Consultant Report

Coastal Valley EMS Agency
California

Quality Management

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Project Overview

Fitch & Associates was engaged on a grant by Costal Valleys EMS Agency (CVEMSA) to complete a two-phase project.

- Phase 1 – Developed a system-wide Quality Improvement Plan (QIP) for the region.
- Phase 2 – Review processes, survey and meet with stakeholders, and provide an assessment of the region's current quality management practices and provide recommendations for enhancing the processes for the future.

Phase 1 of the project was completed June 30, 2009.

This executive summary report is the completion of Phase 2. It includes reference to material from the QIP and findings from meetings with and surveying regional provider stakeholders. It describes what was observed and reported and discusses recommendations for the region to move from its current practice to alignment with the QIP.

The project involved meetings and data collection across a large geographic region with diverse provider entities. The following figure shows the region, which includes Sonoma, Napa, and Mendocino Counties.

Figure 1. Map of the Coastal Valley Region

QM Activities Analysis Approach

The project involved three (3) methods of data collection:

1. Existing Reports & Data
2. Stakeholder Meetings
3. Electronic Questionnaire

The following is a description of each method.

Existing Reports & Data

Representatives of CVEMSA provided existing reports and data. The reports contained the required quarterly data set, which included regional and State data elements and targeted data related to trauma and ST Elevated Myocardial Infarctions (STEMI). In addition, stakeholders discussed data collected at the county and the individual provider entity level.

Stakeholder Meetings

In late July, Fitch consulting members David M. Williams and Michael Greene visited the region for several days to meet with stakeholder groups. Stakeholders representing first response, transport, and the receiving hospitals from Napa, Mendocino, and Sonoma Counties met with Fitch staff for roundtable conversations. A qualitative interview protocol was used as a framework for the conversations, but participants were allowed to guide the dialogue.

The following six (6) questions acted as the core topics for the stakeholder meetings:

1. Please describe what you feel would be the ideal quality management approach for your county and the Coastal Valleys Regional EMS System?
2. What activities or practices currently in place do you believe are working really well?
3. What are specific areas for improvement you see at the local, county, and regional level?
4. How do you measure the quality of care and service provided by the EMS and trauma system?
5. How do you collect data? What specific ideas do you have for improving the data collection process?
6. What do you hope will be an outcome of this quality management analysis and report?

Stakeholder meetings covered a diverse array of topics and the participants drove the focus.

Web-Based Questionnaire

CVEMSA covers a large geographical area and has participating organizations that range from volunteers to large national private ambulance providers. Fitch staff aimed to include input from as many stakeholders as possible, including those that may not be able to attend scheduled face-to-face meetings in each county. A web-based survey questionnaire was developed and emailed to all entities in the region using a contact list provided by CVEMSA.

Table 1. Survey Deployment Statistics

Table: Survey Distribution & Response	Number	Percentage
Survey Invitations	71	100%
Bounced (e.g., inactive email)	15	15%
Delivered	56	85%
Completed Surveys	13	18.3%
Incomplete (Initiated, but not completed)	3	4.2%

The results of the survey questionnaire follow in the findings section.

Consultant Analysis Findings

General Assessment

As the findings are discussed, a lot of attention is focused on what CVEMSA system is not doing or needs to improve. It's important to appreciate that the system is very similar to the majority of EMS systems in the United States. Especially systems with multiple provider entities and receiving hospitals spread across a large geography with diverse communities that range from dense small cities to rural and frontier jurisdictions. The activities and practices currently in place at the local, county, and regional level are very consistent with the norm for similar EMS systems.

This context is important as you read through the findings, which primarily highlight deficits or issues. While CVEMSA is reflective of the industry in similar systems, the EMS industry as a whole is not aligned with current practices of health care quality improvement. Many of the findings and recommendations to follow will be directed at raising the region's quality practices in line with current health care improvement practices.

Concept Awareness

The EMS industry has long used the term "Quality Improvement (QI)" to describe Quality Management (QM) activities. The activities that the majority of EMS entities engage in, however, are Quality Assurance (QA) focused. This term and concept confusion is very common. Stakeholders met with within the Coastal Valley's region also did not appear to recognize the difference between the two concepts. Everyone encountered, as part of the analysis, used the terms Quality Improvement, QI, CQI, etc., as they described their activities, but all of the activities described were Quality Assurance (QA) focused.

The following are the definitions of quality improvement and quality assurance from the National Highway Traffic Safety Administration's *A Leadership Guide to Quality Improvement for Emergency Medical Services Systems.*[1]

- Quality Improvement - The continuous study and improvement of a process, system, or organization.
- Quality Assurance - Retrospective review or inspection of services or processes that is intended to identify problems.

[1] http://www.nhtsa.gov/people/injury/ems/leaderguide/#qit

The noted difference, in plain English, is that Quality Improvement (QI) looks at using data and tests of change to improve a process or system so that it produces future improved outcome every time.

Quality Assurance (QA) looks backwards at either individual events or the system and evaluates compliance against a standard. QA is what Dr. Donald Berwick, President and CEO of the Institute for Healthcare Improvement, describes as inspecting for "bad apples."[2]

Both QI and QA must occur in an EMS system, but systems with a dominant QA focus cannot make continuous improvement. QA needs to occur when individual complaints are received and/or care issues are identified, but over emphasis on QA will not reduce the potential of a similar event happening in the future unless the process of system is changes (i.e., QI).

CVEMSA activities are almost solely Quality Assurance (QA) based. This includes targeted review of specific themed cases (e.g., pediatrics, Versed, trauma) and identified isolated calls. The primary emphasis is placed on reviewing the call, assessing if, retrospectively, the care appears to meet care standards, and then follow up may or may not occur with the field providers to counsel them on the "expectation." In addition, the system collects data across defined data measures that show counts of events (e.g., responses, transports, cardiac). These activities are all quality assurance.

This definition and activity confusion is common in the EMS industry and is rooted in tradition, reinforced in trade journals and conference presentations, and found in the majority of organizations and systems.

The system at the local, county, and regional level should work to transition the balance of activities to focus on Quality Improvement (QI). CVEMSA and its stakeholders should use plain English definitions of Quality Improvement (QI), and Quality Assurance (QA) and clarify what activities fall into each focus and then realign efforts toward a greater improvement focus. The CVEMSA QIP provides a clear breakdown of activities for both foci.

[2] Berwick DM. Continuous improvement as an ideal in health care. N Engl J Med. 1989;320:53–6.

Diverse Activities

The level of effort and the focus of activities in practice in the region vary. Sonoma and Napa counties have active quality committees that meet frequently; Mendocino does not at this time. All of the counties participate in regional meetings either as individual provider entities or through their County EMS committee. There is inconsistent connection between local, county, and regional activities and no uniform method for action.

Individual Case Review

Throughout the region, individual entities perform some form of Quality Assurance (QA) for isolated cases. Cases may be self identified, identified at the EMS committee level, or received via a complaint. How those cases are received and managed varies from organization to organization.

The QIP describes a recommendation for a uniform individual case review process. It includes having a published access number, a consistent review process, reporting method, and timeline. CVEMSA should work with stakeholder entities to create a uniform, but locally managed approach that models after the QIP plan.

Targeted Themed Review

At the county level, EMS committees were engaged in targeted reviews of specific care areas identified by each committee. Locally defined initiatives are great and should be encouraged because those closest to the care being delivered have the most intimate knowledge.

When asked how local committees decided on what to study, the decision process was pretty loose or based on an individual member's interest. That interest frequently focused on a segment of care that involves a small subset (e.g., Versed) or may not be quantified as a significant problem.

For example, in one county, a single case where the Versed administration was in question was introduced for the committee's consideration. This resulted in a targeted review of Versed administration cases. While it was unknown if Versed administration is or is not a significant issue in the region, the number of Versed cases represents a tiny sub-segment of the patient population. Cardiac, respiratory, and motor vehicle collisions represented far more common calls in the system, but there was limited study of those patient areas. One exception was ST Elevation Myocardial Infarctions (STEMI), which is discussed later.

Themed reviews targeting specific care areas are worthwhile, but there should be a methodology for choosing where to invest the limited time and energy available. Focusing efforts on topics that represent the largest segments of patients or very specific subsets where efforts can have a direct impact on outcomes (e.g., sudden cardiac arrest) is preferred. The next section describes how to use patient request data to determine system data measures. The same approach can be used to complete a Pareto Analysis to decide on large segments worthy of targeted review.[3]

What to Measure?

Data is often collected using three different models:

1. Improvement,
2. Accountability, and
3. Research.

Improvement data is collected as part of an effort to test and change the performance of a process or system and involves looking at the results or outcomes.

Accountability data is used to measure counts of activities to understand the number of times an event happens. The data is informational, but does not provide information about how the process being measured is performing or if changes are resulting in improvement.

Finally, the third model is for research data, which is collected to statistically answer a defined question.

Much of the data tracked at the local and regional level are counts of things, which are based on State requirements for data capture. The following Table reflects the 2009 Data Set.

[3] Pareto Diagram: http://www.nhtsa.gov/people/injury/ems/leaderguide/#pd

Table 2. 2009 State Requirements for Data Capture

2009 Key Performance Data Set
Total ambulance response vehicles
Total patients transported
Total patients not transported (AMA/RAS, treated and released dry runs)
Total patient care reports generated
Total trauma patients
Total trauma patients meeting trauma triage criteria
Total cardiac patients
Total medical patients
Total pediatric patients
Total number of CQI cases
Total number of advanced airways attempted
Total number of advanced airways successful
Total number of KING AIRWAYS
Total number of field 12 lead EKG's performed
Total number of filed diagnosed STEMI
Total number of patients transported to a STEMI Receiving Center
Total number of patients treated for pain
Total number of patients receiving greater than 15 mg MS
Total number of patients who received greater than 2 mg of Versed
Total number of patients treated with sedation
Total number of patients treated with ZOFRAN
Total number of patients treated with CPAP
Total number of patients receiving intraosseous infusion
Total number of patients who received needle cricothyrotomy or thoracostomy
Total number of patients who received external cardiac pacing
Total number of patients who received cardioversion
Total number of Disaster/MCI Responses (response with 5 or more victims)

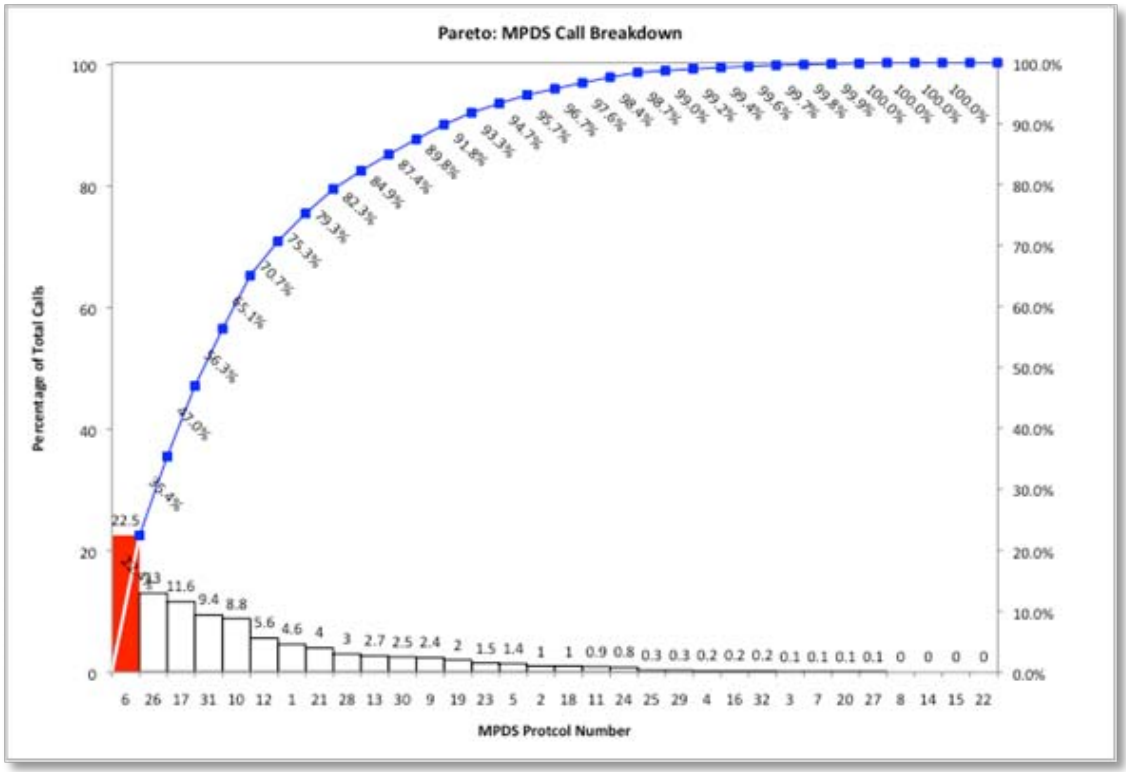
Almost every data measure begins with the words: “Total number of…” or something similar. This kind of data measurement falls in the accountability model.

Some of the data, like number of calls or transports, is helpful to understand the level of activity, but in general it does not aid managing or improving service delivery. It is primarily captured because the State requires it or a question was raised at one time and the data capture was initiated and never discontinued.

There is some data that is outcome or process data and captured as part of stroke, STEMI, and trauma processes. The data is displayed in spreadsheets, however, limiting interpretation or aiding in assessing or making improvements.

The QIP includes a recommendation for data measures to consider implementing. Included is a recommendation to assess the breakdown of existing call types in the region using Medical Priority Dispatch System (MPDS) codes or a summary of crew impression (e.g., “diagnoses) to identify the big segments of call types within the system (e.g., cardiac, trauma, respiratory). Using a Pareto analysis, the core areas of care can be identified and outcome measures developed. The following figure reflects a Pareto analysis of one city’s (not in CVEMSA region) MPDS call type breakdown.

Figure 2. Example of Pareto Chart using MPDS Data



Note that eleven (11) call categories make up nearly 90% of the total requests for service in this sample. Breathing problems (#6), sick persons (#26), unconscious (#31), chest pain (#10), and seizures (#12) represent three (3) out of every four (4) requests. In this example city, it would make sense for process measures to be tracked in these areas to drive improvement projects that focus on these care areas. Doing so would result in activities that address the care of the majority of callers.

The following table reflects an example of a call type driven data measure scorecard.

Table 3. Type Driven Data Measure Scorecard

Measurement Examples
Cardiac
Sudden cardiac arrest survival (%)[Utstein]
Chest pain patients pain free at ED arrival (%)
9-1-1 to ED total call time less than x Min (%)
Respiratory
Respiratory emergency patients not intubated (%)
Respiratory emergency patients with return of O2 saturation to normal ranges (%)
Respiratory emergency patients with successful airway management (%)
Trauma
9-1-1 to trauma center arrival less than x min (%)
Fractures patients pain free at ED arrival (%)
Other Call Types
Targeted Measures on a Rolling Basis

The National Association or State EMS Officials (NASEMSO) and the National Association of EMS Physicians (NAEMSP) presented a performance measure template to the National Highway Traffic Administration. These definitions are a good start for the region as it builds its own scorecard of process and outcome measures.[4]

CVEMSA will continue to have to measure State requirements. Adding measures is a challenge for local providers and that needs to be appreciated. Additional measures should be selected

[4]http://www.nasemso.org/Projects/PerformanceMeasures/documents/PostSubmissionFinalDraftforNHTSA-11.0.doc

because they provide information about the outcomes of processes that represent the largest segments of care or highly important sentinel care areas (e.g., cardiac arrest).

With every data measure tracked, it should be clear why the data is being tracked and what actions are expected to happen with that data. If either of those questions cannot be answered, the data may not be worth tracking.

Data Capture Technology

Provider entities in the region all have computers, some level of Internet access, and availability of office productivity software (e.g., MS Office). This enables all entities the ability to track and submit data in some format.

How data elements are captured on individual calls varies from paper-based to electronic formats. Computer-based patient care records range from a CVEMSA supported platform (i.e., EMRecord), national ePCR vendors, and a proprietary version used by American Medical Response.

Aggregate or summary data required by CVEMSA or for State reporting is either tracked on paper, on a computer using standard spreadsheets, or may be extracted from a commercial ePCR in a report. The varied tools mean that reporting is not an automated process and requires varying levels of effort for entities to provide.

There is no single capture tool used by the majority of provider entities or that could satisfy the needs of the majority of the call volume. Many EMS systems have dreamed of a single ePCR vendor model for all providers to support uniform data collection, but this is often difficult when providers are diverse, range in size and volume, and have varying levels of financial and managerial capacity to support the platform.

Data Measure Reporting

Data is measured in varied forms at the entity level. Some organizations track real-time data elements daily and others only produce reports on a monthly or quarterly base. Each quarter, provider entities are required to send data into CVEMSA where it is merged for region-wide reporting.

Every data report reviewed showed data in infrequent samples (quarterly) and displayed in table form.

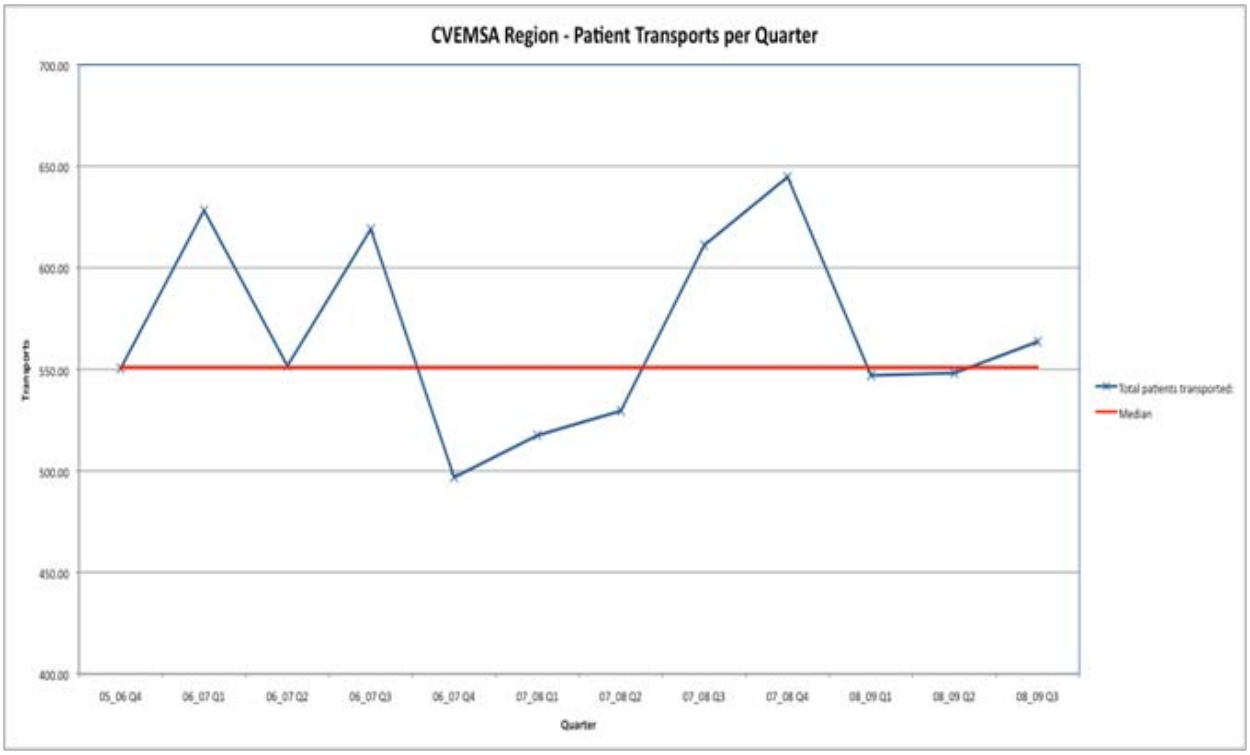
Figure 3. Data Reported in a Table Format

Quarter 1 Date Range June 1 - August 31, 2005-2006	Napa FD	Angwin	Ukiah Amb	Ukiah FD	MCDH	AVA
Total ambulance response vehicles:	0	3	3	3	3	1
Total patients transported:	0	59	770	261	371	20
Total patients not transported (AMA/RAS, treated and released dry runs):	203	29	278	40	123	5
Total patient care reports generated:	1101	75		295	494	24
Total trauma patients:	260	41	84	68	54	14
Total trauma patients meeting trauma triage criteria:		9	5		4	0
Total cardiac patients:	83	3	37	32	22	1
Total medical patients:	734	31	422	194	291	10
Total pediatric patients:	24	5	34	7	4	5
Total number of CQI cases:	270	75	5		3	0

Data was never observed, presented in more frequent samples, over time, and using run or Statistical Process Control charts (SPC). Displaying data in this format fosters rapid interpretation and can enable differentiating when variation is of a common (built into the process) or a special cause (an issue).

The following figure is a run chart created while onsite in Sonoma County reflecting patient transports over a multi-year period.

Figure 4. Data Reported in a Run Chart over Time



When CVEMSA staff members first reviewed a run chart of the existing regional transport data, they were immediately able to draw opinions of transport rates over time. In addition, they

were able to locate one quarter where data was grossly absent and another where an extra month was included in the sample. These errors would have been difficult to note in the previous tabular data.

Data elements should be captured by agency, county, and region allowing for multiple slices of the system. If the CVEMSA continues to only request data quarterly, it should request the data be broken out by month to allow for more frequent data points. Data should be reported over time and be displayed in a run or statistical process control chart to enable interpretation.

QI Methodology

Having access to data is great. Displaying it in a usable format that enables interpretation is better. Having a pragmatic approach to testing ideas, that may lead to process enhancement, leads to quality improvement.

One of the most common failures of EMS system improvement efforts is not a lack of will or ideas, but the absence of a methodology for pragmatically testing changes that can result in improvements. System stakeholders involved in improvement efforts were passionate and engaged professionals, but no process for testing ideas and continuously improving performance were noted or described.

The QIP recommends use of the Model for Improvement as a pragmatic methodology for continuous quality improvement.[5] This method is referenced in the California EMS System QI Program Model Guidelines and is also the methodology advocate and used by the Institute for Healthcare Improvement.

[5] Langley, G.J., Nolan, K.M., Nolan, T.W, Norman, C.L., & Provost, L.P. (2009). *The improvement guide: A practical approach to enhancing organizational performance* (2nd Ed.). San Francisco: Jossey-Bass.

Figure 5. Model for Improvement[6]

The model for improvement involves asking three core questions that help in understanding the aim of an improvement project, defining how you will measure that the change resulted in improvement, and then identifying what changes might result in improvement. Ideas are then tested using an applied approach (i.e., the Shewart-Deming Cycle) that first tests on a small scale and then builds knowledge through multiple cycles of tests until an improvement is complete and ready for system-wide spreading.

Stakeholders involved in local, county, and regional improvement should learn a pragmatic and actionable approach for process improvement like the model for improvement. The approach should be used as framework for every improvement project regardless of size. Using a uniform approach would also enable local and county stakeholder to work on collaboration to benchmark and learn from change efforts.

[6] Image: Institute for Healthcare Improvement. Retrieved August 24, 2009 from, http://www.ihi.org/ihi/images/img_improvementChart.gif

Survey Questionnaire Results

Fitch developed a web-based survey tool to assist in understanding current quality management activities, technology, and the needs of stakeholder for the future. This survey was developed based on the original scope of work and with input from CVEMSA staff. The results were intended to complement information gathered through on-site interviews and meetings conducted by Fitch staff.

The survey was qualitative in design. The results are summarized below due to the size of the sample of respondents and identified themes are presented. Themes from the survey results include:

Participation in QM Activities: All respondents report participating in QM activities in their organization, but individual agencies report different levels of participation or activities at the regional or CVEMSA level.

Routine Quality Assurance (QA): QA is consistently reported as involving:

- Sample or Targeted Retrospective Patient Care Record Review or Audit,
- Protocol Compliance Verification/Inspection,
- Complaint/Medical Error Investigation in all surveys.

This is consistent with activities reported during on-site meetings and reported earlier.

Quality Improvement (QI) Activities: Some of the participants in the survey report a higher level of QI activities within provider agencies that was not observed or discussed in any of the onsite meetings. For example, one respondent listed the following QI activities:

- Assessing processes or systems to create reproducible results,
- Developing procedures or checklists for consistency,
- Measuring process outcome data (e.g., elimination of pain),
- Reporting data measures over time (e.g., run chart),
- Tracking a series of measures reflecting the diversity of care you provided (e.g., cardiac, respiratory, trauma, pain, etc.),
- Conducting planned tests of process changes and measuring improvement, and
- Regular scenario based trainings.

Scenario-based training was the only activity just listed that was described by stakeholders when meeting face-to-face. The other activities are more consistent with QI and process improvement activities. One opportunity may be to learn more about the activities of these respondents and profile them as an example of QI versus QA and ask for their assistance in teaching other organizations.

All respondents selected 'Reporting data measures over time (e.g., run chart).' Based on our onsite observations and interactions, survey participants may have accurately answered this question regarding tracking data over time, but they may not necessarily be tracking the data in run charts. No charting over time was observed in any report reviewed to date.

Data Measures/Raw Data/Data Compilation-Storage-Reporting: Respondents were asked about data reporting. Commonly identified data measuring included:

- Cardiac related emergencies (sudden cardiac arrest, STEMI, chest pain), airway management, and
- Response times.

Raw data is reportedly gathered through patient care reports. The majority of respondents reports that data is compiled by hand and then stored and reported on paper. Many respondents did not indicate they do any external reporting.

Coastal Valley EMS Agency QM Processes: The survey asked open questions about what the CVEMSA QM process was doing well or could improve. Feedback focused on two themes:

1. More CVEMSA involvement with individual agencies, and
2. Feedback on data submitted to CVEMSA.

This is consistent with feedback captured in the onsite meetings.

California EMS Information System (CEMSIS) Data Dictionary: The survey asked organizations if they were compliant with the levels of data elements found in the CEMSIS data dictionary. The following is a breakdown of the responses:

Table 4. CEMSIS Data Dictionary Survey Responses

Level of Data Element Capture	Number of Organizations
Not collecting or submitting CEMSIS Data	3
Level 3	1
Level 2	1
Level 1	2

Note that not all survey respondents answered the question. It's possible those not responding are unsure of the definitions of the levels and abstained from answering. Organizations using paper-based forms approved by the State, meet minimum data elements requirements.

Mobile Computing/Information Technology (IT): Nearly two-thirds (61.5%) of respondents report currently using electronic patient care reporting (ePCR) in their agencies; two (2) organizations recently implemented ePCR. Eighty-Five percent (84.6%) indicate they have expert-level IT support either directly in-house or outsourced. Two agencies report no IT support.

Data Entry Staff Support: Only one (1) respondent indicates they do not have administrative support staff available for QM data entry.

The survey provides additional insights into the current quality practices and technology. While the sample responding was only a segment of all providers, it does add to the information gathered onsite and helps build knowledge of existing practices, opportunities, and needs of the system.

Summary of Findings

To this point, this report has been describing consultant findings from direct observation, onsite meetings with stakeholders, and the web-based survey. Recommendations have been infused within the reporting of the findings and will be pulled out in a summary at the end of the document. The next section will summarize the core recommendations.

Recommendation Areas

The following is a thematic summary of core recommendations resulting from the evaluation. A bulleted list of recommendations follows this section.

Define Quality Concepts and Practices

The most members of the EMS system are knowingly and unknowingly involved in quality management activities. The majority of activities are retrospective, quality assurance based and do not involve process improvement that enhances future performance.

CVEMSA should clearly define the difference between quality improvement and quality assurance and indicate what activities fall in each concept. Individual entities, county groups, and the region should work to transition toward the majority of activities focused on process improvement versus assurance.

Train Key Stakeholders

"Quality Improvement (QI)" training is regularly offered at local workshops and state and national conferences and publications routinely publish articles about it. Unfortunately, almost all of it is Quality Assurance (QA) based and not aimed at process improvement or Quality Improvement (QI). Frequently, one must look to healthcare or other industries for quality training or rely on EMS consultant trainers to provide focused training.

CVEMSA should support coordinating local or virtual training opportunities that help clarify quality/process improvement concepts. The training should provide didactic and applied learning in using a pragmatic improvement method (e.g., Model for Improvement). Ideally, the training should bring diverse local entities together to collaboratively learn and benchmark with each other. Regular, refresher training and further professional development that builds on the base training should also be included.

There are three training options currently available online.

> Institute for Healthcare Improvement Open School for Health Professions offers online courses in the science of improvement and patient safety. The courses are free, are developed by expert faculty, and new content is being added regularly. http://www.ihi.org/IHI/Programs/IHIOpenSchool/

Profound Knowledge Products, Inc (PKP, Inc) is a sister company to the Associates in Process Improvement who developed the Model for Improvement and the methodologies used by the Institute for Healthcare Improvement. PKP, Inc offers several online courses for a fee in process improvement. http://www.pkplearn.com/

Integral Process Solutions (IPS) offers an online executive process improvement program and on demand lectures in using statistical process control in emergency services for a fee. IPS also offers onsite Six Sigma training with an EMS focus. http://www.onlineips.com/publicsafety/classes/spcseries_aug09.html

The IHI Open School is an ideal source to start because it is modeled after best practices in healthcare and is free to users. It covers all of the concepts discussed in the QIP and this report.

In addition to training, three books that build on the knowledge of improvement include:

Langley, G.J., Nolan, K.M., Nolan, T.W, Norman, C.L., & Provost, L.P. (2009). *The improvement guide: A practical approach to enhancing organizational performance* (2nd Ed.). San Francisco: Jossey-Bass.

Balestracci, Davis (2009). *Data Sanity: A quantum leap to unprecedented results*. Englewood, CO: Medical Group Management Association.

Swor, R.A. & Pirrallo, R.G. (2005), *Improving Quality in EMS* (2nd ed.). Dubuque, IA: Kendall/Hunt Publishing Company.

Identify Core Measures

CVEMSA will continue to capture and track the data required by the State of California. Much of this data is assurance or inventory data and has no use or value for process improvement.

Additional process measures should be added that provide guidance on large patient demand areas and tied to key outcomes. Total time from 9-1-1 call to intervention in STEMI is an example of a solid process measure currently being tracked by CVEMSA. Measures should only be added if they provide insight into large patient populations and if there is intent to pursue process improvement. Other less common measures may be periodically tracked on a rolling or revolving basis.

Data Display

All of the data observed was presented in small snapshots and in tabular, spread sheet format. This makes data interpretation near impossible, especially to untrained personnel. Several key recommendations should be adopted today:

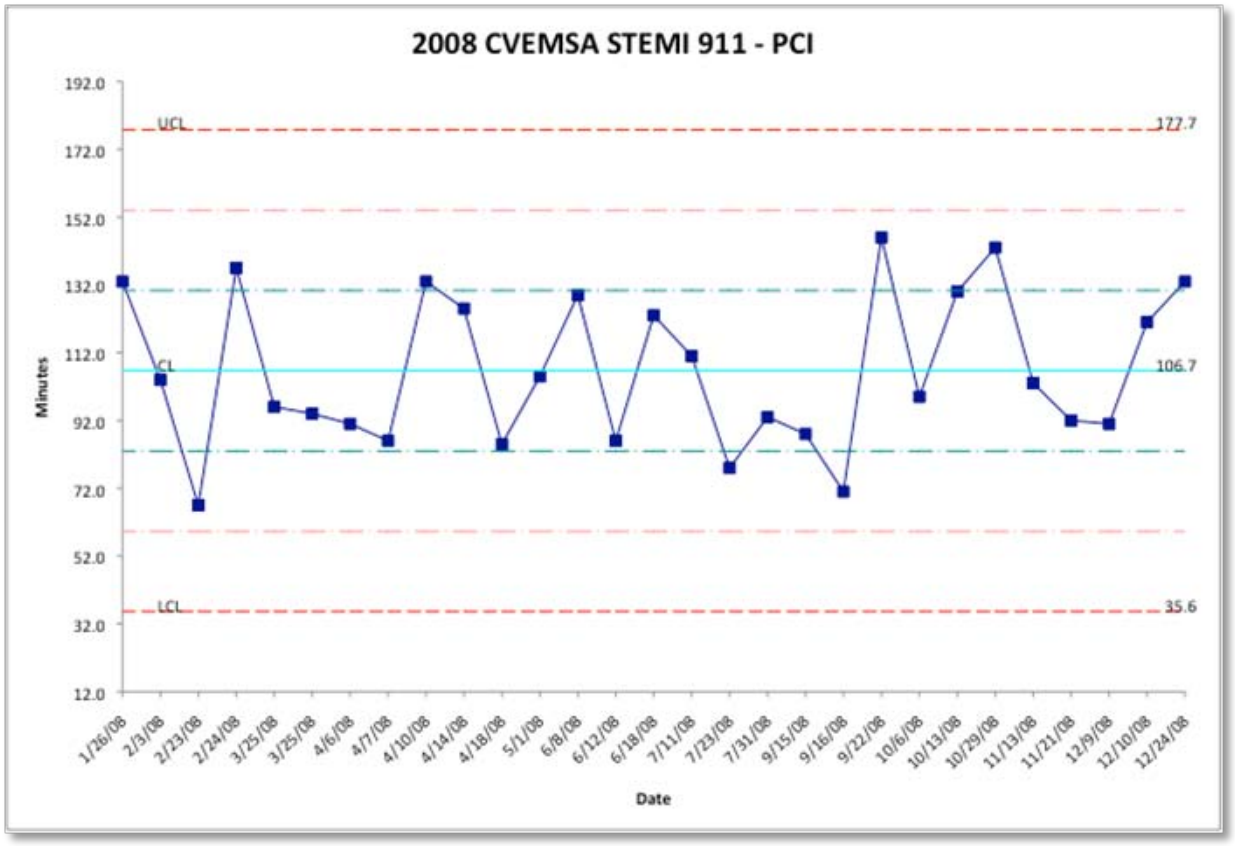
- Capture data in monthly samples (versus quarterly).
- Display data over time across months, quarters, and years.
- Display data using run charts or statistical process control charts.

CVEMSA should invest in software that enables quality charting. The most widely used platform in health care for SPC charting is *CHARTrunner*.[7] The software is costly (>$1,000) and has an annual maintenance fee. A more economical solution is a simple Excel Macro Add-On called *QI Macros* ($139).[8] It offers all of the charting needs CVEMSA requires at a great price. *QI Macros* offers bulk discounts and CVEMSA may be able to negotiate multiple copies for interested organizations at a significantly reduced rate.

The following is an example of a SPC chart created in *QI Macros* using CVEMSA data for 9-1-1 to PCI in STEMI patients.

[7] http://www.pqsystems.com/products/SPC/CHARTrunner/CHARTrunner.php
[8] http://www.qimacros.com/

Figure 6. Example of SPC chart created in *QI MACROS*



Collaborative Improvement

CVEMSA has a unique opportunity because it includes three distinct counties with multiple first response and transport providers of diverse sizes and types. There are local entities, county committees, and regional groups that all have different levels of opportunity for improvement collaboratives. This is fertile ground for leading improvement collaboratives, as discussed earlier, by partnering various groups to work in tandem on process improvement projects. CVEMSA should survey interest, solicit early volunteers, and enable improvement collaboratives amongst system members and beyond.

Electronic Patient Care Capture

Electronic patient care records enable the greatest ability to capture and use data. Many of the entities in the region use either the software service supported by the county (i.e., EMRecord) or other platforms. Findings a platform that works for everyone is likely not possible considering the diversity of services and forcing a universal platform is not recommended.

Providers using the CVEMSA supported system did express they were open to alternative platforms and may be willing to pay for its use, especially if it enhanced reporting.

Historically, one of the largest obstacles for ePCR platforms was the need for onsite server management and IT support. That has since changed and many Software as a Service (SaaS) options are emerging that allow software use and access over a network or web connection (ASP-Active Server Pages). This allows organizations to opt for various data capture devices and to have varying call volumes at a reasonable cost ($1-2/call).

CVEMSA should evaluate the potential of a Software as a Service patient care record vendor that could allow accessibility to providers wishing to pay to participate that enabled current data element capture at a cost effective rate and with little disruption to current practices. CVEMSA should develop a request for information and qualifications describing the needs of the system and its providers and discover available options and costs that exist among ePCR vendors.

Low Tech Data Measure Submission

Each quarter, provider entities submit their organization's data elements via email to a coordinator at CVEMSA who must then merge the data in a report. This is inefficient and time consuming and can result in errors. There are two low-tech and low cost solutions to this process, which may be useful to CVEMSA staff and member entities.

Option 1 – Google Docs is a free productivity suite available online. The spreadsheet program has the ability to create web data entry forms, which auto-populate the imputed data into the spreadsheet.[9] Once the form is completed, a URL (web address) can be emailed to organizations that can simply input their data from any Internet enabled web browser.

Option 2 – Web-based survey tools are varied and cost conscious. For little or no investment, CVEMSA can create basic survey forms and deploy them via email to stakeholder organizations. Data is entered online and automatically populates the database enabling easy reporting. There are a number of platforms to choose from offering varied functionality. One of the most widely used services by EMS agencies is SurveyMonkey.com. Fitch staff has a lot of experience using the service as well and it has been very reliable and easy to use.

[9] http://docs.google.com/support/bin/answer.py?hl=en&answer=151187

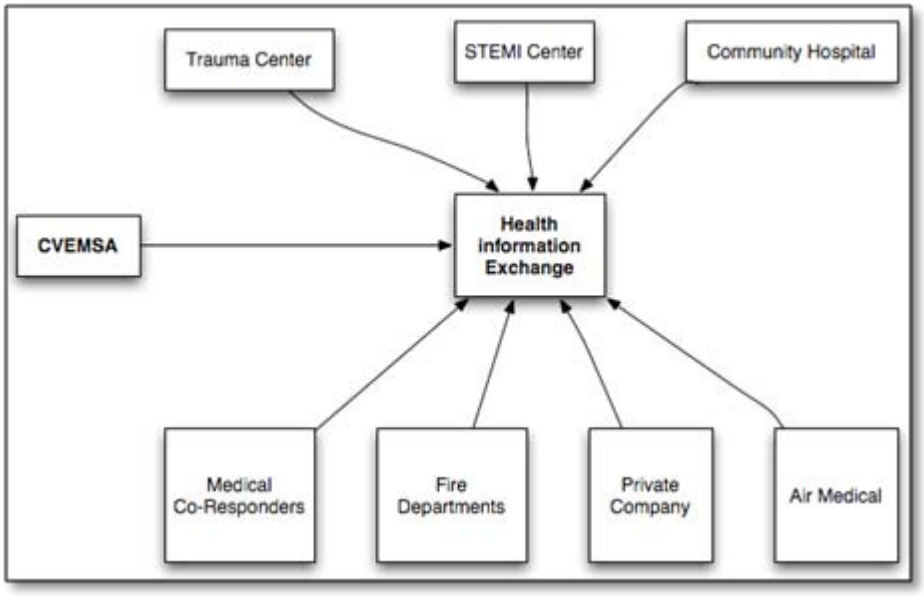
CVEMSA should consider a low-tech solution for collecting data elements monthly from provider entities. A simple web form or survey tool can efficiently capture and collate data from all providers with Internet access. Those unable to complete online data entry can also forward the data in hard copy and CVEMSA administrative staff can enter the data as well. These platforms can also be used to periodically solicit input and survey system stakeholders when necessary.

Health Information Exchange

CVEMSA staff, like many EMS professionals, wishes for a solution that would capture all of the call data and enable querying any question, at any time, with current data. This can be referred to as the "Google model" of search. The closest option to such a system would require all providers to use a single ePCR platform, which is not feasible.

Another option emerging in health care IT is the Health Information Exchange (HIE) model. HIE provide the possibility to electronically move clinical data among disparate information systems while maintaining the meaning of the information being exchanged. It does require the entities to all have electronic data. The HIE takes the data from these different sources and links them together for use.

Figure 7. Health Information Exchange (HIE)



When entities connect to an HIE, there is the ability to merge data and develop universal reporting. When systems are on the same ePCR, there is also the potential of two-way data

exchange. This allows PreHospital entities to connect their data within hospital data, which enables looking at single medical records and outcomes to analyzing system-wide information.

With the increase in electronic data and diverse healthcare networks, it's expected that HIEs will become a more common process. Currently, it can be expensive and even more so when providers are on multiple software platforms. It is possible to currently achieve an HIE model with pre-hospital data and several EMS systems are actively developing HIEs in their communities.

This process is emerging and only a few communities have moved in this direction to date. It is available to CVEMSA, if interested in pursuing, and it will become a standard in the future. HIEs are mentioned here because it does address the data needs that are outlined in the Scope of Work, but because it is such a new process and not widely in place yet, it is presented for information only and opting to pursue an HIE would be at the discretion of CVEMSA and its stakeholders.

Annual Evaluation

EMS systems regularly implement management activities and collect data elements and then set them to autopilot. Many of the measures tracked have historical reasons, but no one ever stops to reassess the activities and measures in place to see if adjustments should be made or if things should be discontinued.

CVEMSA should establish a stakeholder group to annually survey stakeholder entities about the quality management activities and measures in use. Feedback should be used to aid in decisions to continue, alter, or discontinue current activities and to add new ones. The results of the annual evaluation should be shared with provider entities and guide the next year's efforts.

In Summary

The Coastal Valley EMS Agency includes three diverse counties and an array of dedicated provider entities and hospitals. All have the positive intent to serve their communities and take care of patients in the pre-hospital and in-hospital environment and provide the best care possible.

Fitch & Associates was engaged to assist in the development of a quality improvement plan that met state requirements and best practices, was pragmatic, and served the region by offering guidance on how to develop a comprehensive quality management plan and process that

improved care. The QIP is complete and ready for community involvement and implementation.

Upon reviewing the EMS QM system, Fitch validated that there are many dedicated professionals working to the best of their knowledge and ability to take care of patients and that current quality management activities are similar to the quality assurance processes found in many EMS systems.

This report, in concert with the QIP, recommend and provide direction for the EMS system to transition to an improvement focus, using pragmatic and proven methods, to fundamentally change systems and process to improve future performance and use the right data to guide change and see results.

CVEMSA and the many entities that partner to make the EMS system work have a unique opportunity to collaborate with each other to test changes that lead to improvement, work in tandem, and learn from each other so that all benefit.

CVEMSA has the ability and the opportunity to leap past the norm of EMS quality improvement and embrace the best practices we see today in health care. It's attainable if the system has the will.

Summary List of Specific Recommendations

1. CVEMSA and its stakeholders should use plain English definitions of Quality Improvement (QI) and Quality Assurance (QA) and clarify what activities fall into each focus and then realign efforts toward a greater improvement focus. The CVEMSA QIP provides a clear breakdown of activities for both foci.
2. CVEMSA should work with stakeholder to build connection between local, county, and regional activities and to employ a uniform method for action.
3. CVEMSA should work with stakeholder entities to create a uniform, but locally managed approach to individual case review that models after the QIP plan.
4. CVEMSA should have a methodology for choosing where to invest the limited time and energy available to conduct targeted reviews. Focus efforts on topics that represent the largest segments of patients or very specific subsets where efforts can have a direct impact on outcomes (e.g., sudden cardiac arrest) is preferred.
5. Assess the breakdown of existing call types in the region using Medical Priority Dispatch System (MPDS) codes or a summary of crew impression (e.g., “diagnoses) to identify the big segments of call types within the system (e.g., cardiac, trauma, respiratory).
6. Develop a call type driven data measure scorecard.
7. Start with a performance measure template developed by The National Association or State EMS Officials (NASEMSO) and the National Association of EMS Physicians (NAEMSP) presented to the National Highway Traffic Administration.
8. In addition to required State measures, additional measures should only be selected because they provide information about the outcomes of processes that represent the largest segments of care or highly important sentinel care areas (e.g., cardiac arrest).
9. With every data measure tracked, it should be clear why the data is being tracked and what actions are expected to happen with that data. If either of those questions cannot be answered, the data may not be worth tracking.
10. Data elements should be captured by agency, county, and region allowing for multiple slices of the system.
11. If the CVEMSA continues to only request data quarterly, it should request the data be broken out by month to allow for more frequent data points.
12. Data should be reported over time and be displayed in a run or statistical process control chart to enable interpretation.
13. CVEMSA should use a method like the Model for Improvement as a pragmatic approach for continuous quality improvement.

14. Improvement efforts should start by asking three (3) questions: 1) What are we trying to accomplish (aim)? 2) How will we know a change is an improvement(measure)?; What changes can we make that will result in improvement (ideas)?
15. Ideas should be tested using an applied approach (i.e., the Shewart-Deming Cycle) that first tests on a small scale and then builds knowledge through multiple cycles of tests until an improvement is complete and ready for system-wide spreading.
16. Stakeholders involved in local, county, and regional improvement should learn a pragmatic and actionable approach for process improvement like the Model for Improvement. The approach should be used as framework for every improvement project regardless of size.
17. CVEMSA should leverage the opportunity to learn more about the activities of the survey respondents who report using process improvement activities and profile them as an example of QI versus QA. Ask for their assistance in teaching other organizations.
18. CVEMSA should support coordinating local or virtual training opportunities that help clarify quality/process improvement concepts. The IHI Open School is an ideal source to start because it is modeled after best practices in healthcare and is free to users.
19. Additional process measures should be added that provide guidance on large patient demand areas and tied to key outcomes (e.g., 9-1-1 call to intervention in STEMI). Measures should only be added if they provide insight into large patient populations and if there is intent to pursue process improvement.
20. Capture data in monthly samples (versus quarterly).
21. Display data over time across months, quarters, and years.
22. Display data using run charts or statistical process control charts.
23. CVEMSA should invest in software that enables quality charting.
24. CVEMSA should survey interest, solicit early volunteers, and enable improvement collaboratives amongst system members and beyond.
25. Findings an ePCR platform that works for everyone is likely not possible considering the diversity of services and forcing a universal platform is not recommended.
26. CVEMSA should evaluate the potential of a “Software as a Service” (SaaS) patient care record vendor that could allow accessibility to providers wishing to pay to participate that enables current data element capture at a cost effective rate and with little disruption to current practices.
27. CVEMSA should develop a request for information and qualifications describing the needs of the system and its providers and discover available options and costs that exist among ePCR vendors.
28. CVEMSA should consider a low-tech solution for collecting data elements monthly from provider entities. A simple web form or survey tool can efficiently capture and collate data from all providers with Internet access.

29. CVEMSA may explore the health information exchange (HIE) option for merging data. HIE is still very new and emerging in healthcare IT.
30. CVEMSA should establish a stakeholder group to annually survey stakeholder entities about the quality management activities and measures in use. Feedback should be used to aid in decisions to continue, alter, or discontinue current activities and to add new ones. The results of the annual evaluation should be shared with provider entities and guide the next year's efforts.