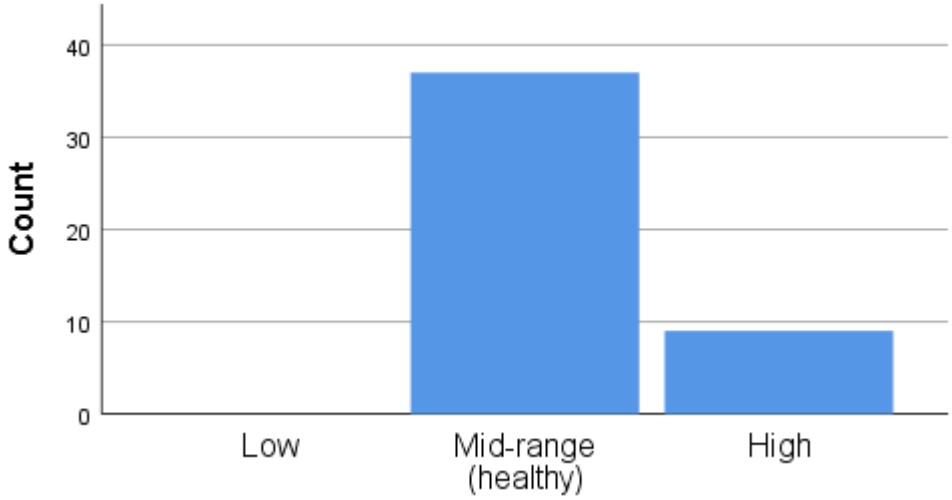

Figure 8. Overall cholesterol distribution.

Medical Conditions

There were 22 medical conditions for the 56 patients considered for discussion -- all of which can be related to stroke. Table 18 lists the medical diagnoses and

percentages that were in the charts for patients. The most common conditions identified for 18 of the 56 patients were hypertension (32.1%), followed by type 2 diabetes (16.1%), anemia (12.5%), and angina (10.7%). The presence of other conditions was limited to three or fewer patients. Based on prevalence, it may be essential to educate patients about the stroke risks associated with hypertension, type 2 diabetes, anemia, and angina; understanding the increased stroke risk associated with these diseases may increase awareness and necessary prevention among individuals with these diseases.

Table 18 suggested that comorbidity was a significant risk factor that predisposed the risk of stroke and its occurrence in the targeted population because almost 60% of the patients are affected by either diabetes or hypertension. The percentage of patients with hypertension (32.1%) was less compared to studies conducted across Asian populations, where 75% of the target population was hypertensive. It could be possible that the study considered in this analysis were known stroke patients and complied with their antihypertensive medications. It could also be that diabetes mellitus or obesity were the significant risk factors compared to hypertension in predisposing the risk of stroke. Such findings are not surprising because the population considered in this study were predominantly female.

Table 18

Frequency Distribution of Medical Conditions Among Patients

Condition	Documented	Not documented
Coronary artery disease	2 (3.6%)	54 (96.4%)
HTN	18 (32.1%)	38 (67.9%)
DM2	9 (16.1%)	47 (83.9%)
Diabetes	1 (16.1%)	55 (98.2%)
Morbid obesity	1 (1.8%)	55 (98.2%)
Angina	6 (10.7%)	50 (89.3%)
Hx of myocardial infarction (MI)	1 (1.8%)	55 (98.2%)
Transient ischemic attack (TIA)	1 (1.8%)	55 (98.2%)
Syncope	1 (1.8%)	55 (98.2%)
Cerebrovascular accident (CVA)	1 (1.8%)	55 (98.2%)
Stroke	1 (1.8%)	55 (98.2%)
Deep vein thrombosis	1 (1.8%)	55 (98.2%)
Pulmonary embolism	2 (3.6%)	54 (96.4%)
Possible TIA	1 (1.8%)	55 (98.2%)
Anemia	7 (12.5%)	49 (87.5%)
Edema	2 (3.6%)	54 (96.4%)
Uribili albuminuria	1 (1.8%)	55 (98.2%)
NIH Stroke Scale	1 (1.8%)	55 (98.2%)
Lupus	1 (1.8%)	55 (98.2%)
Multiple sclerosis	1 (1.8%)	55 (98.2%)
Sjogren's syndrome	2 (3.6%)	54 (96.4%)
Irregular heartbeat	3 (5.4%)	53 (94.6%)

Note. $N = 56$.

The five most common medical conditions are reviewed in Figure 5. Hypertension was the most common medical condition associated with stroke risk, followed by type 2 diabetes, anemia, angina, and irregular heartbeat.

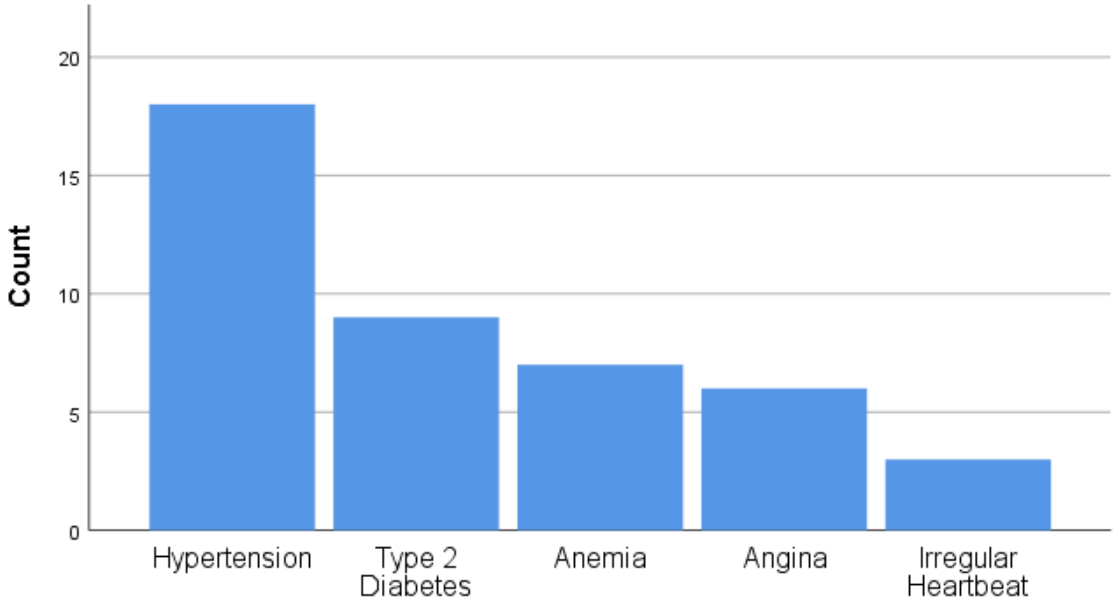

Figure 9. Frequency of conditions.

Although Figure 5 reflected that hypertension was the significant risk factor because it was present in 32%, the combined percentage of type 1 and type 2 diabetes mellitus was equal to the rate of patients with hypertension. These findings suggest that the stroke prevention education program should adequately emphasize achieving glycemic control in the target patients. Also, the application should incorporate strategies in gaining stringent control over blood pressure levels both through pharmacological and nonpharmacological interventions.

Pharmacological Interventions and Supplements

The frequency and percentages are summarized individually for medication classifications due to the various versions of prescribed and over-the-counter medications. There were 24 different classifications identified to prevent stroke in Table 19. Prescribed medicines taken by patients include BP meds, diuretics, anticoagulants, statins, antidiabetics, anti-angina, hydrochlorothiazde (HCTZ), and HMG CoA Reductase.

Table 19 suggested that 33 patients consumed different types of antihypertensive medications, and some of them in combination with others. It could be possible that less than 33 patients consumed antihypertensive drugs routinely. Therefore, 50% of $n = 56$ patients were not taking antihypertensive medications, which showed that 32.1% of the patients suffered from hypertension. The study showed that only 14 patients (20%) received ACE Inhibitors as antihypertensive medication. This observation is significant because congestive heart failure (CHF) or left ventricular hypertrophy (LVH) could predispose the risk of stroke due to a low left ventricular ejection fraction (LVEF).

Table 19

Medication Classification, Name, and Frequency of Use

Medication classification	Medication name	Frequency	Percent
Beta-blockers	Metoprolol	2	3.6
	Propranolol	1	1.8
	Toprol	1	1.8
	None	52	92.9
	Total	56	100.0
Ace inhibitors	Lisinopril	10	17.9
	Lisinopril/HCTZ	3	5.4
	Ramipril	1	1.8
	None	42	75.0
	Total	56	100.0
Ca channel blockers	Amlodipine	6	10.7
	None	50	89.3
	Total	56	100.0
Angiotensins	Cozaar	1	1.8
	Losartan	3	5.4
	None	52	92.9
	Total	56	100.0

(*table continues*)

Medication classification	Medication name	Frequency	Percent
Fibrates	Fenofibrate	2	3.6
	Gemfibrozil	1	1.8
	None	54	96.4
	Total	56	100.0
Nitrates	Nitrostat	1	1.8
	Nitroglycerin (NTG)	1	1.8
	None	54	96.4
	Total	56	100.0
Diuretics	Furosemide	2	3.6
	HCTZ	1	1.8
	Triamterene/HCTZ	2	3.6
	None	51	91.1
	Total	56	100.0
Statins	Crestor	3	5.4
	Pravachol	1	1.8
	Simvastatin	5	8.9
	None	47	83.9
	Total	56	100.0

As illustrated in Figure 10, the most commonly taken medication among the sample was Lisinopril, an ACE inhibitor to 10 patients. The next most common drugs were Metformin, Amlodipine, and Simvastatin. Many patients were not taking any medications.

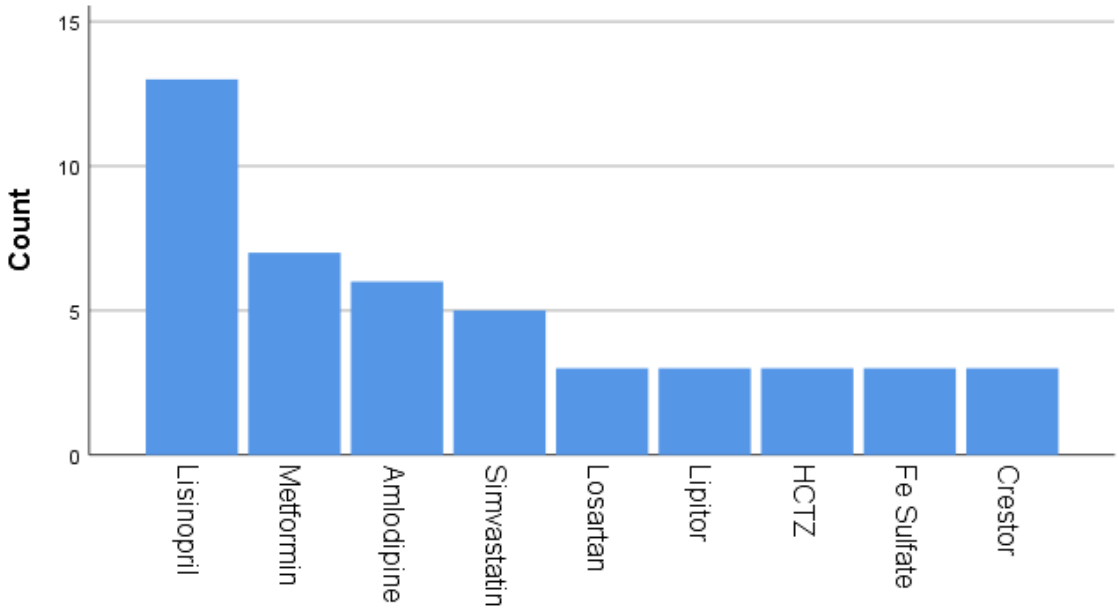

Figure 10. Distribution of medications.

Table 19 reflected the classes and types of blood thinners for the patients. Blood thinners or anticoagulants are drugs that prevent platelet aggregation and maintain the flow of blood within the blood vessels. There are two main types of Anticoagulants: heparin or warfarin, also known by their brand names as Coumadin and Antiplatelets (Aspirin). These drugs prevent blood platelets from clumping together to form a clot. The majority (96.4%) of the sample was not taking any anticoagulants or antiplatelets. Therefore, patients who were taking blood thinners were low (n = 7). However, this finding was pertinent because most of the patients exhibited an INR in the mid-range.

Because of this, physicians and allied healthcare professionals should ensure that the coagulation profile of the patients for their cardiovascular status. Also, 12 patients were taking lipid-lowering medications such as fibrates and statins that correlated with the percentage of individuals who exhibited high LDL cholesterol levels.

Table 20

Frequency of Anticoagulant/Antiplatelet Use

Medication classification	Medication name	Frequency	Percent
Anticoagulant	Coumadin	1	1.8
	Eliquis	1	1.8
	Plavix	2	3.6
	None	52	96.4
	Total	56	100.0
Antiplatelet	Aspirin (ASA)	1	1.8
	Bayer (ASA)	1	1.8
	None	54	96.4
	Total	56	100.0
Anticoagulant/antiplatelet combined	Plavix/ASA	1	1.8
	Plavix/Bayer (ASA)	1	1.8
	None	54	96.4
	Total	56	100.0

Patients' family health and social histories are in Table 21 through 25. Five categories for these data included mother's health history, father's health history, grandparent's health history, sibling's health history, and patient's social history.

Table 21

Frequency Distribution of Health Conditions for Mother

Mother condition	Documented	Not documented
Hypertension (HTN)	8 (14.3%)	48 (85.7%)
Diabetes type 2 (DM2)	3 (5.4%)	53 (94.6%)
Heart disease	4 (7.1%)	52 (92.9%)
Atrial fibrillation (AFib)	1 (1.8%)	55 (98.2%)
Coronary artery disease (CAD)	1 (1.8%)	55 (98.2%)
Diabetes mellitus (DM)	6 (10.7%)	50 (89.3%)
Stroke	4 (7.1%)	52 (92.9%)

Note. $N = 56$.

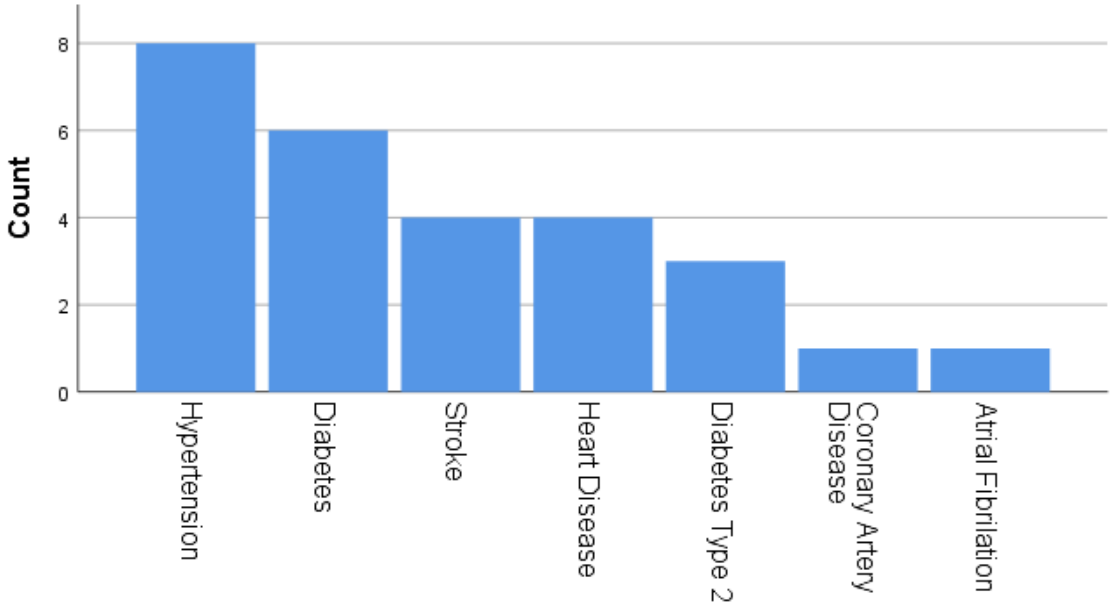

Figure 11. Distribution of mother's health conditions.

The frequency table presented in Figure 7 illustrates the distribution of patients' maternal health history. For paternal health history, the most common ailment was also hypertension (n = 8, 14.3%), followed by type 2 diabetes (n = 4, 7.1%) and diabetes mellitus (n = 4, 7.1%).

Table 22

Frequency Distribution of Health Conditions for Father

Father condition	Documented	Not documented
Hypertension (HTN)	8 (14.3%)	48 (85.7%)
Diabetes type 2 (DM2)	4 (7.1%)	52 (92.9%)
Heart disease	2 (3.6%)	54 (96.4%)
Atrial fibrillation (AFib)	1 (1.8%)	55 (98.2%)
Coronary artery disease (CAD)	1 (1.8%)	55 (98.2%)
Diabetes mellitus (DM)	4 (7.1%)	52 (92.9%)
Stroke	0 (0.0%)	56 (100%)
Cerebrovascular accident (CVA)	1 (1.8%)	55 (98.2%)

Note. $N = 56$.

While sorting the patients in the study in terms of parenthood, it showed that hypertension emerged as an independent and predominant risk factor for stroke followed by diabetes mellitus.

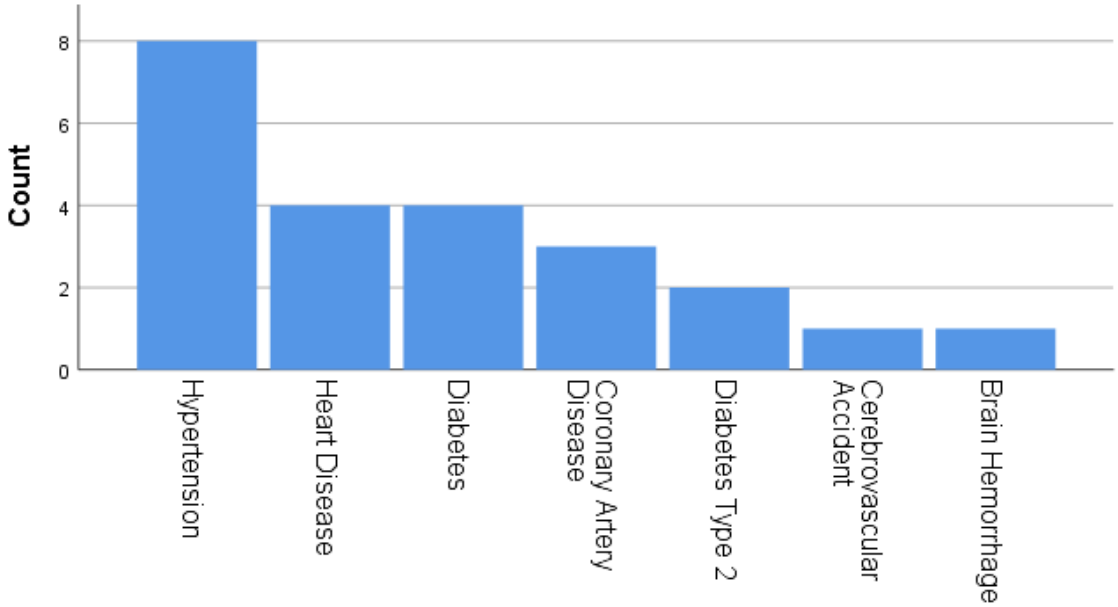

Figure 12. Distribution of father's health conditions.

However, comorbid cardiovascular diseases also emerged as a significant risk factor for strokes in fathers. Therefore, the stroke education program for fathers should emphasize the management of cardiovascular disorders, including hypertension.

Health histories for the patients' grandparents with documented and undocumented cases for six conditions are listed in Table 23.

Table 23

Frequency Distribution of Health Conditions for Grandparent

Grandparent condition	Documented	Not documented
Diabetes mellitus (DM)	5 (8.9%)	51 (91.1%)
Diabetes type 2 (DM2)	1 (1.8%)	55 (98.2%)
Heart disease	6 (10.7%)	50 (89.3%)
Cerebrovascular accident (CVA)	1 (1.8%)	55 (98.2%)
Coronary artery disease (CAD)	1 (1.8%)	55 (98.2%)
Hypertension (HTN)	5 (8.9%)	51 (91.1%)

Figure 13 provides a visual representation of the frequency distribution of the documented health histories for patients' grandparents.

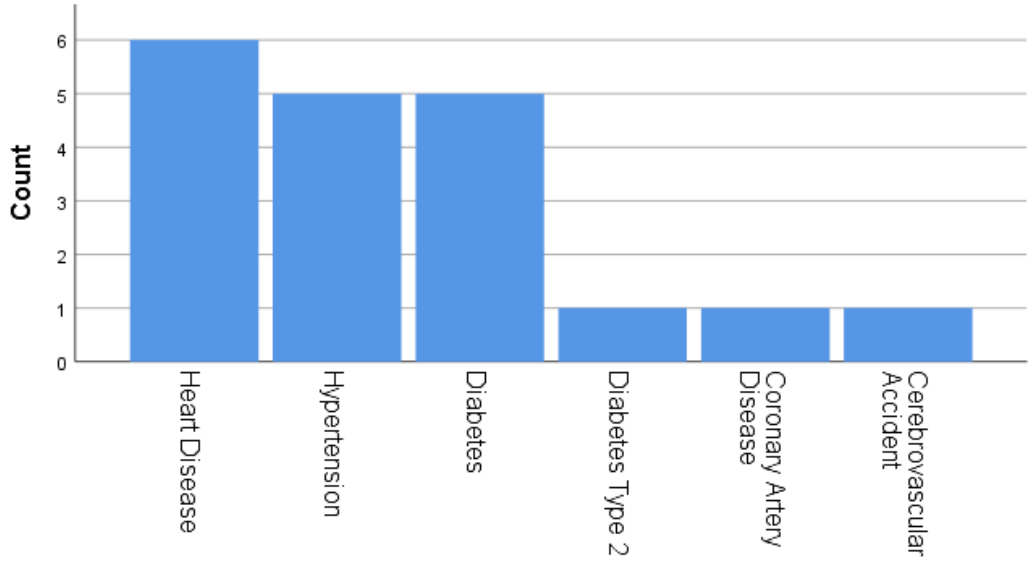

Figure 13. Distribution of grandparents' health conditions.

Finally, health histories for patients' siblings examined. Only four conditions were indicated, including diabetes mellitus, hypertension, coronary artery disease, and stroke. Data for sibling health history is in Table 24.

Table 24

Frequency Distribution of Health Conditions for Siblings

Sibling condition	Documented	Not documented
Diabetes mellitus (DM)	3 (5.4%)	53 (94.6%)
Hypertension (HTN)	3 (5.4%)	53 (96.4%)
Coronary artery disease (CAD)	2 (3.6%)	54 (96.4%)
Stroke	1 (1.8%)	55 (98.2%)

Figure 14 provides a visual representation of the frequency distribution of the health conditions of patients' siblings. Findings regarding patients' family histories indicated that patients should understand the importance of understanding their family history and associated stroke risk factors.

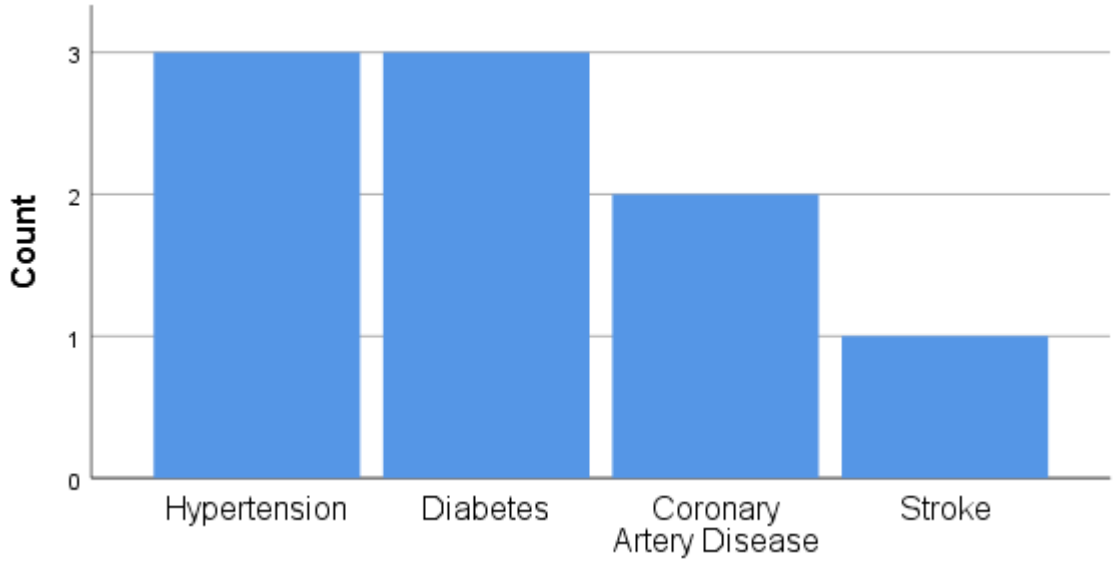

Figure 14. Distribution of siblings' health conditions.

Patients' social histories for documentation of alcohol use, tobacco, caffeine, activity, and a sedentary lifestyle. Table 24 displays data for patients' social history documentation.

Table 25

Frequency Distribution of Patient Social History

Item	Documented	Not documented
Ethyl alcohol (ETOH)	27 (48.2%)	29 (51.8%)
Exercise	32 (57.1%)	24 (42.9%)
Tobacco	19 (33.9%)	37 (66.1%)
Caffeine	20 (35.7%)	36 (64.3%)
Activity	22 (39.3%)	34 (60.7%)
Sedentary	8 (14.3%)	48 (85.7%)

The most common social risk factor for patients was alcohol use in 27 of the patient charts. Twenty patient charts indicated caffeine use, while 19 stated tobacco use. Exercise and activity, which may combat stroke risk factors, were suggested in many of the patients' charts. Based on the review of patient charts, risks associated with alcohol, caffeine, and tobacco could be in the patient stroke-prevention education program.

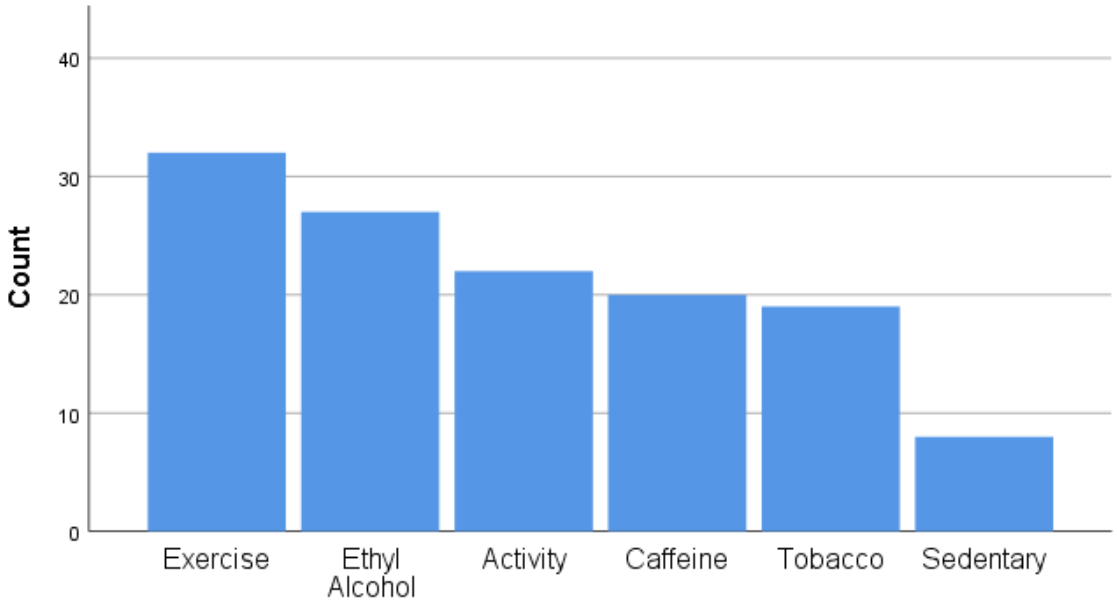

Figure 15. Distribution of social history.

The social history of the patients reflected that more than 50% of the patients exhibited routine physical activity, which should have reduced the risk of hypertension and obesity in this population. However, habit-forming behavior and a sedentary lifestyle were in more than 30% of the participants. Therefore, it could be that the beneficial effects of physical exercise on alleviating the risk factors for stroke nullified habit-forming properties such as alcoholism, smoking, and caffeine addiction. Abstinence should also be a focus of this prevention education program for stroke.

Recommendations

The purpose of this study was to determine if there was a need for a Stroke Education Program in a busy private practice office. Also, I endeavored to determine which type of stroke prevention information would be most beneficial to patients, based on the prevalence of modifiable and nonmodifiable variables. Fifty-six patient charts were reviewed for data related to modifiable and nonmodifiable stroke risk factors. These data points included laboratory values, BMI, disease process, medications, vital signs, age, gender, family history, and social history.

Findings from the analysis revealed several modifiable and nonmodifiable risk factors present in the patient sample. The presence of these risk factors provides an indication of the type of information that is essential to the stroke education program at the study site physician's office. The following risk factors were present for a significant percentage of the sample: high BMI, high glucose, high LDL cholesterol, hypertension, type 2 diabetes, anemia, angina. Also, parents, siblings, and grandparent histories indicated many patients had family members with a history of type 2 diabetes or hypertension.

Finally, findings from this study support the development of a stroke prevention education program at the study site physician's office. This education program would be to educate patients on how to reduce modifiable risk factors, including BMI, A1C levels, high LDL cholesterol, hypertension, type 2 diabetes, and anemia. Such education may include recommendations for improving lifestyle, increasing physical activity, reducing

stress, improving nutrition, and reducing body weight. Patients should also learn about the risks associated with alcohol consumption, smoking, and caffeine use. This program should educate patients about nonmodifiable risk factors, such as family health history, to help build awareness of stroke risk for extra precautions when nonmodifiable chances are present.

The stroke prevention education program can take many forms—for example, educational brochures or flyers displayed in the patient waiting room. The office could develop and offer patient health seminars, in which they brought in specialists to talk about stroke prevention and worked with patients to identify and reduce their risks for stroke. Another possibility may be a virtual training or course on stroke prevention. The office could provide incentives for completing the course, perhaps in partnership with insurance companies. Finally, the office could develop programs to assist patients in reducing modifiable risk factors, such as weight loss, stress reduction, and physical activity programs. Such programming could be group-based, fostering both education and camaraderie to help patients support one another in reducing their risks for stroke.

Strengths and Limitations of the Project

The main advantage of this study was the availability of many data points for the patient sample. Although there were patients with missing data, the overall dataset was rich. It allowed me to make inferences and draw conclusions about patients' stroke risks and the information that may be most pertinent to include in a stroke prevention program.

This study was also subject to some limitations. For example, patient data were only for a single physician's office. Missing patient data did limit the interpretations, to a degree.

Also, patient charts provide a limited perspective of patients' risk factors. Even quantifiable and objective data, such as lab values, are subject to error. Much of the data relies on patient reporting, including the personal history of illness, medication, family history, and social history. There was no way to confirm the accuracy of the information reported by the patients that were available in the patient charts. There is also the chance of subjective bias inherent in the self-report of social risk factors, such as physical activity levels, alcohol consumption, or smoking. Patients may not accurately report the amount of alcohol or tobacco they consume, and it is possible that they under- or over-report physical activity. One person's perspective of a high activity level may differ significantly from the standpoint of another individual.

Summary

Despite these limitations, findings from this study provided a foundation to guide the development of a stroke education program for patients and reinforce the value in tailoring stroke education to the needs of patients in a medical office.

Section 5: Discussion

The purpose of this study was to determine whether there is a need for a stroke prevention program and, if so, what should be addressed in such a program. Zullig & Hayden (2018) contended that to move the field of stroke prevention forward, studies, both positive and null, should be reviewed. This study indicated that at the time of patients' initial visit, the physician and nurse can review their specific data for the risk of stroke and provide stroke education. During this initial visit, patients may receive the knowledge they need to make informed decisions for improvement in their health status by the next visit. On subsequent visits, past visits may be reviewed along with new laboratory values to determine whether improvements have been made or milestones have been reached in patients' health assessments.

Because stroke is a leading cause of morbidity and mortality in the United States (Zullig & Hayden, 2018), laboratory values, BMI, medications, medical diagnoses, and family and social history were examined as modifiable and nonmodifiable data for this study. Interventions need to be a priority for this private practice. Through personal and focused interventions, patients may be informed about behavioral changes to prevent stroke. With more knowledge about strokes, patients can change behaviors that place them at risk of stroke. This study contributes to the growing knowledge base developed by federal agencies such as the CDC, organizations such as the AHA, and journals such as *Stroke* indicating that physicians' offices need to provide formal education for patients whose assessment data show that they are at risk of stroke.

Organizational change in a physician's office starts with implementing changes for staff education. Studies have suggested that nonphysician staff, including nurses employed in a physician's practice, can provide appropriate health awareness education (Ritsema, Bingenheimer, Scholting Cawley, 2014). However, whether the interventions could also be useful in alleviating the risk of stroke or its complications has not been explored comprehensively. There are different modifiable and nonmodifiable risk factors that predispose individuals to the risk of stroke and its associated morbidity. Most of these individuals are unaware of the modifiable and nonmodifiable risk factors that lead them to poor dietary and lifestyle behavior.

Additionally, individuals often fail to comply with therapeutic recommendations and medications to prevent stroke and associated complications. The present study explored whether a stroke prevention program could be designed for vulnerable populations that would be delivered by nonphysician staff, including nurses in a physician's office. Such a stroke education program should address modifiable and nonmodifiable risk factors. Based on the identification of risk factors, members of the target population may be educated to follow therapeutic recommendations as well as adhere to healthy lifestyle and dietary behaviors that could reduce the risk of stroke and associated complications. The design of the stroke prevention education program would facilitate nurses' and allied healthcare professionals' efforts to educate the target population regarding the risk of stroke.

By understanding the most prevalent stroke risk factors among patients of a physician's office, staff may be able to educate patients about the most relevant risk factors and stroke prevention strategies. The purpose of this study was to determine whether there was a need for a stroke education program among patients in a busy private practice. Additionally, I endeavored to determine which type of stroke prevention information would be most beneficial to patients, based on the prevalence of modifiable and nonmodifiable risk factors. The purpose of the study is well defined because there are various stroke prevention education programs based on the identification of modifiable and nonmodifiable risk factors. Certain risk factors do not impose a significant risk for stroke when evaluated independently but could be significant risk factors when assessed in association with comorbid risk factors.

However, most stroke prevention education programs only provide information on modifiable and nonmodifiable risks, which are often too generalized. As a result, patients often tend to ignore risk factors or do not view them as important concerns. For example, an individual might have a genetic predisposition to stroke, which might appear negligible. However, if the same person suffers from a comorbid risk factor such as hyperlipidemia, then the odds of stroke and its associated complications become different. Therefore, new stroke prevention education programs should minimize information on generalized risks and must highlight the risk of stroke by integrating various risk factors. Individualized stroke prevention education programs would help patients to correlate with the risks in a much more effective manner compared to

education on generalized risk factors. Education on generalized risk factors might seem to promote mere awareness of cerebrovascular diseases or the importance of complying with medications, which might not be effective in minimizing the incidence of stroke or its complications.

Fifty-six patient charts were reviewed for data related to modifiable and nonmodifiable stroke risk factors. These data points included laboratory values, BMI, disease pathogenesis, medications, vital signs, age, gender, family history, and social history. Findings from the analysis revealed several modifiable and nonmodifiable risk factors present in the patient sample. The presence of these risk factors provides an indication of the type of information that is essential to the stroke education program at the study site physician's office.

The average age of these risk factors provides an indication of the type of information that is essential to the stroke education program at the study site physician's office. The average age of the patients was 49.86 years, with a median of 50 years, which suggested that the patient charts had a significant proportion of data from the geriatric population. Additionally, the percentages of females and males whose data were evaluated were 83.9% and 16.1%, respectively. The five main ethnic groups considered for analysis were Caucasians (78.2%), Hispanics (12.7%), African Americans (5.55%), Asians (1.8%) and Indians (1.8%), The demographic analysis suggested that the findings of the present study were more relevant to females and Caucasians.

The median systolic and diastolic blood pressure of the patients was 128 mmHg and 82 mmHg, which suggested that 50% of the patients (n = 28) had a blood pressure beyond 128/82 mmHg. The Joint National Committee VI guidelines indicated that the target blood pressure for individuals without any comorbid risk factors such as diabetes mellitus or obesity is 140/90 mmHg, while for those with comorbid risk factors, the target blood pressure should be below 135/85 mmHg (Moawad & Hassan 2015). It is suggested that a 5 mmHg increase in the systolic and diastolic blood pressure in concerned stakeholders could increase the risk of preventable cerebrovascular or cardiovascular diseases such as stroke and myocardial infarction. Therefore, blood pressure or hypertension is one of the major modifiable risk factors that predisposes individuals to the risk of stroke and its complications. The numbers of individuals with low high-density lipoprotein levels and high low-density lipoprotein levels were 12 each, which suggested that dyslipidemia was a significant risk factor alone in almost 20% of the patients whose data were evaluated. Upon detailed analysis, the study showed that 32.1% of the patients had hypertension, followed by 32.2% with diabetes mellitus (type 1 and type 2), followed by angina (10.7%) and morbid obesity (1.8%).

The BMI category identified that individuals' weight ranged from a minimum of 103 pounds to a maximum of 332 pounds. Obesity was the predominant concern in this category, followed by overweight, and then extremely obese. Although only 4.8% of the sample was underweight, a teaching program addressing concerns related to being underweight is warranted because being underweight can interfere with the recovery

phase after a stroke. In underweight individuals, a poor nutritional state and a low red blood cell count may lead to impaired oxygen delivery to brain tissues. A low red blood cell count or anemia is another risk factor for stroke in undernourished populations.

Laboratory values associated with stroke risk were also considered. Included were CBC; electrolytes; vitamins/minerals; cholesterol levels including HDL; LDL; and triglycerides; A1C; INR; BUN; and alkaline phosphatase. Findings from the analysis revealed several modifiable and nonmodifiable risk factors present in the patient sample. The presence of these risk factors provides an indication of the type of information that is essential to the stroke education program at the study site physician's office. The following risk factors were present for a significant percentage of the sample: high BMI; high glucose; high LDL cholesterol; hypertension; type 2 diabetes; anemia; and angina. Additionally: parents'; siblings'; and grandparents' histories indicated that many patients had family members with a history of type 2 diabetes or hypertension. Findings from this study support the development of a stroke prevention education program at the study site physician's office.

The study showed that hypertension was the most common risk factor that could be modified to reduce the risk of stroke and its complications in concerned stakeholders. The findings of the study are aligned with the outcomes of Noorkhairina, Sakinah, & Che Rabiaah (2013), who suggested that hypertension is the most predisposing cause of stroke in the Malaysian population. Hypertension accounted for 75.5% for instances of stroke as per the National Stroke Registry database (Nazifah et al., 2012).

These findings suggest that although hypertension continues to be a risk factor in the population that was explored in my study, it was not the major risk factor that was noted for the Malaysian community. These findings are not surprising because patients in Asian and South East Asian nations exhibit poor compliance with antihypertension medication regimens that leads to uncontrolled blood pressure and persistence of hypertension. Stroke education programs, if designed in Malaysian settings or for the Malaysian population, should be primarily focused on addressing hypertension and its associated complications in the target population. Therefore, 75% of the content of a stroke prevention education program should focus on the importance of and approaches for complying with medications to address uncontrolled hypertension in concerned stakeholders.

Cheah, Lee, Khatijah, & Rasidah (2011) stated that the link between obesity and stroke remains inconclusive because the cause-and-effect relationship is mediated by various risk factors such as hypertension, diabetes, and hyperlipidemia. Cheah et al.'s findings aligned with the results of my study because 43.2% of the patient records indicated that the patients were obese, however, the morbid obesity percentage as a cause of the stroke was around 1%. Therefore, obesity might be an independent risk factor for stroke for the study population, and other risk factors might modify it. Alternatively, obesity may itself change other risk factors to predispose individuals to the risk of stroke. In another study, Yatsuya et al. (2010) reported that obesity increases the risk of ischemic stroke by up to 2.91 times. The findings of Yatsuya et al. substantiated that obesity

modulates the risk of stroke by interacting with other risk factors because ischemia could stem from hypertension, dyslipidemia, and diabetes mellitus.

In the present study, the risk factor that was comparable to hypertension was diabetes mellitus, which was present in almost 32% of the sample. These findings are not surprising because the patient records suggested that 43.2% of the stakeholders suffered from obesity. Obesity is a predisposing risk factor for type 2 diabetes mellitus because obesity reduces the fluidity of the plasma membrane and reduces the sensitivity of the insulin receptor to insulin. With a lack of insulin sensitivity, the insulin receptor fails to activate and upregulate GLUT-4 receptors on the plasma membrane. As a result, glucose from the blood fails to enter the target endothelium of the blood vessels or the cardiac myocytes. Both attributes could predispose individuals to the risk of stroke by compromising the contractile state of the myocardium as well as the blood vessels.

Lack of appropriate perfusion in the brain tissues causes stroke. It might seem that physical activity programs such as exercise could be advised as part of the stroke prevention education program to decrease the risk of stroke in the targeted population. However, Gao et al. (2008) highlighted that obesity mitigation programs such as routine engagement in physical activity did not substantially reduce the incidence of stroke in Malaysian patients. Such findings are not surprising because obesity and diabetes mellitus are not major causes of stroke in Malaysians, unlike my study sample (females and Caucasians).

Hamidon & Raymond (2003) reported that diabetes mellitus increases the risk of stroke by 4.88 times. Because of this report, the stroke prevention education program should address stringent control of blood sugar levels as well as education for concerned stakeholders to participate in obesity mitigation programs such as complying with antiobesity medications, engaging in routine physical activities, and opting for bariatric surgery. Patients should comply with their diabetic regimes as well as monitor their A1C Hgb levels every 3 months to ensure tight glycemic control.

Unhealthy dietary patterns may lead to malnutrition, and nutritional habits should be rectified both before and after stroke. Shen et al. (2011) suggested that poor dietary habits are independent risk factors for poor functional outcomes in stroke patients. Studies endorse that compliance with healthy dietary behavior is extremely important for geriatric stroke patients because improved dietary behavior aids in recovery and reduces the risk of future incidents of stroke and other cerebrovascular diseases by minimizing the risk of anemia and diabetes. The dietary behavior of the patients in the present study was evident from their lipid profile. Lipid profile is strongly related to the dietary consumption of unsaturated fats. Among the biochemical parameters explored in this study, hyperlipidemia emerged as the major risk factor of stroke in the study population. The study showed that out of 56 patients, 38 patients (60%) had dyslipidemia. These findings suggested that dyslipidemia, either independently or by interacting with hypertension and diabetes mellitus, might increase the risk of stroke in the target population.

In the present study, a substantial number of individuals engaged in routine physical activity, which could be considered a decisive factor in reducing the risk of stroke and poststroke complications. Although Chow et al. (2010) suggested that routine physical activity could significantly mitigate the risk of various cardiovascular and cerebrovascular events, including stroke, exercise tolerance could lead to adverse effects in the geriatric population. Therefore, the stroke prevention education program should clearly articulate which individuals should refrain from unmonitored physical activity. Younger individuals, however, should undertake routine physical activity after it is prescribed by their physician because structured physical activity helps to reduce obesity, total cholesterol levels, and blood sugar levels.

Although the patient records showed that the concerned stakeholders engaged in routine physical activity, they also reflected that most of the subjects consumed alcohol, smoke cigarettes, and used caffeine regularly. Such lifestyle behaviors can not only jeopardize the beneficial effects of physical activity, but also moderate the risk of stroke in association with other risk factors (Noorkhairina et al., 2013). Based on these findings, the novel stroke education program should endorse the importance of refraining from alcohol intake and smoking for minimizing the risk of stroke and poststroke complications in the target population.

Reflection

After performing evidence-based practice for the Doctor of Nursing Program (DNP), I gained two specific skills to reflect on. The skills involved critical thinking and

analysis of primary and secondary data related to stroke risk. I gained knowledge not only about pathophysiology of stroke but also the nursing process of caring for patients who are either at risk for or afflicted with stroke. This nursing process requires a comprehensive approach to care for patients with stroke risk factors. Doctors and nurses must not only identify patients with risk factors but also educate them on risk reduction in caring ways that are sensitive to patients' needs.

Secondary skills were developed through an intensive examination of patient data and histories to identify risk factors for stroke. I reviewed multiple articles from scholarly databases to access the most recent data on stroke risk and prevention. This process helped me learn the most recent information about stroke and integrate that knowledge into my review of patient charts. The databases I reviewed included: AHA; National Stroke Association; Walden University Library; CDC; NIH. Studies on stroke cause and prevention were accessed through journals including: Neurology; John Hopkins Medicine; British Journal of Neuroscience Nursing; The Medical Journal of Australia; Brazilian Business Review; Scandinavian Journal of Caring Sciences; Nursing Theory; Obesity Action Coalition; Journal of Health Education; NINDS. My review of the literature on stroke cause and prevention revealed that stroke is a global health issue with the potential to affect individuals all around the world.

The primary skills used involved collecting and analyzing data to determine risks for stroke among the sample of patient charts reviewed. At the beginning of this program, I was excited yet apprehensive; however, with the knowledge of nursing, legal

and ethical theory, and project skills gained throughout this project, I believe that I have grown as a scholar, and a health professional. I hope that the contributions made by this project are used to improve the health of our patient population. In addition to sharpening my critical thinking skills, working on this project also improved my time management skills and self-confidence. I feel more capable of taking on large projects, dividing them up into small goals, and chipping away at them to accomplish long-term goals. This DNP project was one of the most intensive undertakings of my life; completing it has provided me with a new sense of self-efficacy and independence, which I know will benefit me for the rest of my life.

I also believe that this process has helped improve my writing skills dramatically. Writing has not always been a personal strength, but with the guidance of my professors and tutors, I was able to complete the project and improve my writing skills. Without the help of my team (professors, committee members, and tutors), this project would not have been possible. Looking back, I am especially thankful for my Legal and Ethical Views class; the professor was engaging and consistently prompted discussions relevant to the project process.

At all times, the patients' information was under lock and key – not only for the patients' safety and privacy but to ensure my integrity, as well as the integrity of the study site.

Summary

Stroke is a debilitating illness that causes paralysis, blindness, and speech problems. Hospitals and healthcare professionals often provide stroke education videos for stroke patients; however, many patients report they do not receive adequate education (Meighan, 2018). Such findings are not surprising because the present study showed that stroke patients do not require generalized awareness on the risk factors, but specific and tailor-made awareness based on the demographic and clinical background of the patient. The problem that this study addressed was the lack of a structured patient education program on stroke prevention at the physician's office. The purpose of this study was to determine if there was a need for a stroke education program among patients that should be offered by the physician's office.

Also, I endeavored to determine which type of stroke prevention information would be most beneficial to patients, based on the prevalence of modifiable and nonmodifiable risk factors. Modifiable and nonmodifiable data was one of the major hallmarks of this project because risk factors for stroke vary from one population to another. The project questions considered are "whether there is a need for stroke education for patients at risk of stroke," as well as "what should be the content of the stroke education program." The findings of this study reflected that there is indeed a need for a tailored stroke education program for the target population that could be offered by the physician's office because most of the patients continued to exhibit poor

lifestyle and dietary behaviors. These assumptions were retrieved from the patient records that reflected the physical and biochemical vitals of the patients.

The study also endorsed content of the stroke education program for the target population to focus on enhancing compliance of patients with their antihypertensive regimen, oral and injectable hypoglycemic medications. Hypertension and diabetes mellitus were the two most prominent risk factors for stroke and poststroke complications in the target population. Therefore, the target population should also be made aware regarding mindfulness and physical activity, which could ensure their blood pressure and blood sugar remain within normal limits. The stroke education program should also focus on the importance of complying with healthy dietary habits such as refraining from alcohol consumption and unsaturated fats because hyperlipidemia was the major risk factor that emerged as an independent risk factor for stroke. These findings suggested that the patients (target population) should be made aware of the importance of complying with antiplatelet drugs and lipid lowering agents such as statins and aspirin. Statins prevent the synthesis of cholesterol by inhibiting HMG CoA reductase, while aspirin inhibits the thromboxane A2 receptors on the platelets to prevent platelet activation and aggregation. Preventing platelet aggregation within the blood vessels would ensure that the blood flow to the brain would not be compromised. To recall, a reduction in blood flow to the brain underpins the etiology of a stroke.

The major strength of this study was that it could identify the specific modifiable and nonmodifiable within the target populations. However, there were certain limitations

to the study. First, the study skewed towards females and Caucasians. Therefore, the risk of stroke and its associated risk factors in males and other ethnic groups projected in this study might not be reliable or reproducible. Second, the sample size (n = 56) considered for the study was very low, considering the study to be of an epidemiology nature. Future studies should evaluate more patient records to identify the modifiable and nonmodifiable risk factors in the target population, which would also increase the reliability and reproducibility of the findings.

Studies should be conducted to evaluate the effectiveness of well-designed and tailor-made stroke educational programs that should be administered by physician's offices through staff nurses or nonphysician staff. The findings of the present study could be the starting point to design such stroke education programs. Before the referred education programs begin, the competency level of nurses and nonphysician staff should be enhanced through action and Lewin's three step model of change.

Findings from this study provide a foundation to guide the development of a patient stroke education program and reinforce the value in tailoring stroke education to the needs of patients in an office. As stroke continues to be a global health problem, clinicians and healthcare providers must persist in developing new strategies to help reduce stroke risks. This study sheds light on the value of developing a stroke prevention education program based on data from patients at a primary care facility. In this way, the education provided may be more relevant and useful, and ultimately, help lower risks of stroke.

This section compared the findings of the present study with evidence-based literature and previous studies to understand the implication. It also evaluated the strengths and limitations of the present study based on which future studies and endpoints could be framed. Finally, based on the discussion and conclusion, a set of recommendations were constructed that would enable effective stroke prevention education by the physician's office that would help to comply with the therapeutic recommendations that would minimize the risk factors that predisposed the risk of stroke in the vulnerable populations.

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Appendix A: Budget and Revenue for a Stroke Prevention Program

Category	Details	Cost in six months	Revenue gained or not lost in six months
Occupy office space	Small space about 5 x 5 to organize equipment for education	No additional costs	The decrease in stroke victims related to disability and death. May not be able to determine.
Banner	Banner to hang in the patient waiting room	$39.00	None
Brochures Banner	Facts about stroke, (CDC and Stroke) "FAST" Healthy diets, Stroke Prevention Support	$392.48	None

	Groups, Survivor Stories, Risk Factors		
Folders	Red folders for brochures	$120.00	None
Ribbon	Six rolls of ribbons	$21.00	None
Stroke Awareness Pins	100 pins	$132.00	None

Appendix B: Components of a Stroke Prevention Program

Task Name	Start Date	End Date	Duration	% Complete
Stroke Prevention Education				
1. Needs Assessment	06/29/15			
2. Mission Statement	07/13/15	07/17/15	Complete	100%
Chart Reviews				
1. Age, Gender, Race				
2. BMI, Lab Values, VS				

3. Social and Family History				
4. Co-morbidities & Medications				
Materials for Education	08/03/15	12/03/15	Complete	Complete
1. Facts about Stroke	08/03/15	12/03/15	Complete	100%
2. “FAST”	08/03/15	12/03/15	Complete	100%
3. Diet Weight,	08/03/15	12/03/15	Complete	100%

	Lab Values, Medication Education				
4.	Support Groups	08/03/15	12/03/15	Complete	100%
5.	Hospital Locations	08/03/15	12/03/15	Complete	100%
Evaluation Plan		11/25/15	12/15/15	Complete	100%

Appendix C: Gantt Chart Depicting Activities by Week

Week of June 28, 2015	Week of July 5, 2015	Week of July 12, 2015	Week of July 19, 2015	Week of July 26, 2015	Week of August 2, 2015
		Needs Assessment	Needs Assessment		
		Mission Statement		Review materials for education	Review materials for education

Week of August 9, 2015	Week of August 16, 2015	Week of August 23, 2015	Week of August 30, 2015	Week of September 6, 2015	Week of September 13, 2015
Review materials for education	Review materials for education	Review materials for education	Review materials for education	Review materials for education	Review materials for education
			Create folders for education	Create folders for education	Create folders for education

Week of November 30, 2015	Week of December 7, 2015	Week of December 14, 2015	Week of December 21, 2015	Week of December 28, 2015
Create folders for education	Review for additional materials	Folders completed for patient education for stroke prevention with folders	Continue to Review for additional materials	Banner for waiting room location decided
Reacquainted with staff				

Appendix D: Data Collection Tool

	Chart Data	Normal Ranges	Family and Social History
Date			
Age			
Gender			
Ethnicity			
Weight			
Height			
BMI			
Vital Signs			
Absolute Eosinophils			
Vitamin D			
Sodium (Na)			
Potassium (K)			
Calcium (Ca)			
Magnesium (Mag)			
Chloride (Cl)			
Glucose			

	Chart Data	Normal Ranges	Family and Social History
A1C			
BUN			
Creatinine			
Osmolality			
RBC			
Calculated (CLS)			
Cholesterol, Total			
LDL			
HDL			
Triglyceride			
Alkaline Phosphatase			
Hct			
HgB			
PT/PTT			
INR			
Mch			
MCHO			

	Chart Data	Normal Ranges	Family and Social History
RDW			
Diagnoses			
Medications			

Notes: