

IMPROVING STROKE CARE AND PATIENT OUTCOMES IN A RURAL MINNESOTA
HOSPITAL

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DOCTOR OF NURSING PRACTICE

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ABSTRACT

Approximately 795,000 Americans suffer from a stroke each year which results in about 25% of these patients dying, and 15–30% remain permanently disabled. The direct and indirect costs of stroke care exceed \$73 billion annually with more than a million Americans and their families dealing with the aftermath. To help reduce the nation's stroke burden, beyond the efforts to prevent strokes, the quality of care provided to stroke patients needs to improve in order to reduce death and disability from these events (American Stroke Association [ASA], 2011). The National Stroke Association (NSA), American Stroke Association (ASA), and Institute of Medicine (IOM), have collaborated and developed guidelines specifically called a stroke system, to help reduce the nation's stroke burden. The stroke system addresses primordial and primary prevention, community education, pre-hospital services, acute stroke treatment, sub-acute care, secondary prevention, rehabilitation, and evaluation of care.

The purpose of the project was in collaboration with Douglas County Hospital (DCH) to conduct a practice improvement project to implement and evaluate the voluntary Minnesota Department of Health (MDH) Acute Stroke Ready Hospital Designation (ASRH). The project specifically addresses the vulnerable rural population in Douglas County. The acute stroke ready hospital designation process is the principal component of the Minnesota Stroke System.

Previously DCH in Alexandria, Minnesota did not have a stroke designation. In addition, the DCH facility did not utilize a national stroke registry to track stroke outcomes. Both of these facts contributed to DCH not adhering to the national and state evidence based standards for stroke care. Ultimately, as a result of this project, DCH will both practice and document in adherence to national and state evidence based standards for stroke.

Upon successful completion of the project, DCH was awarded a three year acute stroke hospital designation and became part of the national stroke registry program. As a result of becoming a designated stroke facility and participation in the national stroke registry, DCH is now a participant in the MDH State wide initiative to improve systems of stroke care.

ACKNOWLEDGEMENTS

There are a few people that undoubtedly deserve acknowledgement for their roles in the completion of this project. I would like to first thank my committee chair, Dr. Dean Gross. He provided patience and guidance while working with my through the entirety of the project. I would also like to thank Minnesota Department of Health; they were an invaluable asset to me with each step of the project. They were certainly an instrumental reason the project was successful. I know they will continue to work with hospitals in Minnesota to reach the goal of improved stroke care and patient outcomes.

DEDICATION

I dedicate this project to my supportive and loving husband and family. I owe so much of my success to their endless encouragement and support.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	v
DEDICATION	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
CHAPTER ONE. INTRODUCTION.....	1
Background and Significance.....	1
Needs Assessment.....	3
Objectives and Purpose.....	7
CHAPTER TWO. LITERATURE REVIEW	9
Introduction.....	9
Theoretical and Conceptual Framework.....	12
Congruence of the Project to the Organization’s Strategic Goals.....	17
CHAPTER THREE. PROJECT OBJECTIVES AND DESIGN.....	18
Project Objectives.....	18
Project Timeline.....	18
Protection of Human Subjects	21
CHAPTER FOUR. EVALUATION.....	23
Objective One.....	24
Objective Two.....	24
Objective Three.....	25
Conclusion.....	26
CHAPTER FIVE. RESULTS	28
Presentation of Findings.....	28

CHAPTER SIX. DISCUSSION AND RECOMMENDATIONS	32
Interpretation of Results.....	32
Limitations.....	32
Recommendations.....	34
Implications for Practice.....	35
Implications for Future Practice.....	36
Conclusion.....	37
REFERENCES	39
APPENDIX A. APPLICATION REQUIREMENTS.....	41
APPENDIX B. IRB APPROVAL LETTER	42
APPENDIX C. PERMISSION FOR IOWA MODEL	43
APPENDIX D. IOWA MODEL.....	44
APPENDIX E. 10 STROKE CORE MEASURES.....	45
APPENDIX F. STROKE CODE TEAM POLICY	46

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Stroke Team	13
2. Two Sample T-Test.....	29

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Diffusion of Innovation Model.....	15

CHAPTER ONE. INTRODUCTION

Background and Significance

Approximately 795,000 Americans suffer from a stroke each year which results in about 25% of these patients dying, and 15–30% remain permanently disabled. Disabilities suffered from stroke leaves more than a million Americans and their families dealing with the aftermath each year. The direct and indirect costs of stroke care exceed \$73 billion annually in the United States. To help reduce the nation's stroke burden, beyond the sustained efforts by providers to prevent strokes, is the quality of care provided to stroke patients needs to improve in order to reduce death and disability from these events (American Stroke Association [ASA], 2011). The National Stroke Association (NSA), American Stroke Association (ASA), and Institute of Medicine (IOM), have collaborated and developed guidelines specifically called a stroke system, to help reduce the nation's stroke burden. The stroke system addresses primordial and primary prevention, community education, pre-hospital services, acute stroke treatment, sub-acute care, secondary prevention, rehabilitation, and evaluation of care.

Evidence-based medical guidelines for stroke care have been developed, with new and improved diagnostic and treatment tools. However, a persistent national and state wide problem is that many hospitals still do not have the organization, staff, and equipment to timely and effectively diagnose and treat acute stroke patients (ASA, 2011). Fragmented or delayed stroke care can lead to worsened stroke outcomes and ultimately lead to death from stroke (Minnesota Department of Health [MDH], 2014).

Stroke is more than a national issue, stroke affects Minnesotans lives daily. The total inpatient hospitalization costs for stroke remain higher when compared to any other disease conditions in Minnesota. Also, the average Minnesotan lives 60 miles from the closest primary

or comprehensive stroke facility which can delay stroke care (MDH, 2014). The national stroke guidelines encourage individual states to take these guidelines and implement them in a state-wide initiative. In 2013, the Minnesota Legislature authorized the Minnesota Department of Health (MDH) to designate hospitals in Minnesota as “stroke hospitals.” There are three different designations: Comprehensive Stroke Center (CSC), Primary Stroke Center (PSC), or Acute Stroke Ready Hospital (ASRH). There are established criteria outlining the requirements needed for each designation. An ASRH has the infrastructure and capability to care for acute stroke, including administration of intravenous thrombolytic therapy (tPA). An ASRH has staff and resources able to diagnose, stabilize, treat, and transfer most patients with stroke. Most acute stroke patients may be transferred to a Comprehensive Stroke Center or Primary Stroke Center post-treatment for further care. A PSC has the ability to stabilize and treat most stroke patients. Additional functions of a PSC different from that of an ASRH is that a PSC may act as a resource center for other facilities in their region. Providing expertise about managing particular cases, offering guidance for triage of patients, and making diagnostic tests or treatments available to patients treated initially at an ASRH are some functions PSC and CSC can provide that ASRH cannot. Lastly, a CSC has the expertise to diagnose and treat stroke patients who require intensive medical and surgical care, specialized tests, or interventional therapies (MDH, 2014).

A hospital that meets the criteria for one of the three designations may voluntarily apply to the MDH for designation, and upon MDH’s review and approval of the application, shall be designated as a CSC, PSC, or an ASRH for a three-year period. A key component of the stroke system is implementation of a national stroke registry program to monitor best practices in stroke care outlined by national stroke outcomes standards (MDH, 2014).

Douglas County Hospital (DCH) in Alexandria, Minnesota did not have a stroke designation in 2014. In addition, the DCH facility did not utilize a national stroke registry to track stroke outcomes. Both of these facts contribute to DCH not adhering to the national and state evidence based standards for stroke care. According to MDH (2014), one in three stroke victims first arrive at a small rural hospital, making DCH a stroke designation just as important for rural hospitals being prepared for stroke patients as urban hospitals. These facts highlighted the need to ensure that DCH hospital is equipped to treat acute stroke patients in order to provide the highest quality of care and ultimately reduce death and disability of stroke for Douglas County's rural population.

Needs Assessment

Despite a decrease in stroke morbidity and mortality in Minnesota over the last 30 years, continued improvement in stroke management is needed. A thorough understanding of DCH's needs in regards to stroke care was essential when determining whether to implement the project or not. A proper understanding of stroke systems is necessary to provide effective care to patients. The purpose of this assessment was to gather information to gather preliminary information to determine the validity of a practicing stroke system at DCH emergency department (ED) This question was used throughout the data collection process.

Established in 1969, Douglas County Hospital located in Alexandria, Minnesota, is a general medical and surgical hospital with 99 beds. According to the 2010 census, a population of approximately 13,000 people reside in the city of Alexandria. When combined with the surrounding area there is a population of 36,009 people. The closet rural hospital is located in Glenwood, MN approximately 20 miles away. Over 60 miles from DCH is CentraCare hospital, a comprehensive facility. According to the US Census Bureau, a population of less than 50,000

people in considered rural (U.S. Census Bureau, 2013). The racial makeup of the city is 96.3% white, 0.24% Native American, and 0.40% Asian. The population includes 23.80% age 45 to 64, and 17.90% are 65 years of age or older. The community has one hospital, Douglas County Hospital. The hospital is considered to be at full capacity with 99 patients. In addition, the emergency department (ED) has ten exam rooms. DCH ED cared for 22 stroke patients in the first quarter of 2014, with a three year average of average of approximately 80 stroke patients per year. There are two primary care clinics available in the community with three alternative or naturopathic care clinics available as well (U.S. Census Bureau, 2013). The closest MDH approved primary care stroke center is located approximately 60 miles away at St. Cloud Hospital. St. Cloud Hospital is the largest healthcare facility in the Midwestern region of Minnesota. The facility offers neurology, neuroscience, and neurosurgery specialties. The only comprehensive acute stroke center in Minnesota is Regions Hospital in St. Paul, located 143 miles away by ambulance. The facility offers comprehensive neurological services and has the resources to research and utilize the most recent stroke intervention measures.

The purpose of this assessment was to determine the need for a practicing stroke system at DCH ED and how implementation would benefit Douglas County and the surrounding counties the hospital serves. Preliminary work to determine if the community and DCH would benefit from the project prior to IRB and proposal approval was important. The questions chosen to help guide the assessment were, 1) what stroke system does DCH currently has in place?, 2) what the educational needs are for DCH staff regarding most recent EBP ways for acute stroke management?, and 3) what benefits would Douglas County residents and DCH have with a stroke ready program in place?

The assessment consisted of both qualitative and quantitative data collection methods. The following were the two data collection methods used: 1) key informant interviews, and 2) secondary data sources. Key informants at Douglas County Hospital and Minnesota Department of Health were chosen because of their individual expertise and knowledge in the topic of stroke and the needs of education and stroke program in Douglas County. Secondary data sources were Minnesota Department of Health and the Douglas County recorder's office.

Key informant interviews

Utilizing key informant interviews, information was collected from individuals who have access to most of the information regarding stroke outcomes for the target population. There were two key informants used at DCH and one at the MDH. The two informants at DCH were registered nurse Lori Rosch, emergency department clinical director and Steve Rapatz-Haar, emergency department physician assistant and "stroke champion". The key informant from MDH was Megan Hicks, quality improvement coordinator for the Minnesota Stroke Registry program. Information gathered from these expert informants provided key information supporting the need for a stroke system and a national registry program for Douglas County Hospital.

Lori Rosch and Steve-Rapatz-Harr felt passionate about the need for the stroke system program and registry program to be implemented at DCH. In December, 2014, DCH did not have a stroke designation. The facility also did not utilize a national stroke registry to track stroke outcomes. Both of these facts resulted in DCH not adhering to the national and state evidence based standards for stroke care. Steve and Lori vocalized concerns and frustrations with the current system in place. They discussed that DCH has a stroke program in place, but during acute stroke care improvements in the DCH staff's execution of stroke care can be done

(personal communication, August 6th, 2014). They also addressed the fact that without DCH's stroke care being monitored and evaluated by a state or national registry, there was no stroke outcomes monitoring system in place to see how we compare and measure to national standards and guidelines (personal communication, September 8th, 2014). Both individuals represent DCH's desire to practice with evidence based standards for stroke care.

Megan Hicks from MDH was the key informant when gathering initial information regarding the Minnesota stroke program and stroke registry. She provided insight on the history and current progress of the programs statewide. Two different conversations with Megan primarily consisted of gathering information regarding the recent updates to the application process. She worked as DCH's application liaison to the Minnesota Department of Health. She also provided references to refer prior to, during, and after evaluation of the program implementation (personal communication, September 24th, 2014). The information and references provided by Megan all suggested that a stroke and stroke registry program was an essential next step for the DCH in Minnesota to improve stroke outcomes.

Secondary data sources

Utilizing secondary data sources, information was gathered regarding existing information about Douglas County and the state of Minnesota. MDH and the U.S. Census Bureau office were used as sources to gather the needed information to describe the target population. The recorder's office provided demographics in regards to Douglas County's population and age demographics. The MDH provided information regarding proximity of primary and comprehensive stroke centers (see APPENDIX B), Minnesota stroke mortality and morbidity rates, and current stroke care guidelines.

Review of assessable data and personal interviews provided a foundation for further exploration in seeking the acute stroke program designation for DCH. The literature review provided valuable insight into the validity of having a stroke system and registry program as part of an emergency department's standard of practice. Douglas County is designated as a rural population, with the closest designated primary stroke center 60 miles away. To minimize stroke morbidity and mortality of stroke patients that present to DCH, the DCH ED needs to practice according to the most recent evidence based guidelines and evaluate outcomes through documentation with a national registry.

Objectives and Purpose

The purpose of the project is in collaboration with DCH to conduct a practice improvement project to implement and evaluate the voluntary MDH Acute Stroke Ready Hospital Designation. The project specifically addresses the benefit of implementing a stroke program in the rural population in Douglas County. The acute stroke ready hospital designation process is the principal component of the Minnesota Stroke System.

The proposed project will allow for two quality improvement outcomes. The proposed project will allow DCH to participate in the state wide initiative to improve systems of stroke care. An acute stroke ready hospital (ASRH) has the required infrastructure and capability to care for acute stroke. An ASRH has fewer overall capabilities than a primary stroke care facility (PSC), but has staff and resources able to diagnose, stabilize, treat, and transfer most patients with stroke. Most acute stroke patients may be transferred to a CSC or PSC post-treatment. One of the national stroke registry evaluated stroke outcomes is meeting time standards. The four time-to-action stroke outcome standards required to be documented and tracked for the ASRH and registry program are, 1) door-to-image time, 2) NIH Stroke Scale Performance, 3) last

known well to arrival time, and 4) time to IV thrombolytic therapy. By meeting the criteria for acute stroke readiness, DCH will be in a strong position to meet these time-to-action goals.

Ultimately, as a result of this project, DCH will have the capacity to improve stroke outcomes for Douglas County stroke patients.

With the completion of the project the following objectives are:

- (1) Submission of application to Minnesota Department of Health for approval and designation of acute stroke ready hospital, certified stroke center.
- (2) Douglas County Hospital ED staff will adopt the Minnesota Department of Health initiative to practice according to the most recent evidence based guidelines in managing stroke patients.
- (3) Submission of application to “Minnesota Stroke Registry Program” as a new way for Douglas County Hospital to track stroke patient outcomes.

CHAPTER TWO. LITERATURE REVIEW

Introduction

The purpose of the literature review was to gather and summarize the research available regarding the benefits of implementing a stroke system, along with the benefits of using a data reporting system. Specific studies were reviewed to include the outcomes of practicing a stroke system in a rural hospital. A thorough review of literature was completed and the results have been summarized.

Prevalence and cost of stroke

In 2009, stroke was the principal reason for almost 12,000 hospitalizations in Minnesota. These hospitalizations resulted in \$367 million in total inpatient charges. Hospitalizations for stroke increase with age, with women accounting for the majority of hospitalizations. In 2009, Douglas County had nine men and seventeen women die from stroke (Peacock & Shanedling, 2011).

Over the past decade there has been a widespread growth in the development of stroke systems of care to facilitate improved delivery of acute stroke care (AHA, 2011). There were numerous articles that discussed economic outcomes in regards to specific stroke treatment modalities within a stroke system of care such as tPA, or telemedicine use. Specific literature reflecting cost-effectiveness analyses of stroke systems of care as a whole were relatively rare and outdated. The use of stroke systems of care has been shown to increase rates of tPA administration, which may be related to reduce long-term costs of stroke care (Demaerschalk, Hwang, & Leung, 2010). One recent study concluded the cost savings from a stroke system were from reduced hospital costs and reduced rehabilitation and nursing home costs (Demaerschalk et al., 2010). The true cost-effectiveness of stroke systems of care in the United States has yet to be

studied in a rigorous fashion. Further investigation of cost-analyses of stroke systems should be completed with an extended search outside of the United States. The original search to support implementation of the project was restricted to the United States because of significant differences in the healthcare systems of other countries.

Stroke systems

Data gathered regarding the benefits of adopting and implementing a stroke system from AHA, NSA, CDC, and MDH all conclude that certification of stroke centers is an important effort to ensure that such centers have the capacity to deliver stroke care in a safe, efficient, and consistent manner and are adherent to all relevant guidelines. The American Heart Association found that hospitals with high stroke volumes, those with stroke units, and certified stroke centers have better stroke outcomes than hospitals without this expertise, experience, and resources (American Heart Association [AHA], 2013). In 2014 the Mayo Clinic released information regarding cost savings with the use of Tele-stroke. The article discusses that despite upfront and maintenance expense of implementing a tele-stroke system, the entire network of hospitals realizes a greater total cost savings. When comparing a rurally located patient receiving routine stroke care, a patient treated with a tele-stroke system incurred \$1,436 lower costs and gained 0.02 quality-adjusted life-years over a lifetime (Switzer & Demaerschalk, 2014).

Studies conducted by the CDC (2011) and AHA (2005), tracked seven hospitals that utilized a stroke system and national registry program. Ten stroke quality care measures (see APPENDIX F) applied to each patient were tracked using the national registry. The results generated revealed that five of the ten quality care measures showed average annual improvements of at least six percent. The results from another study demonstrate the ability of

state health departments to collaborate with hospitals to monitor and improve the delivery of high-quality care for acute stroke patients (CDC, 2011).

Rural implications

According to the US Census Bureau, a population of less than 50,000 people in considered rural. With 36,009 people, Douglas County is considered a rural population. Advancing age is a major risk factor for stroke, and the demographics of Douglas County reflect a substantial number of older residents: 23.80% age 45 to 64, and 17.90% are 65 years of age or older. As a result of the age of the population, a potential for an increase in the absolute incidence and prevalence of stroke needs to be taken into consideration. Improved stroke systems of care can ensure proper treatment of these patients and a reduction in death and disability (AHA, 2013).

Ultimately every study reviewed concluded that building stroke systems and implementing them throughout the United States is the absolute next step in improving patient outcomes in the prevention, treatment, and rehabilitation of stroke. A facility that utilizes a fragmented approach to stroke care as opposed to a stroke system, potentially misses fundamental components of stroke care while providing care for stroke patients. Providers and policymakers at the local, state, and national levels can make significant contributions to reducing the devastating effects of stroke by working to promote coordinated systems that improve patient care.

Data reporting system

A stroke data reporting system is a system that can measure, track, and ultimately improve the quality of care for stroke patients. Many hospitals have some system in place whether that is a national registry, paper and pen booking system, or an excel spread sheet. The

research reviewed by the AHA concluded that a national registry is considered the gold standard to stroke outcomes monitoring (AHA, 2014). By utilizing a national registry the facility is reporting the information that is considered to be in adherence to recommended national guidelines. Ideally these programs should require mandatory data reporting to a central agency so that claims of improved outcomes are verifiable (AHA, 2011). The American Heart Association (2014), reports a policy recommendation that hospitals in a stroke system of care should be encouraged to track the quality of their care through the use of national registries and make these data available to the public and other providers. Not only does utilizing a national registry provide data for the national level, the data collected provides information and allows for monitoring of successful outcome indicators and facilitates performance improvement activities at the state level as well (MDH, 2014).

Theoretical and Conceptual Framework

Iowa model

The Iowa Model (Titler, Kleiber, Steelman, Budreau, et al., 2001) is a systematic model that will help to facilitate the development and implementation of the Stroke Ready program in Douglas County Hospital. The model includes several feedback loops, reflecting analysis, evaluation, and modification which is based on the evaluative data of both process and outcome indicators. Each category has individual steps, by addressing each feedback loop, key elements of project development and implementation will not be missed (see APPENDIX E for Iowa Model).

- 1. Problem focused triggers:** The Stroke Ready Program was prompted from both problem focused and knowledge focused triggers.

1. New research by national agencies ASA, NSA, and IOM.

2. National agencies, organizational standards and guidelines changed from the ASA, NSA, and IOM based on new research.

2. Knowledge focused triggers:

1. Identification of clinical problem by DCH.

3. Topic priority for organization: DCH desires to implement the program for two specific reasons; 1) to be recognized as a stroke center with the implication that DCH practices to the most up-to-date evidence based guidelines, and 2) to know that the facility is providing the highest quality of stroke care to patients both of which demonstrate the congruence of the project directly relates to DCH’s goals.

4. Form a team: A “stroke team” has already been assembled at DCH as part of the application process for MDH. This stroke team and individual roles are;

Table 1

Stroke Team

Name	Role in Project	Contact Information
Saundra Lauer	Application’s Coordinator and Evaluation Coordinator	Saundra.flynn@ndsu.edu
Barbara Friederichs, RN	DCH Program Manager	bfriederichs@dchospital.com
Lori Rosch , RN	Project Coordinator	lrosch@dchospital.com
Jada Wolf, RN	Project Assistant Coordinator	jwolf@dchospital.com
Steve Rapatz-Harr, PA	Designated Medical Provider	rapatzharr@yahoo.com
Megan Hicks, MHA	Quality Improvement Coordinator MDH	Megan.hicks@state.mn.us
Melissa Freese, RN	CentraCare Contact	freesem@centracare.com

5. Assess relevant research: A literature review and synthesis has already been completed with the results indicating that there is a sufficient base of information to continue on to the step of piloting change in practice.

6. Pilot change in practice: Outcomes have been selected;

1. Submission of application to Minnesota Department of Health for approval and designation of acute stroke ready hospital, certified stroke center.
2. Douglas County Hospital ED staff adopts the Minnesota Department of Health initiative to practice according to the most recent evidence based guidelines to managing stroke patients.
3. Submission of application to “Minnesota Stroke Registry Program” as a new way for Douglas County Hospital to track stroke patient outcomes.

Baseline data has been collected from the initial discussions with key informants and secondary data sources. Evidence based guidelines have been developed and adopted from the MDH. A pilot of these guidelines will be conducted once the application is submitted and approval for designation is granted. Based on the initial pilots, and then scheduled evaluations once designation is active January 1st, 2015, modification of practice guidelines will take place.

7. Monitor and analyze structure process and outcome data: A six month evaluation of both the ASRH program and the national stroke registry program will take place July, 2015. The national registry will provide information regarding improvement measures evaluation and the hospitals ability to meet the improvement measures. As the project continues the model will be utilized and the last steps will evolve.

Diffusion of innovations

Along with the Iowa Model, the Diffusion of Innovations theory guided the project as well. This theory is appropriate for the chosen project because the project itself has a component of healthcare delivery innovation. One of the objectives of the project is that people, as part of a social system, adopt a new idea and behavior. Specifically the social system, DCH staff, adopt the MDH initiative and changes their behavior in how they treat stroke symptoms in each individual patient. Further detail regarding the applicability and usability of the model is below;

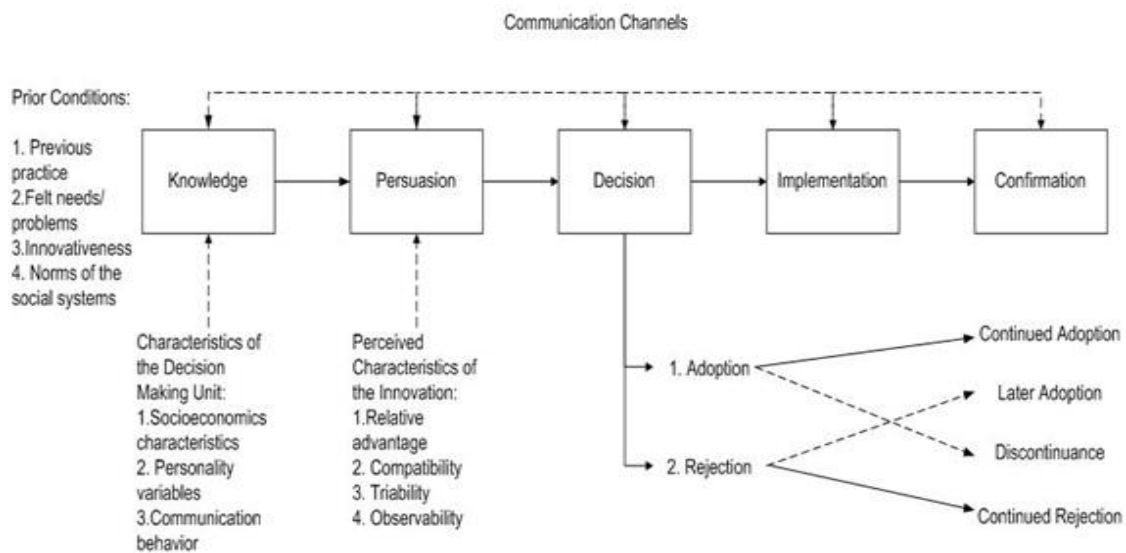


Figure 1. Diffusion of Innovation Model (Rogers, 1995).

Prior Condition

1. Previous Practice:
 - a. Currently do not meet all requirements by the MDH to be designated as an Acute Stroke Ready Hospital
 - b. Currently do not use national stroke registry program
2. Felt Needs/Problems:

- a. Currently DCH does not practice to the national and state evidence based standards for stroke care
3. Innovativeness:
 - a. To implement and evaluate the voluntary MDH practice improvement project: Acute Stroke Ready Hospital Designation
 - b. To apply for and eventually initiate a national stroke registry program
4. Social Systems Involved:
 - a. Minnesota Department of Health
 - b. National Stroke Association
 - c. American Stroke Association

Characteristics of Decision Making Unit:

1. Socioeconomics: There is no upfront cost to apply for stroke designation or application to national stroke registry. Cost savings for decreasing morbidity of stroke by adhering to national and state guidelines may be experienced at the hospital and ultimately state and national level.
2. Personality variables: DCH would be considered an early majority adopter. They chose to adopt an innovation after a varying degree of time that is significantly longer than the innovators and early adopters.
3. Communication: Open communication and collaboration takes place between the social systems involved and DCH. I am the facilitator and spokesperson for DCH communication with the MDH.

Perceived Characteristics of the Innovation:

1. **Relative Advantage:** Ensures that DCH hospital is equipped to treat acute stroke patients in order to provide the highest quality of care and ultimately reduce death and disability of stroke for Douglas County's rural population.
2. **Compatibility:** This innovation is compatible with the current function of DCH ED. The facility is capable of practicing to the national and state evidence based standards of stroke care.
3. **Triability:** Low triability. Once approved for acute stroke ready designation, practicing to the new standards of care is needed to maintain new designation.
4. **Observability:** The innovation would be highly visible to others within DCH ED. The new way of approaching stroke patients impacts each ED staff member.

Congruence of the Project to the Organization's Strategic Goals

My personal interest in working with Douglas County Hospital and the Alexandria Clinic for my project stems from my desire to continue working with the facility after graduation. In discussion with the Education Department at DCH, the Stroke Ready Program project was presented to me. DCH placed high priority on the Stroke Ready Program but due to lack of resources, time, and personnel they have not been able to complete the project. DCH desires to implement the program for two specific reasons; 1) to be recognized as a stroke center with the implication that DCH practices to the most up-to-date evidence based guidelines, and 2) to know that the facility is providing the highest quality of stroke care to patients both of which demonstrate the congruence of the project directly relates to DCH's goals.

CHAPTER THREE. PROJECT OBJECTIVES AND DESIGN

Project Objectives

The project was designed around three objectives. The first objective was the completion and submission of the ASRH application to Minnesota Department of Health for approval and designation of acute stroke ready hospital, certified stroke center. The second objective was for Douglas County Hospital ED staff to adopt the Minnesota Department of Health initiative to practice according to the most recent evidence based guidelines in managing stroke patients. Lastly, the third objective was the submission of application to “Minnesota Stroke Registry Program” as a new way for Douglas County Hospital to track stroke patient outcomes.

Project Timeline

The practice improvement project was an evidence-based intervention plan supported by results of an extensive literature review. Data from MDH, AHA, and IOM all indicated the need to apply and implement a stroke program in order to meet national stroke outcome standards. Although previous stroke care policies and protocols were in place at DCH, a unified program had not been in practice. Once the stroke program and national registry were implemented, the next step was program implementation evaluation by the DCH stroke team to determine initial success and focused areas of improvement. To determine focused areas of improvement, evaluation of stroke patient outcomes. Measurements of these outcomes were completed by evaluation of the MDH stroke indicators. These indicators are reported under the backings of the Minnesota Statewide Quality Reporting and Measurement System (SQRMS). The MDH and DCH used these measures to track the impact of the implementation of the Minnesota Stroke System had on initial patient outcomes at DCH.

ASRH Application

The initial step of the project was the completion of the MDH stroke designation application by the DCH stroke team in collaboration with Megan Hicks, MDH Quality Improvement Coordinator for Stroke Registry Program. The application itself had ten categories with specific requirements within each category. Refer to appendix A for detail of each category. Based on these categories, collaboration with the following DCH departments was required: ED, Respiratory, Pharmacy, Centers for Diagnostic Imaging, and Lab. Collaboration with Douglas County EMS services, CentraCare Hospital, and MDH stroke representatives was required as well primarily to obtain required documents from each application category. Once all of the required documents were obtained, a final review of the applicant contents was completed with the designated stroke team.

Once the application was submitted to MDH, the initial review of application was completed. Revision requests by MDH were reported to DCH. There were two areas requiring further information prior to the acceptance of the application. The EMS protocol needed to be revised to include last known well time as part of their documentation. The last known well time is the time at which the patient or witness is able to state the person was without stroke symptoms. This time is important to know when determining if the patient is a candidate for tPA therapy or not. The last known well time is one of the SQMRS outcomes required by the MDH to be tracked. In collaboration with the EMS medical director and DCH ED, the addition of the last known well time was added to the EMS protocol agreement form. Also, further elaboration of 24/7 availability of neurological services was requested. A policy and procedure was then developed with DCH collaborating facility CentraCare and their neurological department. Both revisions were then completed and the final submission of the application was completed. MDH

approved the final application and a three year Acute Stroke Ready Hospital designation was assigned.

One of the requirements within the application is stroke continuing education for all ED staff, including four hours yearly for all nursing staff and providers in the ED. The project coordinator took on the responsibility of finding education that qualified as continuing stroke education by the MDH. For the 2015 year, the stroke continuing education requirement was met by using an online educational course offered by the National Stroke Association. This program met the Joint Commission and other certifying organizations requirements for stroke education. There was a course specifically for providers and one specifically for nursing staff. The online module was four hours in time. The module was made available on the DCH computer portal for ED nursing staff and providers to access. Per the stroke team's request, the continuing education time was reimbursed education time. As an additional incentive the module offered four continuing education points for the nursing staff if completed on or prior to June 30, 2015. The module was made available March 1st, 2015. All ED nursing staff and providers completed the required four hours of continuing education as of October 1, 2015.

Stroke Registry

After the three year designation, application to the Minnesota Stroke Registry was then completed by the DCH stroke team. The Minnesota Stroke Registry Program provided a data collection method for improving stroke care by promoting consistent adherence to the latest scientific treatment guidelines. The Minnesota program is a subdivision of the national registry program, Get with the Guidelines (GWTG). A study conducted by the GWTG program analyzed the characteristics, performance measures, and in-hospital outcomes in the first 1,000,000 acute ischemic stroke, intracerebral hemorrhage, subarachnoid hemorrhage, and TIA admissions from

1,392 hospitals that participated in the GWTG-Stroke Program 2003 to 2009 (AHA, 2014). Significant improvements were observed; there was an approximate 40% improvement rate of quality care provided. The study was one of the first studies conducted to evaluate the value of the GWTG program. This study demonstrated the importance of GWTG-Stroke as an integrated stroke national registry that is providing national surveillance, promoting innovative research, and supporting vigorous efforts to improve evidence based stroke care and clinical outcomes.

Hospitals can participate in the American Heart Association's "Get with the Guidelines" (GWTG)-Stroke program and the Minnesota Stroke Registry Program simultaneously without entering data into both tools (MDH, 2014). There was no extra fee to hospitals to do so. Once approval by the MDH for the stroke ready designation was awarded, the DCH ED nurse coordinator, emergency room director, and CEO of the hospital approved the application to Minnesota Stroke Registry as the next step in adherence to the MDH recommended tracking system.

ASRH application completion and implementation, national registry implementation, and continuing education were what encompassed the project. The final steps in the project design were implementation evaluation, dissemination, and optimization discussed in detail in later chapters. The potential for future project evolution after the initial objectives were met was part of the optimization discussion with the DCH stroke team.

Protection of Human Subjects

The project improvement and core measures programs currently utilized at DCH record an individual's age and gender. The evaluation of collected data did not include personal access to individual patient's personal information. At no point in the project implementation and evaluation of outcomes was there be a need to have access to subject's personal information.

Protection of human subjects and their personal information was not jeopardized. Although there was no direct interaction with human subjects, application for exempt status through NDSU and DCH was submitted and approved (APPENDIX B).

CHAPTER FOUR. EVALUATION

Evaluation of the ASRH program and national stroke registry implementation at DCH occurred in stages. Initial evaluation of the ASRH program took place by the MDH after three months of designation which occurred March, 2015. Annual reviews are scheduled to take place in the preceding years. Unfortunately an onsite visit was not able to be completed by MDH as originally intended due to budget restrictions. Instead communication via telephone with Megan Hicks from MDH and written documents were completed as means of evaluation. The initial evaluation had the primary goal of assessing how the implementation of the program has initially affected stroke care at DCH. Communication between the DCH ED nurse coordinator and Megan Hicks from MDH took place discussing both positives and barriers to the initial implementation.

A six month evaluation of both the ASRH program and the national stroke registry program took place July, 2015. The national registry provided information regarding improvement measures evaluation and the hospitals ability to meet the improvement measures. As part of the ASRH program, hospitals are currently required to report four time-to-action stroke outcomes: 1) door-to-image time, 2) NIH Stroke Scale Performance, 3) last known well to arrival time, and 4) time to IV thrombolytic therapy. MDH is then able to use the reported information and generate reports on each of the four areas. The reports demonstrate how well each hospital is doing at meeting each outcome. DCH uses these reports at quarterly meeting to evaluate the stroke program effectiveness and identifies areas in need of improvement. This evaluation process will continue to take place ideally quarterly as a tool for continuous optimization within the DCH.

Dissemination of results occurred at the third quarterly DCH ED meeting. This was eight months after the implementation of both the stroke system and registry programs. Dissemination of project results were presented DCH administration, ED nursing, and ED providers. The dissemination and discussion of results lead to a discussion supporting growth of evidence based practice (EBP) within the facility, and expanding. Also, nursing and provider knowledge regarding stroke and EBP through continuing education modules was made available to all DCH nursing and provider staff.

The ASRH application was completed and submitted prior to the MDH deadline, October 30th, 2014. After the initial review of the application, recommended changes were made per MDH request and re-submission was completed. On January 1st, 2015, a three year acute stroke ready designation was given to DCH by MDH. Subsequently the ED implemented the program effective January 1st, 2015. Application to the national stroke registry program occurred as well, and implementation of the registry program began January 1st, 2015.

Objective One

The first objective was to submit the application to Minnesota Department of Health for approval and designation of acute stroke ready hospital, certified stroke center. Objective one was met using the guidance of the Iowa Model. The Iowa Model is a systematic model that was used to help to facilitate the evaluation of the ASRH program. Step seven of the model was to monitor and analyze structure process and outcome data. A three month evaluation of the ASRH program took place March, 2015.

Objective Two

The second objective was for the Douglas County Hospital to adopt the Minnesota Department of Health initiative to practice according to the most recent evidence based

guidelines in managing stroke patients. Per the Iowa Model, identification of clinical problem was acknowledged. The topic became a priority within the organization. DCH recognized the need for the program for two specific reasons: 1) to be recognized as a stroke center with the implication that DCH practices to the most up-to-date evidence based guidelines, and 2) to know that the facility is providing the highest quality of stroke care to patients both of which demonstrate the congruence of the project directly relates to DCH's goals. A stroke team was formed and assessment of relevant research was completed. A literature review and synthesis had been completed with the results indicating that there was a sufficient base of information to continue on to the step of piloting change in practice. Piloting change was the next step for the objective to be met. Submission of application to MDH for approval and designation of acute stroke ready hospital, certified stroke center was completed.

DCH ED staff adopted the MDH initiative on January 1st, 2015 to practice according to the most recent evidence based guidelines to managing stroke patients. An evaluation method to determine initial effectiveness of the program was to evaluate stroke code initiation and DCH's door-to-imaging prior to and after initiation of stroke system management program with the use of Minnesota Stroke Registry outcomes information. The last step in the Iowa Model is to monitor and analyze structure process and outcome data. A six month evaluation of the ASRH program took place July, 2015. The national registry provided information regarding improvement measures evaluation and the hospitals ability to meet the improvement measures as discussed in the results section.

Objective Three

The third objective was the submission of application to "Minnesota Stroke Registry Program" as a new way for DCH to track stroke patient outcomes. After the three year

designation, application to the Minnesota Stroke Registry was then completed by the DCH stroke team. An employee of DCH was then assigned the task of abstracting each stroke outcome using the information provided by the new national registry documentation form filled out by the ED staff. The information from the new form is then entered into the national registry online site. The DCH stroke abstractor reported that the new method of data collected had initially added approximately 15 minutes per stroke patient to the time it took to enter the information. With the help of the DCH IT department, the post stroke data input time was reduced from 15 to 5 minutes. The data entered has become accessible to the MDH, for quality measurement. The information is also accessible to the DCH stroke team. The stroke team accesses the stroke outcome information quarterly to determine areas that need improvement. Specifically, the first two quarterly reviews focused on door-to-imaging time, and stroke code initiation. This method of review allows for close monitoring of DCH stroke performance and acts as a guide for areas of improvement.

Conclusion

The ASA encourages the idea that stroke centers should not be viewed in isolation. Rather, they should be part of a larger support network such as a stroke system of care. Stroke systems encompass issues such as prevention, education, acute care, rehabilitation, and quality improvement. Ideally, as the number of ASRH stroke centers increases, these facilities may form a network of hospitals that would be useful for testing new therapies for acute stroke to ultimately prevent stroke and improve stroke outcomes (AHA, 2011).

Becoming an ASRH has placed a new level of importance on stroke patients at DCH. These patients were always evaluated as critical and seen timely, however, the implementation of the ASRH program held the ED staff to an elevated state and nationally recognized standard of

care. The increased awareness, protocols, stroke team, and education will hopefully in time prove through national registry outcomes, increase quality of care delivered to these patients, as well as expedited care. The support generated from other facilities and the MDH stroke system has played an active role in defining the importance of time equals brain.

CHAPTER FIVE. RESULTS

Presentation of Findings

DCH utilization review department provided abstracted stroke reports from the national stroke registry program approximately seven months after implementation of the ASRH. Results included the first two quarters which comprised outcomes from January 1st, 2015 to June 30th, 2015. Information from the first two quarters from 2014 prior to the stroke program implementation were gathered as well. The comprehensive report included the four time-to-action stroke outcomes required to be documented and tracked for the ASRH and registry program, 1) door-to-image time, 2) NIH Stroke Scale Performance, 3) last known well to arrival time, and 4) time to IV thrombolytic therapy. An initial goal of the stroke team was to improve specifically door-to-CT time with implementation of the ASRH program. The national goal door-to-CT time is <25 minutes. Prior to program implementation, DCH had routinely not been meeting door-to-image time. The ultimate goal of the ASRH program is to have a cohesive stroke program that prevents fragmented stroke care. A key component to accomplish non-fragmented care is initiation of a stroke code. Prior to the ASRH program implementation, DCH was not utilizing a stroke code. Although these outcomes were not part of the dissertation objectives, evaluation of the implementation of the ASRH program is part of the projects evaluation process as means to gather information for optimization review and continuation of the implemented project.

Door-to-computerized tomography time

With the time measurements of door-to-CT time from the first two quarters of 2014 and 2015, a statistical analysis was conducted comparing the times to determine whether an improvement was seen during the first two quarters of the ASRH program implementation. The

graph table below identifies a baseline mean from the 2014 results compared to a follow-up mean from the 2015 results. The results show simple statistics for the two sources of observations. The follow-up mean is about 10 minutes less than the baseline mean, but the results of the inferential tests suggest that the evidence was not sufficient to reject the null hypothesis because the means were equal from baseline and follow-up data. A pooled method for the t-test was completed as well. The p-value of .4386 was larger than alpha of .05 so the null hypothesis was not rejected. The standard deviations of 49.3 and 37.4 as compared to the mean difference of 10, demonstrating as to why the means are not deemed to be statistically different since the SDs are several times larger than the difference in the means.

Table 2

Two Sample T-Test

Type	Method	Mean	95% CL	Mean	Std Dev	95% CL	Std Dev
Baseline		38.2500	15.1848	61.3152	49.2832	37.4794	71.9816
Followup		28.9091	15.6467	42.1715	37.4027	30.0788	49.4723
Diff (1-2)	Pooled	9.3409	14.6790	33.3608	42.2213	35.3835	52.3598
Diff (1-2)	Satterthwaite	9.3409	16.7235	35.4054			

During dissemination of results at a six month ED meeting, identifiers of barriers to meeting the goal door-to-CT time were identified. Primary reasons for delay included: provider discretion, the CT was in use at time of patient arrival, and lastly the waxing and waning of patient condition. Ways to overcome some of these barriers included EMS continuing education regarding the importance of notifying the DCH ED when suspected stroke patient is on route so CT machines can be made available. Also, continued education and discussion with ED providers regarding the importance of following AHA guidelines for imaging suspected stroke

patients. Although the findings suggested an average improved door-to-CT time of 10 minutes, consistent improvement in door-to-CT time will continue to be a priority for the ED staff. Ideally, a collaborative approach at quarterly ED meetings will allow for case reviews and discussion of possible interventions to improve outcomes.

The MDH and DCH continue to use these measures to track the impact of the implementation of the Minnesota Stroke System on the four time-to-action stroke outcome. A quarterly stroke team meeting will be held to assess results to identify areas of continued need of improvement. This evaluation process will continue to take place ideally quarterly as a tool for continuous optimization within the DCH.

Stroke Code

The initiation of a stroke code was part of the ASRH program as means to decrease fragmented stroke care. The policy details the responsibilities of the stroke team (refer to appendix F). The stroke team is available or on-call 24 hours a day, seven days a week. The role of the acute stroke team is to respond to the patient in the ED with presenting with stroke symptoms. The team's role is to initiate diagnostic testing and provide the appropriate action of care in a well-timed and coordinated manner in accordance with hospital protocols for the treatment of stroke patients. As recommended by the AHA, the evaluation and initial treatment of patients with stroke should be performed as a priority in the hospital ED. The development of an organized protocol and stroke team should speed the clinical assessment, the performance of diagnostic studies, and decisions for early management.

DCH had a version of a stroke code protocol in place which was initiated January, 2014. In evaluation of the documentation, no stroke codes were called in the first two quarters of 2014. The first two quarters after the initiation of the ASRH program a total of 33 strokes were seen

within the ED. Nine patients had a stroke code called, six patients had no code called, and lastly, 18 patients had no documentation of whether a code was called or not. Although an improvement was seen in the activation of stroke codes between the comparing quarters, the results highlighted an area in need of great improvement.

During dissemination of results at six month ED meeting, barriers to initiating a stroke code were identified. The primary reason for the stroke code not being called was a lack of staff education to initiate a stroke code. Initiation of a code was not a standard for the ED prior to project implementation. The continued stroke education for ED staff was completed primarily in the months of April-June 2015, essentially as the first two quarters were being completed. Initiation of stroke code will continue to be a priority for the stroke team. With the continued education being completed, the stroke team hopes to see improved incidence of a stroke code called in the last two quarters of 2015.

CHAPTER SIX. DISCUSSION AND RECOMMENDATIONS

Interpretation of Results

As of January, 2015, the total number of designated stroke facilities in Minnesota increased from 54 hospitals to 89 participating hospitals. Specifically, the number of comprehensive stroke facilities increased from one to five, primary care facilities from 15 to 17, and acute care facilities from 38 to 67 (MDH, 2014). The increase in total healthcare facilities participation in the program is an essential first step in improving stroke care and outcomes for patients in Minnesota. Stroke care in Minnesota becomes closer to a coordinated treatment system with the number of facilities becoming designated and participating in the MDH initiative. Coordinated care improves patient care and increases the capacity of healthcare facilities to deliver stroke care in a safe, efficient, and consistent manner and is adherent to American Heart Association guidelines.

The results indicated a detectable change in door-to-CT time and increased use of a stroke code. The continued stroke education was not completed by the ED staff until the end of the second quarter of 2015 making it difficult to determine effectiveness of continued education. Data from the last two quarters of 2015 will need to be evaluated to document effectiveness of continued education on both door-to-CT time and use of stroke code. Though the initial evaluation of the project implementation yielded small improvements in door-to-CT time and increased use of stroke code, DCH will focus the next two years on further improvement.

Limitations

The practice improvement project is associated with a number of limitations. The most significant limitation would be the limited staff available to implement the program. Many individuals within DCH have many responsibilities within multiple projects. A stroke

coordinator is considered a full time position in many facilities. Unfortunately this position is not considered full-time-equivalent (FTE) at DCH like the position is at larger facilities. The role is not actually considered an individual role, but rather part of the DCH ED nurse coordinators job. As a result the responsibility falls largely on the DCH ED nurse coordinator who herself has many responsibilities, which limits the time available for program review, optimization, and expansion. DCH recognizes this as a limitation and will address the limitation by encouraging collaborative effort from the entire stroke team. The proposal of offering other graduate nursing students the opportunity to continue future work on the stroke project was discussed as well. Despite proposed alternatives, limited staff will continue to be a limitation until a FTE position is available.

Another limitation found during the implementation of the program was provider acceptance and adherence to EBP and guidelines, specifically, the use tele-stroke and timely imaging. Tele-stroke is used to connect to a neurologist at DCH's supporting hospital CentraCare. The technology allows for collaboration with a neurologist within 15 minutes of the initiation of the stroke code. A few providers view the use of tele-stroke technology actually delays care, takes away from individual provider assessment and care. Immediate imaging of suspected stroke patient is also thought by some DCH ED providers as unnecessary. Watchful waiting to see if stroke like symptoms improve or worsen is occasionally practiced as well leading to delayed imaging time. In a study conducted by the AHA, less than one-third of patients treated with intravenous tPA had door-to-needle times ≤ 60 minutes (AHA, 2011). Findings such as this support the need for a targeted initiative though guideline adherence to improve the timeliness of reperfusion in acute ischemic stroke. Reinforcing understanding that

tele-stroke and imaging do not delay care but improves care through will be the focus of continued education to providers and ED staff is a goal of the stroke team.

Lastly, understanding what qualifies as approved stroke education and getting all staff to four hours of training was found to be a timely process. Fortunately the MDH had in place a module that met the requirements for the 2015 year. At this point MDH is unsure if modules such as these will continue to be in place for consecutive years. Continuation of the four hour educational course would be beneficial in maintaining the accessibility and ease of required annual continuing education. The educational programs for providers were reported to be too basic by the ED providers themselves. After evaluation of the providers continuing stroke education, the stroke team thought a more in-depth education would be more beneficial and valuable use of time. All of the limitations were discussed with MDH and continued collaboration will take place to overcome and improve the stroke program experience.

Recommendations

The adoption and implementation of the ASRH program ultimately was a positive change to the way DCH provides stroke care to patients. Improvement in the door-to-image time is one measurable outcome that supports the program and helps to improve stroke patient outcomes. Because of the positive results that occurred as a result of the program implementation, it is practical to validate the program effectiveness and support further campaigning of the program by the MDH.

Although yearly evaluations from the MDH will continue to take place at DCH, continuing quarterly review of SMGR outcomes by the stroke team is recommended. Regular review and optimization of the program is an essential part in the continued improvement of the program. DCH has the goal of <15 minutes for the door-to-image time, efforts to improve the

time will come from collaborative efforts to carry out the interventions per the recommended stroke program as effectively as possible. Setting realistic measurable quarterly goals is one tangible way to continue the momentum and awareness around the stroke program. Setting goals at quarterly stroke care meetings and making the goals visible and part of daily ED practice was a recommended action. Printing and laminating the goals and displaying them at work stations, sending quarterly emails updating ED staff on how well the department is doing meeting the goals are potential ways at improving goal outcomes were ways to potentially continue stroke improvements. All of the suggested interventions would be initiated by the stroke team. Lastly, regular case reviews of stroke codes as a means of education and improving on future stroke codes is an important method of continued awareness and adherence to the ASRH program.

Ischemic stroke care is only one component of a larger framework supporting improved post-stroke outcomes. Although the implementation of the ASRH project addresses acute stroke treatment, and evaluation of care, it is critical to assess and coordinate all components of stroke care. All steps including primordial and primary prevention, community education, pre-hospital services, acute stroke treatment, sub-acute care, secondary prevention, and rehabilitation need to eventually be addressed within Douglas County in order for the stroke system to be as successful as possible. Continued efforts particularly with primary prevention and community education are considered a priority in the next steps to full utilization of recommended stroke system in Douglas County.

Implications for Practice

Other steps within the stroke care program include primary prevention and community education. Prevention and education are a foundation of primary care making this area an opportune area to focus on change. With eighty nine percent of nurse practitioners prepared to

practice in primary care, they are equipped with the knowledge to take on these roles within their communities in primary care settings (AANP, 2015). The stroke program is just one of many programs modeled to help improve patient outcomes. The foundation of the program is evidence based practice. Principles from the stroke program can be carried over in to other programs based on the needs of the community and practicing location. Nurse practitioners (NPs) provide high quality of care and are recognized for high patient satisfaction in the primary care setting. Nurse practitioners play a crucial role in the team approach needed to advocate for stroke prevention, they can be the advocates to help address and initiate change in these steps of stroke care (AANP, 2015).

Implications for Future Practice

The future of healthcare is heading in a direction of pay for performance. Stroke outcomes are currently tied to meaningful use and reimbursed based on performance outcomes. Stroke is appropriate for Centers for Medicare and Medicaid Service (CMS) to want to measure and improve the quality of stroke care. Currently, the two measures chosen, stroke mortality and readmission within 30 days of hospital discharge, fail to accurately reflect hospital performance. The American Hospital Association continues to urge CMS not to use these measures in any federal programs until adequate adjustments for stroke severity can be made (American Hospital Association, 2014). Theoretically speaking, implementing a stroke program now and having the ability to use the program and allow for optimization will allow for better outcomes once pay for performance is enforced.

The current and future practice issues regarding stroke prevention were addressed by using the scientific evidence gained through the education and literature review. The nurse practitioner serves as a leader in providing evidence based care as well as being an advocate for

the patient. After evaluation of the existing stroke care program at DCH, weakness within the program were identified. The MDH recommended program would allow DCH to practice in accordance with the most recent evidence based practice guidelines. The project encourages the collaboration of multiple healthcare disciplines specifically primary and acute care professionals, with the mutual goal of improved stroke care and patient outcomes.

Conclusion

The total inpatient hospitalization costs for stroke continue remain higher than for any other disease conditions in Minnesota (MDH, 2014). To help with the national and state issue, DCH is now a participant in the state wide initiative to improve systems of stroke care. Stroke care in Minnesota becomes closer to a coordinated treatment system with the number of facilities becoming designated and participating in the MDH initiative. Coordinated care improves patient care and increases the capacity of healthcare facilities to deliver stroke care in a safe, efficient, and consistent manner. Adherence to all relevant EBP guidelines continues to be the foundation to successful stroke programs, making continued emphasis on EBP a priority in future stroke program optimization at DCH.

The projects focus was acute stroke care. Acute care is just one component of a larger framework supporting improved stroke outcomes. All steps including primordial and primary prevention, community education, pre-hospital services, acute stroke treatment, sub-acute care, secondary prevention, and rehabilitation need to eventually be addressed within Douglas County in order for the stroke system to be as successful as possible. Once acute stroke care within DCH has been optimized, continued efforts particularly with primary prevention and community education are considered a priority in the next steps of the stroke programs implementation. With the prevalence of NPs within the family care setting increasing, the implementation of these next

steps will become largely the NP's responsibility. Ultimately collaboration between all healthcare specialties is needed to coordinate and fully implement the MDH recommended stroke system in Douglas County.

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APPENDIX A. APPLICATION REQUIREMENTS

<p>1. An acute stroke team available or on-call 24 hours a day, seven days a week.</p>	<p>A letter on hospital letterhead signed by the CEO or chief medical officer listing the position titles of the members on the acute stroke team.</p>
<p>2. Written stroke protocols, including triage, stabilization of vital functions, initial diagnostic tests, and use of medications.</p>	<p>A stroke protocol or algorithm that is used for triage and treatment of acute stroke patients in the emergency department.</p>
<p>3. A written plan and letter of cooperation with emergency medical services regarding triage and communication that is consistent with regional patient care procedures.</p>	<p>1. A written plan or protocol for the primary EMS agency that transports to your facility.</p> <p>2. A letter on hospital letterhead co-signed by the hospital's primary EMS agency and the hospital CEO or chief medical officer acknowledging a triage and transportation agreement for potential stroke patients.</p>
<p>4. Emergency department personnel who are trained in diagnosing and treating acute stroke.</p>	<p>A letter on hospital letterhead signed by the CEO or chief medical officer attesting that at least one staff provider per shift has received training in current stroke diagnosis and treatment guidelines.</p>
<p>5. The capacity to complete basic laboratory tests, electrocardiograms, and chest x-rays 24 hours a day, seven days a week.</p>	<p>A "Scope of Service" OR letter on hospital letterhead signed by the CEO or chief medical officer delineating availability of the specified services and hours of operation.</p>
<p>6. The capacity to perform and interpret brain injury imaging studies 24 hours a days, seven days a week.</p>	<p>A "Scope of Service" OR letter on hospital letterhead signed by the CEO or chief medical officer delineating availability of the specified services and hours of operation.</p>
<p>7. Written protocols that detail available emergent therapies and reflect current treatment guidelines, which include performance measures and are reviewed and updated annually.</p>	<p>A protocol or order set for the administration of IV tPA for acute ischemic stroke.</p>
<p>8. A neurosurgery coverage plan, call schedule, and a triage and transportation plan.</p>	<p>1. A "Scope of Service" or other documentation from a hospital with neurosurgery services that demonstrates 24/7 availability of neurosurgery.</p> <p>2. A letter of understanding/agreement from at least one hospital or neurosurgery group with whom you have an agreement for transfer.</p>
<p>9. Transfer protocols and agreements for stroke patients.</p>	<p>A transfer protocol or agreement applicable to stroke patients.</p>
<p>10. A designated medical director with experience and expertise in acute stroke care.</p>	<p>A letter on hospital letterhead co-signed by the designated medical director and CEO or chief medical officer attesting that s/he will serve in this capacity for the hospital.</p>

APPENDIX B. IRB APPROVAL LETTER



November 20, 2014

Dr. Dean Gross
Dept of Nursing
Sudro 222F

Re: Your submission to the IRB: "Improving Stroke Care and Patient Outcomes in a Rural Minnesota Hospital"

Research Team: Saundra Lauer

Thank you for your inquiry regarding your project. At this time, the IRB office has determined that the above-referenced protocol does not require Institutional Review Board approval or certification of exempt status because it does not fit the regulatory definition of 'research involving human subjects'.

Dept. of Health & Human Services regulations governing human subjects research (45CFR46, Protection of Human Subjects), defines 'research' as "...a systematic investigation, research development, testing and evaluation, designed to contribute to generalizable knowledge." These regulations also define a 'human subject' as "...a living individual about whom an investigator conducting research obtains (1) data through intervention or interaction with the individual, or (2) identifiable private information."

It was determined that your project does not require IRB approval (or certification of exempt status) because it does not involve interaction or intervention with human subjects, nor is private identifiable data being collected about a human subject.

We appreciate your intention to abide by NDSU IRB policies and procedures, and thank you for your patience as the IRB Office has reviewed your study. Best wishes for a successful project!

Sincerely,

Kristy Shirley
Digitally signed by Kristy Shirley
DN: cn=Kristy Shirley, o=NDSU, ou=SPA,
email=kristy.shirley@ndsu.edu, c=US
Date: 2014.11.20 12:32:17 -0600

Kristy Shirley, CIP; Research Compliance Administrator

For more information regarding IRB Office submissions and guidelines, please consult www.ndsu.edu/irb. This Institution has an approved FederalWide Assurance with the Department of Health and Human Services: FWA00002439.

INSTITUTIONAL REVIEW BOARD

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NDSU is an EO/AA university.

APPENDIX C. PERMISSION FOR IOWA MODEL

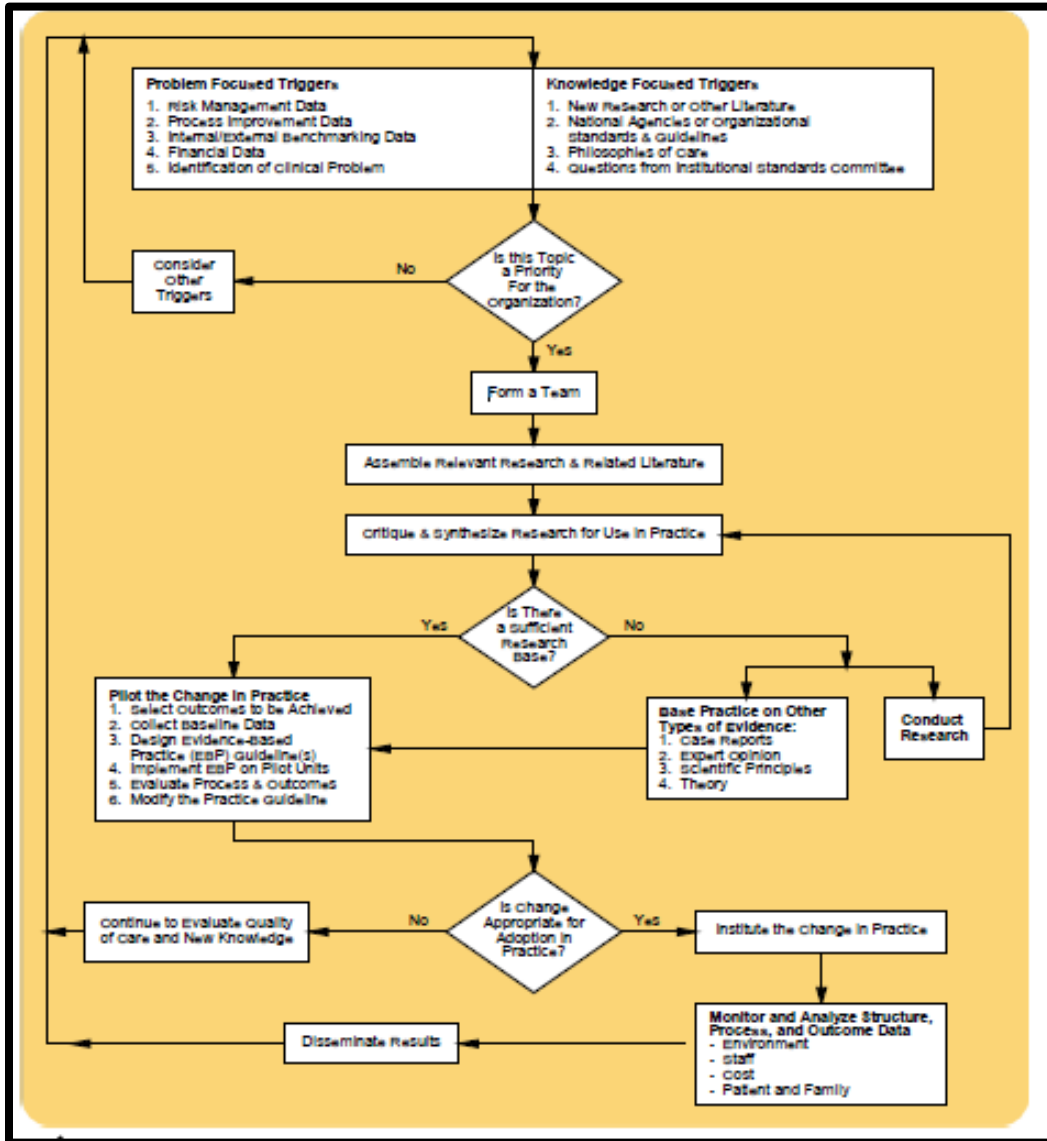
Permission for Iowa Model

You have permission, as requested today, to review/use The Iowa Model of Evidence-Based Practice to Promote Quality Care (Titler et al., 2001). Click the link below to open the model. Copyright of the Iowa Model of Evidence-Based Practice to Promote Quality Care will be retained by The University of Iowa Hospitals and Clinics.

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The Iowa Model

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APPENDIX D. IOWA MODEL



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APPENDIX E. 10 STROKE CORE MEASURES

Stroke (STK) Core Measure Set STK-1	Venous Thromboembolism (VTE) Prophylaxis
STK-2	Discharged on Antithrombotic Therapy
STK-3	Anticoagulation Therapy for Atrial Fibrillation/Flutter
STK-4	Thrombolytic Therapy
STK-5	Antithrombotic Therapy By End of Hospital Day 2
STK-6	Discharged on Statin Medication
STK-8	Stroke Education
STK-10	Assessed for Rehabilitation

APPENDIX F. STROKE CODE TEAM POLICY

Trusted Care. For Generations.



October 28, 2014

Megan Hicks, MHA
Quality Improvement Coordinator
Minnesota Stroke Registry Program
Minnesota Department of Health
P.O. Box 64882
St. Paul, MN 55164-0882

Dear Ms. Hicks,

This letter is attesting that Douglas County Hospital (DCH) has an acute stroke team available or on-call 24 hours a day, seven days a week. The role of the acute stroke team is to respond to patients in the Emergency Department (ED) or in-hospital presenting with stroke symptoms. The team's role is to initiate diagnostic testing and provide the appropriate action of care in a well-timed and coordinated manner in accordance with hospital protocols for the treatment of stroke patients.

Additionally, the ED physicians, Physician Assistants and Charge Nurses of the acute stroke team complete four (4) hours of stroke education annually. For the 2015 year, stroke continuing education will be an online educational course offered by the National Stroke Association. This program meets the MDH and other certifying organizations requirements for stroke education.

The members on the acute stroke team include:

- Neurologist (available via telemedicine within 15 minutes)
- Emergency Department Physician
- Emergency Department Physician Assistant
- Stroke Trained ED Nurse
- Radiologist (available or on-call 24/7)
- Pharmacist (available or on-call 24/7)
- Respiratory (available or on-call 24/7)
- ED Charge Nurse

If you have any questions regarding Douglas County Hospital's acute stroke team, please do not hesitate to contact me.

Sincerely,

A handwritten signature in cursive script that reads 'Carl Vaagenes'.

Carl Vaagenes, CEO
Douglas County Hospital
111 17th Avenue East - Alexandria, Minnesota 56308 | phone: (320) 762-1511 | www.DCHospital.com

Policy

A critical care team will be called for patients who present with neurological deficit of sudden onset within 6 hours of last time known well or awaking with the symptoms.

Indications/Inclusions

Stroke code will be activated for patients within 6 hours of LAST TIME KNOWN WELL (LTKW), normal blood glucose, and FAST screen is positive.

Procedure

FAST Screen

- Patients with stroke-like symptoms will immediately have a Face-Arms-Speech-Time (FAST) screen and blood glucose check.
 - To perform the FAST screen:
 - Face: Have the patient show teeth or smile.
 - Normal: Both side of face move equally.
 - Abnormal: One side of face does not move as well.
 - Arms: Have the patient close their eyes and hold both arms straight out.
 - Normal: Patient is able to hold both arms up.
 - Abnormal: One arm does not move or drifts down.
 - Speech: Have the patient repeat a simple phrase. (i.e. – You can't teach an old dog new tricks.)
 - Normal: Patient uses correct words with no slurring.
 - Abnormal: Patient slurs words and/or uses the wrong words.
 - Time: When was the patient last known to be well?
 - Time Lost = Brain Lost
 - If the FAST screen is negative (normal) or the blood glucose is less than 50 or greater than 400, the patient's assigned RN will inform the provider.
 - If any component of the FAST screen is positive (abnormal), blood glucose is greater than 50, **and last time know well (LTKW) is less than 6 hours** a stroke code will be activated as appropriate.

Activation of Stroke Code

- Emergency Department Activation:
 - Occurs when EMS notifies the Emergency Department that the patient in route meets inclusion criteria.
 - Occurs upon the direction of the nurse who has identified a patient meeting the inclusion criteria.

- Charge Nurse will notify ER Clerk to page “Critical Care Team.”
- All ER rooms are equipped for Telestroke except room 1 and 10.
- **Inpatient Activation:**
 - Activated by the Med/Surg Nurse. Call switchboard and have “Rapid Response Team” called to the room number.
 - Obtain a stat FAST exam and blood sugar.
 - Notify CT.
 - Initiate O₂ per nasal cannula at 4 liters.
 - Obtain vital signs.
 - Obtain ICU room assignment. (All ICU rooms are equipped for Telestroke.)
 - Patient will be transported immediately to CT scanner via hospital bed accompanied by primary nurse and critical care team.
 - Call ER nurse to bring Telestroke equipment and tPA box to ICU
 - After CT, patient will be transported to ICU.

Stroke Team

- Upon paging a critical care team for a stroke patient, the following team members are assembled to provide the following care. (See Attachment A - Stroke Code Algorithm for timeline.)

Team Member	Responsibility
DCH physician (Hospitalist if Inpatient)	<ul style="list-style-type: none"> • Assess patient/history screening • Contact stroke neurologist via phone to determine if Telestroke connection required. • Order IV tPA early • Order antihypertensive treatment if BP >185/110 • NIHSS – Start in ER/ICU and complete as able between procedures
ED Nurse (or ICU Nurse if Inpatient)	<ul style="list-style-type: none"> • ABC and FAST exam • Neurological assessment in EMR • IV’s x 2 (1 lg. bore AC-IV) • O₂ / Monitor • Obtain weight • Monitor Patient • Notify physician if BP >185/110 • Administer antihypertensive treatment if tPA indicated (before or after CT) • Monitor vital signs/neuro during imaging • Check on the following lab results and report any abnormal results to Neurologist and ED physician <ul style="list-style-type: none"> ○ Creatinine ○ Platelet count ○ Glucose ○ INR if on warfarin or history of liver disease • Upon returning from CT, provide to the Neurologist an update of the patient’s vital signs / status • EKG after CT • Insert Foley catheter if needed (either prior to tPA or no sooner than 30 minutes post-infusion.

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 Printed policies are not valid – electronic version only

<i>Continued</i> ED Nurse (or ICU Nurse if Inpatient)	<ul style="list-style-type: none"> • Start IV tPA if instructed to do so when team comes back from CT <ul style="list-style-type: none"> ○ Verify order to administer ○ Verify drug mixing – 1mg/ml ○ Verify drug dosage is weight appropriate (0.09 mg/kg). Total dose not to exceed 90 mg. Bolus dose given over 1 minute. ○ Infusion dose over next 60 minutes and then flush line with 50 ml. NS ○ Assist the Neurologist with movement of Telestroke equipment and patient positioning.
HUC (Absence of HUC duties performed by ED Nurse / N.S.)	<ul style="list-style-type: none"> • Notify switchboard to page “Critical Care Team” • Call St. Cloud Hospital transfer facilitators at (888) 387-2862 to request the stroke neurologist • Document time of call • Initiate stroke code orders; Initial Evaluation / Alteplase #18536 • Notify CT to make copy of scans if patient is being transferred • Initiate transfer forms if applicable.
ICU Nurse (or ED Nurse if Inpatient)	<ul style="list-style-type: none"> • Finger stick glucose (if not done by EMS) • Assist ED Nurse • Obtain med list and allergies • Administer antihypertensive and other medications as ordered • Administer tPA
Lab	<ul style="list-style-type: none"> • Draw labs • Report critical lab results
CT	<ul style="list-style-type: none"> • Prepare CT scanner – Do <u>NOT</u> delay CT for lab or EKG. • Scan patient • Upload scan to PAC’s, send for stat read, and copy if applicable • Burn CD with imaging if transferred
RT (Absence of RT duties performed by ED/ICU Nurse)	<ul style="list-style-type: none"> • Manage and monitor patient airway and respiratory status • EKG
Pharmacist (Absence of Pharm duties performed by ED/ICU Nurse and N.S.)	<ul style="list-style-type: none"> • Drug calculation done – ready to mix tPA < 10 minutes • Mix tPA • Medication calculations
Nursing Supervisor	<ul style="list-style-type: none"> • Connect Telestroke equipment & place near foot of bed • Support & bring family to bedside for neuro consult • Assist ED Nurse

Telestroke/Neurological Consult

- The DCH physician will consult with neurologist regarding the patient status. The Telestroke equipment will be set up for the patient assessment depending on initial phone conversations with stroke neurologist. Collaboration between the patient/family, DCH physician, and the neurologist will be completed to determine the appropriate treatment options.

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 Printed policies are not valid – electronic version only

- Neurologist Responsibilities
 - Respond to page promptly and discuss case initially with DCH physician.
 - Determine with DCH if need to connect via Telestroke.
 - Connect to Omnijoin.
 - Review CT remotely with PACS.
 - Discuss case with physician and order tPA.
 - If treatment appropriate, tell nurse to initiate tPA bolus and infusion as soon as you can.

Ischemic Stroke – NON tPA Candidate

- Do not lower BP. Elevated blood pressure improves cerebral perfusion.

Assessment

- The National Institute of Health (NIH) Stroke Scale and clinical assessment (*Attachment B – NIHSS Stroke Scale*) will be utilized by physicians to assess the neurological status of stroke patients. (Found in the Electronic Medical Record.)

Stroke Treatment and Management

- The treatment and management of stroke patients will be guided by the following physician order sets if patient meets inclusion/exclusion criteria:
 - DCH Stroke Code – Initial Evaluation / Alteplase (tPA) Treatment #18536
 - DCH Stroke Code – Alteplase (tPA) Admission Orders #18537
 - DCH Stroke Code – Alteplase (tPA) Treatment – Complication Orders #18538

Attachments

- A. [Stroke Code Algorithm](#)
- B. [Physician Documentation, National Institutes of Health Stroke Scale \(NIHSS\)](#)
- C. [Stroke Exclusion Criteria](#)
- D. [Stroke Code Timeline](#)
- E. [Stroke Code Medication Worksheet](#)
- F. [Stroke Code Transport Order](#)
- G. [Stroke Connect Instructions - picture](#)

References

- American Heart Association Stroke Guidelines
- National Institute of Health Stroke Scale (NIHSS)
- National Guidelines/National Standards:
 - Adams, R., Albers, M., Albers, G., Bush, R., Fagen, S., et al. (2010). Guidelines for the prevention of stroke in patients with ischemic stroke or transient ischemic attack: A statement for healthcare professionals from the American heart Association/American Stroke Association Council on Stroke: Co-sponsored by the Council Cardiovascular Radiology and Intervention: The American Academy of Neurology affirms the value of this guideline. *Stroke: Journal of the American Heart Association*. Retrieved from stroke.ahajournals.org
 - Adams, R., Bruno, A., Connors, J.J., Demaerschalk BI, et al. (2013). Guidelines for the early management of adults with ischemic stroke: A Guideline for Healthcare Professional. *American Heart Association/American Stroke Association*. Retrieved from stroke.ahajournals.org
 - Anderson, C., Becker, K., Broderick, J., Jr., Connolly, E.S., Greenberg, S., et al. (2010). Guidelines for the management of spontaneous intracerebral hemorrhage: A guideline for healthcare professional from the American Heart Association/American Stroke Association. *Stroke: Journal of the American Heart Association*, 41, 2008-2129.
 - Pugh, S., Mathiesen, C., Meighan, M., Summers, D., & Zrelak, P. (2008). Guide to the care of the hospitalized patient with ischemic stroke (2nd ed.). *American Association of Neuroscience Nurses (AANN)*. Retrieved from www.aann.org.

Terminology / Acronyms

None

Stroke Code Timeline

(Not part of permanent record ~ PI use only)

Date: _____

***Stroke Code tPA Orders #18536**

Event	Time	Comments
Patient arrival		
Symptoms onset <input type="checkbox"/> Unknown or (time)		
Physician at bedside		
Fast Exam		
CT notified of Stroke Code Activation		
Critical Care Team called		
Accu Check <input type="checkbox"/> Per EMS		
Patient to CT Scan (Goal < 15 minutes)		
Patient return from CT scan		
CT results received		
Telestroke connection time		
Oxygen applied if Sats < 94%		
12 Lead EKG *CT Scan priority		
Labs drawn *CT Scan priority		
IV Line #1		
#2		
HOB elevated 30°		
Portable x-ray completed		
NG placed		
Foley placed		
IV TPA decision: <input type="checkbox"/> Contraindicated <input type="checkbox"/> Onset time unclear <input type="checkbox"/> Patient refused <input type="checkbox"/> Symptoms improving <input type="checkbox"/> IV TPA initiated (Goal < 60 minutes)		
Admit/Transfer: <input type="checkbox"/> Admit <input type="checkbox"/> Transfer		

Return completed form to ER or ICU Clinical Director