Determining Interventions to Reduce the Occurrence and Impact of Stroke in the Pleasantview Fire Protection District

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CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of others is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

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Table of Contents

Abstract

This research project was undertaken to address the problem that the Pleasantview Fire Protection District (Pleasantview) had not undertaken any effort to reduce the occurrence and impact of strokes in the community. Strokes have long been the third leading cause of death and the leading cause of disability in the United States. The purpose of this project was to identify the issues for Pleasantview in reducing the occurrence and impact of stroke in the community. Completed as a descriptive research project, the following four questions were answered: (1) To what extent do the residents in the community understand the risk factors of a stroke? (2) What is the residents' of the community understanding of the symptoms of stroke and actions to be taken? (3) What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community? (4) How have other agencies engaged in reducing a community's occurrence and impact of strokes? To answer these questions a questionnaire was developed to determine the community's needs and the ability of the Pleasantview paramedics to provide guidance on strokes. Additionally, information was sought from other fire service agencies to determine what other agencies were doing to reduce strokes in their communities. The results of this research indicated that, while many members of the community understand the risk factors for a stroke, the symptoms of a stroke and what to do in the event of a stroke, a significant portion of the population does not have the this knowledge. The research also indicated that the community overwhelmingly trusted the information given to them by paramedics. This project recommends that efforts are undertaken to develop an educational program to increase the community's knowledge about the risk factors and symptoms of strokes, and what to do if someone experiences a stroke.

Keywords: Stroke, Community Education, Risk Factors, Symptoms

Determining Interventions to Reduce the Occurrence and Impact of Stroke in the Pleasantview Fire Protection District

Fire prevention, including an aggressive public education program, has long been a priority at the Pleasantview Fire Protection District (Pleasantview). It would appear that these efforts have paid solid dividends, as both the occurrence of fire and resulting injuries from fire within Pleasantview are very low in recent years. These education efforts have been continuous and effective. One obvious example is the use of 9-1-1in the community. For nearly thirty years, Pleasantview has joined the nation in educating residents to dial 9-1-1 in an emergency. This effort has led to the increased use of 9-1-1 to report an emergency, with a corresponding decrease in the use of the seven-digit emergency number in these situations. Education begins with children through programs for preschool age children. In 2010, for the first time, Pleasantview did not receive any emergency requests through the seven-digit emergency phone number from the community, a positive result of the decades old campaign to encourage the use of 9-1-1(Pleasantview Fire Protection District, 2011). While the fire prevention efforts certainly need to continue, Pleasantview appears to be well positioned to take additional steps to improve the quality of life for residents in the community. One quality of life initiative that might be addressed is the occurrence and impact of strokes. In her short, yet inspirational, 2008 video, Jill Bolte Taylor, a neuroanatomist (a scientist whose studies focus on the brain) describes the devastating impact of the stroke she suffered (Taylor, 2008). This stroke had a long term impact not only on her, but on her family as well. Although not highly publicized, similar events occur every day.

The problem is that the Pleasantview Fire Protection District has not undertaken any effort to reduce the occurrence and impact of strokes in the community.

The purpose of this research is to identify the issues for the Pleasantview Fire Protection District in reducing the occurrence and impact of stroke in the community.

The descriptive research paper will answer the following four research questions.

- To what extent do the residents in the community understand the risk factors of a stroke?
- What is the residents' of the community understanding of the symptoms of stroke and actions to be taken?
- What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community?
- How have other agencies engaged in reducing a community's occurrence and impact of strokes?

Background and Significance

The Pleasantview Fire Protection District is a primarily career fire district located in suburban Chicago, Illinois responsible for providing fire suppression, advanced life support (ALS) emergency medical services, dispatch and fire prevention activities for seven communities. The community within Pleasantview's primary response district includes approximately 16 square miles and is home to over 22,000 residents (Pleasantview Fire Protection District, 2011). Pleasantview protects numerous industrial and commercial occupancies, a wide variety or retail spaces, two interstate highways and a diverse residential community. Pleasantview currently employs seventy-three personnel, including fifty-one with primary emergency response duties. Every emergency responder hired after 1991 is required to be an Illinois Department of Public Health licensed paramedic. Currently, two ALS ambulances, one ALS engine and two ALS quints provide protection from the three manned fire stations

(Pleasantview Fire Protection District, 2011).

In 2010, Pleasantview responded to 3573 incidents, of which 2281 (64%) were EMS related and 1292 (36%) were fire related. In contrast, for the calendar year 1995, Pleasantview responded to 3287 incidents of which 1637 (50%) were EMS related and 1650 were fire related. According to information available on the Pleasantview website, the change to a higher percentage of EMS requests has been a common trend over the past fifteen years (Appendix A). Of the EMS requests in 2010, only 1593 (70%) were transported to a hospital, of those transported, 1033 (65%) required ALS treatment by the paramedics (Pleasantview Fire Protection District, 2011).

Pleasantview is licensed by the Illinois Department of Public Health, affiliated with the Good Samaritan Emergency Medical Services System and functions under the Illinois Department of Public Health Region Eight Standard Operating Procedures. While patients may be transported to six approved hospitals (Appendix B), Adventist LaGrange Memorial Hospital is frequently the closest. In 2010, 1197 (75%) of all patients transported to a hospital were transported to Adventist LaGrange Memorial Hospital (Appendix C). Of these six hospitals, four are certified as primary stroke centers. LaGrange Memorial Hospital is one of the hospitals that is not a certified primary stroke center (Joint Commission, 2011).

While conducting research for the Executive Analysis of Community Risk Reduction, the ability to focus on a single predominant risk facing the residents of the PFPD was difficult. However, it was noted that nearly one-fifth of the patients transported to hospitals exhibited some symptoms that could indicate the patient might be experiencing a stroke. Additional detail on the transportation of the ALS patients during 2010 is available in Appendix C. That general observation influenced the decision to conduct further research into Pleasantview's ability to

reduce both the occurrence and impact of stroke.

This applied research project will evaluate the issue of strokes in Pleasantview in order to assess the extent of the problem. The information gained will be used to make recommendations to address this risk to the community. This research directly relates to the United States Fire Administration strategic goal of: "Reducing risk at the local level through prevention and mitigation" (National Fire Academy, 2011b). It also directly related to the objective in Module Five of the Executive Analysis of Community Risk Reduction class as it works to "develop a strategy for leading change as part of a community risk-reduction initiative" and by "…converting community equity into political action resulting in a change in local policy" (National Fire Academy, 2011a).

Literature Review

A review of applicable literature was conducted in an attempt to define the known information about strokes, including causes, treatment, and public awareness. Also included in this review was a search for existing stroke programs, particularly programs related to the prehospital medical provider. A great deal of literature exists on the topic of stroke, including preventative actions and treatment. While only a small percentage of this literature is specific to the prehospital provider, it is thought that much of this information is applicable. In that respect, the information is of great value in defining the current situation and applying the general knowledge gained for use by the prehospital provider.

In Human Diseases and Conditions (Izenberg, 2000, pp. 811-818)**,** a stroke is defined as "the sudden destruction of brain cells when blood flow to the brain is disrupted." The National Institute of Health also describes a stroke as a "Brain Attack" (Hoch, 2010), while the World Health Organization notes that the historical term from a stroke, "apoplexy" gave way to the

current term since a stroke would "strike a person down" (MacKay & Mensah, 2010). Farlex (2008) refers to a stroke as a "cerebrovascular accident" or CVA, while Mosby's Medical Dictionary (2009) refers to a stroke as a "cerebrovascular insult" or CVI. Each of these terms describe the same sudden emergent medical condition that has debilitating effects.

The term stroke has several other meanings, including medical conditions. One example is a heat stroke. A heat stroke, while a serious medical condition, has completely different signs, symptoms and treatment (Stoppler, 2011). While a heat stroke is certainly a very serious medical condition, the focus of this paper will remain on the type of stroke that interrupts the flow of blood to the brain.

There are generally two accepted types of strokes, ischemic and hemorrhagic. Ischemia is a medical term that describes the loss of oxygen when there is inadequate blood flow to tissues. An ischemic stroke causes a reduced blood flow to the brain. The longer the brain cells remain ischemic the more likely cell or tissue death in the surrounding area will occur (Izenberg, 2000, pp. 811-818). According to the American Heart Association (2011), ischemic strokes account for about 87% of all strokes. The ischemic stroke is typically caused by a blood clot or embolus. The blood clot or embolus becomes lodged in a narrowing blood vessel and can't pass any further, creating the blockage (Chung & Caplan, 2007).

A subtype of an ischemic stroke, a TIA (Transient Ischemic Attack) is a small stroke caused by the temporary blockage of a vessel. The symptoms are similar to an ischemic stroke but last for twenty-four hours or less (Lacy, Suh, Bueno & Kostis, 2001). Also known as a mini-stroke or, more preferably a warning stroke, a TIA leaves no permanent damage, and may not even be noticed by the victim. The average TIA may last only one minute (Williams, Bruno, Rouch & Marriott, 1997).

The second type of stroke is a hemorrhagic stroke, caused by leaking or burst blood vessels. Normally, oxygen passes across a membrane to the neurons and blood does not come in contact with the neurons that provide the functionality in our brain. (Izenberg, 2000, pp. 811-818) Aneurysms (the ballooning of a weakened blood vessel) can stretch until they break, spilling blood into the surrounding brain cells, allowing blood to come into contact with the neurons (National Institutes of Health, 2010). Up to five percent of the worldwide population has an aneurysm and up to three percent of the population will suffer due to bleeding from an aneurysm. Once an aneurysm bleeds, chances of death may be as high as 40% (American Heart Association, 2011). Hemorrhages can also occur as arteries lose their elasticity due to plaque formation. These arteries become brittle and thin, raising the risk of a crack. A person suffering from an arteriovenous malformation (defective blood vessels in the brain that can rupture) is also at increased risk for a hemorrhagic stroke (Izenberg, 2000, pp. 811-818).

Strokes, particularly ischemic strokes, may be prevented. There are a number of risk factors that predispose a person to having a stroke. While some of these risk factors are uncontrollable, including age, gender and family history, most of the risk factors are controllable and revolve around a healthy lifestyle. According to the report *Health United States 2008* (National Center for Health Statistics, 2009) covering the years 2005-2006, the Centers for Disease Control and Prevention (CDC) listed the most common controllable risk factors, including inactivity reported by 39.5% of the survey respondents, obesity (33.9%), high blood pressure (30.5%), cigarette smoking (20.8%), high cholesterol (15.6%) and diabetes (10.1%). Additionally, over one-third of all respondents reported having two or more of these risk factors.

The statistics demonstrate that strokes are not being prevented. In 2007, 136,000 people in the United States died due to stroke; making stroke is the third leading cause of death behind

heart disease and cancer. Stroke accounts for one in every eighteen deaths annually (Xu, Kochanek, Murphy & Tejada-Vera, 2010). Each year, approximately 795,000 people experience a stroke with 610,000 of those patients experiencing a stroke for the first time. About every 40 seconds, someone in the United States experiences a stroke (American Heart Association, 2009). This is not only a problem in the United States, but problem worldwide as well. Stroke is the number three leading cause of death worldwide, resulting in 5.5 million or 10% of all deaths annually. In 2002, more than 1.6 million people in China alone died from stroke (MacKay & Mensah, 2010). In the United Kingdom, stroke is the biggest single cause of disability and worldwide five million people are left permanently disabled annually (MacKay & Mensah, 2010). Stroke is the only disease that is both a leading cause of death and a leading cause of disability worldwide (Hong & Saver, 2009).

The statistics on stroke in the state of Illinois are relatively similar to the nationwide and worldwide statistics. According to the Illinois Department of Public Health, nearly 6% of all deaths in 2007 were attributed to strokes, the third leading cause of death (Illinois Department of Health, 2009). The information on stroke patients transported by the Pleasantview is unclear, due to the difficulty in correlating the initial patient complaint with the eventual primary diagnosis at the hospital. However, if the patient's complaint is considered for symptoms that might indicate a stroke, up to 312 potential stroke patients were transported by Pleasantview in 2010 (Appendix C).

The cost of a stroke is also significant, not only in terms of the financial expenditure stroke treatment entails, but also the physical and mental toll a stroke takes on the victim, the victim's family and the community at large. Each cost is difficult to define clearly. Estimates indicate that the total cost of strokes in the United States is $43 billion per year, with the direct

costs of medical care and therapy costs totaling $28 billion. While the average cost for stroke care per patient for the first ninety days is estimated at $15,000, however for 10% of the patients, the cost of care over this same period is $35,000 (The University Hospital, 2010).

In 1996, a very significant change occurred with the FDA approval of tissue plasma activator (tPA) in the treatment of strokes (Campbell, 2000). A thrombolytic (clot busting drug), tPA would permit physicians to remove the blockage, allowing the return of blood flow to the brain (The National Institute of Neurological Disorders and Stroke rt-PA Stroke Study Group, 1995). One of the important considerations when delivering a thrombolytic is the need for administration within three hours for most patients (Clark & Renier, 2001). Estimates indicate that if all stroke patients arrive a hospital prepared to treat a stroke, within the treatable time frame, up to 29% of all strokes could be treated with thrombolytics (Kleindorfer et al., 2004). Despite this information, only between 4% and 8% of all these patients receive this treatment. One study suggests that if all stroke patients had arrived at an appropriate emergency room within one hour of the initial signs of a stroke, up to 57% could be treated (California Acute Stroke Pilot Registry Investigators, 2005). All of this research has led to the introduction of the rallying cry of “time is brain”. A take off of Benjamin Franklin’s original aphorism, “time is money”, this is a simple way for patients and health care providers to understand the implications of time in stroke treatment (Saver, 2005).

Because the treatment time frame is very limited, yet so essential, significant emphasis is placed on improving the time period between the onset of stroke symptoms and when the patient receives definitive treatment. Three predominant groups have the ability to reduce this treatment window. The first includes the patient and those closest to the patient. Recognition at the onset of stroke symptoms, understanding the emergent nature of these symptoms and immediate

activation of the Emergency Medical Services (EMS) system is the initial key (Pepe, Zachariah, Sayre & Flocare, 1998). The second key to reducing the impact of strokes involve the actions taken by the EMS system, including the 9-1-1 dispatcher, the responding paramedics and the medical direction given by a communicating nurse or physician. The final key is the hospital, the medical professionals working there, and the ability to adequately treat a stroke using the latest procedures available (Morris, Rosamond, Madden, Schultz & Hamilton, 2000). Efforts are under way in the State of Illinois to reduce the time of definitive treatment for stroke, beginning with the time responding paramedics arrive at the patient. A major focus of these efforts involves the certification of hospitals as primary stroke centers (Vickroy, 2009).

The patient needs to not only be aware of the symptoms of a stroke, but must also understand that this is a medical emergency, requiring immediate medical care in an appropriate hospital. Currently, education programs that address both of these concerns exist. These programs also work to educate patients of the risk factors that may lead to a stroke. Educating the patients about the risk factors, and encouraging them to take appropriate action, is one way to truly prevent strokes (Wilson, Beyth, Linn & Berger, 2007). In order to reduce the incidence of stroke, many groups have successfully championed legislation to reduce the impact of second hand smoke in public places. Although the impact of this legislation is not yet known, these groups hope that with strict enforcement, laws curtailing smoking will reduce the incidence of stroke over time (Bonita, Duncan, Truelsen, Jackson & Beaglehole, 1999). Many other studies demonstrate that stroke education is necessary including education of adults as well as children (Dressman & Hunter, 2002).

The EMS system plays a key role in treating stroke victims. The first step is assuring that EMS professionals are well educated in the signs and symptoms of stroke, the correct treatment

protocols, the hospitals that are prepared to treat stroke patients (preferably stroke certified hospitals) and the most appropriate method of patient transport. This educational effort needs to involve not only the first responders, but the 9-1-1 dispatchers, particularly those using an EMD (Emergency Medical Dispatch) protocols (Handschu, Poope, Raub, Neundorfer & Erbguth, 2003). Education should also include the risk factors for a stroke. Knowledge of these risk factors will help the EMS professional advise patients who may not be having a stroke, or might not believe they are having a stroke (Wilson, Beyth, Linn & Berger, 2007). The next step is assuring that the stroke is treated as a true medical emergency, just as a major trauma might be. This includes early notification of the emergency nurse or physician and a clear representation of the patient's condition. This information is the key to early activation of the receiving hospital's stroke protocol (Daley et al., 1997).

The final key role involves the actions taken within the hospital. If possible, the stroke patient should be taken to the appropriate hospital, one that is best prepared to treat the stroke patient. The Joint Commission, a hospital accreditation organization, launched a certification program in 2003 that recognizes hospitals providing exceptional stroke care. By 2009, there were more than 600 certified primary stroke centers in 49 states. Nine states recognize this certification program for a primary stroke center, including Illinois (The Joint Commission, 2009). This accreditation indicates that the hospital has the facilities and procedures in place to best treat a stroke patient. While the costs of obtaining certification as a primary stroke center may be significant, the benefit to the patient is clear and, for some centers, there may be economic incentives due to an increased population census and a perceived increase in status or expertise within the community (Joint Commission, 2009).

There are a number of programs available that directly address the issue of stroke

education. Some of these programs are directed at potential stroke victims while others are directed at first responders. Additionally, a number of organizations are directly involved in stroke awareness. The National Stroke Association has a wide array of promotional tools, presentations, and media discussion guides available for use. These include both paper based and electronic based materials, which have the benefit of being easily customizable. Also included on their website are short promotional videos meant for use on any website or cable access television program (National Stroke Association, 2009).

The American Stroke Association (a branch of the American Heart Association) has a variety of printed materials and brochures available discussing risk factors, how to reduce the risk and what to expect if you or your loved one experiences a stroke (American Stroke Association, 2011). They also have a number of self evaluation tools to assess stroke risk quickly and easily (American Stroke Association, 2010). The "Power to End Stroke" is a targeted program that has developed into a clearinghouse for various stroke related tools and assessment products. (American Stroke Association, 2011).

The "Stroke Network" is a conglomeration of various websites focused on strokes. One branch looks to increase stroke awareness by selling items, including car magnets and bracelets, which encourage discussion about stroke and the risk factors. Much of their material centers their focus on the need for post stroke care and what the victims and family members might expect (Stroke Net, 2011). Another organization, SAFE (Stroke Awareness for Everyone) is dedicated to helping survivors understand their situation and provides important resources (SAFE: Stroke Awareness for Everyone, 2008).

The AD Council, a non-profit organization dedicated to raising public awareness through media, has produced a number of public service announcements to increase the awareness of

stroke. These advertisements aim to increase the awareness of the risk factors of stroke and the signs that indicate someone might be experiencing a stroke. Much of their material is geared to encourage immediate action when signs of a stroke arise. Their materials are available for many types of media, including television, radio, websites and the print media (Ad Council, 2004). The Stroke Collaborative has a variety of educational materials available. These include simple handouts that are available to be downloaded and printed (The Stroke Collaborative, 2008).

All of these educational programs are readily available and many are free of cost. The interest in addressing the stroke awareness is apparent due to the wide array of resources that are available. However, an exclusive resource for use by prehospital providers, particularly paramedics in educating the community, is conspicuously absent. Studies indicating the need for the involvement of prehospital providers are available (Brice, Griswell, Delbridge & Key, 2002), yet the development of resources needed to implement such an effort are difficult to find.

Through this literature review, it became readily apparent that the problem of strokes is real and substantial. This review has also clarified the ability to have an impact on the stroke problem in the community. The literature unmistakably indicates that community education about the risk factors and the symptoms of a stroke, as well as what to do if stroke symptoms appear, will reduce both the occurrence and impact of stroke.

Procedures

The research for this project began at the National Fire Academy's Learning Resource Center (LRC) in January 2011. The research included a review of past Executive Fire Officer Applied Research Papers as well as a computer search of other periodicals, journals and books available in the library. A review of the sources at the LRC revealed that, while a number of Applied Research Papers discussed strokes in firefighters, only two projects discussed the

intervention of the fire service or EMS agencies in stroke education. Additionally, these two papers only touched on the topic, effectively indicating that stroke should be included in a larger scale risk prevention effort.

The search for information continued online with numerous research sessions between January and June 2011. Using a variety of search engines, words and phrases related to stroke were searched yielding an immense volume of resources. In fact, new sources seemingly became available daily. Search terms included: stroke, hypertension, CVA, brain attack, disability statistics, stroke prevention, stroke certification, stroke education, prehospital patient education and paramedic stroke education.

Further research was conducted at the Riverside, Illinois Public Library, Fort Myers Beach, Florida Public Library and the Loyola University Stritch School of Medicine Library in Maywood, Illinois. Through these research efforts, materials were requested from the Centers for Disease Control and Prevention, the American Stroke Association and the American Heart Association.

The purpose of the literature review was to develop an understanding of what a stroke is, the scope of the stroke problem both nationally and internationally and efforts currently being undertaken to address the problem of strokes. The focus of the literature review was specifically related to providing insight to these four research questions:

- To what extent do the residents in the community understand the risk factors of a stroke?
- What is the residents' of the community understanding of the symptoms of stroke and actions to be taken?

- What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community?
- How have other agencies engaged in reducing a community's occurrence and impact of strokes?

Through the information gained from the literature review, a questionnaire was developed (Appendix D). The questionnaire was then administered to nine members of the office staff (non-medically trained personnel) at Pleasantview. The response to this questionnaire was positive and one staff member commented that providing the answers to the questionnaire, after it was completed, would be helpful and a good educational tool. In response to this comment, an educational handout was developed for use with this questionnaire (Appendix E). These questionnaires were administered to the community members at a number of community events by paramedics from Pleasantview during the months of May and June 2011.

In all, 111 surveys were completed. The information was compiled in a Microsoft Excel spreadsheet for analysis. Of the 111 questionnaires, 31 (28%) were answered by males, 79 (72%) by females and one respondent failed to choose a gender. The questionnaire was also separated by age groups; "Under 25", "25-34", "35-44", "45-54", "55-64", and "65 or older". The breakdown by gender and age was undertaken as some reports discovered in the literature review indicated that gender and age may play a role in the knowledge of a stroke. Raw data used to breakdown the results from the questionnaire are available in Appendix F. This questionnaire was intended to answer three of the four research questions, specifically:

- To what extent do the residents in the community understand the risk factors of a stroke?

- What is the residents' of the community understanding of the symptoms of stroke and actions to be taken?
- What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community?

An effort to determine which patients transported by Pleasantview during the previous calendar year with symptoms indicative or potentially indicative of a stroke was undertaken. The information on these incidents was compiled in a Microsoft Excel spreadsheet and certain incidents were selected for further review. From these incidents, a request for certain patient information was made to Adventist LaGrange Memorial Hospital on the disposition on these patients. The hope was that this information could be evaluated to provide insight to two of the four research questions, particularly:

- To what extent do the residents in the community understand the risk factors of a stroke?
- What is the residents' of the community understanding of the symptoms of stroke and actions to be taken?

The information provided by LaGrange Memorial Hospital was interesting as it showed the disposition of the patient. However, the information was not necessarily in a format that shed insight into the patient's understanding of the risk factors or the symptoms of a stroke, or the necessary actions if someone experienced a stroke. Additionally, the information was difficult for the hospital produce. As a result, the capacity to review more than one or two patients was beyond the scope of this project.

In order to answer two of the four research questions, a number of inquiries were made to discover how other EMS organizations might be addressing the problem of strokes in their

communities. Specifically, these efforts were intended to answer the following research questions.

- What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community?
- How have other agencies engaged in reducing a community's occurrence and impact of strokes?

An inquiry was made to James Wilson, Director of EMS for the Plant City, FL Fire Department, a member of the State of Florida Stroke Task Force and a participant in the NFA EFOP. He is a published author as well as a regular contributor on the information website, www.allexperts.com, where he is an EMS expert. According to his online profile, Chief Wilson has over 25 years of EMS experience. In response to a request for information, Chief Wilson provided a very extensive reply that outlined the efforts undertaken within the State of Florida to address the impact of stroke. His response provided a great deal of information on the training of paramedics, but he had little information on projects that had been undertaken by prehospital providers to educate the community (Appendix G). A request for information was made through the TRADENET website sponsored by the National Fire Academy (Appendix H) and through the Illinois Fire Chief's EMS Committee for information on efforts being undertaken by EMS agencies to reduce the effects of stroke. Finally, at the Good Samaritan EMS System meeting on June 13, 2011, a discussion was initiated about the individual efforts communities are making to reduce the impact of stroke in their community.

A number of responses to these inquiries were received, particularly the TRADENET request. These responses were very helpful in defining the role currently played by EMS agencies. The majority of the responses detailed efforts that have been taken to provide

increasingly aggressive treatment of stroke patients. Of all the responses, only one indicated that their EMS agency had undertaken efforts to educate their community about strokes. This response, from Lieutenant Patricia Dunkleman at the Delray Beach, FL Fire Department included an excellent educational outline.

Several limitations were noted while completing this research. One significant limitation was the information obtained from the questionnaire administered at the various community events. While a number of attempts were initiated to generate a larger sample size, the number of questionnaires completed was less than the desired sample size. Though use of community events to conduct the survey provided a convenient opportunity to obtain information, the respondents were also not truly representative of the community. Consideration was given to providing the questionnaire to a wider sample of the community; however that opportunity fell beyond the time constraints available to complete this research. While the sample cannot be considered statistically reliable, it is felt that the results offer some insight to the overall community.

Additionally, despite numerous attempts to find similarly situated EMS organizations that had undertaken efforts to reduce the occurrence and impact of stroke in their community, little evidence was uncovered to indicate that many EMS organizations have become involved in these types of efforts. While the attempt to find this information was less than exhaustive, little clear evidence of a specific stroke program was discovered.

Results

Through descriptive research, data was obtained to be able to answer each of the four research questions.

The first research question addressed was:

- How have other agencies engaged in reducing a community's occurrence and impact of strokes?

The review of literature clearly indicated that the prevalence of stroke is significant worldwide as well as in the United States. Limited data indicated that stroke is a problem in Pleasantview as well.

As indicated in the personal email communication from Chief Jim Wilson, efforts in the State of Florida have focused on training the EMS providers to properly treat and triage stroke victims to the appropriate medical facility in rapid fashion (Appendix G). This is a very important step and is similar to the efforts that have recently been initiated in Illinois. While these efforts are certainly important, these are largely mitigation efforts, not prevention measures. Responses to the TRADENET request indicated that many other states have or are in the process of adopting similar stroke programs.

A number of education efforts have been undertaken by the American Stroke Association and other agencies. While these have been gaining prominence recently, partially due to a widespread advertising effort, all indications are that the EMS responders have had little involvement.

Through this research, little evidence of significant efforts by EMS agencies was discovered. While it is very likely that some agencies are involved in some type of effort to reduce the occurrence and impact of strokes, aside from the efforts in Delray Beach, FL, these are not prominent efforts. In his 2002 Applied Research Paper for the NFA EFO program, David Hayes of the Tulsa, Oklahoma Fire Department indicated that stroke is one cause of injury that might be addressed in the community (Hayes, 2002). Indications from the City of Tulsa Fire Department are that the part of the program related to stroke education has not been fully

implemented.

While the search for programs was limited, the most relevant stroke education program undertaken by a fire department was provided in a response from Lieutenant Patricia Dunkelmann of the Delray Beach, Florida Fire Department. The Delray Beach Fire Department website indicates that they have developed a number of public education programs (Delray Beach Fire Department, 2011). Their stroke presentation (Appendix I) is simple and easy for a paramedic to deliver. It is also short, hoping to maintain the attention of the audience. While it is not extensive, it clearly provides three key points: (1) define and describe what a stroke is, (2) know the primary controllable and uncontrollable factors that put one at risk for stroke and (3) understand the signs and symptoms of a stroke. While Dunkelmann indicated that they have been unable to quantify the results of this education, they believe that their education programs have certainly made a difference.

The second research question that was answered was:

- To what extent do the residents in the community understand the risk factors of a stroke?

To answer this research question, five separate true or false questions were asked through the questionnaire completed in the Pleasantview community. These questions were:

1. Over 80% of all strokes in the United States occur in persons over 65 years old.
2. Women are more likely to experience a stroke than a man.
3. People who smoke have double the risk of having a stroke.
4. The most important stroke risk factor that can be changed is high cholesterol.
5. The best thing you can do to prevent a stroke is to live a healthy lifestyle including regular exercise, eating well and avoiding tobacco.

The correct response to the first question, “True or False: Over 80% of all strokes in the United States occur in persons over 65 years old”, is “False”. Of the 111 respondents who answered the question, 70 (63%) correctly answered this question while 41 (37%) answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 18 (58%) correctly answered the question and 51 (65%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. When these results are reviewed, it is notable that none of the respondents (three male and three female) in the 25 to 34 year age range answered the question correctly, while all of the male respondents in the 35 to 44 year age range and the male respondents in the 65 and over age range (six total respondents) correctly responded to the question.

While nearly two-thirds of those responding to these questions answered correctly, a significant portion of the respondents were not able to accurately answer this question, believing that the vast majority of stroke occur in those over 65 years old.

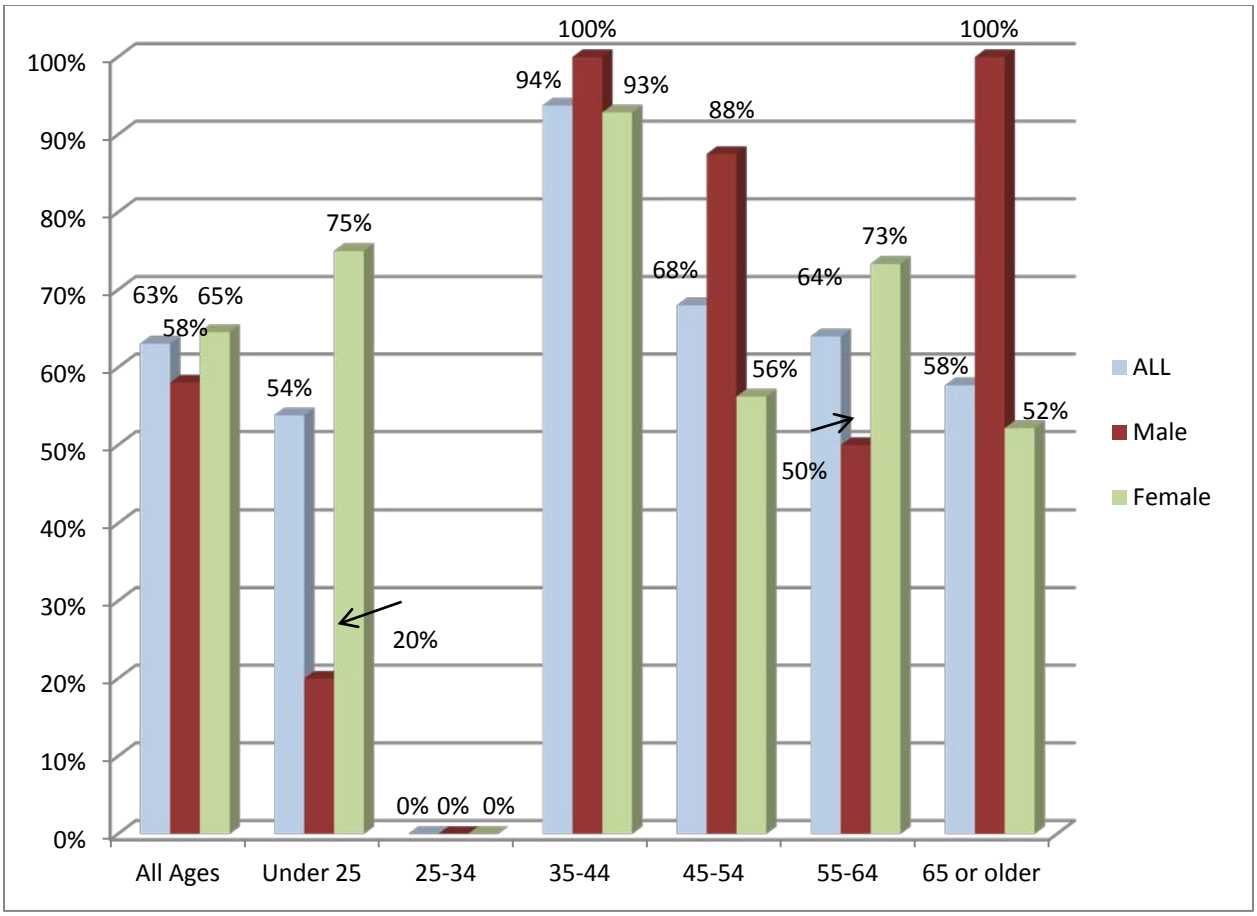

Figure 1. **Percentage of correct answers to questionnaire question one: Over 80% of all strokes in the United States occur in persons over 65 years old.**

In response to the second question, "True or False: Women are more likely to experience a stroke than a man", the correct response to this question is "True". This question was correctly answered by 61 (55%) of the 111 respondents. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 15 (48%) correctly answered the question and 45 (57%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. Only 15% of all respondents in the "25 and Under" age range correctly answered this question, including none of the male respondents. In contrast, all of the female respondents in the "25 to 34" age range correctly answered this question, along with all the male respondents

in the “35 to 44 year” age range.

While slightly more than half of all the respondents correctly answered this question and more female respondents answered this question correctly than male respondents, nearly half the respondents incorrectly believed that women were less susceptible to stroke than men.

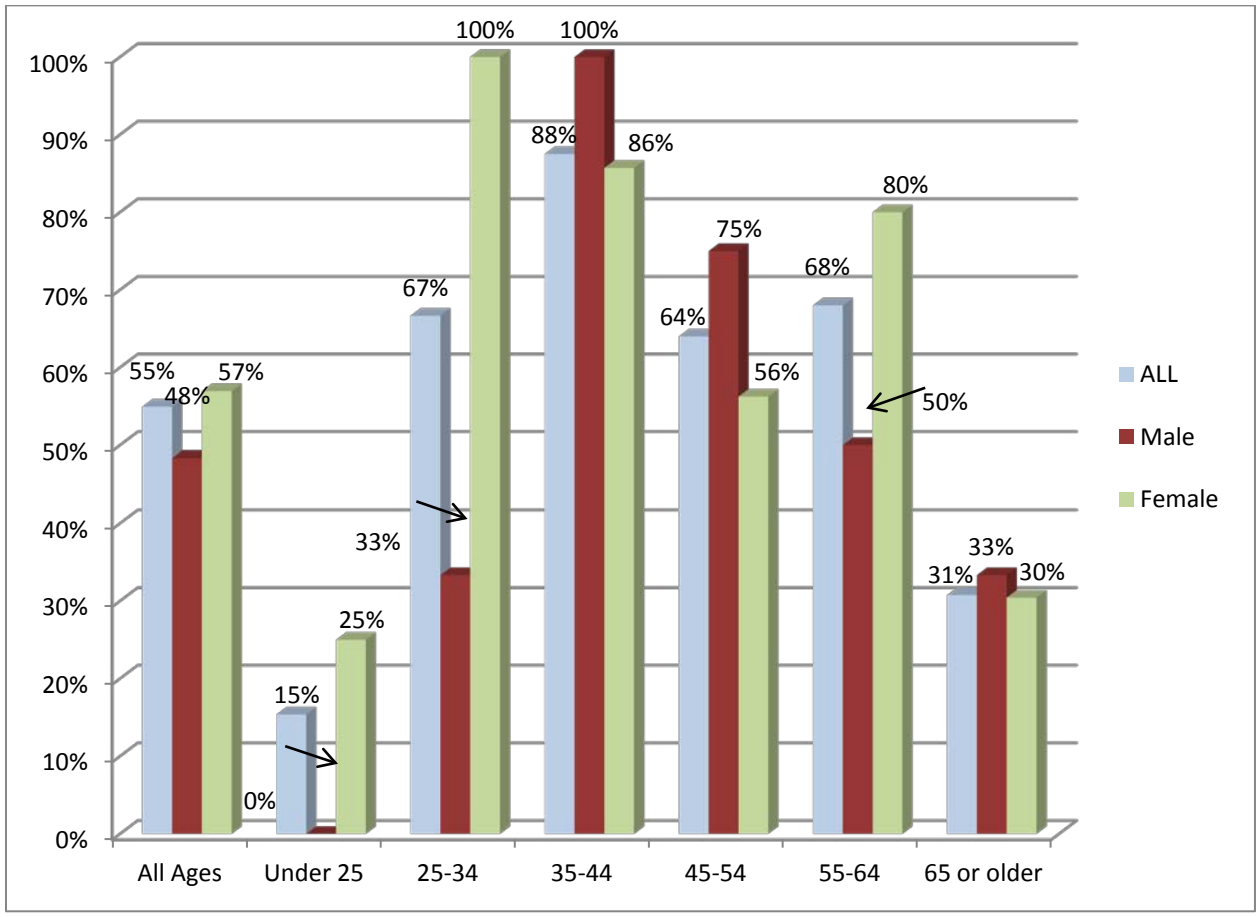

Figure 2. **Percentage of correct responses to questionnaire question two: Women are more likely to experience a stroke than a man.**

In response to the third question, “True or False: People who smoke have double the risk of having a stroke”, the correct response to this question is “True”. Of the 111 respondents who answered the question, 105 (95%) correctly answered this question while only six answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the six respondents who answered incorrectly, three

respondents were male and three respondents were female. The responses to this question were further broken down by age range and gender. When these results are reviewed, of the six incorrect responses, three were in the “34 to 44 year” range, two were in the “45 to 54 year” range and one was in the “55 to 64 year” range. The overwhelming number of respondents answered this question correctly.

The correct response to the fourth question, “True or False: The most important stroke risk factor that can be changed is high cholesterol”, is “False”. Of the 110 respondents who answered the question, 35 (32%) correctly answered this question while 75 answered incorrectly. Of the respondents, 31 (29%) were male, 78 (71%) were female and one respondent chose not to specify a gender. Of the male respondents, 14 (45%) correctly answered the question and 20 (26%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. When these results are reviewed, it is notable that 100% of the males in the “Under 25 years” of age group and “35 to 44 year” age group correctly responded to the question.

Less than one third of the respondents correctly identified that high cholesterol was not the leading risk factor for strokes. While high cholesterol is a risk factor, the respondents failed to understand that hypertension is the leading risk factor for a stroke.

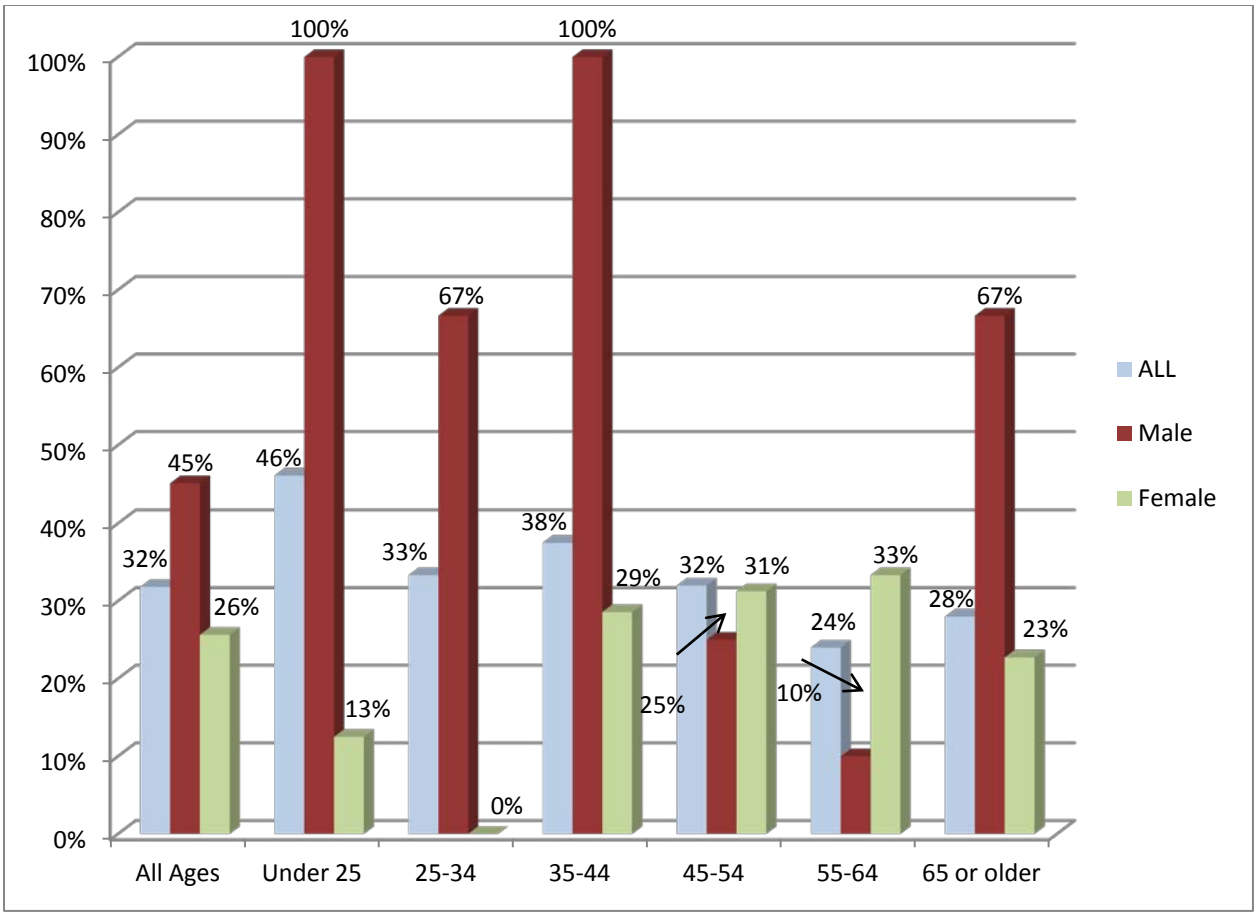

Figure 3. **Percentage of correct responses to questionnaire question four: The most important stroke risk factor that can be changed is high cholesterol.**

In response to the fifth question, "True or False: The best thing you can do to prevent a stroke is to live a healthy lifestyle including regular exercise, eating well and avoiding tobacco", the correct response to this question is "True". Of the 111 respondents who answered the question, 108 (97%) correctly answered this question while three answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, two answered incorrectly, while one female respondent answered incorrectly. The responses to this question were further broken down by age range and gender. When these results are reviewed, it is notable that all three respondents who answered incorrectly were in the "35 to 44 year" old age group. The answers to this

question were overwhelmingly correct.

The first five questions on the questionnaire given to members of the Pleasantview community related to the risk factors for a stroke, specifically:

1. Over 80% of all strokes in the United States occur in persons over 65 years old.
2. Women are more likely to experience a stroke than a man.
3. People who smoke have double the risk of having a stroke.
4. The most important stroke risk factor that can be changed is high cholesterol.
5. The best thing you can do to prevent a stroke is to live a healthy lifestyle including regular exercise, eating well and avoiding tobacco.

When considering these questions as a set, it is interesting to note that an average of 68% of the respondents correctly answered the set of questions. In some age groups the response was moderately higher with 76% of those respondents in the “35 to 44 year” age group answering correctly. When reviewing the results in terms of age and gender, males in the “45 to 54 year” age group and “65 and older” age group, as well as females in the “35 to 44 year” age group and the “55 to 64 year” age group correctly answered these questions at a significantly higher rate than the 68% average. Of particular note was the fact that the lowest collective average was 60% correctly answered questions by the “25 to 34 year” age group. This result was consistent across both the male and female gender groups.

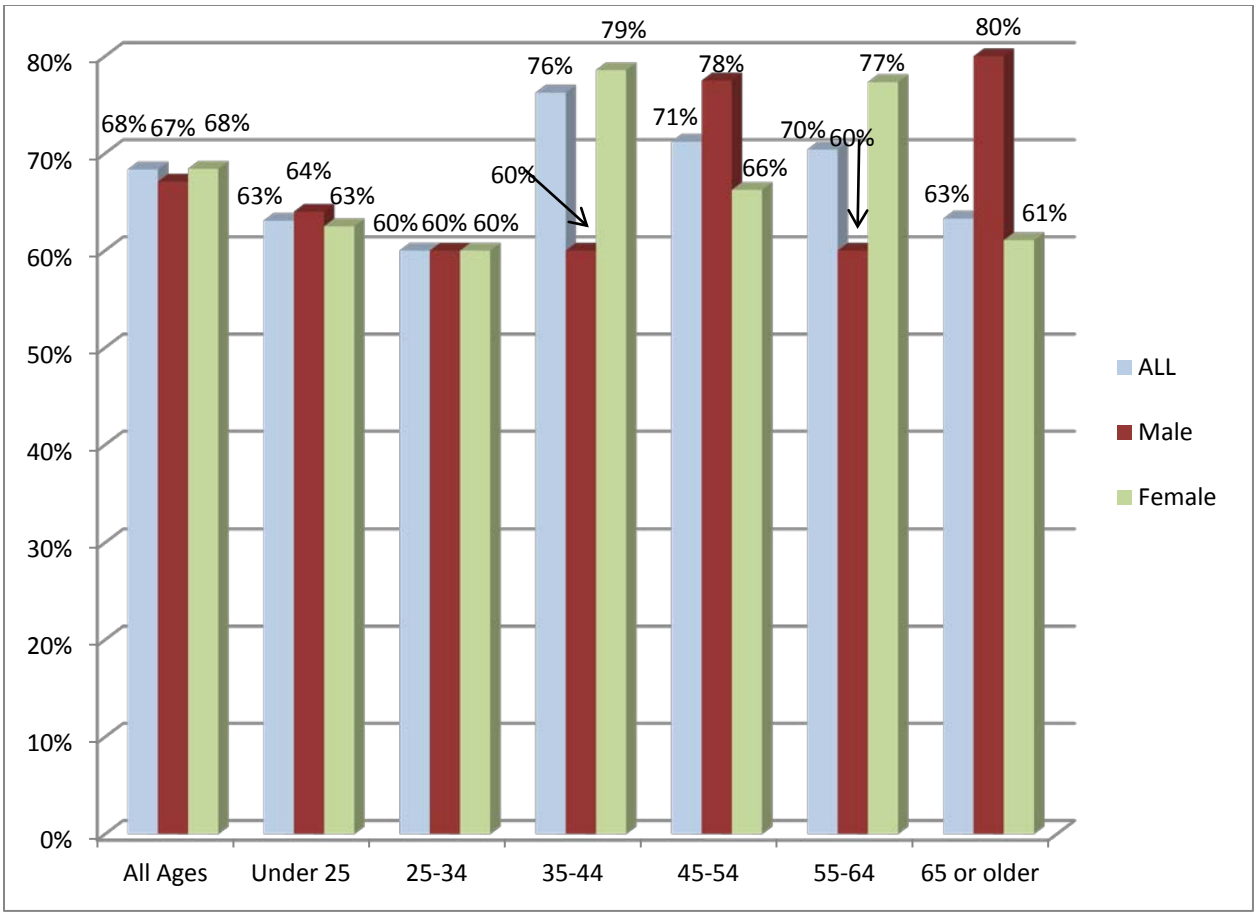

Figure 4. **Percentage of correct responses to questionnaire questions one through five, considered as a set.**

The third research question that was answered was:

- What is the residents' of the community understanding of the symptoms of stroke and actions to be taken?

To answer this research question, five separate true or false questions were asked through the questionnaire completed in the Pleasantview community.

6. The main symptom of most strokes is a sudden severe headache.
7. Symptoms of strokes include sudden dizziness and sudden problems moving arms or legs.

8. If you experience stroke symptoms and they go away within an hour, you should monitor yourself for a while.
9. If you experience stroke symptoms you should call your doctor for an appointment.
10. Most people who have a stroke don't survive more than 90 days.

In response to the sixth question (the first of this set), "True or False: The main symptom of most strokes is a sudden severe headache", the correct response to this question is False. Of the 111 respondents who answered the question, 73 (66%) correctly answered this question while 38 answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 23 (74%) correctly answered the question and 50 (63%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. When these results are reviewed, it is notable that all of the females in the "25 to 34 year" age group and all the males in both the "35 to 44 year" and "65 and older" age groups correctly responded to the question. However, only 43% of the females in the "65 and older" age group and 50% of the females in the "Under 25" age group correctly answered the question. These results indicate that one-third of the respondents to this question incorrectly felt that a sudden severe headache is a primary symptom of a stroke, while it is primarily a symptom of less than 25 percent of all strokes.

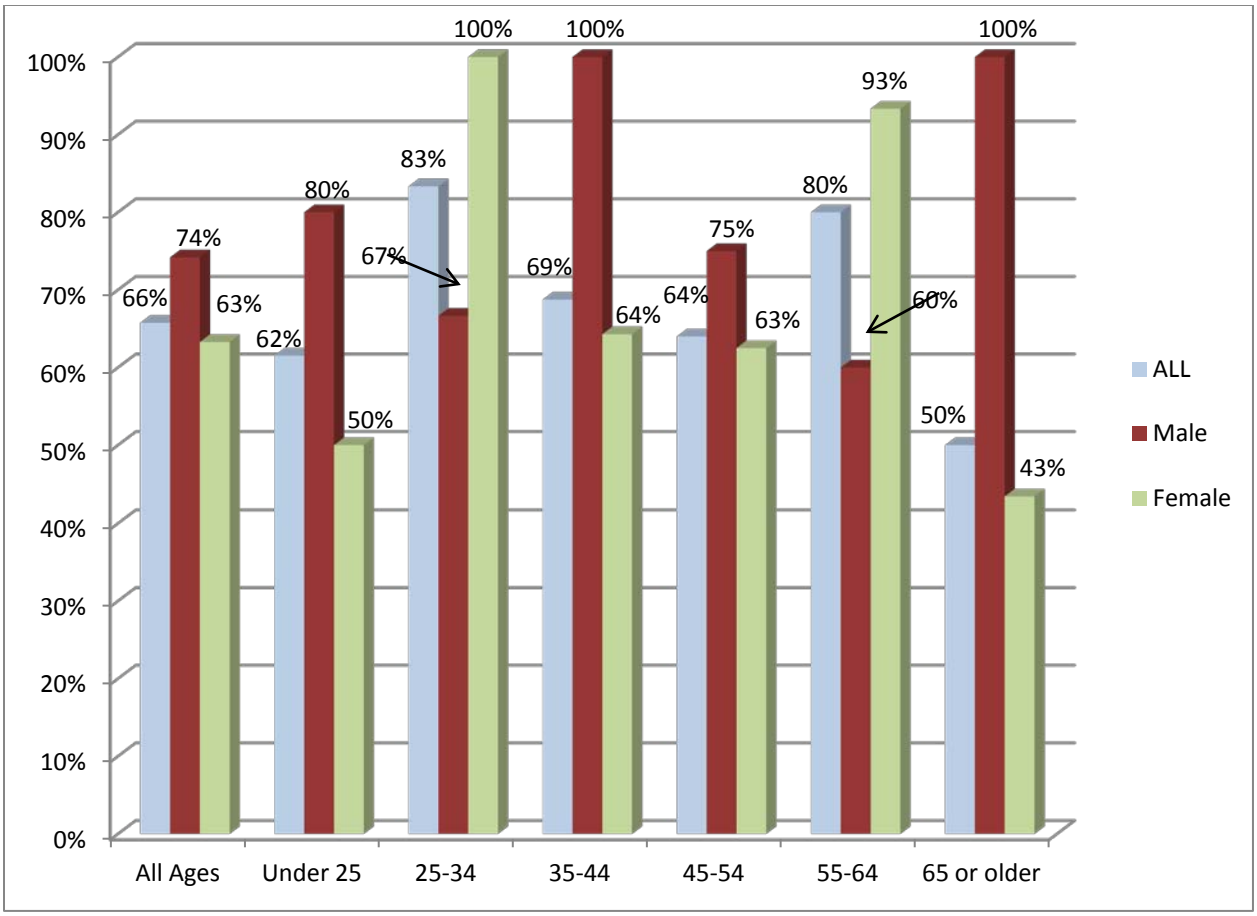

Figure 5. **Percentage of correct responses to questionnaire question six: The main symptom of most strokes is a sudden severe headache.**

In response to the seventh question, "True or False: Symptoms of strokes include sudden dizziness and sudden problems moving arms or legs", the correct response to this question is "True". Of the 111 respondents who answered the question, 104 (94%) correctly answered this question while seven answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 29 (94%) correctly answered the question and 74 (94%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. When these results are reviewed, the only group that did not correctly respond with a high percentage of correct answers was males in the "35 to 44 year" age group.

The responses to this question were nearly universally correct, indicating that the classical symptoms of a stroke are well understood across all the respondents.

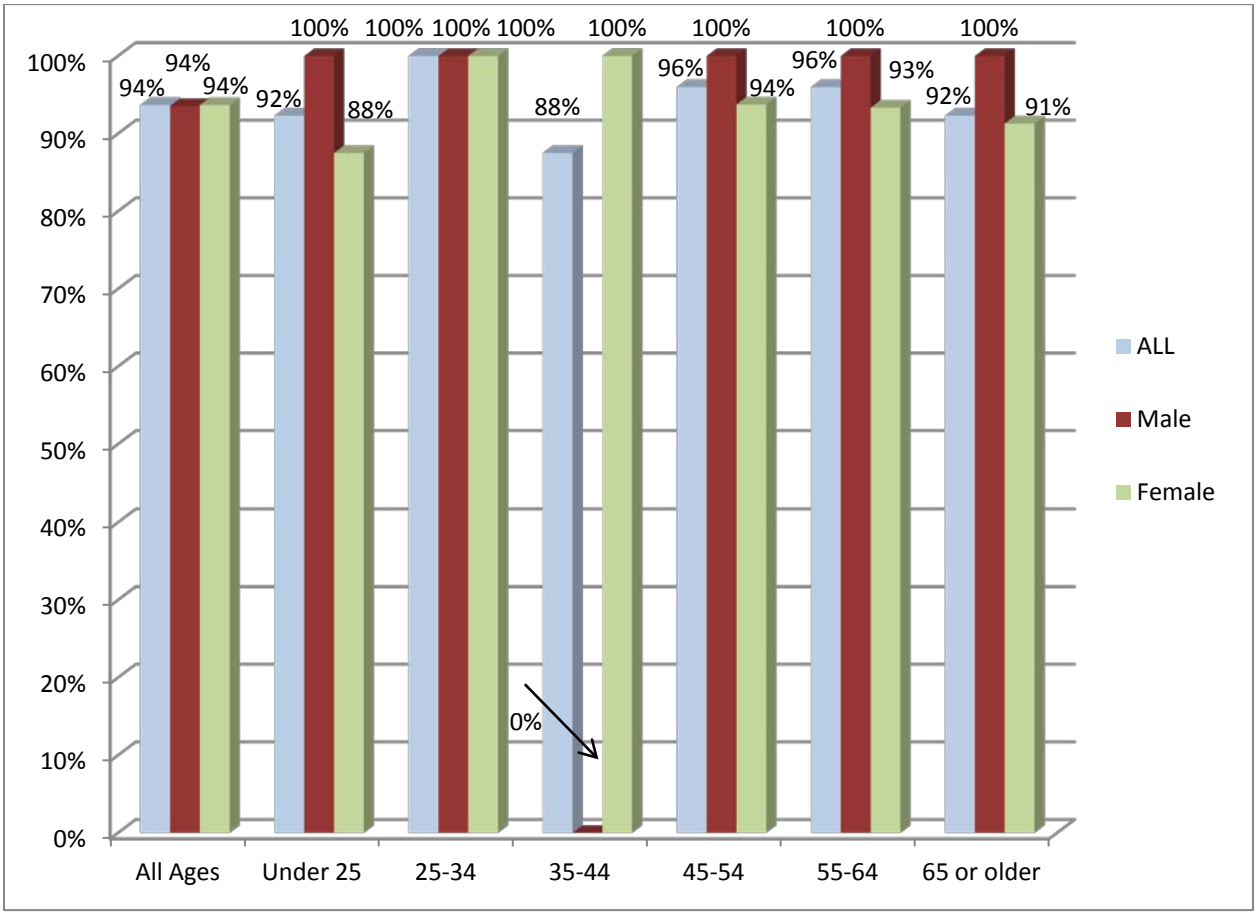

Figure 6. **Percentage of correct responses to questionnaire question seven: Symptoms of strokes include sudden dizziness and sudden problems moving arms or legs.**

In response to the eighth question, "True or False: If you experience stroke symptoms and they go away within an hour, you should monitor yourself for a while", the correct response to this question is "False". Of the 111 respondents who answered the question, 64 (58%) correctly answered this question while 47 answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 18 (58%) correctly answered the question and 48 (58%) of the female respondents correctly answered the question. The responses to this question were further broken down by

age range and gender. When these results are reviewed, all of the females in the "25 to 34 year" age group and all of the males in the "35 to 44 year" age group correctly answered the question. Of particular note were the males in the "65 and older" age group where none of this group correctly answered the question.

While more than half the respondents correctly answered this question, more than four out of ten respondents felt that it was acceptable to monitor their condition for a while, delaying medical treatment.

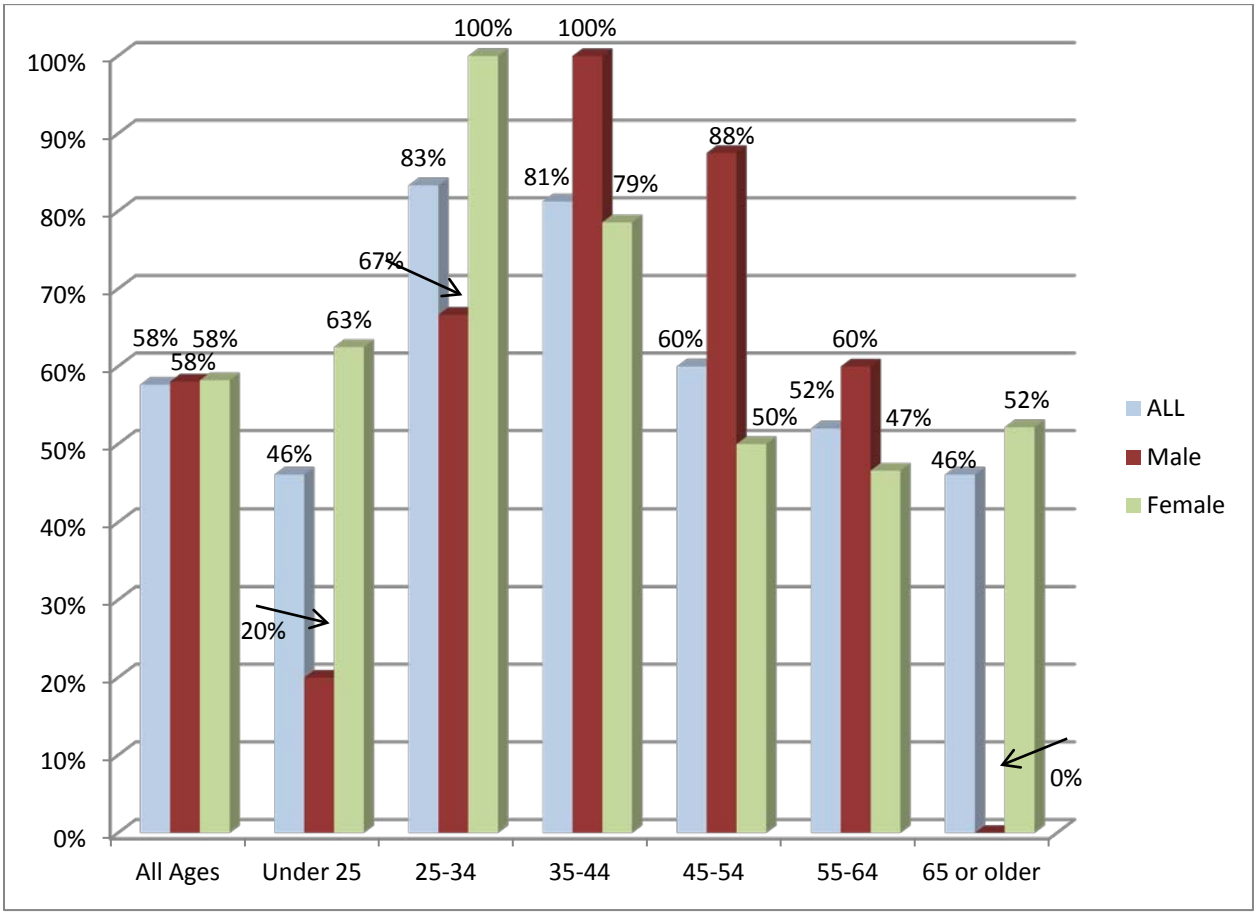

Figure 7. **Percentage of correct responses to questionnaire question eight: If you experience stroke symptoms and they go away within an hour, monitor yourself for a while.**

The correct response to the ninth question, "True or False: If you experience stroke symptoms you should call your doctor for an appointment" is "False". Of the 111 respondents

who answered the question, 58 (52%) correctly answered this question while 47 answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 16 (52%) correctly answered the question while 41 (52%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. When these results are reviewed, all of the females in the "25 to 34 year" age group and males in the "35 to 44 year" age group answered correctly. None of the respondents in the female "Under 25 year" age group or the male "25 to 34 year" age group answered this question correctly. Nearly half the respondents indicated that they would delay treatment seeking the opinion of their physician.

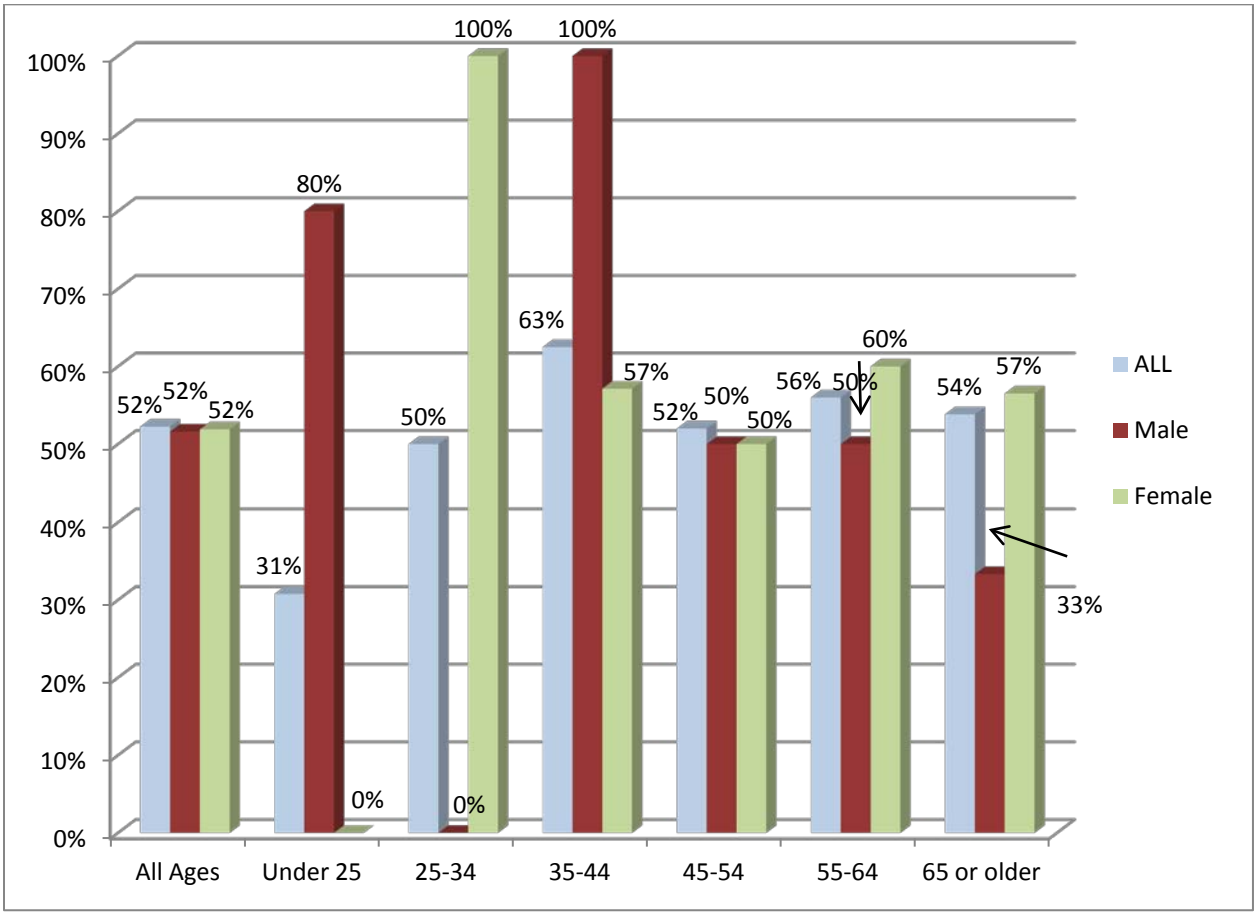

Figure 8. **Percentage of correct responses to questionnaire question nine: If you experience stroke symptoms you should call your doctor for an appointment.**

Question eight, “True or False: If you experience stroke symptoms and they go away within an hour, you should monitor yourself for a while” and question nine, “True or False: If you experience stroke symptoms you should call your doctor for an appointment” were similar in the fact that they related to a delay in seeking medical attention. When reviewing these questions together, it is notable that 44 (40%) of the respondents answered both of these questions incorrectly. This included 36 (46%) of the female respondents and 8 (26%) of the male respondents. This is significant in that 40% of the respondents to this question set would delay seeking medical advice if they experienced stroke symptoms.

In response to the tenth question, “True or False: Most people who have a stroke don’t survive more than 90 days”, the correct response to this question is “False”. Of the 111 respondents who answered the question, 105 (95%) correctly answered this question while six answered incorrectly. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 29 (94%) correctly answered the question and 75 (95%) of the female respondents correctly answered the question. The responses to this question were further broken down by age range and gender. The response given by all the various age and gender groups was overwhelmingly correct.

Questions six through ten on the questionnaire related to the symptoms of a stroke and the type of reaction necessary when a stroke occurs, specifically:

6. The main symptom of most strokes is a sudden severe headache.
7. Symptoms of strokes include sudden dizziness and sudden problems moving arms or legs.
8. If you experience stroke symptoms and they go away within an hour, you should monitor yourself for a while.

9. If you experience stroke symptoms you should call your doctor for an appointment.
10. Most people who have a stroke don't survive more than 90 days.

When considering these questions as a set, nearly three-quarters of the respondents (73%) correctly answered these questions. The age group with the highest percentage of correct responses (83%) was the "25 to 34 year" age group, with 100% of the males in this group answering all the questions correctly. This result is contrasted by the "Under 25 year" age group where 66% of the respondents and 60% of the male respondents correctly answered the question.

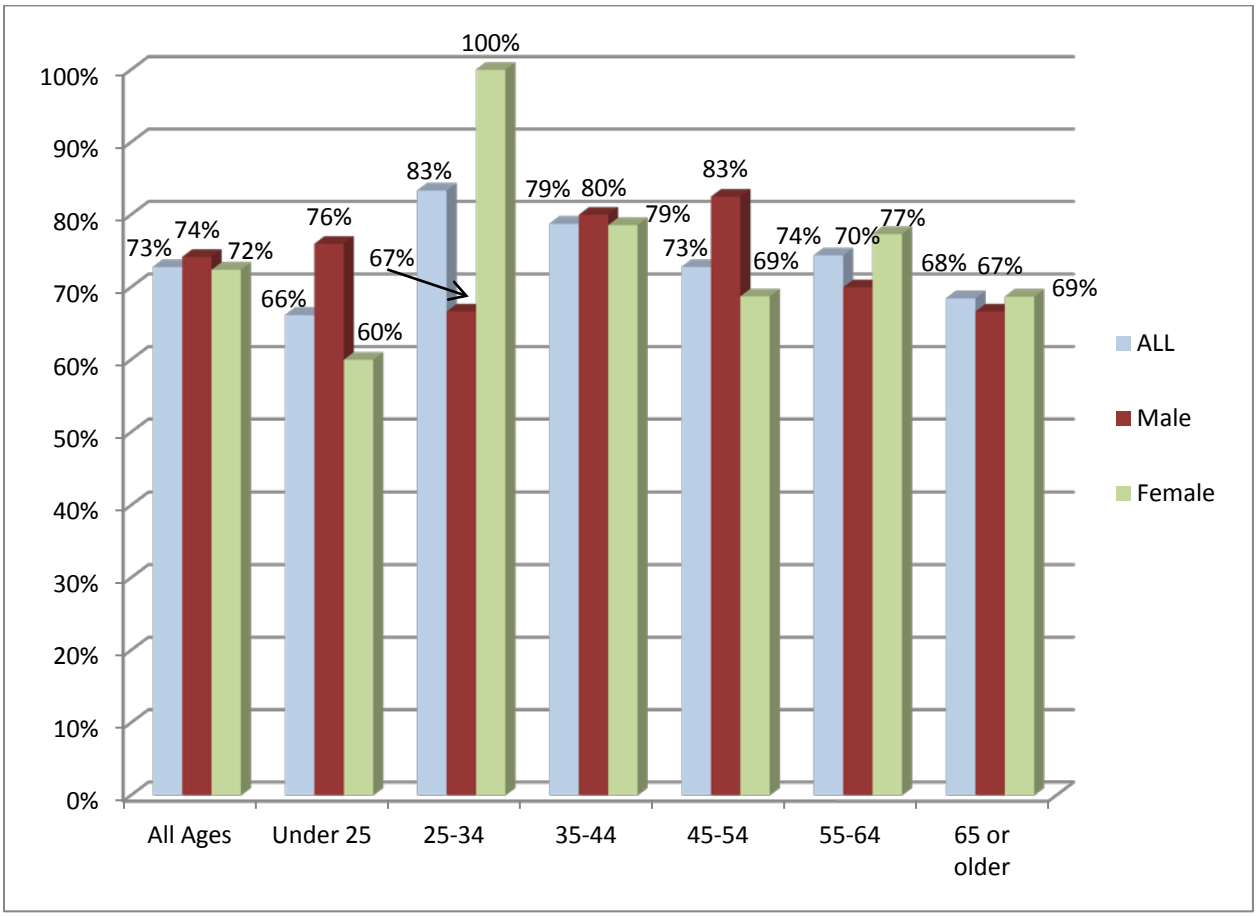

Figure 9. **Percentage of correct responses to questionnaire questions six through ten relating to the symptoms of stroke and the reaction to a stroke, considered as a set.**

The fourth and final research question that was answered was:

- What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community?

To answer this research question, four true or false questions were asked through the questionnaire completed in the Pleasantview community.

Two of the questions related to efforts taken by the respondents to identify controllable risk factors.

11. I have had my blood pressure checked within the last year.
12. True or False: I have had my cholesterol checked within the last year.

The eleventh question was, “True or False: I have had my blood pressure checked within the last year”. Of the 111 respondents who answered the question, 99 (89%) indicated that they had checked their blood pressure in the past year. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents 26 (84%) correctly answered the question compared to 72 (91%) of the female respondents who indicated that they had checked their blood pressure in the last year. The responses to this question were further broken down by age range and gender. The response given by all the various age and gender groups predominantly indicated that most respondents had checked their blood pressure within the last year except for the males in the “35 to 44 year” age group where none indicated they had checked their blood pressure and the females in the “Under 25 year” age group where only one-third indicated they had checked their blood pressure.

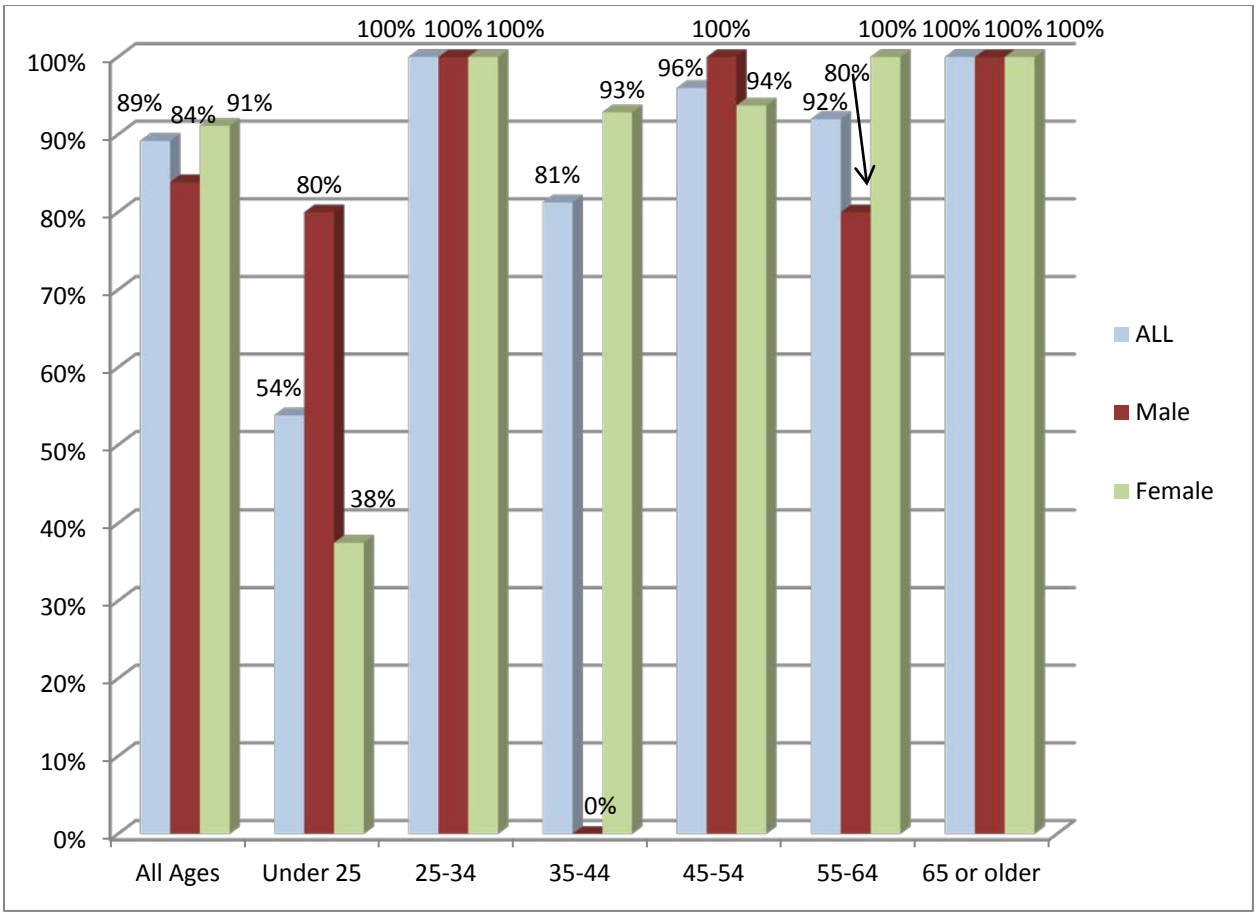

Figure 10. **Percentage of correct responses to questionnaire question eleven: I have had my blood pressure checked within the last year.**

In response to the twelfth question, "True or False: I have had my Cholesterol checked within the last year". Of the 111 respondents who answered the question, 88 (79%) indicated that they had checked their cholesterol in the past year. Of the respondents, 31 (28%) were male, 79 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 19 (61%) indicated they had checked their cholesterol in the last year while 68 (86%) of the female respondents indicated that they had checked their cholesterol in the last year. The responses to this question were further broken down by age range and gender. Both the male and female respondents in the "65 or older" age group indicated they had checked their cholesterol in the past year as had all the females In the "35 to 44 year" age group and all the

males in the "45 to 54 year" age group. A significant number of the respondents, both male and female, under the age of 35 indicated that they had not had their cholesterol checked in the last year including none of the males in the "35 to 44 year" age group.

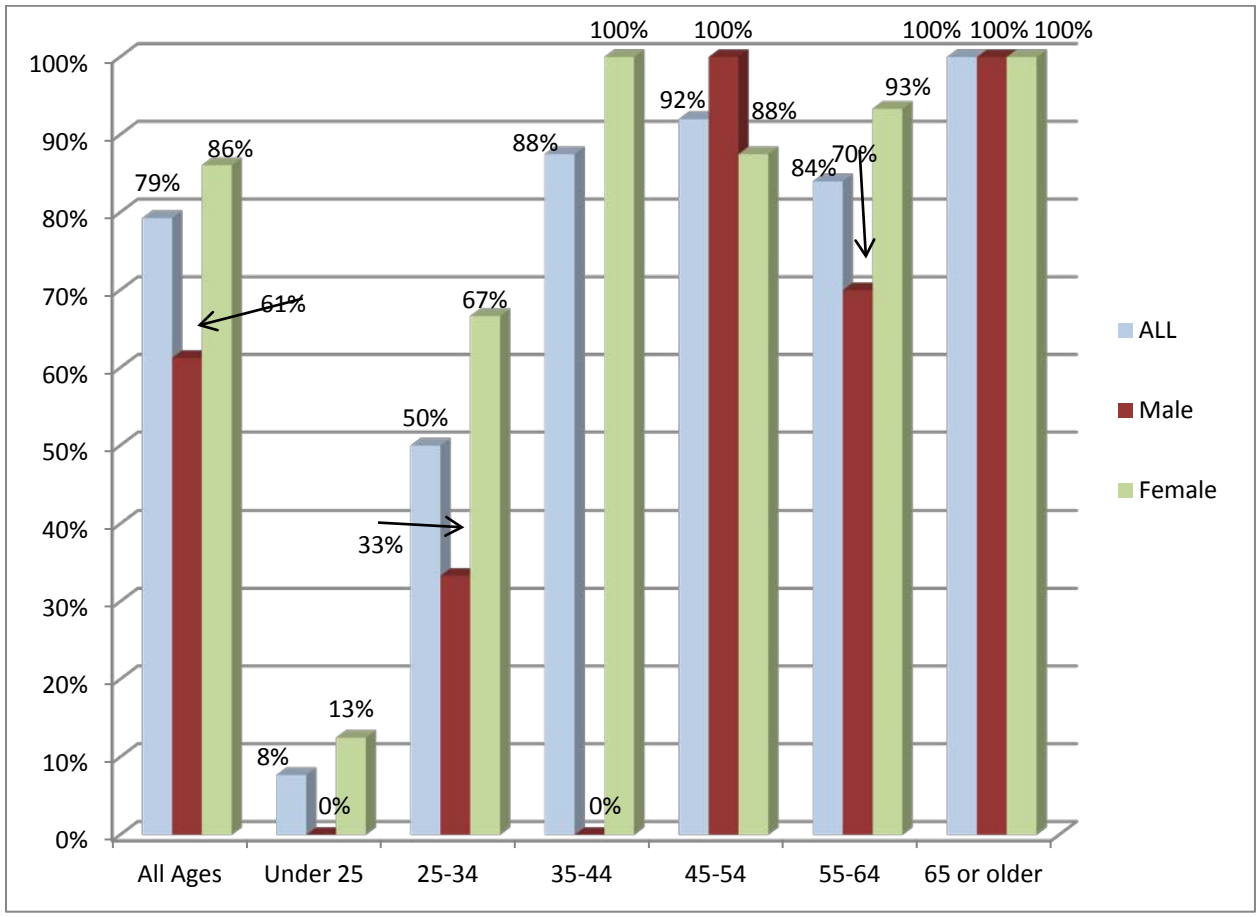

Figure 11. **Percentage of correct responses to questionnaire question twelve: I have had my cholesterol checked within the last year.**

Two of the questions related to the confidence the respondents showed toward the information provided by paramedics.

13. If a paramedic told me I had a risk factor for a stroke, I would do something about it.
14. If a paramedic told me that I needed to go to the hospital because I might be having a stroke, I would go immediately.

In response to the thirteenth question, “True or False: If a paramedic told me I had a risk factor for a stroke, I would do something about it”. Of the 110 respondents who answered the question (one respondent chose not to answer this question), 106 (96%) indicated that they would take action if a paramedic informed them they were at risk for a stroke. Of the respondents, 31 (28%) were male, 78 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 90% indicated they would take action and only one of the female respondents indicated that they would not take action if they were told by a paramedic they were at risk for a stroke. The responses to this question were further broken down by age range and gender. While the responses to this question overwhelmingly indicated that people would take action, males in the “35 to 44 year” age range indicated they might not.

In response to the fourteenth question, “True or False: If a paramedic told me that I needed to go to the hospital because I might be having a stroke, I would go immediately”. Of the 110 respondents who answered the question (one respondent chose not to answer this question), 106 (96%) indicated that they would take action if a paramedic informed them they could be experiencing a stroke. Of the respondents, 31 (28%) were male, 78 (72%) were female and one respondent chose not to specify a gender. Of the male respondents, 87% indicated they would take action and none of the female respondents indicated that they would not immediately go to the hospital if they were told by a paramedic they might be having a stroke. The responses to this question were further broken down by age range and gender. While the responses to this question overwhelmingly indicated that people would take action, males in the “35 to 44 year” age range indicated they might not.

When these questions are reviewed together, it is notable that two of the same respondents indicated that they would not consider the recommendations of a paramedic. Both

of these respondents were males in the “35 to 44 year” age range. Also obvious when considered as a set of questions was the clear indication by those who responded to the survey that they would take the advice given by paramedics to heart, taking positive action.

Discussion

The incredibly vast quantity of literature related to the problem of strokes, both within the United States and throughout the world, is a good indication that the problem is both significant and widespread. While researching this problem, new resources developed on a nearly daily basis, often found while reading the local newspaper. All of these sources point to the fact that strokes pose a serious quality of life problem for the community.

In fact, the statistical information reinforces the perception that strokes present a problem. In 2007, 136,000 people in the United States died due to stroke, making stroke the third leading cause of death behind heart disease and cancer. Stroke accounts for one in every eighteen deaths annually (Xu, Kochanek, Murphy & Tejada-Vera, 2010). Each year, approximately 795,000 people experience a stroke, 610,000 of those for the first time. About every 40 seconds, someone in the United States experiences a stroke (American Heart Association, 2009). This is not only a problem in the United States, but worldwide as well. Stroke is the number three leading cause of death worldwide, resulting in 5.5 million or 10% of all deaths annually. In 2002, more than 1.6 million people in China alone, died from stroke (MacKay & Mensah, 2010). Stroke is the only disease that is a leading cause of death and a leading cause of disability worldwide (Hong & Saver, 2009). Estimates indicate that the total cost of stroke in the United States is $43 billion per year, including direct costs of medical care and therapy costs of over $28 billion. The average cost for stroke care for the first ninety days is estimated at $15,000, however for 10% of the patients, the cost of care over this period is $35,000 (The University

Hospital, 2010).

Due to the exceptionally high incidence of death and disability, stroke prevention and treatment have become a popular target for the medical community to address. Of the two types of strokes, ischemic strokes are the most common. According to the American Heart Association, ischemic strokes account for about 87% of all strokes (2011). The amazing part is that many of the risk factors for stroke are well documented and controllable. These controllable risk factors revolve around a healthy lifestyle. According to the 2008 US Health report covering the years 2005-2006, the CDC listed the most common controllable risk factors including inactivity, reported by 39.5% of the survey respondents; obesity (33.9%); high blood pressure (30.5%); cigarette smoking (20.8%); high cholesterol (15.6%); and diabetes (10.1%) (National Center for Health Statistics, 2009). Preventing strokes begins with addressing these controllable risk factors.

Five of the questions presented in the questionnaire for this research attempted to obtain information specifically to answer the stated research question, "To what extent do the residents in the community understand the risk factors of a stroke?" When viewed as a group, the responses indicate that 68% of the respondents were able to identify the risk factors of a stroke. In certain age and gender groups up to 78% of the respondents correctly answered the question. In one age group, the 35 to 44 year age group, only 60% of the respondents were able to correctly answer the questions when they were considered as a group. While a 68% correct response rate might be considered sufficient knowledge of the risk factors, it does not account for the nearly one-third of the respondents who were unable to correctly identify the risk. Even though it does indicate that a large portion of the population has knowledge of the risk factors of a stroke, it also points out a need to provide education to reduce the gap of knowledge and

increase the understanding of the risk of having a stroke.

While the vast majority of strokes are ischemic, relatively few of these stroke patients receive appropriate therapy. Thrombolytic therapy allows physicians to remove the blockage from the stroke, enabling blood flow to return to the brain (Campbell, 2000). One of the important considerations when administering a thrombolytic is the need for administration within three hours (Clark & Renier, 2001). While up to 29% of all stroke patients may benefit from the administration of thrombolytic, only between 4% and 8% of these patients receive this treatment (California Acute Stroke Pilot Registry Investigators, 2005). Estimates indicate that if all stroke patients arrive at an appropriate hospital, one prepared to treat a stroke, within the current time constraints, up to 29% of all strokes could be treated with thrombolytics (Kleindorfer et al., 2004). One study suggests that if all stroke patients had arrived at an appropriate emergency room within one hour of the initial signs of a stroke, up to 57% could be treated more aggressively, significantly reducing the impact of the stroke (California Acute Stroke Pilot Registry Investigators, 2005). All of this has led to the introduction of the rallying cry of "time is brain".

Since those patients treated with thrombolytics have a much better recovery rate, identified by a lower incidence of death and disability, receiving this treatment must be a primary goal for any stroke patient. In order to mitigate the damage from a stroke, victims must recognize the symptoms of a stroke, react quickly and seek appropriate help. In the introduction to this research project, the 2008 video by Jill Bolte Taylor was briefly discussed. In her book that discusses the details of the stroke she experienced, Taylor (2006) describes the morning of her stroke in great detail. Even though Taylor was a neuroanatomist who had studied the brain for years, she still delayed her treatment for hours by not taking definitive action.

The second research question, “What is the residents’ of the community understanding of the symptoms of stroke and actions to be taken?” addressed the symptoms and what to do if a stroke occurs. Five of the questions in the community questionnaire addressed this research question. Considered as a group, nearly three quarters of the respondents generally understood the symptoms of a stroke and the need to seek immediate medical assistance. While the respondents to these questions indicated a general understanding, only two-thirds of the respondents in the “Under 25 year” age category expressed a similar understanding. Despite the fact that the majority of respondents understood the symptoms and what to do when a stroke occurs, the need to provide education is evident. Through education, the one-quarter who do not understand the symptoms of or reaction to a stroke could have a better knowledge of the problem. At the same time, this knowledge could be reinforced for those who already have an understanding.

The analysis of the questionnaire paid particular attention to the variations of the responses based on gender, age grouping and of both age and gender together. This work was based on the thought that the responses from these groups would point to a target audience that might benefit from a directed effort to reduce stroke. While the sampling for this questionnaire did not meet the desired response level and may not necessarily represent a true breakdown of the groups in the community, the variations between the groups demonstrated a common level of understanding. The results of this questionnaire seem to suggest that any education effort is widespread, across both genders and all age groups.

The third research question was, “What Pleasantview Fire Protection District resources could reduce the occurrence and impact of strokes in the community?”, which evaluated the ability of Pleasantview support a stroke education effort. To discover the steps currently being

taken within the community to reduce the occurrence and impact of stroke and the ability of Pleasantview to enhance this effort, four questions in the community questionnaire were designed to answer this research question.

The first two of these questions related to efforts that the respondents have already taken that could point to their risk of a stroke. Specifically, the two questions were, “I have had my blood pressure checked within the last year” and “I have had my cholesterol checked within the last year.” While nearly 90% of the respondents indicated that they had checked their blood pressure within the last year, less than 80% indicated that they had their cholesterol checked. These responses indicate that while the majority of the respondents at a minimum understand of their risk for a stroke, not all who know these risk factors are taking steps to identify and correct potential problems. It might be somewhat telling however, that only 90% of the respondents had checked their blood pressure within the last year as the surveys were administered at community events where paramedics from Pleasantview were offering to provide blood pressure checks at no cost. During these events, members of the community were encouraged by the paramedics to have their blood pressure checked. The fact that 10% of the respondents did not take advantage of this service would indicate the possible lack of understanding that high blood pressure is a risk factor for a stroke and a general misunderstanding of the risk factors for a stroke. This result further solidifies the need for community education.

The efforts of the fire service to improve the quality of life through education are tangible. Earlier, we noted that the education in the use of 9-1-1 in Pleasantview has substantially eliminated the need for a seven digit emergency number. While the education in the use of 9-1-1 was clearly not a successful endeavor solely through the efforts of the Pleasantview Fire Protection District, these efforts, combined with many other agencies

throughout the United States has led to a simple, effective and universally understood phone number to request emergency assistance. Many other examples of the fire service using education to improve quality of life exist, most notably the programs to promote installing and maintaining smoke detectors in the home.

Educating residents about stroke is something that Pleasantview is certainly capable of and may be accomplished at little cost. While the cost is minimal, the potential benefits are significant. In the questionnaire conducted for this project in the Pleasantview community, two questions addressed the community's confidence in the advice given by paramedics. Specifically, respondents were asked "If a paramedic told me I had a risk for a stroke, I would do something about it" and "If a paramedic told me that I needed to go to the hospital because I was having a stroke, I would go immediately." The respondents to the questionnaire overwhelmingly (96%) indicated that they would listen to the advice of the paramedic and take action. While this questionnaire can't be considered a reliable scientific sample, the incredibly positive result supports the notion that paramedics may be trusted by the community as reliable sources of information, particularly related to strokes.

The final research question, "How have other agencies engaged in reducing a community's occurrence and impact of strokes?" is an important question as we look forward to determine if steps taken by other organizations have accomplished a similar goal. The responses to this question indicate that a large and widespread international effort is underway to reduce strokes. In the United States, a number of significant public education campaigns are underway to raise the awareness of stroke. Many states have adopted or are in the process of adopting programs to identify the medical facilities capable of properly treating stroke patients. The education of paramedics in the proper treatment of the stroke patient is growing nationally.

While this specialized training shows great potential and will change the way stroke patients are treated, with education, the community has the ability to reduce the need for this treatment.

All of these efforts are very promising and necessary. However, of all the responses to multiple inquiries about stroke education programs administered through fire service organizations, very few demonstrated an ongoing effort to educate the residents in their community about strokes. Many responses indicated that they offer free blood pressure testing at both fire stations and community events. While taking a blood pressure is certainly important and a good first step, without further education, this simply might not be enough. Only one of the responses to these inquiries demonstrated any type of formalized stroke education program in their community. This program (Appendix I) included a lesson plan with important and succinct information about strokes. It appears to be easy to deliver and short enough to fit many community educational opportunities. While information is not available on the results of this program, the relative ease of use and low cost make this a very viable basis to begin the development of an educational effort.

The need to reduce the impact and severity of strokes is clear. Significant efforts are underway to manage the risk of stroke throughout the United States. States are enacting laws regarding stroke treatment centers and rules are being enacted to guide the paramedic's treatment of a stroke patient. With this comes the enforcement of these rules, ensuring that hospitals claiming to meet the requirements to treat strokes continue to meet these standards, as well as paramedics following the proper protocols when treating strokes. Engineering efforts to speed up the treatment of stroke, provide better equipment, and decrease the response time to stroke centers are ongoing. Economic incentives are in place to encourage hospitals to become recognized as stroke centers in some regions.

The effort to educate the public about strokes is gaining momentum. Through this research, it is clear that the fire service has the ability to contribute to this educational effort in a meaningful and real way. The education contributions by the fire service have the opportunity to make a very significant difference in the community by decreasing the impact and severity of a stroke. By providing education about the risk factors of strokes, thereby preventing a stroke, and by educating about what the symptoms of a stroke are and what to do if they occur, decreasing the time to definitive treatment, the fire service will be improving the quality of life for their community.

Recommendations

In light of the literary review, analysis of the community questionnaire and requests for information about existing stroke reduction programs, the need for an effort to reduce the occurrence and impact of stroke on the community is apparent. The ability of Pleasantview to participate in this effort is clear and the generally minimal resources needed to initiate such an effort are readily available.

As the primary stakeholder in this effort, the following recommendations are made to the Pleasantview Fire Protection District, as well as any other fire service agency interested in reducing the occurrence and impact of stroke.

1. Become aware of and continue to support the efforts of other agencies working to improve stroke care, particularly with the establishment of stroke treatment centers.
2. Encourage all the local hospitals to obtain and maintain certification as a primary stroke center.

3. Work with the EMS system to improve stroke treatment protocols, including procedures to outlining transportation directly to a primary stroke treatment center.
4. Develop a presentation for use by paramedics when meeting with community groups that addresses the risk factors, symptoms and reaction to a stroke.
5. Adapt the questionnaire used for this project and the corresponding answer sheet for use as an informational handout at community events.
6. Develop and deliver an educational program designed to provide the necessary tools to allow paramedics to be comfortable in delivering information about strokes throughout the community.
7. Implement a method to monitor the delivery of the stroke presentation and other community education events.
8. Perform additional research to determine the actual occurrence of stroke in the Pleasantview Fire Protection District.
9. Conduct an analysis of the occurrence of strokes and the delivery of stroke education within the Pleasantview Fire Protection District.

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Appendix A – Fifteen Year Incident Trend

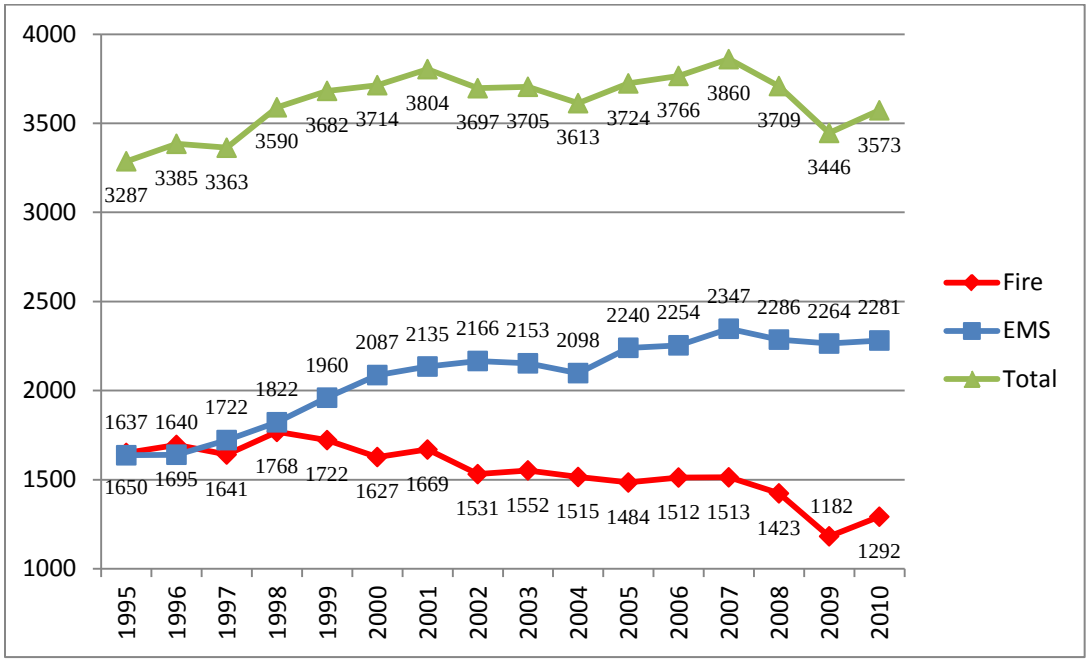
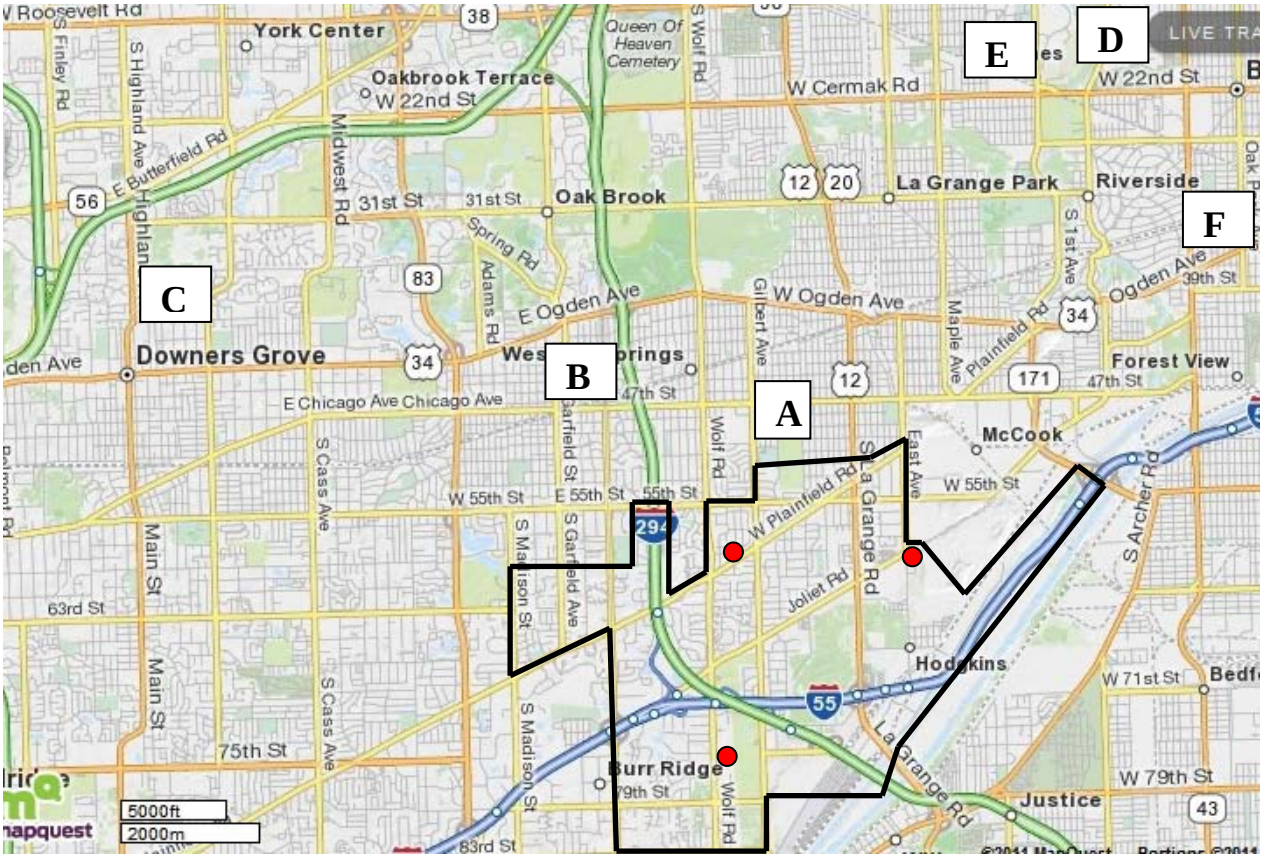


Figure A: Fifteen year incident trend including all incidents as well as fire and EMS incidents broken out separately demonstrating the increase in the number of all incidents and the decrease in fire responses (Pleasantview Fire Protection District, 2011).

Year	Fire	Fire %	EMS	EMS %	Total	Change in total incidents
1995	1650	50%	1637	50%	3287	N/A
1996	1695	50%	1640	48%	3385	+2.90%
1997	1641	49%	1722	51%	3363	-0.65%
1998	1768	49%	1822	51%	3590	+6.32%
1999	1722	47%	1960	53%	3682	+2.50%
2000	1627	44%	2087	56%	3714	+0.86%
2001	1669	44%	2135	56%	3804	+2.37%
2002	1531	41%	2166	59%	3697	-2.89%
2003	1552	42%	2153	58%	3705	+0.22%
2004	1515	42%	2098	58%	3613	-2.55%
2005	1484	40%	2240	60%	3724	+2.98%
2006	1512	40%	2254	60%	3766	+1.12%
2007	1513	39%	2347	61%	3860	+2.44%
2008	1423	38%	2286	62%	3709	-4.07%
2009	1182	34%	2264	66%	3446	-7.63%
2010	1292	36%	2281	64%	3573	+3.55%
					Overall Change	+8.00%

Table A: Actual incident counts with percent of the total and percent change in total incidents for the previous fifteen years (Pleasantview Fire Protection District, 2011).

Appendix B – Transport Hospital Locations



Pleasantview Fire District Border

Pleasantview Fire Stations

A Adventist LaGrange Memorial Hospital

B Adventist Hinsdale Hospital – Primary Stroke Center Accredited

C Advocate Good Samaritan Hospital – Primary Stroke Center Accredited

D Loyola University Medical Center – Primary Stroke Center Accredited

E Hines VA Hospital

F MacNeal Memorial Hospital – Primary Stroke Center Accredited

Figure B: Demonstration of the Pleasantview Fire Protection District and approved transport hospitals with primary stroke center accreditation through (Joint Commission, 2011).

Appendix C – EMS Transports

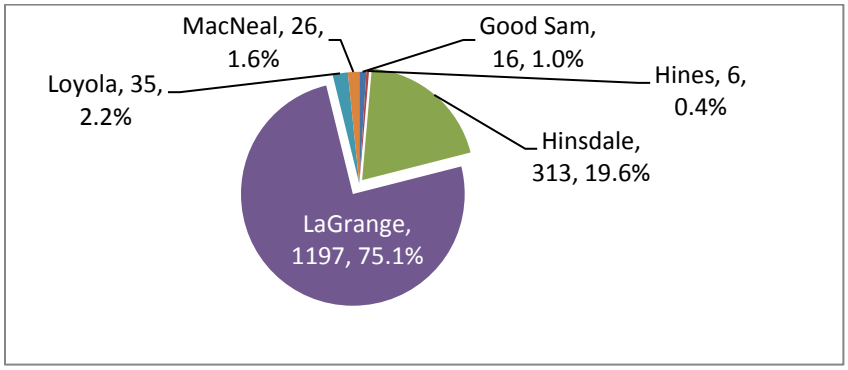


Figure C: Pleasantview EMS transport destination for 2010 demonstrating number of patients transported and percent of total (Pleasantview Fire Protection District, 2011).

Provider Impression	# of Runs	% of Runs	Provider Impression	# of Runs	% of Runs
Abdominal Pain / Problems	32	3.10%	**Migraine**	**2**	**0.19%**
Airway Obstruction	2	0.19%	Nausea/Vomiting (Unknown Etiology)	22	2.13%
Allergic Reaction	11	1.06%	**Near Syncope**	**4**	**0.39%**
Altered Level of Consciousness	**32**	**3.10%**	No Apparent Illness / Injury	39	3.78%
Asthma	11	1.06%	Non-Asthma COPD	7	0.68%
Back Pain (Non-Traumatic)	10	0.97%	OB / Pregnancy Complications	2	0.19%
Behavioral/Psychiatric Disorder	**12**	**1.16%**	Other	71	6.87%
Bowel Obstruction	2	0.19%	**Other Cardiovascular Problem**	**3**	**0.29%**
Cancer	2	0.19%	Other GU Problems	1	0.10%
Cardiac Arrest	13	1.26%	Other Illness/Injury	37	3.58%
Cardiac Rhythm Disturbance	11	1.06%	Other OB/Gyn	1	0.10%
Chest Pain or Discomfort	93	9.00%	Pain	98	9.49%
CHF (Congestive Heart Failure)	4	0.39%	Poisoning / Drug Ingestion	9	0.87%
Dehydration	8	0.77%	Respiratory Arrest	1	0.10%
Diabetic Hyperglycemia	6	0.58%	Respiratory Distress	50	4.84%
Diabetic Hypoglycemia	7	0.68%	**Seizure**	**35**	**3.39%**
Diarrhea	5	0.48%	Sepsis	2	0.19%
Dizziness / Vertigo	**13**	**1.26%**	**Stroke/CVA**	**16**	**1.55%**
Epistaxis (Non-Traumatic)	**3**	**0.29%**	Substance/Drug Abuse	1	0.10%
ETOH Abuse	24	2.32%	**Syncope/Fainting**	**42**	**4.07%**
Fever	7	0.68%	**TIA (Transient Ischemic Attack)**	**4**	**0.39%**
G.I. Bleed	4	0.39%	Traumatic Injury	92	8.91%
General Malaise	**8**	**0.77%**	**Unconscious (Unknown Etiology)**	**13**	**1.26%**
Headache	**6**	**0.58%**	Unknown Problem	12	1.16%
Hypertension	**13**	**1.26%**	Vaginal Hemorrhage	1	0.10%
Hypotension	7	0.68%	**Weakness**	**122**	**11.81%**
			Total	**1033**	**100%**

Table C: Patients transported by provider impression during 2010, bolded conditions were considered as possible stroke patients consisting of 312 possible patients (Pleasantview Fire Protection District, 2011).

Appendix D - Research Questionnaire

This is a short questionnaire about strokes.
All answers are completely confidential and we will never ask for your name. Please circle the best answer.

My age is: Under 25 25-34 35-44 45-54 55-64 65 or older
I am a: Male Female

True False Over 80% of all strokes in the United States occur in persons over 65 years old.
True False Women are more likely to experience a stroke than a man.
True False People who smoke have double the risk of having a stroke.
True False The most important stroke risk factor that can be changed is high cholesterol.
True False The best thing you can do to prevent a stroke is to live a healthy lifestyle including regular exercise, eating well and avoiding tobacco.
True False The main symptom of most strokes is a sudden severe headache.
True False Symptoms of strokes include sudden dizziness and sudden problems moving arms or legs.
True False If you experience stroke symptoms and they go away within an hour, you should monitor yourself for a while.
True False If you experience stroke symptoms you should call your doctor for an appointment.
True False Most people who have a stroke don't survive more than 90 days.
True False I have had my Blood Pressure checked within the last year.
True False I have had my Cholesterol checked within the last year.
True False If a paramedic told me I had a risk factor for a stroke, I would do something about it.
True False If a paramedic told me that I needed to go to the hospital because I might be having a stroke, I would go immediately.

Thank you for your help!

Appendix E – Questionnaire Answers

Thanks for taking our short questionnaire about strokes. Here is a little information on strokes.
False Over 80% of all strokes in the United States occur in persons over 65 years old. Stroke can happen to anyone at any time, regardless of race, sex or age. Annually, about 40% of all stroke victims are under 65 years old.

True Women are more likely to experience a stroke than a man. Approximately 55,000 more women than men have a stroke each year. Depending on age, women may have a 50% greater risk of stroke than men. Women accounted for about 60% of US stroke deaths annually.

True People who smoke have double the risk of having a stroke. Smoking doubles the risk for stroke when compared to a nonsmoker. It reduces the amount of oxygen in the blood, causing the heart to work harder and allowing blood clots to form more easily. Smoking also increases the amount of build-up in the arteries, which may block the flow of blood to the brain, causing a stroke. The good news is that smoking-induced strokes and overall stroke risk can greatly reduced by quitting smoking.

False The most important stroke risk factor that can be changed is high cholesterol. High blood pressure is a leading cause of stroke. Consult your doctor if the higher number is above 135 or if the lower number is over 85. Doctors have long called high blood pressure "the silent killer" because a person can have high blood pressure and never have any symptoms. High blood pressure is one of the most common causes of stroke because it puts unnecessary stress on blood vessel walls, causing them to thicken and deteriorate, which can eventually lead to a stroke.

True The best thing you can do to prevent a stroke is to live a healthy lifestyle including regular exercise, eating well and avoiding tobacco. *Lifestyle stroke risk factors include:* Smoking, being overweight and drinking too much alcohol. You can control these lifestyle risk factors by quitting smoking, exercising regularly, watching what and how much you eat and limiting alcohol consumption.

False The main symptom of most strokes is a sudden severe headache. While a sudden severe headache may be a symptom of a certain type of stroke, up to 80% of all stroke victims experience little or no headache.

True Symptoms of strokes include sudden dizziness and sudden problems moving arms or legs. Common stroke symptoms include: Sudden numbness or weakness of the face, arm or leg – especially on one side of the body; sudden confusion, trouble speaking or understanding; sudden trouble seeing in one or both eyes; sudden trouble walking, dizziness, loss of balance or coordination; and sudden severe headache with no known cause.

False If you experience stroke symptoms and they go away within an hour, you should monitor yourself for a while. If symptoms appear for only a very short period of time and then disappear, you may be experiencing a TIA. It's important to call 911 whenever you experience any stroke symptom because there is emergency medical treatment available that could save your life.

False If you experience stroke symptoms you should call your doctor for an appointment. Two million brain cells die every minute during stroke, increasing risk of permanent brain damage, disability or death. Recognizing the symptoms and **acting fast** to get medical attention can save a life and limit disabilities. Learning stroke symptoms—and acting FAST when they occur—could save your life or the life of a loved one. Remember that: Stroke Strikes Fast. You Should Too. Call 9-1-1.

False Most people who have a stroke don't survive more than 90 days. Typically, less than 20% of stroke victims die in the first 90 days. Up to 70% of stroke survivors regain functional independence, but 30% are permanently disabled, and 20% require institutional long term care.

Remember: Know the stroke symptoms! Call 9-1-1 immediately if you might be having a stroke!
(Quiz questions and answers compiled from information at www.stroke.org and www.strokeassociation.org)

Appendix F – Raw Survey Data

No			1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	E 55-64	M	T	T	T	T	T	T	T	F	T	T	T	F	T	T
2	C 35-44	M	F	T	F	F	F	F	F	F	F	F	F	F	F	F
3	E 55-64	F	T	T	T	T	T	F	T	T	F	F	T	T	T	T
4	D 45-54	F	F	F	T	T	T	T	T	F	F	F	T	T	T	T
5	E 55-64	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
6	E 55-64	F	T	T	T	F	T	F	T	T	T	F	T	T	T	T
7	D 45-54	F	T	F	T	T	T	F	T	T	T	T	T	T	T	T
8	E 55-64	F	F	T	T	T	T	F	T	T	F	F	T	T	T	T
9	E 55-64	M	T	F	T	T	T	T	T	F	T	F	F	F	T	F
10	D 45-54	F	F	T	T	T	T	F	T	T	T	F	F	F	T	T
11	D 45-54	F	F	T	F	T	T	F	T	F	F	F	T	T	T	T
12	E 55-64	F	F	F	T	T	T	F	T	T	T	F	T	T	T	T
13	A Under 25	F	T	F	T	T	T	T	T	F	T	F	T	T	T	T
14	E 55-64	F	F	T	T	F	T	F	T	F	F	F	T	T	X	X
15	B 25-34	M	T	F	T	F	T	F	T	F	T	F	T	F	T	T
16	E 55-64	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
17	E 55-64	M	T	F	F	T	T	F	T	F	T	F	T	T	T	T
18	F 65+	F	F	F	T	F	T	F	T	F	F	F	T	T	T	T
19	E 55-64	M	F	T	T	F	T	F	T	F	F	F	T	T	T	T
20	C 35-44	F	F	T	T	F	T	F	T	F	T	F	T	T	T	T
21	E 55-64	F	T	F	T	T	T	F	T	T	F	F	T	T	T	T
22	F 65+	F	T	F	T	T	T	T	T	T	T	F	T	T	T	T
23	B 25-34	M	T	T	T	T	T	T	T	T	T	F	T	T	T	T
24	E 55-64	F	F	T	T	T	T	T	T	T	T	T	T	T	T	T
25	C 35-44	F	F	T	T	F	T	T	T	F	F	F	T	T	T	T
26	D 45-54	X	F	T	T	F	T	T	T	T	F	F	T	T	T	T
27	C 35-44	F	F	T	T	T	T	T	T	F	F	F	T	T	T	T
28	B 25-34	F	T	T	T	T	T	F	T	F	F	F	T	T	T	T
29	B 25-34	F	T	T	T	T	T	F	T	F	F	F	T	F	T	T
30	D 45-54	M	T	F	T	F	T	F	T	T	T	F	T	T	T	T
31	E 55-64	M	F	F	T	T	T	F	T	F	F	F	T	T	T	T
32	A Under 25	M	F	F	T	F	T	T	T	F	T	F	F	F	F	T
33	C 35-44	F	F	F	F	F	F	T	F	T	F	F	F	F	T	F	T
34	C 35-44	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
35	D 45-54	F	F	T	T	F	T	F	T	F	F	F	T	T	T	T
36	A Under 25	F	F	F	T	T	T	F	T	F	T	F	F	F	T	T
37	E 55-64	M	F	T	T	T	T	F	T	T	F	F	T	T	T	T
38	F 65+	F	T	T	T	T	T	F	T	T	T	F	T	T	T	T
39	F 65+	F	T	F	T	T	T	F	T	F	F	F	T	T	T	T
40	E 55-64	F	F	T	T	F	T	F	T	F	F	F	T	T	T	T
41	F 65+	F	F	F	T	T	T	T	T	T	T	F	T	T	T	T
42	A Under 25	M	T	F	T	F	T	F	T	T	F	F	T	F	T	T

43	D 45-54	M	F	T	T	T	T	F	T	F	F	F	T	T	T	T
44	A Under 25	F	F	T	T	T	T	T	T	T	T	F	T	F	T	T
45	C 35-44	F	F	T	T	T	T	T	T	T	T	F	T	T	T	T
46	F 65+	M	F	F	T	F	T	F	T	T	T	F	T	T	T	T
47	F 65+	F	F	F	F	T	T	T	T	T	F	F	F	T	T	T	T
48	F 65+	F	F	T	T	F	T	T	F	T	T	F	T	T	T	T
49	A Under 25	F	T	F	T	F	T	T	F	T	T	F	F	F	T	T
50	F 65+	F	F	F	F	T	T	T	F	T	T	F	F	T	T	T	T
51	F 65+	F	T	F	T	T	T	T	T	T	T	F	T	T	T	T
52	F 65+	F	T	T	T	X	T	T	T	F	F	F	T	T	T	T
53	D 45-54	F	F	T	T	T	T	F	F	T	T	F	T	T	T	T
54	F 65+	F	F	T	T	T	T	T	T	F	F	F	T	T	T	T
55	F 65+	M	F	T	T	T	T	F	T	T	F	F	T	T	T	T
56	F 65+	F	F	F	T	T	T	T	T	F	T	F	T	T	T	T
57	E 55-64	F	F	T	T	F	T	F	T	T	T	F	T	T	T	T
58	D 45-54	F	T	T	T	T	T	T	T	F	F	F	T	T	T	T
59	B 25-34	F	T	T	T	T	T	F	T	F	F	F	T	T	T	T
60	C 35-44	F	T	F	T	T	T	F	T	T	T	F	T	T	T	T
61	F 65+	F	T	T	T	T	T	T	T	T	F	F	T	T	T	T
62	E 55-64	M	T	F	T	T	T	T	T	T	T	T	T	T	T	T
63	E 55-64	F	T	T	T	T	T	F	F	F	T	F	T	F	T	T
64	D 45-54	F	F	T	F	F	T	F	T	F	F	F	T	T	T	T
65	D 45-54	M	F	F	T	F	T	F	T	F	T	F	T	T	T	T
66	C 35-44	F	F	T	T	T	F	F	T	F	T	T	T	T	T	T
67	D 45-54	F	T	F	T	T	T	T	T	T	T	F	T	F	T	T
68	F 65+	F	T	F	T	T	T	F	T	F	F	F	T	T	T	T
69	D 45-54	M	F	T	T	T	T	T	T	F	T	F	T	T	T	T
70	D 45-54	F	T	F	T	T	T	T	T	T	T	F	T	T	T	T
71	C 35-44	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
72	D 45-54	F	F	T	T	F	T	F	T	F	F	F	T	T	T	T
73	A Under 25	F	F	F	T	T	T	F	T	F	T	F	F	F	T	T
74	E 55-64	M	F	T	T	T	T	F	T	T	F	F	T	T	T	T
75	F 65+	F	T	T	T	T	T	F	T	T	T	F	T	T	T	T
76	F 65+	F	T	F	T	T	T	F	T	F	F	F	T	T	T	T
77	E 55-64	F	F	T	T	F	T	F	T	F	F	F	T	T	T	T
78	F 65+	F	F	F	T	T	T	T	T	T	T	F	T	T	T	T
79	A Under 25	M	T	F	T	F	T	F	T	T	F	F	T	F	T	T
80	D 45-54	M	F	T	T	T	T	F	T	F	F	F	T	T	T	T
81	A Under 25	F	F	T	T	T	T	T	T	T	T	F	T	F	T	T
82	C 35-44	F	F	T	T	T	T	T	T	T	T	F	T	T	T	T
83	F 65+	M	F	F	T	F	T	F	T	T	T	F	T	T	T	T
84	F 65+	F	F	F	F	T	T	T	T	T	F	F	F	T	T	T	T
85	F 65+	F	F	T	T	F	T	T	F	T	T	F	T	T	T	T
86	F 65+	F	T	F	T	T	T	F	T	F	F	F	T	T	T	T
87	D 45-54	M	F	T	T	T	T	T	T	F	T	F	T	T	T	T

88	D 45-54	F	T	F	T	T	T	T	T	T	T	F	T	T	T	T
89	C 35-44	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
90	D 45-54	F	F	T	T	F	T	F	T	F	F	F	T	T	T	T
91	A Under 25	F	F	F	T	T	T	F	T	F	T	F	F	F	T	T
92	E 55-64	M	F	T	T	T	T	F	T	T	F	F	T	T	T	T
93	D 45-54	F	T	F	T	T	T	F	T	T	T	T	T	T	T	T
94	E 55-64	M	T	F	T	T	T	T	T	F	T	F	F	F	T	F
95	E 55-64	F	F	F	T	T	T	F	T	T	T	F	T	T	T	T
96	B 25-34	M	T	F	T	F	T	F	T	F	T	F	T	F	T	T
97	E 55-64	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
98	F 65+	F	F	F	T	F	T	F	T	F	F	F	T	T	T	T
99	C 35-44	F	F	T	T	F	T	F	T	F	T	F	T	T	T	T
100	F 65+	F	T	F	T	T	T	T	T	T	T	F	T	T	T	T
101	C 35-44	F	F	T	T	T	T	T	T	F	F	F	T	T	T	T
102	A Under 25	F	F	F	T	T	T	F	T	F	T	F	F	F	T	T
103	A Under 25	M	T	F	T	F	T	F	T	T	F	F	T	F	T	T
104	D 45-54	M	F	T	T	T	T	F	T	F	F	F	T	T	T	T
105	C 35-44	M	F	T	F	F	F	F	F	F	F	F	F	F	F	F
106	A Under 25	M	T	F	T	F	T	F	T	T	F	F	T	F	T	T
107	D 45-54	M	F	T	T	T	T	F	T	F	F	F	T	T	T	T
108	D 45-54	F	T	F	T	T	T	T	T	T	T	F	T	T	T	T
109	C 35-44	F	F	T	T	T	T	F	T	F	F	F	T	T	T	T
110	D 45-54	F	F	T	T	F	T	F	T	F	F	F	T	T	T	T
111	F 65+	F	F	F	T	F	T	F	T	F	F	F	T	T	T	T

AGE GROUPS	COUNT BY AGE	COUNT BY GENDER	QUESTION NUMBER WITH TRUE THEN FALSE RESPONSES													
			1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	13	31 MALE	41	**61**	**105**	75	**108**	38	**104**	47	53	6	**99**	**88**	**106**	**106**
B	6	79 FEMALE	**70**	50	6	**35**	3	**73**	7	**64**	**58**	**105**	12	23	4	4
C	16	110 TOTAL	111	111	111	110	111	111	111	111	111	111	111	111	110	110
D	25		PERCENT OF CORRECT RESPONSES													
E	25		63%	55%	95%	32%	97%	66%	94%	58%	52%	95%	89%	79%	96%	96%
F	26															
Total	111															

Table F: Raw data from the stroke questionnaire administered to the Pleasantview community during May and June 2011. Age classifications include: A-Under 25, B-25 to 34, C-35 to 44, D-45 to 54, E-55 to 64, and F-65 and older. Number of correct responses bolded for each question.

Appendix G – Email from James Wilson

From: James Wilson
Sent: Fri 4/29/2011 7:30 AM
To: John Buckley
Subject: RE: Ask the Expert

Good Morning John,

For the strokes, here in Florida there is a huge initiative that is coming out that centers on both strokes and heart attacks. And it heavily involves fire departments and EMS.

Basically the State of Florida Department of Health, the regulatory body here for EMS, took the idea from the American Heart Association. The entire idea centers on gathering data and then coming up with a plan on improving patient outcomes. I serve on the State Stroke Committee and the State Sudden Cardiac Arrest Committee so the info I am passing along to you is up-to-date as to the status. I will stay focused on the stroke side since this is the focal point of your paper.

Hospitals here in Florida have to achieve "stroke receipt status". There are various kinds of stroke receiving facilities; basic and comprehensive. The basic facilities can diagnose via CT, perform foundation treatment if the stroke is ischemic based, and arrange transport to comprehensive. The comprehensive centers literally do everything; from arterial ablation to rehabilitation, the comprehensive centers are far more capable. And this is where EMS comes in.

Statewide we perform a Cincinnati Prehispital Stroke Scale exam and, based on this finding, the patient's level of consciousness, their vital signs, and past medical history, the EMS crew initiates a "Stroke Alert" and declares the intended receiving facility. That facility is notified and, per state guidelines, is supposed to have three things at the ready:
1. A CT technician.
2. A radiologist to read the CT.
3. A neurologist to perform treatment.

If the facility is incapable, for whatever reason, to provide any of the three fundamentals, they notify the EMS unit and the patient is diverted to the next closest stroke receiving hospital. Those patients with whom there is a suspicion of a bleed are taken to comprehensive centers because of their capability to perform ablation.

Basically, at state level, certain parameters are being measured in order to determine if we are positively affecting patient outcomes. The primary parameters measured are:
1. Onset to recognition time.
2. EMS/Fire dispatch, response, and on scene times.
3. Time to EMS recognition and Stroke Alert.
4. Transport time.
5. Door to treatment time.
6. Final patient outcome.

The goals of the future center on patient education (public advertising spots are already being aired about the warning signs of stroke and summoning assistance early) and also center on more aggressive care in the field. While it is highly unlikely that TPA would be carried or administered by EMS crews, just the fact that most EMS and Fire crews are "batting 1000" when it comes to recognition and reaction is saving time and lives.

Jim

Appendix H – TRADENET Request

Welcome to TRADENET: TRADE's Training Network

A National Fire Academy Sponsored Activity

Month Day, 2010

Hello folks,

I apologize for the tardiness of this publication. I was involved in one of the best FESHE conferences ever.

Member Requests for Information

1.

While many EMS agencies are working to improve training for the treatment of possible stroke patients, we would like to hear about any other efforts that EMS agencies are undertaking to reduce the occurrence or impact of stroke in their communities.

Thanks in advance for any ideas.

John Buckley

Pleasantview FPD

LaGrange IL

jbuckley@plvw.org

Appendix I – Delray FL FD Stroke Presentation

STROKE/Transient Ischemic Attack (TIA)

I. Objectives:

At the end of the talk, the audience should understand the following:

1. Define and describe what a stroke is

2. The primary controllable and uncontrollable factors that put one at risk for stroke/TIA

3. Understanding signs and symptoms of a stroke

II. Materials

1. Blood Pressure Cuff

2. Blood Pressure Cards

3. Handouts

III. Lesson Material:

STEP 1: Introduction and Outline of 15 minute presentation

Content: Introduce yourself. Explain they you are a Firefighter/Paramedic/EMT from Delray Beach Fire-Rescue and will spend the next 15 minutes talking about Stroke.

1. Acknowledge that an issue like Stroke is not going to be the most important thing in their daily lives, especially when they might have other concerns in their daily life.
2. The purpose of the talk in NOT to make people worry about one more thing, or to tell them what to do

The purpose is to:

- Give them the information they need to make educated decision about their own health.

- To raise awareness about an issue like Stroke, since many residents and visitors may be at risk for this or may have had a stroke.
- Show the community that we care about their wellbeing

Step 2: Assess the audience knowledge of Stroke and TIA

Content: Ask the audience: "What do you know about Strokes and TIA's?" and "What questions do you have that you would like to have us answer tonight?"

Helpful Hints:

• Write the audience's statements or questions on the dry eraser board or easel with paper so that you may address each one at some point during your talk.

• Opening the talk with ideas and questions from the audience will accomplish several things. First, it may give you a better idea of where the audience is at in their understanding of hypertension, thereby guiding the content and complexity of your talk. Second, it may help to establish some rapport with the audience, since the talk will address their specific interests.

• If an audience member states a belief that is incorrect, be careful not to embarrass them in front of the group by saying they're wrong. Say something like "I'm glad you said that because MANY people believe that statement to be true. But in fact, XYZ is true. One of the things we can talk about tonight is why XYZ is true."

• If there is a question to which you do not know the answer, simply say that you don't know. If you have time, you might look up the correct answer and offer to get back with them to talk.

Step 3: Explain the concept of a Stroke or TIA

Content information provided from: www.americanheart.org

What Are the Types of Stroke?

Clot (Ischemic) | Bleed (Hemorrhagic) | TIA (Transient Ischemic Attack)

If we consider an isolated blood vessel, blood flow to the brain tissue can be hampered in two ways:

1. the vessel clogs within (ischemic stroke)
2. the vessel ruptures, causing blood to leak into the brain (hemorrhagic stroke)

Ischemic

click to enlarge

Ischemic stroke accounts for about 83 percent of all cases.

Ischemic strokes occur as a result of an obstruction within a blood vessel supplying blood to the brain. The underlying condition for this type of obstruction is the development of fatty deposits lining the vessel walls. This condition is called atherosclerosis. These fatty deposits can cause two types of obstruction:

Cerebral thrombosis refers to a thrombus (blood clot) that develops at the clogged part of the vessel.

Cerebral embolism refers generally to a blood clot that forms at another location in the circulatory system, usually the heart and large arteries of the upper chest and neck. A portion of the blood clot breaks loose, enters the bloodstream and travels through the brain's blood vessels until it reaches vessels too small to let it pass. A second important cause of embolism is an irregular heartbeat, known as atrial fibrillation. It creates conditions where clots can form in the heart, dislodge and travel to the brain.

Hemorrhagic

Hemorrhagic stroke accounts for about 17 percent of stroke cases.

It results from a weakened vessel that ruptures and bleeds into the surrounding brain. The blood accumulates and compresses the surrounding brain tissue. The two types of hemorrhagic strokes are intracerebral hemorrhage or subarachnoid hemorrhage.

Hemorrhagic stroke occurs when a weakened blood vessel ruptures. Two types of weakened blood vessels usually cause hemorrhagic stroke: aneurysms and arteriovenous malformations (AVMs).

An *aneurysm* is a ballooning of a weakened region of a blood vessel. If left untreated, the aneurysm continues to weaken until it ruptures and bleeds into the brain.

An *arteriovenous malformation* (AVM) is a cluster of abnormally formed blood vessels. Any one of these vessels can rupture, also causing bleeding into the brain.

Transient ischemic attacks

Also called TIAs, transient ischemic attacks are minor or warning strokes. In a TIA, conditions indicative of an ischemic stroke are present and the typical stroke warning signs develop. However, the obstruction (blood clot) occurs for a short time and tends to resolve itself through normal mechanisms.

Even though the symptoms disappear after a short time, TIAs are strong indicators of a possible major stroke. Steps should be taken immediately to prevent a stroke.

Step 4: Explain the Risk Factors for a Stroke

Atrial Fibrillation

In atrial fibrillation, the upper chambers of the heart (the atria) quiver instead of beating effectively to move blood into the

ventricle. Your chances of having a stroke are five times higher if you have atrial fibrillation.

Common Risk Factors

Risk factors are traits and lifestyle habits that increase the risk of disease. Extensive clinical and statistical studies have identified several factors that increase the risk of stroke. Most of them can be modified, treated or controlled. Some can't.

Heart disease and stroke is a major health risk for all people. But African Americans are at particularly high risk. Heart disease and stroke are major health risks for all people. But African Americans are at particularly high risk.

Consider this:

- Blacks have almost twice the risk of first-ever strokes compared to whites.
- Blacks have higher death rates for stroke compared to whites.
- The prevalence of high blood pressure in African Americans in the United States is the highest in the world.
- Among non-Hispanic blacks age 20 and older, 62.9 percent of men and 77.2 percent of women are overweight or obese.
- In 2001, 27.7 percent of black or African-Americans only, used any tobacco product. Heavy cigarette smoking approximately doubles a person's risk for stroke when compared to light smokers..
- Black women have higher prevalence rates of high blood pressure, obesity, physical inactivity, and diabetes than white women.

Stroke among Hispanics

Stroke is the fourth-leading cause of death among Hispanics. One study found that hemorrhagic strokes occurred more commonly in Hispanics than in any other sub-group.

Hidden Risk Factors for Women

This year, more than 100,000 U.S. women under 65 will have a stroke. Stroke is not a geriatric disease. And it's not confined to elderly overweight smokers who have high blood pressure or high cholesterol.

How Cardiovascular & Stroke Risks Relate

Both coronary heart disease and stroke share many of the same risk factors such as cholesterol disorders, high blood pressure, smoking, diabetes, physical inactivity, and being overweight or obese

click to enlarge

Controlling Risky Conditions

Blood Pressure and its Relationship to Stroke

High blood pressure is the leading modifiable risk factor in ischemic and hemorrhagic strokes. It also contributes to heart attacks, heart failure, kidney failure and atherosclerosis (fatty buildups in arteries).

Atrial Fibrillation

In atrial fibrillation, the upper chambers of the heart (the atria) quiver instead of beating effectively to move blood into the ventricle. Your chances of having a stroke are five times higher if you have atrial fibrillation.

Anti-Clotting Agents Explained

Ant platelet and anticoagulant therapies are at the heart of preventing recurrent strokes.

NOTE: Medication must be taken on a daily basis and do not stop taking any prescribed medication unless directed by your physician

Step 5: Signs and Symptoms of a Stroke/TIA

- Sudden numbness or weakness of the face, arm or leg, especially on one side of the body
- Sudden confusion, trouble speaking or understanding
- Sudden trouble seeing in one or both eyes
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden, severe headache with no known cause

When you or someone else is having a stroke, every minute counts. If you're having any of the stroke warning signs, you want to know that you are going to a facility that can help you as quickly as possible

Step 6: Ask the audience if they have any questions and conclude the presentation

Lesson plan adapted from: www.americanheart.org

Note: Program obtained from Delray Beach Florida Fire Department at *from http://www.mydelraybeach.com/Delray/Departments/Fire-Rescue/Education/Fire+Station+Community+Education+Program.htm.*