Stroke: Putting Assessment and Primary Prevention Strategies into Practice

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Citation

Abstract

Stroke is the third leading cause of death in the United States and the leading cause of serious disability. The economic burden of first strokes occurring in 1990 was estimated to be $40.6 billion. In one survey, 42% of Americans were unable to identify a single stroke risk factor, and two-thirds were unable to identify a stroke warning sign.1 Primary care practitioners need to assess patients risk factors for stroke and work with patients to modify the risk factors through lifestyle changes and pharmacological therapy. Primary care practitioners also need to educate patients of the warning signs of stroke thereby expediting treatment of stroke to decrease disability. Several new therapies for stroke treatment are available but some, such as thrombolysis, have a limited window of opportunity. Education of the public and health professionals is needed to improve the treatment of patients at risk for stroke.

INTRODUCTION

Stroke is the third leading cause of death in the United States and the leading cause of serious disability. Many of the 3,000,000 American stroke survivors estimated to be alive require some form of health care assistance.[2,3] In the United States, there are approximately 350,000 long-term stroke survivors per year and of these survivors, 15% require institutional care, 30% to 53% require assistance with activities of daily living, and 60% have decreased socialization.[1,2] The economic burden for the approximately 390,000 first strokes in 1990 was estimated to be $40.6 billion. Direct care costs were approximately $17 billion and indirect costs were $23.6 billion. Acute care costs within the first two years after a stroke were responsible for 45% of the direct cost with long-term ambulatory care and nursing homes responsible for 35.1% and 17.5% of direct cost respectively. Indirect cost of stroke includes decreased productivity by the stroke survivors and lost earnings due to premature mortality.[4]

Treatment of stroke victims is an economic burden not only to the patient and family, but also to society in general. Many stroke victims survive with significant disabilities, therefore, the cost of the stroke accumulates over several years. This burden can only be alleviated through efforts to decrease the incidence of stroke. Public education regarding risk factors for stroke and identifying the warning signs of stroke is an important step toward decreasing the incidence of stroke, as well as lessening the long term disabilities. A significant effort has been made to educate the public regarding risk factors for heart disease and to identify the warning signs of a heart attack so treatment may be sought promptly and possibly abort the heart attack or lessen the extent of damage. The same public education needs to be accomplished regarding the risk factors for stroke, identifying the warning signs of stroke, and encouraging prompt treatment for strokes. In a survey of Americans, 42% were unable to name a single stroke risk factor and two-thirds were unable to identify a stroke warning sign.[1]

Advanced practice nurses (APNs) are in an ideal position to promote stroke prevention awareness. Discussion of an individual's risk factor profile and implementation of strategies to improve this risk profile are key elements in primary stroke prevention. In a large survey of Americans, over one-half of patients at risk for stroke were unaware of their risk. Patients who were aware of their increased risk were more apt to participate in stroke prevention practices.[5]

RISK FACTORS

Important aspects of stroke prevention are being able to identify who is at an increased risk of stroke and implementing strategies to decrease the risk factor profile. Risk factors can be categorized as modifiable and nonmodifiable (see Table 1) or predetermined factors.[2,3,6] Nonmodifiable risk factors are predetermined factors that cannot be treated but add to the total risk-factor profile. Nonmodifiable risk factors include history, age, gender, and race.[2,3] Identification of the risk factors for stroke as well as treatment directed at these risk factors, particularly modifiable risk factors, are an important aspect of health care provided by the Advanced Practice Nurse (APN).

Figure 1

Table 1: Stroke Risk Factors

Stroke Risk Factors	
Modifiable	Nonmodifiable
Hypertension	Age
Heart Disease	Gender
Cigarette Smoking	Race
Diabetes	Heredity
Hypercholesteremia	
Alcohol Consumption	
Obesity	
Physical Inactivity	

NONMODIFIABLE

Age is a very important risk factor for stroke as the risk for stroke doubles each decade after the age of 55-60. Elderly men are at a higher risk of stroke than elderly women until the latest years of life.[2,3]

Studies have demonstrated a higher incidence of stroke among certain races. Black Americans have double the risk of stroke than whites, especially black Americans under the age of 55. Asians, primarily the Japanese and Chinese, have a high prevalence for stroke. The high incidence of stroke in the Japanese is in contrast to the known low rates of coronary disease in the Japanese.[2,3,7,8]

Family history has also been implicated in strokes, but research support of this is weak. A study of elderly Swedish men indicated that a maternal history of stroke was related to an increased risk of stroke in that cohort. The Framingham study also implicated family history as a risk factor. What remains unclear, however, is if the risk of stroke is related to genetics, the environment, or other unidentified risk factors.[2,3,7,8]

MODIFIABLE

Modifiable and potentially modifiable risk factors for stroke that are well documented include hypertension, heart disease, cigarette smoking, and diabetes. Less well-documented risk factors that are either modifiable or potentially modifiable include elevated cholesterol, alcohol consumption, obesity, and physical inactivity.[2,3,7,8]

Hypertension is the most important risk factor for stroke. The risk of stroke increases as a person's blood pressure increases. Elevated systolic and diastolic blood pressures are related to an increase in stroke occurrence.[2,7] People with isolated systolic hypertension experience a 2-4 times increase in strokes than those with normal blood pressures. Vigorous treatment of blood pressure can decrease the incidence of stroke by 50%. Stroke rates are also higher in individuals with mild hypertension. Mild hypertensives, therefore, should be considered for early aggressive treatment based on other risk factors they also exhibit.[2,7,8]

Cardiac disease incorporates a group of disorders that predispose an individual to double the risk of stroke.[2,8] Cardiac abnormalities associated with an increase risk of stroke includes myocardial infarction, cardiomyopathy, left ventricular hypertrophy, coronary artery disease, and atrial fibrillation.[3] Myocardial infarction not only increases the risk of stroke but is frequently the cause of death in patients who have had a stroke.[2] Atrial fibrillation is an important cardiac risk factor for stroke and is implicated in almost half of all strokes of a cardioembolic origin.[3] Atrial fibrillation is associated with a four fold increase in the incidence of stroke and is a condition commonly seen in the elderly.[2] Additional factors that place patients with atrial fibrillation at a higher risk for stroke include age >65, recent congestive heart failure, history of hypertension, and a previous episode of arterial thromboembolism.[7]

Left ventricular hypertrophy as diagnosed by ECG increases the risk of stroke three to fourfold. The hypertrophy is frequently the end result of prolonged hypertension.[3,8]

Cigarette smoking as a risk factor for stroke is second only to hypertension[7] Current cigarette smoking has been linked to an increase in the progression of atherosclerosis in the carotid artery.[18] Cigarette smoking may increase the risk of stroke by as much as 50% compared to nonsmokers.[8] This increased risk of stroke disappears within 2-4 years after smoking cessation.[3,7] Women over the age of 35 who smoke and also use oral contraceptives increase their risk of stroke another five fold.[8]

Diabetes is known to be a significant risk factor for stroke, especially in women.3,7,8 Diabetics also have a greater chance of developing atherosclerosis, hypertension, obesity, and abnormal blood lipids further increasing their risk for stroke.3 Persons with glucose intolerance double their risk of stroke in comparison to nondiabetic individuals.3 A prospective study that included large cohorts of type 2 diabetic patients and nondiabetic subjects in Finland found a strong correlation between hyperglycemia and stroke in the type 2 patients especially those with poor glycemic control.9

Heavy alcohol consumption has been linked with an increase risk of stroke but light to moderate alcohol consumption has not been found to increase the risk of stroke. Heavy alcohol consumption increases the risk of stroke by its relationship to hypertension and elevated triglycerides, whereas, light to moderate drinking may actually increase HDL levels providing for a decrease incidence of stroke.7,8

Studies on the relationship of cholesterol levels to an increase risk of stroke are somewhat ambiguous. However, a relationship exists between elevated cholesterol levels and the development of atherosclerosis of the carotid artery and its distribution.3,8 Efforts to lower cholesterol levels by diet modification and drug therapy will have a positive effect on coronary artery disease which is also a risk factor for strokes. Therefore, lowering cholesterol levels may have an impact on coronary-related stroke.2

Obesity, as a risk factor for stroke is associated with hypertension, heart disease, diabetes, and elevated cholesterol.2,3,8 Weight over 30% above average according to the Metropolitan Life chart was a significant independent risk for stroke. 3 Abdominal fat has a stronger relationship to atherosclerosis than fat deposited in the hips and thighs.2

A sedentary lifestyle in men has been associated with a risk of stroke three times higher than active men. However, no association between stroke risk and exercise has been found in women.3,7

STRATEGIES

The goal of strategies directed at modifying the risk factors is a lower risk of stroke. The greater the stroke risk profile of a person the greater the importance of controlling the risk factors. Promotion of a healthy lifestyle through low fat and low cholesterol diet, decreased salt consumption, smoking cessation, and increased physical activity would help to control hypertension, heart disease, cholesterol levels, diabetes, and obesity. Decreasing salt intake may cause a

26% reduction in stroke in the hypertensive individual..7 Smoking cessation should be strongly advocated, and counseling and information related to smoking cessation programs should be offered as smoking is second only to hypertension as the most frequent risk factor for stroke. Two to four years after smoking cessation the risk of stroke returns to that of a nonsmoker..7

Several clinical trials have shown counseling by clinicians has been effective in helping smokers to quit. Key elements necessary to promote smoking cessation are providing reinforcement, setting a specific "quit date," and scheduling follow-up contacts. Studies have also shown the nicotine patch has improved the 12 month cessation rates when used along with clinician counseling and follow-up visits.17 However, patients with known cardiovascular disease should not use nicotine replacement due to the vasoconstrictive effects of nicotine. Patients not able to use nicotine replacement may benefit from zyban which is an antidepressant medication that has been found beneficial in smoking cessation in some individuals. Smoking cessation counseling is an area that APNs may have a significant impact through ongoing counseling and follow-up support.

Hypertension is the most significant risk factor for stroke, and its treatment should be a priority. The incidence of stroke increases 46% for every 7.5 mm/hg diastolic pressure rise.8 Modest programs using nutritional steps to decrease obesity, salt intake, and alcohol consumption in conjunction with an increase in exercise have been found to be helpful in the control of hypertension.2,10 Pharmocologic treatment of borderline hypertensives should be considered if two or more additional risk factors are present as significant efficacy is achieved.10

Reduction in the risk of stroke was demonstrated when warfarin was used for anticoagulation in the presence of atrial fibrillation..3 Low intensity warfarin therapy that keeps prothrombin times within the therapeutic range of an INR of 2.0 to 3.0 has been found to be 70 - 85% effective in stroke prevention in patients with atrial fibrillation.6,8,11 Patients younger than 65 with atrial fibrillation but no other identifiable risk factors are at a lower risk for stroke and could be treated with aspirin instead of warfarin..3,7 However, treatment with aspirin instead of warfarin in this younger population remains controversial.

Diabetes is a chronic disease in which rigorous glucose control will lessen its impact as a risk factor for stroke.2 Dietary instruction is, therefore, very important in helping

the diabetic maintain good control along with monitoring blood glucose levels in the home. Dietary management is also a priority in the obese patient and the patient with high cholesterol. Dietary counseling should recommend reduction of total fat intake to less than 30% of total calories with saturated fat less than 10% of total calories. Cholesterol intake should be less than 300 mg/day. Emphasis should be placed on the consumption of fish, poultry without skin, lean meats, and dairy products low in fat. To provide variety, five servings of fruits and vegetables and six servings of legumes, breads and cereals should be included.[17]

Physical activity provides several beneficial factors that moderate risk factors for stroke. Physical activity aids in reducing blood pressure, weight, and heart rate, raises HDL cholesterol and lowers LDL cholesterol, and increases insulin sensitivity providing improved glucose tolerance.[3,8] Thirty minutes of moderate physical activity every day, equal to a brisk walk, has been recommended for all adults..[7]

A stroke risk profile was developed by Wolf, D'Agostino, Belanger, and Kannel [10] from the Framingham Study cohort. This risk profile incorporated age, systolic blood pressure, use of antihypertensives, diabetes mellitus, cigarette smoking, prior cardiovascular disease, atrial fibrillation, and left ventricular hypertrophy by electrocardiogram to estimate an individual's risk for stroke. The presence of four risk factors was associated with approximately a 40% risk of stroke and the addition of even one more risk factor increases the risk of stroke to greater than 80% in women and greater than 60% in men. Use of a risk profile would allow the health care practitioner to inform the client of his percent risk of stroke compared to others in his age group. This information may provide the impetus needed to make lifestyle changes that would decrease ones risk of stroke.[10]

WINDOW OF OPPORTUNITY

In addition to identification and treatment of the risk factors for stroke, the primary care practitioner needs to educate those at risk of the warning signs of stroke (see Table 2). Stroke prevention is the primary goal, however, if a stroke does occur then the goal is to prevent permanent deficits.[12] An old, but persistent, misconception among both the public and health care professionals is the idea that once a stroke develops there is nothing that can be done to treat the stroke. This thinking may delay treatment, thereby decreasing the choices of treatment. Two windows of opportunity for the

treatment of stroke exist, but these are limited by time. The first window is the reperfusion window in which it may be possible to lyse the clot and reestablish blood flow to the ischemic area of the brain. The second window is the treatment window during which initiation of treatment may lessen the amount of injury to the brain.[13]

Table 2: Stroke Warning Signs

Stroke Warning Signs

1. Numbness, weakness, or paralysis of face, arm, or leg

2. Sudden blurred or decreased vision

3. Sudden severe headache

4. Difficulty speaking or understanding statements

5. Dizziness, loss of balance/coordination, especially in combination with other symptoms

The central area of ischemia, the core, is injured due to lack of blood supply available to deliver oxygen. The penumbra, an area of ischemic tissue that is possibly salvageable, surrounds the core and is at risk of secondary damage as a result of the brain chemicals released in response to the area of ischemia. This cascade of brain chemicals that are released may kill more neurons if it is not interrupted..[13]

There are two basic types of stroke, ischemic and hemorrhagic. Ischemic strokes are caused by either a thrombus or an embolus. Hemorrhagic strokes are caused by rupture of a blood vessels or aneurysm. In ischemic strokes, reperfusion through lysis of a clot can be done by thrombolytic therapy but needs to be initiated within three hours after onset of symptoms. Thrombolysis may be attempted via intravenous r-tPA in patients that meet inclusion/exclusion criteria such as onset of symptoms within three hours, no recent internal bleeding, and no recent surgery. Intra-arterial thrombolysis may also be accomplished with infusion of urokinase or r-tPA at the site of the clot. Preliminary data indicate that intra-arterial delivery is twice as effective as intravenous but requires the availability of a neuroradiology center with specially trained physicians.[14]

Treatment options that can be beneficial in decreasing the area of damage have a therapeutic window of four to six hours.[15] Studies of several neuroprotective agents are in

process with the hope that the severity of ischemic stroke may be decreased through effects at the cellular level..14

As a result of these new treatment options, education of both health care professionals and the public on the importance of seeking treatment promptly when the warning signs of a stroke are noted. In order to benefit from these new treatments, patients need to present to the emergency room and be diagnosed within two to three hours after onset of symptoms. Two factors identified as contributing to delay in presenting to the emergency room were patient indecision and physician delay.[16] This underscores the need for not only patient education but also provider education. Alberts, and colleagues .16 found a significant reduction in the time delay after instituting a public and professional educational program.

RECOMMENDATIONS FOR PRACTICE
THE ROLE OF THE ADVANCED PRACTICE NURSE

Advanced Practice Nurses (APNs) in primary practice are in the ideal setting to assess a patient's stroke risk profile and implement strategies to decrease the risk. The following are recommendations for APNs in a primary care setting.

1. Determine the stroke risk profile of adult patients by assessing the number of risk factors they possess.

2. Provide dietary instruction on a low fat, low cholesterol, low salt diet that limits fat intake to less than thirty percent of total daily calories, with saturated fats less than ten percent of total fat calories, and cholesterol intake to less than 300 mg/day, and sodium intake no more than 2400 mg/day.

3. Direct patients to participate in thirty minutes of moderate exercise daily which is equivalent to a brisk walk.

4. Counsel regarding smoking cessation including face-to-face advice, scheduled support visits, self-help materials, community programs, and use of nicotine replacement if indicated 17.

5. Monitor patients with hypertension and/or diabetes closely and initiate treatment as indicated. Blood pressure should be treated if the average reading is 140 or higher systolic or 90 or above diastolic. Fasting blood sugars should be 80 - 140 mg/dL.

Following glycosylated hemoglobin(HbA1c) levels give an indication of glycemic control with levels less than 7.5 percent indicating good diabetic control.

6. Maintain therapeutic INR of 2.0-3.0 on patients requiring anticoagulation for atrial fibrillation.

7. Educate patients on the warning signs of stroke (see Table 2).

APN's in a tertiary care setting may be involved in the prompt triage of potential stroke victims. Prompt assessments and early CT scan will allow a stroke victim the opportunity for possible thrombolytic therapy to decrease the amount of neuronal damage.

SUMMARY

As many as two-thirds of people surveyed in a study were unable to identify any of the early warning signs of stroke from a list of symptoms.13 APNs in a primary care setting are in the ideal situation to be instrumental in decreasing the number of strokes through identification and treatment of risk factors as well as in educating patients at risk about the warning signs of stroke (see table 2). The APN must keep abreast of the availability of new treatment options so they are able to refer patients with symptoms of a possible stroke promptly and to an appropriate facility. The time has come to be aggressive with stroke management and education.

Recommendations from the American Heart Association Conference proceedings include improving the education of the public and healthcare providers regarding risk factors and warning signs for stroke.3 Primary care providers need to be aware of the importance of managing the risk factors for stroke and encouraging lifestyle modifications appropriate to the individual. The Clinical Preventive Services Task Force17 identified several health-related behaviors that have been modified through counseling by a primary care practitioner such as smoking cessation, alcohol consumption, improved blood pressure control, and maintenance of better glucose levels in diabetics. Stroke prevention should receive the same priority level and start with the primary care practitioner.

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