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Influence of Stroke Clinical Pathway on Documentation

Shannon Sternberg
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INFLUENCE OF STROKE CLINICAL PATHWAY ON DOCUMENTATION

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Nursing

by
Shannon Sternberg, BSN, RN, CNRN
December 2007

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ABSTRACT

The purpose of this study was to determine whether the implementation of a stroke clinical pathway could improve compliance with documentation of specific quality measures for patients admitted with the diagnosis of acute ischemic stroke, hemorrhagic stroke, or transient ischemic attack. The study used the ten standardized performance measures for stroke identified by the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) and integrated documentation of those measures into a stroke clinical pathway consisting of physician order sets, an interdisciplinary plan of care, and a patient/family education flow sheet. The American Stroke Association’s Get with the Guidelines – Stroke (GWTG-Stroke) database was used to collect data retrospectively on 220 patient records. The control group consisted of 110 randomly selected records of patients admitted with stroke in the year prior to clinical pathway implementation. The intervention group consisted of 110 consecutive records for patients discharged with a stroke diagnosis six months after clinical pathway implementation. Six data collectors reviewed the records to gather the information. Records were entered into the database by a single researcher. A pre-defined measure report was prepared for the “JCAHO Pilot-10” from the GWTG-Stroke database. Comparison of the control and intervention groups using the Fisher’s Exact test and 95% confidence intervals revealed statistically significantly higher rates of compliance with the patient/family stroke education (p<0.001) and smoking cessation counseling (p<0.001) measures after
pathway implementation. Further analysis of the intervention group was done to determine if the use of the clinical pathway forms increased documentation compliance with the measures. There was a statistically significant improvement in documentation of the measures for the lipid profile (p=0.003) and patient/family stroke education (p<0.001) measures when at least one form in the clinical pathway was used. A Chi-square test for linear trend indicated there was a statistically significant increase in the number of measures met as the usage of the clinical pathway increased (p<0.001). This study suggests that implementation of a stroke clinical pathway can improve compliance with documentation of specific performance measures by members of the healthcare team.
DEDICATION

I dedicate this manuscript to my husband, Kenneth, and my children, Nicholas and Stefan. They have been a joy and inspiration. Without their support and understanding, I would not have finished this degree. I also would like to thank Bonnie Leonard for her consistent and insistent encouragement. I have enjoyed the numerous opportunities to learn and grow as a professional nurse while completing the degree requirements in my course of study. Throughout this journey, there have been many others who have freely given their time, knowledge, and advice. To them, I offer my sincere gratitude.
ACKNOWLEDGMENTS

I would like to thank Dr. Linda Howe, my committee chairperson for her assistance, expert advice, and patience during the development of this thesis. I would like to acknowledge the guidance and support, of each of the other graduate committee members, Dr. Julie Eggert, Dr. Dawn Blackhurst, and Cynthia Trout. The wealth of knowledge offered by the committee has been invaluable, and without their assistance, this thesis could not have been completed.
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CHAPTER I  
INTRODUCTION

Stroke is the third leading cause of death in the United States and is the leading cause of long-term disability. The prevalence of stroke in 2003 was 2.6% or over five million Americans. About 700,000 of these Americans experienced a new stroke or a recurrent stroke. About one of every 15 deaths in 2003 could be attributed to stroke. Death within the first 30 days following stroke occurred in 8-12% of ischemic stroke victims and 37-38% of hemorrhagic stroke victims. A transient ischemic attack (TIA) preceded approximately 15% of all strokes. The estimated cost for stroke care in 2006 was $57.9 billion (Thom et al., 2006).

South Carolina, with its high rate of stroke mortality, is considered part of the “stroke belt” in the southeastern region of the United States (South Carolina Department of Health and Environmental Control, 2006). In 2004, stroke was listed as the fifth most common reason for inpatient hospitalization in South Carolina for individuals 65 years and older (South Carolina Office of Research & Statistics, 2005).

A stroke results from the disruption of blood flow through the cerebral arteries to the brain. The resultant injury, as brain cells die from lack of blood flow and oxygen, can be devastating and life altering. Ischemic stroke accounts for 88% of all strokes and occurs due to a blockage in a cerebral blood vessel (Thom et al., 2006). This blockage may be due to plaque or blood clot formation within the vessel itself. A blockage may also occur when a plaque or clot
detaches from the inner wall of a blood vessel or is created within the heart and migrates to a small vessel in the brain where it lodges. Transient ischemic attacks (TIA) occur from the same mechanism, but the resultant neurologic deficit is temporary (American Heart Association, Heart and Stroke Facts, 2003). A focal neurological deficit lasting less than 24 hours has classically been considered a TIA. The current trend is to consider stroke symptoms a TIA if they last for less than one hour (Sacco et al., 2006). Hemorrhagic strokes account for the remaining 12% of strokes (Thom et al., 2006). Since most strokes are ischemic, recommendations and guidelines for stroke prevention in adults are primarily directed toward risk factors related to this type of event. Emerging new therapies for treatment of acute ischemic stroke have raised public and health care provider's consciousness. Stroke awareness has since increased across the nation as well as within the “stroke belt”.

Many guidelines for the management and prevention of stroke, which have been published and periodically updated, have set a standard of care for this population (Coull et al., 2002; Adams, Adams, Brott, et al., 2003; Adams, Adams, Del Zoppo, & Goldstein, 2005; Adams, Del Zoppo, et al., 2007; Broderick, et al., 2007; Duncan et al., 2005; Sacco et al., 2006; Wolf et al., 1999). These documents reflect the move toward evidence-based practice in this country and are intended to assist practitioners in making informed decisions about disease management (American Heart Association, Stroke Council Guideline Development Manual, 2006). Yet, the existence of practice guidelines...
alone does not ensure the integration of recommendations into practice by physicians, nurses and other members of the multidisciplinary team.

Hospitals primarily carry the burden of cost for acute stroke care and therefore seek strategies for effectively implementing guidelines. The hospital’s goal is to reduce their cost of stroke care through elimination of unnecessary tests, procedures, and treatments, while focusing on interventions that are shown to be more effective for prevention of complications and improvement of outcomes for the stroke population.

Ten disease-specific care performance measures for stroke were identified and detailed by Joint Commission on Accreditation of Healthcare Organizations (JCAHO) in its Disease-Specific Care Certification Program: Stroke Performance Measurement Implementation Guide (2004) (Table 1). Inclusion of prompts for ordering and/or documentation of each of those ten measures into a comprehensive stroke clinical pathway may improve the incorporation of stroke guidelines into clinical practice.
<table>
<thead>
<tr>
<th>Set Measure</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>DSC Stroke-1</td>
<td>Deep vein thrombosis prophylaxis</td>
</tr>
<tr>
<td>DSC Stroke-2</td>
<td>Discharged on antithrombotics</td>
</tr>
<tr>
<td>DSC Stroke-3</td>
<td>Patients with atrial fibrillation receiving anticoagulation therapy</td>
</tr>
<tr>
<td>DSC Stroke-4A</td>
<td>Tissue plasminogen activator (t-PA) considered</td>
</tr>
<tr>
<td>DSC Stroke-4B</td>
<td>Tissue plasminogen activator (t-PA) administered</td>
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<td>DSC Stroke-5</td>
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</tr>
<tr>
<td>DSC Stroke-6</td>
<td>Lipid profile</td>
</tr>
<tr>
<td>DSC Stroke-7</td>
<td>Screen for dysphagia</td>
</tr>
<tr>
<td>DSC Stroke-8</td>
<td>Stroke education</td>
</tr>
<tr>
<td>DSC Stroke-9</td>
<td>Smoking cessation</td>
</tr>
<tr>
<td>DSC Stroke-10</td>
<td>A plan for rehabilitation was considered</td>
</tr>
</tbody>
</table>


Documentation by the multidisciplinary team of physicians, nurses, therapists, and others in the patient medical record provides evidence of incorporation of guidelines into practice. Review of the medical record to determine compliance with identified measure criteria offers an opportunity for hospitals to identify areas for process improvement in the care of stroke patients. Use of standardized order sets or clinical pathways is a JCAHO expectation for hospitals that seek recognition for excellent stroke patient care (JCAHO, Disease-Specific Care Toolkit, 2006). The incorporation of such forms, which follow key practice guidelines, utilize existing documentation processes, and are readily accessible to all care providers has the potential to positively alter stroke care.
Statement of the Problem

The incorporation of elements of the current guidelines into the care and management of acute stroke patients continues to be a challenge for many hospitals. Specific performance measures for stroke have been identified and developed by JCAHO to assist hospitals who are committed to assessing and improving the processes and quality of stroke care (JCAHO, Performance Measurement Implementation Guide, 2004). Standardized order sets, clinical pathways, and nursing care plans are tools that have been utilized by institutions to meet this goal in the past. Historically, forms such as these have not consistently proven effective in changing practice as defined by decreased length of stay and controlled acute care inpatient cost for stroke patients in this southeastern academic hospital, the site for this study.

Purpose of Study

The purpose of this study is to determine whether the implementation of a stroke clinical pathway can improve the documentation of the ten JCAHO disease-specific measures. Clinical pathways are widely accepted as instruments that aid in the care of patients with a specific disease process, but can be difficult to introduce into an organization if a significant change in behavior is required of the users. By tailoring a clinical pathway to current processes in an organization, use of the documents may increase. Increased utilization of the stroke clinical pathway would then be expected to increase compliance with the ten measures.
Hypothesis

Written care protocols such as clinical pathways for the evaluation and workup of acute ischemic stroke, hemorrhagic stroke, and TIA patients are a JCAHO disease-specific care expectation (JCAHO, Disease-Specific Care Toolkit, 2006). The ten JCAHO disease-specific measures for stroke were identified as evidence-based performance indicators that could improve quality of care (JCAHO, Performance Measurement Implementation Guide, 2004). Tracking of compliance with these measures offers hospitals an opportunity to identify areas for improvement and strategies to affect patient outcomes. Therefore the following hypothesis is proposed:

- The use of a stroke clinical pathway will increase compliance with documentation in the medical record of the ten JCAHO disease-specific performance measures.

Definitions

The stroke clinical pathway consisted of five separate documents. Those documents included standardized physician order sets for the emergency department (Appendix A), inpatient admission (Appendix B), and discharge (Appendix C), as well as the multidisciplinary forms for documentation of the patient plan of care (Appendix D) and patient/family education flow sheet (Appendix E). The patient/family education flow sheet references the patient/family education handbook which covers each of the topics that should be discussed with stroke patients and their families (JCAHO, Performance Measurement Implementation Guide, 2004).
Measurement Implementation Guide, 2004). Table 2 lists each of the forms included in the stroke clinical pathway and denote which of the ten JCAHO disease-specific measures are addressed by each form.

Table 2. Stroke Clinical Pathway Forms with JCAHO Disease-Specific Measures

<table>
<thead>
<tr>
<th>DSC Stroke Measure</th>
<th>Emergency Orders</th>
<th>Inpatient Admission Orders</th>
<th>Discharge Orders</th>
<th>Interdisciplinary Plan of Care</th>
<th>Interdisciplinary Patient/Family Education Flow Sheet</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td></td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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<td>3</td>
<td></td>
<td>X</td>
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<td>4A &amp; 4B</td>
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<td>5</td>
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<tr>
<td>10</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The ICD-9-CM Principle Diagnosis Codes for ischemic stroke, hemorrhagic stroke, and TIA were used to select patient records for review. The ICD-9-CM stroke codes are listed in Table 3 and the diagnoses for which each of the ten measures applies are listed in Table 4.

Table 3. ICD-9-CM Principal Diagnosis Codes for Stroke

Ischemic Stroke

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>433.01</td>
<td>Occlusion and stenosis of basilar artery with cerebral infarction</td>
</tr>
<tr>
<td>433.11</td>
<td>Occlusion and stenosis of carotid artery with cerebral infarction</td>
</tr>
<tr>
<td>433.21</td>
<td>Occlusion and stenosis of vertebral artery with cerebral infarction</td>
</tr>
</tbody>
</table>
433.31 Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction
433.81 Occlusion and stenosis of other specified precerebral artery with cerebral infarction
433.91 Occlusion and stenosis of unspecified precerebral artery with cerebral infarction
434.00 Cerebral thrombosis without mention of cerebral infarction
434.01 Cerebral thrombosis with cerebral infarction
434.11 Cerebral embolism with cerebral infarction
434.91 Cerebral artery occlusion unspecified with cerebral infarction
436 Acute, but ill-defined, cerebrovascular disease

Hemorrhagic Stroke
430 Subarachnoid hemorrhage
431 Intracerebral hemorrhage
432 Other and unspecified intracranial hemorrhage
432.0 Non-traumatic extradural hemorrhage
432.1 Subdural hemorrhage
432.9 Unspecified intracranial hemorrhage

TIA
435.0 Basilar artery syndrome
435.1 Vertebral artery syndrome
435.2 Subclavian steal syndrome
435.3 Vertebrobasilar artery syndrome
435.8 Other specified transient cerebral ischemias
435.9 Unspecified transient cerebral ischemias


Table 4. Diagnostic Groups for the JCAHO Pilot-10 Disease-Specific Measures

<table>
<thead>
<tr>
<th>DSC Stroke Measure</th>
<th>Ischemic</th>
<th>Hemorrhagic</th>
<th>TIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Anticoagulation therapy included the use of warfarin, heparin or heparinoids, or other full-dose anticoagulants. Antithrombotic therapy included the use of aspirin, aspirin/dipyridamole, warfarin, clopidogrel, ticlodipine, unfractionated intravenous heparin, and full dose low molecular-weight heparin. Thrombolytic therapy included the use of intravenous or intra-arterial recombinant tissue plasminogen activator (t-PA). Screenings for dysphagia included documentation of a simple water swallow test or neurological evaluation specific to swallowing. Stroke education consisted of documentation of patient or family education related to type of stroke, complications, and secondary prevention. Smoking cessation counseling included documentation that information was provided to the patient in addition to advising the patient that smoking is bad for their health (JCAHO, Performance Measurement Implementation Guide, 2004; Stroke Coding Instructions v7.2, 2006).

Conceptual Framework
Lewin’s Force-Field Model of change describes change as occurring when there is an alteration in the equilibrium of a situation. The change process consists of three stages. First is “unfreezing” of the status quo, second is "moving" to a new level of equilibrium, and third is a “refreezing” to the new state of change (Sullivan & Decker, 2005). Lewin’s model considers the balance of two types of forces as being responsible for the change process. Those forces are either driving or restraining forces. The driving force is one that is either away from a negative or towards a positive situation. The effect of a driving force leads to locomotion or movement toward change. Obstacles to locomotion due to the driving force are called restraining forces. Restraining forces do not lead to locomotion, but influence the effect of the driving forces (Lewin, 1997). In order to create change, there must be an alteration in the number or degree of restraining forces and/or driving forces. Once those forces are understood, a deliberate alteration can result in change. This alteration in forces is the unfreezing process; the change or movement to the new goal can then take place. After the change has occurred, a refreezing of the forces in the new position holds the change in place. A conceptual model of Lewin’s theory is depicted in Figure 1.
Figure 1. Lewin’s Force-Field Model of Change.

Present level of equilibrium (status quo)

Driving Forces

Restraining Forces

Unfreezing requires a change degree or number of driving vs. restraining forces

Addition of Driving Forces

Removal of Restraining Forces

Movement occurs as driving forces overcome restraining forces

Refreezing in the new state of equilibrium occurs until the change process occurs again.

New Driving Forces

New Restraining Forces

Adapted from Effective Leadership & Management in Nursing, 6th ed by Eleanor Sullivan & Phillip Decker and Field Theory in Social Science by Kurt Lewin.
Change in a large organization, such as a hospital, is difficult to create since restraining forces for change are many, varied, and sometimes not readily apparent due to the complexity of their nature. Some restraining forces to change in a hospital environment include healthcare personnel resistance to change, limited access to learning opportunities or resources that may provoke change, lack of institutional support for change and, lack of resources to initiate change. Recent changes in driving forces at the hospital for this study include a renewed and collective commitment by hospital leadership to improve stroke care. That commitment is due in part to the newly developed JCAHO Primary Stroke Center certification program. Acknowledgment and support by leadership of the need to unfreeze the current state of equilibrium related to stroke care is essential to removing or reducing restraining forces and adding or strengthening driving forces. The hospital made a commitment to add driving forces such as a physician champion for stroke care, a stroke nurse coordinator, and program oversight by a designated director of nursing. Reduction in restraining forces was planned to evolve as staff are provided opportunities and resources to integrate new guidelines for stroke care into their practice.

As an initial step in the change process to reduce restraining forces, an educational event in the form of a workshop was presented (Appendix F). The target audience for this workshop was staff from inpatient, rehabilitation and home health nursing as well as physical therapy, occupational therapy, speech therapy, and emergency response personnel. This workshop introduced the
recently published acute stroke guidelines and the planned implementation of the stroke clinical pathway. Implementation of the stroke clinical pathway required addition of driving forces and is intended to reduce restraining forces by making it easier for practitioners to meet the new standards of care for stroke. Other efforts to induce alterations in the forces included presentations of the clinical pathway by the stroke physician champion to other physician groups involved in the care of stroke patients. The hospital marketing department supplemented the presentations by sending informational mailings to those same physician groups.

The implementation of a comprehensive clinical pathway for stroke is one component of a hospital-supported stroke initiative and a tangible step in the change process. If successful change occurs, as demonstrated by improved documentation of disease-specific measures for stroke, and the hospital moves to a new state of change, the next step is to refreeze in order to hold any gains in improvement of stroke measures. Measurement of compliance with quality indicator documentation is necessary to maintain positive changes and alter forces to further improve stroke quality of care.

Justification for the Study

Evaluation of compliance with disease-specific measures for stroke will enable the hospital to identify areas where practice guidelines and evidence-based practice can be better integrated into clinical practice by the multidisciplinary team. Any effect of a clinical pathway in consideration and
documentation of those measures will influence future decisions about process improvement opportunities.
CHAPTER II

LITERATURE REVIEW

The purpose of this chapter is to provide a review of current literature related to practice guidelines, JCAHO Disease-Specific Care certification for stroke, and clinical pathways. A description of how the literature influenced the creation of the stroke clinical pathway for this study follows.

Practice Guidelines

Evidence-based medicine emerged in the 1990’s to help clinicians make treatment decisions based on current medical research. The use of evidence-based medicine is intended to improve patient care and outcomes by providing the clinician with more information about a disease state than may be gained through experience and formal training (Evidence-Based Medicine Working Group, 1992). It is through review of current research that practice guidelines are formulated and agreed upon by a consensus of clinical experts (Guyatt, Sinclair, Cook, & Glasziou, 1999). Practice guidelines therefore represent a standard of care for management of a particular disease state. The American Heart Association (AHA) developed a working definition of disease management in 2004. The expert panel defined disease management as “multidisciplinary efforts to improve the quality and cost-effectiveness of care for selected patients suffering from chronic conditions” (Faxon, et al., 2004, p 1528). Disease management programs should be based on scientifically derived and peer-
reviewed guidelines from which specific performance measures are identified to aid the evaluation of those programs (Faxon, et al., 2004).

A movement toward evidence-based practice in nursing has also arisen in recent years. As nurse leaders evaluate standards for practice, more emphasis is beginning to be placed on interventions that are based on research and quality outcomes rather than tradition (Milton, 2007; Penz & Bassendowski, 2006; Melnyk, et al., 2004; Deaton, 2001). The concept of evidence-based practice in nursing may be considered the gold standard, and its adoption is evidenced by a trend toward hospital policy and procedure manuals that are based on available research. The integration of evidence-based guidelines into nursing practice can be challenging since nurses who deliver care at the bedside may not be prepared with the skills or the resources to do so (Springer, Corbett, & Davis, 2006). Strategies for introducing clinical guidelines into nursing practice include general dissemination of the information in nursing journals, targeting specific groups of nurses whose practice may be affected by the guidelines, and providing educational interventions to selected groups of nurses. To encourage implementation of practice guidelines, strategies could include providing reminders and making the guidelines readily accessible to the targeted nurses. Inclusion of the guidelines in the form of prompts into existing systems of required documentation would also be useful (Craig & Smyth, 2002).

The American Stroke Association (ASA) published a new set of guidelines in 2003 for the management of acute ischemic stroke patients. These guidelines
were intended to assist physicians in primary care, emergency medicine, neurology, and other disciplines involved to make informed decisions about the acute management of stroke victims (Adams, Adams, Brottt, et al., 2003). JCAHO used guidelines and scientific statements for stroke management to develop ten disease-specific measures for stroke. The ASA published an update to its acute stroke management guidelines in 2007, with the intention of future updates every three years (Adams, Del Zoppo, et al.). Many of the recommendations are unchanged from the 2003 publication, but there were some substantial additions. One such addition includes a strong recommendation for the creation of primary stroke centers that are certified through an external body such as JCAHO (Adams, Del Zoppo, et al., 2007).

The Centers for Medicare & Medicaid Services (CMS) initiated a Hospital Quality Initiative (HQI) program to address the burden of select disease states on America. The purpose of the program is to promote informed decision making by consumers about healthcare choices, provide incentives to hospitals that improve patient care, and support public accountability for that care (Centers for Medicare & Medicaid Services, 2005). The measures chosen for comparison by CMS are derived from current medical research and are factors likely to positively impact patient outcomes. CMS has worked in collaboration and support with various other entities interested in improving patient outcomes including JCAHO. Although stroke is not presently a disease state measured by CMS through the
HQI program, the same method of reporting HQI indicators for improving and measuring quality of care should be applied.

The ASA recognizes there are significant obstacles to consistently integrating scientific advances into clinical practice (Schwamm, Pancioli, et al., 2005). Making sure that practice guidelines actually guide clinical practice requires educating the clinician about the existence of and value to patient care of such recommendations. Once the clinician is knowledgeable about standards of care for the diagnosis and treatment of a specific disease process, it is reasonable to infer that clinical practice will also be affected. A clinical pathway for stroke could act as an educational tool to guide those clinicians unfamiliar with current standards of care. If clinical practice were affected by the incorporation of stroke guidelines, documentation in the medical record would reflect the change. It is through the documentation of medical care and the decision-making process that hospitals are able to demonstrate the quality of care provided.

In 2004, the Canadian Stroke Quality of Care Study proposed a core set of performance indicators for stroke that is similar in nature to the recommendations from the ASA (Lindsay, Kapral, Holloway, et al., 2005; Lindsay, Kapral, Gladstone, et al., 2005). In a separate publication, the core performance indicators for stroke were compared to the best-practice guidelines for nurses published jointly by the Heart and Stroke Foundation of Ontario and the Registered Nurses’ Association of Ontario. A few examples of the role of
nursing in meeting those measures include the safe and timely administration of medications, monitoring and acting to prevent potential complications of medical therapy, and educating the patient about risk factor modification. The comparison demonstrated a role for nursing in the improvement of performance measures for the acute stroke patient (Lindsay, Kelloway, & McConnell, 2005). Nurses in the United States share the same role in meeting the disease-specific measures set by the JCAHO for stroke center certification.

Documentation is an indirect measure of integration of guidelines into patient care. The patient medical record should confirm if disease-specific quality measures are met or identify patient-specific contraindications. Development of quality measures and auditing for compliance with those measures enables a hospital to identify the level of medical care provided and take action as necessary to improve that care (Walter, Davidowitz, Heineken, & Covinsky, 2004).

**JCAHO Primary Stroke Center Certification**

JCAHO offers a Disease-Specific Certification Program for stroke to hospitals seeking to improve quality, decrease disability, and control costs related to stroke care while working toward designation as a JCAHO certified Primary Stroke Center. A Primary Stroke Center must incorporate current guidelines and recommendations from the ASA and other sources of authority on stroke care into its framework. The certification guide addresses factors related to the diagnosis and treatment of patients experiencing acute ischemic stroke,
hemorrhagic stroke, and TIA. Hospitals are required to report performance measures for these three diagnoses to obtain JCAHO Primary Stroke Center certification (JCAHO, Performance Measurement Implementation Guide, 2004).

Based on review of the literature, JCAHO developed a set of ten performance measures judged to influence patient outcomes (Table 1). A data collection tool (Appendix G) for tracking the ten measures and other performance indicators is also provided by JCAHO (JCAHO, Performance Measurement Implementation Guide, 2004). While JCAHO has not yet made changes to the Stroke Performance Measurement Implementation Guide based on the updated ASA recommendations for 2007, it is expected that they will do so in the near future.

In an effort to help hospitals assess compliance with disease-specific performance measures, the AHA developed data management tools for coronary artery disease, heart failure and stroke. Get with the Guidelines – Stroke (GWTG-Stroke) is an instrument designed to aid in the collection of the ten JCAHO disease-specific measures. It is also used to collect critical time measures in the initial presentation and treatment of acute stroke. It uses the same criteria for measurement provided by JCAHO, but uses reminders about missing data, deviation from guidelines, and has patient education materials that can be printed on demand. When GWTG-Stroke is used, either concurrently or retrospectively, it can assist with identification of deviations from current guidelines and assessment of variances to a stroke clinical pathway.
Early studies using the GWTG-Stroke instrument suggested an association in improvement of at least four of the JCAHO stroke measures (antithrombotic administration, anticoagulation for atrial fibrillation, lipid measurement, and smoking cessation counseling) when it was used to concurrently collect data in the hospital setting (LaBresh, et al., 2005). Compliance with measurements for the acute interventions of administration of antithrombotics and intravenous thrombolytics also increased in hospitals using GWTG-Stroke. By the end of the fourth quarter of use at 99 hospitals utilizing GWTG-Stroke, evidence of physician consideration of thrombolytic therapy was present for all but 15% of acute stroke patients (Schwamm, LaBresh, et al., 2005).

Clinical Pathways

Although there is no single model of a clinical pathway, many are comprised of a document for physician ordering and nurse charting. A clinical pathway should set expectations for a typical course of care from admission to discharge, require education for patients and families, decrease unnecessary utilization of resources by discouraging unnecessary tests and procedures, provide a system for monitoring patient outcomes, and eliminate duplication (Guinane, 1997). Documents for a clinical pathway may include patient care plans with discipline-specific responsibilities and interventions, while also dictating the timing of services provided. Other documents may include research-based protocols for reference, standardized physician order sets, documentation
forms, and checklists (Lanska, 1998). A key element to a successful clinical pathway is integration of the tool into the existing documentation processes within a facility. Streamlining the documentation process reduces the perception of additional work and increases use of a clinical pathway (Guinane, 1997).

In an effort to guide clinical practice so that it conforms more closely to current medical evidence, controls healthcare cost, and improves patient outcomes, hospitals have often utilized clinical pathways. Population-specific clinical pathways became popular in the 1990s in response to the managed care movement and were often based on a targeted length of stay (Lagoe, 1998). During this era, Hydo (1995) outlined the process required to design an effective stroke clinical pathway. This included physician orders with cues, a daily nursing documentation form with a case management plan, and a corresponding patient education tool. This pathway was used at a Michigan hospital where the true benefit of the clinical pathway at the facility was that it identified areas of process improvement and prompted positive changes for stroke care.

In order to evaluate the impact of implementation of a clinical pathway for stroke, both hospital-specific and disease-specific variables should be identified. Those criteria or measures identified must be integrated into each stage of a pathway in order to produce change. A 1997 study involving the implementation of stroke clinical pathways at several hospitals identified the need to individualize pathways to capture information for specific variables. Each hospital in the study chose clinical pathway variables that met its own quality improvement needs.
while also agreeing to collect a common set of variables such as length of stay, use of resources, and clinical outcomes (Hainsworth, Lockwood-Cook, Pond, & Lagoe). A British study explored the effects of an “integrated clinical pathway” in a hospital’s acute stroke unit by comparing patient outcomes and care processes in an intervention and control group. At the end of the study, quality of documentation in the intervention group was significantly improved, a CT scan was more likely to be done within 24 and 48 hours, and there was a lower rate of urinary tract infection (Kwan, Hand, Dennis, & Sandercock, 2004).

Bonnono, Criddle, Lutsep, Steven, Kearns & Norton (2000) described the use of an ‘emergi-path’ for stroke intended to act as a patient care guide and documentation tool for members of the stroke team in the emergent phase of stroke. It included outcome goals for the patient and defined what nurses and physicians should document in the medical record related to stroke care. The emergi-path included orders for the acute evaluation of patients with stroke symptom onset of less than 24 hours, as well as instructions for the evaluation of thrombolytic eligibility. The goal of the emergi-path was to increase the percentage of acute ischemic stroke patients who received intravenous thrombolytics within three hours of symptom onset. However, data was not provided in the article to suggest if use of the emergi-path resulted in increased use of t-PA for stroke at the facility.

An Australian hospital revised an existing, but underutilized, stroke clinical pathway into a more patient-centered documentation form. The pathway included
automatic referrals and consultations, which resulted in a decreased average length of stay and improved clinical outcomes due to the required involvement of specialists (Wilkinson, Parcell, & MacDonald, 2000). The California Acute Stroke Pilot Registry (2005) reviewed use of standardized order sets for stroke in a number of hospitals. For hospitals using standardized stroke orders, an improvement in documentation of deep vein thrombosis (DVT) prophylaxis, lipid-lowering medications at discharge, and antithrombotics at 48 hours and discharge was demonstrated.

Kwan and Sandercock (2004) conducted a review of in-hospital care pathways for stroke for Cochrane Database and concluded there was insufficient evidence to support the use of stroke clinical pathways in the acute care and rehabilitation settings. The review included three randomized trials and 12 non-randomized studies and determined there was not a significant difference between control groups and pathway groups in comparison of mortality rates or discharge destination. It appeared that patients managed with a stroke clinical pathway were more dependent at discharge, but less likely to be readmitted. They were also less likely to have a urinary tract infection, and more likely to have neuroimaging studies. Counter intuitively, the review also suggested evidence of a lower rate of patient satisfaction and a lower quality of life with clinical-pathway managed stroke patients. This suggests that a stroke clinical pathway may not be a panacea for optimal patient outcomes.
Examples of physician order sets and clinical pathways for stroke management are readily available through a simple internet search. The ASA and the Brain Attack Coalition have copies of physician orders and clinical pathways for stroke available on their websites from hospitals active in improving stroke care. Availability of such forms suggests that use of standard order sets and clinical pathways are routinely used in the care of stroke patients across the United States. In fact, the ASA specifically recognizes the need for stroke clinical pathways and stated such tools should be used consistently in an organization to minimize stroke progression and complications (Swhamm, Pancioli, et al., 2005).

The National Stroke Association hosts a Stroke Center Network electronic mailing list where a frequent topic of discussion for stroke care professionals seeking information to improve processes at hospitals where they work, is the utilization of order sets and pathways that include stroke protocols (National Stroke Association, n.d.). Discussions are archived for retrieval by Stroke Center Network members.

The implementation of a comprehensive stroke clinical pathway may improve the use of clinical guidelines for the management of stroke patients. For a clinical pathway to do this, it must be designed to fit the needs of a specific organization and blend with current documentation practices. One of the major obstacles to success of a clinical pathway is lack of use by the multidisciplinary team involved in patient care. A restraining force is a lack of investment and support by the stroke management team for use of a clinical pathway. To limit
barriers to pathway implementation, restraining forces should be minimized and driving forces emphasized. It is therefore imperative that a clinical pathway not require significant alteration in existing processes for writing orders and documenting care at the hospital where it is implemented.

**Stroke Clinical Pathway Development and Implementation**

In 1998, at the hospital for this study, a CareMap® for stroke was designed and implemented that was based on an eight day length of stay requiring multidisciplinary documentation. A standardized stroke order set was implemented in conjunction with the CareMap®. However, use of the pathway by physicians, nurses and therapists was limited and the CareMap® was eventually abandoned. The physician orders developed for the CareMap® were converted into generic stroke admission orders and continue to be used by the neurologists.

In 2006, at the study hospital, a team led by the Director of Nursing for the neuroscience unit and the affiliated rehabilitation hospital began implementation of a new stroke initiative. This multidisciplinary team was comprised of physicians, nurses, therapists, and other disciplines from the emergency, neuroscience, radiology, rehabilitation, pharmacy, and nutrition departments. A long-term goal for the team was to prepare the hospital for JCAHO Primary Stroke Center certification by improving, revising, and refining existing processes for the management of stroke patients. Using a collaborative effort, this team identified ongoing areas of improvement in the process of stroke care. A
comprehensive stroke clinical pathway was one of the needs identified and development of the pathway was delegated to the Neuroscience Clinical Nurse Educator.

The stroke clinical pathway was developed to consist of three physician order sets for the different phases of hospitalization, an interdisciplinary plan of care, and an education/flow sheet which lists topics for patient/family education by members of the patient care team. Development of a comprehensive stroke clinical pathway required the input and review of all disciplines involved in care of a stroke patient.

Currently, a Stroke Care Team consisting of case management, nursing, physical therapy, occupational therapy, speech therapy, and nutrition meets twice weekly for multidisciplinary rounds on the neuroscience unit where the plan of care for each stroke patient on the unit is discussed. The same therapists see stroke patients throughout the hospital and are experts within the facility. This multidisciplinary group of professionals participated in the creation of all the documents developed for the stroke clinical pathway and provided valuable input based on specialty.

One neurologist, acting as a physician champion for stroke care, was closely involved in the development of the physician order sets, multidisciplinary documentation forms and patient education handbook. The physician order sets, plan of care, and education flow sheet were presented as a “stroke clinical pathway” and approved by the Neuroscience Section. The Neuroscience Section
membership consists of all neurologists and neurosurgeons with privileges at the study hospital and is committed to addressing clinical issues related to care of the neuroscience patient.

The stroke clinical pathway was designed to improve compliance with the ten JCAHO disease-specific measures (Table 2). In addition, the clinical pathway forms were developed to meet hospital-defined criteria for documentation as follows:

1. Appropriate for ischemic stroke, hemorrhagic stroke, and TIA
2. Address stroke patient management in the emergency department, at inpatient admission, and upon discharge
3. Incorporate an interdisciplinary plan of care with interventions and outcomes specific to stroke, an anticipated length of stay, and a patient version of the care plan
4. Include a patient/family education form with identified stroke education topics

The individual forms of the stroke clinical pathway were approved by all hospital-required committees and implemented in April 2006. Each of the physician order sets and multidisciplinary forms are available online via the hospital intranet and computerized order entry/documentation system. All registered nurses on the neuroscience/stroke unit have been educated about the stroke clinical pathway and trained in the assessment of stroke patients and are certified by the ASA in the use of the National Institute of Health Stroke Scale
(the standard assessment tool identified in the stroke clinical pathway). Additional education for nurses and therapists was identified and provided at the department level as needed.
CHAPTER III

METHODS AND PROCEDURES

Study Design

The ten JCAHO disease-specific criteria identified by JCAHO for stroke were the variables of measurement for this study. Compliance rates of documentation in the medical record were compared for each of the ten JCAHO disease-specific measures before and after stroke clinical pathway implementation. Two retrospective chart reviews were conducted to determine documentation compliance rates. The first review included 110 stroke patient records (baseline data) discharged in the year prior to clinical pathway implementation. The second review included 110 stroke patient records six months after the implementation date. The compliance rates for each of the ten measures were compared from the baseline data to the post-clinical pathway implementation data. Comparison of the compliance rates for each measure was used to determine if there was statistically significant improvement in the level of documentation in the medical record. Comparison of the documentation rates for patients with the stroke clinical pathway and those without was also completed. Fisher’s Exact test was used to assess differences between the baseline and post-intervention rates. Confidence intervals of 95% were calculated for the baseline and post-intervention compliance rates.
Sample

JCAHO defined requirements for sample population and size in its implementation guide for stroke center certification. As instructed by the JCAHO Performance Measurement Implementation Guide’s (2004) section on sampling (Appendix H), 20% of adult stroke admissions were sampled to provide a baseline data set. A query of patients over the age of 18 with stroke ICD-9-CM codes identified by JCAHO was performed (Table 3). This query identified 550 adult stroke patients discharged between the dates of January 1, 2005 and December 31, 2005. The hospital’s quality management department chose a weighted random sample of 110 charts based on the three categories of stroke. There were 334, 114, and 102 total patients in the ischemic stroke, hemorrhagic stroke, and TIA population groups, respectively (Table 5). Twenty percent samples were taken within each group using random numbers generated through an online randomization software program (Research Randomizer, n.d.)

<table>
<thead>
<tr>
<th>Total # in Population</th>
<th># in 20% Random Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ischemic</td>
<td>67</td>
</tr>
<tr>
<td>Hemorrhagic</td>
<td>23</td>
</tr>
<tr>
<td>TIA</td>
<td>20</td>
</tr>
</tbody>
</table>

Instruments and Data Collection

The GWTG-Stroke database, which covers the JCAHO measures, was used for data collection. Appendix G includes the JCAHO data collection tool from which the GWTG-Stroke Patient Management Tool (PMT) was designed.
Data entry training of authorized persons by Outcome Sciences, Inc., the administrators of the AHA GWTG-Stroke database, was provided once the tool was purchased by the study hospital. The primary data collector was the Neuroscience Clinical Nurse Educator. Six other data collectors included nurses from the Neuroscience Center and a Clinical Nurse Specialist working within the same department. The compliance rates for measure documentation were reported as aggregate data.

Data Management

Patient records were de-identified at the point of data entry into the GWTG-Stroke database for confidentiality purposes. The GWTG-Stroke database requires a user password and requires assignment of a unique number to each patient record. Numbers were assigned 1-110 for the baseline group and 1001-1110 for the intervention group. A separate cross-reference file with both numbers was maintained. The hospital’s quality management department may use any demographic information collected within this database. These data include age, gender, race, admitting and consulting physician services, admission location within the hospital, and utilization of the stroke clinical pathway. This information could also be analyzed for trends in the disease-specific measures related to any of these demographics. The GWTG-Stroke database includes basic reports and the hospital’s quality management department assisted in analyzing all data results included in this study.
The GWTG-Stroke PMT was used to collect the data for the 220 patients in the control and intervention group through medical record review. Data was entered from the PMT into the GWTG-Stroke database. Optional fields within the database were designated to note the use of each component of the stroke clinical pathway for the intervention group.

**Limitations**

The sampling methods for this study were based on the JCAHO Performance Measurement Implementation Guide 2004) to best represent the stroke population at the study hospital. Within the intervention group, comparison of measure compliance for patients with the clinical pathway present versus those without resulted in a smaller sample size within the 110 patient record intervention group. Another threat to the validity of the study is in the data collection method which utilized six different data abstractors (i.e. inter-rater reliability). Although the GTWG-Stroke database has coding instructions for the data collector, there remains some ambiguity about how specific the documentation must be to meet the performance measure criteria. Efforts to reduce inter-rater variability included consultation with a clinical operations analyst in the quality management department to clarify the type of documentation required to meet the coding requirements. The more ambiguous measures were also reviewed by the lead researcher as each record was entered into the GWTG-Stroke database.
CHAPTER IV

RESULTS

This chapter presents the results of the statistical analysis for the control group versus the intervention group and within the intervention group, the no clinical pathway group versus the clinical pathway group. Additional evaluation of the use of the stroke clinical pathway in relation to specific performance measures follows.

Control Group versus Intervention Group

The GWTG-Stroke database is designed to run configured reports for the ten JCAHO performance measures. The “JCAHO Pilot-10” report extracts the numerator and denominator for each measure as defined by the JCAHO Stroke Performance Measurement Implementation Guide from all patient records entered into the database. A JCAHO Pilot-10 report was run for the control group and the intervention group. The report provided a spreadsheet detail for each quality measure. The spreadsheet indicated which patient records were included and excluded from the measure criteria and if the measure was met or not met. The patient records included for each measure in the intervention group were then matched with the corresponding optional field data that indicated which element of the stroke clinical pathway was used in the patient record. From this information, a final spreadsheet was created to identify, for each patient record, if the individual quality measure was met, not met, or excluded. An additional
indicator was used for the intervention group to identify use of the stroke clinical pathway.

The data were then analyzed using SAS v9.0 software (Statistical Analysis System, Cary, NC). Compliance rates were compared using Fisher’s Exact test and 95% confidence intervals. P-values <0.05 were considered indicative of statistical significance. This analysis compared the control and the intervention group for compliance with each measure. The same analysis was completed within the intervention group to compare the compliance rate for each measure for those patients with at least one form of the stroke clinical pathway utilized.

Results of documentation compliance for the control group versus intervention group are detailed in Table 6 and shown as a graph in Figure 2. Statistically significant differences are noted with an asterisk.

There were no statistically significant differences between the compliance rates for documentation of the following measures:

- DVT prophylaxis
- antithrombotic at discharge
- anticoagulant for atrial fibrillation
- consideration and administration of t-PA
- antithrombotic within 48 hours
- presence of lipid profile
- dysphagia screening
- planning for rehabilitation
While six patients were potentially eligible, no patients received t-PA in the intervention group. The GWTG-Stroke database allows the data collector to infer the presence of contraindications to t-PA regardless of specific documentation by the physician. Six patients arrived at the study facility’s emergency department within 180 minutes of stroke symptom onset as documented in the medical record. However, there was insufficient documentation to allow the data collectors to infer the precise contraindications apparent to the physician, which prohibited t-PA administration. Further analysis of the records for patients potentially eligible for thrombolytics would be useful to identify opportunities for process improvement.

The control group versus the intervention group demonstrated statistically significant improvements in the documentation compliance rates for patient/family stroke education ($p<0.001$) and smoking cessation counseling ($p<0.001$). However, the large improvement in the smoking cessation measure cannot be attributed to the implementation of the stroke clinical pathway. In 2006, the hospital implemented changes in the nursing admission history to meet CMS standards for documentation of smoking cessation counseling by prompting the nurse to document materials provided to the patient. Those changes were sufficient to meet the documentation requirements for the stroke measure. A computerized charting system used in the Emergency Department also included a notation for smoking cessation counseling and was present in the medical records for smokers in both the control and intervention groups. However, the
simple notation that smoking cessation counseling was provided did not meet measure criteria based on the GWTG-Stroke database coding instructions (Stroke Coding Instructions v7.2, 2006).

Improvement in documentation of stroke education may be equally attributed to the use of the clinical pathway forms as to the process of pathway implementation. There was an increase in documentation of stroke education in the intervention group even in the absence of the clinical pathway. Nursing, as a discipline, most consistently documented patient/family stroke education in the medical record. The increased documentation rate in patients without the clinical pathway may be attributed to the raised awareness about stroke education and resource availability among nurses who had used the pathway with other patients, or attended workshops where the clinical pathway was presented.
Table 6. Measure Compliance for Control Group vs. Intervention Group

<table>
<thead>
<tr>
<th>DSC Stroke Measure</th>
<th>Group</th>
<th>N</th>
<th>Number (%) compliant</th>
<th>Fisher's Exact Test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Deep vein thrombosis prophylaxis</td>
<td>Control</td>
<td>39</td>
<td>36 (92.3)</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>37</td>
<td>33 (89.2)</td>
<td></td>
</tr>
<tr>
<td>2 Discharged on antithrombotics</td>
<td>Control</td>
<td>80</td>
<td>76 (95.0)</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>72</td>
<td>72 (100)</td>
<td></td>
</tr>
<tr>
<td>3 Patients with atrial fibrillation receiving anticoagulation therapy</td>
<td>Control</td>
<td>7</td>
<td>7 (100)</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>12</td>
<td>11 (91.7)</td>
<td></td>
</tr>
<tr>
<td>4A Tissue plasminogen activator (t-PA) considered</td>
<td>Control</td>
<td>12</td>
<td>7 (58.3)</td>
<td>0.71</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>15</td>
<td>10 (66.7)</td>
<td></td>
</tr>
<tr>
<td>4B Tissue plasminogen activator (t-PA) administered</td>
<td>Control</td>
<td>5</td>
<td>3 (60.0)</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>6</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>5 Antithrombotic medication within 48 hours of hospitalization</td>
<td>Control</td>
<td>72</td>
<td>70 (97.2)</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>71</td>
<td>67 (94.4)</td>
<td></td>
</tr>
<tr>
<td>6 Lipid profile</td>
<td>Control</td>
<td>85</td>
<td>49 (57.6)</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>76</td>
<td>55 (72.4)</td>
<td></td>
</tr>
<tr>
<td>7 Screen for dysphagia</td>
<td>Control</td>
<td>84</td>
<td>31 (36.9)</td>
<td>0.74</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>68</td>
<td>27 (39.7)</td>
<td></td>
</tr>
<tr>
<td>8 Stroke education</td>
<td>Control</td>
<td>10</td>
<td>6 (5.6)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>8</td>
<td>24 (26.7)</td>
<td></td>
</tr>
<tr>
<td>9 Smoking cessation</td>
<td>Control</td>
<td>26</td>
<td>8 (30.8)</td>
<td>&lt;0.001*</td>
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<tr>
<td></td>
<td>Intervention</td>
<td>21</td>
<td>19 (90.5)</td>
<td></td>
</tr>
<tr>
<td>10 A plan for rehabilitation was considered</td>
<td>Control</td>
<td>88</td>
<td>75 (85.2)</td>
<td>0.33</td>
</tr>
<tr>
<td></td>
<td>Intervention</td>
<td>70</td>
<td>64 (91.4)</td>
<td></td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level
Figure 2. Comparison of Control Group Measures to Intervention Group

<table>
<thead>
<tr>
<th>DVT Prophylaxis</th>
<th>Antithrombotic @ discharge</th>
<th>A-fib on anticoag</th>
<th>TPA considered</th>
<th>TPA administered</th>
<th>Antithrombotic w/in 48 hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>Intervention</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>92.3 / 89.2</td>
<td>95.0 / 100</td>
<td>100 / 91.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39 / 37</td>
<td>80 / 72</td>
<td>7 / 12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lipid Profile</th>
<th>Dysphagia Screening</th>
<th>Stroke Education</th>
<th>Smoking Cessation</th>
<th>Plan for Rehab</th>
</tr>
</thead>
<tbody>
<tr>
<td>57.6 / 72.4</td>
<td>36.9 / 39.7</td>
<td>5.5 / 26.7</td>
<td>30.8 / 26.7</td>
<td>85.2 / 91.4</td>
</tr>
<tr>
<td>85 / 76</td>
<td>84 / 68</td>
<td>108 / 90</td>
<td>26 / 21</td>
<td>88 / 70</td>
</tr>
</tbody>
</table>

Items marked with an * indicate statistical significance
Intervention Group versus Clinical Pathway Group

Analyses within the intervention group to determine the influence of stroke clinical pathway use on documentation of the ten JCAHO disease-specific measures were completed. Thirty-three (30%) of the 110 patients in the intervention group had at least one form of the stroke clinical pathway utilized. Data analyses within the intervention group comparing documentation compliance for patients with the stroke clinical pathway/order sets in use and those without are summarized in Table 7 and as a graph Figure 3. Measures with statistically significant improvement are noted with an asterisk. There were no statistically significant differences in the compliance rates in the following stroke performance measures:

- DVT prophylaxis
- antithrombotic at discharge
- anticoagulant for atrial fibrillation
- consideration and administration of t-PA
- antithrombotic within 48 hours
- dysphagia screening
- smoking cessation counseling
- planning for rehabilitation

There was a noticeable difference in the t-PA considered performance measure for the clinical pathway group (88.9%) versus the no clinical pathway group (33.3%), but it was not statistically significant. It is, however, clinically
significant that documentation of consideration for t-PA, the only Food and Drug Administration (FDA) approved medication to treat acute stroke, was present in the medical record. It is interesting to note that for some patient records, the only physician documentation of t-PA consideration was on the Stroke Admission Orders.

One patient record out of five with atrial fibrillation in the clinical pathway group did not have documented contraindications to anticoagulation. The Stroke Admission order set used for this patient has a medication section containing the statement “Anticoagulant for ischemic stroke of cardioembolic source”, but does not prompt documentation of contraindications to anticoagulant therapy. The Stroke Interdisciplinary Plan of Care has prompts for nursing related to this measure, but was not used for this patient.

The smoking cessation measure was not met for two patients in the clinical pathway group. One patient had only the Emergency Department Orders of the clinical pathway in place, which does not address smoking cessation. The other patient had all elements of the clinical pathway used except the Stroke Admission Orders, most of which include smoking cessation-counseling prompts. For this patient, the clinical pathway did not ensure adequate documentation of smoking cessation counseling or treatment. The documentation prompts embedded in the nursing admission history previously referenced were not utilized for either of these two patients.
Two of the stroke performance measures in the intervention group had a statistically significant improvement when the stroke clinical pathway was utilized. Those measures were patient/family stroke education and lipid profile.

Over half of the patients with the clinical pathway had patient/family stroke education documented. The Stroke Admission Orders include an order for patient/family stroke education and was present on 80% of the charts with required documentation. Over 50% of the charts with stroke education documentation had the Stroke Interdisciplinary Plan of Care and the Stroke Interdisciplinary Patient/Education Flow Sheet present in the record. The increased rate of compliance with stroke education may be attributed to the clinical pathway. Although location of the patient in the hospital was not a variable for this study, it is noteworthy that all patients with documentation of education on the clinical pathway were admitted or transferred to the neuroscience/stroke unit.

Two patient records with the clinical pathway utilized did not have lipid profile results available. A lipid profile is a pre-checked item on the Stroke Admission Orders; therefore, any patient admitted with the order set should have had a lipid profile drawn. The Stroke Admission Orders were used for one of the patient records, but no results were available.
Table 7. Measure Compliance for No Clinical Pathway Group vs. Clinical Pathway Group

<table>
<thead>
<tr>
<th>DSC Stroke Measure</th>
<th>Group</th>
<th>N</th>
<th>Number (%) compliant</th>
<th>Fisher’s Exact Test p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Deep vein thrombosis prophylaxis</td>
<td>No Pathway</td>
<td>24</td>
<td>21 (87.5)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>13</td>
<td>12 (92.3)</td>
<td></td>
</tr>
<tr>
<td>2 Discharged on antithrombotics Patients with atrial fibrillation receiving</td>
<td>No Pathway</td>
<td>45</td>
<td>45 (100)</td>
<td></td>
</tr>
<tr>
<td>anticoagulation therapy Tissue plasminogen activator (t-PA) considered</td>
<td>Pathway</td>
<td>27</td>
<td>27 (100)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Patients with atrial fibrillation receiving anticoagulation therapy Tissue</td>
<td>No Pathway</td>
<td>7</td>
<td>7 (100)</td>
<td></td>
</tr>
<tr>
<td>plasminogen activator (t-PA) administered</td>
<td>Pathway</td>
<td>5</td>
<td>4 (80)</td>
<td>0.42</td>
</tr>
<tr>
<td>4A Antithrombotic medication within 48 hours of hospitalization</td>
<td>No Pathway</td>
<td>6</td>
<td>2 (33.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>9</td>
<td>8 (88.9)</td>
<td>0.09</td>
</tr>
<tr>
<td>4B Tissue plasminogen activator (t-PA) administered</td>
<td>No Pathway</td>
<td>4</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>2</td>
<td>0 (0.0)</td>
<td></td>
</tr>
<tr>
<td>5 Antithrombotic medication within 48 hours of hospitalization</td>
<td>No Pathway</td>
<td>43</td>
<td>39 (90.7)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>28</td>
<td>28 (100)</td>
<td>0.15</td>
</tr>
<tr>
<td>6 Lipid profile</td>
<td>No Pathway</td>
<td>48</td>
<td>29 (60.4)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>28</td>
<td>26 (92.9)</td>
<td>0.003*</td>
</tr>
<tr>
<td>7 Screen for dysphagia</td>
<td>No Pathway</td>
<td>47</td>
<td>16 (34.0)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>21</td>
<td>11 (52.4)</td>
<td>0.19</td>
</tr>
<tr>
<td>8 Stroke education</td>
<td>N</td>
<td>61</td>
<td>9 (14.8)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No Pathway</td>
<td>29</td>
<td>15 (51.7)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>29</td>
<td>15 (51.7)</td>
<td></td>
</tr>
<tr>
<td>9 Smoking cessation</td>
<td>No Pathway</td>
<td>11</td>
<td>11 (100)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>10</td>
<td>8 (80)</td>
<td>0.21</td>
</tr>
<tr>
<td>10 A plan for rehabilitation was considered</td>
<td>No Pathway</td>
<td>47</td>
<td>41 (87.2)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pathway</td>
<td>23</td>
<td>23 (100)</td>
<td>0.17</td>
</tr>
</tbody>
</table>

* Significant at the 0.05 level
Figure 3. Comparison of No Clinical Pathway Group Measures to Clinical Pathway Group

Items marked with an * indicate statistical significance
Additional Findings

The form most often used from the stroke clinical pathway was the Stroke Admission Orders. This form includes a section directing the admitting nurse to initiate the Stroke Interdisciplinary Plan of Care and utilize the Stroke Interdisciplinary Patient/Family Education Flow Sheet and Handbook. These forms were the second and third most utilized elements of the clinical pathway respectively (Table 8). Of the 33 patients with the clinical pathway, 17 had at least one element in the pathway present. Only one chart had all stroke clinical pathway forms utilized (Table 9).

<table>
<thead>
<tr>
<th>Emergency Orders</th>
<th>Admission Orders</th>
<th>Discharge Orders</th>
<th>Interdisciplinary Plan of Care</th>
<th>Interdisciplinary Patient/Family Education Flow Sheet &amp; Handbook</th>
</tr>
</thead>
<tbody>
<tr>
<td>7 (21.2%)</td>
<td>26 (78.8%)</td>
<td>4 (12.1%)</td>
<td>12 (36.4%)</td>
<td>11 (33.3%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 9. Number (%) with Multiple Clinical Pathway Forms Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Form</td>
</tr>
<tr>
<td>---------</td>
</tr>
<tr>
<td>17 (51.5%)</td>
</tr>
</tbody>
</table>

An analysis of the number of measures met in the control group, intervention group, and clinical pathway group was completed to determine if there was an increase in the documentation of multiple performance measures.
for each patient rather than the individual measure only. A Chi-square test for linear trend revealed that the increased compliance with multiple measures for patients on the clinical pathway was statistically significant (Table 10 & Figure 4). The control group and intervention group, as a whole did not show the same trend with multiple measures as the clinical pathway group.

Table 10. Number (%) of Records with Multiple Measures Met with and without Clinical Pathway Forms Present

<table>
<thead>
<tr>
<th>Number of measures met</th>
<th>Number of records</th>
<th>Number records (%) without Pathway</th>
<th>Number records (%) With Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>15</td>
<td>14 (93.3%)</td>
<td>1 (6.7%)</td>
</tr>
<tr>
<td>1-2</td>
<td>21</td>
<td>19 (90.5%)</td>
<td>2 (9.5%)</td>
</tr>
<tr>
<td>3-4</td>
<td>36</td>
<td>27 (75%)</td>
<td>9 (25.0%)</td>
</tr>
<tr>
<td>5-6</td>
<td>26</td>
<td>13 (50.0%)</td>
<td>13 (50.0%)</td>
</tr>
<tr>
<td>7-8</td>
<td>12</td>
<td>4 (33.3%)</td>
<td>8 (66.7%)</td>
</tr>
</tbody>
</table>

Figure 4. Graph of Increased Compliance of Measures Met with Clinical Pathway Forms Used

Note: p<0.001 from Chi-square test for linear trend. This indicates a statistically significant increase in the # of measures met as the usage of clinical pathway increases.
A factor, which could have affected the study results, was the institution of a multidisciplinary Stroke Discharge Team at the hospital. Starting in January 2007, this team met daily to facilitate discharge plans and notify physicians when the stroke clinical pathway was not utilized. The data collected for this study included 23 patients admitted after the multidisciplinary stroke team was formed. The 23 patients did not show the same trend with documentation of multiple measures as did the clinical pathway group. Ideally, however, a clinical pathway is a tool used by a multidisciplinary team to promote the use of evidence-based medicine and documentation of key quality indicators.
The intervention group demonstrated statistically significant improvement in the documentation of patient/family stroke education ($p<0.001$). This positive change was also statistically significant in the intervention group when the stroke clinical pathway was used ($p<0.001$). Patient/family education about the type of stroke, treatment plan, and risk factor modifications are vital elements of quality nursing care. Without education about modifiable risk factors, secondary stroke prevention is limited. Thus, nurses play a pivotal role in helping the patient avoid a second stroke. The Stroke Admission Orders direct the admitting nurse to initiate and document stroke education. The improvement in this measure with the use of a clinical pathway demonstrates how nurses effectively utilize a physician order set as a checklist.

The pre-checked item for a lipid profile in the admission order set also had a statistically significant influence on measure compliance ($p<0.003$). The improvement demonstrates that it is useful to force compliance with some orders rather than leaving it to the individual physician to make a choice. However, there should be thoughtful consideration of which measures to enforce in this manner to ensure individualization of patient care.

The clinical pathway not only led to improvement in two individual measures, it improved the overall compliance with documentation of multiple measures. Meeting more performance measures per individual patient is more
indicative of quality patient care than improving compliance in only one measure. This study suggests that implementation of a clinical pathway can help physicians and nurses improve quality measure documentation.

Deficiencies in the clinical pathway process may have limited the clinical pathway utilization. This may be the reason only 30% of patients in the intervention group had any element of the clinical pathway in place. To make the clinical pathway more user friendly, it should be simplified into as few documents as possible, while not requiring additional effort to initiate. The Emergency Department order sets were the second least utilized element of the pathway in this study. The Emergency Department at the study facility uses a computerized documentation and order entry system. Integrating performance measures into that system would facilitate compliance with measures affecting patients entering through that department. Customization of any computerized documentation system can be a time consuming and costly endeavor, which may prove limiting.

The Stroke Discharge Orders were the least utilized component of the clinical pathway. While the computer system at the facility was set up to automatically print the Discharge Orders, it would only do so if the unit secretary selected the “Stroke Admission” packet when the inpatient chart is prepared. If the standard admission packet is selected, a generic discharge order form is printed and placed on the chart that does not prompt the physician to consider discharge quality measures. Computerized physician order entry (CPOE) could help ensure discharge stroke measures are met by integrating prompts for
patients with a stroke diagnosis. Currently, the study facility is in the initial stages of transition to a CPOE system. The hospital's discharge instructions for nursing are already computerized, so inclusion of prompts for patients with stroke diagnosis could enhance documentation of stroke performance measures at discharge. Since some of the stroke measures at discharge are physician initiated, the effectiveness of including prompts in the nursing discharge would be limited.

While instructions to screen stroke patients for dysphagia were included in the Stroke Admission Orders and the Stroke Interdisciplinary Plan of Care, there are not specific prompts to ensure documentation of swallow screen by nursing in the medical record. Inclusion of such instructions in future revisions of the clinical pathway should be considered. Addition of a formal dysphagia screening form that is completed by the bedside nurse prior to oral intake may be a useful tool to include in the pathway. Such a tool should provide instructions to withhold all oral intake for stroke patients with symptoms suspicious for impaired swallowing until evaluation by a Speech Pathologist is completed.

The study facility currently utilizes a computerized nursing documentation system, but it does not include the Interdisciplinary Plan of Care. Use of the hospital's generic Interdisciplinary Plan of Care form is not consistent. Use of the Stroke Interdisciplinary Plan of Care was also limited as evidenced by this study. Transition to a computerized plan of care could trigger documentation prompts
for quality measures based on nurses’ charting. The hospital is investigating this type of option.

Compliance with the measure of anticoagulant therapy for patients with atrial fibrillation was high, but one patient with the clinical pathway did not meet the measure criteria. Opportunity to document contraindications to anticoagulant therapy in the clinical pathway may have helped with meeting this measure by excluding the patient record from the denominator population. The measure for consideration of t-PA could also have improved documentation with incorporation of a prompt to document contraindications to thrombolytic therapy. These additions should be considered with future stroke clinical pathway revisions.

Conclusions

A clinical pathway is always a challenge to implement and maintain due to the complex nature of patient care. Success depends in part on the level of pathway integration into existing documentation processes. Clinical pathways have been used in various settings and in multiple formats to improve documentation and streamline patient care with reports of mixed success (Kwan, Sandercock, 2004).

The most recently published update to the ASA guidelines for acute ischemic stroke management includes a recommendation for use of standardized stroke care order sets to improve the general management of stroke patients (Adams, Del Zoppo, et al., 2007). This is a new recommendation based on the consensus that a clinical pathway is useful despite limited evidence from large
trials. This study demonstrates that documentation, which is a reflection of care given, can be improved by the incorporation of evidence-based guidelines into a clinical pathway consisting of order sets, interdisciplinary care plans, and flow sheets. However, the small number of patients in the intervention/clinical pathway group of 33 patients limits the power to detect statistically significant differences. Continued surveillance of the effect of the clinical pathway on documentation in the study facility with the GWTG-Stroke tool is suggested to further explore the relationship between the clinical pathway use and measure compliance. Additional research into the subject is recommended on a larger scale and in other institutions.

Development and implementation of a clinical pathway for stroke care must be a multidisciplinary endeavor. While each discipline involved in the care of the stroke patient at the study facility was consulted for input into pathway development, it was on an individual basis rather than in a group forum. There was not sufficient opportunity for the stroke care team to discuss existing processes and how the clinical pathway could be utilized at each step in the stroke patient’s hospital course. This lack of a comprehensive and ongoing team commitment to the development and implementation of the clinical pathway very likely reduced its acceptance and utilization.

Consistent and continuous feedback to physicians and nurses about use of the clinical pathway and compliance with quality measures is vital to the success of a clinical pathway in influencing care. A designated position such as a
nurse coordinator to provide concurrent feedback about the clinical pathway to the healthcare team would likely have had a positive effect on its use and documentation. A multidisciplinary team active in the care of individual stroke patients and in program development is necessary to improve compliance with quality measures. A database such as *GWTG-Stroke* to gather data concurrently, identify key measures specific to the stroke patient, and provide feedback on compliance is a valuable tool for improving stroke care in a hospital.

**Nursing Implications**

This study has demonstrated that a stroke clinical pathway can have a positive effect on documentation of specific quality measures and can increase compliance with multiple measures for the individual patient. While the increase in smoking cessation counseling cannot be attributed to the stroke clinical pathway, it was a direct result of changes in the nursing documentation system, similar to intent of the clinical pathway. Improvement in patient/family stroke education, however, can be attributed the stroke clinical pathway. Nursing is primarily responsible for patient/family education; providing learning resources, reminders, and a checklist within the clinical pathway process proved to be useful. However, even with the improvement in stroke education, only about one-fourth of the patients in the intervention group had documented evidence that stroke teaching occurred demonstrating there is still much work to be done to meet this measure. Providing to each nursing unit involved in care of the stroke patient, a compliance chart on a monthly basis may be a way to raise staff
awareness of the value of this nursing intervention. The improvement in lipid profile measure shows that it is effective to make some quality measures mandatory, rather than leaving them to the discretion of the physician. This principle would apply to nursing care orders as well.

The t-PA administration rates in the intervention group are of particular concern and should received special attention. The control group had an overall rate of t-PA administration of 4.5%, while the intervention group did not have any patients. Individual chart analysis of those who arrived to the hospital’s emergency department within three hours of symptom onset, may help in identifying specific areas of process improvement for acute stroke evaluation. Early identification and work-up of patients eligible for t-PA is vital. The earlier t-PA is administered, the greater the possibility decreased disability and improved outcome. Another measure for closer attention is the dysphagia. Staff education focused on the importance of a swallowing evaluation for stroke patients will be necessary. Incorporation of a dysphagia screening checklist for the nurse into existing documentation systems should also be considered.

Unfortunately only 30% of the intervention group records had the stroke clinical pathway in place. The lack of pathway acceptance by physicians and nurses seriously undermines the potential benefits in quality measure improvement. In retrospect, efforts to involve physicians and nurses in the emergency department, intensive care unit, and the acute care unit to a much greater degree in the development of the pathway could have resulted in a more
successful pathway implementation. Staff in each of these departments should be actively involved in all pathway revisions and may benefit from participating in chart reviews to better identify deficiencies in documentation of quality measures. Future research with this data should include further analysis to identify trends in measure compliance based on admitting physicians, consulting physicians, and nursing unit as well as demographics such as age, ethnicity, and payor source.
Appendix A

Emergency Department Orders for Stroke

<table>
<thead>
<tr>
<th>ACUTE STROKE (Emergency Dept or Inpatient)</th>
<th>Page 1 of 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emergency Department Arrival: Date</td>
<td>Evaluation by ED Physician: Time</td>
</tr>
<tr>
<td>Onset of Symptoms: Date</td>
<td>Non-contrast head CT completed: Time</td>
</tr>
<tr>
<td></td>
<td>Evaluation by Neurologist: Time</td>
</tr>
<tr>
<td></td>
<td>TPA administration: Time</td>
</tr>
<tr>
<td></td>
<td>Initial NIHSS score:</td>
</tr>
</tbody>
</table>

*May be t-PA candidate if known onset of symptoms less than 3 hours

Presenting symptoms:
- [] Loss of language function (aphasia)
- [] Cranial nerve palsy (diplopia or dysarthria)
- [] Loss of coordination (ataxia)
- [] Difficulty speaking
- [] Loss of vision (one eye, both eye, to one side)
- [] Difficulty understanding speech
- [] Loss of sensation (pin and temp. NOT stocking)
- [] Weakness (one side or generalized)
- [] Difficulty walking
- [] Coma
- [] glove pattern

Part 1: Evaluation for t-PA administration and Initial Acute Stroke Orders

Complete on all stroke patients admitted to ED or Inpatient with new onset symptoms of Acute Ischemic Stroke

All items without a box are active orders. Items with a (☐) must be checked to become an active order.

1. Notify neurologist if patient is a t-PA candidate and document critical times for stroke assessment.

2. Diagnostic Tests & labs:
   - [] CT head without contrast with STAT interpretation
   - [] LOD labs: CBC with diff, PT/PTT/INR
   - [] Stat labs: Magnesium, Phosphorus, Urine pregnancy test (if premenopausal), Glucose
   - [] STAT EKG

3. Monitoring:
   - [] Vital signs every 15 minutes, bilateral BP (blood pressure) readings on initial check.
   - [] Neuro checks (National Institute of Health Stroke Scale-NIHSS) every 1 hour. Notify MD if any changes in neuro exam, vital signs, or occurrence of nausea, vomiting, diaphoresis or headache
   - [] Continuous pulse oximetry: Titrate O₂ to keep sats greater than 95%.
   - [] Continuous cardiac monitoring
   - [] Monitor I&O, may place indwelling catheter if patient unable to communicate

4. IV fluids:
   - [] Obtain at least 2 IV sites 1/2 NS at 50 ml/hour

5. Elevate Head of Bed 30 degrees to prevent aspiration unless contraindicated

6. NPO

7. Do not give any warfarin, heparin, aspirin, or other antithrombotic medications until patient is ruled out as a t-PA candidate.

Physician to note contraindications to t-PA for Acute Ischemic Stroke

- [] Neurological signs clearing spontaneously
- [] Neurological signs minor and isolated (Caution should be used in treating a patient with major deficits)
- [] Clinical presentation suggestive of subarachnoid hemorrhage, even with normal CT
- [] Known onset of symptoms greater than 3 hours
- [] Head trauma or prior stroke in previous 3 months
- [] Myocardial Infarction in the previous 3 months
- [] Gastrointestinal or urinary tract hemorrhage in previous 21 days or positive stool hemoccult
- [] Major surgery in previous 14 days
- [] Arterial puncture at noncompressible site in previous 7 days
- [] History of intracranial hemorrhage
- [] Evidence of intracranial hemorrhage
- [] Blood pressure elevated (systolic greater than 185 mmHg, diastolic greater than 110 mmHg)
- [] Evidence of bleeding or acute trauma (fracture) on exam
- [] Use of oral anticoagulant with an INR greater than 1.5
- [] Use of heparin in previous 48 hrs with an elevated PTT
- [] Platelet less than 100,000 mm³
- [] Blood glucose less than 50 mg/dl
- [] Seizure with postictal residual neurologic impairments
- [] CT showing multilobar infarction (hypodensity of greater than 1/3 cerebral hemisphere)
ACUTE STROKE (Emergency Dept or Inpatient)

All items without a box are active orders. Items with a [ ] must be checked to become an active order.

8. Candidate for t-PA:
   - [ ] If NONE of the previous contraindications indicated, potentially a candidate for t-PA and acute stroke research studies. Notify neurologist and Refer to Step 2: t-PA for Acute Ischemic Stroke
   - [ ] If ANY of the above contraindications indicated, THEN PATIENT NOT A CANDIDATE FOR T-PA, but may still qualify for acute research studies.

9. Blood Pressure Control for patients NOT eligible for t-PA:
   - [ ] SBP greater than 220 mmHg or greater than 120 DBP mmHg:
     - Labeletalol 10-20 mg IV over 1-2 min. May repeat or double every 10 min (maximum of 300 mg).
     - Nicardipine 5 mg/hour IV drip; titrate by 2.5 mg/hour every 5 min (maximum of 15 mg/hour)
       (critical care only)
     - Nitropresside 0.5 mcg/kg/min IV drip (max of 10 mcg/kg/min)
       (critical care only, requires continuous BP monitoring, use cautiously if patient has renal impairment)

   [ ] [ ] [ ]

Physician Signature: __________________________

Print Name: __________________________

---

Part 2: t-PA for Acute Ischemic Stroke

Obtain physician order to complete following section only if patient meets criteria for t-PA administration

1. Ensure all evaluation for t-PA Inclusion/Exclusion criteria documentation has been completed and patient is a candidate for t-PA treatment and patient/family understand risks and benefits of t-PA.

2. Do not give antplatelet, anticoagulant, or antithrombotic agent x 24 hrs after start of t-PA infusion.

3. Blood Pressure Control before treatment with t-PA
   - Monitor BP every 15 min during antihypertensive therapy. (Goal BP less than 185/110 mmHg.)
     - [ ] If SBP greater than 185 mmHg or DBP greater than 110 mmHg:
       - Labeletalol 10-20 mg IV over 1-2 minutes. May repeat once.
     - [ ] If BP not reduced and maintained below 185/110, do not administer t-PA.

4. Initiate t-PA at 0.9 mg/kg IV (not to exceed 90 mg), with 10% of total dose given over 1 minute and remainder infusing over 60 minutes.
   - Actual patient weight in kg ________ x 0.9 mg/kg = ________ mg Total t-PA dose
   - Bolus dose: Total t-PA dose ________ x 0.1 = ________ mg IV over 1 minute.
   - Infusion dose: Total t-PA dose ________ x 0.9 = ________ mg IV over 60 minutes.

5. Monitor BP and neuro check for first 24 hours after starting treatment: Every 15 minutes for 2 hours after infusion start, then every 30 minutes for 6 hours, then every 1 hour for 16 hours.
ACUTE STROKE
(Emergency Dept or Inpatient)

All items without a box are active orders. Items with a ( ) must be checked to become an active order.

6. Blood Pressure Control during and after treatment with t-PA
   Increase frequency of BP monitoring if SBP greater than 180 mmHg or DBP greater than 105 mmHg.
   Administer antihypertensives to maintain BP at or below 180/105 mmHg
   SBP 180-230 mmHg or DBP 105-120 mmHg:
   □ Labetalol 10 mg IV over 1-2 min. May repeat or double every 10 min (maximum of 300 mg)
   OR
   □ Labetalol 10 mg IV over 1-2 min and start IV drip at 1-6 mg/min (critical care only)
   SBP greater than 230 mmHg or DBP 120 mmHg:
   □ Nicardipine 5 mg/hour IV drip; titrate by 2.5 mg/hour every 5 min (maximum of 15 mg/hour)
   (critical care only)
   □ Nitroprusside 0.5 mcg/kg/min IV drip (max of 10 mcg/kg/min)
   (critical care only, requires continuous BP monitoring, use cautiously if patient has renal impairment)

7. If patient develops severe headache, acute hypertension, nausea, or vomiting, discontinue t-PA infusion, call physician and obtain STAT CT scan of brain.

Physician Signature: ____________________________
Print Name: ____________________________

Part 3: Potential Hemorrhage after t-PA

Obtain physician order to complete following section only
if patient demonstrates signs of intracranial hemorrhage following t-PA administration

1. Stop t-PA infusion if not completed.
2. STAT CT of brain for evaluation of intracranial hemorrhage
3. Life or Death PT, PTT, platelet, fibrinogen; and type and crossmatch
4. Prepare 6 units of platelets and keep on hold for immediate administration.
5. Prepare 6 units of cryoprecipitate with Factor VIII.
6. Notify physician of CT scan completion.
7. If signs of intracranial hemorrhage, obtain physician order to proceed to Step 4: Intracranial Hemorrhage after t-PA Order Set

Part 4: Intracranial Hemorrhage after t-PA

Obtain physician order to complete following section only
if intracranial hemorrhage after t-PA evident on CT scan.

1. Transfuse with ______ units of PRBC
2. Transfuse ______ units of platelets
3. Administer ______ units of cryoprecipitate containing factor VIII
4. STAT bleeding time
5. Neurosurgical consultation to assess for possible surgical decompression
   Hematology consultation to assess for potential reversible contributors to hemorrhage

TELEPHONE ORDERS MUST BE READ BACK AND CONFIRMED

Physician's Signature: ____________________________ Date: ____________________________
# Appendix B

## Stroke Admission Orders

**STROKE ADMISSION ORDERS**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>DRUG ALLERGIES</th>
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<table>
<thead>
<tr>
<th>HEIGHT</th>
<th>WEIGHT</th>
<th>DIAGNOSIS</th>
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<tr>
<td></td>
<td></td>
<td>□ TIA □ Ischemic CVA □ Intracranial Hemorrhage</td>
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<table>
<thead>
<tr>
<th>STROKE ADMISSION ORDERS</th>
<th>Page 1 of 5</th>
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</table>

All items without a box are active orders. Items with a □ must be checked to become an active order.

**Patient Status:** □ Admit as Inpatient □ Outpatient Observation (may not be used for ICU patients)

**Level of Service:** □ Neuroscience Unit □ Cardiac Monitored Bed □ Neuro Trauma ICU □ IICU

**Category:** □ 2 Do Not Ventilate □ 3 Do Not Resuscitate □ 4 Allow Natural Death

- □ Telemetry x 24 hour or ________ notify physician of new dysrhythmia, pulse less than 45, greater than 125
- □ Continuous cardiac monitoring □ Continuous pulse oximetry □ Arterial line □ Other ____________

**ICU monitoring:** (Critical Care use only)

- □ if patient intubated, complete Ventilation Order Form

1. **Thrombolytic:** □ Patient NOT a t-PA candidate □ Patient has received t-PA. (Avoid lab draws, catheter insertion, other procedures with bleeding risk x 24 hrs after t-PA infusion)

2. **Patient Admitting RN to:**
   **Education:**
   - □ Initiate Interdisciplinary Plan of Care: Stroke (M10278)
   - □ Give Patient/Family Stroke Education handbook to patient/family. (Stroke education accessed from GHSnet Nursing webpage under Patient/Family Education Materials)
   - □ Document teaching on Stroke Interdisciplinary Patient/Family Education Flowsheet (M10419)

3. **Vital Signs Neuro Checks**
   **O2 sat checks:**
   - Use NIHSS (National Institute of Health Stroke Scale) for neuro assessment.
   - □ If t-PA given, continue checks every 5 minutes for 2 hours after infusion start, then every 30 minutes for 6 hours, then every 1 hr for 16 hours.
   - □ Every 2 hour x 12 hours, every 4 hour x 12 hours, then every 8 hours
   - □ Every 1 hour (critical care only)

   Notify physician of:
   - SBP (systolic blood pressure) greater than □ 185 mmHg □ 220 mmHg
   - DBP (diastolic blood pressure) greater than □ 110 mmHg □ 120 mmHg
   - Pulse less than 50
   - Respirations greater than 24
   - Temperature greater than 101.5
   - Any changes or decline in neuro status.
<table>
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<th>MONTH</th>
<th>DAY</th>
<th>TIME</th>
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**STROKE ADMISSION ORDERS**

All items without a box are active orders. Items with a ( ) must be checked to become an active order.

4. **Stroke Team** consult to evaluate & treat (call physician with recommendations requiring additional orders)
   - [ ] All members (mark individual consults if all members not needed)
   - [ ] Physical Therapy (Diet/Tube feeding recommendations per Nutrition)
   - [ ] Occupational Therapy
   - [ ] Case Management/Social Work for discharge planning
   - [ ] Speech Therapy and Modified Barium Swallow as indicated by Speech Therapy assessment. (Diet recommendations per Speech Therapy to be followed.)

5. **Activity:**
   - [ ] Out of bed with assistance if sitting BP less than 20 mmHg change from baseline
   - [ ] Bedrest for 1st 24 hour
   - [ ] Head of bed 30 degrees
   - [ ] Other:

6. **Nutrition/Diet**
   - [ ] NDD3: Dysphagia Advanced
   - [ ] NDD2: Dysphagia
   - [ ] NDD1: Pures
   - [ ] Sips/Chips/Meds
   - [ ] Enteral feeding
   - [ ] Regular
   - [ ] Cardiac/ADA
   - [ ] Mechanical Soft
   - [ ] NPO
   - [ ] Other:

7. **Aspiration Precautions:**
   - Nursing to perform bedside exam prior to oral intake of food, fluid or meds.
   - Use standard as listed until modified by Speech Therapy
   - Bedside swallow exam: If patient alert, sitting upright, cooperative and has gross oromotor function, provide small sip of water and monitor for cough, respiratory distress, voice changes, laryngeal movement and reduction in O2 saturation levels.
   - Visual checks of mouth for food pocketing.
   - Monitor temp, pulmonary status and phlegm color for change
   - Head of bed 90 degrees for all po intake and 30 minutes after

8. **Respiratory/Oxygen:**
   - O2 at 2 liters nasal cannula.
   - If O2 saturation less than 95%, titrate Oxygen therapy to maintain O2 sat greater than 95%
   - Respiratory consult for patients who smoke and request additional information about smoking cessation.

9. **Urinary:**
   - [ ] Measure I&O every 1 hour for 24 hours, then every 2 hours if stable
   - [ ] Straight cath every 6 hours pm if unable to void or urinary output less than 240 ml in 8 hour
   - [ ] Foley catheter
   - [ ] Bedside commode
   - [ ] Bathroom privileges

10. **IV fluids:**
    - [ ] Saline lock
    - [ ] IVF ______________________ at ______ ml/hour
### StROKE ADMISSION ORders

All items without a box are active orders. Items with a [ ] must be checked to become an active order.

#### 11. Consults:
- Rehab hospital consult
- Neurologist
- Neurosurgeon
- Hospitalist
- Cardiologist
- Vascular
- GI
- Neuropsychologist
- Subacute consult
- Other:

#### 12. Diagnostic tests:
- CT head w/o contrast
- Carotid Ultrasound/Juplex
- MRI brain
- MRA head
- EEG
- 2D Echo
- TEE: Cardiologist to perform and read as consulted above.

#### 13. Labs:
- Lipid profile
- BMET
- CMP
- CRP
- ESR
- TSH
- RPR
- CBC
- PT/INR
- PT/PTT
- Hemoglobin electrophoresis for sickle cell
- Homocysteine level
- Serum protein electrophoresis
- Hypercoagulable profile
- For ischemic stroke in patients less than 60 yrs
- Anticoagulant
- Hemoglobin electrophoresis
- Other:

#### 14. SQBS every [ ]
- Use regular insulin and follow GHS Subcutaneous Insulin Orders: Standard Sliding Scale. Call MD for glucose less than 50 or greater than 400.

#### 15. Blood Pressure Control for patients NOT eligible for t-PA:
- SBP greater than 220 mmHg or greater than 120 DBP mmHg:
  - Labetalol 10-20 mg IV over 1-2 min. May repeat or double every 10 min (maximum of 300 mg).
  - Nicardipine 5 mg/hour IV drip; titrate by 2.5 mg/hour every 5 min (maximum of 15 mg/hour) (critical care only)
  - Nitroprusside 0.5 mcg/kg/min IV drip (max of 10 mcg/kg/min) (critical care only, requires continuous BP monitoring, use cautiously if patient has renal impairment)
16. Blood Pressure Control during and after treatment with t-PA
   Increase frequency of BP monitoring if SBP greater than 180 mmHg or DBP greater than 105 mmHg.
   Administer antihypertensives to maintain BP at or below 180/105 mmHg
   SBP 180-230 mmHg or DBP 105-120 mmHg:
   □ Labetalol 10 mg IV over 1-2 min. May repeat or double every 10 min (maximum of 300 mg)
   OR
   □ Labetalol 10 mg IV over 1-2 min and start IV drip at 1-6 mg/min (critical care only)
   SBP greater than 230 mmHg or DBP 120 mmHg:
   □ Nicardipine 5 mg/hour IV drip; titrate by 2.5 mg/hour every 5 min (maximum of 15 mg/hour)
     (critical care only)
   □ Nitroprusside 0.5 mcg/kg/min IV drip (max of 10 mcg/kg/min)
     (critical care only, requires continuous BP monitoring, use cautiously if patient has renal impairment)

17. Antithrombotic therapy:
   Antiplatelet for ischemic stroke
   □ Enteric Coated Aspirin ________ mg PO daily
   □ Aspirin 300 mg suppository PR daily if NPO
   □ Plavix (clopidogrel) 75 mg PO/NG daily
   □ Aggrenox (ASA/dipyridamole) 1 PO/NG daily
   Anticoagulant for ischemic stroke of cardioembolic source
   (i.e. atrial fibrillation, mechanical heart valve):
   □ Coumadin (warfarin) ______ mg
   □ IV Heparin per Weight Based protocol
   □ IV Heparin per Gusto protocol: Bolus ______ units, start at ______ units/hour
   □ No IV Heparin boluses
   Other: ____________________________________________________________
   Do not give any antiplatelet or anticoagulant to t-PA patients until 24 hours after t-PA infusion.

18. DVT prophylaxis:
   □ Heparin 5000 units SubQ every 12 hour
   □ Sequential Compression Device
   □ Other: _______________________________________________________

19. Stress Ulcer/GERD:
   Zantac (ranitidine) □ 150 mg PO/NG BID
   □ 150 mg PO/NG each day
   □ 50 mg IV every 8 hours
   □ 50 mg IV BID
   □ Other: _______________________________________________________
STROKE ADMISSION ORDERS

20. Pain/Fever:  □ Acetaminophen 650 mg PO/PR prn for pain every 4-6 hours
               (Do not exceed 4000 mg of acetaminophen in any 24 hr period.)
               □ Other:

21. Nausea:

22. Bowel:
   □ Bowel program:
      □ Docusate Sodium 100 mg PO DID (hold prn)
      □ Bisacodyl suppository 10 mg every other day if no bowel movement
      □ Fleet's enema if no bowel movement by 4th day
   □ Laxative of choice prn: Milk of Magnesia 15 ml every 6 hours prn unless another requested by patient.
   □ Antacid of choice prn: Maalox plus 30 ml every 4 hours prn unless another requested by patient.

23. Critical Care Medications:
   □ Neosynephrine drip prn: start at 40 mcg/min, titrate to keep BP greater than ________________.
   □ Dopamine drip prn: start at 5 mcg/kg/min, titrate to keep BP greater than ________________.
   □ Nitroglycerin drip prn: start at 5 mcg/kg/min, titrate to maintain BP at ________________.

24. Other:
   ✔ 2-step PPD skin test

TELEPHONE ORDERS MUST BE READ BACK AND CONFIRMED
Appendix C

Stroke Discharge Orders

STROKE DISCHARGE INSTRUCTIONS

All items without a box are active orders. Items with a (□) must be checked to become an active order.

Discharge to:

Diet:

Ensure Patient/Family Stroke Education handbook provided to patient/family and teaching done.
(Stroke education accessed from GHSnet Nursing webpage under Patient/Family Education Materials)

☐ Smoking Cessation Counseling to be provided and documented by nurse at discharge.

Activity:

Follow up:

Appointment:

Home Health

☐ Physical Therapy for _________ days or _______ per week
☐ Occupational Therapy for _________ days or _______ per week
☐ Speech Therapy for _________ days or _______ per week
☐ RN/Aide
☐ Hospice
☐ Medical Social Worker
☐ Other: ________________________

Outpatient discharge needs:

☐ Outpatient Brain Injury
☐ Outpatient Rehabilitation
☐ Physical Therapy
☐ Occupational Therapy
☐ Speech Therapy
☐ Outpatient Diabetes Education

Medications:

☐ Antithrombotic therapy
☐ Antihyperlipidemia therapy
☐ Antihypertensive therapy

TELEPHONE ORDERS MUST BE READ BACK AND CONFIRMED
**Appendix D**

**Stroke Interdisciplinary Plan of Care**

**Nursing**
- Frequent vital signs (VS) and neuro checks (see Stroke Admission Orders for frequency), decrease frequency on Day 2 if patient stable.
- Telemetry or continuous cardiac monitoring as ordered. Discontinue on Day 2 if no arrhythmias.
- Obtain order to continue if appropriate.
- Foley cath or straight cath if unable to void. Discontinue Foley on Day 2 unless contraindicated.
- Bowel status assessed and bowel program initiated. Monitor urinary output and bowel function.
- Verify non-ambulatory patients receiving DVT prophylaxis.

**IVs/Meds**
- Monitor meds affecting BP, heart rate, rhythm, coag studies.
- Maintenance IV fluids if NPO.
- Ensure ischemic stroke patients receiving antplatelet agent or anticoagulation (for cardioembolic stroke) unless contraindicated.

**Labs/Tests**
- Ensure ordered tests (MRI, CT, Cerebral Ultrasound, Echo, EKG, angiogram) completed and results available.
- Monitor SBO, coag studies, lipid profile.
- Notify physician of critical results or for additional orders.

**Patient Activity**
- Complete fall risk assessment and skin assessment. Ensure fall precautions in place if meets criteria.
- Of bed with assist if sitting BP less than 20mmHg change from baseline (unless otherwise ordered by doctor), Range of motion to affected limb(s) every 4 hours, reposition immobile patients at least every 2 hours.
- Out of bed or chair position BID or as tolerated by Day 2.
- Verify Physical/Occupational therapy (PT/OT) evals ordered on Day 1.
- Verify PT/OT evals complete, treatment begins by Day 2. Advance activity per PT/OT recommendations if stable.

**Nutrition**
- NPO and/or Aspiration Precautions until Speech evaluation complete.
- Aspiration Precautions: Assess lung sounds, temp 30 min after all PO.
- See page 3 for bedside swallow exam instructions.
- Advance diet per physician and/or Speech recommendations.
- Nasogastric (NG) tube if unable to swallow safely. Obtain and follow nutrition recommendations for tube feeding.
- Obtain GI consult from physician for pts requiring long-term alternate nutrition.

**Patient Education**
- Patient/Family Stroke education handbook given and discussed with patient/family. (Stroke education assessed from Orientation Nursing webpage under Patient/Family Education Materials).
- Teach Patient/family about tests/procedures ordered.
- Assess smoking history and provide smoking cessation advice/counseling. (Respiratory therapy may assist)

**Discharge Planning**
- Evaluate family/community support, discuss options with patient/family related to discharge planning.
- Verify Case Manager/Social Work (CM/SW) consult placed as needed to assist with discharge planning.

---

### Clinical Pathway

**Day 1 & 2**

- **Nursing**
  - VS and neuro checks as ordered and based on patient condition.
- **IVs/Meds**
  - Saline lock maintenance IV fluids if PO or tube feeding well tolerated.
- **Activity**
  - Follow PT/OT recommendations for patient activity.
- **Nutrition**
  - NG tube for NPO patients. Ensure Modified Barium Swallow completed per Speech recommendations.
- **Education**
  - Initiate family training on medications, transfers, bathing, turning, etc.
- **Discharge Planning**
  - Consider rehabilitation and other discharge needs.

---

### Days 3, 4, & 5

- **Nursing**
  - VS and neuro checks as ordered and based on patient condition.
- **IVs/Meds**
  - Monitor all meds that affect VS.
- **Activity**
  - Involve family/caregivers in activity. Initiate family training as appropriate.
- **Nutrition**
  - Continue to advance diet per physician and/or Speech recommendations and continue Aspiration Precautions.
- **Education**
  - Initiate family training on feedings, transfers, bathing, turning, etc.
- **Discharge Planning**
  - Verify discharge plans in place by Day 5.

---

**INTERDISCIPLINARY PLAN OF CARE: STROKE**

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INTERDISCIPLINARY PLAN OF CARE: Stroke

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### INTERDISCIPLINARY PLAN OF CARE: STROKE

Items A, E, L are required documentation for all stroke patients

<table>
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<tr>
<th>FOCUS</th>
<th>DESIRED OUTCOME</th>
<th>PATIENT SPECIFIC CONCERN/BEHAVIOR</th>
<th>PLAN</th>
<th>OUTCOME STATUS</th>
</tr>
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<tbody>
<tr>
<td><strong>A.</strong></td>
<td>✓ Altered Cerebral Tissue Perfusion</td>
<td>Absence of further neurological deficits</td>
<td>Altered Cerebral perfusion due to:</td>
<td>• Assess neuro status using NIHSS (National Institute of Health Stroke Scale) on admission and at ordered frequency.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vital signs stable</td>
<td>□ Transient Ischemic Attack</td>
<td>• Notify physician of any decline in previously documented neurological status (to include level of consciousness, extremity strength, language expression or comprehension, articulation, swallowing, sensory loss, seizure)</td>
</tr>
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<td></td>
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<td>□ Ischemic stroke</td>
<td>• Administer antithrombotic medication as ordered within 48 hours of hospitalization unless contraindicated.</td>
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<td></td>
<td>□ Intracerebral hemorrhage</td>
<td>• Administer anticoagulant therapy as ordered for patients with atrial fibrillation unless contraindicated.</td>
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<td>• Discuss with physician potential need to order anticoagulant or anticoagulant therapy upon discharge.</td>
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<td>Date/Time/ Initials</td>
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| **B.** | | Maintenance of patient airway and adequate ventilation | Altered Oxygenation due to: | • Assess O₂ sat on admission, prn and as ordered. Administer O₂ if saturation less than 95% in coordination with Respiratory Therapy. | |
| | | O₂ sat greater than 95 percent | □ Hypoxia | • Obtain Respiratory Therapy consult to assist with achieving/maintaining adequate oxygenation as needed. (MD order req) | |
| | | Respiations unlabored from 12-24 | □ Hypercarbia | • Assess respiratory rate, effort, lung sounds on admission, as ordered and prn for changes in patient status. | |
| | | | □ Other | • Standard aspiration precautions until modified by Speech Therapy, then follow recommendations | |
| Date/Time/ Initials | | | | | |

---

Key: Outcome met (J) Progressing Toward Outcome (+) Maintaining (M) Deteriorated (-) Deferred (D) Unable to Assess (UTA) Not applicable (n/a)

<table>
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<tr>
<th>Initials</th>
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TERDISCIPLINARY PLAN OF CARE: Stroke  M10378 (3/06)  NURSING  PAGE 2 OF 7

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<th>PLAN</th>
<th>OUTCOME STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>C.</td>
<td>BP within acceptable parameters as defined by physician order.</td>
<td>□ BP outside parameters</td>
<td>● Assess BP &amp; heart rate as ordered and prn</td>
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<tr>
<td></td>
<td>Heart rate between 60-100</td>
<td>Systolic BP ______ Diastolic BP ______</td>
<td>Telemetry as ordered</td>
<td></td>
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<tr>
<td></td>
<td>Absence of new onset</td>
<td>□ Heart Rate greater than less than ______</td>
<td>Assess UOP to ensure at least 30 ml/hr</td>
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<td></td>
<td>arrhythmias</td>
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<td>Monitor fluid volume and Intake and Output</td>
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<td></td>
<td>Urine output at least 30 ml/hr</td>
<td>□ Heart rhythm ______</td>
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<tr>
<td>D.</td>
<td>Maintains safe and adequate nutrition following Speech and Nutrition recommendations using Aspiration Precautions</td>
<td>□ NPO status</td>
<td>NURSING to perform bedside exam prior to oral intake of food, fluid or meds.</td>
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<td></td>
<td>Remains without symptoms of Aspiration pneumonia i.e. elevated temp, abnormal lung sounds, tachypnea, decreased oxygen saturation, chest x-ray with infiltrates, positive blood or sputum cultures.</td>
<td>□ Non-oral feeding</td>
<td>Bedside swallow exam: If patient alert, sitting upright, cooperative and has gross oromotor function, provide small sip of water and monitor for cough, respiratory distress, voice changes, laryngeal movement and reduction in O2 saturation levels.</td>
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<td>□ Decreased intake due to</td>
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<td></td>
<td>□ Symptoms of dysphagia or aspiration</td>
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Key: Outcome met (✓) Progressing Toward Outcome (+) Maintaining (M) Deteriorated (-) Deferred (D) Unable to Assess (U/A) Not applicable (n/a)

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INTERDISCIPLINARY PLAN OF CARE: Stroke

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## INTERDISCIPLINARY PLAN OF CARE: STROKE

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<th>PLAN</th>
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<tbody>
<tr>
<td>E.</td>
<td>Knowledge Deficit</td>
<td>Patient/family understands diagnosis, prognosis, treatments, tests ordered, and plan of care.</td>
<td>Onset of neurological deficits requiring hospital admission for stroke</td>
<td>• Ensure patient/family informed of treatment plan, physician orders, scheduled tests and procedures, delays, results. &lt;br&gt; • Educate patient/family regarding type of stroke, risk factors, lifestyle changes. &lt;br&gt; • Provide smoking cessation counseling as appropriate. &lt;br&gt; • Consider Respiratory Therapy consult for patients requesting additional information about smoking cessation.</td>
</tr>
<tr>
<td>F.</td>
<td>Altered Mobility</td>
<td>Remains free of DVT</td>
<td>□ Altered mobility due to ________</td>
<td>Ensure DVT prophylaxis in place for non-ambulatory patient within 48 hours of admission &lt;br&gt; □ Assess symptoms of DVT with all complete assessments &lt;br&gt; □ Assess for cognitive deficits and motor weakness/abilities ongoing and assist with performance of activities of daily living as necessary &lt;br&gt; □ Advance activity per patient tolerance, physician order, and/or therapy recommendations &lt;br&gt; □ Physical therapy consult for patients with motor deficits (requires physician order) &lt;br&gt; □ Occupational therapy consult for patients with self-care deficits (requires MD order) &lt;br&gt; □ Fall precautions initiated as indicated from continuing assessments &lt;br&gt; □ Assess for pressure ulcer risk &amp; initiate measures to prevent pressure ulcers &lt;br&gt; □ Turn and reposition patient using draw sheet every 2 hours if unable to reposition self and float heels off of bed as appropriate.</td>
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Key: Outcome met (✓) Progressing Toward Outcome (+) Maintaining (M) Deteriorated (-) Deferred (D) Unable to Assess (UTA) Not applicable (n/a)

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INTERDISCIPLINARY PLAN OF CARE: Stroke

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<th>OUTCOME STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.</td>
<td>Oriented to person, place, time or at baseline for cognition</td>
<td>☐ Decreased level of consciousness</td>
<td>● Assess for cognition/sensory deficits using NIHSS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Patient aware of sensory and motor deficits</td>
<td>☐ Oriented to</td>
<td>● Fall precautions evaluated in place</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobilizes within environment safely</td>
<td>☐ Sensory deficit</td>
<td>● Physical &amp; Occupational therapy consults for therapy/eval and treat if appropriate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Does not recognize motor deficit of</td>
<td>● Speech therapy consult to eval and treat if appropriate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>☐ Confusion</td>
<td>● Reorient patient to surroundings and motor deficits if neglect or inattention demonstrated</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>☐ Impulsivity</td>
<td>● Assess for injury related to any existing sensory deficits</td>
<td></td>
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<td></td>
<td></td>
<td>☐ Poor judgment</td>
<td>● Assess need for restraints to prevent injury to self related to altered cognition</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Utilize alternative measures for restraints for patients with potential need for restraints</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>● Restrain using least restrictive device to prevent injury to self after obtaining physician order and using alternative measures</td>
<td></td>
</tr>
</tbody>
</table>

| H.                  | Patient independent with bladder management to full extent of abilities.        | ☐ Bladder dysfunction               | ★ Offer frequent toileting to avoid incontinence as appropriate for cognitive and activity level. |                |
|                     | Intermittent or indwelling catheter utilized for patients unable to empty bladder adequately. | ☐ Bowel dysfunction                | ★ Utilize bladder scanner when appropriate to assess for post-void residuals. |                |
|                     | Skin integrity maintained for incontinent patients.                              | ☐ Cognitive impairments             | ★ Maintain skin integrity for incontinent patients through the use of available skin products and frequent incontinent care. |                |
|                     | Absence of signs/symptoms of urinary tract infection.                            | ☐ Motor/Sensory impairment          | ★ Utilize bowel program (laxative, stool softener, enema) as ordered to prevent or treat constipation. |                |
|                     | Satisfactory bowel pattern established and maintained with the absence of constipation or diarrhea. |                                   | ★ Utilize nutrition recommendations to increase fluids/fiber in diet as appropriate. |                |

Key: Outcome met (√) Progressing Toward Outcome (+) Maintaining (M) Deteriorated (-) Deferred (D) Unable to Assess (UTA) Not applicable (NA)
## INTERDISCIPLINARY PLAN OF CARE: STROKE

<table>
<thead>
<tr>
<th>FOCUS</th>
<th>DESIRED OUTCOME</th>
<th>PATIENT SPECIFIC CONCERN/BEHAVIOR</th>
<th>PLAN</th>
<th>OUTCOME STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Altered Communication</td>
<td>Able to communicate effectively and understand communication from others</td>
<td>■ Expressive language impairment ______</td>
<td>Assess language abilities for deficits using NIHSS</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Able to express needs and emotions verbally or non-verbally</td>
<td>■ Receptive language impairment ______</td>
<td>Consult Speech Therapy (requires physician order) and follow recommendations</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ Slurred speech (dysarthric)</td>
<td>Provide alternative communication tools as appropriate</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>■ Other __________</td>
<td>Allow patient time to respond to inquiries and listen attentively</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Encourage patient to verbalize to fullest ability with each interaction</td>
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<td></td>
<td></td>
<td></td>
<td>Provide assistive visual devices as appropriate</td>
<td></td>
</tr>
</tbody>
</table>

### J. Pain

<table>
<thead>
<tr>
<th>Date/Time/Initials</th>
<th>Patient will be pain free or controlled (less than 5 on 0-10 scale) with medications and/or other comfort measures.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain intensity of _____ on 0-10 scale.</td>
<td>■ Use pain intensity scale 0-10 or verbal descriptors, or other indicators of pain or comfort and document.</td>
</tr>
<tr>
<td>Pain located __________</td>
<td>■ Provide comfort measures i.e. medications, positioning, relaxation techniques</td>
</tr>
<tr>
<td>Description __________</td>
<td>■ Assess effectiveness of interventions: Pain medication-within one hour after administration</td>
</tr>
<tr>
<td>Radiates __________</td>
<td>■ Notify physician of unrelieved pain</td>
</tr>
</tbody>
</table>

### K. Emotional/Spiritual/Cultural

<table>
<thead>
<tr>
<th>Date/Time/Initials</th>
<th>Patient/family indicates spiritual/emotional/cultural needs are met</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>■ Patient/family exhibit signs of spiritual/emotional/cultural distress</td>
</tr>
<tr>
<td></td>
<td>Description __________</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

Key: Outcome met (✓)  Progressing Toward Outcome (+)  Maintaining (M)  Deteriorated (-)  Deferred (D)  Unable to Assess (UTA)  Not applicable (n/a)

<table>
<thead>
<tr>
<th>Initials</th>
<th>Signature</th>
<th>Discipline</th>
<th>Initials</th>
<th>Signature</th>
<th>Discipline</th>
</tr>
</thead>
<tbody>
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</tbody>
</table>

INTERDISCIPLINARY PLAN OF CARE: Stroke

M10378 (3/06)
NURSING

PAGE 6 OF 7

71
# INTERDISCIPLINARY PLAN OF CARE: STROKE

<table>
<thead>
<tr>
<th>FOCUS</th>
<th>DESIRED OUTCOME</th>
<th>PATIENT SPECIFIC CONCERN/BEHAVIOR</th>
<th>PLAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>L</td>
<td>Discharge Planning</td>
<td>Identify discharge needs/support system upon admission and throughout hospitalization.</td>
<td>Consult Case Management/Social Work for any placement concerns as identified.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Collaborate with patient/family and care team to determine and implement discharge plan upon admission and throughout hospitalization.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Describe current support system:</td>
<td></td>
</tr>
<tr>
<td>Date/Time/Initials</td>
<td></td>
<td>Potential discharge needs:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Home:</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>□ Alone □ With family</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ With home health</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ PT □ OT □ Speech</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>□ Nutrition □ RN/Aide</td>
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<td></td>
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<td>□ Hospice</td>
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<td></td>
<td></td>
<td>Outpatient:</td>
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<td></td>
<td></td>
<td>□ Brain Injury □ Rehab</td>
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<td></td>
<td></td>
<td>□ Diabetes Education</td>
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</tr>
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<td></td>
<td></td>
<td>Facility:</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>□ Rehabilitation hospital</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Assisted Living</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Extended Care facility</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>□ Ensure antiplatelet or anticoagulant therapy is considered for discharge medications unless contraindicated.</td>
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<tr>
<td></td>
<td></td>
<td>□ Ensure follow-up appointments identified and given to patient/family</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>□ Ensure rehabilitation needs/potential considered and arranged before discharge.</td>
<td></td>
</tr>
<tr>
<td>M</td>
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</tbody>
</table>

Key: Outcome met (✓) Progressing Toward Outcome (+) Maintaining (M) Deteriorated (●) Deferred (D) Unable to Assess (UTA) Not applicable (n/a)

<table>
<thead>
<tr>
<th>Initials</th>
<th>Signature</th>
<th>Discipline</th>
<th>Initials</th>
<th>Signature</th>
<th>Discipline</th>
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</table>

INTERDISCIPLINARY PLAN OF CARE: Stroke
M10378 (3/06)
NURSING
PAGE 7 OF 7
Your Path to Stroke Recovery

Day 1

On the first day of your stroke your doctor may order many tests for you. You may have a CT scan or MRI of your brain, an ultrasound of your carotid arteries or your heart, an EKG of your heart, and blood tests. All of these tests are to help your doctor determine the type of stroke you had and what may be the reason for your stroke.

Your nurse will teach you about stroke and answer your questions. If you smoke, your doctor and nurse will talk to you about how quitting can decrease the risk of having another stroke.

You may have tubes such as an IV, oxygen, a heart monitor or a bladder catheter. You may have weakness from the stroke that could cause problems with swallowing. If so, you may not be allowed to eat or drink until your swallowing is checked by a speech therapist. You may need a temporary tube placed in your stomach if you are unable to swallow safely.

You will be checked by the nurses for changes in your blood pressure, oxygen levels and any other changes that may tell us how your "brain is doing".

You will be seen by the physical and occupational therapists to check any weakness in your arms and legs. The therapists will recommend the amount of therapy you will need as you recover.

Your family and friends will want to show their support, but rest is important for your recovery. If you or your family have questions about your stroke, please ask your doctor or nurse so they can help you understand.

This is a general guide for what will happen to you during your hospital stay for a stroke. Things may not occur exactly as is described.

The goal of the Greenville Hospital System is to provide each stroke patient with the best stroke care available. If you continue to require hospitalization after the 5th day of your stroke recovery, all members of your healthcare team will continue to work with you and your family to develop a plan for your discharge and recovery.
**Day 2**

The nurses will continue to check your stroke symptoms, your blood pressure, and oxygen levels. Your heart monitor may be removed. Any tests and evaluations that were not done on the first day may be done on this day.

The case manager or social worker and your primary nurse will start working with you on plans for your discharge from the hospital.

The physical and occupational therapists will start working with you to see if you can get out of bed.

The speech therapist, nutritionist, and doctor will work together to decide if you may eat safely. If your swallowing has been affected by the stroke, a tube in your stomach may be used to feed you.

**Day 5 & after**

You may go home or be transferred to another hospital or unit, but your stroke care does not end here.

As you begin to improve, tubes such as your IV, bladder catheter or oxygen may be removed.

The nurses and the therapists will work with you to help you begin to take care of your own needs such as bathing, eating, or toileting.

They will work with you and your family to determine where you should go after you leave this nursing unit and if you need to receive any further therapy.

You will continue to work with the therapists to improve your strength.

All members of your healthcare team will work with you to make sure your needs are met and you are ready for discharge from the hospital. Your doctor, nurses, therapists, nutritionist, and case manager will make sure you have been informed of lifestyle and dietary changes that you can make to improve your health. They will answer any questions you have about the care you will need after leaving the hospital.

Your doctor may make changes to your medications and may add pills to help prevent another stroke. Your doctor or nurse should discuss these changes with you.

**Day 3 & 4**

You will probably need less frequent neurological checks and will continue to work with therapy to get stronger.

The doctors, nurses, therapists, nutritionist, and case manager will be working as a team with you to make decisions about the care you will need when you go home.
Appendix E

Stroke Patient/Family Education Flow Sheet

INTERDISCIPLINARY PATIENT/FAMILY EDUCATION FLOWSHEET

Ischemic Stroke, Hemorrhagic Stroke, TIA

<table>
<thead>
<tr>
<th>Learning Needs</th>
<th>Person(s) Taught</th>
<th>Readiness to Learn (Limitations/Barriers)</th>
<th>Department</th>
<th>Teaching Method(s)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Patient Safety</td>
<td>A. Patient</td>
<td>A. No limitations/</td>
<td>Nursing</td>
<td>1. Care Notes</td>
<td>A. Able to verbalize</td>
</tr>
<tr>
<td>2. Patient's rights and</td>
<td>B. Parent</td>
<td>barriers</td>
<td>Physician</td>
<td>2. Written</td>
<td>or demonstrate</td>
</tr>
<tr>
<td>responsibilities</td>
<td></td>
<td></td>
<td></td>
<td>3. Verbal</td>
<td>understanding of</td>
</tr>
<tr>
<td>3. Diagnosis</td>
<td>C. Family</td>
<td></td>
<td>NPIA</td>
<td>4. Demonstration</td>
<td>content. No review</td>
</tr>
<tr>
<td>treatments</td>
<td>(name)</td>
<td></td>
<td>Child Life</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Medical equipment</td>
<td>E. Guardian</td>
<td></td>
<td>Radiology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Nutritional needs</td>
<td></td>
<td></td>
<td>Respiratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Meals/Food-Drug</td>
<td></td>
<td></td>
<td>Care</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Community resources</td>
<td></td>
<td></td>
<td>Pharmacy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Rehab techniques</td>
<td></td>
<td></td>
<td>Nutrition</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Health promotion</td>
<td></td>
<td></td>
<td>Therapy</td>
<td></td>
<td>G. (Explain)</td>
</tr>
<tr>
<td>11. Financial concerns</td>
<td></td>
<td></td>
<td>Pastoral</td>
<td></td>
<td>Poor</td>
</tr>
<tr>
<td>13. Home care needs</td>
<td></td>
<td></td>
<td>Speech-Lang</td>
<td></td>
<td>Repeat all</td>
</tr>
<tr>
<td>14. Pain</td>
<td></td>
<td></td>
<td>Pathology</td>
<td></td>
<td>E. (Explain)</td>
</tr>
<tr>
<td>15. Smoking Cessation</td>
<td></td>
<td></td>
<td>Therapy</td>
<td></td>
<td>Family involvement</td>
</tr>
<tr>
<td>16. Other</td>
<td></td>
<td></td>
<td>Occup.</td>
<td></td>
<td>necessary</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Therapy</td>
<td></td>
<td>Unable to teach</td>
</tr>
</tbody>
</table>

*Pt/Par Stroke Education may be printed from GHSnet Nursing webpage under Patient/Family Education Materials

<table>
<thead>
<tr>
<th>Date/Initials</th>
<th>Learning Needs</th>
<th>Person Taught</th>
<th>Readiness to Learn</th>
<th>Learning Preferences</th>
<th>Dept.</th>
<th>Teaching Method</th>
<th>Outcome</th>
<th>Topic Discussed/Teaching Materials</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>1</td>
<td>2, 8</td>
<td>Causes &amp; treatment for TIA - *Pt/Par StROKE Education</td>
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</tr>
<tr>
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<td>1</td>
<td>2, 8</td>
<td>Causes of ischemic stroke; thrombus, embolis - *Pt/Par Stroke Education</td>
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<tr>
<td>1</td>
<td>2, 8</td>
<td>Causes of Hemorrhagic stroke; Hypertension, aneurysm, other - *Pt/Par Stroke Education</td>
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<td>4</td>
<td>2, 8</td>
<td>Treatment for ischemic stroke - *Pt/Par Stroke Education</td>
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<td>10</td>
<td>1</td>
<td>3, 8</td>
<td>Risk factors for stroke - *Pt/Par Stroke Education</td>
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<tr>
<td>8</td>
<td>1</td>
<td>3, 8</td>
<td>Resources for social support/services - *Pt/Par Stroke Education</td>
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<td></td>
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<td>Medication prescribed for stroke</td>
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<td>Occupational therapy goals/treatment plan</td>
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<tr>
<td>11</td>
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<td>Physical therapy goals/treatment plan</td>
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<tr>
<td>10</td>
<td></td>
<td>Speech-Language Pathology goals/treatment plan</td>
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<td>Discharge plan</td>
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</tbody>
</table>

Initials/Signature

Initials/Signature

Initials/Signature

Keep on patient's clipboard until patient discharged.
## Appendix F

South Carolina Nurses Association Educational Content Objective Form

### Educational Activity

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Content (Topics)</th>
<th>Time Frame</th>
<th>Presenter</th>
<th>Methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>List learner's objectives in behavioral terms</td>
<td>Provide an outline of the content for each objective. It must be more than a restatement of the objective.</td>
<td>State the time frame for each objective</td>
<td>List the Faculty for each objective</td>
<td>Describe the teaching methods, strategies, materials &amp; resources for each objective</td>
</tr>
</tbody>
</table>
| Introduction/Welcome | • Pretest  
• Introduction of Case Study #1 | 10 minutes  
4:00-4:10pm | Katie Woodfin, BSN, RN | Pretest form  
Introduction of Case Study of typical stroke patient |
| A. Recognize the value of JCAHO Stroke Center designation and clinical pathway in ensuring practice of evidence based stroke care. | • JCAHO Stroke Center designation & stroke unit | 15 minutes  
4:10–4:25 pm | Cynthia Bishop, MSN, RN, CRRN | Didactic  
Lead group discussion to relate Case Study #1 patient symptoms to possible type/location of stroke  
Question/Answer opportunity |
| B. Relate symptoms of stroke type and location of injury. | Overview of stroke  
• Population affected, statistics, risk factors  
• Types of stroke & causes (ischemic, hemorrhagic, SAH)  
• Arterial distribution & correlating stroke symptoms in ischemic stroke  
• Type of stroke related to case study | 30 minutes  
4:25pm-4:55pm | Lorette Mitchem, MSN, ANP | Didactic  
Lead group discussion to relate Case Study #1 patient symptoms to possible type/location of stroke  
Question/Answer opportunity |
| C. Discuss the scope of emergency department management for stroke patients. | ED Management of acute stroke  
• EMS  
• Triage on arrival to ED  
• Symptoms suspicious of stroke  
• Assessment  
• Initial diagnostic tests  
• BP management  
• tPA assessment  
• Case study presentation to the ED | 30 minutes  
4:55pm-5:25pm | Martin Lutz, MD | Didactic (to include Case Study #1 patient's ED experience)  
Group discussion  
Question/Answer opportunity |
<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>CONTENT (Topics)</th>
<th>TIME FRAME</th>
<th>PRESENTER</th>
<th>METHODS</th>
</tr>
</thead>
<tbody>
<tr>
<td>List learner’s objectives in behavioral terms</td>
<td>Provide an outline of the content for each objective. It must be more than a restatement of the objective.</td>
<td>State the time frame for each objective</td>
<td>List the Faculty for each objective</td>
<td>List learner’s objectives in behavioral terms</td>
</tr>
<tr>
<td>D. Describe the value of radiology testing for stroke.</td>
<td>Imaging for stroke: • Stat CT: rationale, normal findings, abnormal findings. • MRI: when, normal vs abnormal • CTA • Angio • Other radiology test • Examples of stroke related changes seen on radiology films • Radiology tests applicable to case study and possible results</td>
<td>30 minutes 5:25pm-5:55pm</td>
<td>Naveen Parti, MD</td>
<td>D. Describe the value of radiology testing for stroke.</td>
</tr>
<tr>
<td>Break</td>
<td></td>
<td>20 minutes 5:55 - 6:15pm</td>
<td></td>
<td>Break</td>
</tr>
<tr>
<td>E. Explain the tests, medications, interventions, and risk factor modification for acute stroke treatment, prevention of potential complications and second stroke.</td>
<td>Acute stroke treatment: • TPA administration • Rationales and implications for diagnostic tests: MRI, EKG, Echo, Telemetry, Lipids, PT/PTT • BP Management • Antithrombotics • Potential complications: Oxygenation, fever, glucose control, DVT prophylaxis • Risk factor modification • Neurologist admission orders</td>
<td>45 minutes 6:15 – 7:00 pm</td>
<td>John Absher, MD</td>
<td>E. Explain the tests, medications, interventions, and risk factor modification for acute stroke treatment, prevention of potential complications and second stroke.</td>
</tr>
<tr>
<td>OBJECTIVES</td>
<td>CONTENT (Topics)</td>
<td>TIME FRAME</td>
<td>PRESENTER</td>
<td>METHODS</td>
</tr>
<tr>
<td>------------------------------------------------</td>
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<td>-------------------------------------------------------------------------</td>
</tr>
<tr>
<td>List learner’s objectives in behavioral terms</td>
<td>Provide an outline of the content for each objective. It must be more than a restatement of the objective.</td>
<td>State the time frame for each objective.</td>
<td>List the Faculty for each objective.</td>
<td>List learner’s objectives in behavioral terms</td>
</tr>
<tr>
<td>F. Discuss the role of the interdisciplinary team in treatment of acute stroke and case study</td>
<td>Stroke Team: • consideration of rehabilitation/discharge needs • PT • OT • Speech Therapy • Nutrition • Case Management discharge of patient</td>
<td>50 minutes 7:00 - 7:50 7:00 - 7:10pm 7:10 - 7:20pm 7:20 - 7:30pm 7:30 - 7:40pm 7:40 - 7:50pm</td>
<td>LouNell Eady, PT Brigitte King, OTR/L Karen Arunakel ST Jennifer Leckenby, RD Tammy Edge, BSN, RN</td>
<td>Didactic (to include Case Study #1 interdisciplinary treatment plan) Video of swallow study Question/Answers Group discussion</td>
</tr>
<tr>
<td>G. Describe the contents of GHS’s stroke clinical pathway and how it relates to external agencies guidelines</td>
<td>Presentation of Case study (patient admitted for TIA and had a stroke while an inpatient and received tPA) Stroke Clinical Pathway • ASA guidelines • JCAHO disease specific criteria: • ED orders (tPA consideration, administration) • Admission orders • Discharge orders • Stroke Interdisciplinary Plan of Care • Stroke Pt/Family Education Flowsheet • Stroke Pt/Family Education handbook Post Test &amp; Evaluations</td>
<td>5 minutes 7:50 - 7:55 pm 30 minutes 7:55 - 8:25 pm</td>
<td>Patti Morgan, RN Shannon Sternberg, BSN, RN, CNRN</td>
<td>Didactic Didactic Handouts including sample stroke clinical pathway Question/Answers</td>
</tr>
</tbody>
</table>
## Appendix G
### JCAHO Stroke Data Collection Tool

**Disease Specific Care**  
**Primary Stroke Center**

**Report Period (Quarter)**  
Note: this time period for inpatients is based on the patient's discharge date  

- [ ] 1st (January - March)  
- [ ] 2nd (March - June)  
- [ ] 3rd (July - September)  
- [ ] 4th (October - December)

**Year** ______ ______ ______

---

### Core Data Elements

1. **Record ID** #__________
2. **Treated at a DSC Certified Primary Stroke Center Program**
   - [ ] Yes
   - [ ] No (Stop)
3. **Gender**  
   - [ ] Male  
   - [ ] Female
4. **Birth Date** ______ / ____ / ______
5. **Arrival Date** ______ / ____ / ______
6. **Arrival Time (military)** ______ : ______
7. **Admission Date** ______ / ____ / ______
8. **Discharge Date** ______ / ____ / ______
9) Discharge Status
☐ 01 Discharged to home care or self care (routine discharge)
☐ 02 Discharged/transfered to another short term general hospital for inpatient care
☐ 03 Discharged/transfered to a skilled nursing facility (SNF) with Medicare certification
☐ 04 Discharged/transfered to an intermediate care facility
☐ 05 Discharged/transfered to another type of institution for inpatient care
☐ 06 Discharged/transfered to home under care of organized home health service organization
☐ 07 Left against medical advice or discontinued care
☐ 08 Discharged/transfered to home under care of a home IV drug therapy provider
☐ 20 Expired (or did not recover - Christian Science Patient). This code does not refer only to Christian Science patients. The code is meant to be used for all patients that expire at your facility, unless a Medicare or Champus claim for hospice is filed.
☐ 41 Expired in medical facility, such as hospital, SNF, ICF or freestanding hospice (Hospice). This code is for use only on Medicare and Champus claims for hospice care. (Refer to the National Inform Billing Data Element Specifications manual developed by the National Inform Billing Committee for further clarification on the differences between codes 20 and 41.
☐ 50 Hospice - home
☐ 51 Hospice - medical facility
☐ 61 Discharged/transfered within this institution to hospital-based Medicare approved swing bed
☐ 62 Discharged/transfered to an inpatient rehabilitation facility (IRF) including rehabilitation distinct part units of a hospital
☐ 63 Discharged/transfered to a Medicare certified long term care hospital (LTCH)
☐ 64 Discharged/transfered to a nursing facility certified under Medicaid but not certified under Medicare
Diagnostic Data

10) ICD-9-CM Diagnosis Code
   Principal _______ ______

   Other _______ ______ _______ ______ ______ _______ ______
       _______ ______ _______ ______ ______ _______ ______

11) Date of Onset of Stroke Symptoms □ 1) ___/___/_______ □ 2) Not documented □ 3) Documented as Unknown

12) Time of Onset of Stroke Symptoms □ 1) ___:___ □ 2) Not documented □ 3) Documented as Unknown

13) Patient Ambulatory at End of Hospital Day Two □ 1) Yes (Skip 15) □ 2) No □ 3) Unable to determine

14) Atrial Fibrillation during Hospitalization □ 1) Yes □ 2) No (Skip 19 and 20)
   (ICD-9-CM code 427.31)

Comments on questions 10 – 14 above:

_________________________________________________________________________
Therapeutic Data

15) DVT Prophylaxis Initiated by the End of Hospital Day Two
   □ 1) Yes (Low dose unfractionated heparin, low molecular weight heparin, heparinoids, pneumatic compression devices)
   □ 2) No
   □ 3) N/A (Already on anticoagulation, i.e., admitted on coumadin and remains on coumadin)

16) Discharged within 48 hours of hospitalization
   □ 1) Yes □ 2) No

17) Contraindications/possible reasons for not administering Antithrombotic Therapy
   Note: Select “Yes” if a reason was documented as a contraindication to administering antithrombotic therapy. *(See Data Dictionary for list of contraindications)*
   □ 1) Yes □ 2) No

18) Antithrombotic Therapy
   □ 1) Administered within 48 hours of hospitalization
   □ 2) Prescribed at discharge
   □ 3) None prescribed
   Optional:
   □ a) Aspirin (ASA) □ b) ASA/dipyridamole (Aggrenox) □ c) Warfarin (Coumadin) □ d) Clopidogrel (Plavix)

   □ e) Ticlopidine (Ticlid) □ f) Unfractionated heparin IV □ g) Full dose LMW heparin

19) Contraindications/possible reasons for not administering Anticoagulation Therapy □ 1) Yes *(Skip 20)* □ 2) No
    *(See data dictionary for a list of contraindications)*

20) Patient discharged on Anticoagulation Therapy (Warfarin/Coumadin, heparin/heparinoids, other full dose anticoagulants i.e., Lepirudin,)
    □ 1) Yes
    □ 2) No

21) IV t-PA administration considered (Note: Documentation must reflect mention of IV t-PA)
    □ 1) Yes
    □ 2) No
22) IV t-PA administered to patient at this hospital
   □ 1) Yes (If yes, skip 23)
   □ 2) No (If no, skip 23 & 24, go to 25)

23) Date IV t-PA Administered at this Hospital       /       /       /       /       /       /       /       /       /       / Date not documented

24) Time IV t-PA Administered at this Hospital (military)       :       Time not documented

25) Contraindications/possible reasons why IV t-PA was not administered at this hospital:
   □ 1) Yes (If yes, check all that apply)
   □ 2) No

Contraindications/possible reasons:
   a. □ Delay in patient arrival
   b. □ Delay from CT ordered to CT done
   c. □ Delay from CT done to CT read
   d. □ Other time delay
   e. □ Uncontrolled hypertension
   f. □ Rapid improvement
   g. □ CT findings
   h. □ Stroke severity – Too mild
   i. □ Stroke severity – Too severe
   j. □ Seizure at onset
   k. □ Recent surgery/truma (<15 days)
   l. □ Recent intracranial surgery, head trauma or stroke (in past 3 months)
   m. □ Investigational protocol instead of IV t-PA
   n. □ IV t-PA offered but patient/family refused (e.g., DNR/Comfort measures only)
   o. □ Consent not obtainable
   p. □ H/O intracranial hemorrhage, brain aneurysm, vascular malformation or brain tumor
   q. □ Age
   r. □ Active internal bleeding (<22 days)
   s. □ Platelet count (<100,000)
   t. □ Abnormal PTT or PT
   u. □ No IV access
   v. □ Glucose < 50 mg/dl or > 400 mg/dl
   w. □ Life expectancy < 1 year or severe co-morbid illness
   x. □ IV t-PA given at outside hospital prior to transfer
   y. □ Other
   z. □ Not documented

Comments on questions 15 – 25 above:

6-9
Optional Performance Measure Data (Data Collection for Pilot Test Sites)

26) Lipid Profile (Total cholesterol, triglycerides, HDL, LDL, HbA1C if diabetic)
   (Performed during hospitalization or 30 days prior to hospitalization)
   □ 1) Yes
   □ 2) No

27) Dysphagia Screen Performed Prior to Oral Intake
   □ 1) Yes (Skip question 28)
   □ 2) No

28) Reasons for not performing dysphagia screen
   □ 1) Yes (If yes, check all that apply)
   □ 2) No
   a. □ Symptoms have resolved
   b. □ Patient NPO
   c. □ Dysphagia screen unable to be performed, i.e., patient comatose

29) Stroke Education (Patient and/or caregiver received education and/or resource materials)
   □ 1) Yes
   □ 2) No
   □ 3) Not documented

30) Adult Smoking History
   □ 1) Patient has a history of smoking cigarettes in past year prior to hospitalization
   □ 2) Patient has NO history of smoking cigarettes in past year before hospitalization (Skip questions 31 & 32)
31) Reasons for not providing smoking cessation counseling
   □ 1) Yes *(Skip 32)* *(If yes, check all that apply)*
   □ 2) No
   □ a) Patient not appropriate for adult smoking cessation intervention due to neurological deficits that preclude comprehension of smoking cessation counseling
   □ b) Physical/mental status prevents patient from engaging in smoking

32) Adult Smoking Cessation Counseling
   □ 1) Yes
   □ 2) No

33) Patient Assessed for or Received Rehabilitation Services
   □ 1) Yes *(If yes, check all that apply)*
   □ 2) No
   □ 3) Not documented
   □ a. Consult for rehabilitation services
   □ b. Patient was assessed by a member of the rehabilitation team
   □ c. Patient received rehabilitation services during hospitalization
   □ d. Patient transferred to rehabilitation facility
   □ e. Patient referred to rehabilitation services following discharge
   □ f. Patient ineligible to receive rehabilitation services
   □ g. Patient/family refused rehabilitation services

Comments on questions 26 – 33 above:
Appendix H

JCAHO Stroke Center Certification-Section I: Sampling

SAMPLING

Introduction
Sampling is a process of selecting a representative part of a population in order to estimate the organization’s performance, without collecting data for its entire population. Using a statistically valid sample, an organization can measure its performance in an effective and efficient manner. Sampling is a particularly useful technique for performance measures that require primary data collection from a source such as the medical record. Sampling should not be used unless the organization has a large number of cases in the measure population because a fairly large number of sample cases are needed to achieve a representative sample of the population of interest.

To obtain statistically valid sample data, the sample size should be carefully determined and the sample cases should be randomly selected in such a way that the individual cases in the population have an equal chance of being selected. Only when the sample data truly represent the whole population can the sample-based performance measure data be meaningful and useful.

Hospitals in the Disease Specific Care (DSC) Stroke pilot project must meet the following sampling requirements.

Sampling Availability
Sampling is done by diagnosis and should be done using available databases that contain discharges by quarter, ICD-9-CM diagnosis codes, and other necessary administrative data (e.g., only patients 18 and older are included in the DSC stroke measures).

The specific measure set sampling populations are defined below:

- Patients with ICD-9-CM Codes for Ischemic Stroke as defined in the Appendix, Table 1
- Patients with ICD-9-CM Codes for Hemorrhagic Stroke as defined in the Appendix, Table 2
- Patients with ICD-9-CM Codes for Transient Ischemic Attack (TIA) as defined in the Appendix, Table 3

Sample Size Requirements
Hospitals selecting sample cases for the stroke measures should ensure that its measure population(s) and sample size(s) meet the following conditions:

- The patient population includes stroke patients that fall into the identified ICD-9-CM codes.
- The sampling methodology is as follows:

<table>
<thead>
<tr>
<th>Patient Volume</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 59</td>
<td>100%</td>
</tr>
<tr>
<td>60 - 299</td>
<td>60</td>
</tr>
<tr>
<td>300 - 599</td>
<td>20%</td>
</tr>
<tr>
<td>&gt;= 600</td>
<td>120</td>
</tr>
</tbody>
</table>

7 - 1
Sample Size Examples
  
  - A hospital has 45 discharges in the first quarter. All 45 cases (100%) will be reviewed.
  - A hospital has 130 discharges for the second quarter. The sample size would be 60 cases. (Note: although 20% of 130 is 26, the required minimum sample size is 60).
  - A hospital has 340 discharges in the third quarter. The sample size would be 68 (20% of 340).
  - A hospital has 660 discharges in the fourth quarter. Twenty percent of 660 equals 132 cases – which exceeds the maximum sample size condition (i.e., 120); thus the required sample size would be at least 120 cases for the fourth quarter.

Sampling Approach

Systematic random sampling - selecting every \( k^{th} \) record from a population of size \( N \) in such a way that a sample size of \( n \) is obtained, where \( k \leq N/n \). The first sample record (i.e., the starting point) must be randomly selected before taking every \( k^{th} \) record. This is a two step process:

  a) Select the starting point; and
  b) Then select every \( k^{th} \) record thereafter until the selection of the sample size is completed.

Sampling Approach Examples

For a hospital with a population size of 360 discharges per quarter, the sample size would be 72 (20% of 360). To select a random sample of 72 patients:

1) Determine the population size (total discharges) for the quarter;
2) Determine the sample size per diagnosis using the above table;
3) Divide the population size by the sample size and take the quotient (i.e., the integer as the sampling interval \( k \)). The sampling interval \( k = 360/72 = 5 \). Thus, every 5th patient record will be selected from the measure population until 72 cases are selected.
4) To ensure that each patient has an equal chance of being selected, the "starting point" must be randomly determined before selecting every 5th record. Therefore a simple approach to determine where to start would be to write the numbers 1, 2, 3, 4, 5 on separate pieces of paper and place the numbers in a container and pull one piece of paper. For example if you draw the number 3, start with the 3rd case on your list and select every 5th case after that until you reach 72 cases.
Appendix I

IRC Approval Form

January 13, 2007

Linda Howe, PhD, RN, CS
Attn: Shannon Sternberg, BSN, RN, CNRN
111 Meadowbrook Drive
Mauldin, SC 29662

RE: IRC File #01-07-03

Study Title: Influence of Stroke Clinical Pathway on Documentation

Items Submitted for IRC Review: Study Proposal

Dear Dr. Howe:

On January 11, 2007, the Chairperson of the Institutional Review Committee (IRC) of the Greenville Hospital System reviewed your above-mentioned study that was presented for expedited approval. Expedited approval was given for one year.

In accordance with 45 CFR 46.116 (c) (2) and 45 CFR 46.116 (d), the IRC has approved waiving the requirements to obtain informed consent because:

- The research involves no more than minimal risk to the participants.
- Waiving consent will not adversely affect the rights and welfare of the participants.
- The research could not practically be carried out without waiving consent.
- Whenever appropriate, the participants will be provided with additional pertinent information after participation.

Your study will expire on January 10, 2008. Both the Office for Human Research Protections (OHRP) and the Food and Drug Administration (FDA) regulations require that if a study is not reapproved by the IRC by the expiration date, the IRC is required to suspend the study and notify the OHRP, the FDA, and the study sponsor. It is the investigator's responsibility to make sure the proper reapproval information is submitted to the IRC. This information must be submitted to the IRC in December 2007. Be sure to utilize the IRC File # (01-07-03) on any communication regarding this study.

Please keep in mind the following requirements of the Institutional Review Committee:
Linda Howe, PhD, RN, CS
January 13, 2007
Page 2

1. A report to the IRC is required at the end of the approved time period
giving the results of the study, the status of the study and whether or not
renewed approval is desired. If the study is complete, a final closure
notice should be sent to the IRC Office including results from the study.

2. Immediate notification must be sent to the IRC Office of any
advertisements, as well as all revisions, changes, or amendments to the
protocol. Please contact the IRC office for the appropriate forms
required for submittal to the IRC.

3. Notification must be sent to the IRC Office within five (5) working days
of any adverse event that occurs locally. Notification of all non-locally
occurring adverse events must be sent to the IRC Office as soon as they
are received from the sponsor.

The IRC has written procedures for the initial and continuing review of research studies;
prepares written minutes of convened meetings; and retains records pertaining to the
review and approval process. This is done in compliance with requirements defined in
21 CFR Parts 50, 56 and 312; 45 CFR Part 56 (Code of Federal Regulations); and ICH
(International Conference on Harmonisation) guidance relating to GCP (Good Clinical
Practice).

Thank you for your assistance in this matter. Should you have any questions, please do
not hesitate to call the IRC office at 455-4984.

Sincerely,

T. Fleming Mattox, MD, Chairperson
Institutional Review Committee – A

TFM/ks
REFERENCES


