Stroke

Critical Care System Plan

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Sacramento County Department of Health Services
Emergency Medical Services Agency
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Executive Summary

California statute mandates the Emergency Medical Services (EMS) Authority to adopt necessary regulations to carry out the coordination and integration of all state activities concerning EMS (Health and Safety Code §1797.107).

In addition, State statute allows the EMS Authority to establish guidelines for hospital facilities, in cooperation with affected medical organizations, according to critical care capabilities (Health and Safety Code §1798.150).

As a result of these statutes, the EMS Authority established a multidisciplinary stroke taskforce for the development of Stroke System of Care Regulations for California.¹

California’s Statewide Stroke Critical Care System is described in the California Code of Regulations; Title 22, Division 9, Chapter 7.2. These regulations outline the requirements of all components of the Stroke Critical Care System including the Local EMS Agency (LEMSA), prehospital providers, and hospitals.

Because data management, quality improvement and the evaluation process all have a vital role in providing high quality care to the stroke patient; these items have also been identified in the regulations. The overall goal of the regulations is to reduce morbidity and mortality from acute stroke disease by improving the delivery of emergency medical care within the communities of California.

The Sacramento County EMS Agency (SCEMSA) has been involved with the regulation development process alongside state and hospital system representatives. Sacramento County already has many of the regulations in place, including prehospital care policies to identify stroke patients, identify designated stroke receiving hospitals, and stroke destination policies.

As a requirement of the California Regulations, this document is to serve as a formal written plan for the SCEMSA Stroke Critical Care System.

Sacramento County Emergency Medical Services Agency’s Stroke Critical Care System Plan has been written in accordance with Title 22, Division 9, Chapter 7.2 of the California Code of Regulations.

¹ https://emsa.ca.gov/about-stroke/
**Stroke Critical Care System**

Every year approximately 795,000 adult Americans suffer a stroke. A stroke death occurs every four minutes. Stroke is the most common cause of adult long-term disability in the United States. It is a life-changing event that places heavy burden on patients, families, and caregivers. When a patient is suffering an ischemic stroke, timely intervention is critical to reverse the damage; reduce mortality, morbidity and disability in addition to improving survivor quality of life.\(^2\)

Although there are 172 designated stroke centers in California, there have been no standardized statewide requirements for the development and implementation of a stroke critical care system until now. Hospitals have traditionally been designated as a stroke receiving hospital by their Local EMS Agency as a result of differing standards from one geographic area to the next. Public safety is best served when patients receive a standard of care based on national standards and best practices. This implementation of standardized statewide requirements for stroke care will provide consistent care across the state.\(^3\)

Sacramento’s Stroke Critical Care System is a subspecialty care component of the EMS system that was developed by the Sacramento County EMS Agency. This critical care system links pre-hospital and in-hospital care to deliver treatment to stroke patients who potentially require immediate medical or surgical intervention.

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\(^2\) [https://www.oshpd.ca.gov/HID/Ischemic-Stroke-Report.html](https://www.oshpd.ca.gov/HID/Ischemic-Stroke-Report.html)

Stroke Continuum of Care

Stroke systems of care improve care and support for stroke patients throughout their health care journey. We know that patient care is improved from the first symptoms of stroke through the transition from EMS to hospital care. We also see improved care throughout rehabilitation and follow up with primary care physicians to prevent complications and second strokes. Together, EMS agencies, hospitals, and health care facilities collect and analyze data about stroke patients and care. When best practices and data are shared, the different disciplines can work together to improve patient care.\(^4\)

The continuum of care is important to caregivers and patients alike. It leads to an improvement of patient satisfaction levels, reduces costs and improves health. Keeping up the continuum of care is especially significant for specific patient populations such as those patients who are more dependent on the health services, elderly patients, patients suffering from complex medical conditions, mentally vulnerable patients and patients with chronic diseases. Due to the aforementioned examples, the continuum of care is particularly beneficial to the stroke patient population. Stroke systems of care depend on robust collaboration to ensure that the continuum of care is optimally exercised.

The Sacramento stroke continuum of care can be broken down and evaluated at three levels:

4 https://www.cdc.gov/dhdsp/programs/about_pcnasp.htm
Goals Within the Continuum of Care

Within each level of the continuum of care, there are identified goals designed to build safety into the stroke system of care, ensuring that patients receive the safest, most reliable care across the continuum.

**Pre-Hospital**
- Primary Prevention
- Early Identification & Rapid Response
- Treatment & Transport
- Education & Outreach
- Performance Improvement
- Data Management

**In-Hospital**
- Hospital Services
- Hospital Personnel
- Clinical Capabilities
- Education & Outreach
- Performance Improvement
- Data Management

**Post-Hospital**
- Post Discharge Care
- Secondary and Tertiary Prevention
- Resources and Referrals
- Education & Outreach
- Performance Improvement
- Data Management
Three Areas of Collaboration: A Team Approach

Recognizing that patient outcomes are greatly dependent on the quality of care within each level of care on the continuum, it is critical for Sacramento providers to work in collaboration with a team approach wherever possible. Common themes span across the Pre-Hospital, In-Hospital and Post-Hospital levels that identify opportunities to maximize SCEMSA’s team approach to care of the stroke patient.

- Education of the community, EMS and other healthcare professionals promote and support an integrated system of care. Interprofessional and interdisciplinary education systems prepare care providers to work collaboratively together as a team. When combined with community education and outreach efforts, the patients and their families have an active role in their personal health and well-being.
- Performance Improvement invariably involves work across multiple systems and disciplines within a practice. Within the healthcare practice continuum, this is particularly applicable as patients have various formal and informal care providers throughout their course of illness and into their discharge disposition.
- Good data can help identify, verify and proactively address issues, measure progress and capitalize on opportunities. When data is gathered, tracked and analyzed in a credible way over time, it becomes possible to measure progress and success. Policies, procedures, services and interventions can then be evaluated, modified and improved.

A team approach from a truly integrated healthcare system will go beyond education, outreach, performance improvement and data management/sharing. SCEMSA’s aim is to create a seamless system which requires EMS professionals and community partners to commit to the same shared objectives and find ways to achieve them together. This team approach from a people-centered EMS system takes advantages of the strengths and resources brought by each organization and provider to protect the health and wellness of individuals and communities.  

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Stakeholders

Sacramento County EMS Agency

Serving 1,458 people per square mile, the Sacramento EMS Agency works diligently to ensure that the communities which are spread over its approximate 994 square-miles, have access to stroke treatment and services that provide quality care based off of best practices and evidence-based research.

SCEMSA’s specialty care programs are further refined by the agency’s commitment to excellence as defined in the Vision, Mission, Values and Principles:

Vision

To be the exceptional, outcome-focused Emergency Medical Services (EMS) leader that others seek to model.

Mission Statement

To assure the timely delivery of high quality, outcome-based, compassionate, and cost-effective emergency medical services to the people of Sacramento County and to optimize these services through a balance of community collaboration and regulatory leadership.

Values

- Patient centered care
- Dignity and respect
- Honesty and integrity
- Personal and organizational accountability
- Collaboration in our endeavors
- Inclusive decision-making
- Evidence-based change as an avenue to excellence

Principles

- System success is measured in the patient care outcomes of the community we serve.
- Each interaction brings value to us and the EMS system.
- The success of the organization is success for all.
- Our duty is to lead effectively and regulate with consistency.
The Sacramento County EMS Agency is comprised of an EMS Administrator, EMS Medical Director (part-time contracted), EMS Coordinator, three EMS Specialists, one Administrative Service Officer and one Office Assistant. Although each staff member has a different role in the Stroke Critical Care System, it is through the work that is managed collectively as a group that the Stroke System exhibits optimal performance.

http:www.dhs.saccounty.net/PRI/EMS/Pages/EMS-Home.aspx
Sacramento County Stroke Centers

Sacramento County has a total of eleven pre-hospital receiving centers. Nine of these hospitals are within Sacramento County and two of these hospitals are physically located just outside of the Sacramento County line in Placer County. Ten of the eleven receiving centers are currently certified by The Joint Commission as Primary Stroke Centers.

The California State Regulations define a Primary Stroke Center as a hospital that “…stabilizes and treats acute stroke patients, providing initial acute care, and may transfer to one or more higher level of care centers when clinically warranted”.

Sacramento County EMS Agency has written agreements with hospitals that are designated stroke receiving hospitals. To be considered for stroke receiving center designation, hospitals must hold current certification as a Primary Stroke Center by The Joint Commission and fill out a SCEMSA Stroke Center Designation Application packet. The application packet contains an evaluation tool that SCEMSA uses to ensure that the facility meets the requirements to receive Stroke Center Designation.

Stroke Centers must also maintain compliance with Sacramento County EMS Agency designation criteria outlined in Policy document #2529; Stroke Center Designation.

SCEMSA Stroke Center Designation Application Packet can be found in Attachment APP. Policy document for Stroke Center Designation can be found as Attachment K.
Sacramento County Prehospital Providers

The County of Sacramento is comprised of a mix of public and private EMS Advanced Life Support (ALS) providers as well as a number of Basic Life Support (BLS) First Responders. A combination of ground, air and specialty CCT transport are all offered within the county. The community can access emergency transport services via public providers through the 9-1-1 system. ALS first responder ambulance services are provided by private providers and can be utilized by calling a seven-digit number.

Once on scene, the first responder and ambulance transport crews coordinate their efforts to rapidly identify, treat and transport stroke patients to a Stroke Receiving Center. When needed, pre-hospital providers can contact base hospital personnel for On-Line Medical Direction (OLMD). Field crews notify the Stroke Receiving Center of the incoming patient with a “Stroke Alert” radio report in order to allow hospital staff to prepare for expeditious triage and treatment upon patient arrival.

Pre-hospital providers work closely with the hospital staff to ensure that all pertinent information is relayed for a seamless transition within the continuum of care.

The Stroke Patient

SCEMSA believes that early identification of stroke symptoms by emergency medical personnel is a valuable part of optimal care for the victims of stroke. EMS professionals should attempt to determine the time of onset of the patient’s neurological symptoms and the time the patient was last known to be symptom free. Time of onset is an essential component of pre-hospital stroke screening instruments and may be a factor in determining triage and transport modality decisions.

It is imperative that both field and hospital clinicians are well trained and educated on stroke assessments including the utilization of a stroke screening tool that is used universally within the Sacramento Stroke System.

Sacramento County EMS Agency has a policy in place to assist field providers in the rapid identification of a patient who may be suffering a stroke. Policy document # 8060; Stroke; describes signs and symptoms of a suspected stroke and gives direction for treatment therapies including the application of the Cincinnati Prehospital Stroke Scale.

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Destination

In stroke systems of care, stroke patients should be transported to the most appropriate facility staffed and equipped to manage an acute stroke patient. This determination will include assessments of local resources and transport times.  

In the rare situation that the closest, most appropriate stroke center is not available to accept a stroke patient due to an internal disaster or a failure of all Computerized Axial Tomography (CT) scanners, field providers will transport the patient to the next closest, most appropriate stroke center.

Sacramento County EMS Agency has a policy in place to assist field providers in determining destination for a potential stroke patient. Policy document 5050; Destination; outlines the destination facilities for patient populations requiring specialty systems of care.

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7 Recommendations for The Establishment of an Optimal System of Acute Stroke Care for Adults  pp 26
Communication

EMS personnel should provide pre-hospital notification to the stroke receiving center that a suspected stroke patient is enroute so that the appropriate hospital resources may be mobilized before patient arrival.\(^8\)

Sacramento County prehospital providers have two ways to make pre-hospital notification. In addition to the 800 MHz radio system available to transporting units in Sacramento, providers have a phone number that is assigned to each receiving hospital for the purposes of receiving radio reports. Either method of communication is reliable and is utilized frequently amongst field crews.

Sacramento County EMS Agency has a policy in place to give direction on administering a notification report to receiving hospitals. Policy document #2525; *EMS Radio Report Format*; addresses the minimum acceptable information to be communicated and provides a standardized and consistent approach to prehospital notifications.

\(^8\) 2018 Guidelines for Management of Acute Ischemic Stroke pp e7
Inter-Facility Transfers

Fortunately, in Sacramento County, 10 out of 11 receiving hospitals are currently certified by The Joint Commission at a minimum as a Primary Stroke Center. Although infrequent, there may be times when a stroke patient needs to be transferred from one acute care facility to another. For this reason, Sacramento Stroke Centers have plans developed that include:

- Pre-arranged agreements with stroke receiving hospitals (primary or comprehensive) for transfer of patients
- Pre-arranged agreements with EMS providers for rapid transport of patients who are eligible for time-sensitive treatments

Inter-facility transfers may apply to patients who would benefit from being transferred emergently from a non-stroke-receiving hospital to a stroke-receiving hospital, or patients who might benefit from being transferred from a stroke-receiving hospital with primary stroke center capabilities to a comprehensive stroke center or equivalent. In either case, emergency transfer protocols are pre-arranged, and it is understood that transport should be provided with the urgency of a 911 response.

Sacramento County EMS Agency has a policy in place to provide guidelines for ambulance transport of patients between acute care hospitals. Policy document #5102; Inter-facility Transfers; outlines transfer agreements, medical control and levels of care to ensure that patient needs are being met while providing quality rapid transport to definitive treatment.

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Data Collection

The primary aim of Sacramento County’s Stroke Critical Care System is to develop a comprehensive system in Sacramento that provides timely access to proven treatments necessary to reduce morbidity and mortality. It is through continuous quality improvement efforts that stroke patients receive care based on best practices. Implementation of quality improvement programs and clinical best practices reduces morbidity and mortality, hence improves patient outcomes.

Retrospective data collection and analysis lie at the heart of quality improvement. Data aids in understanding how well the systems work, identifying potential areas for improvement, setting measurable goals, and monitoring the effectiveness of change. Robust data systems, with the ability to report clinical indicators and performance measures, are a key tool to accomplish Quality Improvement (QI) activities. The goal is to connect data from across the continuum of care from pre-hospital to in-hospital to post-hospital disposition in order to optimally evaluate patient outcomes.10

Currently, SCEMSA collects stroke pre-hospital care data elements through Patient Care Record (PCR) extraction. Data elements that are specific to Stroke centers are extracted through a common software registry platform shared with the hospitals called Get with the Guidelines.

Sacramento County EMS Agency has a policy in place to standardize data elements collected from designated Stroke Centers and EMS providers to monitor, review, evaluate, and improve the delivery of pre-hospital advanced life support and hospital stroke care services. Policy document #2528; Stroke System Data Elements; outlines the data elements that are requested from both pre-hospital and hospital providers on a monthly basis.

Stroke Quality Improvement

Reaching for excellence in any system requires a functional decision making process among the team of workers and users within that system. Inherent to this process is the need to know how the system is functioning and what to do to fix or improve it. The concept of continuous quality improvement (CQI) particularly in the field of health care relies mainly upon the following fundamental components:

- The availability of reliable and trusted information
- The ability to effectively communicate that information in easy to understand ways
- A standardized approach to reaching decisions and acting on those decisions

It is through SCEMSA’s Continuous Quality Improvement that the gap between performance and expectations narrows. It pushes the standards upward which results in better outcomes. Quality Improvement stresses understanding complex processes, measuring performance using reliable statistical methods, and using that information to build quality into the process. ¹¹

Sacramento County EMS Agency has a policy in place to ensure continued high quality of patient care in emergency medical services provided within the community. Policy document #7600; Quality Improvement Program; establishes a system-wide Quality Improvement Program to continuously monitor, review, evaluate and improve the delivery of Pre-Hospital, In-Hospital and Post-Hospital care of the stroke patient. The program has active members from all system partners and includes prospective / concurrent / retrospective reviews as well as a feedback system.

**Stroke Care Committee**

As the delivery of stroke care evolves to become more interconnected, coordinating care between pre-hospital providers, nurses, physicians, and other disciplines has become increasingly important. In its simplest form, Interprofessional collaboration is the practice of approaching patient care from a team-based perspective.

When implementing interprofessional collaboration and learning to work together and respecting one another’s perspectives in healthcare, multiple disciplines can work more effectively as a team to help improve patient outcomes. In addition, it improves the coordination and communication between healthcare professionals and thus in turn, improves the quality and safety of patient care.

Sacramento County EMS Agency has a Stroke Care Committee that has representation from each of the Stroke Centers as well as members that represent the pre-hospital providers in our area. The Stroke Care Committee meets regularly and is tasked at reviewing performance data, identifying areas in need of improvement, carrying out and monitoring improvement efforts. For these activities, the committee uses a variety of QI approaches and tools, including Plan, Do, Study, Act (PDSA) cycles, assessments, audits and feedback, benchmarking and best practices research. The Stroke Care Committee provides expertise to address potential quality improvement initiatives within the stroke system which contributes to the development or revision of stroke related policies, procedures and treatment protocols.

Sacramento County EMS Agency has a policy in place that describes the scope of the role in membership on the Stroke Review Committee. Policy document #2027; Stroke Care Committee; provides the context in which the interprofessional collaboration across the continuum of care meets quality improvement.
Education and Outreach

According to the Robert Wood Johnson Foundation (RWJF), enhancing interdisciplinary collaboration and coordination in healthcare is imperative. As the delivery of care becomes more complex across a wide range of settings, and the need to coordinate care among multiple providers becomes ever more important, developing well-functioning teams becomes a crucial objective throughout the health care system. Health professionals have traditionally operated in separate spheres. Studies show that if they “breakdown the walls of hierarchical silos” and come together as a team, they will improve the safety and quality of patient care.

Collaboration between professions starts with interdisciplinary education. To break down those walls, health professionals must begin working together before they actually start working. Interdisciplinary education will lead to more effective communication across disciplines and, ultimately, safer, more affordable, and higher quality care. 12

In addition to interdisciplinary education, there is a vital component of public education and outreach that contributes to the health and wellness of a community. One of the goals identified in Healthy People 2020 is to increase the quality, availability and effectiveness of educational and community-based programs designed to prevent disease and injury, improve health, and enhance quality of life. Educational and community-based programs play a key role in:

- Preventing disease and injury
- Improving health
- Enhancing quality of life

Health status and related health behaviors are determined by influence at multiple levels. Because significant and dynamic interrelationships exist among these different levels of health determinants, educational and community-based programs are most likely to succeed in improving health and wellness when they address influences at all levels and in a variety of environments/settings. 13

Public education and outreach will continue to contribute to the improvement of health outcomes in the United States and is a major component of the Sacramento Stroke Critical Care System.

Understanding the critical role that stroke education and outreach has in healthcare, Sacramento County EMS Agency has developed a reporting process for Stroke Centers as well as pre-hospital providers to identify education and outreach efforts within the community. The reporting matrix includes four elements of education and outreach.

Internal Education is driven towards “in-house” educational efforts on stroke care. This would include mandatory staff training, in-service training and any other educational opportunities that are offered only to the staff members within that stroke center system or within the pre-hospital agency.

External Education is geared towards “external” participants which may include sponsoring a conference or speaking at a conference, stroke education for non-stroke center hospitals, Lunch and Learn activities that are open to outside facilities and similar events.

EMS Education is education that is designed specifically for the EMS providers. This may include station visits by stroke teams to review stroke care assessment scales or on-line learning management systems created to give lectures with pre and post quizzes to evaluate learning. In addition, it may include run reviews or protocol updates.

Public Education and Outreach is specific to bringing stroke education to the community members. This area of education provides the greatest opportunity for the EMS Agency to partner with both pre-hospital providers and the stroke centers to deliver a comprehensive message of heart and vascular health to the members of the community.

Sacramento County EMS Agency has started the collection of stroke education and outreach efforts of our partners. This information is presented in the Stroke Education and Outreach table.

This document can be found as Attachment TAB.
Neighboring EMS Agencies

Due to the complex nature of an EMS System that has multiple agencies which provide local operational oversight, it is imperative to have processes in place in which patients’ care is uninterrupted despite crossing county line. A Memorandum of Understanding (MOU) is beneficial to alleviate the fragmentation, improve coordination of services, and enhance quality of care.

MOU’s can be tailored to the specific needs of each agency, and ensure in advance that there is seamless access and transition between county destinations.

Sacramento County EMS Agency has established Stroke Critical Care System MOU’s with each of the Local EMS Agencies who have a bordering county to Sacramento.

Individual Memorandums of Understanding can be found in attachments T through Z.
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