KNOWLEDGE OF STROKE WARNING SYMPTOMS AND RISK FACTORS: VARIATIONS BY RURAL AND URBAN CATEGORIES

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DEDICATION

This dissertation is dedicated to my husband, Donald James Ennen. Don, your supportive love, friendship, and encouragement have made yet one more of my lifelong dreams come true. This one is ours, including the footers and tables!

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ABBREVIATIONS

AHA	American Heart Association
AMI	Acute Myocardial Infarction
CVI	Content Validity Index
HMO	Health Maintenance Organization
NINDS	National Institute of Neurologic Disorders and Stroke
NHLBI	National Heart Lung and Blood Institute
MI	Myocardial Infarction
SPSS	Statistical Package for the Social Sciences
SRQ	Stroke Recognition Questionnaire
TIA	Transient Ischemic Attack
tPA	Tissue Plasminogen Activator

SUMMARY

The purpose of this descriptive, correlational study was to assess the knowledge of stroke symptoms and risk factors in a general public Midwest sample. Secondarily, similarities and differences in stroke knowledge between respondents' residence location, age, and gender group were identified. The self-administered Stroke Recognition Questionnaire (SRQ) directed at stroke knowledge assessment was developed.

An East Central Illinois community-based sample of 400 rural and 400 urban residents was randomly selected from telephone directories and stratified by residence zip code. Dillman's (2000) Tailored Design Method for mail surveys was implemented. Response rate for this mail survey was 566 (70.5%) returned completed questionnaires. The final sample consisted of 328 (58%) males and 236 (42%) females, ranged in age from 20 to 97 years, and was evenly split at 283 (50%) rural and non-rural respondents.

The stroke symptom knowledge in this sample is better than that of published reports from other studies, while the knowledge of stroke risk factors is somewhat better or comparable to the findings in those same studies. The stroke symptom subscale revealed higher scores for rural respondents and those less than 64 years of age. The most frequently identified stroke symptoms were slurred or garbled speech, numbness of one side of face, weakness of one side of body, and confusion. Women were more likely to recognize symptoms of confusion and double vision. The stroke symptoms least often identified were double vision and sudden severe headache.

The stroke risk factor knowledge subscale revealed no significant differences in recognition by residence location and gender. Younger respondents more often recognized stroke risk factors of high blood pressure, smoking cigarettes, diabetes and alcohol use. The most frequently identified stroke risk factors were high blood pressure, high blood cholesterol, smoking cigarettes, and more than 20 pounds

overweight. The stroke risk factors least often identified were alcohol use, irregular heartbeat, diabetes, and history of having had a heart attack.

INTRODUCTION

The focus of this research was an assessment and comparison of the knowledge of stroke symptoms, as well as stroke's risk factors in a rural versus urban Midwest general public sample using a self-administered mail survey. In addition, the influence of age and gender on stroke knowledge was determined. Improving control of stroke risk factors and decreasing the time from stroke detection to hospital arrival depends on increasing the public knowledge of stroke symptoms and risk factors (Kothari et al., 1997; Pancioli et al., 1998; Yoon, Heller, Levi, Wiggers, & Fitzgerald, 2001). The goal of this study was to identify specific areas of stroke knowledge deficit, and thus provide a focus for improvement in the content of health information provided to the general public related to strokes.

A. Background

Stroke is the third leading cause of death behind heart disease and cancer in the United States, accounting for more than 160,000 deaths annually. On average someone in the United States suffers a stroke every 53 seconds; every 3.1 minutes someone dies of one. It is the leading cause of serious, long-term disability estimated to cost in excess of $45.3 billion a year (American Heart Association, 2001b).

A stroke, sometimes called a "brain attack", occurs when blood flow to the brain is interrupted. When a stroke occurs, brain cells in the immediate area begin to die because they stop receiving the oxygen and nutrients needed for function. There are two different types of stroke: ischemic and hemorrhagic. An ischemic stroke is caused by a blood clot that blocks a blood vessel in the brain. About 85% of all strokes are ischemic (American Heart Association, 2001b). A hemorrhagic stroke is caused by bleeding into the brain or the spaces surrounding the brain (National Institute of Neurological Disorders and Stroke, 2001). Another term that is sometimes used to describe a stroke is silent stroke. A silent stroke is a focal brain injury resulting from a blockage or rupture of a blood vessel with effects too subtle to be noticed and is 5 to 20 times more common than symptomatic stroke (Leary & Saver, 2001).

Estimates of new stroke incidence in the United States have ranged from 600,000 to 750,000 per year (Williams, Jiang, Matchar, & Samsa, 1999). Based on incidence rates derived from a large, multi-center population-based study, Broderick et al. (2001) estimated that 760,000 first-ever and recurrent strokes occurred in the United States in the year 2000. These estimates of stroke incidence do not take into account silent strokes (Kasner, Saver, & Levine, 2001; Leary & Saver, 2001). Leary and Saver (2001) presented the first estimate of the annual incidence of silent stroke in the United States. Their calculations suggest that each year more than 11 million persons in the United States suffer a silent stroke. These findings suggest that the annual burden of stroke is substantially higher than suggested by estimates based solely on clinically manifest events.

Age, gender, race, ethnicity, and heredity have been identified as non-modifiable risks for stroke (American Heart Association, 2001b). Partially modifiable risk factors include hypertension, atrial fibrillation, diabetes, heart and vascular disease, hypercholesterolemia, and sleep disorders. Modifiable risk factors for stroke such as cigarette smoking, physical inactivity, heavy alcohol consumption, and obesity can be treated or controlled by lifestyle changes (American Heart Association, 2000).

Stroke symptoms appear suddenly and include:

- Numbness or weakness of the face, arm, leg (especially on one side of the body),
- Confusion or trouble speaking or understanding speech,
- Trouble seeing in one or both eyes,
- Trouble walking, dizziness, or loss of balance or coordination, and
- Severe headache with no known cause.

The symptoms can range from those that are mild to significant impairment.

Rural populations are typically older and earning less than their urban counterparts compounding the issues surrounding stroke recognition, detection, and treatment (Redford & Cook, 2001). The

decreased availability and accessibility of health care providers to the 25% of Americans who live in rural areas, places with fewer than 2500 residents, may impact both the dissemination of stroke information and the timely treatment of stroke (U. S. Department of Health and Human Services, 2000b).

No published study has reported stroke knowledge of a rural (<2500 population) community-based group compared to findings about stroke knowledge in an urban group. In the few reported research studies of the general public's knowledge of stroke symptoms and risk factors, knowledge appears to be quite low (Kothari et al., 1997; Samsa et al., 1997). Improving people's knowledge of stroke symptoms and risk factors may increase the proportion of patients eligible for new stroke treatments and thus, reduce stroke deaths and disability (Williams, Bruno, Rouch, & Marriott, 1997). Increasing the public's knowledge of stroke may contribute to increasing the recognition of stroke as an emergency by bystanders (Hux, Rogers, & Mongar, 2000), and decrease the delay in the initiation of appropriate stroke treatment therapies (Kothari et al., 1997; Yoon et al., 2001).

B. Statement of the Problem

Recent evidence indicates that early intervention for stroke increases the chance for recovery and restoration of function (National Institute of Stroke and Neurologic Diseases and t-PA Working Group, 1995). A stroke can impair cognition and judgment, and limit mobility, speech, or vision, reducing a victim's ability to seek help (Barch, 1996). Co-workers, friends, or family members (bystanders) may be called upon to determine if an observed health problem is serious and what should be done. A bystander may have limited knowledge of stroke symptoms or may misinterpret the symptoms as a consequence of the aging process (Barch, 1996). Therefore, the general public's knowledge of stroke, its symptoms and risk factors, may directly impact its timely diagnosis and treatment (Kothari et al., 1997; Samsa et al., 1997; Williams et al., 1997; Yoon et al., 2001).

Only a fraction of those suffering a stroke are getting to the hospital in time to receive treatment that can make the difference between disability and recovery. Effectiveness of current drug therapies such

as thrombolysis and neuroprotection for an acute ischemic stroke event is sensitive to the time from symptom onset to the patient's presentation in the emergency department. Prolonged patient delay in care seeking for stroke symptoms can exclude the patient from these time sensitive drug therapies (Kothari et al., 1999). Health care providers play an increasingly critical role in communicating information about stroke symptoms and available therapies, as well as stroke risk factors and their prevention (Kothari et al., 1997; Samsa et al., 1997).

C. Purpose of the Study

The purpose of this study was to determine a Midwest sample's knowledge of stroke symptoms and risk factors using the *Stroke Recognition Questionnaire* (SRQ) (see Appendix A). This research study assessed gender differences in stroke knowledge as well as whether elderly persons or those living in a rural area – have less knowledge about stroke compared to younger adults and those individuals living in urban communities.

The data obtained provides further information about the general public's knowledge of stroke symptoms and factors increasing stroke risk. The data also adds to the understanding of health information needs for the elderly and those living in rural areas.

D. Research Questions

The following research questions were addressed in this study:

1. What is the knowledge of stroke symptoms in this Midwest sample?
2. What is the knowledge of stroke risk factors in this Midwest sample?
3. What is the relationship between stroke symptom knowledge and residence location, gender, and age?
4. What is the relationship between stroke risk factor knowledge and residence location, gender, and age?

E. Significance of the Problem

Stroke continues to have a devastating disabling effect on Americans while remaining the third leading cause of death in the United States. One challenge to health care professionals continues to be providing stroke therapies in a timely and effective manner. The direct costs of stroke in the United States in 2002 is estimated at $30.8 billion for health care and therapy (American Heart Association, 2001b). The costs for the diminished quality of life for stroke victims does not have a price tag, but stroke remains the leading cause of disability for Americans resulting in indirect costs of $12.8 billion a year (American Heart Association, 2001b).

One explanation for the continuing impact of stroke on American's morbidity and mortality is the general public's lack of knowledge of its symptoms and risk factors. The availability and accessibility of health information related to stroke is important. The public needs access to health information that helps them recognize and differentiate a stroke from other health problems. The need to respond quickly to the early symptoms of stroke must also be stressed. People at high risk for stroke must be taught about their risks and how to address those risks effectively. Communities must be helped to assess availability and accessibility of health care services to their residents, and work with appropriate healthcare professionals to influence and improve the timely recognition, detection, and treatment of those suffering a stroke.

F. Significance of the Study

Most Americans do not recognize the symptoms of a stroke, causing disabling or even fatal delays in receiving effective, but time-sensitive treatment. Because stroke injures the brain, stroke victims may have an impaired ability to communicate or to recognize symptoms as a stroke. The burden for quick, efficient action therefore shifts to an alert bystander amongst the general public (i.e., family, friends, neighbors, co-workers) to recognize the symptoms associated with a stroke (National Institutes of Neurological Disorders and Stroke, 1999).

The public needs access to health information to learn how to recognize and respond quickly to the early symptoms of stroke observed in another person (Joseph, Babikian, Allen, & Winter, 1999). This study provides baseline data about a Midwestern sample's knowledge of stroke symptoms and risk factors. This information will serve as a foundation for interventions to improve the general public's knowledge and ability to rapidly access the emergency medical services during episodes of stroke symptoms.

G. Definition of Terms

Access – a general concept which summarizes a set of more specific areas or dimensions of "fit" between the patient and the health care system (Penchansky & Thomas, 1981)

Accessibility – addresses the relationship between the location of supply and the location of patients, taking into account patient transportation resources, and travel time, distance, and costs (Penchansky & Thomas, 1981).

Atherosclerosis – a blood vessel disease characterized by deposits of fat, cholesterol and other substances on the inside of the walls of large to medium-sized arteries which make the artery walls thick and irregular. This buildup is called "plaque." As the interior walls of arteries become lined with these fatty deposits, the arteries become narrowed, reducing the blood flow through them [American Heart Association, 2002 #265].

Atrial Fibrillation – the most common sustained irregular heart rhythm encountered in clinical practice. It is a disorder in which the heart's two small, upper chambers quiver instead of beating effectively. Blood that isn't pumped completely out of the atria when the heart beats may pool and clot. Then a blood clot may enter the bloodstream, become a cerebral embolus and cause an ischemic stroke (American Heart Association, 2002).

Availability - addresses the adequacy of the number and type of health care providers, health information programs, and health care facilities to the patients' volume and types of needs (Penchansky & Thomas, 1981).

Cholesterol – a fat-like substance found in the blood and produced by the liver. Also found in animal tissue and present only in foods from animal sources such as whole-milk dairy products, meat, fish, poultry, animal fats and egg yolks (American Heart Association, 2002).

Hemorrhagic stroke – the injury to brain cells caused by ruptured blood vessels in the brain. Cerebral hemorrhages bleed inside the brain; subarachnoid hemorrhages bleed into the space between the brain and the skull (American Heart Association, 2002).

Hypertension – a chronic increase in blood pressure above its normal range (systolic pressure of 140mm Hg or higher and/or diastolic pressure of 90mm Hg or higher) [American Heart Association, 2002 #265].

Ischemic stroke – the death of or injury to brain cells caused when a blood clot or other particle blocks a cerebral artery. Cerebral thrombosis and cerebral embolism are ischemic strokes (American Heart Association, 2002).

Risk Factor – an element or condition involving certain hazard or danger. When referring to the heart and blood vessels, a positive risk factor is associated with an increased chance of developing cardiovascular disease including stroke (American Heart Association, 2002).

Rural area – a town with a population of less than 2500 residents (Edelman & Menz, 1996).

Silent stroke – is a focal brain injury resulting from a blockage or rupture of blood vessel, that occurs without acute or noticeable symptoms (Leary & Saver, 2001).

Stroke – a form of cerebrovascular disease that affects the arteries of the central nervous system. A stroke occurs when blood vessels bringing oxygen and nutrients to the brain burst or become clogged by a blood clot or some other particle. Because of this rupture or blockage, part of the brain does not get the flow of blood it needs. Deprived of oxygen, nerve cells in the affected area of the brain cannot function and die within minutes. When

nerve cells cannot function, the part of the body controlled by these cells cannot function either (United States Department of Health and Human Services, 2000).

Tissue Plasminogen Activator (tPA) – one of several clot-dissolving drugs used during a stroke to restore blood flow in a blocked artery (American Heart Association, 2002).

Transient Ischemic Attack (TIA) – a temporary stroke-like event that lasts for only a short time and is caused by a temporarily blocked blood vessel leading to or within the brain. Also called a "little stroke" or "mini-stroke," it is an extremely important stroke indicator (American Heart Association, 2002).

Urban area – a non-rural town or city with a population greater than 2500 residents (Edelman & Menz, 1996).

H. Summary

The research problem introduced in this chapter is the need to identify the stroke symptom and risk factor knowledge level of a general public Midwestern sample. Secondarily, similarities and differences in stroke knowledge between rural and urban groups will be identified. Results will provide a focus for improvement in the content of health information related to strokes provided the general public. This information will serve as a foundation for interventions to improve the general public's stroke knowledge and recognition, and the need to seek rapid access to the emergency medical services during episodes of stroke symptoms.

II. Conceptual Framework and Related Literature

Stroke is the third leading cause of death in the United States, and the leading cause of serious, long-term neurological disability (American Heart Association, 2001b). Despite the prominence of stroke as a cause of death and disability, an overwhelming majority of Americans remain unfamiliar with stroke symptoms and unaware of the benefits of prompt treatment (Hachinski, 2002). Thrombolytic therapy treatment may potentially reduce functional limitations from ischemic stroke when received within three hours or less of the onset of symptoms (Adams et al., 1996). However, most stroke patients arrive at the hospital too late to even consider thrombolytic treatment (Evenson, Rosamond, & Morris, 2001). No published study regarding stroke knowledge has examined whether there is a difference in knowledge level between those living in a rural versus an urban community. Rural residents account for twenty-five percent of the general population, while their communities experience a decline in available health services including health information resources. Stroke education efforts will be more effective with an understanding of the similarities and differences in stroke knowledge between rural and urban residents.

A. Conceptual Framework

The conceptual framework used for this study is Leventhal's Self-Regulation Model of Health and Illness (Leventhal, Nerenz, & Steele, 1984). An essential step in the process of seeking health care for a physical illness is a person's accurate identification of the signs or symptoms experienced (Bishop & Converse, 1986). The label applied to a health threat is an important component in the process of care seeking for symptoms in Leventhal's Self-Regulation Model of Health and Illness (Leventhal et al., 1984). This model is helpful in understanding the cognitive and behavioral processes patients with stroke symptoms use as they decide whether or not to seek care (Leventhal & Cameron, 1987). The self-regulation model identifies three stages regulating adaptive behavior during a health crisis: (1) mental representation of the health threat, (2) development of an action plan for coping, and (3) a re-appraisal stage (Leventhal & Cameron, 1987; Leventhal et al., 1984). Understanding what a person identifies as a

set of symptoms (mental representation) indicating a particular illness such as stroke may help understand their behavior in response to that illness (Bishop & Converse, 1986; Leventhal & Prohaska, 1986; Ward, 1993).

The identity or mental representation of stroke symptoms may be influenced by beliefs and emotions from family experience with stroke, knowledge about stroke, and understanding its treatment. Together beliefs, knowledge, and understanding shape how an individual labels or names the symptom or set of symptoms (Leventhal, Diefenbach, & Leventhal, 1992; Leventhal et al., 1984; Meischke et al., 1999). Knowledge of stroke symptoms may increase the likelihood of correctly naming or labeling the experienced symptoms a stroke. Labeling the health threat is key to coping behaviors that effectively address the experienced symptoms. Research has shown that patients who identified their symptoms as stroke in origin sought medical care faster than those who did not recognize their symptoms were a stroke (Azzimondi et al., 1997; Evenson et al., 2001; Jorgensen, Nakayama, Reith, Raaschou, & Olsen, 1996; Kothari et al., 1999; Lacy, Suh, Bueno, Kostis, & for the S.T.R.O.K.E. Collaborative Study Group, 2001; Rosamund, Gorton, Hinn, Hohenhaus, & Morris, 1998; Streifler, Davidovitch, & Sendovski, 1998; Wester, Radberg, Lundgren, Peltonen, & for the Seek-Medical-Attention-in-Time Study Group, 1999; Williams et al., 1997). Correctly labeling a health threat is one key to seeking appropriate and timely health care to address the threat.

B. Healthy People 2010

Healthy People 2010 outlines a comprehensive, nationwide health promotion and disease prevention agenda (United States Department of Health and Human Services, 2000b). It is designed to achieve two overarching goals: increase quality and years of healthy life, and eliminate disparities in all areas of health care (United States Department of Health and Human Services, 2000a). It provides a road map to improve the accessibility and availability to health care information and services for our nation's communities (Burggraf & Barry, 2000).

One specific goal of *Healthy People 2010* is to improve cardiovascular health, and quality of life through stroke prevention, detection, and treatment. Specific objectives for this goal are: (1) reduce stroke deaths through early identification, and (2) increase the proportion of adults knowledgeable of the early symptoms of stroke and the factors which increase their risk for stroke (United States Department of Health and Human Services, 2000b). The frequency with which strokes occur and the devastating effects they have on survivors and their families make provision of general information about stroke prevention, identification, and treatment management an essential element of public health education (Hux et al., 2000).

C. Health Information Access

Improving access to comprehensive, quality health care information and health services is a goal of Healthy People 2010. Access to quality care is important to the elimination of health disparities and to increase the quality and years of healthy life for all Americans. Adequate access to health care and related services can increase appropriate patient use of the health care system and ultimately, improve health outcomes. Success in reducing the burden of stroke and realizing the full potential of stroke prevention will depend on access to health care information and services across the continuum of care (United States Department of Health and Human Services, 2000b).

Access to health information and access to health care services is believed to be related to each other, and both are thought to be distributed inequitably. For example, those persons who are less well educated, and less affluent, also receive less health information and incur the highest health risks. These predisposing factors have been linked particularly to older rural populations (Connell & Crawford, 1988).

Penchansky and Thomas (1981) defined access as factors that affect entry into the health system. Specifically, access is a measure of "fit" between the characteristics of providers and health services and populations they serve. They identified five closely related dimensions of access: (a) availability;

(b) accessibility; (c) accommodation; (d) affordability; and (e) acceptability. Early stroke recognition, detection, and treatment depend on the access dimensions of availability and accessibility.

Availability addresses the number and type of health care providers, health information programs, and health care facilities and accessibility addresses the relationship between their location and that of the population. These dimensions of access to health care may be important determinants of potential barriers to utilization of services such as lack of knowledge, usual source of primary care, or emergency services in stroke recognition, prevention and care. Increasing the general public's knowledge of health risks and how to recognize when to use the health care system will contribute to health promotion and disease prevention (United States Department of Health and Human Services, 2000b)

Stroke, though not completely preventable, is a treatable disease. A stroke does not occur by chance or random incident , as the term cerebrovascular accident implies. It is actually the end result of a chain of events set into motion many years before actual occurrence (Helgason & Wolf, 1997). There are barriers to stroke prevention and care that are based on the availability of personnel, diagnostic technology, and health services and the accessibility of health information and health promotion programs. Effective and efficient access helps to eliminate barriers and may result in improved health status, health outcomes, and quality of life as perceived and experienced by individuals, families, communities, and providers (Gulzar, 1999). A systematic approach to organization, implementation, and maintenance of services could improve outcomes for stroke patients and reduce the public health burden of this deadly disease (Ruland et al., 2002).

D. Rural Communities

Rural localities are defined as those with fewer than 2500 residents. Twenty-five percent of Americans live in rural areas today. They are less likely to use preventive health services and in 1996, twenty percent of the rural population were uninsured compared to sixteen percent of the urban population (United States Department of Health and Human Services, 2000b). When in need of health care, rural

elders are more likely to be dependent on local rural health systems because of the logistics and cost of travel to urban areas for care (Redford & Cook, 2001). The timely access to emergency services and availability of specialty medical care are additional issues of concern for those in rural areas (United States Department of Health and Human Services, 2000b). These facts may well hinder the rural resident from not only receiving care for a stroke's symptoms, but limit their knowledge of what those symptoms are and how to recognize them as an impending stroke.

Probably the single most important characteristic distinguishing rural from urban areas is low population density. This factor is particularly important in terms of its impact on communication and transportation patterns and availability of health institutions and specialized services (Cordes, 1985). The first step in designing any public education intervention, such as one for stroke recognition, is to gather data and to assess the general public's knowledge base so that appropriate actions to disseminate health information can be determined (Billett, 2002). Rural aspects of health promotion, especially for older adults, needs to center on the methods by which programs and services are delivered and the barriers to delivering services most effectively (Coward, Bull, Kukulka, & Galliher, 1994). Healthcare providers play a crucial role in communicating information about risk, and successful communication encourages adoption of stroke prevention practices (Samsa et al., 1997).

As a group rural elders tend to have less formal education, higher rates of disability, and lower incomes than their urban counterparts. Appel and colleagues (2002) studied 1,110 women (27% black, 73% white) in rural North Carolina to examine the disparities in cardiovascular health. Women with the least education had the highest cardiovascular risk, regardless of race. Gaps in terms of geographic and cultural accessibility of health promotion services for the diverse group of elderly rural individuals still exist. Innovative strategies using rural realities and strengths such as self-sufficiency and community loyalty are needed to overcome their specific barriers to health care access (Coward et al., 1994; Racher, 2002).

Traditional approaches to health care in rural areas are failing, leaving many rural residents with limited and inadequate access to care. The problems of rural health care are a reflection of the economic and demographic pressures facing rural communities. Rural areas, particularly those not adjacent to metropolitan areas, often have more than a fifth of their population over 65 years of age, with a higher than average percentage of these elders being 85 years of age and older. This aging population is often coupled with a higher percentage of persons living in poverty in rural areas versus urban areas (Redford & Cook, 2001).

One of the dominant findings from rural aging research conducted during the past two decades is that health services are neither available nor accessible to meet the needs of rural elders (Krout, 2001). Although the rural-urban service gap has diminished for some health services in some areas in the last 20 years, a significant rural disadvantage can still be found. Substantial differences persist between rural and urban residents in self-reported accessibility of health care services (Braden & Beauregard, 1994). In most rural communities elders simply do not have access to as many or as large a range of formal health services as their urban counterparts (Coward et al., 1994). Often, a service, such as health education, that may be available in the more populated part of a rural area or in the community where a service provider is based is not available in the more distant parts of a service area (Krout, 2001).

People living in rural areas encounter a variety of barriers to health care. Geographic distance from services may be the most important of these barriers, reflecting the scarcity of providers and resulting in greater travel time to medical services (Pierce, Williamson, & Kruse, 1998). In a study of older adults in North Carolina, Blazer and colleagues (1995) found that rural residents were more likely than their urban counterparts to put off seeking care because of transportation difficulties. The likelihood of having a regular physician was found to increase as road conditions improved in rural Kentucky (Ramsbottom-Lucier, Emmett, Rich, & Wilson, 1996). Edelman and Menz (1996) documented that rural residents traveled further to receive emergency care than urban residents, a finding that suggests worse outcomes for time-

sensitive conditions such as ischemic stroke treatment. Distance to care or travel time is an important factor in accessing health care and in personal decision making for the use of health care (Slifkin, 2002).

Stroke will continue to be a leading cause of mortality and disability until health care resource availability is addressed in our rural communities. Effective health promotion requires an understanding of the special needs of specific groups such as rural Americans who continue to have access to fewer community-based acute health care services, and thus fewer health care providers and health education programs, than their urban counterparts. Health education planning also depends on awareness of the added influence of formal education, age, gender, and annual income on a specific group such as rural American residents (Congdon & Magilvy, 2001).

E. Stroke Definition, Incidence, and Symptoms

In ancient times stroke was called *apoplexy*, a general term that physicians applied to anyone suddenly struck down with paralysis. In 1658, Johann Jacob Wepfer was the first to identify postmortem signs of bleeding in the brains of patients who died of apoplexy (National Institutes of Neurological Disorders and Stroke, 1999). He also was the first person to suggest that apoplexy could be caused by a blockage of one of the main arteries supplying blood to the brain; thus, stroke became known as a cerebrovascular disease (National Institutes of Neurological Disorders and Stroke, 1999).

1. Stroke Definition

A stroke, sometimes called a "brain attack" or cerebrovascular accident (CVA), occurs when blood flow to the brain is interrupted and brain cells in the immediate area begin to die because of lack of oxygen and nutrients needed for function. Eighty-five percent of all strokes are classified as ischemic and 20% as hemorrhagic (Bratina et al., 1997). An ischemic stroke is caused by a blood clot that blocks or clogs a blood vessel in the brain. A hemorrhagic stroke is caused by a ruptured blood vessel resulting in bleeding into the brain or the spaces surrounding the brain (National Institutes of Neurological

Disorders and Stroke, 2001). A silent stroke is a focal brain injury resulting from a blockage or rupture of a blood vessel with effects too subtle to be noticed (Leary & Saver, 2001).

2. Stroke Incidence

Each year, about 600,000 people suffer a new or recurrent stroke. About 500,000 of these are first strokes and 100,000 are recurrent strokes (National Heart Lung and Blood Institute, 1998). The most common type of stoke is ischemic accounting for 85 percent of all strokes, while hemorrhagic stroke accounts for the remaining 15 percent (American Heart Association, 2001b). Death occurs within 30 days in 7.6 percent of all ischemic strokes and 37.5 percent of all hemorrhagic strokes (Rosamund et al., 1999). The incidence of ischemic stroke has declined over the past 20 years; however, the mean age of the population has risen resulting in a continual increase in the absolute number of strokes. Recent projections indicate that by the year 2050 more than one million strokes will occur each year in the United States (Benavente & Hart, 1999).

Although the stroke death rate fell 15.1 percent from 1988 to 1998, the actual number of stroke deaths rose 5.3 percent (American Heart Association, 2001b). Stroke accounts for one of every 14.8 deaths in the United States, the third leading cause of death behind heart disease and cancer. On average, someone in the United States suffers a stroke every 53 seconds; every 3.1 minutes someone dies of one (American Heart Association, 2001b).

Fifteen to thirty percent of stroke survivors are permanently disabled (National Heart Lung and Blood Institute, 1998). Institutional care is required by 20 percent of stroke survivors at three months after onset. Fourteen percent of persons who survive a first-ever stroke or TIA will experience a recurrence within one year. Twenty-two percent of men and 25 percent of women who have an initial stroke die within a year. This percentage is higher among people age 65 and older (National Heart Lung and Blood Institute, 1998).

The lowest stroke rates (20 to 24 deaths/100,000 population) occur largely in the Southwest, while the highest (29 to 42/100,000 population) occur in the southeastern states, which have been designated the "stroke belt" (National Institutes of Health, 1996). Within the stroke belt there is a "stroke buckle", the coastal plains of Georgia, North Carolina, and South Carolina have the highest rates, a 40 percent overall excess risk of stroke compared with other regions (Howard, Evans, & Pearce, 1995). This increased stroke mortality occurs in blacks and whites and men and women. In a recent report, Howard and colleagues (2001) suggested that the "stroke belt" (not including the stroke buckle) may be shifting. They analyzed geographic, gender, and race differences in stroke mortality from 1968 to 1996 and found that the deep South (Alabama and Mississippi) will fall from the highest stroke mortality rates in the nation, while the West (Oregon and Washington) are on the rise to replace them in the future. These increased risks for stroke may be due to geographic or environmental factors and/or regional differences in lifestyles.

3. Stroke Pathophysiology and Symptoms

Because stroke injures the brain, the patient may not recognize its occurrence. The effects of a stroke range from mild to severe and can include paralysis, problems with thinking, problems with speaking and emotional problems. The symptoms of stroke are distinct: numbness or weakness of face, arm, or leg (especially on one side of the body), confusion, trouble speaking or understanding speech, trouble seeing in one or both eyes, trouble walking, dizziness, loss of balance or coordination, and severe headache with no known cause (National Institutes of Neurological Disorders and Stroke, 2001).

Thrombus and embolus are the two major causes of an ischemic stroke. Thrombotic strokes are more common than embolic stroke and are often caused by a pathologic process such as atherosclerosis within an artery obstructing blood flow. Atherosclerosis narrows the arterial lumen and creates a site for a blood clot to form causing a thrombosis of the involved artery. A history of smoking, diabetes, hypertension, and hypercholesterolemia often result in atherosclerosis (Bratina et al., 1997).

Embolic strokes occur when occlusive material such as a blood clot or atheromatous debris formed outside the brain, detaches, and flows through the cerebral circulation until it lodges and blocks a cerebral artery. Emboli frequently originate in either the left-sided chambers of the heart or the proximal arteries that supply the brain. Patients with atrial fibrillation, valvular heart disease, carotid artery disease, coronary artery disease, or cardiomyopathy are at significant risk for embolus formation (Bratina et al., 1997).

F. Stroke Risk Factors

Whisnant (1997) states that the effect of a risk factor on the probability of stroke in the general population is determined by three considerations: (1) the relative risk of the factor, (2) the prevalence of the factor in the population, and (3) the effect of intervention. The relative risk may be modified by other risk factors or by the effect of other risk factor interventions. Prevalence may be affected by geography and certainly by age and gender. The Stroke Council of the American Heart Association (Goldstein et al., 2001), using evidence regarding various established and potential stroke risk factors, established a classification for stroke risk factors according to their potential for modification (nonmodifiable, modifiable, and potentially modifiable).

1. Nonmodifiable Stroke Risk Factors

Nonmodifiable risk factors of age, gender, race/ethnicity, family history of stroke, and transient ischemic attack (TIA) identify individuals at higher risk for stroke than others, as well as those individuals who may benefit from prevention or treatment of medical and lifestyle modifiable risk factors (Goldstein et al., 2001).

It is a myth that stroke occurs only in elderly adults. In actuality, stroke strikes all age groups from fetuses still in the womb to centenarians. It is true however, that age is the single most important risk factor for stroke (Wolf et al., 1992). The incidence of stroke more than doubles in each successive decade for people over the age of 55 years. Stroke deaths rise significantly after age 65 years accounting for more than 40% of all deaths among persons aged 65-74 years and almost 60% for those aged 85 years and

older (National Heart Lung and Blood Institute, 1998). When the baby boomers move into the over-65 years of age group, stroke and other diseases will take on an even greater significance in the health care field (National Institutes of Neurological Disorders and Stroke, 1999).

Gender also plays a role in risk for stroke. In most age groups, more men than women will have a stroke in a given year. However, at all ages more women than men die of stroke, are incapacitated after a stroke, and are demented because of stroke simply because they live about 10 years longer than men (American Heart Association, 2002; Bousser, 1999). Men have an increased risk for atherosclerosis. They also have a greater risk of high blood pressure than women do until age 55 years. The risk factors of high serum cholesterol, physical inactivity, and being overweight or obese are particular problems for women (American Heart Association, 2001b). In addition, diabetes is a more potent contributing risk factor in women than in men (American Heart Association, 2001b). Women who are pregnant have a higher stroke risk. So do women taking birth control pills who also smoke or have high blood pressure (American Heart Association, 2002).

The risk of stroke varies among different racial and ethnic groups. The incidence of stroke among Blacks is almost double that of non-Hispanic whites and twice as many Blacks who have a stroke die from the event compared to non-Hispanic whites. In the Atherosclerosis Risk in Communities (ARIC) Study, Blacks had a 38% greater incidence of strokes than whites (Rosamund et al., 1999). Compared to non-Hispanic whites, Blacks have a higher incidence of stroke risk factors, including hypertension, obesity, and cigarette smoking. Blacks also have a higher incidence and prevalence of some genetic diseases, such as diabetes and sickle cell anemia, which predispose them to stroke (Gillum, 1999; Woo et al., 1999).

Hispanics and Native Americans have stroke incidence and mortality rates similar to those of non-Hispanic white Americans. In Asian-Americans stroke incidence and mortality rates are also similar to those in non-Hispanic white Americans, even though Asians living in Japan, China, and other countries of the Far East have significantly higher stroke incidence and mortality rates than non-Hispanic white Americans. This

suggests that environment and lifestyle factors play a large role in stroke risk (National Institutes of Neurological Disorders and Stroke, 1999).

Stroke seems to run in some families. Several factors might contribute to familial stroke risk. Members of a family might have a genetic tendency for stroke risk factors such as an inherited predisposition for hypertension or diabetes. The influence of a common lifestyle among family members could also contribute to familial stroke (National Institutes of Neurological Disorders and Stroke, 1999). Studies with twins provide strong data suggesting familial inheritance of stroke. There is nearly a five-fold increase in stroke prevalence among monozygotic versus dizygotic twins (Brass, Osaacsohn, Merikangas, & Robinette, 1992).

In a study of the familial predisposition to stroke (Kiely, Wolf, Cupples, Beiser, & Myers, 1993), there was no association between stroke death among original cohort members and their reported parental stroke death. However, fatal and nonfatal strokes in these cohort members were related to occurrence of stroke in their children (members of the Framingham Offspring Study Cohort). In these analyses, both maternal and paternal stroke were associated with approximately a 1.5-fold increased risk of stroke even after other risk factors were taken into account (Kiely et al., 1993).

A transient ischemic attack (TIA) is a temporary stroke-like event that lasts for only a short time and is caused by a temporarily blocked blood vessel leading to or within the brain. It is also called a "little stroke" or "mini-stroke," and it is an extremely important stroke indicator (American Heart Association, 2002). TIA symptoms occur suddenly and are similar to those of stroke, but do not last as long, usually disappearing within an hour, although they may persist for up to 24 hours (National Institute of Neurological Disorders and Stroke, 2001). TIAs are common, the incidence is reported as approximately 40 per 100,000 people per year in the Western World (Dennis, Bamford, Sandercock, & Warlow, 1990). The risk of stroke following a TIA is highest in the first year, and is approximately 12 times greater than the risk of a similar patient with no previous TIA (Walters & Lees, 2001).

2. Modifiable Stroke Risk Factors

In contrast to nonmodifiable stroke risks, the National Stroke Association (Gorelick et al., 1999) and American Heart Association (Goldstein et al., 2001) have identified ten important modifiable stroke risk factors which can be changed or controlled by the person at risk, six health status factors (hypertension, myocardial infarction, atrial fibrillation, diabetes, elevated blood lipids and asymptomatic carotid artery disease), and four lifestyle factors (smoking, excessive alcohol use, physical inactivity and poor diet/obesity).

Hypertension, defined as a blood pressure over 140/90 mm Hg, is extremely common in Americans, found in 1 in 4 adults (American Heart Association, 2001b). It is by far the most potent modifiable risk factor for stroke (National Institutes of Neurological Disorders and Stroke, 1999). Among American men and women aged 60 years of age and older, elevated blood pressure was found in 60 percent of non-Hispanic whites, 71 percent of Blacks, and 61 percent of Hispanics (Burt, Whelton, & Roccella, 1995). High blood pressure is the major risk factor contributing to more than 500,000 strokes each year in the United States (National Center for Health Statistics, 1999). In older persons, elevated systolic blood pressure and elevated pulse pressure are better predictors of stroke occurrence, than is elevated diastolic blood pressure (Klungel et al., 2001; Nemade & Ciocon, 2000; Stamler, Stamler, & Neaton, 1993). At least 17 randomized trials have demonstrated the morbidity and mortality benefits associated with the treatment of hypertension (Collins et al., 1990). However, the Manhattan Stroke Study (Boden-Albala et al., 2001) found that only 45% of 271 hypertensive patients discharged after stroke were prescribed antihypertensive agents. Blood pressure control at one year post-stroke was suboptimal in this population. Health education programs for the general public need to emphasize the importance of treating high blood pressure as one way to decrease risk for stroke (Kasner et al., 2001).

Based on the Framingham Heart Study, 8 percent of men and 11 percent of women will have a stroke within 6 years after an acute myocardial infarction (Wolf et al., 1992). People with coronary artery

disease and heart failure have more than double the risk of stroke over those with hearts that work normally (American Heart Association, 2001b). Research reveals that the incidence of an ischemic stroke is greatest in the first month after a myocardial infarction (Tanne et al., 1993). Previously the risk of stroke within one year following a myocardial infarction was estimated to be approximately 1 percent to 2 percent increased risk per year, however new research indicates it may actually be as high as 5% (Gorelick et al., 1999; Lichtman, Krumholz, Wang, Radford, & Brass, 2002).

Coronary heart disease, valve defects, irregular heart beat, enlargement of one of the heart chambers can result in blood clots that may break loose and block vessels in or leading to the brain (American Heart Association, 2001b). Overall, an estimated 20 percent of ischemic strokes are due to cardiogenic embolism. In addition, myocardial infarction is associated with the development of atrial fibrillation, a common source of cardiogenic emboli (Benjamin et al., 1998).

Atrial fibrillation, a common cardiac arrhythmia affecting 2.2 million persons in the United States, is a potent independent risk factor for stroke occurring in about 15 percent of people who suffer a stroke (Feinberg, Blackshear, Laupacis, Kronmal, & Hart, 1995; Wolf, Abbott, & Kannel, 1991). The prevalence of atrial fibrillation is greater among men than women. About 70 percent of people with atrial fibrillation are between 65 and 85 years old. Advancing age increases risk for stroke in atrial fibrillation (Hart & Halperin, 1999). Atrial fibrillation rises with age, with a prevalence of 0.5 percent for persons age 50 to 59 years old that increases to 8.8 percent in those aged 80 to 89 years old (Chandramouli & Kotler, 1998). Women older than 75 years of age with atrial fibrillation are at particular risk for ischemic stroke because advancing age is a more potent stroke risk factor when combined with other risk factors such as female gender (Hart & Halperin, 1999; Stroke Prevention in Atrial Fibrillation Investigators, 1993).

In 1998, 10,430,000 Americans had physician-diagnosed diabetes and 64,751 individuals died as a result of their diabetes (American Heart Association, 2001b). Diabetes causes destructive changes in blood vessels throughout the body accounting for the fact that two-thirds of people with diabetes mellitus die of

some form of heart or blood vessel disease. People with diabetes often have high blood pressure, elevated blood lipids, and are obese amplifying their overall stroke risk (American Heart Association, 2000). Diabetics have three times the risk of stroke compared to people without diabetes. The relative risk of stroke from diabetes is highest in the fifth and sixth decades of life and decreases after that. Diabetes creates an increased risk for stroke in both men and women, but stroke occurs at earlier age in diabetic men than in diabetic women (National Institutes of Neurological Disorders and Stroke, 1999).

Most people know that high serum cholesterol levels contribute to heart disease. Many do not realize that a high serum cholesterol level (240 mg/dL or higher) also contributes to their ischemic stroke risk. Low-density liproprotein (LDL), the so-called bad cholesterol, contains most of the cholesterol in the blood and carries it to the tissues and organs of the body including the arteries (U. S. Department of Health and Human Services, 2000b). Cholesterol from LDL is the main source of damaging buildup and blockage in the arteries, and for the formation of blood clots (American Heart Association, 2001b). Women, beginning at age 50 years, have significantly higher average total cholesterol and low-density lipoprotein cholesterol than do males (Horenstein, Smith, Mosca, & Investigators, 2002). In 1999, 52,830,000 adult women and 48,180,000 adult men had total blood cholesterol levels of 200 mg/dL or higher (American Heart Association, 2001b).

Lifestyle changes that prevent or lower high serum cholesterol include eating a diet low in saturated fat and cholesterol, increasing physical activity, and reducing excess weight (Iso et al., 1989). Benefits from lowering elevated cholesterol levels, chiefly LDL cholesterol, has been widely recognized for coronary heart disease, but not until recently have the implications for stroke been recognized (Scandinavian Simvastatin Survival Study Group, 1994; Shepherd et al., 1995). Two studies (Crouse, Byington, Hoen, & Furberg, 1997; Hebert, Gaziano, Chan, & Hennekens, 1997) have demonstrated a highly significant and clinically relevant reduction in the incidence of stroke in patients treated with statin drugs. A recent study confirmed the relationship between high serum levels of cholesterol (> 225 mg/dL)

and an increased risk for stroke among women with no known history of cardiovascular disease accounting for a 23% increased stroke risk in women younger than 55 years of age (Horenstein et al., 2002).

Atherosclerotic carotid artery disease is an important stroke risk factor (Gorelick et al., 1999). The carotid arteries in the neck supply blood to the brain. A carotid artery narrowed by fatty deposits from atherosclerosis may become obstructed by a blood clot causing carotid stenosis. The risk of clinical symptoms increase with the degree of stenosis (Sacco et al., 1997). In the Cardiovascular Health Study (O'Leary et al., 1992), carotid stenosis >50 percent was detected in 7 percent of the men and 5 percent of the women aged 65 years of age and older. Similarly, carotid stenosis of >50 percent was detected in 9 percent of men and 7 percent of women aged 66 to 93 years in the Framingham cohort (Wolf, D'Agnostino, Belanger, & Kannel, 1991). Therefore, it seems likely between 7 percent and 10 percent of men and between 5 percent and 7 percent of women above age 65 years have carotid stenosis of >50 percent.

3. Modifiable Stroke Lifestyle Risk Factors

Cigarette smoking is the number one preventable lifestyle risk factor for stroke. Current age-adjusted prevalence of Americans age 18 and older shows 28,830,000 men (27.1%) and 22,830,000 women (22.2%) are smokers, putting them at increased risk for stroke (American Heart Association, 2001b). Smoking almost doubles a person's risk for ischemic stroke, independent of other risk factors (National Institutes of Neurological Disorders and Stroke, 1999).

The nicotine and carbon dioxide in tobacco smoke reduce the amount of oxygen in blood, and damage the walls of blood vessels making clots more likely to form. Nicotine also raises the smoker's blood pressure, and carbon monoxide reduces the amount of oxygen blood can carry to the brain. Cigarette smoking also has been linked to the buildup of fatty substances in the carotid artery, and makes the blood thicker and more likely to clot. Smoking cigarettes in combination with certain kinds of birth control pills greatly increases a woman's stroke risk (American Heart Association, 2001b).

Generally, an increase in alcohol consumption leads to an increase in blood pressure. Heavy or excessive drinking is a risk for both hemorrhagic and ischemic strokes. Heavy alcohol consumption may seriously deplete platelet numbers and compromise blood clotting and blood viscosity, leading to hemorrhage. In addition, heavy drinking, or binge drinking, can lead to a rebound effect after the alcohol is purged from the body. The consequences of this rebound effect are that blood viscosity and platelet levels skyrocket increasing the risk for an ischemic stroke (National Institutes of Neurological Disorders and Stroke, 1999).

The results of the Framingham Heart Study, Honolulu Heart Program, and Oslo Study have shown the protective effect of physical activity for men (Abbott, Rodriguez, Burchfiel, & Curb, 1994; Haheim, Holme, Hjermann, & Leren, 1993; Kiely, Wolf, Cupples, Beiser, & Kannel, 1994). For women, the results of the Nurses' Health Study and the Copenhagen City Heart Study demonstrated an inverse association between level of physical activity and stroke incidence (Lindentrom, Boysen, & Nyboe, 1993; Manson, Stampfer, & Willett, 1995). Hu and associates (2000) found that the most physically active women were approximately 50 percent less likely to have any kind of stroke than the least active women regardless of their age. The protective effects of physical activity have also been found for Blacks and Hispanics in the National Health and Nutrition Examination Survey I (NHANES I) Follow-Up Study and the Northern Manhattan Stroke Study (Gillum, Mussolino, & Ingram, 1996; Sacco et al., 1998). The protective effect of physical activity may be mediated in part through its role in controlling various known risk factors for stroke, including hypertension (National Institutes of Health Consensus Development Panel on Physical Activity and Cardiovascular Health, 1996), cardiovascular disease (Blair et al., 1996), diabetes (Manson et al., 1991), and body weight (National Institutes of Health Consensus Development Panel on Physical Activity and Cardiovascular Health, 1996).

Data regarding the effects of general nutritional status on stroke risk are limited. There may be a protective relationship between stroke and consumption of fruits and vegetables, especially cruciferous and

green leafy vegetables and citrus fruits and juice. Joshipura and colleagues (1999) analyzed data from the Nurses' Health Study and the Health Professionals Follow-Up Study that included individuals free of cardiovascular disease at baseline and found that the relative risk of stroke was 0.69 (95% confidence interval, 0.52-0.92) for persons in the highest quintile of fruit and vegetable intake. An increment of one serving of vegetable or citrus fruit per day was associated with a 6 percent lower risk of stroke (Joshipura et al., 1999).

Obesity, defined as a body mass index (BMI) greater than 30kg/m^2, is an expanding epidemic in the United States (Kalafut & Saver, 2001). Obesity predisposes a person to cardiovascular disease in general, and to stroke in particular. Obesity prevalence increases with advancing age and is associated with increased blood pressure, increased blood sugar, and excessive blood lipids (Walker et al., 1996). Whether obesity is an independent risk factor for stroke has been a matter of controversy. Kurth and colleagues (2001) used data from the United States Physicians Health Study to analyze the relation of body mass index and stroke among 21,414 prospectively followed male United States physicians. After adjusting for multiple covariates – including age, hypertension, diabetes, and history of high serum cholesterol – participants with a BMI of 30 or higher were found to be twice as likely to have a stroke compared to those with a BMI of less than 23.

Abdominal obesity (the "spare-tire" or increased waist-hip ratio), rather than BMI or general obesity, may be more closely related to stroke risk. Researchers from the ongoing Manhattan Stroke Study (Suk, 2002) reported that a man in his fifties with an expanding waistline had a 4.4 times greater risk for stroke than a slim man of the same age. Moreover, this "spare-tire" risk stays with a man into his retirement years, when a 40-plus inch waistline adds up to a 2.2 times increase in relative risk. Suk (2002) also showed that if women develop the predominantly male-pattern "apple-shape"(instead of the predominantly female-pattern "pear-shape"), their risk of stroke increases 2.5 times.

Other potentially modifiable risk factors which increase the affected individual's cumulative stroke risk include: sickle cell disease, oral contraceptive use, hyperhomocysteinemia, sleep disorders, drug abuse (cocaine the substance most commonly associated with stroke), hypercoagulability, end-stage renal disease, hormone replacement therapy, migraine, low plasma vitamin C, and recent or persistent viral or bacterial infections, including periodontal disease and chronic bronchitis (American Heart Association, 2001b; Buring et al., 1995; Goldstein et al., 2001; Hart & Halperin, 1999; Helgason & Wolf, 1997; Kurl et al., 2002; National Institute of Neurological Disorders and Stroke, 2001; Qureshi, Fareed, & Suri, 2001; Sacco et al., 1997).

People with more than one risk factor have what is called "amplification of risk." This means that the multiple risk factors compound their destructive effects and create an overall risk greater than the simple cumulative effect of the individual risk factors (National Institutes of Neurological Disorders and Stroke, 1999).

G. Stroke Treatment and Therapies

There is a range and variety of treatments and therapies both to prevent stroke by treating an individual's underlying stroke risk factors as well as to interfere with a stroke "in progress" and/or treating a stroke's aftermath. Medication or drug therapy is the most common treatment for stroke. The most popular classes of drugs used to treat stroke are antithrombotics (antiplatelet agents and anticoagulants) thrombolytics, and neuroprotective agents (American Heart Association, 2001a; National Institutes of Neurological Disorders and Stroke, 2001).

The most important advance in stroke treatment has been the acute use of thrombolytic therapy, drugs that reestablish blood flow through thrombolysis or dissolution of the obstructing clot. Ischemic strokes, the most common stroke type, can be treated with a drug called recombinant tissue plasminogen-activator (t-PA) which dissolves artery-obstructing clots. A five-year clinical trial conducted by National Institute of Neurological Disorders and Strokes (NINDS) found that selected stroke patients who receive t-

PA within three hours of the onset of stroke symptoms were at least 30 percent more likely than patients who received a placebo to recover from their stroke with little or no disability after three months (National Institute of Neurological Disorders and Stroke, 2001). Initiating t-PA treatment more than three hours after first stroke symptoms resulted in a much higher rate of bleeding into the brain (National Institute of Stroke and Neurologic Diseases and t-PA Working Group, 1995)

Based on research in animal models and clinical observations, the NINDS (1995) t-PA clinical investigators designed their highly coordinated emergency treatment program to work within the narrow time window of 3-hours. The ability to measure cerebral blood flow and metabolism resulted in the observation that the first minutes to hours after a stroke is a period of dynamic and potentially reversible change. The brain regions that are threatened by an occluded cerebral artery, but still viable, are termed the "ischemic penumbra," and the time this penumbra can remain viable is termed the "therapeutic time window." The more profound the reduction of blood flow, the briefer this window becomes (National Institute of Stroke and Neurologic Diseases and t-PA Working Group, 1995).

The type of stroke therapy a patient should receive depends upon the stage of disease. Therapies to prevent a recurrent transient ischemic attack or stroke are based on treating an individual's underlying risk factors for ischemic stroke, such as hypertension, atrial fibrillation, and diabetes, all of which may lead to the recurrent formation of blood clots. Acute stroke therapies interfere with an ischemic stroke while it is happening by dissolving the blood clot causing the stroke (National Institute of Neurological Disorders and Stroke, 2001).

Antithrombotics prevent the formation of blood clots. Antiplatelet drugs prevent clotting by decreasing the action of platelets that contributes to the clotting property of blood. The most widely known and used antiplatelet drug is aspirin. Other antiplatelet drugs include clopidogrel (Plavix) and ticlopidine (Ticlid). Anticoagulants reduce the clotting property of the blood. The most commonly used anticoagulants

include warfarin (also known as Coumadin) and heparin (American Heart Association, 2001a; National Institutes of Neurological Disorders and Stroke, 2001).

Progress in the therapy for stroke has most recently come from a number of new approaches including neuroprotective agents such as calcium antagonists, glutamate antagonists, glycine antagonists, and antioxidants (Helgason & Wolf, 1997). This approach may alter or stop the progression of the ischemic cascade to prevent cell death (Bratina et al., 1997).

Both thrombolytic and neuroprotective pharmocologic approaches must be used soon after the reduction in blood flow occurs to be of benefit. The window of opportunity for beginning treatment with pharmocologic therapies is a very narrow one of three hours or less after initial symptom onset (Adams et al., 1996; Ladurner, 2001; National Institute of Stroke and Neurologic Diseases and t-PA Working Group, 1995; Saver, Kasner, & Levine, 2000).

H. Review of Knowledge of Stroke Research

Several researchers have attempted to determine the general public's knowledge about stroke risk factors and symptoms. For example, Pancioli and his colleagues (1998) performed random telephone interviews in which they asked respondents (n=1880) to list up to three risk factors and three symptoms of strokes in response to open-ended questions. The most commonly cited risk factors were hypertension and stress; the most frequently identified symptoms were dizziness, severe headaches, and unspecified weakness. Only 144 (8%) correctly listed 3 established symptoms of stroke and 67 (4%) correctly listed 3 risk factors for stroke. In addition, 14 percent of the respondents could not name a single risk factor, and 27 percent could not state a single symptom of stroke.

A total of 822 participants completed a community-based telephone interview survey for Yoon and colleagues (2001). A high proportion of respondents (73.4%) identified the brain as the location where stroke occurs. However, 129 (15.9%) respondents still thought of stroke as a heart problem. Over 76 percent (626) of respondents correctly listed one or more established stroke risk factors and 49.8 percent

(409) respondents correctly noted one or more symptoms. The most common risk factors of stroke specified by respondents were "smoking," identified by 324 (39.4%), "stress," identified by 277 (33.7%), and "bad diet," identified by 265 (32.2%). A smaller proportion of respondents (31.8%) pinpointed high blood pressure as a risk for stroke. "Blurred and double vision or loss of vision in one eye" was the most common stroke symptom identified by respondents. A lower proportion of respondents stated "weakness and paralysis on one side of body" as a stroke symptom.

Hux and her colleagues (2000) explored the general public's knowledge about the common perceptions of stroke. A questionnaire about the physiological processes, risk factors, symptoms, and functional consequences of stroke was administered to 190 individuals at a regional shopping mall. Approximately two-thirds of the survey respondents could provide correct or partially correct explanations of stroke physiology and could name at least one stroke symptom. Over 90 percent of the respondents could name at least one stroke risk factor. However, almost one-half of the respondents gave one or more incorrect answers regarding risk factors and symptoms. Most respondents reported acquiring information about strokes through personal acquaintances, popular media, or general life experiences rather than from professionals or as part of their formal schooling.

In a nationally diverse sample of inpatients and outpatients (n=1253) being treated for a stroke occurrence or for conditions increasing stroke risk, Samsa (1997) collaborated with colleagues working on three major stroke studies to evaluate whether or not these patients recognized their increased risk for stroke. The sample ranged from 20 to 97 years with over one-half older than 65 years of age. Nearly 33% had previously experienced a stroke and 15 percent had a history of TIA without a resultant stroke. The sample was 90 percent white, 66 percent were married, and there was an even split of men and women. Results from phone or in-person interviews indicated that only 41% of respondents were aware of their increased risk for stroke including less than one-half (42%) of patients with previous minor stroke. By self-report, only 27 percent recalled being informed of their stroke risk by a physician. Younger patients,

depressed patients, those in poor current health, and those with a history of a TIA were most likely to be aware of their stroke risk.

In a study of 123 patients with acute stroke who were interviewed within 48 hours of hospital admission, Kothari and colleagues (1997) reported that medical record documentation revealed the most common stroke symptoms, as noted by the patient at the time of the stroke onset were weakness (26%) and numbness (22%). Approximately 40 percent of the respondents could not state a single symptom or risk factor of stroke. Patients aged ≥ 65 years were less likely to know a symptom of stroke than those aged < 65 years The percentage of those 65 years or older not knowing a single symptom was 47 percent versus only 28 percent of those less than 65 years, (p =.016). Similarly, 43 percent of patients did not know a single risk factor for stroke. Those patients aged 65 years or older were significantly less likely to know a risk factor for stroke than those younger than 65 years of age (percentage not knowing a single risk factor, 58 percent versus 24 percent, $p < .05$). Only 26 percent of all respondents could identify more than one risk factor. In a similar study, Williams et al. (1997) interviewed 67 patients who had suffered a stroke within the past 72-hours and only 25 percent (16) of these participants correctly interpreted their symptoms and sought medical attention in the emergency department within three hours. Of this group, those with prior stroke experience were more likely to correctly interpret their symptoms (45% v. 16%; $p < .03$).

The results of these few studies support the conclusions that the general public's knowledge of stroke's symptoms and risk factors and recognition of stroke as a health emergency are inadequate. None of these studies address variations in the general public's knowledge of stroke's risk factors or symptoms when comparing rural and urban residents. Only three studies regarding stroke knowledge have used a general population (Hux et al., 2000; Pancioli et al., 1998; Yoon & Byles, 2002) while the other studies surveyed stroke patients while in the hospital (Kothari et al., 1997; Williams et al., 1997) and patients in the community diagnosed at high risk for stroke (Samsa et al., 1997). Understanding the variations in

knowledge between rural and urban residents is another step in understanding where those most at need for stroke education reside (Yoon et al., 2001).

Symptoms of stroke are not easy to recognize because they vary so from person to person (Yoon et al., 2001). Almost 40 percent of patients admitted to a hospital with a possible stroke did not know symptoms or risk factors of stroke (Kothari et al., 1997). The lack of knowledge of stroke, especially in those most at risk such as the elderly, contributes to the delay in seeking health care services.

Effective future community-based education programs rely on an accurate assessment of baseline knowledge of a population. However, few studies have specifically examined the knowledge of stroke symptoms and risk factors in the community, and none have specifically surveyed the knowledge of rural residents. Educating everyone about stroke symptoms is necessary to ensure that a person suffering a stroke is recognized and help sought quickly.

I. Summary

Understanding people's ways of knowing about health and illness is integral to the development of health care information services (Turton, 1997). Improving people's knowledge of symptoms and risk factors can reduce deaths and disability from stroke (Williams et al., 1997). Health care providers play a crucial role in communicating information about stroke symptoms and risks (Kothari et al., 1997; Samsa et al., 1997). Increasing awareness of stroke risks and symptoms, among health professionals and the public, can begin to close the gap between knowledge, prevention and/or treatment, and practice in acute ischemic stroke care.

Most Americans do not recognize the symptoms of stroke, causing disabling or fatal delays in receipt of effective, but time-sensitive treatment. Because stroke injures the brain, stroke victims often have an impaired ability to communicate or may not be able to recognize symptoms as a stroke. The burden for quick, efficient action therefore shifts to an alert bystander amongst the general public (i.e. family members,

friends, neighbors, co-workers) to recognize the symptoms associated with a stroke (National Institutes of Neurological Disorders and Stroke, 1999).

The barriers to timely access to emergency care are amplified for rural residents by distance and availability (Coward et al., 1994; Racher, 2002). Rural populations are largely elderly and present with additional barriers to care including less formal education and lower incomes. Identifying similarities and differences in stroke knowledge among rural residents will help health care professionals provide appropriate and population specific information regarding earlier stroke recognition and seeking emergency care in a more timely manner.

Recent advances in the treatment of acute ischemic stroke offer hope in reducing its disabling effects. Continued prehospital delay by stroke victims underscores the need for the implementation of effective public health programs. Educational strategies must be designed to reach both individuals at risk for stroke and the general public if time to evaluation and treatment of stroke victim is to be minimized. These strategies should include improving community wide use of 911 and the emergency medical transport system when victim and/or bystander recognize a stroke. Reducing the number of individuals devastated by stroke requires health care professionals to be innovative in developing educational programs and information dissemination strategies.

III. Methodology

This chapter describes the methodology used in this study. Four sections are included in the chapter: (1) design, sample, and setting, (2) survey construction and implementation, (3) data collection procedures, and (4) data analysis procedures.

A. Design, Sample, and Setting

This descriptive, correlational study of stroke knowledge had a non-experimental, quantitative design. The mailed self-administered Stroke Recognition Questionnaire (SRQ) (Appendix A) was used to assess the general public's knowledge of stroke symptoms and risk factors. Demographic data were obtained and compared to describe the relationship among variables of rural and urban location of residence, age, and gender and knowledge of stroke symptoms and risk factors.

An East Central Illinois community-based general public sample was randomly selected and stratified based on rural and urban residence zip code. Six East Central Illinois counties were involved in this study – Champaign, Coles, Douglas, Edgar, Piatt, and Vermilion. SBC telephone directories for Danville and Champaign area communities and Yellow Books for Mattoon/Charleston, Danville, and Champaign/Urbana area communities provided the sample frame for the stratified random sample selection of resident names and addresses from the six selected counties (Dillman, 2000).

The United States Census Bureau's 2000 Geographic Comparison Table for Illinois was used to identify rural (population < 2500) and urban communities in the six selected counties (United States Census Bureau, 2001). A random number table was used to select a number (38) then used to randomly selected each individual subject from the residence white pages of each telephone directory using that number. The random selection process was completed when the names of 400 rural residents and 400 urban residents had been selected at random and stratified by zip code.

In Polit and Sherman's (1990) analysis of effect sizes for all studies appearing in Nursing Research and Research in Nursing & Health in 1989, the average effect size for *t*-test situations was .35, with those in the range of .20 to .40 the most common. Since there were no similarly designed published research studies, this researcher estimated that the effect size would be .30 with a power of .80 at $\alpha = .05$ (Cohen, 1988). To ensure 200 rural and 200 urban subjects it was estimated that the questionnaire should be mailed to 800 potential respondents (400 rural and 400 urban). Thus, a 50% response was needed to meet effect size and power parameters.

B. Survey Construction and Implementation

Early in the 20th century, the notion that a thousand people selected from households throughout the United States could yield consistent and accurate or reliable estimates of characteristics of the entire population seemed to defy reason. Such sampling is now accepted as a cornerstone of the survey method (Dillman, 1999).

Changes in the nature of survey methods and the rise of telephone interviewing in the last third of the 20th century can hardly be traced to a single innovation or other cause. Modifications of institutionalized methods occur slowly and usually result from the coalescence of factors in the survey environment that encourage the use of one method over another. These forces of change can be grouped conveniently under four categories: (1) changes in societal organization and culture, (2) available technology, (3) sources of cost and efficiency, and (4) a consideration of contributors to survey error (Dillman, 1999).

It has been shown that while response rates for telephone interviewing methods have been decreasing in recent years, those for mail self-administered surveys have held steady (Hox & de Leeuw, 1994). The rapidly evolving information era has placed new demands on the population. Whereas the telephone culture placed emphasis on verbal exchange, the new culture places a greater emphasis on writing skills. Effective use of computers requires good keyboard skills and being able to compose and

deliver prose quickly. Writing skills are important for being able to respond to self-administered questionnaires (Dillman, 1999).

A major societal trend also exists towards "self-administration." Many activities that once required individuals to interact with another person are now being shifted to a self-administration mode. Using ATMs to obtain banking information and cash, touch-tone input to renew library books and register for college courses, purchasing stock, and ordering airline tickets are all examples of this mode. Effective functioning in the United States' society now requires skills in following instructions and interacting with machines that were not generally anticipated a decade ago. The role of the telephone is changing as well. It has evolved from being an interruption that demanded attention to being perceived as an intrusion that can be ignored (Dillman, 1999).

During the 1970s, research using mailed questionnaires was successful obtaining data of reasonable quality (Dillman, 1978; Heberlein & Baumgartner, 1978). However, the mail method continued to face formidable coverage problems; there were no acceptable national address lists. Technological changes in the 1990s assisted improved mail surveying by making it possible to use computers to create and maintain address files, print questionnaires, send correspondence, keep track of returns, and perform calculations once subject to considerable error (Dillman, 1999).

Technological developments in the late 1990s provided new options for survey self-administration. Just as a person's ability to avoid unwanted telephone calls increased, the ability to keep one's name off widely accessible lists has decreased. It is now possible for nearly anyone with Internet access to locate the address and telephone number for any person with a listed telephone number from a national directory. Credit card information, magazine subscription lists, mail order purchase information, utility lists, and large numbers of other address information sources are compiled, unduplicated, and used to create national address lists. In the past, self-administered methods and mail-out/mail-back surveys in particular were viewed as inferior, mostly because of inadequacies with regard to coverage and nonresponse. Lists were

not available for general public samples, and response rates tended to be lower than desired. These concerns may be changing (Dillman, 1999).

The *Tailored Design Method* for mail surveys (Dillman, 2000) is a general method of survey implementation which outlines a set of procedures for conducting successful self-administered surveys that produce both high quality information and high response rates. It consists of five elements with each element shaped to complement the other elements. These elements include: (1) a respondent-friendly questionnaire, (2) up to five contacts with the questionnaire recipient, (3) inclusion of stamped return envelopes, (4) personalized correspondence, and (5) a token financial incentive that is sent with the survey request. These five elements work together to create respondent trust and the perception of increased rewards and reduced costs for being a respondent. Their overall goal is to reduce the four sources of survey error: sampling error, coverage error, measurement error, and nonresponse error. This survey implementation method was used in this study.

1. Respondent-Friendly Questionnaire

The Stroke Recognition Questionnaire (SRQ) (see Appendix A) was developed by this investigator to identify respondent's knowledge of stroke symptoms and stroke risk factors. Prior to the development of this questionnaire, there was no tool available that specifically measured knowledge of stroke symptoms and risk factors. In the SRQ, respondents were given a list of items describing associated stroke symptoms and a list of items describing stroke risk factors. Respondents are asked to check yes or no as to the likelihood of that item being evident in a person experiencing a stroke or putting a person at risk for stroke. The stroke symptom items were selected from the list of primary symptoms developed by the American Heart Association (2001b). The stroke risk factor items were selected based on the work of the American Heart Association Stroke Council's (Goldstein et al., 2001) classification of the primary well documented modifiable or potentially modifiable risk factors.

The Stroke Recognition Questionnaire (SRQ) was designed to be easily comprehended and respondent-friendly. Issues of writing the questionnaire at a 6th grade reading level, explicit wording of statements, confusing jargon, value-laden words, and keeping each item statement as short as possible were addressed to provide survey respondents a questionnaire they would want to answer (Streiner & Norman, 1989). The SRQ has four sections: (1) a list of twenty symptom statements requesting a yes or no box be checked, (2) a list of twenty risk factors statements requesting a yes or no box be checked, (3) four questions related to respondent's risk for stroke and recognition of stroke, and (4) demographic statements regarding respondent's age, gender, race, marital status, educational level, employment status, zip code, health insurance, and income category. The SRQ was typed in black lettering on white non-gloss paper using a type font size of 14-point for directions and statements (Burnside, Preski, & Hertz, 1998). Using one 11 inch x 17 inch piece of paper printed on both sides, folded, and stapled, the SRQ was an easy to handle booklet, pre-folded in half for return in a 9 inch x 6 inch business envelope.

a. Content Validity

The stroke symptom and stroke risk factor items in the SRQ were chosen from the published literature to include items that are most likely to be experienced with a stroke and to put a person at risk for a stroke (seeTable I and Table II). Eight nationally recognized physician and nurse experts specializing in stroke knowledge research and care of stroke patients reviewed the Stroke Recognition Questionnaire for content validity. The eight SRQ national expert reviewers included: Dr. Arthur M. Pancioli, Professor of Emergency Medicine at the University of Cincinnati; Dr. Lise A. Labiche, a neurology resident of the University of Texas at Houston; Dr. Mark Alberts, Director of Stroke Program at Northwestern University Medical School; Carol A. Barch, MN, CRNP, CNRN, Clinical Administrator of the University of Pittsburgh Medical Center Stroke Institute; Rosemarie B. King, Ph.D., RN, Rehabilitation Institute of Chicago; Julie Billett, Ph.D., RN, at Grand Valley State University, Allendale, MI; Debbie

TABLE I

SUMMARY OF STROKE SYMPTOMS REPORTED IN THE LITERATURE

Symptoms	Literature Citations
Sudden numbness or weakness of face, arm, leg, especially on one side. Sudden confusion or trouble speaking/understanding speech. Sudden trouble seeing in one or both eyes. Sudden trouble walking, dizziness, or loss of balance or coordination. Sudden severe headache with no known cause.	American Heart Association, 2001b; Bratina et al., 1997; Helgason & Wolf, 1997; Kothari et al., 1997; Leary & Saver, 2001; National Institute of Neurological Disorders and Stroke, 2001; National Institute of Neurological Disorders and Stroke, 1999; United States Department of Health and Human Services, 2000; Williams et al., 1997; Yoon et al., 2001.

Summers, RN, APN, MidAmerica Brain & Stroke Institute, Kansas City, MO. These content specialists assessed the Stroke Recognition Questionnaire's content validity.

Content validity for the SRQ, the degree to which the questionnaire has an appropriate sample of items for measuring stroke knowledge, was determined by using the content validity index (CVI). To compute the CVI, the eight experts were asked to rate the relevance of each item to the objective(s) using a 4-point rating scale: (1) not relevant, (2) somewhat relevant, (3) quite relevant, and (4) very relevant. The CVI is defined as the proportion of items given a rating of quite relevant or very relevant by the experts. An acceptable CVI is at least 0.80 or above agreement on each individual item as well as the entire questionnaire (Waltz, Strickland, & Lenz, 1991). The SRQ was found to have good content validity for both

TABLE II

SUMMARY OF STROKE RISK FACTORS REPORTED IN THE LITERATURE

Risk Factor	Literature Citation/s
Nonmodifiable	
Age	Arboix, Garcia-Eroles, Massons, & Targa, 2000; Brown et al., 1996; Wolf et al., 1992
Gender	Bousser, 1999; Brown et al., 1996; Goldstein et al., 2001; Mosca et al., 2000; Sacco et al., 1997
Family History of Stroke	Goldstein et al., 2001; Kiely et al., 1993; Sacco et al., 1997
Race/Ethnicity	Broderick et al., 2001; Gillum, 1999; Goldstein et al., 2001; Gorelick, 1998; Howard et al., 2001; Kissela et al., 2001; Rosamund et al., 1999; Sacco et al., 1997; Staub & Morgenstern, 2000; Woo et al., 1999
Modifiable/Health Status	
Hypertension	Burt et al., 1995; Haheim, 1993; Joint National Committee, 1997; Rigaud & Frorette, 2001; Sacco et al., 1997; Stamler et al., 1993; Wolf et al., 1998.
Hyperlipidemia	Goldstein et al., 2001; Haheim et al., 1993; Iso et al., 1989; Sacco et al., 1997
Transient Ischemic Attacks	Goldstein et al., 2001; Howard et al., 1994; Sacco et al., 1997
Atherosclerosis	American Heart Association, 2000; Goldstein et al., 2001; Sacco et al., 1997
Diabetes Mellitus	American Heart Association, 2001b; Goldstein et al., 2001; Gorelick et al., 1999; National Institute of Neurological Disorders and Stroke, 1999; Sacco et al., 1997
Atrial Fibrillation	Goldstein et al., 2001; Hart & Halperin, 1999; Sacco et al., 1997; Stroke Prevention I Atrial Fibrillation Investigators, 1993; Wolf et al., 1991
Asymptomatic Carotid Artery Disease	Goldstein et al., 2001; Sacco et al., 1997
Isolated Systolic Hypertension	American Heart Association, 2000; Goldstein et al., 2001; Rigaud & Frorette, 2001; Sacco et al., 1997; Stamler et al., 1993

TABLE II (continued)

SUMMARY OF STROKE RISK FACTORS REPORTED IN THE LITERATURE

Risk Factor	Literature Citation/s
Modifiable/Health Status (continued)	
Myocardial Infarction	Goldstein et al., 2001;Sacco et al., 1997
Sickle Cell Disease	Goldstein et al., 2001; Ohene-Frempong et al., 1998
Hyperhomocysteinemia	Bouser, 1999; Eikelboom, Lonn, Genest, Hankey, & Ysuf, 1999; Giles, Croft, Greenlund, Ford & Kittner, 1998; Sacco et al., 1997; Selhub, Jacques, Wilson, Rush, & Rosenberg, 1993
Hypercoagulability	Goldstein et al., 2001; Kamashta et al., 1995
Recent Infections	National Institute of Neurological Disorders and Stroke, 1999; Sacco et al., 1997
Sleep Disorders	American Heart Association, 2001a; National Institute of Neurological Disorders and Stroke, 1999
End Stage Renal Disease	American Heart Association, 2000
Migraine	Bousser, 1999; Buring et al., 1995; Sacco et al., 1997
Low Plasma Vitamin C	Ascherio et al., 1999
Modifiable/Lifestyle	
State of Residence	American Heart Association, 2001b; Howard et al., 1995
Smoking	Goldstein et al., 2001; Haheim et al., 1993; Lindentrom et al., 1993; Robbins, Manson, Lee, Satterfield, & Hennekens, 1994; Sacco et al., 1997; Whisnant, 1997; Wolf et al., 1991
Excessive Alcohol Use	Goldstein et al., 2001; Gorelick, 1989; Sacco et al., 1997; Stampfer, Colditz, Willet, Speizer, & Hennekens, 1998
Physical Inactivity	Abbott et al., 1994; Ellekjaer et al., 2000; Goldstein et al., 2001; Haheim et al., 1993; Hu et al., 2000; Keily et al., 1994; Lindentrom et al, 1993; Sacco et al., 1998

TABLE II (continued)

SUMMARY OF STROKE RISK FACTORS REPORTED IN THE LITERATURE

Risk Factor	Literature Citation/s
Modifiable/Lifestyle (continued)	
Poor Diet/Nutrition	Ascherio et al., 1999; Goldstein et al., 2001; Joshipura et al., 1999; Sacco et al., 1997
Secondhand Smoke	American Heart Association, 2002a
Obesity	Goldstein et al., 2001; Rexrode et al., 1997; Sacco et al., 1997; Walker et al., 1996
Oral Contraceptive Use	Bouser, 1999; Gillum, Mamidipudi, & Johnston, 2000; Goldstein et al., 2001 Sacco et al., 1997
Hormone Replacement Therapy	Bouser, 1999; Fung, Barrett-Connor, & Bettencourt, 1999; Goldstein et al., 2001; Grodstein et al., 2000; Lindentrom et al., 1993; Sacco et al., 1997; Tolbert & Oparil, 2001
Drug Abuse	Quershi et al., 1997; Sacco et al.,1997; Sloan, Kittner, Rigamonti, & Price, 1991

the stroke symptom item list (CVI = .90) and the stroke risk factor item list (CVI = 1.00). The entire questionnaire scored a CVI of .95.

b. Pilot Study

The purposes of a pilot study of a questionnaire are to provide information regarding reliability and validity and to reveal problems with content, administration, and scoring (Waltz et al., 1991). It is a strongly recommended step in survey development (Dillman, 2000).

After content validation, the questionnaire was completed by a community sample of 34 individuals who completed the questionnaire on two occasions, two weeks apart. The individuals were recruited from a group of city employees through an ad placed in their workplace newsletter (see Appendix B). Participants were eligible for study if they had no prior history of stroke and were 18 years of age or older. The sample included 24 women and 10 men. Participants ranged in age between 25 years and 56 years (M = 42.4, SD = 8.7). The majority of participants (53%) did not think they were at risk for stroke, were somewhat sure or sure (47%) that they would recognize a stroke in another person, were white (79%), and had completed some college or obtained a college degree (82.4%).

c. Reliability

The test-retest correlation for the stroke symptom subscale was .80 and for the non-stroke (distractor) symptom subscale correlation was .75. The test-retest correlation for the stroke risk factor subscale was .44 and for the non-stroke (distractor) risk factor subscale was .44. The internal consistency reliability coefficient (KR20 for dichotomously scored items) for the stroke symptom subscale was .88 and for the stroke risk factor subscale was .58. The non-stroke (distractor) symptom subscale alpha was .86, while the non-stroke (distractor) risk factor subscale was .61. The subscales of the SRQ for symptoms were demonstrated to be reliable (.86 to .88) subscales, while the SRQ subscales for stroke risk factors are borderline acceptable (.58 to .61) for a new questionnaire (See Table III).

TABLE III

RELIABILITY OF THE STROKE RECOGNITION QUESTIONNAIRE - PILOT STUDY

N = 34

	# of Items	KR20 Alpha	Correlation T_1 - T_2
Stroke Symptom Subscale	10	.88	.80
Non-Stroke (Distractor) Symptom Subscale	10	.86	.75
Stroke Risk Factors Subscale	10	.58	.44
Non-Stroke (Distractor) Risk Factor Subscale	10	.61	.44
Total Symptom Score	20	.90	.82
Total Risk Factor Score	20	.53	.36

2. Five Contacts with Questionnaire Recipient

Designing a quality survey begins with two fundamental assumptions: (1) responding to a self-administered questionnaire involves not only cognition, but also motivation, and (2) multiple attempts are essential to achieving satisfactory response rates to self-administered surveys (Dillman, 2000). People must understand clearly what is wanted of them if they are to respond and be motivated to go through the process associated with understanding and answering each question and returning the questionnaire. Multiple attempts to contact potential respondents are essential to improve response rate to self-

administered surveys. It means there are several opportunities to encourage a cognitive understanding of what is being requested and motivate recipients of a questionnaire to respond to the survey request.

This study used Dillman's (2000) Tailored Design Method, a system of five compatible respondent contacts (see Appendix C). Each contact acts as a different stimulus and is generally more powerful than repeating a previously used technique. This system of compatible contacts used in this study included five distinct contacts.

a. Prenotice Letter

A brief prenotice letter sent to each respondent four days before the first questionnaire mailing was the first respondent contact. It noted that a questionnaire for an important survey would arrive in a few days and that the person's response would be greatly appreciated.

b. Questionnaire Mailing

The second contact was a questionnaire mailing that included a detailed cover letter explaining why a response was important and that completing the questionnaire should take only a few minutes. A one-dollar bill was attached to the questionnaire as a small token of appreciation. Providing a tangible incentive, even a token one, can be effective because it creates a sense of reciprocal obligation that can be discharged by returning the completed questionnaire (James & Bolstein, 1990). This mailing included an addressed, stamped return envelope to help improve the overall response rate.

c. Postcard Reminder

A thank you postcard was sent to all study subjects one week after the questionnaire mailing. The postcard expressed appreciation for responding to the important questionnaire recently sent, and indicated that if the completed questionnaire had not yet been mailed it was hoped that it would be returned soon.

d. Replacement Questionnaire

The fourth contact was a replacement questionnaire and was sent to nonrespondents three weeks after the first questionnaire mailing. The cover letter indicated that the person's completed questionnaire had not yet been received and urged the recipient to respond. An accompanying letter encouraged response by telling the nonrespondent that many others like themselves have already responded and encouraged them to act in a similar way. A replacement questionnaire with a one-dollar token of appreciation, and an addressed, stamped envelope were included in this mailing.

e. Final Contact

The fifth and final contact was made three weeks after the fourth contact in a white first-class mail envelope. The different appearance of this final contact distinguished it from all others. Past research studies (Dillman, 1978; Heberlein & Baumgartner, 1978) show that a "special" contact of this type improves overall response to mail surveys. This last mailing included a cover letter reiterating the importance of their reply, a copy of the questionnaire, a one-dollar bill attached, and an addressed, stamped return envelope.

Each contact used provided a different look and feel to it. Each communication differed from the previous one, and communicated a sense of appropriate renewal of an effort to obtain a respondent's questionnaire completion. The spaced timing of each mailing was an important aspect of each contact's effectiveness.

3. Return Envelopes with Real First-Class Stamps

Dillman (2000) asserts that the use of reply envelopes with real stamps affixed instead of business reply envelopes will improve response several percentage points. Sending the return envelope with a real stamp affixed is a goodwill gesture and can engender a reciprocal feeling of value in the respondent. It will be difficult to throw away something of monetary value.

4. Token Prepaid Financial Incentives

As noted by James and Bolstein (1990), research has consistently shown that the inclusion of a small, token financial incentive with a request to respond to a mail questionnaire can improve response rates significantly. Promised incentives do not have nearly so great an effect on response. It is easy to decline a request to complete a questionnaire when it offers to pay respondents for their time after the questionnaire is returned. However, if a surveyor has made a goodwill gesture such as sending a dollar as a token of appreciation in advance, that produces a sense of reciprocal obligation (Dillman, 2000).

These four elements are the basic structural features around which an effective implementation system was developed for this mail survey study. They constitute the skeleton around which additional details for this study such as deadline dates, correspondence wording, and length of cover letter were developed.

C. Data Collection Procedures

The initial, and all subsequent contacts, with the 800 randomly selected potential study participants were by the principal investigator through five written mailed contacts. Each participant was 18 years of age or older by self-report in response to question, "How old are you?" on questionnaire, resided in a residence with a telephone, was listed in an applicable telephone directory, lived in East Central Illinois, and was able to read and understand the English language. Participants' consent for participation was implied and assumed by the return of a completed questionnaire.

The potential risks to the respondents were low: completing the questionnaire took their time and requested a sharing of personal information. The questionnaire cover letters for second, fourth, and fifth contacts provided an explanation of the research survey purposes, as well as phone numbers to call with questions. A code number of 1 to 800 was assigned to each subject and written on the questionnaire prior to mailing. This maintained confidentiality of responders while permitting the appropriate follow-up steps with non-responders.

There were no direct benefits to this study's participants. The only potential benefit to the participants was the knowledge that in the future the results of this study may help health professionals provide appropriately focused education or information regarding stroke. All completed questionnaires and data files were kept in a locked filing cabinet accessible only to this investigator. The data sets will be kept for five years after publication and will then be destroyed on or before August 31, 2010.

D. Data Analysis Procedures

The data consisted of respondents' returned completed Stroke Recognition Questionnaire (SRQ).

1. Sampling Information

Information on data collection including response rate, age, gender, race, rural versus urban location of residence of responders is presented along with information on those who did not respond.

2. Demographic Data

Demographic data were analyzed using descriptive statistics. Measures of central tendency and frequency distributions are included. Contingency tables are used to present associations between dichotomous data and baseline characteristics of age, gender, and residence location. Pearson's chi-square statistic for dichotomous data and *t*-test statistic for ordinal data were used to test group associations and differences relative to knowledge of stroke symptoms and risk factors and residence location, age, and gender. A multiple linear regression analysis was used to determine the relationships among residence location, age, and gender and the level of stroke knowledge.

3. Scoring of Questionnaire

Data were entered into an SPSS version 11.5 software database. Knowledge scores for stroke symptoms and stroke risk factors were obtained by assigning one point for every correct answer, and zero points were assigned for every incorrect or missing answer. The distractors for symptoms and risk

factors were recoded to reflect one point for those correctly identified as distractors and zero points for those incorrectly identified.

Seven stroke knowledge scores were computed on the data after recoding was completed. Total stroke knowledge score included all symptoms, risk factors, and recoded non-stroke symptoms and risk factors with a resultant score range of 0 points to 40 points possible. Total stroke symptom score included symptoms and recoded non-stroke symptoms with a possible score range of 0 points to 20 points. Total stroke risk factor score included risk factors and recoded non-stroke risk factors with a possible score range of 0 points to 20 points. Stroke symptom and stroke risk factor subscale scores could each range from 0 points to 10 points. Non-stroke symptom and non-stroke risk factor subscale score could each range from 0 points to 10 points.

4. Psychometric Properties of the Questionnaire

Reliability of the SRQ was evaluated on the data collected in this study. Internal consistency reliability was computed for stroke symptom item set and for stroke risk factor item set. A Cronbach's alpha of 0.70 or greater is considered to be adequate for establishing the reliability of the questionnaire (Nunnally & Bernstein, 1994).

IV. RESULTS

The purpose of this study was to investigate the knowledge of stroke symptoms and stroke risk factors in a Midwest general public sample. Specifically, this study sought to identify the stroke knowledge differences between residents of rural versus urban communities, as well as age and gender differences. In this chapter the following results are presented: (1) data screening; (2) sampling information and demographic data; (3) stroke symptom knowledge; (4) stroke risk factor knowledge; (5) reliability and validity of the SRQ; (6) research purposes and questions; and (7) summary of results.

A. Data Quality

Data were screened prior to analysis in order to address the issues of accuracy of data entry, missing data, and variable recoding.

1. Data Entry

Accuracy of data entry was evaluated by reviewing each questionnaire with the data file in the window. Data cleaning was initially done by checking the data for outliers. Outliers were exposed through descriptive statistics and statistical graphs which verified that all values fell within the set ranges and that mean scores were plausible (Tabachnick & Fidell, 2001). Errors of data entry were corrected in the computerized data file prior to final analyses.

2. Missing Data

Every individual stroke symptom item and individual stroke risk factor item had missing data ranging from 1(0.2%) to 18 (3.2%) respondents. Nineteen (3.4%) respondents did not disclose annual household income. Considering the small percentages of missing data, and the random pattern of missing values noted in this large data set, it was assumed that the missing values posed no serious overall effect on the stroke knowledge scores obtained (Tabachnick & Fidell, 2001). Therefore, analyses are based on the number of subjects who responded with completed items within each subscale of the questionnaire.

The seven stroke knowledge scores were calculated excluding respondents who had missing data within a specific score.

3. Normality

Normality of the distribution of knowledge scores was determined by assessing histograms and skewness. Histograms revealed a substantial negative skewness for the stroke symptom subscale scores (-3.07) and for the non-stroke risk factor subscale scores (-1.28). Reflection of the scores and then data transformations were performed with no improvement in results. Since all the stroke knowledge scores were skewed to about the same moderate extent, improvements of analysis with transformation are typically marginal as was the case in this study (Tabachnick & Fidell, 2001).

B. Sampling Information and Demographic Data

1. Sampling Information

Data collection for this study began on October 27, 2003 and ended on December 20, 2003. All data were collected by the investigator through a mail survey design consisting of five specific contacts, as outlined in Chapter III, to a randomly selected general public sample of 400 rural residents and 400 urban residents.

The Stroke Recognition Questionnaire (SRQ) was structured for self-administration. A completed returned questionnaire was the respondent's implied consent to participate in this research study. Response rate for this mail survey was 566 (70.5%) completed questionnaires returned. The initial questionnaire mailing resulted in 517 (64.4%) returned completed questionnaires. The second and third follow-up questionnaire mailings yielded 41 (5.1%) and 8 (1.0%) completed questionnaires returned respectively.

2. Demographic Data

Demographic data were analyzed using descriptive statistics. The following measures were assessed: (1) central tendency, (2) dispersion, and (3) distribution. The rural and urban mix of

respondents was evenly split at 283 (50%) each. The final pool of 566 respondents consisted of 328 males (58%) and 236 females (42%). Respondents ranged in age from 20 years to 97 years of age. Detailed demographic information regarding the SRQ respondents and residence location, gender, and age group is contained in Tables IV, V, and VI respectively.

The age range for males was 20 years to 97 years (M = 51.67, SD = 15.22) and for females was 20-94 years (M = 52.42, SD = 18.28). These differences were not statistically significant (t (560) = -.53, p = .60). Respondents' ages were grouped into two categories, 20 years to 64 years of age and 65 years to 97 years of age, for subsequent data analysis and comparison with results from other published stroke knowledge studies. In the 20 year to 64 year age group there were 436 respondents (77.6% of the total sample) and in the 65 year to 97 year age group there were 126 respondents (22.4% of the total sample). There were significant differences between gender and age groups (X^2= 4.47, df = 1, p = .03). In the 20 year to 64 year age group there were significantly more men (60.6%) than in the 65 year to 97 year age group (50%). Over 95 % (540) of the respondents had completed high school or above. Significantly more of the urban respondents (62%) had a community college or higher educational level compared to the rural respondents (48%; X^2 = 30.48, df = 5, p < .01). In addition, significantly more of the 20 year to 64 year age group (60.3%) had a community college or higher educational level compared to the 65 year to 97 year age group (55.8%; X^2 = 46.40, df = 5, p < .01).

Income levels indicated 312 (55.1%) respondents reporting greater than $40,000 annually, while 85 (15.5%) respondents reported annual incomes of less than $20,000. Significant more respondents 20 years to 64 years of age reported annual household income over $60,000 (37%) than respondents 65 years to 97 years of age (14.3%; X^2 = 43.14, df = 3, p < .01). The majority of respondents 20 years to 64 years of age were working (79%), while only 19.5% of those 65 to 97 years of age were working (X^2 = 257.59, df = 5, p < .01) .

TABLE IV

DEMOGRAPHIC CHARACTERISTICS BY RESIDENCE LOCATION

Variable	Categories	Residence Location				
		Rural n=283	(%)	Urban n=283	(%)	Total
Gender	Male	170	(60%)	158	(56%)	328
	Female	113	(40%)	123	(44%)	236
Age	20 - 64 years	217	(76%)	219	(78%)	436
	65 - 97 years	66	(24%)	60	(22%)	126
Marital Status	Married	197	(70%)	167	(59%)	364
	Never Married	22	(8%)	49	(17%)	71
	Divorced	31	(11%)	33	(12%)	64
	Separated	2	(0%)	2	(0%)	4
	Widowed	30	(11%)	32	(12%)	62
Employment Status	Working	172	(62%)	183	(65%)	355
	Retired	78	(28%)	69	(25%)	147
	Homemaker	19	(7%)	14	(5%)	33
	Unemployed	10	(3%)	13	(5%)	23
	Student	0	(0%)	2	(0%)	2
Highest Education Level	Grade School	9	(3%)	6	(2%)	15
	Middle School	5	(2%)	4	(1%)	9
	High School	132	(47%)	97	(35%)	229
	Tech School/Comm. College	73	(26%)	54	(19%)	127
	Four-year Degree	38	(13%)	55	(19%)	93
	Graduate Degree	25	(9%)	66	(24%)	91
Household Annual Income	<$20,000	37	(14%)	48	(17%)	85
	$20,001 - $39,999	79	(29%)	71	(26%)	150
	$40,000 - $59,999	70	(26%)	64	(23%)	134
	>$60,000	85	(31%)	93	(34%)	178
Race	White	280	(99%)	250	(89%)	530
	Black	0	(0%)	15	(5%)	15
	Asian	0	(0%)	10	(4%)	10
	Hispanic	0	(0%)	6	(2%)	6
	Other	1	(1%)	0	(0%)	1

TABLE V

DEMOGRAPHIC CHARACTERISTICS BY AGE

Variable	Categories	Age				Total
		20-64 n=436	(%)	65-97 n=126	(%)	
Residence Location	Rural	217	(50%)	66	(52%)	283
	Urban	219	(50%)	60	(48%)	279
Gender	Male	264	(61%)	63	(50%)	327
	Female	172	(39%)	63	(50%)	235
Marital Status	Married	299	(69%)	63	(51%)	362
	Never Married	67	(15%)	3	(2%)	70
	Divorced	55	(13%)	9	(7%)	64
	Separated	4	(1%)	0		4
	Widowed	11	(2%)	50	(40%)	61
Employment Status	Working	343	(79%)	12	(10%)	355
	Retired	47	(11%)	99	(80%)	146
	Homemaker	20	(4%)	11	(9%)	31
	Unemployed	22	(5%)	1	(1%)	23
	Student	2	(1%)	0		2
Highest Education Level	Grade School	3	(1%)	12	(10%)	15
	Middle School	6	(1%)	3	(2%)	9
	High School	164	(38%)	64	(51%)	228
	Tech School/Comm. College	108	(25%)	19	(15%)	127
	Four-year Degree	83	(19%)	9	(7%)	92
	Graduate Degree	72	(16%)	18	(15%)	90
Household Annual Income	<$20,000	50	(12%)	34	(29%)	84
	$20,001 - $39,999	103	(24%)	47	(39%)	150
	$40,000 - $59,999	111	(26%)	21	(18%)	132
	>$60,000	160	(38%)	17	(14%)	177
Race	White	402	(93%)	124	(99%)	526
	Black	14	(3%)	1	(1%)	15
	Asian	10	(2%)	0		10
	Hispanic	6	(1%)	0		6
	Other	1	(1%)	0		1

TABLE VI

DEMOGRAPHIC CHARACTERISTICS BY GENDER

Variable	Categories	Gender				Total
		Male n=328	(%)	Female n=236	(%)	
Residence Location	Rural	170	(52%)	113	(48%)	283
	Urban	158	(48%)	123	(52%)	281
Age	20 - 64 years	264	(81%)	172	(73%)	436
	65 - 97 years	63	(19%)	63	(27%)	126
Marital Status	Married	244	(74%)	119	(51%)	363
	Never Married	41	(13%)	30	(13%)	71
	Divorced	27	(8%)	37	(15%)	64
	Separated	2	(1%)	2	(1%)	4
	Widowed	14	(4%)	47	(20%)	61
Employment Status	Working	218	(67%)	137	(59%)	355
	Retired	90	(28%)	56	(24%)	146
	Homemaker	0	(0%)	32	(14%)	32
	Unemployed	16	(5%)	7	(3%)	23
	Student	1	(0%)	1	(0%)	2
Highest Education Level	Grade School	9	(3%)	6	(3%)	15
	Middle School	4	(1%)	5	(2%)	9
	High School	129	(39%)	99	(42%)	228
	Tech School/Comm. College	71	(22%)	56	(24%)	127
	Four-year Degree	55	(17%)	38	(16%)	93
	Graduate Degree	59	(18%)	31	(13%)	90
Household Annual Income	<$20,000	32	(10%)	52	(23%)	84
	$20,001 - $39,999	79	(24%)	71	(32%)	150
	$40,000 - $59,999	90	(28%)	43	(19%)	133
	>$60,000	121	(38%)	57	(26%)	178
Race	White	312	(95%)	216	(93%)	528
	Black	5	(2%)	10	(4%)	15
	Asian	5	(2%)	5	(2%)	10
	Hispanic	4	(1%)	2	(1%)	6
	Other	1	(0%)	0	(0%)	1

The majority of respondents were married, however significantly more men than women reported being married (74.4% men vs. 50.6% women; $\underline{X}^2 = 50.17$, df = 4, $\underline{p} < .01$). Significantly more respondents 20 years to 64 years of age (68.6% vs. 50.4%; $\underline{X}^2 = 147.20$, df =4, $\underline{p} < .01$) and significantly more rural respondents were married (69.6% vs. 59.0%; $\underline{X}^2 = 12.87$, df = 4, $\underline{p} < .01$).

C. Overall Knowledge of Stroke Symptoms and Risk Factors

Scores for knowledge of stroke signs and symptoms and risk factors were computed for three overall scales and four subscales. Table VII presents a summation of these seven scores for the 566 respondents. Detailed analyses of total stroke symptom and total stroke risk factor scores, their subscales, and individual items follows.

TABLE VII

STROKE RECOGNITION QUESTIONNAIRE KNOWLEDGE SCORES

Score	N	Mean	Standard Deviation	Actual Range	Possible Range
Total Knowledge	509	31.99	3.71	15 - 39	0 - 40
Total Symptom	534	16.22	2.55	7 - 20	0 - 20
Total Risk Factor	524	15.77	2.22	8 - 20	0 - 20
Symptom Subscale	546	9.17	1.66	0 - 10	0 - 10
Symptom Distractor Subscale	536	7.05	2.09	0 - 10	0 - 10
Risk Factor Subscale	536	7.43	2.16	0 - 10	0 - 10
Risk Factor Distractor Subscale	532	8.34	1.66	1 - 10	0 - 10

1. Stroke Symptom Knowledge

Respondents were asked to select symptoms of stroke from a list of twenty symptom statements. Ten of the statements were correct stroke symptoms and ten were non-stroke symptom distractor statements. Respondents were asked to check "yes" or "no" for each symptom item they thought applied to stroke. The range of respondents' total knowledge of stroke symptoms was from 7 to 20 symptoms correctly identified (M = 16.22, SD = 2.55).

The subscale score for the ten stroke symptoms had a range of 0 points to 10 points (M = 9.2, SD = 1.67). The majority of respondents (93.4%) had a score of 7 points or above, 18 of the respondents (3.3%) had a score of 0 points to 4 points. There were significant differences in knowledge of actual stroke symptoms by both respondents' residence location and age group. Respondents in rural settings had higher stroke symptom knowledge (M = 9.32, SD = 1.34) compared to respondents in urban locations (M = 9.01, SD = 1.93; t (544) = 2.18, p = .03). In addition, respondents in the 20 year to 64 year age group had higher stroke symptom knowledge (M = 9.29, SD = 1.51) compared to respondents 65 years and older (M = 8.84, SD = 1.85; t (540) = 2.67, p < .01).

Respondents' knowledge of individual stroke symptom items was examined (See Tables VIII, IX, and X). The two stroke symptoms least often identified were double vision (only 83.7% of the total sample) and sudden severe headache (only 80.7% of the total sample). Significantly more rural respondents (96%) recognized confusion as a stroke symptom (urban = 89%; X^2 = 11.00, df = 1, p < .01). Women were significantly more likely to recognize confusion compared to men (women = 96% , men = 91%; X^2 = 4.44, df = 1, p =.03) and were significantly more likely to recognize double vision (women = 88%, men = 81%; X^2 = 5.35, df = 1, p = .02). Respondents aged 20 years to 64 years were significantly more likely to recognize trouble walking (20 to 64 = 94%, 65 to 97 = 88%; X^2 = 6.30, df = 1, p = .01), confusion (20 to 64 = 94%, 65 to 97 = 89%; X^2 = 5.16, df = 1, p = .02), loss of balance (20 to 64 = 94%, 65 to 97 = 86%;

TABLE VIII

INDIVIDUAL STROKE SYMPTOM KNOWLEDGE BY RESIDENCE LOCATION

Individual Symptom	Residence Location					
	Rural n=283	(%)	Urban n=283	(%)	χ^2	p
Slurred or garbled speech	273	(99%)	264	(96%)	3.41	.065
Numbness on one side of face	273	(97%)	267	(95%)	1.57	.211
Confusion	272	(96%)	249	(89%)	11.00	.001
Weakness one side of body	269	(95%)	269	(96%)	0.04	.845
Trouble with coordination	262	(95%)	254	(92%)	1.45	.229
Trouble walking	266	(94%)	257	(91%)	2.13	.144
Sudden unexplained dizziness	259	(94%)	248	(90%)	3.51	.061
Loss of balance	262	(93%)	257	(91%)	0.39	.530
Double vision	244	(86%)	227	(81%)	3.39	.065
Sudden severe headache	228	(83%)	218	(79%)	1.35	.245

TABLE IX

INDIVIDUAL STROKE SYMPTOM KNOWLEDGE BY AGE

Individual Symptom	Age					
	20 - 64 n=436	(%)	65 - 97 n=126	(%)	χ^2	p
Slurred or garbled speech	421	(98%)	114	(97%)	0.67	.412
Weakness one side of body	419	(96%)	116	(93%)	1.81	.179
Numbness on one side of face	417	(96%)	122	(98%)	0.81	.367
Trouble walking	411	(94%)	110	(88%)	6.30	.012
Confusion	410	(94%)	109	(89%)	5.16	.023
Loss of balance	409	(94%)	108	(86%)	9.33	.002
Trouble with coordination	406	(94%)	108	(91%)	2.09	.148
Sudden unexplained dizziness	401	(93%)	103	(88%)	3.46	.063
Double vision	378	(87%)	91	(73%)	13.04	.000
Sudden severe headache	351	(81%)	93	(79%)	0.41	.521

TABLE X

INDIVIDUAL STROKE SYMPTOM KNOWLEDGE BY GENDER

Individual Symptom	Gender					
	Male n=328	(%)	Female n=236	(%)	χ^2	*p*
Slurred or garbled speech	312	(97%)	224	(97%)	0.01	.936
Numbness on one side of face	314	(96%)	225	(96%)	0.62	.803
Weakness one side of body	312	(95%)	225	(96%)	0.18	.669
Trouble walking	304	(93%)	218	(93%)	0.01	.927
Loss of balance	304	(93%)	214	(91%)	0.49	.485
Trouble with coordination	300	(93%)	215	(93%)	0.00	.992
Confusion	297	(91%)	223	(96%)	4.44	.035
Sudden unexplained dizziness	293	(91%)	213	(93%)	0.85	.357
Double vision	264	(81%)	206	(88%)	5.35	.021
Sudden severe headache	257	(80%)	188	(82%)	0.24	.622

X^2 = 9.33, df = 1, p < .01), and double vision (20 to 64 = 87%, 65 to 97 = 73%; X^2 = 13.04, df = 1, p < .01).

The subscale scores for correct identification of the ten non-stroke (distractor) symptoms had a range of 0 points to 10 points (M = 7.05, SD = 2.10). The majority (64.6%) of respondents correctly identified seven or more symptoms as non-stroke symptoms, while 122 (22.8%) had a score of four or less. Examination of the non-stroke (distractor) symptom score variations by residence location, gender, and age group revealed no significant differences.

Respondents misidentified several non-stroke symptom statements as stroke symptoms: (1) difficulty breathing (60.4%); (2) sudden pain in one arm (57.0%); (3) extreme tiredness (54.9%); (4) chest pain (40.0%); (5) leg cramps (28.3%); and (6) heartburn (18.0%) (See Tables XI, XII, and XIII). Chi-square statistics applied to non-stroke (distractor) symptoms across residence location, gender, and age group revealed five significant associations. Extreme tiredness was incorrectly identified as a stroke symptom by more rural respondents (30.3%) than urban respondents (24.6%; X^2 = 7.031, df = 1, p < .01). Swollen ankles was incorrectly misidentified by more rural respondents (20.7%) than urban respondents (14.3%; X^2 = 4.007, df = 1, p = .045). Heartburn was more often misidentified as a stroke symptom by younger respondents (15.4%) than older respondents (2.5%; X^2 = 4.450, df = 1, p = .03) and diarrhea was more often misidentified as a stroke symptom be younger respondents (younger = 6%, older = 2%; X^2 = 4.14, df = 1, p = .04). Cough was more often misidentified as a stroke symptom by women (10.5%) than men (5.3%; X^2 = 5.229, df = 1, p = .022).

2. Stroke Risk Factor Knowledge

The *Stroke Recognition Questionnaire* listed twenty risk factor items, ten of which were specific for stroke, and ten of which were non-stroke risk factors. Respondents were asked to check "yes" or "no" for each risk factor item they thought applied to stroke. Knowledge of stroke risk factors had a range

TABLE XI

INDIVIDUAL SYMPTOMS MISIDENTIFIED AS STROKE SYMPTOMS BY RESIDENCE LOCATION

Individual Symptoms	Residence Location					
	Rural n=283	(%)	Urban n=283	(%)	χ^2	p
Difficulty breathing	176	(62%)	165	(58%)	0.79	.371
Extreme tiredness	167	(60%)	136	(49%)	7.03	.008
Sudden pain in one arm	161	(58%)	154	(56%)	0.30	.581
Chest Pain	113	(40%)	112	(40%)	0.00	.986
Leg cramps	83	(30%)	72	(26%)	1.09	.297
Swollen ankles	58	(21%)	40	(14%)	4.01	.045
Heartburn	50	(18%)	51	(18%)	0.02	.897
Fever	28	(10%)	26	(9%)	0.09	.764
Cough	21	(8%)	20	(7%)	0.02	.890
Diarrhea	16	(6%)	14	(5%)	0.12	.730

TABLE XII

INDIVIDUAL SYMPTOMS MISIDENTIFIED AS STROKE SYMPTOMS BY AGE

Individual Symptoms	Age					
	20 - 64 n=436	(%)	65 - 97 n=126	(%)	χ^2	p
Difficulty breathing	264	(61%)	76	(60%)	0.01	.940
Sudden pain in one arm	246	(57%)	69	(58%)	0.02	.880
Extreme tiredness	244	(57%)	58	(49%)	2.08	.149
Chest Pain	178	(41%)	46	(37%)	0.47	.493
Leg cramps	130	(30%)	24	(21%)	3.74	.053
Heartburn	86	(20%)	14	(11%)	4.45	.035
Swollen ankles	76	(17%)	21	(17%)	0.01	.939
Fever	47	(11%)	7	(6%)	2.53	.112
Cough	27	(6%)	13	(11%)	3.14	.076
Diarrhea	27	(6%)	2	(2%)	4.14	.042

TABLE XIII

INDIVIDUAL SYMPTOMS MISIDENTIFIED AS STROKE SYMPTOMS BY GENDER

Individual Symptoms	Gender					
	Male n=328	(%)	Female n=236	(%)	χ^2	p
Difficulty breathing	205	(62%)	136	(58%)	1.23	.268
Sudden pain in one arm	193	(60%)	122	(53%)	2.74	.098
Extreme tiredness	172	(54%)	131	(57%)	0.62	.432
Chest Pain	133	(41%)	92	(39%)	0.15	.694
Leg cramps	90	(28%)	65	(29%)	0.05	.828
Heartburn	62	(19%)	39	(17%)	0.53	.465
Swollen ankles	56	(17%)	42	(18%)	0.08	.777
Fever	32	(10%)	22	(10%)	0.02	.879
Diarrhea	20	(6%)	10	(4%)	0.91	.339
Cough	17	(5%)	24	(10%)	5.23	.022

of 8 to 20 risk factors correctly identified (M = 15.77, SD = 2.22). Examining respondent total risk factor score by residence, gender, and age group revealed no significant findings.

The subscale score for the ten stroke risk factors had a range of 0 points to 10 points (M = 7.43, SD = 2.16). While the majority of respondents (87.4%) had a score of 7 points or above, 19 respondents (3.6%) had a score of 4 points or less. Examination of stroke risk factor score variations by residence location, gender, and age group revealed no significant differences.

The following risk factors were frequently not identified by respondents as stroke risk factors: (1) alcohol use (52.8%); (2) irregular heartbeat (41.2%); (3) diabetes (31.0%); (4) history of having a heart attack (30.7%); and (5) lack of physical activity (26.0%) (See Tables XIV, XV, and XVI). There were no significant differences in recognition of risk factors by residence location and gender, however, there were differences by age group. Younger respondents were significantly more likely to recognize high blood pressure (20 years to 64 years = 97%; 65 years and older = 93%; X^2 = 4.10, df = 1, p = .04), smoking (20 years to 64 years = 88%; 65 years and older = 74%; X^2 = 13.97, df = 1, p < .01), diabetes (20 years to 64 years 73%; 65 years and older = 56%; X^2 = 13.07, df = 1, p < .01), and alcohol use (20 years to 64 years = 49%; 65 years and older = 32%; X^2 = 11.46, df = 1, p < .01) as risk factors for stroke.

The subscale score for the ten non-stroke (distractor) risk factors had a range of 1 point to 10 points (M = 8.34, SD = 1.66). The majority (71.8%) of respondents correctly identified 7 or more non-stroke risk factors correctly, while 59 (11.0%) correctly identified 4 or less. Examination of non-stroke risk factor score variations by residence location, gender, and age group revealed one significant difference. Higher knowledge of non-stroke risk factors was noted in respondents aged 20 years to 64 years (M = 7.61, SD = 2.09) compared to respondents 65 years and older (M = 6.83, SD = 2.23; t (532) = 3.47, p < .01).

Three non-stroke (distractor) risk factors most often misidentified by respondents as stroke risk factors were hypoglycemia (34.7%); varicose veins (31.3%); and trouble sleeping (28.6%) (See Tables XVII, XVIII, and XIX). There were no significant differences in recognition of non-stroke risk factors by

TABLE XIV

INDIVIDUAL STROKE RISK FACTOR KNOWLEDGE BY RESIDENCE LOCATION

Individual Stroke Risk Factor	Residence Location					
	Rural n=283	(%)	Urban n=283	(%)	χ^2	p
High blood pressure	269	(97%)	263	(95%)	1.26	.262
High blood cholesterol	240	(87%)	231	(84%)	0.77	.380
Smoking cigarettes	243	(86%)	233	(83%)	1.37	.241
More than 20 pounds overweight	227	(82%)	218	(79%)	0.77	.379
History of neck vein disease	225	(80%)	220	(79%)	0.13	.721
Lack of physical activity	198	(72%)	207	(75%)	0.75	.386
Diabetes	193	(70%)	187	(68%)	0.24	.625
History of having a heart attack	190	(68%)	195	(70%)	0.27	.603
Irregular heartbeat	164	(59%)	155	(56%)	0.60	.438
Alcohol use (> 2 drinks per day)	127	(46%)	124	(45%)	0.03	.858

TABLE XV

INDIVIDUAL STROKE RISK FACTOR KNOWLEDGE BY AGE

Individual Stroke Risk Factor	Age					
	20 - 64 n=436	(%)	65 - 97 n=126	(%)	χ^2	p
High blood pressure	418	(97%)	111	(93%)	4.10	.043
Smoking cigarettes	383	(88%)	92	(74%)	13.97	.000
High blood cholesterol	369	(86%)	100	(84%)	0.30	.586
History of neck vein disease	351	(81%)	93	(74%)	2.65	.104
More than 20 pounds overweight	347	(81%)	96	(81%)	0.00	.995
Lack of physical activity	322	(75%)	82	(69%)	1.82	.177
Diabetes	312	(73%)	67	(56%)	13.07	.000
History of having a heart attack	306	(71%)	78	(63%)	2.71	.099
Irregular heartbeat	251	(59%)	67	(56%)	0.30	.581
Alcohol use (> 2 drinks per day)	211	(49%)	38	(32%)	11.46	.001

TABLE XVI

INDIVIDUAL STROKE RISK FACTOR KNOWLEDGE BY GENDER

Individual Stroke Risk Factor	Gender					
	Male n=328	(%)	Female n=236	(%)	χ^2	p
High blood pressure	309	(96%)	222	(97%)	0.37	.544
Smoking cigarettes	280	(86%)	196	(83%)	0.52	.470
High blood cholesterol	275	(85%)	195	(85%)	0.00	.968
More than 20 pounds overweight	259	(80%)	185	(81%)	0.01	.918
History of neck vein disease	257	(79%)	188	(81%)	0.36	.546
Lack of physical activity	237	(74%)	167	(73%)	0.00	.926
History of having a heart attack	230	(71%)	155	(66%)	1.03	.310
Diabetes	227	(70%)	153	(67%)	0.60	.439
Irregular heartbeat	186	(58%)	133	(58%)	0.00	.975
Alcohol use (> 2 drinks per day)	140	(44%)	110	(48%)	1.08	.298

TABLE XVII

INDIVIDUAL RISK FACTORS MISIDENTIFIED AS STROKE RISK FACTORS BY RESIDENCE LOCATION

Individual Risk Factor	Residence Location					
	Rural n=283	(%)	Urban n=283	(%)	χ^2	p
Hypoglycemia	102	(36%)	92	(33%)	0.74	.391
Trouble sleeping	83	(30%)	75	(27%)	0.61	.435
Varicose veins	81	(29%)	94	(34%)	1.47	.225
Iron deficiency	51	(19%)	39	(14%)	1.91	.166
Low levels of calcium in diet	49	(18%)	35	(13%)	3.00	.083
Alzheimer's Disease	39	(14%)	31	(11%)	1.05	.306
Lyme Disease	32	(12%)	23	(8%)	1.64	.201
Exposure to too much sunlight	28	(10%)	21	(7%)	1.10	.295
Living close to a power plant	14	(5%)	14	(5%)	0.00	1.00
Travel to foreign countries	11	(4%)	6	(2%)	1.54	.215

TABLE XVIII

INDIVIDUAL RISK FACTORS MISIDENTIFIED AS STROKE RISK FACTORS BY AGE

Individual Risk Factor	Age					
	20 - 64 n=436	(%)	65 - 97 n=126	(%)	χ^2	p
Hypoglycemia	155	(36%)	38	(31%)	0.94	.321
Varicose veins	146	(34%)	29	(23%)	4.77	.029
Trouble sleeping	129	(30%)	28	(23%)	1.91	.167
Iron deficiency	77	(18%)	12	(10%)	4.02	.045
Low levels of calcium in diet	65	(15%)	19	(16%)	0.08	.778
Alzheimer's Disease	57	(13%)	12	(10%)	0.90	.343
Lyme Disease	52	(12%)	3	(2%)	9.42	.002
Exposure to too much sunlight	41	(9%)	8	(6%)	1.02	.312
Living close to a power plant	25	(6%)	3	(2%)	2.26	.133
Travel to foreign countries	13	(3%)	4	(3%)	0.04	.851

TABLE XIX

INDIVIDUAL RISK FACTORS MISIDENTIFIED AS STROKE RISK FACTORS BY GENDER

Individual Risk Factor	Gender					
	Male n=328	(%)	Female n=236	(%)	χ^2	p
Hypoglycemia	116	(35%)	78	(34%)	0.21	.650
Varicose veins	96	(29%)	79	(34%)	1.31	.238
Trouble sleeping	88	(27%)	69	(30%)	0.52	.473
Iron deficiency	56	(17%)	34	(15%)	0.61	.433
Low levels of calcium in diet	51	(16%)	33	(14%)	0.27	.605
Alzheimer's Disease	42	(13%)	28	(12%)	0.07	.796
Lyme Disease	36	(11%)	19	(8%)	1.19	.275
Exposure to too much sunlight	31	(9%)	18	(8%)	0.52	.469
Living close to a power plant	16	(5%)	12	(5%)	0.01	.906
Travel to foreign countries	11	(3%)	6	(3%)	0.27	.605

residence location and gender, however, there were differences by age group. Younger subjects were significantly more likely to incorrectly identify varicose veins (20 years to 64 years = 34%; 65 years and older = 23%; $X^2 = 4.77$, df = 1, $p = .03$), iron deficiency (20 years to 64 years = 18%; 65 years and older = 10%; $X^2 = 4.02$, df = 1, $p = .04$), and lyme disease (20 years to 64 years = 12%; 65 years and older = 2%; $X^2 = 9.42$, df = 1, $p < .01$) as risk factors for stroke.

D. Reliability and Validity of the SRQ

The Stroke Recognition Questionnaire (SRQ) was designed to assess the general public's knowledge of stroke symptoms, and stroke risk factors. The following section focuses on the reliability and validity of the questionnaire (See Table XX). Discussion of these findings is found in Chapter V.

TABLE XX

RELIABILITY COEFFICIENTS FOR THE STROKE RECOGNITION QUESTIONNAIRE

Scale	KR20 Alpha Coefficient
Entire Questionnaire	.62
Entire Stroke Symptom Scale	.66
a. Symptom Subscale	.81
b. Non-Stroke (Distractor) Symptom Subscale	.69
Entire Stroke Risk Factor Scale	.42
a. Risk Factor Subscale	.70
b. Non-Stroke (Distractor) Risk Factor Subscale	.59

1. Reliability of the SRQ

Internal consistency reliability (KR20 for dichotomously scored items) was computed for the SRQ as a whole and individually for stroke symptoms and stroke risk factors. The alpha for the entire questionnaire was low at .62. The stroke risk factor subscale and stroke symptom subscale alphas ranged from .70 to .81 respectively. The non-stroke (distractor) risk factor and non-stroke symptom subscale alphas ranged from .59 to .69 respectively.

2. Validity of the SRQ

As discussed in Chapter III, a review of the literature and the computation of a Content Validity Index (CVI) supported the content validity of the SRQ. Eight nationally recognized physician and nurse experts in the field of stroke research and stroke patient care determined the CVI of .95 for the entire questionnaire.

E. Research Purposes and Questions

The purpose of this research was to determine the knowledge of stroke symptoms and stroke risk factors in a randomly selected general public Midwest sample across rural and urban groups. Completed questionnaire rate of return was over 70% (566) with an equal split of 50% (283) rural and urban respondents.

1. Research Question 1

The first research question determined subject knowledge of stroke symptoms. The total symptom score could range from 0 points to 20 points. The scores of the 534 respondents without missing data ranged from 7 points to 20 points, (M = 16.22, SD = 2.55).

2. Research Question 2

The second research question determined subject knowledge of stroke risk factors. The total risk factor score could range from 0 points to 20 points. The scores of the 524 respondents without missing data ranged from 8 points to 20 points, (M = 15.77, SD = 2.22).

3. Research Question 3

The third research question described the relationship between stroke symptom knowledge and respondents' residence location, gender, and age. Age was treated as a continuous variable. A multiple linear regression analysis showed that there was no relationship between stroke symptom knowledge and the set of demographic variables (R^2 = .01, F (3, 527) = 1.20, p = .31). One percent of the variance of knowledge of stroke symptoms was accounted for by the linear combination of the three demographic variables. As discussed earlier, analysis of stroke symptom knowledge by its subscale revealed significant differences by respondents' residence location and age with rural and younger (20 years to 64 years of age) respondents having higher stroke symptom knowledge scores.

4. Research Question 4

The fourth research question described the relationship between stroke risk factor knowledge and respondents' residence location, gender, and age. Age was treated as a continuous variable. A multiple linear regression analysis showed that there was no relationship between stroke risk factor knowledge and the set of demographic variables (R^2 = .001, F (3, 518) = .188, p = .90). Less than one percent of the variance of stroke risk factor knowledge was accounted for by the linear combination of the three demographic variables. Risk factor subscale analyses revealed that younger (20 years to 64 years of age) respondents had significantly higher knowledge of non-stroke risk factors than their older (65 years and older) counterparts.

5. Respondent Questions

Respondents to the SRQ were asked to answer several questions related to their risk for stroke, awareness of stroke in a family member or friend, and whether they would recognize a stroke in another person (see Tables XXI, XXII, and XXIII). More men (62% vs. 55% of women), 20 years to 64 years of age respondents (61.0% vs. 51% of those respondents 65 years or older), and urban respondents (63.0% vs. 55% of rural respondents) said they were not at risk for a stroke. More men (63.0% vs. 58% of

TABLE XXI

HISTORY AND RISK OF STROKE BY RESIDENCE LOCATION

History/Risk		Residence Location				
		Rural n=283	(%)	Urban n=283	(%)	Total
Do you think you are at risk for suffering a stroke?	Yes	123	(22%)	103	(19%)	226
	No	153	(28%)	175	(32%)	328
Has any member of your family or a close friend had a stroke?	Yes	181	(32%)	163	(29%)	344
	No	102	(18%)	118	(21%)	220
How sure are you that you would recognize a stroke in another person?	Very sure	18	(3%)	21	(4%)	39
	Sure	52	(9%)	38	(7%)	90
	Somewhat sure	111	(20%)	114	(20%)	225
	Somewhat not sure	73	(13%)	76	(13%)	149
	Not at all sure	29	(5%)	32	(6%)	61

women), respondents 65 years of age and older (71.0% vs. 58% of younger), and rural respondents (64.0% vs. 58% of urban respondents) stated they had experience with stroke in either a family member or a friend.

Only a small number of respondents stated they were "very sure" (7%) or "sure" (16%) that they would recognize a stroke in another person. Respondents who were "very sure" they would recognize a stroke in another person had significantly higher scores compared to the "not at all sure" (11%) respondents on the stroke symptom subscale ("very sure" $M = 9.36$, $SD = 1.13$; "not at all sure" $M = 8.52$, $SD = 1.98$; $t(97) = -2.410$, $p = .02$) and stroke risk factor subscale ("very sure" $M = 7.72$, $SD = 2.17$; "not at all sure" $M = 6.07$, $SD = 2.59$; $t(92) = -3.190$, $p < .01$).

TABLE XXII

HISTORY AND RISK OF STROKE BY AGE

History/Risk		Age				
		20 - 64 n=436	(%)	65 - 97 n=126	(%)	Total
Do you think you are at risk for suffering a stroke?	Yes	166	(30%)	60	(11%)	226
	No	264	(48%)	62	(11%)	326
Has any member of your family or a close friend had a stroke?	Yes	254	(45%)	89	(16%)	343
	No	182	(32%)	37	(7%)	219
How sure are you that you would recognize a stroke in another person?	Very sure	30	(5%)	9	(2%)	39
	Sure	74	(13%)	16	(3%)	90
	Somewhat sure	175	(31%)	50	(9%)	225
	Somewhat not sure	111	(20%)	38	(7%)	149
	Not at all sure	46	(8%)	13	(2%)	59

TABLE XXIII

HISTORY AND RISK OF STROKE BY GENDER

History/Risk		Gender				
		Male n=328	(%)	Female n=236	(%)	Total
Do you think you are at risk for suffering a stroke?	Yes	121	(22%)	105	(19%)	226
	No	200	(36%)	128	(23%)	328
Has any member of your family or a close friend had a stroke?	Yes	206	(36%)	138	(25%)	344
	No	122	(22%)	98	(17%)	220
How sure are you that you would recognize a stroke in another person?	Very sure	18	(3%)	21	(4%)	39
	Sure	55	(10%)	35	(6%)	90
	Somewhat sure	120	(21%)	105	(19%)	225
	Somewhat not sure	96	(17%)	53	(9%)	149
	Not at all sure	39	(7%)	22	(4%)	61

Across the demographic variables the most common source of health information is a health care professional followed by a print medium (see Table XXIV). The most common health insurance sources are HMOs and private/commercial carriers, except in the 65 year to 97 year age group who qualify for Medicare. Only 22 (3.9%) of the respondents had access to Medicaid for their health care costs while 27 (4.8%) respondents report having no health insurance (see Table XXV).

TABLE XXIV

HEALTH INFORMATION SOURCES

Source	Residence Location		Age		Gender	
	Rural n=283	Urban n=283	20 - 64 n=436	65 - 97 n=126	Male n=328	Female n=236
Doctor/Nurse	169 (60%)	142 (50%)	213 (49%)	95 (76%)	165 (50%)	144 (61%)
Family Members, Friends	69 (25%)	51 (18%)	99 (23%)	18 (14%)	74 (23%)	44 (19%)
Internet	31 (11%)	28 (10%)	56 (13%)	3 (2%)	37 (11%)	22 (9%)
Newspapers, Magazines, Books	93 (33%)	89 (31%)	133 (31%)	49 (39%)	96 (29%)	86 (37%)
Television	54 (19%)	61 (22%)	84 (19%)	29 (23%)	65 (20%)	48 (20%)

TABLE XXV

HEALTH INSURANCE

Insurance	Residence Location		Age Group		Gender	
	Rural n=283	Urban n=283	20 - 64 n=436	65 - 97 n=126	Male n=328	Female n=236
HMO	152 (54%)	142 (50%)	242 (56%)	50 (40%)	164 (50%)	129 (55%)
Medicaid	12 (4%)	10 (4%)	10 (2%)	12 (10%)	13 (4%)	9 (4%)
Medicare	69 (24%)	56 (20%)	19 (4%)	104 (83%)	58 (18%)	65 (28%)
Private / Commercial Insurance	96 (34%)	95 (34%)	131 (30%)	58 (46%)	123 (37%)	67 (29%)
No health insurance	19 (7%)	19 (7%)	37 (9%)	1 (0.8%)	23 (7%)	15 (6%)
Other health insurance	14 (5%)	13 (5%)	16 (4%)	11 (9%)	15 (5%)	12 (5%)

F. Summary

The purpose of this research was to assess the knowledge of stroke symptoms and stroke risk factors in a general public Midwest sample. Specifically, this study sought to identify the stroke knowledge differences between rural and urban community residents, men and women, and old versus young respondents using a mail survey design consisting of five contacts with potential respondents.

The Stroke Recognition Questionnaire (SRQ) was structured for self-administration. The response rate for this mail survey was 566 (70.5%) returned completed questionnaires. Data were screened prior to analyses to address the issues of accuracy of data entry, missing data, and variable recoding. Every stroke symptom item and stroke risk factor item had missing data. The seven stroke knowledge scores were

calculated excluding respondents with missing data. Considering the very small percentages of missing data it was assumed that there was no overall effect on the obtained scores.

Demographic data analysis revealed an identical rural and urban mix of 283 (50.0%) respondents. The final pool of respondents had more men than women, was predominantly 20 to 64 years of age, and married. More men and young respondents were married than were women and older respondents. Ninety-five percent of the sample population was educated at a high school or higher level and more than half of the respondents reported annual household incomes greater than $40,000. Greater than 79% of the younger respondents (20 to 64 years) reported working while more than 80% of the older respondents (> 65 years) reported being retired.

Generally, the knowledge scores for stroke symptoms and stroke risk factors were not significant across the three demographic characteristics of age, gender, and residence location. The subscale for stroke symptom knowledge did reveal higher scores for rural respondents and those 20 to 64 years of age when compared to their urban and older counterparts. The subscale for the specific area of non-stroke risk factor knowledge revealed higher scores for younger versus older respondents.

The most frequently correctly identified stroke symptoms were slurred or garbled speech, numbness of one side of face, and confusion. The stroke symptoms, double vision and sudden severe headache, were least often correctly identified. The four most common non-stroke symptoms identified as stroke symptoms were: difficulty breathing, extreme tiredness, sudden pain in one arm, and chest pain. Extreme tiredness was significantly more often misidentified by rural versus urban respondents. Heartburn was more commonly misidentified by younger versus older respondents.

Significantly more rural respondents and women recognized confusion as a stroke symptom when compared to their urban and male counterparts. Women were also more likely than men to recognize double vision as a stroke symptom. Younger respondents were significantly more likely to recognize trouble

walking, confusion, loss of balance, and double vision as stroke symptoms when compared to older respondents.

The most frequently identified stroke risk factors were high blood pressure, high blood cholesterol, smoking cigarettes, and more than 20 pounds overweight. Four stroke risk factors least often correctly identified were alcohol use, irregular heartbeat, diabetes, and history of having had a heart attack. The three most common non-stroke risk factors misidentified were hypoglycemia, trouble sleeping, and varicose veins. More young than older respondents misidentified varicose veins as a stroke risk factor.

V. DISCUSSION

There has been a concerted effort to educate the general public about stroke. Healthy People 2010, the American Heart Association, the National Stroke Association, the National Institutes of Neurological Diseases and Stroke, and other major health organizations have emphasized educating the public regarding the symptoms and risk factors for stroke. These organizations have used various media including television, video, newsprint, educational pamphlets, and health seminars to disseminate their message. Collecting baseline data about the general public's stroke knowledge will help these organizations to determine the effectiveness of their programs and to adjust them to target specific populations and emphasize specific facts.

The purpose of this study was to assess the knowledge of stroke symptoms and stroke risk factors in a general public Midwest sample of rural and urban residents. A sample of 800 residents living in six East Central Illinois counties were randomly selected from telephone directories and were mailed the Stroke Recognition Questionnaire (SRQ). The method used for mailing the SRQ was based on Dillman's (2000) design method for mailed surveys.

The interpretation of study results are presented in this chapter. Discussion includes the following topics: (1) assessment of the reliability and validity of the Stroke Recognition Questionnaire (SRQ); (2) study methodology; (3) findings related to stroke knowledge; (4) aims of research (5) implications for nursing; (6) strengths and limitations of the study; and (7) recommendations for future research.

A. Reliability and Validity of the SRQ

The Stroke Recognition Questionnaire (SRQ) was developed to assess the general public's knowledge of stroke symptoms and stroke risk factors. Prior to development of this instrument, there was no means to assess stroke knowledge by self-report. The items in this questionnaire were chosen as representative of the 10 most frequently reported stroke symptoms (American Heart Association, 2002) and stroke risk factors (Goldstein et al., 2001). Ten non-stroke (distractor) symptoms and 10 non-

stroke (distractors) risk factors were chosen and were loosely matched to the actual stroke symptoms and stroke risk factors. Content Validity Index (CVI = .95) was established by three physician and five nursing experts from across the country actively involved in stroke research and the emergency and rehabilitative treatment of stroke patients.

To examine the initial reliability of the SRQ a pilot study was conducted. Thirty-four city employees completed the SRQ on two occasions, two weeks apart. Examination of test-retest correlation revealed high correlation for stroke symptom knowledge and little to no correlation for risk factor knowledge. The 20-item total stroke symptom knowledge scale (r = .82) suggested satisfactory stability in the pilot study group's knowledge of stroke symptoms across time. In contrast, the 20-item total stroke risk factor scale (r = .36) suggested little correlation of knowledge level of stroke risk factors across test occasions. This low correlation may be due to respondents' lack of knowledge of risk factors and their reliance on guessing the correct responses.

Alpha (KR20) reliability coefficients of the SRQ subscales for this study suggested good stability and internal consistency within the ten-item stroke symptom subscale (.81) and borderline internal consistency for the ten-item non-stroke symptom subscale (.69) and the ten-item risk factor subscale (.70). The 10-item non-stroke risk factor subscale had a low internal consistency (.59). In addition, the 20-item symptom scale, the 20-item risk factor scale and the 40-item total score all had borderline to low internal consistency (.66, .42, and .62 respectively). The low internal consistency on some of these subscales suggests that the subscales are not measuring just one attribute or domain. Perhaps internal consistency could be improved if the sample were more heterogeneous in terms of educational level or more items were added to the questionnaire.

Additionally, the low internal consistency for the non-stroke symptom and non-stroke risk factor subscales is measuring the "distractors" and thus is not surprising. The distractors for both subscales were not selected with a single domain in mind, rather they were deliberately selected as symptoms and risk

factors for many conditions other than stroke. It is not meaningful then to measure or sum distractors into subscale or overall scores with future use of questionnaire.

B. Study Methodology

Dillman's (2000) method for mailed surveys was used for this study. The SRQ was mailed to 800 randomly selected rural and urban residents in East Central Illinois. Dillman's (2000) general method for a mailed survey consists of five contacts with potential respondents. Additionally, making sure that the SRQ was a respondent-friendly questionnaire, enclosing a token financial incentive, and enclosing a stamped return envelopes worked together to provide a response rate for this study of >70% (566).

C. Findings Related to Stroke Knowledge

The level of knowledge of stroke symptoms in this community-based sample is much better than that of the few published reports from other studies, while the knowledge level of stroke risk factors is somewhat better or comparable to the findings in those same studies (Kothari et al.,1997; Pancioli et al., 1998; Yoon et al., 2001). In a hospital-based report from 1997 of 163 stroke patient interviews, Kothari and colleagues (1997) reported that 40% of interviewees could not name a single stroke symptom or risk factor. In a 1998 report of a Greater Cincinnati Area general public telephone interview of 1880 persons, Pancioli and colleagues (1998) reported only 8% of participants could list three (3) stroke symptoms and only 4% could list three (3) stroke risk factors. Yoon and colleagues (2001), in a general public telephone interview of 822 persons, reported that 49.8% of subjects identified one (1) stroke symptom and 76% identified one (1) stroke risk factor. Compared with these earlier surveys, the knowledge of stroke symptoms of the SRQ respondents has clearly improved with 93.4% identifying seven or more of the ten most common stroke symptoms and 87.4% able to identify seven or more of the ten most common stroke risk factors.

The greater knowledge level of stroke symptoms and stroke risk factors in this study compared with previous surveys may be related, in part, to the characteristics of the respondent population or to methodological differences. In contrast to previous studies, this study's population was mostly white, young

(<65 years), and well educated. Differences in stroke knowledge between a general public sample and a sample of stroke patients may be related to cognitive deficits of the acute brain insult in the latter population.

In completing the SRQ respondents are asked to "recognize" stroke symptoms or stroke risk factors from 20-item lists for each. Other studies that examined a sample's stroke knowledge used an interview format, either phone or in-person, and had respondents "recall" stroke symptoms or risk factors in response to open-ended questions (Hux et al., 2000; Kothari et al., 1997; Pancioli et al.,1998; Samsa et al.,1997; & Yoon et al., 2001). The use of a recognition methodology may have contributed to the higher stroke knowledge scores in this study. Zerwic (1998) offered a similar explanation in a study in a general public sample knowledge of acute myocardial infarction (AMI) symptoms.

An additional alternative explanation is that there may have been a general improvement in the public's stroke knowledge since the early studies in this area were done. Numerous organizations such as the American Heart Association have increasingly focused on educating the public about stroke symptoms and risk factors and media outlets have increased coverage on stroke. For example, the cover of Newsweek on March 8, 2004 was titled, "The New Science of Strokes. What You Need to Know Now." These types of media campaigns may have resulted in increased knowledge among the sample.

Slurred speech (97.3%), numbness of one side of face (95.7%), weakness of one side of body (95.1%), and confusion (92.9%) were the most frequently identified stroke symptoms in this study; while the stroke symptoms of double vision (83.7%) and sudden severe headaches (80.7%) were the stroke symptoms least often identified. In previous studies (Kothari et al., 1997; Pancioli et al., 1998; & Yoon et al., 2001), the most commonly identified stroke symptoms were dizziness, double vision, severe headaches, and unspecified weakness and numbness.

Rural respondents ($\underline{M}$ = 9.32, $\underline{SD}$ = 1.32) had slightly higher stroke symptom knowledge than their urban counterparts ($\underline{M}$ = 9.01, $\underline{SD}$ = 1.93). This was a surprising finding as the literature leads us to believe

that rural residents who are older, less educated, and poorer than the general public, would thus be generally less knowledgeable of health issues such as stroke symptoms or risk factors (Coward et al., 1994; Racher et al., 2002). This finding raises many questions about reported differences between rural and urban residents. Perhaps the definition of a rural community simply by population of less than 2500 is not sufficient. Maybe there is a need to expand the definition of a rural community to include a specified number of miles from the nearest metropolitan community. For example, perhaps the rural areas surveyed in this study were actually bedroom communities to urban cities where respondents worked. These "rural" respondents may have had access to information regarding stroke symptoms and risk factors because much of their time is spent in urban locations where access to information is available.

Women had minimally higher stroke symptom knowledge scores (M = 9.28) compared to men (M = 9.11) which is consistent with past studies (Pancioli et al., 1998; & Yoon et al., 2001) where men were noted to have less stroke knowledge than women. In recent years, women have become the focus of research and health campaigns so one might have anticipated an even greater difference in stroke knowledge scores.

Younger (20 years to 64 years of age) respondents had significantly higher stroke symptom knowledge (M = 9.29, SD = 1.93) compared to respondents 65 years and older (M = 8.84, SD = 1.85). The pattern of age-group differences in knowledge of stroke symptoms was somewhat surprising. Greater knowledge in older than younger respondents was anticipated related to the greater importance of stroke as a health problem in older persons. The basis for this finding is not obvious, but may include differences in education and access to information about health issues such as stroke.

In this study, four non-stroke symptoms most often misidentified as stroke symptoms were difficulty breathing (60.4%), extreme tiredness (54.9%), sudden pain in one arm (57.0%), and chest pain (40%). Pancioli (1998) reported that men were more likely to misidentify sudden pain in one arm and chest pain as stroke symptoms. Current educational campaigns may need to refocus informational efforts on helping the

general public understand more about non-stroke symptoms. These symptoms are in fact symptoms that are reported by individuals experiencing an acute myocardial infarction (AMI). Some individuals in this study appear to have trouble distinguishing between the symptoms of stroke and AMI. This is quite interesting because in an earlier study by Zerwic (1998) which focused on the knowledge of a community sample about AMI symptoms, the sample confused *stroke* symptoms with *AMI* symptoms. Zerwic concluded that individuals at-risk for AMI may need education about the symptoms that *are not* associated with AMI as well as those symptoms that *are* associated with AMI. A similar approach may need to be considered with stroke. Patients who have multiple risk factors for stroke are also at risk for AMI. Education may need to help patients sort out which symptoms are associated with one health problem versus the other health problem.

The most frequently identified stroke risk factors were high blood pressure (96.2%), high blood cholesterol (85.3%), smoking cigarettes (84.7%), and more than 20 pounds overweight (80.5%) and are comparable to the findings of high blood pressure, stress, smoking, and diet in previous studies (Kothari et al., 1997; Pancioli et al., 1998; Yoon et al., 2001). There were four stroke risk factors that were not recognized by a substantial number of subjects. Fifty-three percent of respondents did not recognize alcohol use, 42.2% did not recognize irregular heartbeat, 31% did not recognize diabetes, and 31% did not recognize history of having had a heart attack as risk factors for stroke. This is evidence that there is a need to educate the general public more specifically regarding stroke's risk factors and to motivate patients to reduce their susceptibility to stroke by controlling their risks through appropriate treatments.

D. Aims of Research

The primary purpose of this study was to determine the knowledge level of stroke symptoms and stroke risk factors in a rural versus urban general public Midwest sample. Recruiting an adequate number of both rural and urban residents was accomplished. The respondent sample was representative of the East Central Illinois population in terms of ethnicity, education, and income. However, this sample is not

representative of the United States' population, therefore findings cannot be generalized to other areas without further testing. And finally, information about the influence or relationship of residence location, gender and age to stroke knowledge was sought.

The identification of specific areas of stroke knowledge deficits, such as stroke risk factors and non-stroke symptoms, provide a focus for improvement in the content of health information provided to the general public related to strokes. The non-stroke symptom items of chest pain, sudden pain in one arm, and difficulty breathing were misidentified as stroke symptoms suggesting confusion among respondents in distinguishing a stroke from a myocardial infarction. This confusion may affect how and when a person seeks treatment and the recognition of stroke by victim and bystanders. Those over 65 years of age, who had lower stroke knowledge scores, may need information related to stroke presented differently than their younger counterparts.

Educational interventions are needed which improve the general public's recognition of and rapid reaction to episodes of stroke symptoms such as complaints of blurred vision or severe headache in another person. Motivation to acknowledge and seek treatment for stroke risk factors such as diabetes and overweight is needed for patients to reduce their stroke risk. There is a need for a simple and consistent educational message regarding stroke symptoms that can be easily remembered. Such a message may help the public appropriately label stroke symptoms as a health threat and react by seeking health care in an appropriate manner.

E. Implications for Nursing

The forecast of a rising toll of stroke-related deaths and disability as the baby boomer generation ages has brought a new urgency to more effective prevention, earlier recognition, and timely treatment of stroke. Nurses are in the unique position to provide education for the general public and for patients needing assistance addressing their stroke risk factors. Talking with patients and their families to understand what they know about stroke will make interventional education more effective. Nurses have

access to patients' families to explain the symptoms of stroke so they can recognize stroke symptoms in their relative and call 911 immediately if they see those symptoms. Stroke screening programs and education in the workplace is needed, because that is where a large number of stroke patients first show symptoms. Stroke-awareness programs for employees could make a difference in faster stroke treatment (Zerwic, Ennen, & DeVon, 2002).

Based on the findings of this study, teaching the differences between stroke symptoms and non-stroke symptoms is very important to the patient seeking appropriate and timely treatment. If the patient is experiencing blurred vision and facial numbness, but is waiting to have chest pain or difficulty breathing before seeking treatment, today's time-sensitive stroke therapies may be missed. Nurses should consider creating and disseminating role model stories, based on the real experiences of patients with stroke, that may be effective in educating the public about the constellation of stroke symptoms and stroke risk factors. Nurses have the potential to assist the general public, patients, and their families in the translation of stroke knowledge into rapid early action for stroke treatment.

Although it is important for the public to be aware of stroke's symptoms and life-saving benefits of immediate treatments, the key to improved public health is prevention. Nurses' taking advantage of their daily opportunities to work with patients in improving the control of their diabetes and hypertension and smoking cessation is an important step in reducing the toll of stroke on the American public. To be most effective, however, nurses must help patients understand stroke risk factors related to their lifestyle. Ideally, education about and promotion of healthy lifestyles would begin during childhood. Community-based screening programs addressing risk laden lifestyle behaviors and the symptoms of stroke is one way to increase the public's stroke knowledge and begin to decrease stroke incidence and its devastating consequences.

F. Strengths and Limitations of the Study

1. Strengths of the Study

A strength of this study was the methodology. The mail survey design was successful in obtaining a > 70% response rate (566 respondents) and an equivalent representation of rural and urban residents. The opportunity to complete the SRQ without the influence of an interviewer is a strength of self-administered surveys. The topic of stroke was relevant and possibly important to this general public sample making the completion of the SRQ meaningful to them. The specific assessment of rural residents' stroke knowledge was an important strength of this study. Improving the understanding of what the public knows about stroke symptoms and stroke risk factors assists in developing targeted interventional education programs and motivational interventions for patients needing to address stroke risk factors.

2. Limitations of the Study

It is possible that the characteristics and knowledge level of stroke symptoms and stroke risk factors in those people who did not return a completed questionnaire and who were not selected to participate were different than the sample respondents. The sample, though large, was quite homogeneous as they were mostly white, young, and well educated. The use of a specified list of stroke symptoms and stroke risk factors versus open-ended questions about stroke may have been a limitation in this study. The use of telephone directories to select a sample may have resulted in the underrepresentation of members of the lowest socioeconomic group and racial minorities in the sample. Those who choose to have their phone numbers unlisted or rely on a cellular phone may have further limited the sample. Caution needs to be used when trying to generalize any results of this study to any other geographic region.

G. Recommendations for Future Research

Future research needs to answer the questions about how can we improve stroke knowledge, why are stroke victims and bystanders not recognizing stroke symptoms and seeking timely treatment, what is the general public's expectation of stroke symptoms? Seeking further understanding of how the public

comes to label certain symptoms a "stroke" is important to helping the public act on the health threat of stroke. Prevention of stroke requires strategies that address access to appropriate health information that spur efforts to identify persons at risk and recognize persons experiencing stroke. It would be interesting to examine risk factor knowledge and how that knowledge translates into action in a group with known stroke risks. Educational program research is needed for the development of specific strategies aimed at helping vulnerable groups like rural residents (e.g. communities 60-plus miles from any metropolitan area) and the very elderly by educating everyone who has increased contact with such vulnerable groups. Research that could determine educational methods of bridging the knowledge-behavior gap might focus on people's apparent reluctance to change lifestyle towards prevention of stroke and on ways of bringing people to accept calling the emergency medical system as a natural and appropriate response when they experience stroke symptoms. Questions to be answered by future research, are what do health care providers know about stroke, and how can the public prevent stroke and/or obtain timely treatment when it occurs.

H. Summary

The purpose of this study was to determine the knowledge level of stroke symptoms and stroke risk factors in a general public sample via the mailed self-administered SRQ. A secondary purpose was to identify similarities and differences in stroke knowledge between rural and urban respondents, men and women, and young aged versus older aged respondents. This information has potential to provide a focus for improvement in the content of health information related to strokes provided the general public. Based on respondents' specified sources of information about stroke, it may be appropriate to focus educational efforts in the mass media and to encourage health care providers to expand their patient education of stroke, especially to those individuals at increased stroke risk.

Knowledge of stroke symptoms was high and fairly uniform across the subgroups of gender and resident location. Knowledge of stroke risk factors, though less than that of stroke symptoms, was generally uniform across the subgroups of residence location, age, and gender. In summary, this study addressed

only the baseline public knowledge of stroke symptoms and stroke risk factors. Equally important are how a person decides on the label "stroke" for a set of symptoms, and the behavioral patterns (coping actions) based on that label or knowledge. Additionally, future educational efforts may need to correct the public's misconceptions concerning stroke symptoms that are more commonly associated with myocardial infarction.

Education programs must also focus on stroke risk factor modification and actions to take if stroke symptoms occur. Data (Appel, 2002; Fontanarosa, 1998; Stephenson, 1998) indicate that stroke educational efforts should target the elderly, who have the greatest stroke risk, but who appear to be the least informed group regarding stroke symptoms and stroke risk factors. However, stroke education will not be effective if directed only towards those at greatest risk for stroke. Patients with acute stroke often have impaired ability to communicate or are unable to recognize their symptoms. Therefore, persons of all age groups must be able to recognize and label the symptoms of stroke to facilitate rapid stroke identification and transport of the patient to the hospital.

Public education promoting awareness of the seriousness of stroke, the urgent need for stroke evaluation, and the narrow therapeutic window of time may lead toward changes in behavior. The translation of enhanced knowledge about stroke symptoms into the rapid seeking of health care needs further attention to increase the number and percentage of patients with stroke symptoms who are eligible to receive effective interventions to reduce the disability and mortality associated with stroke.

APPENDICES

APPENDIX A

2003

Questionnaire #: _____

STROKE RECOGNITION QUESTIONNAIRE

Conducted by:

Kathleen A. Ennen, MS, RN
Doctoral Student
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APPENDIX A (continued)

Stroke Recognition Questionnaire

Below is a list of symptoms, some are symptoms of stroke some are not. Please check yes if you think it is a stroke symptom. Check no if you think it is not a symptom of stroke.

START HERE:

	YES	NO
1. Diarrhea.	☐	☐
2. Difficulty breathing.	☐	☐
3. Confusion.	☐	☐
4. Chest pain.	☐	☐
5. Double vision.	☐	☐
6. Weakness on one side of body.	☐	☐
7. Swollen ankles.	☐	☐
8. Numbness on one side of face.	☐	☐
9. Heartburn.	☐	☐
10. Loss of balance.	☐	☐

APPENDIX A (continued)

	YES	NO
11. Trouble walking.	☐	☐
12. Sudden severe headache.	☐	☐
13. Fever.	☐	☐
14. Slurred or garbled speech.	☐	☐
15. Cough.	☐	☐
16. Sudden pain in one arm.	☐	☐
17. Leg cramps.	☐	☐
18. Sudden unexplained dizziness.	☐	☐
19. Extreme tiredness.	☐	☐
20. Trouble with coordination.	☐	☐

APPENDIX A (continued)

Below is a list of risk factors, some are risk factors for stroke and some are not. Please check yes if you think it is a risk factor of stroke. Check no if you think it is not a risk factor of stroke.

	Yes	No
21. Lyme Disease.	☐	☐
22. Alcohol use greater than 2 drinks each day.	☐	☐
23. Irregular heartbeat such as atrial fibrillation.	☐	☐
24. High blood pressure.	☐	☐
25. Diabetes.	☐	☐
26. High blood cholesterol.	☐	☐
27. Iron deficiency.	☐	☐
28. Alzheimer's disease.	☐	☐
29. Travel to foreign countries.	☐	☐
30. Lack of physical activity.	☐	☐
31. Trouble sleeping.	☐	☐

APPENDIX A (continued)

	Yes	No
32. More than 20 pounds overweight.	☐	☐
33. Low levels of calcium in diet.	☐	☐
34. History of having had a heart attack.	☐	☐
35. Smoking cigarettes.	☐	☐
36. Varicose veins.	☐	☐
37. Living close to a power plant.	☐	☐
38. Exposure to too much sunlight.	☐	☐
39. History of neck vein disease or carotid artery disease.	☐	☐
40. Hypoglycemia [low blood sugar].	☐	☐

APPENDIX A (continued)

41. Do you think you are at risk for suffering a stroke? [Please circle your answer]

YES NO

42. How sure are you that you would recognize stroke's signs and symptoms in another person? [Please circle your answer.]

Very sure

Somewhat sure

Sure

Somewhat not sure

Not at all sure

43. If you thought someone was having a stroke what would you do? [Please circle your answer.]

Do nothing

Call doctor

Call 911

44. Has any member of your family or a close friend had a stroke? [Please circle your answer.]

YES NO

INSTRUCTIONS: Each of the following questions asks for specific information about yourself. [Please enter your answer on the line provided or check box next to correct answer.]

45. How old are you?

_____ Years.

APPENDIX A (continued)

46. Are you?

☐ Male ☐ Female

47. Are you?

☐ White

☐ Black

☐ Asian

☐ Hispanic

Other _____

48. What is your marital status?

☐ Married

☐ Never Married

☐ Divorced

☐ Separated

☐ Widowed

APPENDIX A (continued)

49. What is the highest level education you finished?

- ☐ Never attended school
- ☐ Grade school
- ☐ Middle school
- ☐ High school
- ☐ Technical School or College
- ☐ Four-year College Degree
- ☐ Graduate Degree

50. Are you currently?

- ☐ Working
- ☐ Retired
- ☐ Homemaker
- ☐ Unemployed, seeking work

51. What is your Zip Code?

_____ Zip Code

APPENDIX A (continued)

52. Where do you get most of your health information?

- ☐ Television
- ☐ Doctor/Nurse
- ☐ Newspaper/Magazines
- ☐ Family member/Friends
- ☐ Internet

53. What type of health insurance do you currently have? [Check all that apply.]

- ☐ Private or Commercial [for example Blue Cross/Blue Shield]
- ☐ An HMO [for example Health Alliance or Personal Care]
- ☐ Medicare
- ☐ Medicaid
- ☐ Have no health insurance
- ☐ Other _____

53. Which of the following categories best describes your household income during the year 2002?

- ☐ Less than $20,000
- ☐ $20,001 - $39,999
- ☐ $40,000 - $59,999
- ☐ More than $60,000

STOP HERE.

Thank you for your participation in this important survey.

APPENDIX B

RECRUITMENT AD FOR PRETEST PILOT STUDY

Doctoral student needs YOUR help!

Kathy Ennen, MS, RN, a doctoral student at the University of Illinois College of Nursing, is getting ready to conduct a research study of what 800 residents of East Central Illinois know about stroke's warning signs, symptoms, and risk factors. She needs YOUR help with her newly developed *Stroke Recognition Questionnaire*. It requires at least 50 of you to volunteer about 45 minutes of your time on two Thursdays, two weeks apart. If you are interested in helping her with this project please come to the City Building Council Chambers between 11:00am and 1:00pm on **Thursday, October 16th, 2003**. Feel free to call Kathy at [redacted] or email her at [redacted] with your questions. Thanks in advance!!!

APPENDIX B (continued)

INSTRUCTIONS FOR THE PRETEST PILOT STUDY PARTICIPANTS

I am asking your help in a research study about what people know about stroke. This research study is part of the requirements for my doctoral studies at the University of Illinois' College of Nursing. The two questionnaire testing sessions you have agreed to participate in by coming today are part of this research study.

The purpose of my research study is to learn what people who live in rural towns know about the warning signs of stroke compared to those who live in cities. It will also find out what these two groups think puts a person at risk for stroke. The main research study will involve 800 people randomly selected from telephone directories of six East Central Illinois counties.

Stroke is the third leading cause of death for Americans. Stroke is also the leading cause of serious disabilities. There is a special treatment available for stroke patients. However, too few get to the hospital in time. Researchers have looked at this problem. Their studies show that many people do not recognize signs of stroke.

Everyone needs to know stroke signs. An onlooker could then recognize someone having a stroke and know to seek help. This study will help doctors and nurses learn what information about stroke East Central Illinois residents need to help them act quickly.

Your participation today and again two weeks from today is voluntary and will require about 45 minutes total time commitment for each session. I ask that you complete the questionnaire provided at your seat. It should take you about 30 minutes to complete. I do not believe that your participation in these two sessions nor the questions asked pose any risk to you. Although you will not benefit directly from this exercise, it is work necessary towards finalizing the questionnaire to be used in the main research study. Your participation in the two testing sessions is considered your consent to voluntarily participate in this part of my research study.

By participating in these sessions you will be sharing personal information about yourself. However, your answers are confidential and will be tracked by the identification number on each questionnaire you complete matched to the list of participant names. All completed questionnaires and lists of participant names and questionnaire identification numbers will be kept in a secured office area in a locked filing cabinet accessible only to this researcher and faculty sponsor. The data sets will be kept for five years after the results from the research study have been published and then will be destroyed on or before August 31, 2010. The identification code linking the test group participant with the questionnaires will be deleted from the test group tracking file when the questionnaire test-retest is completed. If for any reason or at any time you do not wish to participate in the questionnaire testing process please feel free to leave.

During the coming months educational opportunities to learn more about stroke and its prevention will be offered to all test group participants by this researcher. These sessions will be held at times and locations to be determined by yourselves in conjunction with the Personnel Department.

APPENDIX B (continued)

I will be happy to answer any questions you have about this study. My phone number is [redacted] please feel free to call me collect, or you can write me at the address in the letterhead. You may also contact my faculty sponsor, Julie J. Zerwic, Ph.D., RN, at [redacted] and/or Chris Bezruki, Director Personnel Department at [redacted] If you have any questions about your rights as a research subject, you may call the toll free telephone for Office for Protection of Research Subjects at the University of Illinois at Chicago at [redacted].

Thank you very much for helping with this research study.

UNIVERSITY OF ILLINOIS
AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Approval Notice
Initial Review (Response To Modifications)

September 26, 2003

Kathleen Ennen, MS, BSN, RN
Medical-Surgical Nursing
[redacted]

RE: Protocol # 2003-0481
"Knowledge of Stroke Warning Signs and Risk Factors: Variations by Rural and Urban Groups"

Dear Ms. Ennen:

Your Initial Review (Response To Modifications) was reviewed and approved by the Expedited review process on September 25, 2003. You may now begin your research.

Please note the following information about your approved research protocol:

- Protocol Approval period: September 25, 2003 - September 23, 2004
- Informed Consent: Waiver of Informed Consent granted under 45 CFR 46.117(c)
- Recruiting Materials:
  a) Recruitment Ad, V #2, 09/12/03
  b) Test Group Instructions, V #2, 09/12/03
  c) Prenotice Letter, V #2. 09/12/03
  d) Second Contact, V #2, 09/12/03
  e) Postcard Reminder, V #2, 09/12/03
  f) Fourth Contact, V #2, 09/12/03
  g) Fifth Contact, V #2, 09/12/03
- Research Protocol: Knowledge of Stroke Warning Signs and Risk Factors: Variations by Rural and Urban Groups
- Sponsor: None
- Approved Subject Enrollment #: 800
- Performance Sites: UIC
- Expedited Category: 45 CFR 46.110(b)

7 Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices and social behavior) or research employing survey, interview, oral history, focus group, program evaluation,

human factors evaluation, or quality assurance methodologies.

- Initial Review (Response To Modifications) Review History:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
07/23/2003	Initial Review	Expedited	08/04/2003	Modifications Required
09/15/2003	Response To Modifications	Expedited	09/25/2003	Approved

Please remember to:

→ Use your **research protocol number** (2003-0481) on any documents or correspondence with the IRB concerning your research protocol.

→ Review and comply with all requirements on the enclosure,
"UIC Investigator Responsibilities, Protection of Human Research Subjects"

Please note that the UIC IRB has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact the OPRS office at [redacted] or me at [redacted]. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

[redacted]
[redacted] Jewell Hamilton, MSW
Coordinator, IRB #2
Office for the Protection of Research Subjects

Enclosures:

- **UIC Investigator Responsibilities, Protection of Human Research Subjects**
- Recruiting Materials:
  a) Recruitment Ad, V #2, 09/12/03
  b) Test Group Instructions, V #2, 09/12/03
  c) Prenotice Letter, V #2. 09/12/03
  d) Second Contact, V #2, 09/12/03
  e) Postcard Reminder, V #2, 09/12/03
  f) Fourth Contact, V #2, 09/12/03
  g) Fifth Contact, V #2, 09/12/03

cc: Janet L. Larson, Ph.D., Head, Department of Medical-Surgical Nursing, M/C 802
Julie A. Zerwic, Ph.D., RN, Faculty Sponsor, Department of Medical-Surgical Nursing, M/C 802

APPENDIX C

PRENOTICE LETTER

A few days from now you will receive in the mail a request to fill out a brief questionnaire for a research project being conducted as part of my doctoral studies in nursing.

It concerns the knowledge of stroke warning signs and the knowledge of stroke risk factors in a general sample of 800 people living in East Central Illinois.

I am writing in advance because many people like to know ahead of time that they will be contacted. This research study will help doctors and nurses understand what people know about stroke and what they need to learn about stroke.

Thank you for your time and consideration.

Sincerely,

Kathy Ennen, MS, RN
Doctoral Candidate at University of Illinois at Chicago
College of Nursing

P.S. I will be enclosing a small token of appreciation with the questionnaire as a way of saying thanks.

APPENDIX C (continued)

SECOND CONTACT

I am writing to ask your help in a research study about what people know about stroke. This study is part of the requirements for my doctoral studies at the University of Illinois's College of Nursing. The purpose of this research study is to learn what people who live in rural towns know about the warning signs of stroke compared to those who live in cities. It will also find out what these two groups [total 800 possible participants] think puts a person at risk for a stroke.

Stroke is the third leading cause of death for Americans. Stroke is also the leading cause of serious disabilities. There is a special treatment available for stroke patients. However, too few get to the hospital in time. Researchers have looked at this problem. Their studies show that many people do not recognize signs of stroke.

Everyone needs to know stroke signs. An onlooker could then recognize someone having a stroke and know to seek help. This study will help doctors and nurses learn what information about stroke East Central Illinois residents need to help them act quickly.

Your participation in this study is voluntary. I ask that you would fill out and return the enclosed questionnaire. It should take you about 30 minutes to the questionnaire. I do not believe that the questions asked pose any risk to you. Although you will not benefit directly, every completed questionnaire will be useful. A completed returned questionnaire will be considered your consent to participate in this research study.

By participating in this research study, you will be providing personal information about yourself. However, your answers are confidential and will be released only as summaries in which no individual's name or answers can be identified. When you return your completed questionnaire, your name will be deleted from the mailing list and never connected to your answers in anyway. All completed questionnaires, name and address lists, and all other materials associated with this research study will be kept in a secured office area in a locked cabinet, accessible only by the researcher and her faculty sponsor. The identification codes linking the research participant with the questionnaire will be deleted from the participant tracking file when the completed questionnaire is received. The data sets will be kept for five years after the results from the research study have been published and then will be destroyed on or before August 31, 2010. If for any reason you prefer not to participate in this study please let me know by returning the blank questionnaire in the enclosed stamped envelope. If I receive no response from you, I will mail you a reminder. Every completed questionnaire is valued in this research study.

APPENDIX C (continued)

SECOND CONTACT

I have enclosed a small token of appreciation as a way of saying thanks for your help.

I will be happy to answer any questions you have about this study. My phone number is [redacted] please feel free to call me collect or you can write me at the address in the letterhead. You may also contact my faculty sponsor, Julie J. Zerwic, Ph.D., RN, at [redacted]. If you have any questions about your rights as a research subject, you may call the toll free telephone number for the Office for Protection of Research Subjects at the University of Illinois at Chicago at [redacted]

Thank you very much for helping with this research study.

Sincerely,

Kathy Ennen, MS, RN
Doctoral Candidate at University of Illinois at Chicago
College of Nursing

APPENDIX C (continued)

POSTCARD REMINDER

Last week a questionnaire was mailed to you as a member of my research study group of 800 persons seeking your answers to a set of questions about stroke warning signs and risk factors.

If you have already completed and returned the questionnaire please accept my sincere thanks. If not, please do so today. I am especially grateful for your help because by asking people like you to share your knowledge about stroke doctors and nurses can learn what information will increase people's recognition of stroke.

If you did not receive a questionnaire, or it was misplaced, please call me, collect if you want, at [redacted] and I will get another one in the mail to you today.

Kathy Ennen, MS, RN
[redacted]

APPENDIX C (continued)

FOURTH CONTACT

About three weeks ago I sent a questionnaire to you that asked about your knowledge of stroke warning signs and risk factors. To the best of my knowledge, it's not yet been returned.

The information from people who have already responded includes some interesting differences between those who live in rural towns and urban areas. I think the results are going to be very useful to doctors and nurses in East Central Illinois.

I am writing again because of the value your completed questionnaire has for helping to get accurate results. Although I sent questionnaires to a total of 800 people living in six different counties of East Central Illinois, it's only by hearing from nearly everyone in the sample that I can be sure that the results are truly representative.

A few people have written to say that they should not have received the questionnaire because they no longer live in East Central Illinois. If this concern applies to you please let me know on the cover of the questionnaire and return it in the enclosed envelope so I can delete your name from the mailing list.

My survey procedure includes a questionnaire identification number printed on a label and placed on the back cover of the questionnaire so that I can check your name off of the mailing list when it is returned. The list of names is then destroyed so that an individual's name can never be connected to the results in any way. Protecting the confidentiality of people's answers is important to me. All questionnaires and associated data files are being kept in a locked filing cabinet accessible only to my faculty sponsor and myself. The identification codes linking the research participant with the questionnaire will be deleted from the participant tracking file when the completed questionnaire is received. The data sets will be kept for five years after the results from the research study have been published and then will be destroyed on or before August 31, 2010.

I will be happy to answer any questions you have about this research study. My phone number is [redacted] please feel free to call me collect or you can write me at the address in the letterhead. You may also contact my faculty sponsor, Julie J. Zerwic, Ph.D., RN, at [redacted]. If you have any questions about your rights as a research subject, you may call the toll free telephone for the Office for Protection of Research Subjects at the University of Illinois at Chicago at [redacted].

I hope that you will fill out and return the questionnaire soon, but if for any reason you prefer not to answer it, please let me know by returning a note or blank questionnaire in the enclosed stamped envelope.

Sincerely,

Kathy Ennen, MS, RN
Doctoral Candidate at University of Illinois at Chicago
College of Nursing

APPENDIX C (continued)

FIFTH CONTACT

During the last two months I have sent you several mailings about a research study I am conducting about the knowledge of stroke warning signs and risk factors.

Its purpose is to learn what people who live in rural towns know about the warning signs and risk factors of stroke compared to those who live in cities. This study will help doctors and nurses learn what information about stroke residents in East Central Illinois need to help them react quickly.

The research study is drawing to a close, and this is the last contact that will be made with the random sample of 800 people who I think, based on telephone directories, are representative of all East Central Illinois residents.

I want to assure you that your response to this study is voluntary, and if you prefer not to respond that's fine. If you no longer live in East Central Illinois, and you feel I've made a mistake including you in this study, please let me know by returning the blank questionnaire with a note indicating so. This would be very helpful.

A completed returned questionnaire will imply your consent to participate in this research study. By participating in this study, you will be providing some personal information about yourself as well as answering some questions about stroke warning signs and risk factors. Your answers are confidential and will be released only as summaries in which no individual's name or responses can be identified. All questionnaires, data files, and associated materials with the research study are being kept in a locked filing cabinet accessible only to my faculty sponsor and myself. The identification codes linking the research participant with the questionnaire will be deleted from the participant tracking file when the completed questionnaire is received. The data sets will be kept for five years after the results from the study have been published and then will be destroyed on or before August 31, 2010.

I will be happy to answer any questions you have about this research study. My phone number is [redacted], please feel free to call me collect. You may also contact my faculty advisor, Julie J. Zerwic, Ph.D., RN, at [redacted]. If you have questions about your rights as a research subject, you may call the toll free telephone for the Office for Protection of Research Subjects at the University of Illinois at Chicago at [redacted]

APPENDIX C (continued)

FIFTH CONTACT

Finally, I appreciate your willingness to consider my request as I conclude this research effort to better understand what residents of East Central Illinois know about stroke.

Thank you very much.

Sincerely,

Kathy Ennen, MS, RN
Doctoral Candidate at University of Illinois at Chicago
College of Nursing

CITED LITERATURE

Abbott, R. D., Rodriguez, B. L., Burchfiel, C. M., & Curb, J. D. (1994). Physical activity in older middle-aged men and reduced risk of stroke: The Honolulu heart program. *American Journal of Epidemiology, 139*(9), 881-893.

Adams, H. P., Jr., Brott, T., Furlan, A., Gomez, C. R., Grotta, J., Helgason, C. M., Kwiatkowski, T., Lyden, P. D., Marler, J. R., Torner, J., Feinberg, W., Mayberg, M., & Thies, W. (1996). Guidelines for thrombolytic therapy for acute stroke: A supplement to the guidelines for the management of patients with acute ischemic stroke. *Stroke, 27*, 1711-1718.

Adler, J. (2004). The war on strokes. *Newsweek, 143*(10), 42-48.

American Heart Association. (2000). *2001 Heart and stroke statistical update.* Dallas, TX: American Heart Association.

American Heart Association. (2001 a). *American Heart Association's 3rd Scientific forum on quality of care and outcomes research in cardiovascular diseases and stroke.* Reuters Health. Available: http://www.americanheart.org/Reuters/pro/20011001epid008.txt.html [2001, October 3].

American Heart Association. (2001b). *2002 Heart and stroke statistical update.* Dallas, TX: American Heart Association.

American Heart Association. (2002). *Heart and stroke facts.* Dallas, TX: American Heart Association.

Appel, S. J., Harrell, J. S., & Deng, S. (2002). Racial and socioeconomic differences in risk factors for cardiovascular disease among southern rural women. *Nursing Research, 51*(3), 140-147.

Arboix, A., Garcia-Eroles, L., Massons, J., & Targa, C. (2000). Acute stroke in very old people: Clinical features and predictors of in-hospital mortality. *Journal of the American Geriatrics Society, 48*(1), 36-41.

Ascherio, A., Rimm, E. B., Hernan, M. A., Giovannucci, E., Kawachi, I., Stampfer, M. J., & Willet, W. C. (1999). Relation of consumption of vitamin E, vitamin C, and carotenoids to risk for stroke among men in the United States. *Annals of Internal Medicine, 130*(12), 963-970.

Azzimondi, G., Bassein, L., Fiorani, L., Nonino, F., Montaguti, U., Celin, D., Re, G., & D'Alessandro, R. (1997). Variables associated with hospital arrival time after stroke: Effect of delay on the clinical efficiency of early treatment. *Stroke, 28*(3), 537-542.

Barch, C. A. (1996). *Seeking health care following stroke: Public education.* National Institute of Neurological Disorders and Stroke. Available: http://accessible.ninds.nih.gov/health_and_medical/stroke_proceedings/barch.htm [2003, February 5].

Benavente, O., & Hart, R. G. (1999). Stroke: Part II. Management of acute ischemic stroke. *American Family Physician, 59*(10), 2828-2834.

Benjamin, E. J., Wolf, P. A., D'Agnostino, R. B., Silbershatz, H., Kannel, W. B., & Levy, D. (1998). Impact of atrial fibrillation on the risk of death: The Framingham Heart Study. *Circulation, 98*, 946-952.

Billett, J. A. (2002). Knowledge about stroke in adults from rural communities (abstract #4074). *Midwest Nursing Research Society 2002 Annual Research Conference: Nursing research international perspectives, proceedings*, 119.

Bishop, G. D., & Converse, S. A. (1986). Illness representations: A prototype approach. *Health Psychology, 5*(2), 95-114.

Blair, S. N., Kampert, J. B., Kohl III, H. W., Barlow, C. E., Macera, C. A., Paffenbarger, R. S., & Gibbons, L. W. (1996). Influences of cardiorespiratory fitness and other precursors on cardiovascular disease and all-cause mortality in men and women. *Journal of the American Medical Association, 276*(3), 205-210.

Blazer, D. G., Landerman, L. R., Fillenbaum, G., & Horner, R. (1995). Health services access and use among older adults in North Carolina urban vs rural residents. *American Journal of Public Health, 85*(10), 1384-1390.

Boden-Albala, B. M., Evers, S. K., Rundek, T., Elkind, M. S., Cheng, J. F., & Sacco, R. L. (2001). Blood pressure status one year post-stroke: Findings from the Northern Manhattan Stroke Study [Abstract]. *Stroke, 32*(1), 322.

Bousser, M.-G. (1999). Stroke in women: The 1997 Paul Dudley White international lecture. *Circulation, 99*(4), 463-467.

Braden, J., & Beauregard, K. (1994). *Health status and access to care of rural and urban populations*. Rockville, MD: Agency for Health Care Policy and Research. Public Health Service.

Brass, L. M., Osaacsohn, J. L., Merikangas, K. R., & Robinette, D. (1992). A study of twins and stroke. *Stroke, 23*(2), 221-223.

Bratina, P., Rapp, K., Barch, C., Kingable, G., Donnarumma, R., Spilker, J., Daley, S., Braimah, J., Sailor, S., & the NINDS rt-PA Stroke Study Group. (1997). Pathophysiology and mechanisms of acute ischemic stroke. *Journal of Neuroscience Nursing, 29*(6), 356-360.

Broderick, J. P., Miller, R., Khoury, J. C., Alwell, K., Kissela, B. M., Woo, D., Shujla, R., Moomaw, C., Gebel, J., Pancioli, A. M., Brott, T. G., & Kothari, R. (2001). Incidence rates of stroke for blacks and whites: Preliminary results from the Greater Cincinnati/Northern Kentucky stroke study [Abstract]. *Stroke, 32*(1), 320.

Brown, R. D., Whisnant, J. P., Sicks, J. D., O'Fallon, W. M., & Wilbers, D. O. (1996). Stroke incidence, prevalence, and survival: Secular trends in Rochester, Minnesota through 1989. *Stroke, 27*, 951-957.

Burggraf, V., & Barry, R. J. (2000). Healthy people 2010: Protecting the health of older individuals. *Journal of Gerontological Nursing, 26*(12), 16-22.

Buring, J. E., Hebert, P. R., Romero, J., Kittross, A., Cook, N., Manson, J. E., Peto, R., & Hennekens, C. H. (1995). Migraine and subsequent risk of stroke in the Physician's Health Study. *Archives of Neurology, 52*, 129-134.

Burnside, I., Preski, S., & Hertz, J. E. (1998). Research instrumentation and elderly subjects. *Image: Journal of Nursing Scholarship, 30*, 185-190.

Burt, V. L., Whelton, P., & Roccella, E. J. (1995). Prevalence of hypertension in the US adult population: Results from the third National Health and Nutrition Examination Study, 1988-1991. *Hypertension, 25*, 305-313.

Chandramouli, B. V., & Kotler, M. N. (1998). Atrial fibrillation: Preventing thromboembolism and choosing nondrug therapies. *Geriatrics, 53*(7), 53-60.

Collins, R., Peto, R., MacMahon, S., Hebert, P., Fiebach, N. H., Eberlein, K. A., Godwin, J., Qizilbash, N., Taylor, J. O., & Hennekens, C. H. (1990). Blood pressure, stroke and coronary heart disease, part 2. Short-term reductions in blood pressure: Overview of randomized drug trials in their epidemiological context. *Lancet, 335*, 827-838.

Congdon, J. G., & Magilvy, J. K. (2001). Themes of rural health and aging from a program of research. *Geriatric Nursing, 22*(5), 234-238.

Connell, C. M., & Crawford, C. O. (1988). How people obtain their health information - A survey in two Pennsylvania counties. *Public Health Reports, 103*(2), 189-195.

Cordes, S. M. (1985). Biopsychosocial imperatives from the rural perspective. *Social Science Medicine, 21*(12), 1373-1379.

Coward, R. T., Bull, C. N., Kukulka, G., & Galliher, J. M. E. (1994). *Health services for rural elders*. New York: Springer Publishing.

Crouse, J. R., Byington, R. P., Hoen, H. M., & Furberg, C. D. (1997). Reductase inhibitor monotherapy and stroke prevention. *Archives of Internal Medicine, 157*, 1305-1310.

Dennis, M., Bamford, J., Sandercock, P., & Warlow, C. (1990). Prognosis of transient ischemic attack in the Oxford Community Stroke Program. *Stroke, 21*, 848-853.

Dillman, D. A. (1978). *Mail and telephone surveys: The total design method*. New York: Wiley & Sons.

Dillman, D. A. (1999). Mail and other self-administered surveys in the 21st century: The beginning of a new era. *The Gallup Research Journal*(Winter/Spring), 121-140.

Dillman, D. A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons, Inc.

Edelman, M. A., & Menz, B. L. (1996). Selected comparisons and implications of a national rural and urban survey on health care access, demographics, and policy issues. *The Journal of Rural Health, 12*(3), 197-205.

Eikelboom, J. W., Lonn, E., Genest, J. J., Hankey, G., & Yusuf, S. (1999). Homocysteine and cardiovascular disease: A critical review of the epidemiologic evidence. *Annals of Internal medicine, 131*(5), 363-375.

Ellekjaer, H., Holman, J., Ellekjaer, E., & Vatten, L. (2000). Physical activity and stroke mortality in women: Ten year follow-up of the Nord-Trondelag Health Study, 1984-1986. *Stroke, 31*(1), 14-18.

Evenson, K., Rosamond, W., & Morris, D. (2001). Prehospital and in-hospital delays in acute stroke care. *Neuroepidemiology, 20*, 65-76.

Feinberg, W. M., Blackshear, J. L., Laupacis, A., Kronmal, R., & Hart, R. G. (1995). Prevalence, age distribution, and gender of patients with atrial fibrillation. *Archives of Internal Medicine, 155*(5), 469-473.

Fontanarosa, P. B., & Winkler, M. A. (1998). Timely and appropriate treatment of acute stroke: What's missing from this picture? *Journal of the American Medical Association, 279*(16), 1307-1309.

Fung, M. M., Barrett-Connor, E., & Bettencourt, R. R. (1999). Hormone replacement therapy and stroke risk in older women. *Journal of Women's Health, 8*(3), 359-364.

Giles, W. H., Croft, J. B., Greenlund, K. J., Ford, E. S., & Kittner, S. J. (1998). Total homocysteine concentration and the likelihood of nonfatal stroke: Results from the third national health and nutrition examination survey, 1988-1994. *Stroke, 29*(12), 2473-2477.

Gillum, R. F. (1999). Stroke mortality in blacks: Disturbing trends. *Stroke, 30*(8), 1711-1715.

Gillum, R. F., Mussolino, M. E., & Ingram, D. D. (1996). Physical activity and stroke incidence in women and men: The NHANES I epidemiologic follow-up study. *American Journal of Epidemiology, 143*(9), 860-869.

Goldstein, L. B., Adams, R., Becker, K., Furberg, C. D., Gorelick, P. B., Hademenos, G., Hill, M., Howard, G., Howard, V. J., Jacobs, B., Levine, S. R., Mosca, L., Sacco, R. L., Sherman, D. G., Wolf, P. A., & del Zoppo, G. J. (2001). Primary prevention of ischemic stroke: A statement for healthcare professionals from the stroke council of the American Heart Association. *Circulation, 103*, 163-182.

Gorelick, P. B., Sacco, R. L., Smith, D. B., Alberts, M., Mustone-Alexander, L., Rader, D., Ross, J. L., Raps, E., Ozer, M. N., Brass, L. M., Malone, M. E., Goldberg, S., Booss, J., Hanley, D. F., Toole, J. F., Greengold, N. L., & Rhew, D. C. (1999). Prevention of a first stroke: A review of guidelines and a multidisciplinary consensus statement from the National Stroke Association. *Journal of the American Medical Association, 281*(12), 1112-1120.

Grodstein, F., Manson, J. E., Colditz, G. A., Willett, W. C., Speizer, F. E., & Stampfer, M. J. (2000). A prospective, observational study of postmenopausal hormone therapy and primary prevention of cardiovascular disease. *Annals of Internal medicine, 133*(12), 933-941.

Gulzar, L. (1999). Access to health care. *Image: Journal of Nursing Scholarship, 31*(1), 13-19.

Hachinski, V. (2002). Awareness: The first step to action. *Stroke, 33*, 1173.

Haheim, L. L., Holme, I., Hjermann, I., & Leren, P. (1993). Risk factors of stroke incidence and mortality: A 12-year follow-up of the Oslo study. *Stroke, 24*(10), 1484-1489.

Hart, R. G., & Benavente, O. (1999). Stroke: Part I. A clinical update on prevention. *American Family Physician, 59*(9), 2475-2482.

Hart, R. G., & Halperin, J. L. (1999). Atrial fibrillation and thromboembolism: A decade of progress in stroke prevention. *Annals of Internal Medicine, 131*(9), 688-695.

Heberlein, T. A., & Baumgartner, R. (1978). Factors affecting response rates to mailed questionnaires: A quantitative analysis of the published literature. *American Sociological review, 43*, 447-462.

Hebert, P. R., Gaziano, J. M., Chan, K. S., & Hennekens, C. H. (1997). Cholesterol lowering with statin drugs, risk of stroke and total mortality: An overview of randomized trials. *Journal of the American Medical Association, 278*, 313-321.

Helgason, C., & Wolf, P. (1997). American Heart Association prevention conference IV: Prevention and rehabilitation of stroke. *Stroke, 28*, 1498-1500.

Horenstein, R. B., Smith, D. E., Mosca, L., & Investigators, f. t. W. s. P. P. (2002). Cholesterol predicts stroke mortality in the women's' pooling project. *Stroke, 33*(7), 1863-1868.

Howard, G., Evans, G. W., & Pearce, K. (1995). Is the stroke belt disappearing? An analysis of racial, temporal, and age effects. *Stroke, 26*, 1153-1158.

Hox, J., & de Leeuw, E. D. (1994). A comparison of nonresponse in mail, telephone and face-to-face surveys. *Quality and Quantity, 28*, 329-344.

Hu, F. B., Stampfer, M. J., Colditz, G. A., Ascherio, A., Rexrode, K. M., Willett, W. C., & Manson, J. E. (2000). Physical activity and risk of stroke in women. *Journal of the American Medical Association, 283*(22), 2961-2967.

Hux, K., Rogers, T., & Mongar, K. (2000). Common perceptions about strokes. *Journal of Community Health, 25*(1), 47-65.

Iso, H., Jacobs, D. R., Wentworth, D., Neaton, K. D., Choen, J. D., & Group, f. t. M. R. (1989). Serum cholesterol levels and six-year mortality from stroke in 350,977 men screened for the multiple risk factor intervention trial. *The New England Journal of Medicine, 320*(14), 904-910.

James, J. M., & Bolstein, R. (1990). The effect of monetary incentives and follow-up mailings on the response rate and response quality in mail surveys. *Public Opinion Quarterly, 54*, 346-361.

Joint National Committee. (1997). The sixth report of the Joint National Committee on prevention, detection, evaluation, and treatment of high blood pressure. *Archives of Internal medicine, 157*, 2413-2446.

Jorgensen, H. S., Nakayama, H., Reith, J., Raaschou, H. O., & Olsen, T. S. (1996). Factors delaying hospital admission in acute stroke: The Copenhagen stroke study. *Neurology, 47*, 383-387.

Joseph, L. N., Babikian, V. L., Allen, N. C., & Winter, M. R. (1999). Risk factor modification in stroke prevention: The experience of a stroke clinic. *Stroke, 30*, 16-20.

Joshipura, K. J., Ascherio, A., Manson, J. E., Stampfer, M. J., Rimm, E. B., Speizer, F. E., Hennekens, C. H., Speigelman, D., & Willett, W. C. (1999). Fruit and vegetable intake in relation to risk of ischemic stroke. *Journal of the American Medical Association, 282*(13), 1233-1239.

Kalafut, M., & Saver, J. L. (2001). *Stroke advances*. 53rd Annual Meeting of the American Academy of Neurology. Available: http://www.medscape.com/Medscape [2001, August 6].

Kasner, S. E., Saver, J., & Levine, S. R. (2001). *Conference Report - Update from the 26th Annual International Stroke Conference.* Medscape Neurology. Available: http://www.medscape.com/Medscape [2001, March 24].

Khamashta, M. A., Cuadrado, M. J., Mujic, F., Taub, N. A., Hunt, B. J., & Hughes, G. R. V. (1995). The management of thrombosis in the antiphospholipid-antibody syndrome. *New England Journal of Medicine, 332*(15), 993-997.

Kiely, D. K., Wolf, P. A., Cupples, A., Beiser, A. S., & Myers, R. H. (1993). Familial aggregation of stroke: The Framingham study. *Stroke, 24*(9), 1366-1371.

Kiely, D. K., Wolf, P. A., Cupples, L. A., Beiser, A. S., & Kannel, W. B. (1994). Physical activity and stroke risk: The Framingham study. *American Journal of Epidemiology, 140*(7), 608-620.

Kissela, B. M., Broderick, J., Woo, D., Kothari, R., Miller, R., Khoury, J. C., Brott, T., Pancioli, A., Jauch, E., Gebel, J., Shukla, R., Alwell, K., & Tomsick, T. (2001). Greater Cincinnati/Northern Kentucky stroke study: Volume of first-ever ischemic stroke among blacks in a population-based study. *Stroke, 32*(6), 1285-1290.

Klungel, O. H., Heckbert, S. R., Longstreth, W. T., Furberg, C. D., Kaplan, R. C., Smith, N. L., Lemaitre, R. N., Leufkens, H. G. M., de Boer, A., & Psaty, B. M. (2001). Antihypertensive drug therapies and the risk of ischemic stroke. *Archives of Internal Medicine, 161*, 37-43.

Kothari, R., Jauch, E., Broderick, J., Brott, T., Sauerbeck, L., Khoury, J., & Liu, T. (1999). Acute stroke: Delays to presentation and emergency department evaluation. *Annals of Emergency Medicine, 33*, 3-8.

Kothari, R., Sauerbeck, L., Jauch, E., Broderick, J., Brott, T., Khoury, J., & Liu, T. (1997). Patients' awareness of stroke signs, symptoms, and risk factors. *Stroke, 28*, 1871-1875.

Krout, J. A. (2001). Community services and housing for rural elders. *The public policy and aging report, 12*(1), 6-8.

Kurl, S., Tuomainen, T. P., Laukkanen, J. A., Nyyssonen, K., Lakka, T., Sivenius, J., & Salonen, J. T. (2002). Plasma vitamin C modifies the association between hypertension and risk of stroke. *Stroke, 33*(6), 1568-1573.

Kurth, T., Gaziano, J. M., & Berger, K. (2001, May 5-11). *Body mass index and the risk of stroke in men. [Abstract].* Paper presented at the 53rd Annual meeting of the American Academy of Neurology, Philadelphia, Pennsylvania.

Labiche, L. A., Chan, W., Saldin, K. R., & Morgenstern, L. B. (2002). Sex and acute stroke presentation. *Annals of Emergency Medicine, 40*(5), 453-460.

Lacy, C. R., Suh, D.-C., Bueno, M., Kostis, J. B., & for the S.T.R.O.K.E. Collaborative Study Group. (2001). Delay in presentation and evaluation for acute stroke: Stroke time registry for outcomes knowledge and epidemiology (S.T.R.O.K.E.). *Stroke, 32*(1), 63-69.

Ladurner, G. (2001). Neuroprotein in acute ischemic stroke [Abstract]. *Stroke, 32*(1), 323.

Leary, M. C., & Saver, J. L. (2001). Incidence of silent stroke in the United States [Abstract]. *Stroke, 32*(1), 363.

Leventhal, E. A., & Prohaska, T. R. (1986). Age, symptom interpretation, and health behavior. *Journal of the American Geriatrics Society, 34*(3), 185-191.

Leventhal, H., & Cameron, L. (1987). Behavioral theories and the problem of compliance. *Patient Education and Counseling, 10*, 117-138.

Leventhal, H., Diefenbach, M., & Leventhal, E. A. (1992). Illness cognition: Using common sense to understand treatment adherence and affect cognition interactions. *Cognitive Therapy and Research, 16*(2), 143-163.

Leventhal, H., Nerenz, D. R., & Steele, D. J. (1984). Illness representations and coping with health threats (Chapter 9). In A. Baum & S. E. Taylor & J. E. Singer (Eds.), *Handbook of psychology and health: Social psychological aspects of health* (Vol. IV, pp. 219-252). Hillsdale, NJ: Lawrence Erlbaum Associates.

Lichtman, J. H., Krumholz, H. M., Wang, Y., Radford, M. J., & Brass, L. M. (2002). Risk and predictors of stroke after myocardial infarction among the elderly: Results from the cooperative cardiovascular project. *Circulation, 105*, 1082-1087.

Lindentrom, E., Boysen, G., & Nyboe, J. (1993). Lifestyle factors and risk of cerebrovascular disease in women: The Copenhagen City Heart Study. *Stroke, 24*(10), 1468-1472.

Lindsey, J. (2000). Implementing a stroke risk assessment program in a community setting. *Journal of Neuroscience Nursing, 32*(5), 266-270.

Manson, J. E., Rimm, E. B., Stampfer, M. J., Colditz, G. A., Willett, W. C., Krolewski, A. S., Rosner, B., Hennekens, C. H., & Speizer, F. E. (1991). Physical activity and incidence of non-insulin-dependent diabetes mellitus in women. *The Lancet, 338*, 774-778.

Manson, J. E., Stampfer, M. J., & Willett, W. C. (1995). Physical activity and incidence of coronary heart disease and stroke in women. *Circulation, 91(suppl)*, 5.

Meischke, H., Yasui, Y., Kuniyuki, A., Bowen, D. J., Andersen, R., & Urban, N. (1999). How women label and respond to symptoms of acute myocardial infarction: Responses to hypothetical symptom scenarios. *Heart & Lung, 28*(4), 261-269.

Mosca, L., Jones, W. K., King, K. B., Ouyang, P., Redberg, R. F., & Hill, M. N. (2000). Awareness, perception, and knowledge of heart disease risk and prevention among women in the United States. *Archives of Family Medicine, 9*(6), 506-515.

National Center for Health Statistics. (1999). *Health, United States, 1999, with health and aging chartbook.* Hyattsville, MD: U. S. Department of Health and Human Services.

National Heart Lung and Blood Institute. (1998). *Morbidity and mortality: 1998 Chartbook on cardiovascular, lung, and blood diseases.* Bethesda, MD: National Institutes of Health, Public Health Service NHLBI.

National Institute of Stroke and Neurologic Diseases and t-PA Working Group. (1995). Tissue plasminogen activator for acute ischemic stroke. *New England Journal of Medicine, 333*(24), 1581-1587.

National Institutes of Health. (1996). *National Institutes of Health: Morbidity and mortality: 1996 chartbook on cardiovascular, lung, and blood diseases.* Bethesda: National Institutes of Health.

National Institutes of Health Consensus Development Panel on Physical Activity and Cardiovascular Health. (1996). Physical activity and cardiovascular health. *Journal of the American Medical Association, 276*(3), 241-246.

National Institutes of Neurological Disorders and Stroke. (2001). *Know stroke: Know the signs. Act in time.* Bethesda, MD: National Institutes of Health.

National Institutes of Neurological Disorders and Stroke. (1999). *Stroke: Hope through research.* Bethesda, MD: National Institutes of Health.

Nemade, S. S., & Ciocon, J. O. (2000). Blood pressure therapy in the elderly: An observation in octogenarians. *Journal of Clinical Hypertension, 2*(4), 263-266.

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). New York, NY: McGraw-Hill, Inc.

Ohene-Frempong, K., Weiner, S. J., Sleeper, L. A., Miller, S. T., Embury, S., Moohr, J. W., Wethers, D. L., Pegelow, C. H., Gill, F. M., & the Cooperative Study of Sickle Cell Disease. (1998). Cerebrovascular accidents in sickle cell disease: Rates and risk factors. *Blood, 91*(1), 288-294.

O'Leary, D. H., Polak, J. F., Kronmal, R. A., Kittner, S. J., Bond, G., Wolfson, S. K., Bommer, W. P., Thomas R., Gardin, J. M., Savage, P. J., & on the behalf of the CHS Collaborative Research Group. (1992). Distribution and correlates of sonographically detected carotid artery disease in the cardiovascular health study. *Stroke, 23*(12), 1752-1760.

Pancioli, A. M., Broderick, J., Kothari, R., Brott, T. G., Tuchfarber, A., Miller, R., Khoury, J. C., & Jauch, E. (1998). Public perception of stroke warning signs and knowledge of potential risk factors. *Journal of the American Medical Association, 279*(16), 1288-1292.

Penchansky, R., & Thomas, J. W. (1981). The concept of access: definition and relationship to consumer satisfaction. *Medical care, 19*(2), 127-140.

Pierce, R. P., Williamson, H. A., & Kruse, R. L. (1998). Distance, use of resources, and mortality among rural Missouri residents with acute myocardial infarction. *The Journal of Rural Health, 14*(1), 28-35.

Polit, D. F., & Beck, C. T. (2004). *Nursing research: Principles and methods* (7th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Qureshi, A., Fareed, M., & Suri, K. (2001). Sleep patterns and likelihood of stroke and carotid atherosclerosis [Abstract]. *Stroke, 32*(1), 331.

Racher, F. E. (2002). Synergism of frail rural elderly couples: Influencing interdependent independence. *Journal of Gerontological Nursing, 28*(6), 32-39.

Ramsbottom-Lucier, M., Emmett, K., Rich, E. C., & Wilson, J. F. (1996). Hills, ridges, mountains, and roads: Geographical factors and access to care in rural Kentucky. *The Journal of Rural Health, 12*(5), 386-394.

Redford, L., & Cook, D. (2001). Rural health care in transition: The role of technology. *The Public Policy and Aging Report, 12*(1), 1, 3-5.

Rexrode, K. M., Hennekens, C. H., Willett, W. C., Colditz, G. A., Stampfer, M. J., Rich-Edwards, J. W., Speizer, F. E., & Manson, J. E. (1997). A prospective study of body mass index, weight change, and risk of stroke in women. *Journal of the American Medical Association, 277*(19), 1539-1545.

Rigaud, A. S., & Frorette, B. (2001). Hypertension in older adults. *Journal of Gerontology: Medical Sciences, 56A*(4), M217-M225.

Robbins, A. S., Manson, J. E., Lee, I. M., Satterfield, S., & Hennekens, C. H. (1994). Cigarette smoking and stroke in a cohort of U.S. male physicians. *Annals of Internal Medicine, 120*(6), 458-462.

Rosamund, W. D., Folsom, A. R., Chambless, I. E., Wang, C.-H., McGovern, P. G., Howard, G., Copper, L. S., & Shahar, E. (1999). Stroke incidence and survival among middle-aged adults 9-year follow-up of the atherosclerosis risk in communities (ARIC) cohort. *Stroke, 30*(4), 736-743.

Rosamund, W. D., Gorton, R. A., Hinn, A. R., Hohenhaus, S. M., & Morris, D. L. (1998). Rapid response to stroke symptoms: The delay in accessing stroke healthcare (DASH) study. *Academic Emergency Medicine, 5*(1), 45-51.

Rowe, A. K., Frankel, M. R., & Sanders, K. A. (2001). Stroke awareness among Georgia adults: Epidemiology and considerations regarding measurement. *Southern Medical Journal, 94*(6), 613-618.

Ruland, S., Gorelick, P. B., Schneck, M., Kim, D., Moore, C. G., & Leurgans, S. (2002). Acute stroke care in Illinois: A statewide assessment of diagnostic and treatment capabilities. *Stroke, 33*, 1334-1340.

Sacco, R. L., Benjamin, E. J., Broderick, J. P., Dyken, M., Easton, D., Feinberg, W. M., Goldstein, L. B., Gorelick, P. B., Howard, G., Kittner, S. J., Manolio, T. A., Whisnant, J. P., & Wolf, P. A. (1997). Risk factors. *Stroke, 28*(7), 1507-1517.

Sacco, R. L., Gan, R., Boden-Albala, B., Lin, I. F., Kargman, D. E., Hauser, A., Shea, S., & Paik, M. C. (1998). Leisure-time physical activity and ischemic stroke risk: The Northern Manhattan Stroke Study. *Stroke, 29*(2), 380-387.

Samsa, G. P., Cohen, S. J., Goldstein, L. B., Bonito, A. J., Duncan, P. W., Enarson, C., DeFriese, G. H., Horner, R. D., & Matchar, D. B. (1997). Knowledge of risks among patients at increased risk for stroke. *Stroke, 28*(5), 916-921.

Saver, J., Kasner, S. E., & Levine, S. R. (2000). *Stroke research clarifies many questions*. American Academy of Neurology. Available: http://www.medscape.com/medscape [2001, August 6].

Scandinavian Simvastatin Survival Study Group. (1994). Randomized trial of cholesterol lowering in 4444 patients with coronary heart disease. *Lancet, 344*, 1383-1389.

Selhaub, J., Jacques, P. F., Wilson, P. W. F., Rush, D., & Rosenberg, I. H. (1993). Vitamin status and intake as primary determinants of homocysteinemia in an elderly population. *Journal of the American Medical Association, 270*(22), 2393-2398.

Shepherd, J., Cobbe, S. M., Ford, I., Isles, C. G., Lorimer, A. R., MacFarlane, P. W., McKillop, J. H., & Packard, C. J. (1995). Prevention of coronary heart disease with pravastatin in men with hypercholesterolemia: West of Scotland Coronary Prevention Study Group. *The New England Journal of Medicine, 333*, 1301-1307.

Slifkin, R. T. (2002). Developing policies responsive to barriers to health care among rural residents: What do we need to know? *The Journal of Rural Health, 18*(5 Supplemental), 233-241.

Sloan, M. A., Kittner, S. J., Rigamonti, D., & Price, T. R. (1991). Occurrence of stroke associated with use/abuse of drugs. *Neurology, 41*(9), 1358-1364.

Social Security Administration. (1998). *Fast facts and figures about Social Security 1998. Office of Research, Evaluation, and Statistics*. Washington, D. C.: U. S. Government Printing Office.

Stamler, J., Stamler, S., & Neaton, J. D. (1993). Blood pressure, systolic and diastolic, and cardiovascular risks: US population data. *Archives of Internal Medicine, 153*, 598-615.

Stampfer, J., Stamler, S., & Neaton, J. D. (1993). A prospective study of moderate alcohol consumption and the risk of coronary disease and stroke in women. *New England Journal of Medicine, 319*(5), 267-273.

Staub, L., & Morgenstern, L. B. (2000). Stroke in Hispanic Americans. *Neurologic Clinics, 18*(2).

Stephenson, J. (1998). Rising stroke rates spur efforts to identify risks, prevent disease. *Journal of the American Medical Association, 279*(16), 1239-1240.

Streifler, J. Y., Davidovitch, S., & Sendovski, U. (1998). Factors associated with the time of presentation of acute stroke patients in an Israeli community hospital. *Neuroepidemiology, 17*, 161-166.

Streiner, D. L., & Norman, G. R. (1989). *Health measurement scales: A practical guide to their development and use*. New York: Oxford University Press.

Stroke Prevention in Atrial Fibrillation Investigators. (1993). A differential effect of aspirin for prevention of stroke in atrial fibrillation. *Journal of Stroke and Cerebrovascular Disease, 3*, 181-188.

Suk, S.-H. (2002). *Abdominal obesity and risk of ischemic stroke: Northern Manhattan Stroke Study (Abstract 18)*. Paper presented at the 27th International Stroke Conference, February 7-9, 2002, San Antonio, Texas.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston: Allyn and Bacon.

Tanne, D., Goldbourt, U., Zion, M., Reicher-Reiss, H., Kaplinsky, E., Behar, S., & Group, f. T. S. S. (1993). Frequency and prognosis of stroke/TIA among 4808 survivors of acute myocardial infarction. *Stroke, 24*, 1490-1495.

Tolbert, T., & Oparil, S. (2001). Hormone replacement therapy and stroke: Are results surprising? *Circulation, 103*, 620-622.

Turton, C. L. R. (1997). Ways of knowing about health: An aboriginal perspective. *Advances in Nursing Science, 19*(3), 28-36.

United States Census Bureau. (2001). *Census redistricting data summary file, PL 94-171.* Available: http://www.illinoisgis.ito.state.il.us/census2000/censusData/2000/docs./munialpha.pdf. [September 4, 2003].

United States Department of Health and Human Services. (2000b). *Healthy people 2010: Tracking healthy people 2010*. Washington, DC: Office of Public Health and Science.

United States Department of Health and Human Services. (2000a). *Health people 2010: 1. Access to quality healthy services* (Vol. 1). Washington, DC: Office of Public Health and Science.

United States Department of Health and Human Services. (2000). Heart disease and stroke. In United States Department of Health and Human Services (Ed.), *Healthy people 2010: Objectives for improving health.* Washington, DC: United States Public Health Service.

Walker, S. P., Rimm, E. B., Ascherio, A., Kawachi, I., Stampfer, M. J., & Willett, W. C. (1996). Body size and fat distribution as predictors of stroke among US men. *American Journal of Epidemiology, 144*(12), 1143-1150.

Walters, M. M., & Lees, K. R. (2001). Transient ischemic attacks: A GP guide. *The Practitioner, 245*(1623), 481, 484, 488, 490-491, 493.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (1991). *Measurement in nursing research* (2nd ed.). Philadelphia: F. A. Davis Company.

Ward, S. E. (1993). The common sense model: An organizing framework for knowledge development in nursing. *Scholarly Inquiry for Nursing Practice: An International Journal, 7*(2), 79-94.

Wester, P., Radberg, J., Lundgren, B., Peltonen, M., & for the Seek-Medical-Attention-in-Time Study Group. (1999). Factors associated with delayed admission to hospital and in-hospital delays in acute stroke and TIA: A prospective, multicenter study. *Stroke, 30*(1), 40-48.

Whisnant, J. P. (1997). Modeling of risk factors for ischemic stroke: The Willis lecture. *Stroke, 28*(9), 1839-1843.

Williams, G. R., Jiang, J. G., Matchar, D. B., & Samsa, G. P. (1999). Incidence and occurrence of total (first-ever and recurrent) stroke. *Stroke, 30*, 2523-2528.

Williams, L. S., Bruno, A., Rouch, D., & Marriott, D. J. (1997). Stroke patients' knowledge of stroke: Influence on time to presentation. *Stroke, 28*, 912-915.

Wolf, P., Abbott, R. D., & Kannel, W. B. (1991). Atrial fibrillation as an independent risk factor for stroke: The Framingham Study. *Stroke, 22*, 983-988.

Wolf, P. A., D'Agnostino, R. B., Belanger, A. J., & Kannel, W. B. (1991). Probability of stroke: A risk profile from the Framingham study. *Stroke, 23*(3), 312-318.

Wolf, P. A., D'Agnostino, R. B., & O'Neal, A. (1992). Secular trends in stroke incidence and mortality: The Framingham study. *Stroke, 23*, 1551-1555.

Woo, D., Gebel, J., Miller, R., Kothari, R., Brott, T., Khoury, J. C., Salisbury, S., Shukla, R., Pancioli, A., Jauch, E., & Broderick, J. (1999). Incidence rates of first-ever ischemic stroke subtypes among blacks: A population-based study. *Stroke, 30*(12), 2517-2522.

Yoon, S. S., & Byles, J. (2002). Perceptions of stroke in the general public and patients with stroke: A qualitative study. *British Medical Journal, 234*(7345), 1065-1068.

Yoon, S. S., Heller, R. F., Levi, C., Wiggers, J., & Fitzgerald, P. E. (2001). Knowledge of stroke risk factors, warning symptoms, and treatment among an Australian urban population. *Stroke, 32*(8), 1926-1930.

Zerwic, J. J. (1998). Symptoms of acute myocardial infarction: Expectations of a community sample. *Heart & Lung, 27*(2), 75-81.

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Treasurer, 1987-1991
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President, 1995-1997
Delegate to ANA House of Delegates, 1989-2005
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Member, Assembly on Health Policy, 1997-2003
Member, Nominating Committee, 1999-2003
Treasurer, INA-PAC, 1999-2002
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Editor, INA District 15 Newsletter, *ECHO*, 2000-2002

Illinois Women's Health Coalition
Member, Steering Committee, 1998 to present

National Gerontological Nursing Association

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COMMUNITY INVOLVEMENT:

Champaign City Council Member, At-Large, 1999 to present

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Champaign County Head Start Policy Council, appointed 2002-2005

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Zerwic, J. J., Ennen, K. A., & DeVon, H. A. (2002). Stroke: Risks, recognition, and return to work. *AAHON Journal, 50*(8), 354-359.

Ennen, K. A. (2001). Shaping the future of practice through political activity. *AAOHN Journal, 49*(12), 557-570.

Ennen, K. A. (2000). The health care delivery system as context for practice. In H. Harkreader (Ed.), *Fundamentals of nursing: Caring and clinical judgment* (pp. 76-95). Philadelphia: W. B. Saunders Company.

Ennen, K. A., Komorita, N. I., & Pogue, N. (1997). Validation of the defining characteristics of the nursing diagnosis fluid volume excess. In M. J. Rantz and P. LeMone (Eds.), *Classification of nursing diagnoses: Proceedings of the twelfth conference North American Nursing Diagnosis Association* (97-101). Glendale, CA: Cinahl Information Systems.

PRESENTATIONS:

"Advanced Assessment of Complex Health Problems in the Elderly." Sponsored by the University of Illinois Office of Continuing Education, Urbana-Champaign, Illinois. June 13, 2000.

"Disease Management: Heart Failure, Atrial Fibrillation, and Stroke Prevention." Sponsored by Health Professions Institute of Parkland College and the UIUC Department of Family Medicine, Champaign, Illinois. January 12, 2000.

"Delegation in Nursing: Effective, Legal, and Changing." Presentation for the Millikin Institute Division of Allied Health Continuing Education, Decatur, Illinois. November 10, 1998.

"Feminist Perspectives on Nursing." Presentation for the Women's Health and Healing Series sponsored by Parkland College's Women's Programs and Services. March 21, 1996.

"Validation of the Defining Characteristics of the Nursing Diagnosis Fluid Volume Excess." Presented at the 12th Biennial NANDA Conference on the Classification of Nursing Diagnosis, Pittsburgh, PA. April 12, 1996.