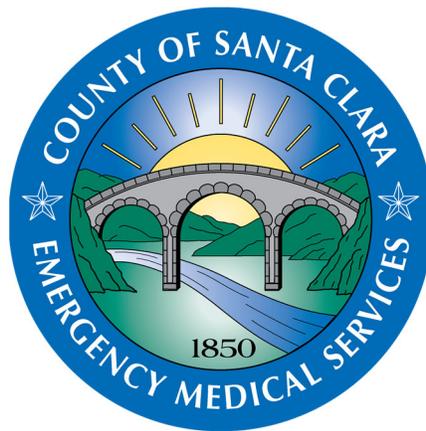


Emergency Medical Services  
Quality Improvement Program (EQIP)



Santa Clara County Emergency Medical Services System

2019

**TABLE OF CONTENTS**

**I. Purpose .....3**

**II. Summary of Program .....3**

**III. Organizational Description .....4**

**a. Description of the Quality Improvement Unit at the EMS Agency .....4**

**b. EMS Agency Organizational Chart .....5**

**c. Committees that Influence and Direct Quality Improvement .....5**

**IV. Objectives of the EMS Quality Improvement Program .....7**

**V. Measuring Performance .....8**

**VI. The DMAIC Project Methodology .....10**

**VII. Responsibilities of Key Stakeholders .....11**

**a. EMS Agency .....12**

**b. Communication/Dispatch .....14**

**c. EMS Provider Agencies .....15**

**d. Receiving Facilities .....17**

**e. Base Hospitals .....18**

**VIII. System-Wide Key Performance Indicators .....19**

**IX. Introduction Statistical Process Control Charts .....21**

**X. Policy Review Process .....23**

**a. Introduction .....23**

**b. Policy Process .....23**

**c. Training and Education .....23**

**d. Annual Update .....24**

**XI. Measure of Success .....24**

**PURPOSE**

The purpose of the EMS Quality Improvement Plan (EQIP) is to provide structure and guidance for the quality improvement (QI) coordinators of EMS provider agencies within Santa Clara County. The EQIP describes the layout, requirements, and responsibilities of quality improvement programs at county and private provider levels. The EQIP also provides a detailed description of the administrative and committee structure of the Santa Clara County EMS Agency's QI network.

**SUMMARY OF PROGRAM**

The Santa Clara County EMS Agency is committed to providing quality services to all our communities. We are dedicated to improving patient outcomes to those we serve. Quality improvement occurs system-wide, as well as with individual organizations that are part of the Santa Clara County EMS system. Through the quality improvement committees and data collected from the EMS system and its hospitals, strategic changes are utilized to enhance the system, address weaknesses and promote the use of evidence to inform our decision making. These practices are integrated into the core operations of our provider agencies, as well as at the system level. The quality improvement program affords all participants, from administrator to first responder, an opportunity to affect change within the system. It provides a process to identify performance standards, to measure success, to report on progress, and ensures the system achieves the desired outcomes.

The Santa Clara County EMS System has made significant advancement in the way data is collected and utilized throughout the system. With the new data system in place benchmark reports, quality assurance modules and performance indicators are being applied at both the system and provider level. It is imperative that system participants use standardized data when comparing and analyzing reports. All system participants are now using data collection that is based on the National EMS Information System's (NEMSIS) data dictionary. In addition to Santa Clara County's participation in the NEMSIS data system the county submits data to the California EMS Information System (CEMSIS) data base. By using this common language, the Santa Clara EMS Agency will decrease variability between provider agencies and allow for national and state benchmarking to ensure our system is providing the highest quality care.

The Santa Clara County EMS Quality Improvement (QI) Program also serves as a guideline for providers in the development of their organizational QI plans (EQIP). These QI plans are submitted annually to ensure compliance with California State Regulations and Santa Clara County policy and protocol. Training and education are an important aspect of every QI program. Starting with our system quality improvement coordinator the agency has provided education to our committee members on data analysis and quality improvement methodologies.

**ORGANIZATIONAL DESCRIPTION****Description of the Quality Improvement Unit at the EMS Agency**

The EMS Director: Jackie Lowther:

The Emergency Medical Services Director leads and directs the regional Countywide Emergency Medical Services System for the County of Santa Clara. Administers and monitors the Emergency Medical Services Agency by planning, coordinating, and integrating activities of both public and private emergency health care services; and, by managing and supervising professional and other staff in the Quality Improvement program.

The EMS Medical Director: Dr. Kenneth Miller:

The Medical Director oversees all medical and clinical components of the EMS system. This includes policy and protocol development, all equipment approval, emergency medical dispatch, base station operations and continuous quality improvement. The EMS medical director is assisted by the quality improvement coordinators and support staff.

The Specialty Programs Nurse Coordinator: Falko Schoeneweiss:

This position is responsible for specialty care systems, clinical quality improvement activities, including data collection, committee support, and ongoing evaluation of specialty care service delivery.

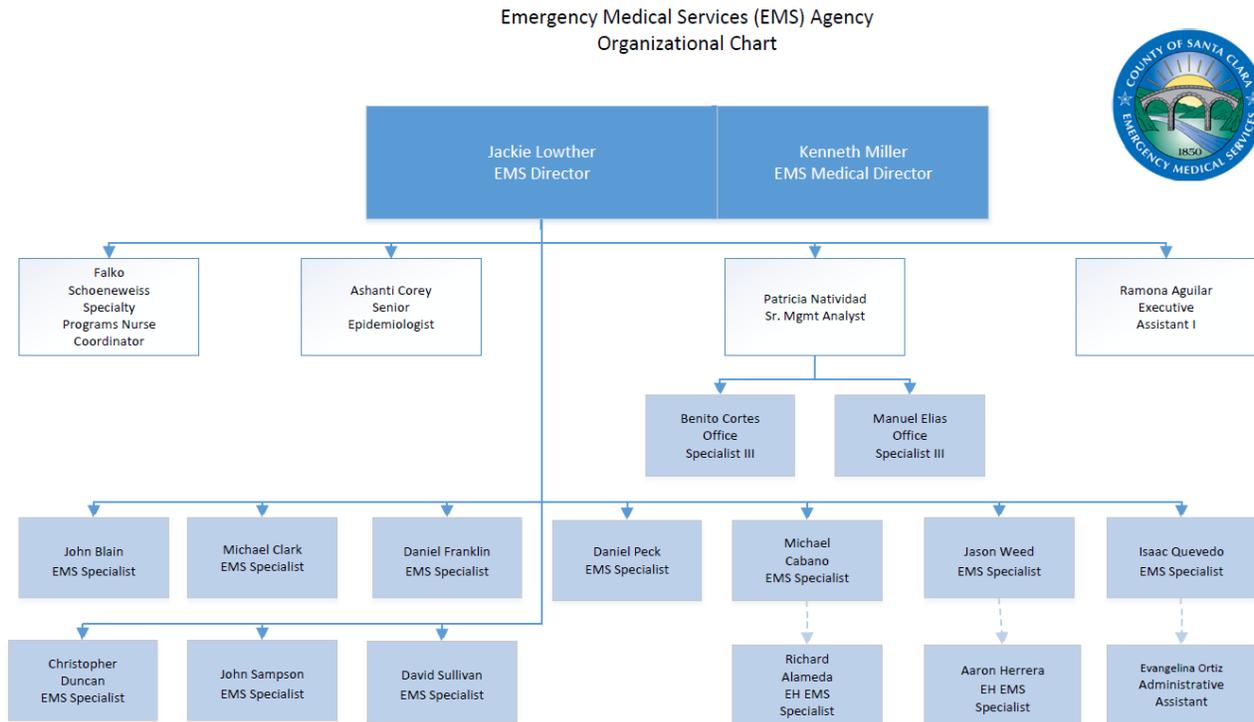
The EMS Specialist/Quality Improvement Coordinators: John Sampson, David Sullivan:

This position is responsible for the development and implementation of the local EMS Agency (LEMSA) quality improvement (QI) plan, oversight of prehospital QI process, outcome, and education. It also serves as clinical liaison to all prehospital providers and the base station.

The EMS Epidemiologist: Ashanti Corey

This position collects and analyzes data pertaining to QI and composes data reports as mandated by the LEMSA.

EMS Agency Organizational Chart depicts the complete reporting structure of the Santa Clara County EMS Agency.



Committees that Influence and Direct Quality Improvement. The following committees play a crucial role in the development and refinement of clinical care and clinical practice within the EMS system. Data is presented (as is outlined in this plan) within the QI committees to inform the prehospital providers and stakeholders on the quality performance of each respective medical specialty service. The QI committees are as follows:

**Prehospital Care System Quality Improvement Committee (PCSQIC):**

This committee reviews and studies all aspects of EMS prehospital care. The committee is responsible for determining pre-hospital key performance indicators (KPI) on an annual basis protocol and policy development, equipment evaluation and the implementation of system wide CQI processes to address system performance issues. This committee works closely with all the county’s QI committees along with the Medical Director to disseminate information and CQI initiatives.

**The Medical Advisors Committee (MAC):**

This committee advises the EMS medical director on the development and improvement of prehospital policies and protocols. Membership of the committee consists of the base hospital medical director; physician representative from hospital emergency departments in the county; the medical director or their representative from each prehospital provider agency in the county; EMS coordinators of each prehospital provider agency; and EMS Agency specialist/quality improvement coordinator.

**Trauma Care System Quality Improvement Committee (TCSQIC):**

This committee includes members from the Trauma Executive Committee as well as multidisciplinary members of trauma centers, emergency care providers, and medical specialties such as neurosurgery and orthopedics. The TCSQIC is the medical care review committee, as well as, an advisory group for trauma system issues.

**Stroke Care System Quality Improvement Committee (SCSQIC):**

This committee is a multidisciplinary committee composed of stroke medical directors, primary stroke center coordinators, EMS medical director, and other system stakeholders, as required. Major responsibilities include monitoring stroke system performance and recommendations for system improvement.

**Cardiac Care System Quality Improvement Committee (CCSQIC):**

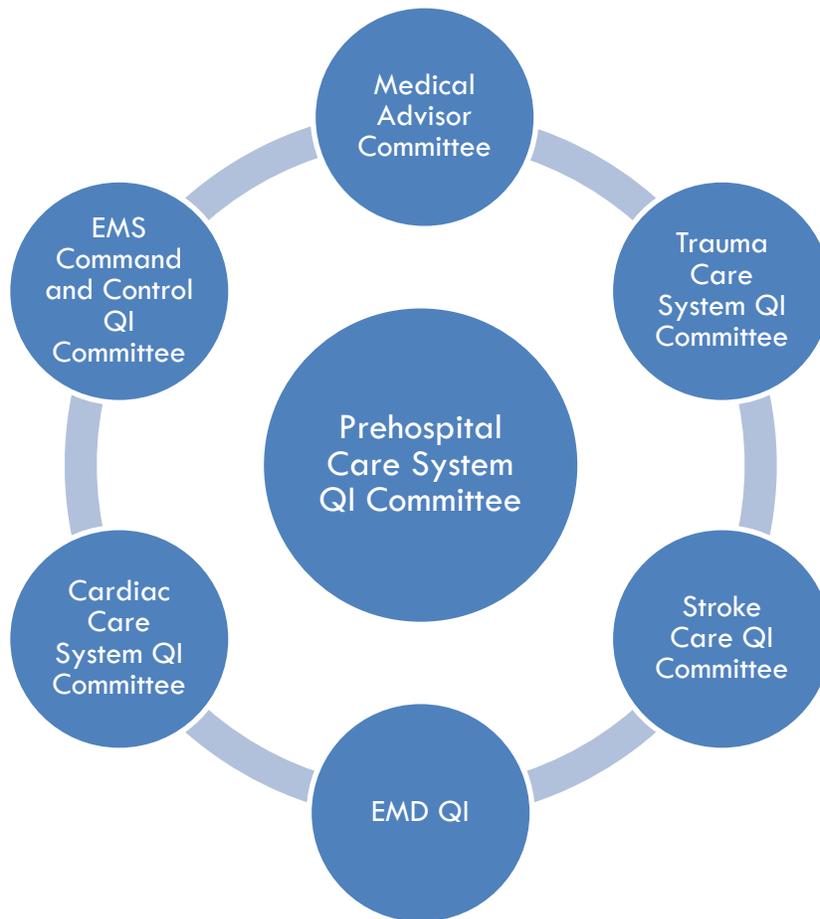
This is a multidisciplinary committee comprised of STEMI center medical directors, STEMI center program managers, EMS medical director, the base hospital physician liaison, the base hospital nurse coordinator, representatives of medical control advisory committee, and other system stakeholders, as needed. The major responsibilities of this committee include monitoring the STEMI system performance, as well as, recommendations for system improvement.

**EMS Command and Control Quality Improvement Committee (ECCQIC):**

This committee addresses the operational aspects of EMS response and mitigation including incident review, planning for events, MVDR (Medical Volunteers Disaster Response)/disaster medical services, and provider agency operational reports. This committee is open to Santa Clara County EMS system providers only.

**Emergency Medical Dispatch Quality Improvement Committee:**

This is a newly formed committee that concentrates on addressing Emergency Medical Dispatching protocols and the use of Medical Priority Dispatch System (MPDS). The Committee is comprised of EMD Dispatcher Quality Coordinators, Communication Center Managers and Medical Advisors, EMS Medical Director, Dispatchers, EMS Program Managers from each provider agency, and is facilitated by EMS Agency CQI Coordinators.



**OBJECTIVES OF THE EMS QUALITY IMPROVEMENT PROGRAM**

- A. Ensures the standard of care for pre-hospital patients in Santa Clara County through system surveillance at the LEMSA and provider level.
- B. The EMS medical director works in collaboration with the Prehospital Care System Quality Improvement Committee (PCSQIC).
- C. Collect and evaluate pre-hospital and specialty care data to determine key performance indicators (KPI) for system surveillance.
- D. Ensures EMS Agency and System provider EQIPs follow California Code of Regulations, Title 22, Division 9, Chapter 12, Article 4

- E. Ensures all prehospital provider agencies review and report on quality Indicators (EQIP) on a monthly basis to the Santa Clara County EMS Agency. All data from the quality indicators (EQIP) will be maintained by the Santa Clara County EMS Agency and the reporting provider agency.
- F. Ensures each prehospital provider agency submits an annual report of quality improvement activities to the Santa Clara County EMS Agency.
- G. Oversees all clinical trial or pilot studies conducted within the emergency medical services system along with transmittals of updates and/or data to governing bodies.
- H. Prepares final data analysis on the selected annual quality indicators for the EMS Agency’s annual report submitted to the State EMS Authority.

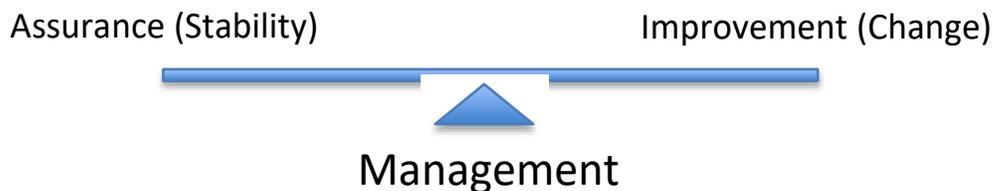
**MEASURING PERFORMANCE**

Approach – It is important to understand these three approaches.

**Quality Assurance** – is the attempt to maintain a given level of quality or performance. This is accomplished by monitoring standard benchmark and key performance indicator reports that highlight the critical aspects of the EMS System. As variances in performance are noted, quality improvement projects may be employed.

**Quality Improvement** – is the attempt to improve the level of quality or performance. This accomplished through quality improvement projects. Most initiatives will follow the DMAIC methodology, as describe later in this document.

**Quality Management** – (or simply management as depicted below) – is the balance of the first two approaches.



It is important to note, we are not just talking about clinical quality or performance but instead are talking about everything that an organization does to provide care and service to the people they serve.

When measuring performance, three types of indicators should be evaluated:

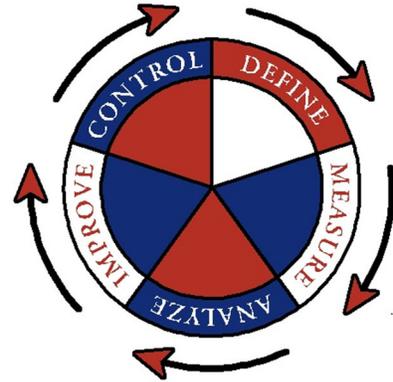
1. Rule indicators are standards or protocols where a variance does not cause an adverse patient outcome. In reference to Policy 108: System Variance Reporting or rule indicators would generally be classified as a Level B Variance, in which a variance was documented but no negative patient outcome occurred directly because of it.
2. Key performance indicators (KPIs) are rates that represent processes crucial to the EMS system performance. Of interest is the delineation between special cause and common cause variation.
  - a. **Special Cause Variation** arises when there is a given assignable cause for the observed data that is not thought to be inherent to the process being measured.
  - b. **Common Cause Variation** assumes that the observed variation is inherent to the process being measured. This delineation between the two is crucial as actions required of these two types of data differ. Within each key result area (KRA) we use statistical process control charts to monitor and focus on improving performance of several KPIs.
3. **EMS System Variance Indicators**

EMS system variance indicators are situations in which a variation in treatment or practice results in an adverse outcome, complaint, or a conflict.

4. **Management of Systems and Processes**
  - a. If it is determined that performance is not meeting required or desired expectations, but no special cause is identified, then, based on prioritization of projects, a quality improvement project may be initiated. During the project, common cause variation will be evaluated, and the process will be redesigned in such a manner that it can produce the desired level of performance.
  - b. On occasion, it may be determined that an entirely new process is required to meet the needs of patients and/or customers. In this scenario, a design of an experimental project will be initiated with the goal of designing a new process that will meet or exceed the level of performance expected by patients and/or customers.

**THE DMAIC PROJECT METHODOLOGY:**

A. **Define:** The process starts by clearly understanding the problem or issue at hand. Next, the team strives to understand the voice of the customer. A clear understanding of customer expectations provides a platform for determining elements that are critical to quality. Then critical to quality goals can be established that will exceed customer expectations. By establishing goals that are customer centric, the organization stands to gain the most return on investment from the efforts of its team.

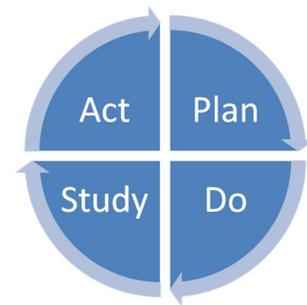


B. **Measure:** The measure phase of a project involves assessing current performance of critical to quality metrics and the establishment of a clear and understandable baseline. Often the process of assessing current process performance involves an evaluation of the accuracy and precision of currently available data. This upfront attention to measure accuracy and precision eliminates problems that can result at later stages of the process related to misinterpretation or inaccuracy of data.

C. **Analyze:** Once the team has established a clear and understandable baseline that is accurate and appropriately precise for the project at hand, the team is ready to consider changes that can be made to the variables that are most responsible for producing outputs. In this stage, effort is given to identifying cause and effect relationships with the goal of identifying the factors/variables that are most influential in producing the desired output.

D. **Improve:** During the improve phase, the PDSA (Plan, Do, Study, Act) model can be used to implement and evaluate improvements.

1. **Plan** - Understanding of the process gleaned from the analyze phase is used to make planned changes to the process.
2. **Do** – Such changes should be implemented as a pilot test or designed experiment.
3. **Study** - As a means of assessing the efficacy of changes made to the process, post-change performance is assessed and compared to baseline performance. This can be done with pre and post comparison of control charts or more advanced statistical methods.
4. **Act** – Finally, adjustments are made as necessary and then changes are implemented system-wide.
  - a. The PDSA cycle continues to be repeated until the desired actions are achieved.



- E. **Control:** Once improvements have been made to a given process, control mechanisms are put in place to insure sustainability of desired results. Tools such as statistical process control charts are used to detect the future state of any deviations from target and to allow for rapid correction before they result in adverse or undesired outcomes.

**Responsibilities of Key Stakeholders**



- A. The path to excellence is a model for building an EMS system that minimizes occurrences of clinical variance and need for disciplinary actions by focusing on hiring the best employees and developing an open system of performance measurement and evaluation, provider feedback, system participation, and standardized processes.
- B. The following outlines the activities required of various participants at each stage of the Path to Excellence.

1. The EMS Agency is responsible for development, implementation, and monitoring of the overall comprehensive quality improvement plan (EQIP – EMS Path to Excellence).
2. The comprehensive plan EQIP – EMS Path to Excellence is comprised of seven steps. Listed below are the stakeholder responsibilities of each step.
3. In addition to the comprehensive EQIP, each provider agency is required to have its own quality improvement plan.
4. Each year the EQIP will review quality improvement efforts and will update all stakeholders on quality improvement efforts.

**C. EMS Agency**

1. Step 1 - Hire the Best Employees
  - a. Ensure the EMS Agency provides all individuals involved in quality improvement with the requisite quality improvement education and training needed to perform their respective roles.
  - b. Certify/authorize prehospital personnel.
  - c. Communicate educational and training needs to the appropriate training venues.
  - d. Approve prehospital education and training programs.
  - e. Evaluate the impact of education/training activities on EMS performance.
  - f. Support provider agencies in the implementation of quality plans.
2. Step 2 - Set and Communicate Standards of Performance
  - a. Develop a comprehensive EQIP.
  - b. Educate stakeholders on their respective role in the EQIP.
  - c. Provide education and training on quality improvement to stakeholders.
  - d. Ensure the EMS Agency adheres to all local, state and federal regulations.
  - e. Coordinate quality improvement committees.
3. Step 3 - Measure Performance
  - a. Aggregate key performance indicator data on a monthly basis.
  - b. Develop and present statistical process control charts of system performance for all three types of performance indicators.
    - Rule indicators
    - Key Performance Indicators
    - EMS Systems Variance

- 
4. Step 4 - Provide Periodic Feedback
    - a. Provide statistical process control chart feedback to each provider agency monthly.
    - b. Provide updates on system performance for the various quality committee meetings.
    - c. Provide continuous updates to the medical director.
    - d. Support the medical director in reviewing annual performance and in creating periodic and annual updates.
  
  5. Step 5 - Manage Systems and Processes
    - a. Investigate special cause variation.
    - b. Charter and facilitate quality improvement project teams aimed at improving key system processes.
    - c. Support provider agencies in the implementation of improvement efforts.
    - d. Provide real-time system support for:
      - Multi-casualty situations.
      - Periods of excessive hospital bypass.
      - Periods of prolonged hospital ambulance patient offload times.
  
  6. Step 6 - Manage Poor Individual-Level Performance
    - a. Approve individual improvement/development plans for poor performers.
      - EMS provider agencies will work in conjunction with the EMS medical director to execute performance improvement plans.
  
  7. Step 7 - Take Individual-Level Corrective Actions
    - a. As a last resort and in situations involving gross negligence, the EMS Medical Director will assist EMS provider agencies with corrective actions and referrals to EMSA, as deemed appropriate.

**D. Communications/Dispatch**

1. Step 1 - Hire the Best Employees
  - a. Provide new employee orientation that sets the standard for performance.
  - b. Provide continuing education/training that integrated the knowledge gleaned from all performance improvement activities.
  - c. Maintain current certifications
2. Step 2 - Set and Communicate Standards of Performance
  - a. Participate in quality improvement committees as appointed.
  - b. Ensure that all policies, procedures and protocols comply with local, state and federal regulation and standards.
  - c. Make changes to internal performance standards as needed to support system performance.
3. Step 3 - Measure Performance
  - a. Develop system performance indicators based on:
    - High-risk
    - High-volume
    - Agency requirements and improvement efforts
    - In-house improvement efforts
    - Develop individual performance indicators based on
    - Tape reviews
    - EMD QI Software
    - National Standards
4. Step 4 - Provide Periodic Feedback
  - a. Provide system performance feedback to all dispatch personnel.
  - b. Provide individual performance feedback to all dispatch personnel.
  - c. Communicate system changes to all dispatch personnel.
  - d. Provide performance indicator data to EMS Agency on a monthly basis.
5. Step 5 - Manage Systems and Processes
  - a. Participate in quality improvement projects.
  - b. Participate in incident reviews.

6. Step 6 - Manage Poor Individual-Level Performance
  - a. Develop individual performance improvement/development plans for individuals with performance found to be statistically different than system performance.
7. Step 7 - Take Individual-Level Corrective Actions
  - a. As a last step take individual corrective action as outlined in Policy #106.

**E. EMS Provider Agencies**

1. Step 1 - Hire the Best Employees
  - a. Provide new employee orientation that sets the standard for quality performance.
  - b. Provide continuing education/training that integrates the knowledge garnered from all performance improvement activities.
  - c. Maintain current status on all certifications required by Santa Clara County. These requirements can be found on the EMS Agency's website under the EMT Certification and Paramedic Accreditation tab.
  - d. Designate an individual as the primary quality improvement contact.
2. Step 2 - Set and Communicate Standards of Performance
  - a. Participate in quality improvement committees as appointed.
  - b. Ensure that all policies, procedures, and protocols comply with local, state and federal regulation and standards.
  - c. Make changes to internal performance standards as needed to support the EMS system's performance.
3. Step 3 - Measure Performance
  - a. Develop system performance indicators based on:
    - High-risk
    - High-volume
    - Agency requirements and improvement efforts
    - In-house improvement efforts
  - b. Develop individual performance indicators based on:
    - Patient charting
    - Patient care
    - High-risk
    - High-volume
  - c. Evaluate system and individual performance through:
    - Review of ePCRs
    - Ride-alongs
    - Routine testing

- d. Review variances/unusual events in care that are detected through:
  - ePCR Review
  - Employee concerns
  - Management concerns
  - Public concerns
4. Step 4 - Provide Periodic Feedback
  - a. Provide feedback to hospitals and base hospital as needed to facilitate patient outcome follow-up.
  - b. Provide system performance feedback to all provider agency personnel.
  - c. Provide individual performance feedback to all provider agency personnel.
  - d. Communicate system changes to all provider agency personnel.
  - e. Provide performance indicator data to EMS Agency on a monthly basis.
  - f. Supervisors and QI personnel should provide real-time feedback to agency personnel on performance.
  - g. Provide training education to EMS providers and the community
  - h. Address deficiencies in policy and protocol identified through the CQI process.
5. Step 5 - Manage Systems and Processes
  - a. Participate in quality improvement projects.
  - b. Participate in incident reviews.
  - c. Participate in the quality review process.
6. Step 6 - Manage Poor Individual-Level Performance
  - a. Develop individual performance improvement/development plans for individuals.
7. Step 7 - Take Individual-Level Corrective Actions
  - a. As a last step take individual corrective action as outlined in Policy #106.

**F. Receiving Facilities**

1. Step 1 - Hire the Best Employees
  - a. Provide new employee orientation to medical facility.
  - b. Provide recommendations on the orientation of new employees.
  - c. Provide recommendations on continuing education/training objectives that integrate the knowledge gleaned from all performance improvement activities.

2. Step 2 - Set and Communicate Standards of Performance
  - a. Participate in quality improvement committees as appointed.
  - b. Ensure that all policies, procedures, and protocols comply with local, state and federal regulation and standards.
  - c. Make changes to internal performance standards as needed to support system performance.
3. Step 3 - Measure Performance
  - a. Track patient outcomes.
4. Step 4 - Provide Periodic Feedback
  - a. Provide feedback to base hospital and provider agencies as needed to facilitate patient outcome follow-up.
  - b. Provide performance feedback to quality committees as necessary.
  - c. Report unusual event/variance to the appropriate provider agency and EMS Agency.
5. Step 5 - Manage Systems and Processes
  - a. Participate in quality improvement projects.
  - b. Participate in incident reviews.
6. Step 6 - Manage Poor Individual-Level Performance
  - a. Support provider agencies as needed with individual improvement/development plans.
7. Step 7 - Take Individual-Level Corrective Actions
  - b. Support provider agencies as necessary.

**G. Base Hospital**

1. Step 1 - Hire the Best Employees
  - a. Provide orientation to new base hospital physicians setting the standard for performance.
  - b. Provide continuing education/training that integrates the knowledge collected from all performance improvement activities.
  - c. Offer supervised clinical rotations for paramedics.
  - d. Participate in the continuing education/training of prehospital personnel.
  - e. Designate an individual as the primary quality improvement contact.
  - f. Develop requirements for base hospital physician authorization and training.

2. Step 2 - Set and Communicate Standards of Performance
  - a. Participate in quality improvement committees as appointed.
  - b. Ensure that all policies, procedures, and protocols comply with local, state and federal regulation and standards.
  - c. Make changes to base hospital performance standards as needed to support system performance.
3. Step 3 - Measure Performance
  - a. Develop system performance indicators based on:
    - High-risk
    - High-volume
    - Agency requirements and improvement efforts
    - In-house improvement efforts
  - b. Develop individual performance indicators based on:
    - High-risk
    - High-volume
    - Agency requirements and improvement efforts
    - In-house improvement efforts
  - c. Evaluate system and individual performance through:
    - Written record
    - Recorded communications
  - d. Assist in the review of unusual events/variances in care that are detected through:
    - Complaints
    - Reviews
    - Adverse outcomes
4. Step 4 - Provide Periodic Feedback
  - a. Provide feedback to provider agencies and hospital as needed to facilitate patient outcome follow-up.
  - b. Provide system performance feedback to all base hospital personnel.
  - c. Provide individual performance feedback to all base hospital physicians personnel.
  - d. Communicate system changes to all base hospital personnel.
  - e. Provide performance indicator data to EMS Agency on a monthly basis.
5. Step 5 - Manage Systems and Processes
  - a. Participate in quality improvement projects.
  - b. Participate in incident reviews.
6. Step 6 - Manage Poor Individual-Level Performance
  - a. Develop individual performance improvement/development plans for individuals with performance found to be statistically different than system performance.
7. Step 7 - Take Individual-Level Corrective Actions
  - a. As a last step take individual corrective action.

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**SYSTEM-WIDE KEY PERFORMANCE INDICATORS**

Santa Clara County's performance indicators are measures based on scientific evidence about processes and treatments thought to produce the best results for a condition or illness. Quality improvement is a continuous process that requires continual monitoring and activity to maintain a given level of quality and to continuously strive to improve performance in all areas. Being a dynamic and continuous process, there is the need to occasionally update quality goals annually. Respectively, there is the need to evaluate performance indicators and core measures. Changes to the performance indicators will be made annually as part of the Annual Update process through the Prehospital Care System Quality Improvement Committee (PCSQIC) and/or EMS Agency.

A. On an annual basis the QI program will:

1. Determine if new performance indicators need to be added.
2. Determine if any performance indicators need to be retired or adjusted.
3. Publish a list of revised indicators in the Annual Update Document.

B. Performance indicator definitions should only be changed when necessary as the changes to definitions of core measure detracts from the ability to compare current performance to historical performance.

C. Performance Indicator Selection

Performance indicators are created to continually monitor key processes within the Santa Clara EMS System. Each year the Prehospital Care System Quality Improvement Committee (PCSQIC) reviews the performance indicators that are being collected and determines whether new performance indicators need to be collected and evaluated. The need for new performance indicators could arise from one of two perspectives.

1. An improvement project may lead to the discovery of a new leading performance indicator. Leading performance indicators are those that if performed correctly lead to desired outcomes. An example of a leading indicator is the time from onset of cardiac arrest until an initial shock is delivered. Evidence supports the notion that the shorter this time interval the higher probability of a desirable patient outcome.
2. A second situation is the situation in which a new outcome is determined to be important to the overall service and care provided to the people of Santa Clara County.

D. Clinical Indicator Reporting

The quality improvement unit of each prehospital provider agency will collect and aggregate the data needed to evaluate each of the performance indicators based on the care that its personnel renders to patients. Using ImageTrend reports authored or vetted through the EMS agency or an Excel spreadsheet template author or vetted by the EMS Agency; each provider agency will submit the required information for the clinical indicator currently in use

to the EMS Agency, monthly. The clinical indicator information is due to Santa Clara County EMS Agency by the 15th business day after the end of the month.

E. Agency Review of Performance Indicators

The EMS Agency epidemiologist will review and validate the data and place in the appropriate statistical process control chart. Special cause variation and/or processes that are not meeting performance standards will be discussed at the quarterly meetings of the Prehospital Care System Quality Improvement Committee. The EMS Agency will also provide copies of the statistical process control charts created from each provider's data back to the given provider agency. In addition to the required performance indicators, the quality improvement unit of each local EMS provider is encouraged to develop their own performance indicators to evaluate unique aspects of their individual organization.

F. Evaluation of Performance Indicators

The Quality Improvement Unit will review each statistical process control chart. Out-of-control process and/or processes that are not meeting performance standards will be discussed at the quarterly meetings of the Prehospital Care System Quality Improvement Committee. Each prehospital provider should investigate out-of-control data points and should provide their findings at the bimonthly meeting.

G. Presentation of Performance Indicators

Performance indicators are monitored over time with the purpose of monitoring process performance to allow for the early identification of changes to important processes and to provide a standardized way of visualizing improvements. Section VIII provides a brief example of the general concept and features of a control chart. Specifics on choosing the most appropriate type of control chart for a given type of data and for more detail on interpreting control charts can be found on our website.

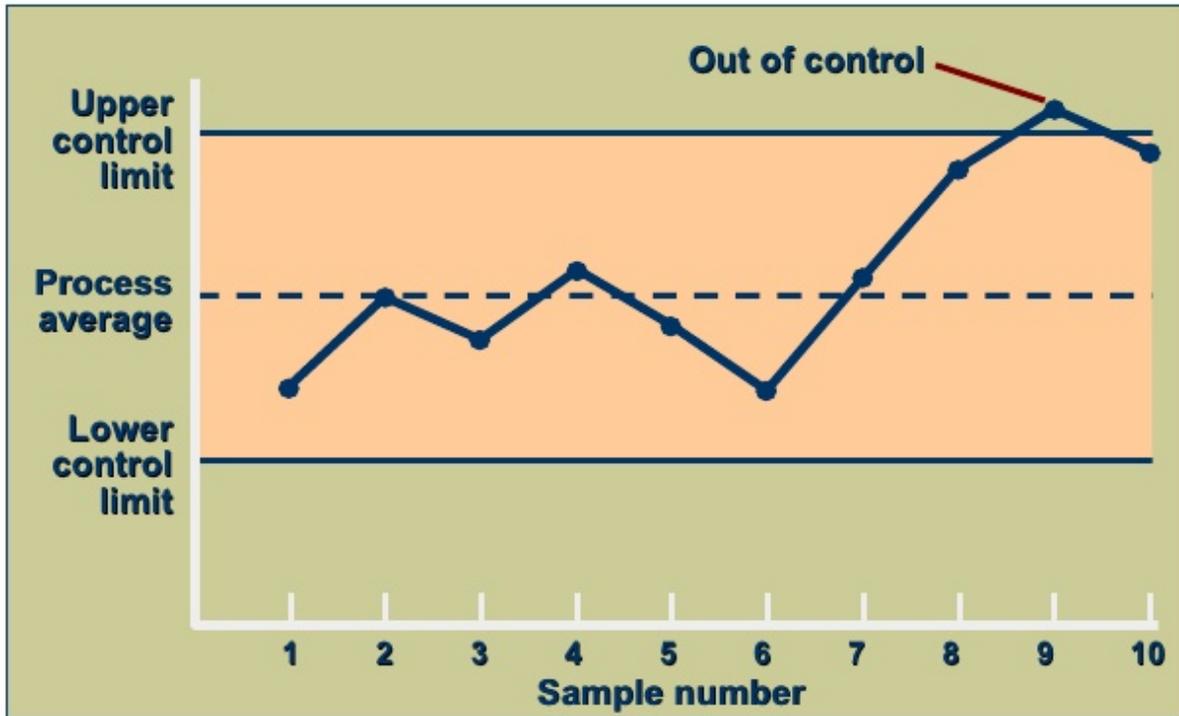
<https://www.sccgov.org/sites/ems/services/qi/Pages/EMSCQI.aspx>

## INTRODUCTION STATISTICAL PROCESS CONTROL CHARTS

- A. The statistical process control chart or "process behavior chart" is used to monitor processes over time. The theoretical basis is that work happens over time in the context of a process. Process data collected on such processes should produce a predictable range of data. This range is used to determine natural process boundaries. If data falls outside of these statistically derived boundaries, then there is a high probability that there has been a change in a process. This phenomenon is known as "out-of-control." When a data point falls off these boundaries or control limits, the process is said to be out-of-control and the process that results in the data point should be investigated. If the process is not out of control and is not meeting given standards, then all data from the process should be evaluated in aggregate to determine sources of common cause variation.

- 
- B. It is important to remember that out-of-control and “out of standard” are two entirely different phenomena. The approach on how to intervene in these two distinct situations is very different. When a process is in a state of control and is not producing outputs at a desirable level, a process often referred to as common cause variation, then improvement efforts should be targeted at improving or redesigning the entire process, such that it produces desired outcomes. Alternatively, if a process is just out-of-control or is experiencing what is referred to as special cause variation, then it is appropriate to investigate the out-of-control points and to institute appropriate changes to prevent such special causes in the future.
- C. There are three important components of a control or process behavior chart. These include the centerline, the upper control limit, and the lower control limit. The centerline represents the central tendency of the range of process data. Often, this is the average level of performance of a process. The second component is the upper control limit. The upper control limit represents the upper boundary of data that is within the range of a given process performance. Points that fall beyond this upper control limit or boundary have a high probability of coming from an alternative process. Simply meaning that there is a high probability that the series of steps that were carried out were altered in some manner. This could have resulted from any number of reasons from an employee doing the process incorrectly or from an adverse environment influencing the processes output. The final component is the lower control limit (LCL) or boundary and operates exactly like the upper control limits. Points falling below this level have a high probability of being produced by an altered process.
- D. The following is an example of a control chart. Statistical process control charts (process behavior charts) are the most sophisticated way to monitor process indicators over time. While there are different types of control charts to accommodate different forms of data, all control charts have the same three essential components outlined above.

# Process Control Chart



## E. Using Performance Improvement Data

Process owners are responsible for continuously monitoring processes with control charts and for presenting a review of them to the appropriate oversight committee. Out-of-control points should be evaluated by the process owner and appropriate actions such be instituted to prevent such deviations from the process in the future. If a process is found to be in “control” but is not meeting a particular standard, then the process owner should present such findings to the Prehospital Care System Quality Improvement Committee (PCSQIC), who should also consider charting a quality improvement project to facilitate improvement of the process.

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**POLICY REVIEW PROCESS****A. Introduction**

The policy review process is an advisory process to the EMS Agency and the EMS medical director for the formulation of medical protocols and operational policies. Policy suggestions and/or draft policies are accepted from committees, system participants, individuals, and/or interested parties.

Policies will be evaluated on an annual basis with adequate time allowed for training and distribution. Specific recommendations for additions, deletions, and/or revisions should be forwarded to the EMS Agency.

**B. Policy Process****1. Written Public Comment**

- a. The EMS office will distribute draft policies to the appropriate system participants and/or interested parties for written comments.
- b. Policies under consideration that affect the EMS system will be sent out for review by all systems participants. A policy under consideration that applies to a limited group will only be sent to those who would be directly affected.
- c. The time frame allowed for the return of comments will be 30 days. Comments may be emailed to the EMS office but must be received no later than 5:00 p.m. on the deadline date.
- d. All comments will be reviewed by the EMS Medical Director and EMS Agency Staff. All suggestions will be taken into consideration.

**C. TRAINING AND EDUCATION****1. Paramedic and EMT Training Programs**

Paramedic and EMT training programs are approved and monitored in accordance with the California Code of Regulations, Title 22, Division 9, Chapter 2, Article 3 and Chapter 4, Article 3. Training programs receive EMS education initiatives associated with treatment protocol updates and quality improvement activities.

**2. Continuing Education (CE) Title 22. Division 9. Chapter 11**

Training and education are fundamental to the success of quality improvement and is addressed in collaboration with quality and training experts from all our partners throughout the EMS system. CE training program objectives are designed to:

- a. Meet state licensure/certification requirements and/or county accreditation requirements.
- b. Be developed with educational content to address Santa Clara County specific needs.
- c. Provide standards-based training for all fire and ambulance personnel.
- d. Integrate prehospital skills/CE training into a countywide system.

- e. Utilize patient simulator training countywide to achieve training objectives.
- f. Improve and integrate “partners” in ALS/BLS training.
- g. Facilitate increased interagency training to promote cooperation and respect.

**D. ANNUAL UPDATE**

The medical director will oversee an annual evaluation of the QI program annually by the EMS Agency, various committees and stakeholders. An annual update will be created to inform, educate and train all individuals involved in QI activities. At a minimum this will include the following:

1. Update on new performance indicators.
2. Review key improvements from the previous year.
3. Review current important data and any special cause variations trends.
4. A review of any policy revisions.
5. A description of any changes in continuing education and skills training requirements.
6. A description of priorities for the coming year.

The annual update document is a written account of the progress of an organization’s activities as stated in the EMS QI Program. The plan will summarize previous year’s changes and progress. The annual update will include the indicators monitored, key findings/priority issues identified, improvement action plan/plans for further action, and state whether goals were met. If goals were not met, what follow-up actions are needed, if any. The update shall include, but not be limited to, a summary of how the EQIP addressed the program indicators. The EQIP shall be reviewed by the LEMSA or the EMSA at least every five (5) years.

**Measures of Success**

<b>MEASURE 1 TITLE</b>	Cardiac Arrest-Return of Spontaneous Circulation (ROSC)
DESCRIPTION	The Emergency Medical Services Agency will improve prehospital clinical practices in cardiopulmonary resuscitation and monitor the effects on patient outcome. By providing high performance CPR, the department’s stakeholders will increase the frequency of the “Return of Spontaneous Circulation” (ROSC). ROSC is the return of a palpable pulse in a patient following cardiopulmonary arrest. Several patient factors will influence ROSC along with the changes in cardiac arrest management. It is anticipated that there will be an overall improvement in ROSC with the implementation of high-performance CPR, the magnitude of which will vary based upon patient factors.
FREQUENCY OF DATA COLLECTION	Monthly
<b>MEASURE 2 TITLE</b>	Lower Ambulance Cancellation Rate
STATUS	<b>Sunset/Retire</b>

DESCRIPTION	The Department seeks to reduce the 911 ambulance cancellation rate by 3 percent by the end of June 2020. Reducing unnecessary ambulance dispatches could increase the total number of available ambulances for life threatening emergencies. The percentage of incidents will be recorded on a monthly basis to compare previous year's incidents during respective months.
FREQUENCY OF DATA COLLECTION	Monthly
<b>MEASURE 3 TITLE</b>	Lower Ambulance Patient Offload Time
STATUS	Continue
DESCRIPTION	The Department will reduce current ambulance patient offload time in all hospitals to 25 minutes or less (measured at the 90th percentile) by December 2019. This will improve the customer experience, the efficient allocation of resources, and timely access to EMS services. On a monthly basis, the Department will determine the 90th percentile for all ambulance offload times in the County measuring time from the ambulance arrival at the hospital until the hospital assumes care.
FREQUENCY OF DATA COLLECTION	Monthly
<b>MEASURE 4 TITLE</b>	Electronic Patient Care Record Documentation
STATUS	Continue
DESCRIPTION	Conduct education for all EMS system field providers on the appropriate way to complete a patient care record (PCR) for when medical assessments and/or medical care has been performed within the 911 system. For all 911 patients a patient care record will be submitted with a Validation Score of at least 80 (of 100) points.
FREQUENCY OF DATA COLLECTION	Monthly
<b>MEASURE 5 TITLE</b>	Timely Submission of PCRs for Time Sensitive Injuries
STATUS	<b>New</b>
DESCRIPTION	Decrease the time elapsed between collected patient information on the 911 scene to the submission of patient care reports (PCR) to the transported hospital for time sensitive injures, such as Stroke, STEMI, or Trauma. Comparing the average of time interval from when a 911 ambulance crew arrived at the patient's side and the time the chart was first posted to the database, to the average scene time of patients suffering from time sensitive injuries. This comparison will demonstrate an overall depiction of how well the system performs at delivering the most charts of the most critical patient types.
FREQUENCY OF DATA COLLECTION	Monthly

MEASURE 6 TITLE	Trauma Scene Time Reduction					
STATUS	<b>New</b>					
DESCRIPTION	In order to discourage an increase in prehospital scene times, the EMS Agency will be tracking and reviewing trauma scene times. This will be accomplished by creating reports in ImageTrend that display incidents with scene times over 15 minutes for major trauma victims. The EMS Agency will then review the corresponding Patient Care Records and look for reasonable explanations for delays. If none can be found, then communication will occur with the crew members and the Program Manager, to educate and prevent future delays. The goal is to lower average trauma scene time.					
FREQUENCY OF DATA COLLECTION	Monthly					
<b>OUTCOME/RESULTS</b>	<b>FY2016 Actual</b>	<b>FY2017 Actual</b>	<b>FY2018 Actual</b>	<b>FY2019 Actual</b>	<b>FY2020 Anticipated</b>	<b>FY2021 Projected</b>
Cardiac Arrest-Return of Spontaneous Circulation (ROSC)	33.27%	34.9%	35.4%	32%	33%	33%
Reduce ambulance patient offload time to 25 minutes	45.32 mins.	38.27 mins.	34.45 mins.	24.53 mins.	25 mins.	24 mins.
Increase patient care record submission validation score	N/A	N/A	92.99%	93.1%	94%	94%
Timely Submission of ePCRs for Time Sensitive Injuries	N/A	N/A	N/A	Avg Scene Time + 172 mins.	Avg Scene Time + 20 mins.	Avg Scene Time + 10 mins.
Trauma Scene Time Reduction	N/A	N/A	N/A	N/A	18.19 mins.	15 mins.

**Sunset/Retire**

% of Prehospital Providers Trained	N/A	0%	3.86%	99.5%		
Reduce ambulance non-transport rate by 3% year-over-year	35%	36%	35%	34%		

The EMS Agency sought to reduce the 911 cancellation rate by 3 percent by the end of 2020 to increase the total number of available ambulances for life threatening emergencies. After working on this measure for four years without success it has been determined that in order achieve any success it would require considerable system changes, such as multi-level response, therefore the EMS Agency is going to Sunset this measure. In addition, we do not currently have control over situations where ambulances are sent when there is not a patient and Medical Priority Dispatch cannot be performed.

In 2018 the EMS Agency selected a Measure of Success to Conduct training for all EMS Providers in high performance CPR; providers delivering coordinated, effective high-quality CPR. This measure was a subset of EMS Measure #1: Cardiac Arrest-Return of Spontaneous Circulation (ROSC). This portion of the measure has been met with 100 percent of all providers trained during the 2019 EMS Update and throughout the year. Even though this measure has been met, the EMS Agency continues to monitor the effectiveness of this skill for the increase for the "Return of Spontaneous Circulation" (ROSC). ROSC is the return of a palpable pulse in a patient following cardiopulmonary arrest. It is anticipated that there will be an overall improvement in ROSC with the implementation of high-performance CPR.

### **Summary**

Santa Clara County EMS is guided by its mission: an essential service dedicated to ensuring the provision of quality patient care to the people of Santa Clara County through collaboration, facilitated regulation and system management.

Our EMTs, Paramedics, support staff, and leadership strive to model and support the agencies' core values of dignity, respect, innovation, professionalism, objectivity, leadership, and participation in all of their actions. The product being the culmination of a comprehensive vision, assuring an EMS system in Santa Clara County that provides safe, quality, and effective prehospital care.

The past year has allowed the Santa Clara EMS Agency the opportunity to further affirm our commitment and dedication to the community we serve. As a service, we continue to develop deep bonds in the neighborhoods of Santa Clara, not only in the delivery of pre-hospital emergency medical care, but through science-based protocols and community outreach programs.