MISSISSIPPI STATE DEPARTMENT OF HEALTH

Mississippi Stroke System of Care Plan

Developed by the:
Office of EMS & Acute Care Systems
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Mississippi State Department of Health

Daniel P. Edney, MD, FACP, FASAM
State Health Officer

Office of EMS & Acute Care Systems

Teresa Windham, MBA/HA, BSN, EMT, CHP, Director
Office of EMS & Acute Care Systems

Christy Berry, BSN, RN, CEDP, CHP
Deputy Director

Courtney Day, RN
Stroke Program Coordinator

Billie Collier
Accounting Officer

Katianne McMillen
Stroke Data Analyst

Mississippi State Department of Health
Office of EMS & Acute Care Systems
310 Airport Road
Pearl, Mississippi 39208
601/933-2441
FAX: 601/933-2455

Mississippi Stroke Advisory Committee

Ruth Fredericks, MD
Neurology
Chairman

Vacant, MD
Emergency Medicine
Co-Chairman

Paul Bradley, MD
Neurology Representative – Northern District

Shreyas Gangadhara, MD
Neurology Representative – Central District

William Evans, MD
Neurology Representative – Southern District

David Hooker, MD
Emergency Medicine Representative – Northern District

James "Jimmy" Kolb, MD
Emergency Medicine Representative – Central District

Vacant, MD
Emergency Medicine Representative – Southern District

Laura Nikki Kelleway
Emergency Nursing Representative – Northern District

Vacant
Emergency Nursing Representative – Central District

Amber Roberts, RN
Emergency Nursing Representative – Southern District

Alicia Grant
Hospital Administration Representative – Northern District

Wendy Barrilleaux
Hospital Administration Representative – Central District

Sonya Barber, RN
Hospital Administration Representative – Southern District

Belinda Sanderson, RN
Stroke Nursing Representative – Northern District

Teresa Ellerbusch, RN
Stroke Nursing Representative – Central District

Monica Rowell, RN
Stroke Nursing Representative – South District

Sonya Collums, RN
Registry Representative – North District

Paula Metzger
Registry Representative – Central District

Vickie Buchanon
Registry Representative – Southern District

Sam Marshall
EMS Provider Representative – Northern District

Mickee Ramsey
EMS Provider Representative – Central District

Evan McGlothin
EMS Provider Representative – Southern District

David Grayson
EMS Administration Representative – Northern District

Kolandra Rucker
EMS Administration Representative – Central District

Scott Stinson
EMS Administration Representative – Southern District

Lee Waldrop, RN
Regional Coordinator Representative – Northern District

Neal Kiihnl, RN
Regional Coordinator Representative – Central District

Heather Sudduth
Regional Coordinator Representative – Southern District

Kunal Bhatia, MD
Neurocritical Care Physician

Kristen Isom, RN
American Heart Association Representative
Ex-officio

Teresa Windham, MBA/HA, BSN, RN, NREMT
Mississippi State Department of Health
Ex-officio

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Legal Authority and Purpose

Section § 41-3-15 of the Mississippi Code 1972 Annotated, as amended, provides the general powers, duties and authority of the State Board of Health and certain powers of the Mississippi State Department of Health. Included in this is the State Board of Health powers and duties to formulate the policy of the State Department of Health regarding public health matters within the jurisdiction of the department; to adopt, modify, repeal and promulgate, after due notice and hearing, and enforce rules and regulations implementing or effectuating the powers and duties of the department under any and all statutes within the department's jurisdiction, and as the board may deem necessary; to apply for, receive, accept and expend any federal or state funds or contributions, gifts, trusts, devises, bequests, grants, endowments or funds from any other source or transfers of property of any kind; and to enter into, and to authorize the executive officer to execute contracts, grants and cooperative agreements with any federal or state agency or subdivision thereof, or any public or private institution located inside or outside the State of Mississippi, or any person, corporation or association in connection with carrying out the provisions of this chapter, if it finds those actions to be in the public interest and the contracts or agreements do not have a financial cost that exceeds the amounts appropriated for those purposes by the Legislature. The State Board of Health shall have the authority, in its discretion, to establish programs to promote the public health, to be administered by the State Department of Health. Specifically, those programs may include, but shall not be limited to, programs in the areas of chronic disease and other such public health programs and services as may be assigned to the State Board of Health by the Legislature or by executive order.

The system of care approach to public health provides a functional framework for making use of resources to optimize the care of patients. The intent is to address conditions that have a significant impact on mortality and morbidity. This functional framework generally includes hospitals designated based on resources for the care of particular types of patients, destination guidelines for the transport of patients to the appropriate hospital via EMS, criteria for activation and utilization of hospital resources, data collection, and data use for improving system performance. In terms of patient care the system of care framework promotes best practices for caring for patients.

The State Board of Health approved the first Stroke System of Care Plan on November 6, 2012. The State Board of Health also established a Stroke Advisory Council. The Stroke Advisory Council is comprised of an American Heart Association representative, one stroke coordinator from each of the three regions (North, Central, and South), and one representative for each of the stroke regions in each of the following disciplines: emergency medicine physician, emergency nurse, hospital administrator, neurologist, stroke nurse, a nationally recognized stroke registrar, EMS provider, and EMS administrator. Members are appointed by the State Board of Health for a three-year term and may be reappointed.

The State Board of Health's intent for the Stroke System of Care is to reduce death and disability resulting from stroke events in Mississippi. MSDH is assigned the responsibility for creating, implementing and managing the statewide Stroke System of Care. The Department shall develop and administer stroke regulations that include, but are not limited to, the Mississippi Stroke System of Care Plan, Stroke Care System standards, Stroke Center designations, field triage, interfacility stroke

transfers, EMS aeromedical transportation, stroke data collection, and Stroke Care System evaluation. The Department shall cause the implementation of both professional and lay stroke and cardiovascular education programs. These stroke educational programs shall include both clinical stroke education and cardiovascular disease prevention.

The Department has taken the necessary steps to develop, adopt, and implement the Mississippi Stroke System of Care Plan and associated Stroke Care System regulations necessary to implement the Stroke System of Care. The effective date of this Mississippi Stroke System of Care Plan is October 9, 2024, and it remains in effect until superseded by a later *Plan.*

System Introduction

Stroke is a significant public health problem and carries a high risk of death and disability. According to the Centers for Disease Control and Prevention (CDC), 795,000 people suffer from stroke each year in the United States, and of these incidents, 137,000 people die. Approximately 601,000 of these are first or new strokes, and nearly 185,000 strokes (1 in 4) occur in people who have had a previous stroke. Ischemic strokes, where blood flow to the brain is blocked, account for approximately 87% of all strokes (Stroke Facts, 2024). According to the American Heart Association, stroke is the fifth leading cause of death and the leading preventable cause of long-term disability in the United States. Indeed, the costs of stroke are substantial. The annual estimated direct and indirect cost of stroke in the United States is 56.2 billion dollars (AHA, 2024). Costs include money spent in stroke care, as well as potential economic impact losses, i.e., lost workdays or quality of life changes that altogether alter the patient's ability to work.

Over the last 20 years advances in the treatment of acute ischemic stroke have resulted in improved outcomes in patients suffering from this type of stroke. The use of thrombolytics has been shown to limit long-term neurological effects of ischemic strokes, which would otherwise be disabling. Thrombolytics have become the standard for ischemic stroke care. Stroke patients should be identified as quickly as possible in order to recognize those eligible for endovascular thrombectomy (EVT) and for thrombolytic therapy. Additional research has demonstrated that in-the-field recognition by pre-hospital providers utilizing an approved pre-hospital stroke scale, coupled with pre-hospital notification of receiving facilities, can further reduce time to reperfusion, resulting in improved neurological outcomes. Some patients will require further interventional neurological services at appropriately designated stroke centers.

Mississippi Facts

From 2019 to 2021, Mississippi had the highest rate of death due to stroke of any state in the United States (Elflein, 2024). Moreover, stroke continues to be the 6th leading cause of death and a leading cause of disability in Mississippi (National Center for Health Statistics, Mississippi, 2024). The primary goal of the Mississippi Stroke System of Care is to get the patient suffering from a stroke to an appropriate hospital so that patients who are candidates for thrombolytic and interventional therapies may receive appropriate care in a timely manner. This approach is supported by research that shows that early thrombolytics for ischemic stroke and interventional therapy for large vessel occlusion improve outcomes in patients suffering from these types of strokes. To this end the Stroke

System of Care has focused on early recognition of stroke, promoting populations to call 911 when stroke occurs, minimizing door to CT times and ensuring early administration of thrombolytics.

Chronology of Stroke Care in Mississippi

Mississippi became the first state to have three acute care systems of care on October 9, 2013, when the Mississippi State Board of Health approved the first Stroke System of Care Plan. The development of the Stroke System of Care owed much to the collaborative efforts of the Mississippi State Department of Health, Mississippi Healthcare Alliance (MHCA), Mississippi Hospital Association (MHA) and American Heart Association. Collaboratively, these groups contributed in various ways to the development of the Mississippi STEMI System of Care in 2011. The American Heart Association: Get with the Guidelines program has led on a national level by developing guidelines for stroke systems of care. In the state, the Mississippi Healthcare Alliance (MHCA) was established in 2007 for the purpose of improving care for STEMI patients in Mississippi. By 2011, MHCA had begun promoting the development of the Stroke System of Care. The first Stroke System of Care Plan developed through the collaborative efforts of the Mississippi State Department of Health, MHCA, MHA and the American Heart Association was approved by the State Board of Health on October 9, 2013. The success of these efforts and the formation of the statewide Stroke System of Care owed much to the support of the Mississippi Healthcare Alliance and Mississippi Hospital Association. MHCA has committed to providing educational opportunities in support of the Stroke System of Care and hosts an annual statewide educational symposium for disseminating best practices in stroke care. MHA supports the participation of its member hospitals in the Stroke System of Care. This is important because the Stroke System of Care is a voluntary system. MHA supports the commitment of efforts and resources to improving the quality of Stroke care in Mississippi.

Since FY 2015, the Mississippi Legislature has continued to support the MS Stroke System of Care financially through appropriation bills.

Mississippi STROKE System of Care Plan

Mississippi Stroke System of Care Plan

This Plan outlines the statewide system for the care of stroke victims in Mississippi. Authority for planning, coordination, and evaluation of the system is centralized within the Office of EMS and Acute Care Systems. The public health community refers to stroke as a *brain attack.* Mississippi is truly a rural state, primary transport to hospital offering interventional stroke therapy is not a viable option in some instances. Initial stroke care using thrombolytics at closer, local facilities is key to the system of care model for stroke. The goal is an inclusive model, matching appropriate responses to the needs of the patient.

Vision

The Mississippi Stroke System of Care Plan, when fully implemented throughout Mississippi will result in increased numbers of patients who receive timely thrombolytic and interventional therapy for stroke.

Plan Goals

- Develop the ability to rapidly and accurately identify patients suffering from stroke.

- Assure patients who have sustained a stroke receive a rapid diagnosis and appropriate care in a designated stroke center, even if that means bypassing the closest Emergency Department.

- Maintain an ongoing and effective Quality Improvement (QI) Program, in order to assure continuing appropriate function in providing the highly specialized care necessary in the management of stroke. This program will include the evaluation of pre-hospital management, hospital management, and overall system function. Pre-hospital data collection will be through the Mississippi EMS Information System (MEMSIS).

- Assure a role for all Mississippi hospitals in the stroke system.

- Active data entry by all participating hospitals into a nationally recognized stroke registry.

- Assure citizens and visitors to Mississippi are aware of the statewide stroke system.

- Provide education to the citizens of Mississippi in stroke prevention.

System Performance Measures

The Performance Improvement Committee has identified standard performance measures. Each has to do with processes involved in the facilitation of timely thrombolytics and/or interventional therapy. For example, measures include arrival mode, pre-hospital notification, door to CT time, in-hospital mortality and measures looking specifically at the administration of thrombolytics. To this end the committee is seeking to improve on processes involved in ensuring the timely administration of thrombolytics and interventional therapy with the intent to decrease mortality and morbidity in stroke patients. Mississippi is meeting the national standard of care by exceeding 50% in this

measure and continues to remain lower than the national average in terms of administering thrombolytics in less than 3 hours of the last known well time in patients presenting with stroke symptoms.

Regional Stroke Coordination

The Mississippi Stroke System is based on the concept of regional coordination and education. The state has been divided into three (3) stroke regions - North (along and north of Highway 82), Central, and South (along and south of Highway 84). A Stroke Coordinator has been identified for each region (the following map represents hospitals identified as self-designated stroke centers prior to the designation process outlined in this document).

Figure 1 – Stroke Region Map
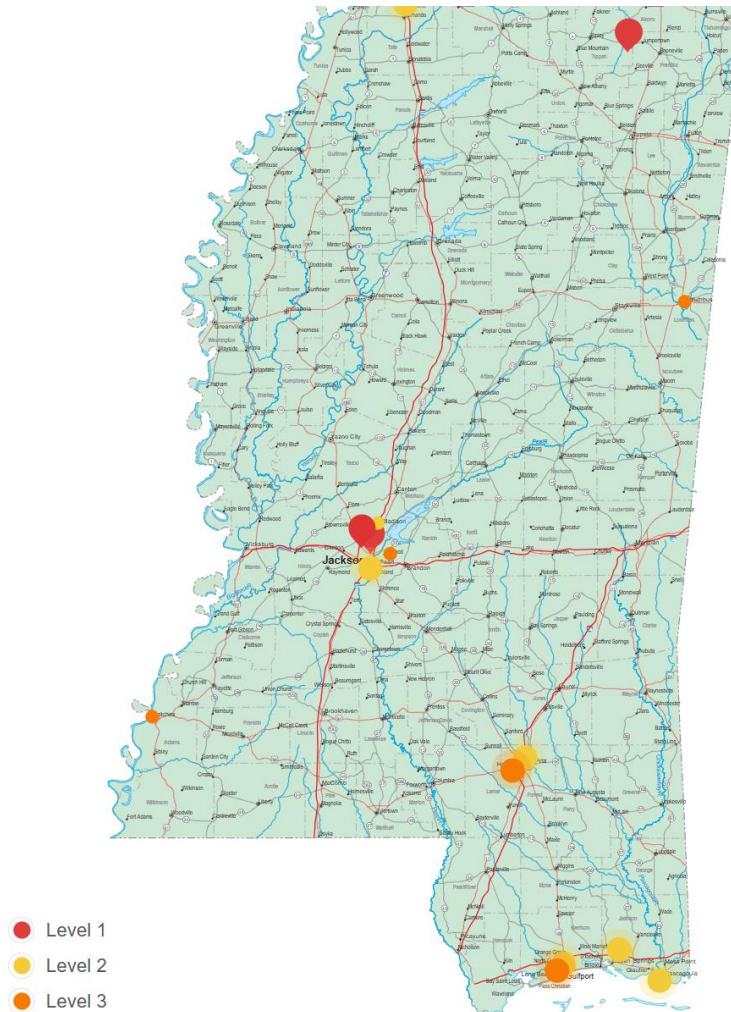
Goals

- Maintain a coordinated regional stroke system.

- Assure that all stroke regions work in harmony with other stroke regions.

- Maintain a system of funding for the stroke regions.

Stroke System Design

The Stroke Advisory Council is appointed by the Mississippi State Board of Health and is comprised of leaders in neurology, EMS agencies, emergency medicine, hospital administration, emergency nursing, stroke nursing, stroke registry, EMS administration and the American Heart Association. The Stroke Advisory Council provides advice and recommendations to the Board and the Department on the Stroke System and has developed a plan for Stroke that meets the plan goals established above. The components, to some degree, have separate and individual identities and functions; however, there should be an understanding, a desire, and willingness to work together in unified effort to reach the end result. If recommendations directly involve pre-hospital aspects of the Stroke program, they will be referred to the EMS Advisory Council and the Office of EMS and Acute Care Systems for review.

Systems require oversight of project concept, overall responsibility, developmental aspects, implementation, and evaluation of continuing activities. The Mississippi State Department of Health Office of EMS and Acute Care Systems has the responsibility for coordinating the Stroke System and pre-hospital EMS activities throughout the State of Mississippi. The Office of EMS and Acute Care Systems will coordinate with all participating partners, healthcare facilities, and EMS services to manage the Stroke Plan implementation.

The goal of the Stroke System is to provide optimal medical care to all stroke patients throughout the continuum of care including prevention, pre-hospital care, acute care, and rehabilitation. The integration of all hospitals into the system is referred to as an *inclusive* stroke system. By providing a comprehensive approach to stroke care, geographical or geopolitical barriers are minimized, and morbidity and mortality are reduced. Inclusive stroke systems address the needs of all stroke patients and identify the roles of the institutions that serve them. The concept of an inclusive system applies to both the rural and urban setting and strives to match each hospital's resources with the needs of the individual stroke patient.

In rural states like Mississippi, unique logistical problems are present including long distances, difficult access, adverse weather conditions, and sparse population densities. The challenge in designing a stroke system in rural areas is to be able to ensure that each facility understands their role in the system and provides the level of specialized care within its capacity, and with referral capabilities built into the system for thrombolytics or interventional services.

The Stroke System of Care involves the organization of already existing resources into a program providing comprehensive care for stroke patients though all phases of their management from the

moment of onset through rehabilitation. The two basic patient management components of the system are the pre-hospital providers and individual hospitals.

The System function involves the use of the Stroke EMS Triage and Destination Guideline and Mississippi EMS Stroke Model Treatment Protocol. Based upon need, modifications and additions may be recommended by the Stroke Advisory Committee and EMS Advisory Council.

Hospitals participating in the system and receiving stroke patients will have organized response systems including:
  a. Equipment and facilities
  b. Trained and committed personnel
  c. Organized management protocols

The emergency department plays a pivotal role in stroke management. The rapid diagnosis of ischemic stroke takes places in the emergency department, where the physician, nurse practitioner or physician assistant performs an appropriate neurological exam and interprets CT results. Their decision to administer thrombolytics will be based on relative and absolute contraindications for thrombolytics. Some patients who have large vessel occlusion ischemia, will require interventional clot retrieval (endovascular treatment) at a higher level of care, and transfer plans should be in place to facilitate the timely transfer of such patients. Endovascular treatment is indicated for such patients up to 24 hours after stroke onset. Transfer to an endovascular center should be considered up to 22 hours from onset to allow time for travel and evaluation at the receiving facility (this timeline may be extended for patient with waxing and waning symptoms). Evidence of continuing leadership should be demonstrated through emergency medicine and neurology participation in Stroke System activities and through individual hospital QI programs.

System design includes integration of the essential components of a Stroke System, pre-hospital triage and identification of stroke patients, medical control and direction, facility resources and identification, data collection and evaluation, public information and education, systems cost, and funding. Each component is a vital link in the effectiveness of the overall system in reducing premature death and disability from stroke events.

Goals
  - Maintain the integration of all of the essential components of the Mississippi Stroke Care System.

  - Assure that the Mississippi State EMS System remains integrated with the Stroke System of Care.

Hospital Resources

The American Heart Association has adopted guidelines for the categorization of facilities providing care to the stroke patient. Mississippi's Stroke System of Care Plan closely follows these guidelines which stress the importance of having available resources ready to administer to the needs of the patient in a timely manner and to the extraordinary commitment of hospital resources and personnel. One of the most important components of a stroke system's design is the designation process for

stroke facilities. It is essential to take into consideration the spectrum of care for all stroke patients and the ability of each facility to provide treatment and care for these patients.

The most widely used guidelines for stroke center designation are those developed by the American Heart Association. These guidelines have been reviewed and adopted to reflect specific nuances to Mississippi. These guidelines identify 4 levels of stroke hospitals.

Stroke Level 1 – The below criteria or designation by a national certification program as a Comprehensive or Thrombectomy Capable Stroke Center

- Consists of a core team of personnel, infrastructure, and expertise to diagnose and treat stroke patients who require intensive medical, surgical, and interventional vascular care. The team consists of a neurologist, neurosurgeon, and endovascular specialists.

- Fully equipped Emergency Department (ED) for rapid diagnosis and treatment using standard CT imaging and ability to have results reported within 45 minutes of arrival.

- Lab services available 24/7 with appropriate result reporting.

- Neurology, Neurosurgery, and Endovascular specialists available 24/7.

- Intensive Care capability available with critical care specialist available 24/7.

- Complete rehabilitation services (physical therapy, occupational therapy, and speech therapy) staffed by trained professionals and available for all patients within 24 to 48 hours of admission.

- Readily available for transfer of patient from field or lower care facility.

- Maintenance of adequate helicopter landing site on campus.

- Operating room and appropriate support staff available 24/7 for emergency surgery when necessary.

- Radiologic and diagnostic imaging with expedited reporting available 24/7, including angiography with endovascular capabilities.

- Must participate in a nationally recognized stroke registry. A multi-disciplinary quality improvement team should meet at least quarterly to review data and lead quality improvement initiatives.

- Core stroke team members must document at least eight hours of stroke specific continuing education annually.

- Community and professional educational projects should be ongoing.

Stroke Level 2 – The below criteria (all of the requirements of Level 1 EXCLUDING endovascular capabilities) or designation by a national certification program as a Primary Stroke Center

- Consists of a core team of personnel, infrastructure, and expertise to diagnose and treat stroke patients who require intensive medical and surgical care.

- The team consists of a diagnostic radiologist and neurologist.

- Fully equipped Emergency Department (ED) for rapid diagnosis and treatment using standard CT imaging and ability to have results reported within 45 minutes of arrival.

- Lab services available 24/7 with appropriate result reporting.

- Radiology and Neurology specialists available 24/7.

- Intensive Care capability available with critical care specialist available 24/7.

- Complete rehab services (physical therapy, occupational therapy and speech therapy) staffed by trained professionals and available for all patients within 24 to 48 hours of admission.

- Readily available for transfer of patient from field or lower care facility.

- Maintenance of adequate helicopter landing site on campus.

- Written plan for transfer of patient to higher level of care if needed for endovascular or surgical treatments.

- Radiologic and diagnostic imaging with expedited reporting available 24/7.

- Must participate in a nationally recognized stroke registry. A multi-disciplinary quality improvement team should meet to review data and lead quality improvement initiatives at least quarterly.

- Core stroke team members must document at least eight hours of stroke specific continuing education annually.

- Community and professional educational projects should be ongoing.

Stroke Level 3 --The below criteria or designation by a national certification program as a Stroke Ready Center. (must have the ability to diagnose and stabilize patient for transfer to Level 1 or 2 Referring Center)

- ED physician, other qualified physician, or physician extender available 24/7 to diagnose and initiate appropriate treatment.

- Fully equipped Emergency Department (ED) for rapid diagnosis and treatment using standard CT imaging and ability to have results reported within 45 minutes of arrival.

- Lab services available 24/7 with appropriate result reporting.

- Acute stroke-trained providers should be available 24/7 to direct IV thrombolytic administration.

- Transfer plans must be established for rapid transfer of the patient to Level 1 or 2 Stroke Center. Factors that may necessitate transfer include:

  o Patients who receive thrombolytics if neurosurgery coverage is not available.

  o Patients with rapid clinical decline.

  o Patients without response to IV thrombolytics.

  o Patients outside of the thrombolytic window who may benefit from endovascular treatments.

  o Other factors as clinically necessary.

- Must participate in a nationally recognized stroke registry. A multi-disciplinary quality improvement team should meet to review data and lead quality improvement initiatives at least quarterly.

- Community and professional educational projects should be ongoing.

Level 4 -- **Non-Stroke Hospital**

- Facility is able to assess and evaluate for possible stroke but lacks essential components to treat patients with IV thrombolytics.

- Transfer plans must be established to facilitate rapid transfer of patients to Level 1 or 2 Stroke Centers.

- May be bypassed in accordance with this plan or an EMS Medical Control Plan.

All facilities are required to have transfer algorithms in place with higher-level facilities to expedite and facilitate the transfer of patients in need of a higher level of care. The closest appropriate level Stroke Center is indicated for patients with time sensitive needs.

Each hospital wishing to be designated as a stroke hospital must submit a letter of application to the Office of EMS and Acute Care Systems. The Stroke Advisory Committee shall make recommendations for designation based on the survey of facility staff and resources. Stroke

Advisory recommendations will be presented to the State Health Officer who will issue designations for a three-year period once approved.

Goals

- Assure that all designated stroke hospitals continue to maintain the highest level of standards.

- Assist with the provision of continuing education in the area of stroke care.

Performance Improvement

The Mississippi Stroke System of Care Plan is a dynamic plan and, as such, will require continuous monitoring and modification. The MSDH in conjunction with the advice of the Mississippi Stroke Advisory Council will work to make the system more efficient and responsive to the needs of stroke patients.

The PI program will be system wide. Every participating organization or facility is required to participate in the system PI process. The appropriateness, quality, and quantity of all activities of the Stroke System must be continuously evaluated.

The Stroke PI Committee will be responsible for the oversight of performance improvement for the Stroke System.

Goals

- Establish and maintain Statewide data through a nationally recognized stroke registry.

- Provide technical assistance to regions and hospitals for a nationally recognized Stroke Registry.

- Provide aggregate stroke data feedback to stroke regions and stroke hospitals.

- Provide stroke-related data to the Stroke Performance Improvement Committee to further the development of Stroke System standards and education.

Administrative Components

The Mississippi State Department of Health Office of EMS and Acute Care Systems has the responsibility for coordinating the Stroke System of Care and coordinating pre-hospital activities throughout the State of Mississippi.

The Office of EMS and Acute Care Systems is responsible for the administration of the statewide Stroke System of Care including policy development, planning, program and policy implementation, promulgation and coordination of regulatory efforts, and general administrative activities necessary to oversee the Stroke System.

The Office of EMS and Acute Care Systems is responsible for providing staff assistance to the Stroke Advisory Council that assists the Office in the development of statewide policies and protocols.

Goal

- Maintain necessary resources to provide needed assistance for stroke regions, stroke hospitals, EMS, public awareness and community education throughout Mississippi.

Finance

The Mississippi Legislature fiscally supports the Stroke System of Care through appropriations from various funding sources.

Goal

- Maintain funding to support the activities provided in the Stroke System of Care Plan.

Public Awareness and Community Education

It is recognized that for stroke patients, major delays exist from patient symptom onset to presentation for medical care. It is also recognized that the 9-1-1 system to access the EMS system is significantly under-utilized by stroke patients. A statewide public awareness campaign about the importance of early recognition of stroke signs and symptoms and the importance of the early activation of the EMS system will be an integral part of the Stroke System of Care. In part, this awareness campaign should help educate the next generation of Mississippians to recognize stroke symptoms as an emergency.

Goals

- Encourage physicians to pursue a leadership role in community education, promoting early recognition of stroke symptoms and the need to call 9-1-1 as quickly as possible after the onset of symptoms.

- Assist the stroke regions with the development of clinical and public stroke health education programs.

- Assure there are appropriate public awareness programs in the area of stroke prevention.

Pre-hospital Care

EMS units are an integral part of the Stroke System of Care. All EMTs, Paramedics, on-line and off-line medical control physicians need to have a basic knowledge and awareness of the Stroke System

of Care Plan elements and system function. This specifically refers to the alert criteria (identification of a stroke) and communication procedures.

Pre-hospital care is provided by both private, public and hospital-based EMS agencies. Each of these agencies has its own medical director and medical control system. While there are statewide requirements for these agencies and a model Mississippi Stroke Treatment Protocol, specific EMS treatment protocols may vary from provider to provider. EMS regulations require licensed EMS agencies' Medical Control Program to comply with this System of Care Plan. The Stroke EMS Triage and Destination Protocols are designed to deliver stroke patients to the most appropriate facility, regardless of the nearest facility or the affiliation of the ambulance service. This protocol is continuously reviewed to ensure stroke patients have access to the most appropriate care.

Each stroke region is responsible for providing education programs for pre-hospital care providers. This education will stress regional protocols appropriate to the level of care being provided and recognition of the symptoms of a potential stroke in the field. Pre-hospital care providers will participate in the STROKE System evaluation and performance improvement programs.

Goals

- Revise and adjust the pre-hospital care regulations to ensure their integration within the stroke system.

- Provide assistance to the stroke regions in providing necessary Stroke System of Care education to the pre-hospital care providers.

- Assist with the interregional coordination of pre-hospital care providers.

Definitive Care

Each level of stroke hospital must have medical oversight for the stroke team. Level 1 and 2 stroke hospitals must have a neurologist and emergency physician responsible for oversight of the Stroke System. The responsibility includes:

a.   Maintaining compliance with state and federal regulations
b.   Oversight responsibility for the Hospital Stroke QI Program including data collection and reporting

Mississippi has 111 hospitals with 4 satellite locations, 96 are considered acute care facilities, critical access hospitals, or rural emergency hospitals with emergency departments and 65 self-designated stroke hospitals. All participating stroke hospitals are required to collect and submit data into a nationally recognized stroke registry. Twenty-four (24) have signed agreements with the Mississippi State Department of Health to un-blind data for use in Stroke PI system development.

Hospitals interested in being designated must submit an application to the Office of EMS and Acute Care Systems describing, in detail, how they meet each of the requirements within their requested designation level and certifying that they meet designation standards.

It has been long recognized that all hospitals are not capable of providing emergent stroke care. Mississippi, following national patient care standards set forth by the American Heart Association has developed a hospital classification concept as described above. Based on this concept, patients may be transferred from the field or from a facility to a higher level of care at another facility based on that individual's medical needs and the level of designation for each facility. These transfers may seem, and may in fact be, contrary to the transfer concept set forth by the Federal Government in its EMTALA Regulations. The triage and transfer guidelines in Mississippi are based on the concept of getting the right patient to the right hospital in the shortest period of time. In order to do this some hospitals may be completely bypassed in favor of a more distant but more medically capable hospital.

The current system is regionally based and is built on an "inclusive model" which allows all hospitals to participate in the Stroke System of Care. The goal of the inclusive model is to ensure that all stroke patients receive optimal care, given available resources, and that the needs and location of the patient are matched with the resources of the system.

Each designated facility will be required, based on their level of designation, to have in place patient transfer plans with higher-level designated facilities. These transfer plans will include suggested patient transfer guidelines. All patients being transferred from one facility to another will be subjected to a local and regional review to ensure medically appropriate transfers.

Rehabilitation is an important component of stroke patient care. It is a well-established fact that stroke patients recover more rapidly and completely when rehabilitation is instituted early in the acute care phase. All designated stroke facilities must have a plan in place, including transfer plans, for the early institution of rehabilitation.

Communications are critical to the function of the Stroke System. Communications provide:
  a. Essential knowledge of the overall status of pre-hospital stroke activities and hospital resource availability on a continuous basis.
  b. A link between the pre-hospital providers and stroke hospitals for the rapid exchange of information, which provides for efficient pre-hospital care provisions and hospital preparation for stroke patient arrival.
  c. Collection of uniform System-wide data for QI activities.

Goals

- Encourage all Mississippi hospitals to participate in the Stroke System of Care.

- Provide additional assistance to hospitals that cannot meet certain stroke hospital standards.

- Encourage and assist hospitals that wish to upgrade their stroke hospital status.

Evaluation

The Mississippi State Stroke System of Care is a dynamic system initially based on national standards modified to meet the needs of Mississippi. To ensure patients, have access to and are transported to the most appropriate facility, data will be collected and reviewed on all stroke patients.

The Office of EMS and Acute Care Systems utilizes a nationally recognized stroke registry. There are four objectives: performance improvement, hospital operations, prevention, and medical research. Of the four, performance improvement is the primary reason for using the registry. When utilized appropriately, performance improvement can be done in a much more efficient manner than if done manually. Secondly, the registry can help in managing resource utilization through daily logs, summaries, etc. The registry can also be used to help target specific prevention programs to reduce stroke in Mississippi. Finally, by all designated facilities capturing standardized data, the information can be used in clinical research.

The Stroke Registry is designed primarily to collect data on stroke patients. It is also designed to identify system issues, such as over and under triage. Data collection will begin with systems and field data and continue through patient discharge.

Performance improvement is a vital part of the Stroke System. It is used to document continuing proper function of the system and evaluation of that function to implement improvements in system operation and stroke patient management. In the Stroke System, patients have virtually no time to make specific choices regarding acute and critical medical care. Therefore, the system has a moral obligation to perform evaluation functions to assure that the highest level of care is being provided, and that improvements are implemented whenever possible in a timely manner.

The PI program will be system wide. Every participating organization or facility is required to participate in the system PI process. The appropriateness, quality, and quantity of all activities of the Stroke System must be continuously evaluated.

- The Stroke PI committee will be responsible for the PI oversight of the Stroke System.
    - Members of the Stroke PI committee will be appointed by the State Health Officer for a term of three years.
    - Member representation on the Stroke PI committee shall include:
        - A neurologist, interventional neurologist or a neurosurgeon shall serve as the chair.
        - One neurologist practicing at a stroke hospital from each of the three regions.
        - One emergency medicine physician practicing at a stroke hospital from each of the three regions.
        - The State EMS Medical Director or his/her physician designee.
    - The Stroke PI Committee will be co-chaired by an emergency medicine physician of the committee as determined annually by a majority of the committee.
- Specific audit filters will be established by the Stroke PI Committee.

In general, the following processes should be performed by each agency or organization. The results

of these reviews will be reported to the Stroke PI Committee.

- Each organization assigns an individual to oversee the PI process
- Standards established
- Determine audit filters
- Collect data
- Evaluate data
- Determine PI issues present
- Develop corrective action plan (CAP)
- Re-evaluate to document results/effectiveness of CAP

Specific items for evaluation:

- Pre-hospital:
  - Accuracy of patient assessment, including the use of an appropriate stroke scale
  - Protocol adherence
  - Procedures initiated/completed
  - Medical control interaction
  - Transport mode (air/ground)
  - Record/documentation
  - Inter-facility care/transport
- Hospital:
  - Protocol adherence
  - Outcome review
    - Complications
    - Deaths
  - Achievement of time-sensitive goals, i.e., door-to-CT, door-to-drug, door-to-device times
  - Adherence to designation level criteria

Data will be reviewed and analyzed at no less than two separate levels. Primary patient care data will be reviewed at each hospital by its stroke team. The stroke team will utilize nationally accepted patient review criteria and will also review the pre-hospital care of stroke patients. The second level of data review will take place at the state level. Statewide data will be used for the review of statewide criteria and epidemiological purposes. The Statewide Education/Prevention program will be based on this data.

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