Yolo County
Stroke Plan

2018

Contents

Introduction

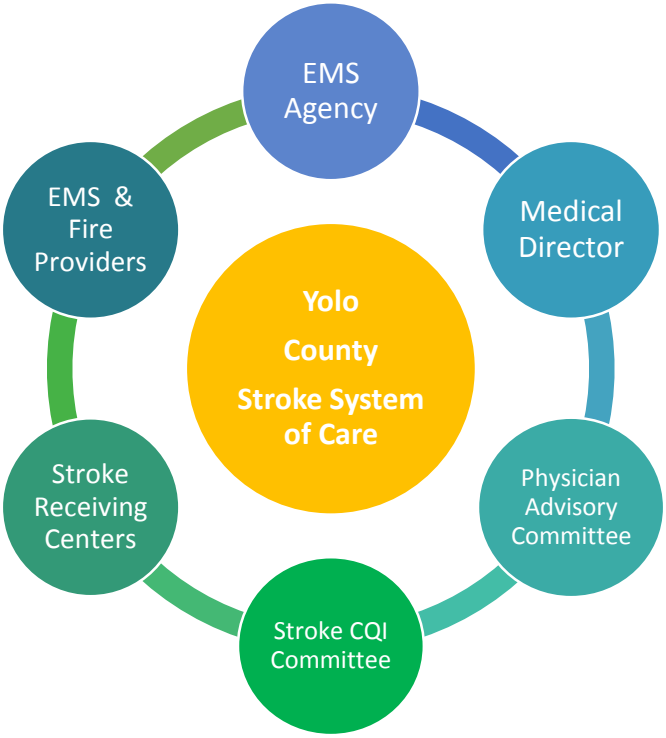
The California Emergency Medical Service Authority (EMSA) developed stroke system of care regulations for California with the goal to reduce morbidity and mortality from acute cerebrovascular accidents by improving the delivery of emergency medical care within local communities in California. Yolo County EMS Agency (YEMSA), per Title 22, Division 9, Chapter 7.2, Article 2 § 100270.220 of the California Code of Regulations has developed a Stroke Critical Care System Plan. The primary focus of the plan is to provide guidelines to facilitate the early recognition of patients suffering from an acute stroke, and to expedite their transport to a center able to provide definitive care within an appropriate time window. Our Stroke Critical Care System is based on current evidence-based guidelines, best of practices, and a shared commitment to excellence. A system approach to stroke care begins in the prehospital setting with rapid identification of stroke symptoms by EMS providers, continues into the Emergency Department (ED) of a stroke receiving center with rapid treatment, and continues throughout the patient's hospital stay and rehabilitation. Committed participation in the Stroke Critical Care System by all stakeholders is a key component to optimizing and improving patient outcomes. This Stroke Critical Care System Plan seeks to identify and promote efforts of effective communication and collaboration, provide an inclusive organized approach to identifying performance measures, and create a consistent standard of high-quality patient care and continued performance improvements.

EMS Agency Personnel and System Coordination

The Yolo County Stroke Critical Care System is designed to provide quality care and improve outcomes for patients experiencing a stroke through sharing information and ideas and partnering to achieve current and future goals in stroke care.

YEMSA helps coordinate components of the Stroke Critical Care System. Key personnel include:

- **EMS Administrator**
- **Medical Director**
- **EMS Program Coordinator**
- **The CQI Stroke Committee**
  - YEMSA: Medical Director, Administrator, Program Coordinator, and staff
  - Base Hospital Representative(s)
  - Stroke Receiving Hospital Representative(s)
  - First Responder (Fire) Representative(s)
  - Paramedic & EMT for approved Ambulance Providers
- **Physician Advisory Committee (PAC)**
  - Medical Director
  - Hospital and Provider Medical Directors
  - ED Physicians or Specialty Care Physicians



Prevention of a Stroke

The Yolo County Stroke Critical Care System supports efforts to identify, educate, and aggressively treat individuals at high risk for a stroke. This includes individuals who have suffered from previous strokes or transient ischemic attacks (TIA), as well as those with atrial fibrillation and diabetes. As a collaborative stroke system, we will develop education and community outreach opportunities that focuses on stroke prevention and life style modification strategies to decrease the risk of a stroke.

Dispatch and Prehospital Providers

Dispatch

Dispatchers have formalized training and protocols for the evaluation of calls that report warning signs of a stroke. ProQA, a dispatching software based on Medical Priority Dispatch Systems (MPDS), is used to ensure that the response to the 9-1-1 call is appropriate and stroke patients are rapidly identified.

Prehospital Providers

Basic Life Support (BLS) and Advanced Life Support (ALS) prehospital providers are trained in a rapid assessment that incorporates acute stroke protocol inclusion criteria, the use of the Cincinnati Prehospital Stroke Scale (CPSS), the determination of a patient's Last Known Well Time (LKWT), and the Time of Discovery of symptoms. Providers recognize that time is a critical component of stroke patient care and optimal outcomes. Patients with a suspected stroke are transported by ALS ambulance to the closest appropriate Primary Stroke Center (PSC) with early notification of a possible stroke provided to the facility prior to their arrival. These providers will receive yearly continuing education on the most current advances in the prehospital treatment of stroke and work closely with the YEMSA staff in developing best practice approaches to field care.

Yolo County Designated Stroke Centers

Stroke system design identifies the strengths and opportunities for improved stroke care in all areas of the county. An inclusive system of care will incorporate all medical care facilities. PSCs are the primary resource hub of the system. All PSCs meet or exceed the national recommended standards for PSC resources. Capabilities of each center will be widely disseminated to the medical and hospital community in order to assure advance resource recognition and access for complex patients to definitive care. All system providers shall work together to refine and improve the pathway to therapy for the stroke patient.

YEMSA designates PSCs via a contractual agreement. There are two (2) designated PSC hospitals within Yolo County which handle 74% of prehospital identified stroke patients and five (5) designated PSC hospitals in Sacramento County which handle the remainder. Hospitals designated by YEMSA have stroke capabilities designed to provide rapid intervention for stroke patients consistent with Primary Stroke Center Certification Criteria of the Joint Commission program. The Joint Commission program is based on recommendations for Primary Stroke Centers published by the Brain Attack Coalition, American Heart Association, and American Stroke Association. The designation is a three (3) year contract with an automatic two (2) year extension. The contractual agreement supports the system approach with the goal to reduce morbidity and mortality from acute stroke disease by improving the delivery of emergency medical care within Yolo County.

Designated PSCs participate in the system by providing specific data sets with signs and symptoms of a vascular incident. This feedback is compiled and presented at the Stroke Continuous Quality Improvement (CQI) meeting each year where representatives from each hospital attend to review and discuss the data and the prehospital stroke protocol and processes. Being a designated PSC is a commitment to a system-wide approach to quality improvement and improved patient outcomes.

Designated Primary Stroke Centers:

Woodland Memorial Hospital, Woodland, CA

Sutter Davis Hospital, Davis, CA

Mercy General Hospital, Sacramento, CA

UC Davis Medical Center, Sacramento, CA

Sutter Medical Center Sacramento, Sacramento, CA

Mercy San Juan Medical Center, Sacramento, CA

Methodist Hospital, Sacramento, CA

Interfacility Transfer

The Interfacility Transfer Policy was developed based on state regulation and best practices. Designated Yolo County PSCs provide specific data sets on patients who arrived by ambulance or by personal vehicle who are then stabilized and transferred to a Comprehensive Stroke Center. Data is reviewed and presented at the Stroke CQI Committee and PAC meetings.

The PSCs participate in the development and execution of formal transfer agreements and bypass and diversion protocols which provide for the “right patient, right place, right time” benefits of timely, appropriate therapy for stroke patients.

Protocol

The Yolo County Acute Cerebral Vascular Accident (Stroke) protocol was developed in coordination with Yolo County stakeholders, designated PSCs, and the PAC. Changes and updates to the protocol are driven by current American Heart Association Standards and new research that focuses on improving outcomes.

The protocol was also updated to expand the window for acute stroke alert activation to 24 hours and to better support the component of communication between the PSC and the prehospital provider. Early notification and detailed communication with the PSC is designed to expedite time sensitive treatment upon arrival. If a patient meets stroke criteria, the prehospital provider will contact the hospital with a “stroke alert” prior to arrival at the ED. This notification allows the hospital to be prepared, based on their policies and procedures, to evaluate and accelerate timely interventions.

Information the prehospital provider is asked to report prior to arrival includes:

- The nature of the symptoms and CPSS findings
- LKWT and Time of Discovery of Symptoms
- Blood Glucose
- Vital Signs

Additional information considered pertinent for stroke care includes:

- Contact information for any witnesses to the onset of stroke symptoms if not present upon arrival at the ED.
- All medications the patient is currently taking.

See Appendix A - Acute Cerebral Vascular Accident (Stroke) Prehospital Protocol. Any updates to the protocol occur during the YEMSA protocol update two (2) times per year.

Data Collection

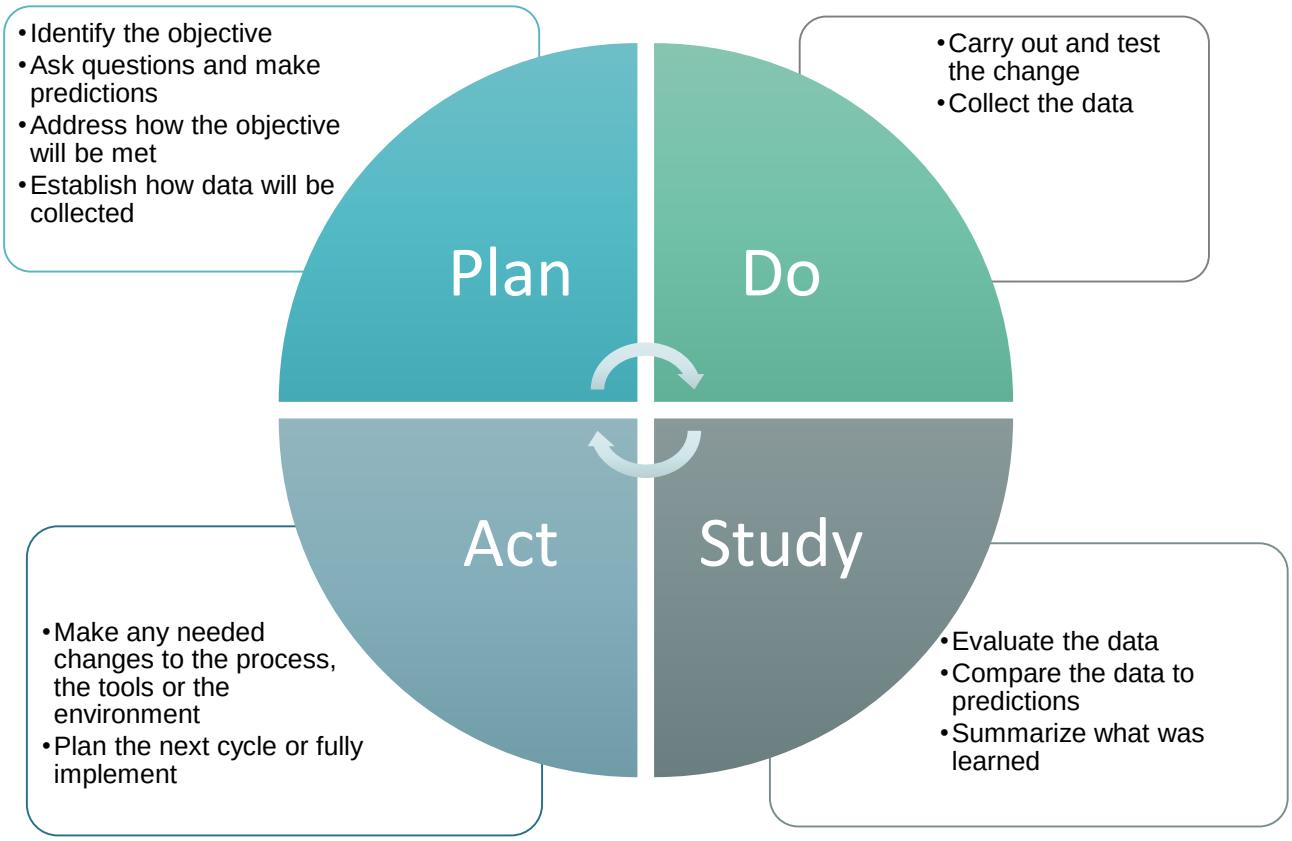
Yolo County EMS has developed a database entitled "Stroke Data," see Appendix B – Stroke Data Template that records prehospital and hospital data. The prehospital data points are derived from national and California standards. Hospital outcome quality measures will remain identical to the American Heart Association guidelines and standards. The Stroke Data sheet contains key indicators such as: patient information, stroke and stroke mimic assessments, stroke alert, times, and the patient's hospital destination. The information is then separated by destination and sent securely with all of the information to each stroke receiving center. The stroke receiving center provides follow-up information to YEMSA based on determined indicators such as: CT times, stroke treatments and times, transfers, and diagnosis. The spreadsheet is completed and returned securely to YEMSA. This data is compiled and presented for review at the Stroke CQI meeting each year. YEMSA has developed performance measures based on the American Heart Stroke Guidelines and Mission Lifeline Standards. Data is collected to analyze and create action plans for improvement on these measures as well as provide data on State Core Measures and local indicators for quality assurance.

Continuous Quality Improvement

The Yolo County Stroke Critical Care System's quality improvement is part of the Yolo County EMS Quality Improvement Plan (EQIP) and is designed as a collective approach to continuous monitoring, analysis, and measurement of performance using the **Plan-Do-Study-Act Cycle Model.** Once a needed improvement is identified, the model is used to test a change and determine if the change is an improvement. As representatives from multiple disciplines, paramedics, registered nurses, physicians, prehospital care coordinators, and stroke coordinators all have input and drive change. Fostering positive relationships and participating in our neighboring counties and hospitals' CQI plans promotes new ideas to shared challenges, builds trust, and increases opportunities for community outreach. Participants are encouraged to attend

YEMSA's annual Continuous Quality Improvement (CQI) Stroke Committee meeting to review the data and identify objectives to drive positive change.

Additionally, each PSC shall have a multidisciplinary quality improvement body that evaluates the care delivered in its facility and makes recommendations as to changes in approaches to the delivery of care and resource utilization. YEMSA will continue to monitor the quality of the care delivered by dispatchers, first responders, and prehospital personnel in supporting optimal care of the stroke victim.



Programs for Public Education

YEMSA hosted an EMS Symposium in 2018 on trauma care. It was such a success we recognized the value and importance of continuing to provide this type of educational opportunity within our community for first responders, EMTs, paramedics, and registered nurses. This year, on April 8, 2019, we presented an educational symposium on vascular emergencies which focused on emergent stroke and cardiac events for adults and pediatrics. We could not provide this opportunity without the support and generosity from our local hospitals, partners, and stakeholders.

By supporting each other through collaboration and joint participation in outreach programs, we increase opportunities to be involved in the community and provide education on stroke awareness, prevention, and recognition.

We distribute an annual EMS report to all county and out-of-county stakeholders which is available to the public. The goal is to share our system's delivery of care and continuous quality improvement through reports on specialty care, coordinated training events with our partners, clinical programs, and quality improvement activities.

Objectives

For the 2019-2020 calendar year we have set these strategic goals using SMART objectives aimed to improve our stroke system.

Goal # 1 Track and trend the LAMS Score with the National Institutes of Health Stroke Scale (NIHSS).

Specific:

- Los Angeles Motor Scale (LAMS) was added in December 2018 as an addition to the CPSS for suspected acute strokes.
- Will review if a high LAMS Score correlates with a high NIHSS hospital score indicating Large Vessel Occlusion (LVO).

Measurable:
LAMS score will be mandatory and automatically calculated when Primary or Secondary impression of stroke is identified in the ePCR and will be completed in conjunction with a Cincinnati Prehospital Stroke Scale. We will utilize a 100% ePCR audit. LAMS score will be compared against the hospital NIHSS score.

Attainable:
The LAMS score was implemented December 2018. Hospitals currently report NIHSS score quarterly to YEMSA for all patients presenting in the ED with a field impression of stroke.

Relevant:
In alignment with American Heart Association and American Stroke Association, YEMSA is committed to collecting data for a point-of-care triage algorithm for patients with suspected LVO. With proficient and accurate data collection and reporting of the CPSS and the severity score (LAMS), we can review and analyze data on patients with a high NIHSS score and a high LAMS score to determine if a high LAMS score indicates the likelihood of a LVO. This information will help weigh the benefits of rapid early access to an Endovascular Thrombectomy (EVT) capable facility.

Time:
Ongoing after January 1, 2019, data will be collected quarterly, and will be reviewed with CQI committee annually.

Outcome:
Monitor and assess LAMS score in conjunction with NIHSS score to determine if both scores are consistent with LVO.

Goal # 2 Review and revise Stroke Protocol to encompass best practices and to align with American Heart Association and Mission Lifeline Goals.

Specific:

- Review stroke protocol annually to ensure it is aligned with American Heart Association and best practices.
- Revise and draft protocol when gaps are recognized.

Measurable:
Review and analyze data collected from providers and designated PSCs annually at CQI committee meeting. Revise protocol(s) as needed.

Attainable:
After review and analysis of the previous year's data, we will make draft changes to be shared with stakeholders for feedback and then implement changes to the protocol(s).

Relevant:
Yolo County will ensure that patients experiencing an acute stroke get the best and most appropriate care available.

Time:
Acute Cerebral Vascular Accident (Stroke) Protocol rolled out September 2018. We will collect data quarterly from the 9-1-1 provider and stroke receiving centers.

Outcome:
A clear protocol with best practices and evidence-driven decision-making tools provided to prehospital providers that can guide the best possible care.

Goal # 3 Increase stroke education opportunities and stroke system awareness in Yolo County.

Specific:

- Provide Yearly System Report to include stroke data.
- Seek opportunities to partner with local hospitals for community outreach.

Measurable:
The Yearly System Report will be created and distributed to all partners.

Attainable:
The Yearly System Report is produced and distributed to prehospital providers and stakeholders who participate in the community.

With our strong partnership and shared goals with local hospitals, we hope to identify ways we can jointly provide information on stroke prevention and recognition to the community.

Relevant:
Providing stroke education and information to field providers and the community is a key component of improving outcomes and reducing disability caused by a stroke.

Time:
EMS System Report for 2017/2018 was released November 2018 and 2018/2019 is expected to be available November 2019.

Outcome:
The Yearly System Report provides current data on YEMSA's stroke system of care, such as Yolo County average door to CT time, total stroke alerts provided for early notification, and types of patients experiencing stroke symptoms.

We hope to partner with our local hospitals on any stroke awareness outreach or community projects on stroke education in the future.

Goal # 4 Collect data for prehospital “Stroke Alert” that supports accurate notification to a Stroke Receiving Center.

Specific:
Advanced hospital notification by EMS personnel may reduce the time to receive sensitive diagnostics and therapy upon arrival at the ED. Yolo County has collected data on pre-arrival notification that inconsistently demonstrated that a stroke receiving center was notified of a possible stroke. The goal is to accurately capture if a “Stroke Alert” was provided to a receiving center to support rapid time sensitive diagnostics and definitive stroke care.

Measurable:
We will be able to compare the previous year of 2018 to 2019 to see how the data is captured to measure improvement and accuracy.

Attainable:
With training and improvement in selected data points in the ePCR program currently in use, we will be able to collect more accurate data.

Relevant:
This is a core measure.

Time:
This data will be collected annually and submitted as part of core measure reporting.

Outcome:
Review Annually

Goal # 5	Identify patients who do not meet Cincinnati Prehospital Stroke Scale (CPSS) criteria but have neurological changes that indicate a possible stroke.

Specific:
We have identified that the CPSS is designed to capture only certain neurological changes that identify a stroke. With additional awareness and assessments, prehospital providers can identify strokes that do not fall into the criteria of the CPSS. With focused education and documentation, we can improve prehospital stroke identification and documentation.

Measurable:
We will collect data on suspected stroke patients that have non-traumatic neurological changes that do not meet the criteria of the CPSS and LAMS; specifically vision changes, coordination, sudden hearing loss, and change in mental status.

Attainable:
We will provide training to Yolo County Paramedic providers in stroke identification and provide training in documentation for stroke identification that does not fit into the PCSS.

Relevant:
New stroke best practices update the F.A.S.T acronym to include additional symptoms involving balance and vision. B.E.F.A.S.T. This goal identifies the importance of additional assessments and the need to capture them in accurate documentation. These additional assessments may be added to the protocol in the future.

Time:
Beginning in quarter one (1) of 2019, we will collect data on neuro assessments performed in addition to the CPSS. Training will be provided to all Yolo County providers in 2019 to include balance and vision assessments for suspected stroke patients.

Outcome:
Review Annually

Appendix A – Acute Cerebral Vascular Accident (Stroke) Protocol

ACUTE CEREBRAL VASCULAR ACCIDENT (STROKE)

Adult | **Pediatric**

Purpose

The YEMSA Stroke System is designed to provide timely appropriate care to patients who have suffered symptoms of a stroke within **24 hours**.

Stroke Triage Criteria

Perform **Cincinnati Prehospital Stroke Scale** Assessment using the **FAST** mnemonic

- Assess for **Facial Droop**: have the patient show their teeth or smile:
  - Normal: both sides move equally
  - Abnormal: 1 side of the face does not move equally
- Assess for **Arm Drift**: have the patient close eyes and hold both arms straight out for 10 seconds:
  - Normal: both arms stay still or move the same
  - Abnormal: 1 arm does not move or drifts downward compared to the other
- Assess for abnormal **Speech**: have the patient say, “You can’t teach an old dog new tricks”:
  - Normal: patient uses correct words, without slurring
  - Abnormal: the patient slurs words, uses wrong words, or is unable to speak
- Ask patient, family, or friends about **Timing** of the event:
  - Last Known Well Time (LKWT)
  - Time of discovery of symptoms (may be the same as LKWT)

If any of the above are positive, the patient meets stroke triage criteria

Patients meeting stroke criteria shall have a LAMS score recorded in the ePCR

LAMS Score

Findings	Scoring
Facial Droop	Absent = 0 Points Present = 1 Point
Arm Weakness	Absent = 0 Points Drifts = 1 Point Falls Rapidly = 2 Points
Grips	Equal = 0 Points Weak = 1 Point No Grip = 2 Points

A LAMS score of $\geq$ 4 indicates a high likelihood of a Large Vessel Occlusion (LVO)

Adult	Pediatric
BLS	
Assess vital signs O_2, titrate SpO_2 > 94% Assist ventilations as needed Avoid hyperventilation	
BLS Optional Scope	
Blood Glucose Check	
ALS	
Cardiac Monitor, Waveform $EtCO_2$, Vascular Access	
Consider	
• If new onset altered state (GCS < 14) with unidentifiable etiology, consider acute stroke • 12-Lead (do not delay transport for 12-Lead)	
Direction	
• Collect medications • Bring family/caregiver. If not able, collect a phone number of family/caregiver who can provide history of events • Transport to a designated Stroke Receiving Center when: 1. Patient meets stroke triage criteria 2. Onset of symptoms is under **24 hours** • Contact the Stroke Receiving Center with a "**STROKE ALERT"** (preferably from the scene) • Include **All** of the following information: 1. Nature of the symptoms 2. LKWT and/or Time of discovery of symptoms 3. Cincinnati Prehospital Stroke Scale 4. Blood glucose 5. Vital signs 6. Treatment provided	

Appendix B – Stroke Data Template

Prehospital

Incident Date	Case Number	First Name	Last Name	DOB	City	Chief Complaint	Primary Impression	Secondary Impression	Patient Age	Gender	Hospital Activation Time	Hospital Activation Type	Receiving Hospital

Time of Call	Time of Dispatch	Time Enroute	Time Onscene	Time Patient Side	Departed Scene	Time Arrive Hospital	Blood Glucose	Time Last Seen Normal	Onset of Symptoms	Onset Unit	Facial Droop	Arm Lift	Speech

Hospital Data

Hospital Door Time	NIHSS	Time of CT	Dx	Time of TPA	Treatments/Surgery	Length of Stay