



California  
ED Diversion Project  
Final Report  
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by  
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## EXECUTIVE SUMMARY

The California Emergency Department (ED) Diversion Project was conducted by The Abaris Group and supported by the California HealthCare Foundation (CHCF), based in Oakland, California, with a goal to measure and publicly report the extent of ambulance diversion by local emergency medical service agency (LEMSA) regions and their hospitals, identify best practices to minimize diversion, and help to implement best practices in communities less successful in resolving their EMS diversion problems.

Ambulance diversion is clearly a statewide and national problem with many communities struggling with the challenges caused by hospitals diverting ambulances. A 2003 study found an estimated 501,000 ambulances in the United States (US) were re-routed as a result of ambulance diversion, or approximately one ambulance diverted each minute of the day.<sup>1</sup> In addition, approximately 45 percent of all United States (US) EDs reported that they were on diversion at some point during that year.<sup>2</sup>

Ambulance diversion was once thought to be a “novel” solution for the problem of ED overcrowding.<sup>3</sup> However, it is now understood that diversion is not an effective means for alleviating crowding, because when one hospital is over crowded, others in the area are likely to be crowded as well. Additionally, ambulance diversion has been found to be unsafe for patients, resulting in increased transport times, discontinuity of patient care, delays in reperfusion therapy in patients with acute myocardial infarction, and mortality in severe trauma patients. More than a dozen articles and studies have been published on this topic providing evidence of negative patient outcomes associated with ambulance diversion. (For further citations, see the endnotes section of this report).

Ambulance diversion is also a major concern in California. In the initial report for this study it was found that statewide, hospital EDs were closed to ambulances 9.6 percent of the time

during 2005 and down to 5.5 percent in 2007. While improved in 2007, the problem is still evident. Of the 31 LEMSA regions in California, five LEMSAs still had the most diversion hours in 2007 as in 2005, operating on divert status for 2007 at 11 percent of the time. This potentially equates to one out of every ten ambulance patients being transported to an alternate hospital. EMS diversion impacts patient care resources and drives potential continuity issues as the patient’s physician may not have hospital privileges at the alternate receiving facility and that hospital is unlikely to have the patient’s medical records.

Diversion at one ED may also artificially create diversion at neighboring EDs. This was the case in a recent study in which researchers found that the closure of a hospital or ED increases diversion for surrounding hospitals<sup>4</sup>. Additional ambulance unit hours and other EMS costs are also experienced due to longer transport times. Further, EMS diversion increases the overall cost of healthcare when patients cannot be transported to hospitals within their health plans or where their physician practices.

The California ED Diversion Project started in September 2006 and concluded in August 2008. It had four major phases:

### *Phase One: Initial Research and Reporting*

The focus of this phase was to collect, analyze, and publish data from all 31 LEMSAs to describe the nature and extent of ambulance diversion activity in each EMS region.

### *Phase Two: Identification of Needs and Best Practices and Policies*

During this phase, the focus was to select regions to evaluate diversion and to inventory best practice solutions.

### *Phase Three: Implementation of Best Practices via Collaborative*

In Phase Three, four EMS regions and hospitals within those regions were selected to participate in a one-year collaborative phase. The collaborative was designed to test if diversion could be substantially reduced in

these communities through the work of the collaborative which included setting and monitoring key performance indicators (KPIs) and mentoring by outside expert faculty. Faculty members were persons with significant experience (greater than five years) working with hospitals and communities on capacity-building strategies and best practices.

#### *Phase Four: End of Project Reporting*

The focus during the final phase was to collect, analyze, and publish updated data from the collaborative participants and again from all 31 LEMSAs to describe the current status of the nature and extent of ambulance diversion activity and, if feasible, establish a mechanism for continuing routine reporting.

The hypothesis for this project was that ED diversion is a function of sub-optimized operational policies and processes in the pre-hospital and hospital environments and by creating a collaborative and implementing best-practice management processes in these environments, would result in significantly reduce diversion hours.

#### Findings

The conclusion of the collaborative phase found that indeed diversion hours can be reduced with improved operational processes when a region works together collaboratively. The overall reduction of diversion hours for the project participants was 39.8 percent during the project time period, (September 2007 to June 2008) demonstrating the project's success when compared to a statewide decline of only 15.3 between calendar years 2006 and 2007.

Further, the collaborative approach was thought to be beneficial from the participant's point of view because it encouraged the sharing of experiences and solutions among hospitals and the participating EMS agencies. It also helped hospitals more clearly understand that their diversion actions directly impact the other hospitals in their region.

None of the counties involved completely eliminated diversion during this project but two counties (San Bernardino and Ventura) plan on adopting a “no-divert” policy in early 2009. To move in the direction of a “no-divert” policy statewide will take a joint effort among the LEMSAs and all of the hospitals in each county, not only those that participated in this project.

Another benefit from this project was that many hospitals saw improvements in their overall patient flow both in the ED and on their inpatient units which improved their physical capacity and is likely why so many hospitals experienced diversion reductions.

Hospitals and their LEMSAs benefited during the collaborative from working together to respond to a growing national problem. This reinforced that ambulance diversion is a systemic problem and cannot be solved alone by any single hospital or LEMSA.

#### Overall Results

With improved hospital and LEMSA operations ED diversion can be reduced. A notable result from this project identified in the body of this report is that diversion actually affected only a small number of EMS-transported patients.

The question then arises, is diversion actually benefiting the hospitals to provide safe patient care or is diversion no longer effective in over crowding situations. The results from the collaborative suggests that diversion causes inefficiencies for the nation's limited healthcare resources and can lead to conflict between the LEMSAs, the EMS providers and hospitals in the participating regions. By working together, diversion can be substantially reduced and thus this collaborative model could be a helpful model for further improvements of hospital and ED diversion throughout the state and the nation.

## INTRODUCTION

### Ambulance Diversion – An Overview

Ambulance diversion is clearly a statewide and national problem with many communities struggling with the challenges caused by hospitals diverting ambulances. A 2003 study found that an estimated 501,000 ambulances in the US were re-routed as a result of ambulance diversion, or approximately one ambulance diverted each minute<sup>5</sup>. Approximately 45 percent of all United States emergency departments (EDs) reported that they were on diversion at some point during that year<sup>6</sup>.

Ambulance diversion was once thought to be a “novel” solution for the problem of ED crowding<sup>7</sup>. However, it is now understood that diversion is not an effective means for alleviating over crowding, because when one hospital is over crowded, others in the area are likely to be crowded as well. Additionally, ambulance diversion has been found to be unsafe for patients, resulting in increased transport times, interfering with the patient’s continuity of care, causing delays in reperfusion therapy in patients with acute myocardial infarction, and increasing mortality in severe trauma patients. More than one dozen articles and studies have been published on this topic providing evidence of negative patient care associated with ambulance diversion.<sup>8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21</sup>

The California ED Diversion Project initially reported on the status of ambulance diversion throughout the state of California by county and was published in March 2007. At the time of the initial study, Los Angeles, Ventura, Inland Counties, San Diego<sup>22</sup>, San Francisco, and San Mateo EMS Agency (LEMSAs) regions had the highest number of diversion hours per hospital ED treatment station, using the number of licensed ED treatment spaces as a surrogate of ED capacity for comparing between regions in the state.

As reported initially, nine of the 31 LEMSAs in California had approached the issue of ambulance diversion by removing the ability for hospitals to divert patients altogether (i.e., implementing a “no-divert” policy). While this did solve the diversion problem for that region, there was a risk that this policy would shift the burden elsewhere such as lengthening ambulance patient offload times. This proved not to be the case during the initial study period as only two regions reported only nominal increases in off-load times and the other seven reporting no impact on off load times. Since that time, three other regions have gone to a no-divert policy without shifting the burden to the EMS providers.

Other EMS regions in California have been successful in reducing diversion hours through a series of best practices. Alameda, Riverside Sacramento, and Santa Clara Counties have implemented effective diversion strategies as witnessed by their reduction in diversion hours outside this study. Their solutions do not completely eliminate diversion but provide very stringent standards for when hospitals can divert patients and for how long they may remain on diversion lowering diversion in some of these communities to only a few hours per hospital each year. In addition, some of the hospitals within these LEMSA have developed improved ED and inpatient flow strategies that have dramatically improved their ability to handle overall ED visits and ambulance patients. These and other nationally-accepted best practices and others learned during this project may be applicable to the remaining California LEMSAs and their hospitals that are experiencing high ambulance diversion rates. These best practices are published and are publicly available as part of this project’s website.

## PROJECT METHODOLOGY

### Study Hypothesis

The hypothesis for this project was that ED diversion is a function of sub-optimized operational policies and processes in the pre-hospital and hospital environments and that

by creating a collaborative process and implementing best-practices in these environments, ambulance diversion hours will dramatically fall.

*Phase One: Initial Research and Reporting*

The focus of this phase was to collect, analyze, and publish data from all 31 LEMSAs to describe the nature and extent of ambulance diversion activity in each EMS region.

*Phase Two: Identification of Needs and Best Practices and Policies*

This phase focused on selecting regions with a variety of ambulance diversion issues. Three regions were identified that were experiencing significant ED saturation and ambulance diversion, three regions that were not experiencing significant diversion and three regions that were experiencing some diversion but the number of hours was declining. These nine regions studied in depth and also were used as the framework to identify the final regions and hospitals to be involved in the next phase. During the first year of the project, an inventory ranking EMS and hospital practices along with mitigation efforts in the nine regions was created. This information was used to develop relevant tools and identify customizable best practices and policies for use in resolving the various levels of diversion. Final collaborative participants were chosen by a matrix scoring system in the following areas:

- Level of interest of participating in the collaborative phase of the project at both the LEMSA and hospital level
- Past successes in decreasing diversion hours
- Level of commitment from the LEMSA and hospital
- Oversight and accountability within the county
- Potential for success in a collaborative model by LEMSA and hospitals

The matrix was reviewed by a project advisory group (see the project advisory group listing at the end of this report) and the final Phase Three collaborative participant selection was approved in June 2007.

*Phase Three: Implementation of Best Practices Through a Collaborative*

In phase three, four EMS regions and hospitals within those regions were selected to participate in the collaborative phase. The four regions were notified and each LEMSA and hospital participant signed a letter of agreement to participate in the project

The four EMS regions and hospitals selected for the project were Los Angeles County (St. Francis Medical Center, Presbyterian Intercommunity Hospital, and Methodist Hospital, Arcadia), San Bernardino County (Arrowhead Regional Medical Center, Loma Linda University Medical Center, and St. Mary Medical Center), Santa Clara County (Regional Medical Center of San Jose), and Ventura County (Community Memorial Hospital, Simi Valley Hospital, St. John's Regional Medical Center, and Ventura County Medical Center).

During this collaborative phase, assistance was provided by project faculty and expert speakers to the LEMSAs and hospitals in developing and sustaining change processes through the implementation of best practices to significantly improved hospital ED capacity and thus mitigate ambulance diversion. Faculty members were persons chosen with significant experience (greater than five years) working with hospitals on capacity-building strategies and best practices.

*Phase Four: End of Project Reporting*

The focus during the final phase was to collect, analyze, and publish updated data from the collaborative participants and all 31 LEMSAs to describe the current status of the nature and extent of ambulance diversion activity and, if feasible, establish a mechanism for continuing routine reporting.

Study Process

The results throughout this project were based on gathering data, holding interviews with the appropriate stakeholders, reviewing policies, procedures and practices, and conducting site visits by the project's faculty members.

During Phase One and Four, data was collected for all 31 LEMSAs. These agencies were contacted to determine the status of ambulance diversion for its region for the preceding four years (2003 to 2006) and the first portion of the collaboration phase (2007). To determine EMS and diversion trends, LEMSAs provided EMS transports and hours of diversion.

Hospital demographic information and regional population data were collected from the California Office of Statewide Health Planning and Development (OSHPD) and the California Department of Finance respectively.

An analysis of the Phase One data was conducted during Phase Two and then again in Phase Four to determine the level and trend of ambulance diversion throughout California.

During Phase Three, the collaborative phase, each hospital and LEMSA was required to submit a data collection plan for key performance indicators (KPI). The KPI's data were submitted either bi-monthly or monthly depending on the KPI (See the appendix for details on the KPIs used for this project). Each participant was also required to submit a written monthly progress report to the project website.

In addition, the participants were requested to participate in monthly coaching calls with The Abaris Group's faculty members, quarterly on-site visits with the faculty member, periodic didactic educational calls with national experts, and three full-day educational and participant best practice sharing summits.

#### Statewide Data Study

There are 31 LEMSAs spanning the 58 counties in California. Some agencies, particularly in rural areas, represent more than one county. During Phase I, each LEMSA was contacted to determine the state of ambulance diversion for its region. Copies of the LEMSA diversion policies were also collected and studied. To determine EMS and diversion trends, LEMSAs provided during Phase One and Four at least

five years of EMS transports and hours of diversion (2003 through 2007). If data, such as the number of 9-1-1 transports were unavailable, estimates were made using generally accepted utilization ratios based on the region's population (see appendix for detailed statewide diversion results for the years 2003 to 2007). In addition to data collected, each LEMSA was asked about their diversion issues, needs, and progress made if diversion was a problem for their region.

By studying the data collected either from the LEMSAs or through other public sources, the project noted that California's population grew by 5.1 percent from 2003 to 2007, increasing from 35.9 million to 37.8 million (Source: California Department of Finance). According to data provided by each LEMSA, there were 1,637,411 EMS transports in 2003 compared with 1,876,212 in 2007, (an increase of 14.6 percent). In that same period, ED visits increased 6.4 percent from 9,780,948 to 10,204,309. (Source: Office of Statewide Health Planning and Development).

Despite the rise in visits to the ED, the total diversion hours have continued to decrease. In 2003, California hospitals were on diversion for a total of 302,169 hours. By 2007, hospitals were on diversion for 165,180 hours, a 45.3 percent decrease from 2003. The most substantial decrease occurred from 2005 to 2006, when diversion was reduced by 30.5 percent, followed by a 15.3 percent decrease from 2006 to 2007. Most of the decrease in hours for that year occurred in Los Angeles County after a change in their diversion policy (the new policy limited the number of hours a hospital could go on diversion at any given time).

Although the diversion problem does appear to be improving statewide and in some specific regions, there are some regions that have experienced significant increases in their diversion levels. There were two EMS regions with zero hours of ambulance diversion in 2003 that began experiencing diversion in 2007. An additional eight regions saw an

increase in diversion hours during the 2003 to 2007 time period.

One LEMSA region experienced an increase from 56 diversion hours in 2003 to 376 hours (for four hospitals) in 2007. While the annual diversion hours for this region are still relatively low, it is a concern that that region that the rate has increased so drastically.

Twelve EMS regions reduced their ambulance diversion from 2003 to 2007, (not including the “no-divert” regions). Each of these regions realized a reduction of anywhere from four to 75 percent.

In the five-year period from 2003 to 2007, diversion hours decreased by 45.3 percent despite corresponding increases in ED volume and EMS transports, (6.4 and 14.6 percent, respectively). The majority of the non-rural regional reductions were seen by Inland, Los Angeles, and Riverside LEMSAs, though others had significant decreases as well.

Statewide Trends, 2003-2007			
	2003	2007	Percent Change
Population	35,944,213	37,771,431	5.1%
ED Volume	9,780,948	10,402,309	6.4%
EMS Transports <sup>1</sup>	1,637,411	1,876,212	14.6%
Diversion Hours <sup>2</sup>	302,169	165,180	-45.3%

<sup>1</sup>Unavailable data was estimated based on average growth rate

<sup>2</sup>When data was not provided by EMSA, OSHPD was used

Source: California Department of Finance, OSHPD, EMSAs

For a complete list of diversion by region and other comparison metrics, please see the end of this report.

### Research Leading to Participant Selection

During Phase II, nine LEMSA regions participated in site visits in April 2007. The sites visited included: Contra Costa, Los Angeles, San Bernardino, San Diego, San Joaquin, Sacramento, Santa Clara, Santa Cruz, and Ventura Counties. Within those regions, each LEMSA and a sample of hospitals (a total of 23 hospitals) participated in the site visit (one hospital visit was conducted by phone). The regions were picked as representative of having low diversion hours

(three regions), high diversion hours and climbing (three regions) and high but declining diversion hours (three regions). The hospitals site visited were nominated by each local LEMSA.

The purpose of the site visit was to determine the current level of the ambulance diversion problem in that community, the hospital’s engagement on mitigating diversion hours, and the level and status of each LEMSA’s management of the problem to the extent there was a problem. One county (Contra Costa) had recently converted to a “no-divert” policy so the site visit team focused on the steps that were taken by the LEMSA to get to the no-diversion policy and to determining if the no-diversion policy was working.

Another purpose for the site visit for those communities still experiencing high diversion levels was to inquire about the level of interest of participating in the Phase Three collaborative phase of the project at both the LEMSA and hospital levels.

In addition, the site visit faculty members inventoried each individual hospital’s experience with best practice interventions that were implemented regarding capacity and to the extent each hospital had embraced these best practices to mitigate bottlenecks and improve flow.

During the site visits, it was discovered that each community had different levels of ambulance diversion problems and were also responding to their local problems differently. This included one region which had some of the highest hours of diversion but had essentially not taken any steps to mitigate the problem. One LEMSA expressed ambivalence about participating at the next phase of the project even though the hospitals that participated in the site visits were quite enthusiastic about participating.

During the site visits, significant variation was found between hospitals regarding the level and sophistication of interventions being used to attempt to resolve overcrowding and

subsequent diversion. Many had attempted what is referred to by the faculty as first tier strategies and only few had considered or implemented more sophisticated second tier strategies (e.g. medical staff initiatives, clinical decision units, etc). This included variation on whether the hospital saw the problem as an ED problem (all were working to some degree on ED issues) or a hospital-wide problem (few hospitals were working on hospital-wide issues). Of the 23 hospitals site visited, only two hospitals engaged in interventions on flow at the inpatient level at the time of the first site visit.

To determine the potential for each region to be successful during the next collaborative phase of the project, a matrix (see the full report Appendix) was developed for the nine LEMSA regions with a scoring tool using measures on whether the region and its hospitals were likely to succeed in the collaborative phase. This tool was used to determine which of the nine regions would move on to the third collaborative phase.

Participants were chosen by a matrix that scored regions on the following areas:

- Level of interest in participating in the third collaborative phase of the project for both the EMS agency and hospitals
- Past successes in decreasing diversion hours
- Potential level of commitment from the LEMSA and hospitals on diversion in general
- Oversight and accountability of the diversion issue within the region
- Potential for success in a collaborative model by the LEMSA and their hospitals

This matrix was discussed with the project's advisory group in June 2007 and the selection of the final four regions was based on points (Santa Clara, Santa Cruz, Los Angeles and San Bernardino scored the highest).

A concern arose by the project advisory group regarding one region (Santa Cruz County) that scored high on the list to likely to succeed, but

had very low diversion hours (680 hours per year countywide between three hospitals) and thus might not have the greatest benefit from the project's resources. At the same time, the highest diversion hour per hospital county (Ventura) did not score high enough to participate using the scoring methodology, but was felt by the advisory group that this county would likely benefit greatly from the use of project resources. Thus, with the project advisory group's input, a decision was made on the final list of participants for the final phase: Los Angeles, Santa Clara, San Bernardino and Ventura Counties.

Each proposed LEMSA participant was then contacted to nominate their final hospital participants. The selected LEMSAs and hospitals each signed a letter of agreement with commitments to provide resources and participate with the collaborative phase.

#### The Collaborative Phase

Upon agreement to participate in the collaborative phase, each participant was asked to assign a project sponsor and for the hospitals, two champions, one for the ED and one for the inpatient areas. The project sponsor was an executive within the hospital or LEMSA that oversaw the project and had the ability to add resources to the project and remove organizational barriers. The sponsor was also responsible for keeping the rest of the organization informed on the project's progress. The champions were defined as the "go-to" persons, having the ability to motivate teams, to accomplish process improvement and have the authority to implement change.

All LEMSAs and hospitals were required to submit a data collection plan for the key performance indicators, or KPIs (see the full report's Appendix). Data were submitted either bi-monthly or monthly depending on the KPI. Initially the data were to be submitted bi-weekly (for those KPIs) but for most hospitals that turned out to be too burdensome so the requirement was changed to twice a month. Each participant was provided spreadsheet workbooks to be completed and uploaded to

the project extranet (a password-protected website that was only accessible by participants and faculty). Each participant was also required to submit a written monthly progress report online.

Additionally, the participants were requested to participate in monthly coaching calls. During quarterly site visits, participants received on-site consultation by their assigned faculty member. Group didactic calls were provided to the participants with nationally renowned speakers discussing a wide variety of leading-edge, best or promising practice patient flow and capacity-building strategies to assist the participants in developing their own best practices that would improve patient throughput and decrease ambulance diversion. The topics and speakers were chosen to provide progressive information and practices throughout the project. Didactic calls occurred in October 2007, December 2007, April 2008, May 2008, and June 2008.

Three separate educational summits occurred throughout the project. The first summit, held in August 2007, was the kick-off session for all participants. The participants were provided with information on the project goals, data collection and how to use the project's extranet. The second summit, in February 2008, updated the participants on progress of the project, shared best practices and barriers, and allowed networking among the participants. The third summit, in May 2008, built upon the second summit, requiring each participant to present some of their own experiences with best practices, and provide an overview from where they started to their current status.

Each summit also showcased nationally-known speakers to discuss patient best and promising practice on flow improvement topics, case studies on how other communities moved to a no-diversion status and how to spread and sustain change processes.

The project participants were divided by LEMSA region between two faculty members. Each faculty member was assigned two LEMSA

regions. The faculty members also submitted monthly written reports on the status of their regions. These reports documented the status of progress to date, successes, barriers, lessons learned, celebrations, and data collected for the counties.

## **KEY PERFORMANCE INDICATORS AND DATA COLLECTION PLANS**

The Project's KPIs were designed based on a previous national patient flow project called Urgent Matters. Urgent Matters was a project funded by the Robert Wood Johnson Foundation in 2002 dedicated to improving patient flow and reducing ED overcrowding. Ten safety-net hospitals from ten different states participated in a one-year learning network and collaborative similar to this project<sup>23</sup>. The Abaris Group, the firm contracted by the California Healthcare Foundation for this project, had substantial involvement with the Urgent Matters Project.

### Data Collection

Information systems varied greatly among the participants in this project and it was ultimately determined that the sources of the data used to measure performance could not be the same for all participating hospitals and LEMSAs. However, early on in this project each participant was asked to develop their own data plan to include the following:

- The most appropriate source(s) of the data requested from the hospital or LEMSA
- The baseline value of each KPI
- The target values participants wanted to attain for the KPIs
- A sampling methodology, if appropriate
- The staff responsible for gathering, reporting and inputting the data to the extranet
- A protocol for routine collection and reporting of information (e.g. total ED throughput measurements from a patient tracking system report that is run the 1<sup>st</sup> and 16<sup>th</sup> of every month)

Depending on the specific KPI, possible data sources could include patients' medical records, transport logs, a manual log maintained by the triage nurse or unit clerk, or patient bed tracking system (automated or manual). It was not feasible for some participants to collect data for 100 percent of their patient population. In this instance the participants were encouraged to collect sampled data for the specific KPI.

The sampling method encouraged was by using a representative quantity of data which should indicate randomly selected patient records distributed evenly over a 24-hour period with a universe (or "n") as small as 30 events, if randomly selected. For example, ten patients might be randomly selected from each three work shifts on Monday, Thursday and Saturday and thus would be a suitable sample for this project. Within a shift, the ten patient records should be evenly distributed, with three from the first two hours of the shift, four from the next three hours, and three from the final three hours of the shift. This sampling approach yields a total of ten patients per shift, with three shifts per day, and three days a week for a total of 90 patient records per week.

### Measuring Progress Toward a Goal

To track progress toward attaining the target value of a KPI, each participant was asked to track the percentage of all patient visits that met their stated goal. For example, if the current (or baseline) average total ED throughput time (patient arrival to discharge) was six hours and the stated goal was to reduce that time to four hours or less and it was determined that currently 25 percent of their patients were meeting that goal, the "Percent Meeting Goal" measure for this KPI would be 25 percent.

The following list was the required hospital and LEMSAs' KPIs provided to each participant at the kickoff summit. The full definition for each KPI can be found in the project's full report's appendix.

### ED Clinical Process

Time to heart treatment or time to pain management for orthopedic patients – only one of these two measures was to be reported.

### ED Throughput

The time a patient spends in the ED was broken down by three treatment paths: admitted patients, fast track patients and patient treated and released from the ED. The following were collected for each path:

- Total ED throughput time
- Arrival to seen by provider
- Provider to disposition decision
- Disposition decision to actual disposition

### Inpatient Throughput

Five inpatient KPIs were requested:

- Time from inpatient bed assignment to bed placement
- Time of discharge
- Inpatient bed turnaround time
- Hospital discharges.

### Other ED KPIs

In addition to throughput measurements each ED was asked to supply the following data:

- Hours on diversion
- Incomplete Treatment (or Patients Left Without Being Seen)
- Total Boarding Hours
- ED Volume
- ED Admissions

### Total LEMSA

Each LEMSA was asked to submit combined data for the hospital participants in their county for:

- Total diversion hours
- Patients diverted
- Total offload hours

The LEMSAs also reported data for each participant hospital separately for the following metrics:

- Total diversion hours
- Total offload hours
- Average ambulance offload time (in minutes)

Ambulance offload data for the most part was not being routinely collected by the LEMSAs. Thus, the local LEMSAs requested that their local EMS providers collect offload data for the project. Upon reviewing the data, which were highly varied and inconsistently reported, it was determined near the end of this project that the data appeared to be questionable. Hospitals were also asked to collect patient offload time and a similar finding occurred. In the end, The Abaris Group determined that the offload data collected was not useable.

## **THE WEBSITE**

A project website was created to provide information about the California ED Diversion Project ([www.caeddiversionproject.com](http://www.caeddiversionproject.com)) to the public, and included a definition of ambulance diversion, an introduction to the project, a list of communities participating in the collaborative, and a list of resources related to diversion and hospital crowding. The website also contained the original statewide diversion data study (Report One) of the project completed in Phase One, the project's work plan, and a project fact sheet.

The project website also included a password-protected extranet. The extranet site included the following main sections:

### Calendar of Events

All upcoming events and reminders were displayed on a Web calendar. Periodic announcements also were sent to all participants about new postings and reminders.

### Submit Initial KPI Work plan

A web-based form allowed each hospital team and LEMSA to input its KPIs which listed the targets and goals for each participant.

### Data Reports

On a bi-monthly or monthly basis, each site was asked to submit data on their KPIs for the previous period. This data were then automatically displayed on run-charts. These charts enabled each team to view its progress over the length of the program.

### Monthly Project Report

At the end of each month, the hospital and LEMSA project sponsors or designees were asked to submit a web-based project report on a form that was forwarded to the California ED Diversion Project staff.

### Tool Kit

On the extranet site a tool kit was provided that contained information about best practices inventoried throughout the state in Phase Two and others that were in place throughout the country. They pertain to ED throughput, ED treatment path, ED clinical processes, other ED issues, inpatient flow, patient satisfaction, and diversion/LEMSA issues. A total of 50 best practices and cases studies were made available to project participants. Participants could browse for best practices in any of these categories, or search for specific key words.

### Faculty Monthly Report

The faculty member reported monthly on the status for the facilities in their region.

### Celebrating Success

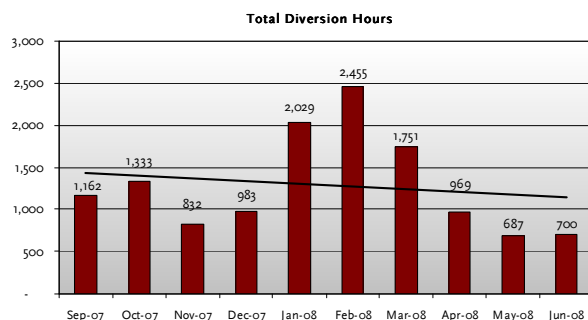
Hospitals and LEMSAs had the opportunity to submit and share success stories they had experienced with patient flow and diversion initiatives throughout the collaborative phase of the project. Twenty-one success stories were shared on the extranet, including at least one

from each of the participating hospitals and two of the LEMSAs.

### OVERALL RESULTS

This section of the report addresses the overall results for all the participating regions. Results for the individual hospitals are discussed in the section that follows.

Overall, total diversion hours dropped by 39.8 percent from 1,162 hours in September 2007 to 700 hours in June 2008 (a decrease of 462 hours).

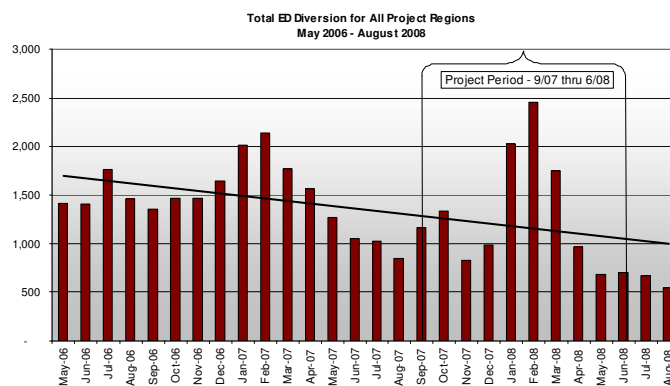


There were some increases in diversion hours during the collaborative. The highest increase occurred in the month of February with total participant diversion hours of 2,455 and the lowest diversion hours occurred in May with 687 hours. The spike in diversion hours was believed to be largely the result of a surge in ED volume due to the heavy influenza season during the months of January to March 2008. While diversion hours dropped, there was a rise of 12.1 percent in ED volume and an increase of 22.7 percent in ED admissions for the same time period.

In addition to analyzing diversion hours during the collaborative period, diversion hour data were reviewed for several months prior to the study to help determine if the reduction in diversion hours were the result of the collaborative's efforts or could the diversion hours have declined without the collaborative. The analysis of the months prior to the collaborative compared to the collaborative period showed that, while diversion hours were declining anyway, the collaborative diversion

hours dropped more dramatically than pre-collaborative months.

The following histogram displays diversion hours for all collaborative participants beginning in May 2006 through August 2008 and diversion hours during the collaborative.



The graph shows that ED diversion was generally around the 1,500 level from May thru December 2006, then the hour rose in January and February 2007 (due to the flu season). Starting in March 2007, ED diversion began declining through August 2007. At the start of the collaborative, diversion hours began rising up again in September 2007 and October 2007, following the trend for the same months from the year before. However, there was a drop of 500 hours from October 2007 to November 2007, while comparable data for November 2006 shows it at the same level as October 2006.

In December 2007, diversion hours again increased, but also were much lower when compared to December of the year before (983 versus 1,647). In January and February 2008, hours rose due to an unusually strong flu season. According to the Centers for Disease Control, the 2008 flu season was worse than the three previous flu seasons. March 2008 diversion data dropped to the same level as March 2007 and in April 2008, hours dropped precipitously by 782 hours. This downward trend in hours continued through August 2008 for the collaborative participants. Thus, the data show that there was a decreased in

diversion hours deepened due to the efforts of the collaborative.

The following table shows the overall results for the project’s KPIs.

KPI Comparison of First Reporting Period to Last Reporting Period	
KPI	Percent Change
<b>Hospitals</b>	
Time to Heart Treatment	-28.4%
Time to Pain Management	n/a
Bed Assignment to Placement	8.1%
Time of Discharge	3.9%
Bed Empty to Clean/Available	n/a
Total Hospital Discharges	n/a
ED TAT - Admitted <sup>1</sup>	12.2%
ED TAT - Fast Track	n/a
ED TAT - Treated and Released <sup>1</sup>	-1.4%
ED Volume	12.1%
ED Admissions	22.7%
Incomplete Treatment	-2.4%
Boarding Hours	-14.5%
<b>EMSAs</b>	
Diversion Hours (monthly)	-39.8%

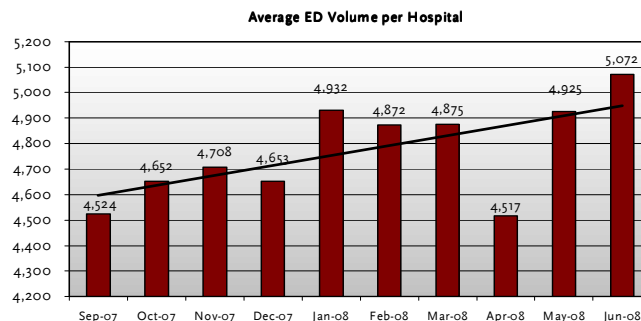
n/a: not available due to incomplete data availability.

<sup>1</sup> The percent change for ED TAT for admitted and treated and released was calculated comparing period one to period 15. Period 20 had insufficient data for a comparison.

Other KPIs that experienced a drop were time to heart treatment (-28.4 percent), incomplete treatment or what is also known as left without being seen (-2.4 percent), and boarding hours (-14.5 percent).

KPIs that had an increase in their average time were bed assignment to placement (8.1 percent), time of discharge (3.9 percent), ED arrival to admitted (4.5 percent), and ED arrival to treated and released (14.2 percent).

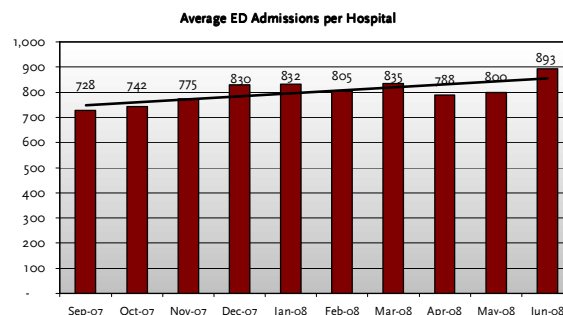
Over the course of the project, ED volume for participating hospitals continued to rise. June 2008 experienced the highest peak in ED volume (5,072 total ED patients), while April 2008 was the lowest (4,517 total ED patients).



Hospital Average ED Volume and Admissions Percent Change				
KPI	Reporting Periods 1-5	Reporting Periods 1-10	Reporting Periods 1-15	Reporting Periods 1-20
ED Volume	4.1%	9.0%	-0.2%	12.1%
ED Admissions	6.5%	14.4%	8.3%	22.7%

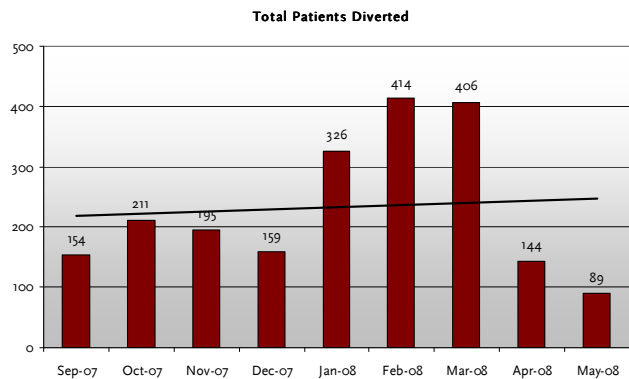
Hospital Average ED Volume and Admissions Absolute Change				
KPI	Reporting Periods 1-5	Reporting Periods 1-10	Reporting Periods 1-15	Reporting Periods 1-20
ED Volume	184	407	(8)	548
ED Admissions	47	105	61	165

The average ED admissions per hospital began during this project at 728 patients for September 2007 and then rose to 893 for June 2008.



There were a total of 2,098 patients reported as being diverted from September 2007 to March 2008 (data were not collected from April to June). This would equate to approximately 0.2 patients per diversion hour a very modest number of actual patients diverted.

For this nine-month period, the LEMSAs averaged 78 patients diverted per month or three patients per day per LEMSA. This data shows that while diversion can have a deleterious effect on throughput and patient care, it does not affect large numbers of patients needing EMS transport.



ED turn-around times (TAT) for admitted and treat and released patients fluctuated during the project. Overall, admitted TAT started at 6 hours and 42 minutes for period 1, rose to 8 hours and 59 minutes in period 15, and dropped down to 7 hours and 30 minutes for period 20. The TAT for treat and released experienced a slight decline of 1.4 percent when comparing period 1 to period 20.

Hospital KPI Performance: Turn-Around-Time Percent Change				
KPI	Reporting Periods 1-5	Reporting Periods 1-10	Reporting Periods 1-15	Reporting Periods 1-20
TAT - Admitted	4.0%	34.5%	12.2%	-
TAT - Fast Track	-	-	-	-
TAT - Treat & Release	2.8%	19.2%	-1.4%	-

Hospital KPI Performance: Turn-Around-Time Hours & Minutes				
KPI	Period 1	Period 5	Period 10	Period 15
TAT - Admitted	6:42	6:57	8:59	7:30
TAT - Fast Track	-	-	-	-
TAT - Treat & Release	3:38	3:44	4:19	3:35

Note: This data is for those hospitals that reported their data (some hospitals provided data for all periods, some provided it sporadically and others provided no data). Proxy data were used when a hospital reported data for most of the periods, but not all. The proxy data was taken from the most current reported period. Data for the Fast Track TAT was minimally reported and therefore not useable. This was also the case for period 20 for all three TAT KPIs, thus a comparison between period 1 and period 20 was not possible.

Finally, it should be noted that the results of the collaborative could possibly have been influenced by selection bias. These hospitals and LEMSAs obviously were motivated to participate and were willing to reduce or eliminate their diversion hours. On the other hand, this is a very difficult bias to eliminate in a study such as this since the participants need to be willing and able to participate.

### Participant Involvement

Participant involvement varied greatly throughout the project which resulted in some of the participants not being able to submit some or all of the KPI data. This was due to

either changes in project staff (e.g. champion) to even changes with the overall hospital leadership or both. The following indicates the level of involvement by project role.

- Project sponsors:
  - Six active
  - Four limited involvement
  - One no involvement
- ED champions:
  - Nine actively involved
  - Two limited involvement
- In-patient champions:
  - Six actively involved
  - One limited involvement
  - Four no involvement
- All of the LEMSA champions were active

“Active” indicates the staff member was very involved having attended the majority of project activities and very involved in developing and implementing initiatives

“Limited” involvement means that the staff member attended some project activities and had some involvement in developing and implementing initiatives or became engaged in the project after January 1, 2008.

“No” involvement indicates either the staff member was not assigned to the project or did not attend any project activities and had no obvious involvement in developing and implementing initiatives.

“Change” indicates the staff member assigned to the project changed or was assigned after January 1, 2008.

One of the three project LEMSAs had a change in project staff while eight of the 11 hospital participants had a change in project staff. However, no correlation was found in the KPIs data and outcomes for those participants that had a change in project staff.

Data submission was the greatest challenge for the participants as witnessed by data received and the participant project evaluations. No participant submitted all the requested data,

work plans, or monthly progress reports. As shown in the following table.

EMSA KPI Performance										
EMSAs/Hospitals	IP Flow	ED Clinical	Total ED Throughput	ED Throughput	Other ED	Total EMSA	Hospital Specific	Workplan	Progress Report	
LAEMSA	N/A	N/A	N/A	N/A	N/A	I	C	C	C	C
SFMC	M	M	C	M	M	NA	NA	M	M	M
PIH	C	I	M	M	M	NA	NA	C	I	I
MHSC	I	I	C	I	C	NA	NA	C	C	C
ICEMA	N/A	N/A	N/A	N/A	N/A	C	C	C	I	I
ARMC	I	I	M	I	I	NA	NA	C	C	C
LLUMC	I	I	C	C	I	NA	NA	M	M	M
SVMC	I	I	I	I	I	NA	NA	M	C	C
SCEMVA	N/A	N/A	N/A	N/A	N/A	NA	NA	NA	NA	NA
RMCSJ	I	I	I	I	I	NA	NA	M	I	I
VCEMSA	N/A	N/A	N/A	N/A	N/A	I	I	C	C	C
CMH	I	C	C	C	I	NA	NA	M	I	I
SVJ	I	I	I	I	I	NA	NA	C	I	I
SJRMV	M	M	I	I	I	NA	NA	M	I	I
VCVC	I	I	I	I	I	NA	NA	M	M	M

C=Complete, M=Missing, I=Incomplete

### OVERALL OUTCOMES

The overall project outcomes were very positive. This study resulted in the first statewide EMS agency reporting of diversion hours, EMS transports and the analysis of why some communities seem to do better with diversion than others. Additionally, the overall reduction of diversion hours by 39.8 percent from all of the participating hospitals during the project time period (September 2007 to June 2008) demonstrated a great success when compared to a statewide decline of only 15.3 percent using calendar years 2006 and 2007.

The collaborative diversion hour reduction was in spite of rising ED volumes and ED admissions. Other overall reductions in project KPI cycle times did occur during the collaborative (e.g. patients treated and released, patients left before treatment completion and patient hours boarding while waiting for an inpatient bed). Still other KPI reductions did not occur at levels hoped for during the project but these results must be taken in the context of the increase in demand the participant hospitals experienced.

Further, the collaborative approach demonstrated the beneficial affect of encouraging the sharing of experiences and solutions between hospitals and the participating LEMSAs. It also helped hospitals more clearly understand that their diversion

actions directly impacted other hospitals in their region.

None of the counties involved completely eliminated diversion during this project but two (San Bernardino and Ventura Counties) have plans to implement a “no-divert” policy in early 2009. To move in the direction of a “no-divert” policy statewide will take a joint effort among the LEMSAs and all of the hospitals in each county, not only those that participated in this project.

Another benefit to this collaborative portion of the study was that many hospitals saw improvements in their overall patient flow both in the ED and on their inpatient units which is likely why so many hospitals experienced diversion hour reductions.

Another benefit to this study and determined during the collaborative was that hospitals and their LEMSAs witnessed the partnership of working together to respond to a growing national problem. This reinforced that ambulance diversion is a systemic problem and cannot be solved by any single hospital or LEMSAs.

With improved hospital and LEMSAs policies and practices, ED diversion can be reduced. A notable result from this project is that diversion actually affects only a small number of EMS patients transported compared to the number of diversion hours.

The question then arises, is diversion actually benefiting the hospitals to provide safe patient care or is diversion no longer effective in over crowded situations? The collaborative data suggests that diversion causes inefficiencies for the limited healthcare resources that are available and creates conflicts between the LEMSAs and hospitals in the participating regions.

## PROJECT CHALLENGES

Data collection was the number one challenge for all phases of the project. Data challenges experienced throughout the project ranged from the inability for all participants to collect data to delays implementing the website which was the data input tool for this project. Some of the data challenges experienced:

- Data often had to be extrapolated from one format to meet the project required format
- Frequency of the reporting requirements (bi-monthly and monthly)
- Quantity of data required (missing reporting periods)
- Resources and time required to manually gather data considered time consuming and labor intensive

The project recommended step for each participant to assign a part-time data resource person to support the project champions did not occur for any participant. That plus the other data challenges resulted in gaps in data from all participating entities and some participants not submitting data that they perceived as particularly difficult to obtain and at least one hospital stating early on in the project that they were not submitting any data. (Note: that hospital eventually submitted data for many of the KPIs on a monthly basis).

Other challenges specific to the collaborative phase experienced by some participant hospitals included:

- Senior hospital staff not always involved or committed to project
- Staffing ratios making some best practices difficult to implement
- Limited communication within the regions among non-participants and earlier on in the project among participants
- Changes in project staff membership
- Difficulty in obtaining the required cultural changes for hospital staff for planned KPI improvements

Another significant challenge in the project was stability of the champions and some hospital

leadership. One LEMSA expressed significant interest in the project as did three of their hospitals but ultimately that LEMSA (Santa Clara County) dropped out early due to a new project that was assigned to the LEMSA and two of their hospitals dropped out early in the project for various reasons and ultimately the last hospital dropped out after substantial involvement (Regional Medical Center) due to the fact they felt alone in their region and were doing so well on their with KPI progress suing their own corporate initiatives.

One hospital's entire executive leadership team changed midway during the project requiring re-orientation and reassignments. Two other project champions resigned their positions at the hospitals for various reasons and one LEMSA staff champion changed jobs requiring significant re-orientation and data delays and gaps.

## SUGGESTIONS FOR OTHER COMMUNITIES

The following is a list of suggestions for communities to consider if they establish a similar collaborative.

- Obtain funding to provide resources to assist participants with the required data collection
- Assure that the executive leadership of participants understand the commitment and resources required prior to joining the collaborative
- Prior to beginning the collaborative pre-schedule routine meetings among the regional participants
- Value the importance of the relationships in the collaborative with the LEMSA partners
- Considering the effort as not just an ED project but an entire hospital and regional initiative
- Keep focused on expected outcomes
- Understand the importance of developing written outcomes at the beginning of the project
- Involve all hospitals in the region to participate in reducing and/or eliminating diversion

- Initiate ED and non-ED activities simultaneously so they have equal importance
- Do not be afraid to refocus if an initiative does not initially work
- Celebrate each small success and then build on these to reach big successes and reinforce future willingness of the staff to be involved in change
- Access to data in a timely and user friendly manner is essential to monitoring improvements
- Participants should understand the importance of data-driven decision making and that compiling and reporting data is very resource consuming and they need to dedicate the resources required to do so
- Identify a physician champion early on who can overcome resistance to change by the medical staff

- Data collection requirements
  - Quantity of data required
  - Frequency of collection
- Fast-paced timeline of the project
- Delays in getting the website running

Several participants stated that the website was difficult to use. However, 66.7 percent of respondents rated the website as “good” or “excellent.” The following table shows the breakdown of how participants rated the various aspects of the project. Specific comments that respondents provided on the evaluation can be found in the appendix.

California ED Diversion Project Evaluation Form					
	Poor	Fair	Average	Good	Excellent
Please rate the impact of the project's Collaborative on diversion and hospital capacity for your organization based on your organization's overall goals and expectations.	-	-	30.0%	45.0%	25.0%
How would you rate the Collaborative's faculty?	-	-	18.2%	36.4%	45.5%
How beneficial were the site visits conducted by the faculty?	-	-	30.0%	30.0%	40.0%
How would you rate the Collaborative's didactic conference calls?	-	-	22.2%	50.0%	27.8%
How would you rate the Collaborative's web site?	-	5.6%	27.8%	55.6%	11.1%
What is your overall satisfaction with the Collaborative?	-	-	19.0%	52.4%	28.6%
	Yes	No	Somewhat		
Will your organization continue to use some of the tools you learned or that were provided?	100.0%	-	-		
Were the best practices listed on the web site and in the Summit binders helpful?	93.8%	-	6.3%		

### COLLABORATIVE EVALUATION SUMMARY

Collaborative participants were asked to complete a survey tool to evaluate various aspects of the project as well as their overall experience with the project during the final summit.

Overall, participants were satisfied with the collaborative (refer to the following table), with overall an 81 percent of the participants rating their overall satisfaction as “good” (52.4 percent) or as “excellent” (28.6 percent) All participants responded that they would continue to use some of the tools that they received from this project. The survey also asked participants to list the top strengths and weaknesses of the collaborative. Top strengths included:

- Improved communication and cooperation between different hospitals within a region and their LEMSA
- Support from project faculty
- The valuable information and best practices provided

Weaknesses identified by collaborative participants included:

### STUDY CONTACT INFORMATION

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## PROJECT PARTICIPANT SUMMARIES

The following section is a description of the participants and their experience during the collaborative phase of this project.

### LOS ANGELES COUNTY EMS AGENCY

#### Overview

The Los Angeles County EMS Agency (LAEMS) located in Southern California is responsible for providing EMS and emergency provider oversight for 9-1-1 and hospital emergency services to greater than 10 million people (27 percent of all California's residents) in 88 cities covering 4,084 square miles<sup>24</sup>. LAEMS has 73 9-1-1 receiving hospitals and 20 base hospitals. LAEMS has 12,700 certified pre-hospital responders<sup>25</sup> and 653 certified mobile intensive care nurses (MICN). LAEMS has the responsibility to develop policies that affect the EMS providers in LA County. The two policies that define diversion in LA County are the Hospitals Requesting Diversion of Advanced Life Support (ALS) Patients, and Reference Number 503.1 – Hospital Diversion Request Requirements for ED Saturation. The diversion policies were drafted by a Diversion Task Force and implemented November 27, 2006 and revised August 1, 2007, the Diversion Task Force discontinued meeting regularly once the policy was implemented.

#### Project Challenges

LAEMS had some unique challenges in participating in this project:

- ED demand already exceeded capacity (system-wide stress) due to the closure of ten EDs in a five-year period
- That existing stress on the emergency and acute care capacity was exacerbated by the relatively more recent closure (August 2007) of Martin Luther King-Harbor Community Hospital (MLK-H), a public hospital in a low income area with limited access to other healthcare resources
- A “round-robin” process was implemented to equitably distribute MLK-H's 9-1-1

patients to surrounding EDs post the closure

- Confusion existed about the “round-robin” process within many of the EMS providers
- One hospital near the affected geographical area chose to opt out of the “round-robin” process periodically causing increased stress in other parts of the system
- There was provider agency confusion about diversion requests, service area hospital rules and service area boundary changes post MLK-H closure
- A late, moderate influenza season during 2007-2008 caused an increased demand for ED services
- While baseline data were readily available for the hours of diversion for the participating hospitals and LAEMS through the ReddiNet system computer system, offload hours were not historically tracked
- The collection of offload data was labor intensive and required the cooperation of agencies not participating in the project

#### Steps Taken

The following steps were taken to support the goals of the project:

- The LAEMS sent a letter to all provider agencies with the potential to contribute data to the study, followed by telephone contacts
- Dispatch centers for providers were telephoned asking for offload data collection
- Private provider agencies were asked for offload time data
- A log was created for the partner hospitals to record the number of patients diverted
- Liaisons within provider agencies and dispatch centers were identified to ensure ongoing data collection
- The LEMSA coordinated periodic meetings with partner hospitals and provided feedback on data collection
- Monthly project reports and data were posted on The California ED Diversion Project's website within established timeframes
- A six-month progress report (general information only) was provided to the

County’s EMS Commission and the project discussed at the LEMSA’s regional meetings with 9-1-1 receiving hospitals.

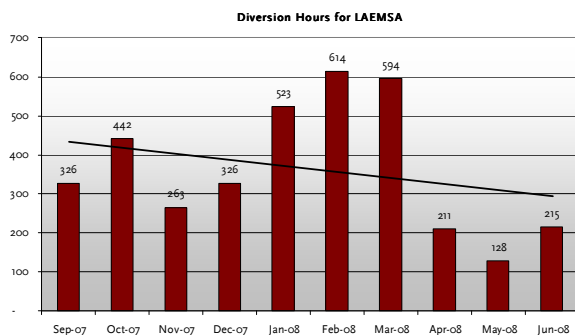
- Regular progress reports were provided to the LEMSA Director

**Results**

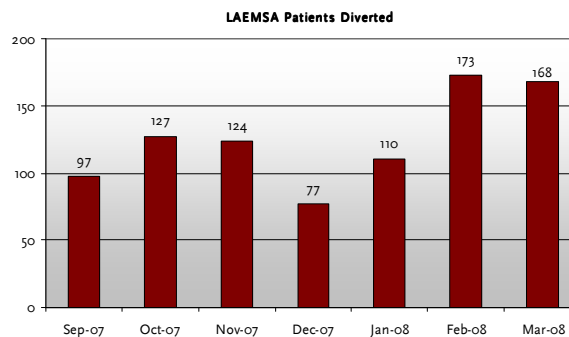
The following are results from the steps taken by LAEMSA:

- One participant hospital demonstrated a significant decrease in diversion hours
- One participant hospital’s baseline diversion hours were low at the outset of the study and remained low
- One participant hospital’s diversion hours remained about the same throughout the study
- It was not possible to determine the impact of the MLK-H closure on offload times due to lack of data prior to September 2007

Diversion hours declined by 34 percent from September 2007 (326 hours) to June 2008 (215 hours). The highest hours of diversion occurred in during February with 614 hours, and the lowest reporting month was May with 128 hours.



During the project, the number of patients diverted away from the three participating LA County hospitals ranged from a low of 77 patients during December 2007 to a high of 173 in February 2008.



The following chart shows the percent change and absolute change for diversion hours and patients diverted for LAEMSA comparing the first month to every third month.

LAEMSA			
	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Diversion Hours			
Percent Change	0.0%	82.2%	-34.0%
Absolute Change	-	268	(111)
Patients Diverted			
Percent Change	-20.6%	73.2%	-41.2%
Absolute Change	(20)	71	(40)

Note: Diversion hours were the same for 9/07 and 12/07.

The Hospital Association of Southern California restructured the 2005 Diversion Task Force and it is understood will begin scheduling meetings to implement changes to the diversion policies based on findings from the project. A “no-diversion” policy had originally been proposed for trial for this project in a specific part of the county. However, task force opted instead for unannounced site audits of EDs that had requested diversion due to saturation. Overall, LA County hospital participants witnessed the second largest reduction in diversion during this project of any other region. Also, during the year prior to this project, LA County nearly cut in half their diversion hours in one year by revising their diversion policy limiting each hospital’s diversion to a one-hour time period followed by a mandatory 15-minute open period, which dramatically affected diversion hours. However, the Diversion Task Force agreed to abandon the one-hour closure lock out and the mandatory 15-minute open period.

## Methodist Hospital of Southern California

### Overview

Methodist Hospital of Southern California (MHSC) was founded in 1903 and is a 460 bed, non-profit hospital. MHSC is located in Arcadia, California in the northern part of Los Angeles County. MHSC was the first California community hospital that developed a psychiatric unit. Comprehensive acute care services provided include medical, surgical, prenatal, pediatric, oncology, intensive care (neonatal and adult), and complete cardiovascular services, including open-heart surgery. MHSC is accredited by the Joint Commission.

The ED at MHSC has 21 beds with a 2007 volume of 38,617. The ED admits 30 percent of the ED volume, which accounts for 50 percent of all hospital admissions. MHSC saw the collaborative as an opportunity to build upon their previous activities to improve patient throughput.

MHSC plans to expand their ED capacity to 26 ED beds and add a Clinical Decision Unit (CDU) with 18 beds in 2010. During the project, the hospital renovated a closed inpatient unit to provide additional inpatient bed capacity for 25 unmonitored medical surgical patients.

### Where They Started

MHSC started improving patient throughput in 2003 with a six-month consultation project with Voluntary Hospital Association (VHA) and has continued their journey to improve the patient care experience since that time. For this collaborative, the hospital worked on the following interventions to decrease diversion hours and to improve patient care access:

- Internal ED team worked on the triage process
- External short-stay team worked on the Rapid Admissions Unit
- Improved bed huddles
- Electronic bed board and bed czar were implemented

The methodology used with these interventions allowed more people to be involved and provided for progress on several fronts.

### Gaining Momentum for Change

MHSC had already started a cultural change of embracing ED crowding as a hospital wide challenge to overcome. Throughout the collaborative their champions, project sponsor, the vice president and chief nursing officer (CNO), were actively involved in the collaborative and interventions. This level of executive commitment was impressive but is required to gain and sustain change management in most hospitals. The director of adult services was the inpatient champion and the ED manager was the ED champion, and both spent numerous hours designing and implementing the interventions for this project. The ED champion spent hours (320) gathering and downloading the data. MHSC used their existing patient flow team as a starting point for the collaborative. The following were additional steps taken for this project:

- Created a steering team to include champions and other key staff
- Shared project goals with executive team, all organizational directors, nursing leadership and nursing staff
- Shared project with Performance Improvement (PI) Committee
- Involved all those affected in decision making

### Strategies/Implementation

To implement the strategies MHSC used the high impact team (HIT) approach and rapid cycle testing (RCT) tool that critiqued each change either daily or weekly as appropriate for the intervention. Adjustments were made based on these assessments to address the identified issues. Front line staff was involved in each step, including process design, RCT, implementation analysis and changes.

A retreat was held with the ED leadership, ED physicians, and ED charge nurses to discuss issues, options and develop priorities.

Following the retreat, the charge nurse meetings were used for education and discussion of the change status. The following are the strategies used by MHSC to implement change:

- Multidisciplinary approach
- Flow chart current processes and identify issues
- Setting and monitoring of goals
- Education of the KPIs and the processes
- Update technology
- Utilized the RCT approach

#### Overcoming Barriers

Overcoming resistance to change was one of the leading barriers at MHSC. During the initial months of the project, MHSC had to re-sort priorities at many levels starting with the departmental leadership. By the November coaching call, MHSC had developed a high level of energy with members of the throughput teams and by the April site visit had developed and refined their structure on change management. The change and acceptance came about with the commitment and participation of the chief nursing officer and project champions. Early on in the collaborative, the project sponsor and champions identified the need to involve as many people as possible in the project. Opening up communication throughout the organization led to buy-in by many hospital staff, which aided to reduce diversion hours.

The medical staff plays an important role when it comes to change management. There appeared to be minimal involvement by the medical staff beyond data reporting outside of the ED physician group. This will be the next step that MHSC will need to take as they evolve their cultural change.

The influenza season hit MHSC hard with a 4.6 percent increase in ED volume for the first three months of 2008 (1Q08) compared to the last three months of 2007 (4Q07). Not surprisingly, ED admissions rose during this same time period by 9.2 percent. The rise in ED volume led to an increase in diversion hours. During the 4Q07, MHSC's diversion

hours were 395, while in 1Q08 they were 741 (up an additional 346 hours). This in turn led to a significant rise in boarding hours (1,233 in 4Q07 to 5,097 in 1Q08) and those patients that did not complete treatment (16.2% in 4Q07 to 24.2% in 1Q08).

These challenges in demand required the hospital leadership to be creative in meeting demand and loss of staff due to the same illness for which the hospital was trying to provide services. The following are just a few ways MHSC attempted to overcome these barriers:

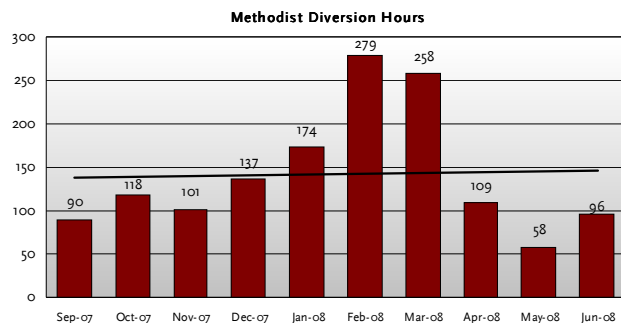
- ED retreat was conducted to address barriers
- Asked staff to try a change prior to making a final decision
- Including all key players in didactic calls helped get buy-in on tough initiatives since they could see that others had been successful

#### Results

MHSC saw the following results from the above implemented interventions:

- Triage redesign: minimal triage data set was established to reduce time to 5 minutes
- The ED Flow sheet form redesign: to facilitate data collection and regulate compliance
- Daily huddle: improved intra-departmental collaboration
- Admit Resource Nursing Role: provided improved throughput for admitted patients boarding in ED
- Manager for bed board process (Bed Czar): provided leadership in facilitating throughput
- Development of Rapid Admit Unit: improved availability of ED beds during high census

MHSC started with 90 hours of diversion in September, 2007, which peaked in February during the influenza season at 279 hours. Their lowest month of diversion hours was May with 58 hours.



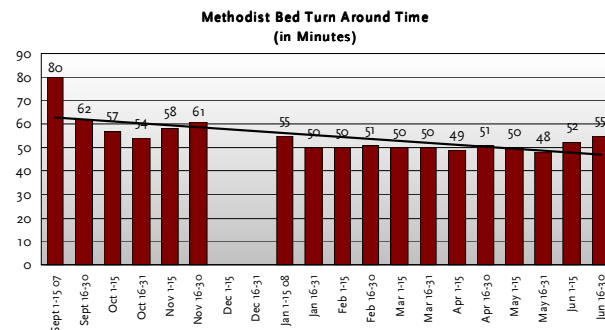
The following table shows the percent and absolute change for the number of diversion hours comparing the first month to every third month.

MHSC			
	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Diversion Hours			
Percent Change	52.2%	186.7%	6.7%
Absolute Change	47	168	6

MHSC had a slight increase in diversion hours from the September 2007 to June 2008. However, they were able to reach their goal of 146 divert hours or less per month seven times in the ten months of reporting. Difficulty achieving this goal occurred during the peak winter months and influenza season from December to March.

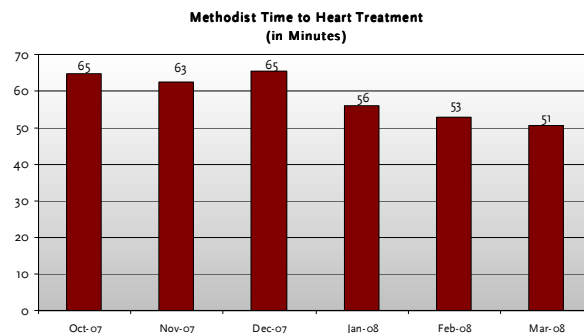
MHSC was one of the few participant hospitals that were able to submit the majority of all the requested KPIs. They had to manually collect their data for many of the KPIs and there were a few reporting periods where data were missing. MHSC chose to use the recommended method that was provided in the project handbook in August 2007.

The inpatient KPIs showed a significant improvement in the bed turn-around times. During the first period it took 1 hour and 20 minutes from the time the bed was empty until it was clean. By the last period, it only took 55 minutes.

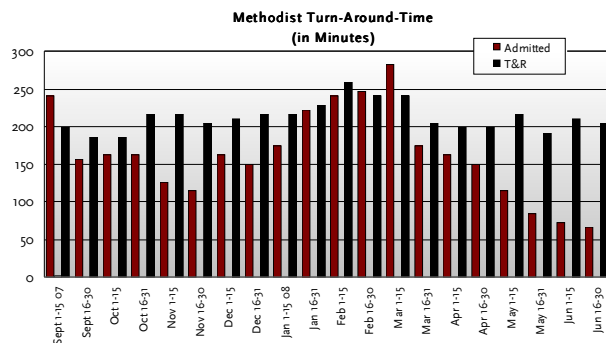


Hospital discharges were steady with an average of 989 per month and having a slight decrease of 1.6 percent when comparing the baseline period to the last reporting period. The bed assignment to bed placement KPI had a 78.8 percent increase when compared to the first and last reporting periods with no apparent reason reported.

MHSC submitted the “time to heart treatment” for their clinical process KPI. Data were only submitted from October 2007 through March 2008. As the graph below indicates there was a steady downward trend during the months reported and all months were below the goal of 90 minutes.



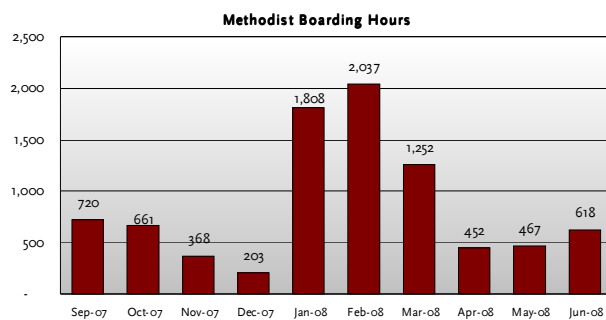
Turn-around time data were reported for admitted and treated and released ED patients (MHSC does not have a Fast Track). ED arrival to treated and released patients remained fairly flat throughout the project, while arrival to admitted patients greatly improved with a 73 percent decrease when comparing the change between the first and last reporting period.



The time from arrival to being seen by a provider for admitted patients remained fairly flat during the project. However, the time from being seen by a provider to disposition for admitted patients trended downward with a two percent decrease from the first to the last reporting period, but once the decision to discharge an admitted patient occurred, the time increased by 47.7 percent.

Treated and released ED patients trended upwards for these same three KPIs. Once the decision to discharge occurred, the time from the baseline to the end of the project went up 25 minutes (from 24 to 49 minutes).

ED volume increased by two percent from September 2007 to June 2008, while the incomplete treatment rate for the same period decreased by 1.3 percent. ED admissions rose by 1.8 percent. Overall, boarding hours decreased by 14.2 percent. However, during the first quarter of 2008 MHSC experienced a tremendous increase in boarding hours with the peak hitting 2,037 hours in February due to the flu season.



### Lessons for Other Hospitals

MHSC identified the following as important considerations for other hospitals that are embarking on the journey to improve the patient care experience from the pre-hospital throughout the continuum of their hospital stay. Their motto is developing and providing the *Next Generation of Care*.

- Executive team must support goals
- Must be a multi-disciplinary approach
- Should initiate ED and non-ED activities simultaneously so they have equal importance
- Not to be afraid to refocus if an initial strategy does not work
- Celebrate each small success because several small successes lead to big successes and future willingness of the staff to be involved in change

### Presbyterian Intercommunity Hospital

#### Overview

Presbyterian Intercommunity Hospital (PIH) is located in Whittier, California, and was founded in the mid 1950s<sup>26</sup> by two women. PIH has approximately 3,000 staff and 600 physicians and specialists that serve the region’s nearly 1.5 million residents. The R.C. Baker Foundation Emergency Department is a basic ED with 32 main beds and a five-bed Fast Track. PIH had over 70,000 annual ED visits in 2007. The ED is certified for the following<sup>8</sup>:

- Paramedic Base Hospital
- ED Approved for Pediatrics (EDAP)
- STEMI Receiving Center (SRC)

The current hospital is licensed for 444 beds with 18 percent of all inpatients admitted from the ED. PIH is a non-profit regional medical center that serves people in Los Angeles and Orange Counties and is Joint Commission accredited.

#### Where They Started

- PIH had very minimal diversion hours at the beginning of this project and remained low throughout the collaborative

- PIH started this project with an engrained culture of being patient centered and with minimal silos throughout the organization
- The executive team had already developed a multidisciplinary team approach to addressing barriers and developing new processes
- The project was given to a team that was already well versed in change management
- The project sponsor and champions had a high level of energy was seen throughout the project along with the staff member assigned to data entry
- A critical-care intensivist program was in place
- Adult and pediatric hospitalists were also utilized
- An ED-call compensation program was present from the beginning of the project

#### Gaining Momentum for Change

Due to the past efforts by the executive team this hospital was very organized in their set up of the project and was able to bypass some of the normal challenges that other participants had to overcome. PIH did not have any type of change in the sponsor and/or champions during the project which allowed for a smooth continuum throughout the project.

The transition from an ED throughput team to a hospital throughput team had very few barriers to overcome other than finding the right team members and best meeting times. The committee continues to meet the second and fourth Thursday of the month.

#### Strategies/Implementation

- Developed written expectations and responsibilities for throughput teams and their committee chairs
- Utilized the rapid cycle testing (RCT) concept for change improvement
- Tried a licensed vocational nurse (LVN) physician facilitator
- Tried an additional second physician team Sunday through Monday
  - The LVN and second physician team was a three-month trial to see which program has the best results to determine which program will be implemented. Length of stay data and

patients who leave without treatment data will be compared between the two projects

- ED diversion request has changed to:
  - ED Administrator must now be called between the hours of 6:00 am-10:00 pm
  - House supervisor is called after hours for approval
- Daily bed rounds have been moved to an hour early
- Additional triage coverage was added to meet demand and peak times
- Lead triage nurse will be responsible for patient placement starting in January 2008
- Pull for Pediatrics Program: pediatric inpatient nurses come to the ED to receive report and transport the admitted pediatric patient to the floor
- Adding to tracking board: possible admit, admit status, and ready to admit
  - Change the system to allow inpatient floors access to bed board
- Implemented computerized provider order entry (CPOE) in March 2008
- Developed a bed census program
  - Real-time dashboard
  - Matches capacity management plan using color codes
- Opened a second overflow area to deal with the surge in capacity
- Nurse stationed in the ED lobby
  - To improve a sense of urgency
  - Staffed 24/7
  - Have already seen:
    - Nurses answering questions
    - Taking patients back
    - Prioritizing patients
    - Improving the sense of urgency
    - Keeping visitor and patients informed, thus less agitation in lobby
    - Improved nurse satisfaction
- ED case management pushing appropriate placement and alternative placement
- Implemented “ED Board Rounds”
  - Keeps focus on flow within the ED
  - Anticipate admissions
  - Breakup end-of-shift batching
  - Held at 12:00 pm; 4:00 pm; 9:00 pm

- Resulted in improved communication among ED team members

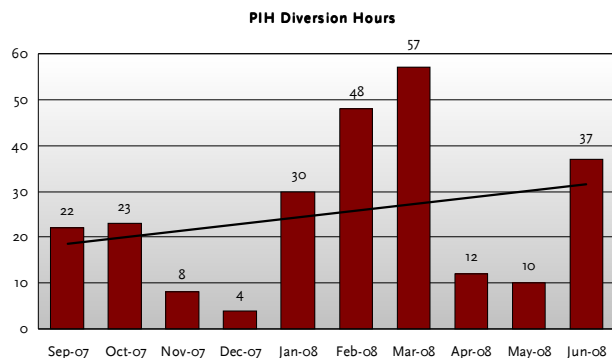
**Overcoming Barriers**

The collection of data was a challenge for PIH as almost all of the required KPIs had to be manually collected. The ED champion worked with the Information Technology (IT) department to develop automatic reports for the requested data. This process took several months to receive the reports and by then PIH was unable to download the data due to the delay and other priorities that arose at the facility.

This organization had very active involvement by the medical staff from the ED medical director to the vice president of medical affairs. Weekly focus meetings were held throughout the project to review the progress of the developed strategies with the executive and management team.

**Results and Next Steps**

PIH had very low diversion hours throughout the project. The highest diversion hours reported was in the month of March 2008 with 57 hours (during the flu season) and the lowest was the month of December 2007 with 4 hours.



The following table shows the percent and absolute change for diversion hours comparing the September 2007 to every third month.

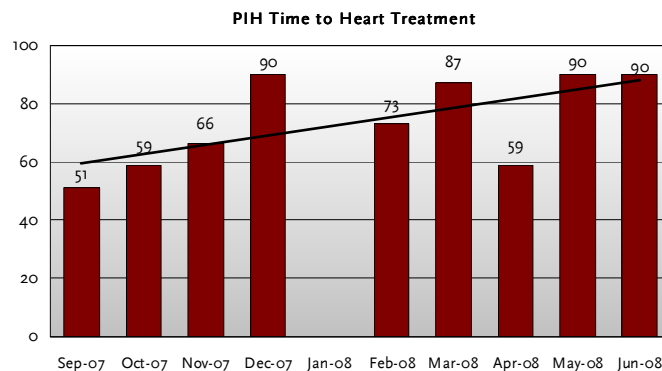
PIH			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Percent Change	-81.8%	159.1%	68.2%
Absolute Change	(18)	35	15

While the table shows an increase from September 2007 to June 2008, the absolute change was only 15 hours (or 22 hours for the month of September and 37 hours for the month of June).

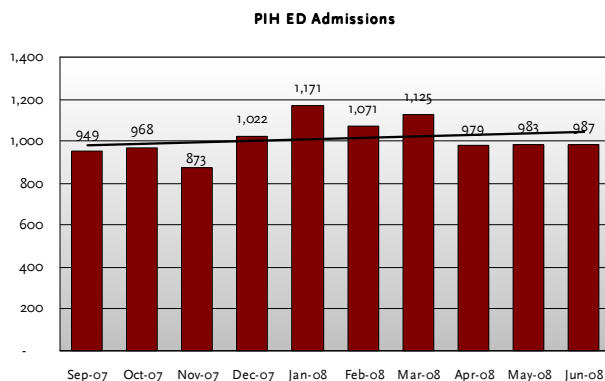
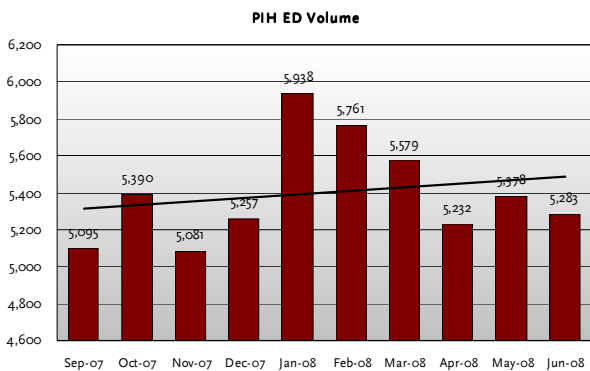
The inpatient KPIs were reported for bed assignment to bed placement and for hospital discharges. Data were not available for time of discharge or bed turn-around-time.

PIH had a 30-minute increase in bed assignment to bed placement from the first reporting period (1 hour and 21 minutes) to the last reporting period (1 hour and 51 minutes) which might be partially explained by a slight increase in census. While bed assignment to placement increased, they experienced a 2.7 percent increase in hospital discharges for the same time period.

PIH chose the “time to heart treatment” as their clinical process KPI for this project. PIH showed a 39 minute increase from the baseline reporting period in September to the last reporting period in June. (Data were not available for January). However, all reported months met or fell below their goal of 90 minutes. The lowest month reported was in September with 51 minutes and the highest months were in December, May and June with 90 minutes each.



PIH reported a consistent one percent incomplete treatment rate throughout the study. This was maintained even with the 3.7 percent increase in ED volume and a four percent rise in ED admissions from the baseline data to the end of the study.



PIH was unable to submit data for the ED total turn-around-time, ED turn-around-time and boarding hours.

#### Lessons for Other Hospitals

- Access to data in a timely and user friendly manner is essential to monitoring improvements
- Developing the right mix of team members up front saves time during the development and implementation phase
- Compiling and reporting data is very resource consuming. Facilities must be willing to dedicate the resources required

## St. Francis Medical Center

### Overview

St. Francis Medical Center (SFMC), a not-for-profit acute care hospital, is located in Lynwood, California and is part of the Daughters for Charity Health System. SFMC is accredited by the Joint Commission. The hospital was opened in 1945 and is currently licensed for 384 inpatient beds<sup>27</sup>. SFMC is a Level II trauma center and has 46 ED beds. The hospital is also part of the safety-net providing care for the poor in their area. Their ED volume reached 63,000 in 2007.

### Where They Started

- SFMC started this project with the challenge of the closure of the nearby MLK-H and were the closest in proximity, which resulted in an immediate impact on the ED volume
- SFMC had a strong executive commitment to improving patient flow and had developed a monthly scorecard that was reported throughout the organization prior to the beginning of this project
- While SFMC had fewer resources available than most participants in the project, their project sponsor and the ED medical director were tireless in improving access to care to their patients
- SFMC, just prior to the beginning of this project, opened a state-of-the-art Fast Track<sup>28</sup> located one floor beneath the main ED

### Gaining Momentum for Change

- SFMC established a patient flow committee as part of this project and the project sponsor was the chair. During the past year, the project sponsor reorganized the committee by adding additional multi-disciplinary team members as well as increasing the frequency of the meetings
- Developed a surge-capacity plan that would meet the intended requirements of the proposed AB 2207. AB 2207 is a bill to alleviate ED overcrowding in California. (See appendix). An executive committee of hospital vice presidents started meeting to develop the overall structure of the plan

- Aligning the patient flow and executive committees allowed for the organization to move in the same direction with the same goals in mind

Strategies/Implementation

- The hospital developed an ED Fast Track which averaged 60 patients per day, resulting in lower patient left with being scene rates and a lower ED overall length of stay
- Two discharge lounges<sup>29</sup> were developed
  - Main hospital building
  - Women’s services building
- Developed a mobile admit program
  - Inpatient nursing resources were provided to assist with ED boarding patients
  - This freed up ED nurses to care for ED patients
- A hospitalist program was initiated in August 2008
- A capacity management process titled “Code Purple” was created
  - Reviewed potential discharges
  - Held four times per day
  - Revised “Code-Purple” form to meet the meeting goals
- Diversion notification changed
  - ED nurse manager must be contacted by ED charge nurse to go on diversion
  - Uses LAEMS divert criteria
  - Nurse manager often found other solutions
- Increased an Inpatient Staging unit from five to seven beds to allow for admitted ED patients to be moved out of the ED while waiting for a inpatient room
- Increased case management accountability to assure earlier discharges; each patient room has white board with expected discharge date for enhanced communication with patient and family
- A Lobby Coordinator program provided dedicated patient/family liaisons in ED waiting room which increased communication with patients, resulting in lower LWBS
- Increased ED nursing staff levels

- Developed a Rapid Medical Evaluation<sup>®30</sup> program to begin August 2008

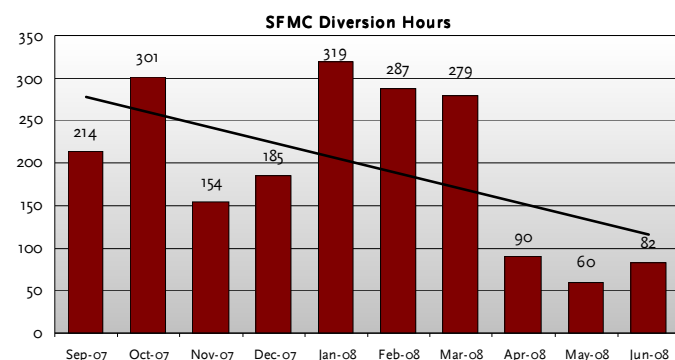
Overcoming Barriers

SFMC had initial barriers in many forms in addition to the MLK-H closure. The patient flow nurse, who was initially assigned as a project champion left the organization and the ED director position was vacant until May 2008. The project sponsor worked collaboratively with the members of the Patient Flow/Throughput Committee which achieved many of the organization’s goals.

Given the internal and external barriers faced by this facility the easy option would have been to withdraw from the project, but the executive team felt the project was important not only to the hospital but to the community they serve. The dedication and perseverance of the project sponsor kept the hospital on target throughout the collaborative.

Results and Next Steps

SFMC started the project with 214 diversion hours in September, 2007. Diversion hours peaked in January, 2008 with 319 diversion hours. Since March, SFMC has trended steadily down to a low of 60 hours in May. Overall, from September 2007 to June 2008, SFMC dropped their diversion hours by 61.7 percent.



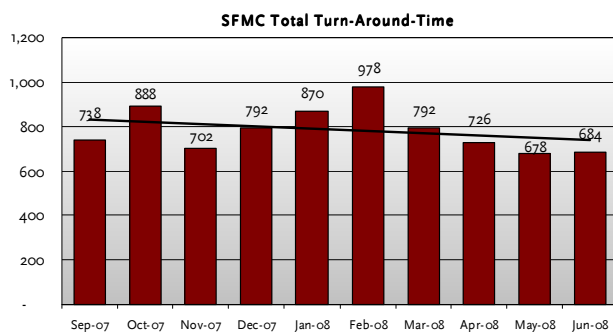
The following chart shows the percent and absolute change for diversion hours comparing September 2007 to every third month.

SFMC			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Percent Change	-13.6%	30.4%	-61.7%
Absolute Change	(29)	65	(132)

SFMC was unable to collect all the required hospital KPIs due to the limited resources available for the project. The KPIs that were provided were only provided monthly and not the requested bi-monthly. Reporting period two was the first data uploaded to the website from SFMC as the monthly data were uploaded at the end of each month. The following are the results for the KPIs submitted.

Total turnaround time was only provided on admitted patients and patients discharged from the ED as SFMC does not collect separate data on Fast Track times.

Admitted patients in September 2007 averaged 12 hours and 18 minutes; February had the highest turnaround time at 16 hours and 18 minutes; the lowest was reported in May with 11 hours and 18 minutes. From September to June there was a reduction in turnaround time for admitted patients of 54 minutes (or a decline of 7.3 percent).

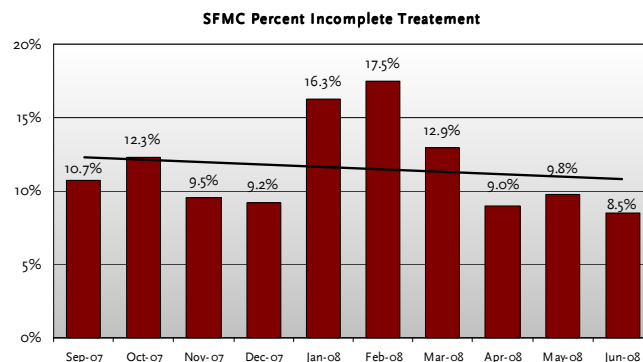


The total turnaround time for patients treated and released from the ED was 5 hours in September 2007 and dropped to 4 hours and 36 minutes in June 2008. The highest time recorded was in January with 5 hours and 42 minutes.

The closure of MLK-H in August 2007 caused an immediate increase in SFMC's ED volume. The hospital experienced a change from 155 patients per day to 185 with the closure. Thus,

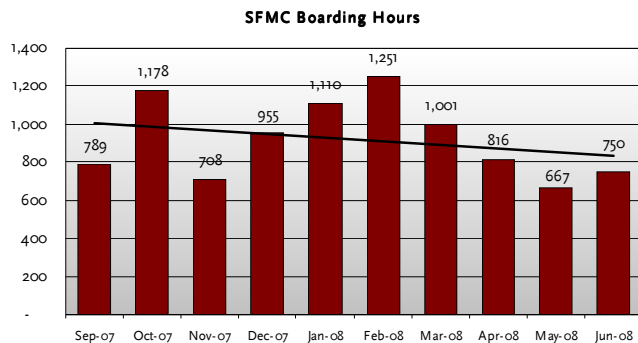
the ED volume from September 2007 onward includes an increase of just over 900 new patients on average each month. In September 2007, SFMC treated 5,274 in the ED. The highest volume was in May with 5,620 and the lowest volume occurred in November with 5,070 patients. From the September 2007 to June 2008, SFMC had a four percent increase in volume.

SFMC has historically had very high rates of patients that leave without being seen.



In September 2007, SFMC reported a 10.7 percent incomplete treatment rate. The highest reporting rates occurred during January and February, the months most impacted by the influenza season with February having a 17.5 percent rate. The lowest occurred in June 2008 with an 8.5 percent rate, which is a 21 percent reduction from September 2007.

Inpatient boarding hours started in September at 789 hours with a high reported in February of 1,251 hours and a low in May of 667 hours. Throughout the project, SFMC averaged 37 boarding hours each day.



SFMC made improvements in each of the KPIs reported. The best improvements occurred in divert hours and incomplete treatment. With the high level of attention that was given to improving access to care and patient throughput, SFMC is expected to continue to improve on these KPIs.

#### Lessons for other hospitals

- The development of written throughput expectations is helpful
- Standardization of throughput meetings and goals provides a platform for change management
- Senior leadership involvement and support is crucial for success
- Presentation of data and reports to high level committees, including Board of Directors, is key to improved communication and accountabilities
- In spite of incredible barriers (e.g. resources) and an dramatic increase in demand (e.g. closure of MLK-MC), a hospital can be very successful in similar collaboratives

### **INLAND COUNTIES EMERGENCY MEDICAL AGENCY**

#### Overview

The Inland Counties Emergency Medical Agency (ICEMA) is a joint powers agreement consisting of San Bernardino, Inyo, and Mono Counties. According to the California Department of Finance, the three counties had a combined population of 2,058,244 in 2007 (San Bernardino comprising 2,026,325).

It was formed to perform the emergency medical system duties mandated in statutes and regulations for planning, implementing and evaluating an advanced life support system, including the mandated requirement to exercise medical control over the system.

The following information describes the system:

- 2,233 paramedics
- 2,628 EMT-Is
- 179 MICNs
- Eight base hospitals
- 21 paramedic receiving hospitals: 18 in San Bernardino County, two in Inyo County, and one in Mono County

There are two designated trauma centers:

- Loma Linda University Medical Center, Level I adult and pediatrics
- Arrowhead Regional Medical Center, Level II adult

Only 13 of the 21 paramedic receiving hospitals are allowed currently to request diversion status, since the remaining hospitals are geographically isolated and there no other destination options. There are five dispatch centers and 9-1-1 is used to activate the system.

#### Goals for Participating in the Diversion Project

- Decrease diversion hours
- Decrease offload times
- Learn and initiate best practices
- Provide opportunities for hospitals within the ICEMA system to become leaders in developing strategies to lessen the nationwide problem of ED wait times
- Provide information necessary to revise or eliminate current diversion
- Develop policies and practices related to these goals

#### Project Challenges

- Obtaining complete data necessary to evaluate progress
- Increasing population with no significant increase in available hospital beds

- Proper and timely destination of mental health patients
- Staff time necessary to monitor project
- Some hospital non-compliance with ICEMA diversion policies
- Improper use of “internal diversion” category
- Heavy influenza/respiratory illness season, which skewed data
- Some hospitals were slow to start participating in the project

**Base Line Data**

September 2, 2007 – September 29, 2007

Total Hours:

- ED Diversion and Internal Disaster: 507
- Patient volume (American Medical Response [AMR] services only): 2,029

**Steps Taken**

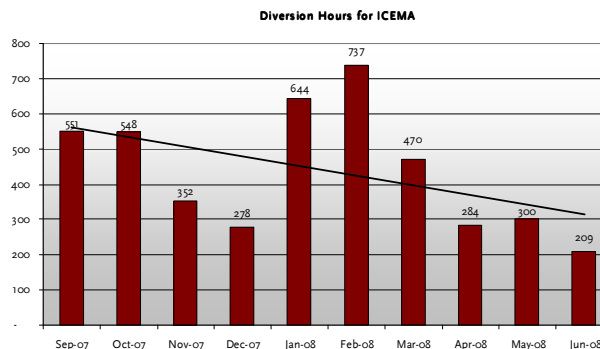
A diversion policy reminder was sent to all hospitals at the beginning of the project. A review and approval of hospitals’ internal diversion policies was conducted to ensure consistency with ICEMA’s policy. The following steps were also taken:

- Real-time monitoring of hospitals on diversion
- Implementation of bed-delay page report system
- Hospital meetings were held to discuss elimination or significant modifications to the current diversion policy, with eventual goal towards complete elimination

**Results**

The hospitals implemented numerous strategies to improve hospital wide patient flow and to decrease diversion.

At the outset of the project, diversion hours were 551. By June 2008, they dropped to 209 hours (or a 62.1 percent decline). This represented the largest drop among the three LEMSAs.



The following table presents the percent and absolute change for ICEMA’s diversion hours and patients diverted from September 2007 to every third month.

ICEMA			
	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Diversion Hours			
Percent Change	-49.5%	-14.7%	-62.1%
Absolute Change	(273)	(81)	(342)
Patients Diverted			
Percent Change	-	87.5%	-
Absolute Change		(1)	-

Note: There were zero patients diverted in 12/07 and patients diverted were not reported after 5/07.

As diversion hours declined for each comparative period, the number of patients diverted was also very low. ICEMA averaged only 5 patients diverted per month for all three of its participating hospitals. In addition, the patient volume (AMR only) remained steady at 2,034 with only a very small increase (.025 percent) over baseline.

**Arrowhead Regional Medical Center**

**Overview**

Arrowhead Regional Medical Center (ARMC) is located in Colton, California. This 324-bed county hospital has a Level II trauma center that serves San Bernardino County’s population. The ED has a total of 49 beds with 26 acute care beds and a six bed Fast Track. The 2007 ED volume was 96,000, which was an increase of 16 percent from their 2006 volume.

**Where They Started**

This participant started early on with a high level of energy which was maintained throughout the collaborative. An inpatient flow

team was in place by November with good participation by the inpatient units. Initially there was reluctance by the admitting department to participate but the enthusiasm by the team soon won this department over.

#### Gaining Momentum for Change

ARMC was very aware that executive support and involvement were keys to implementing and sustaining successful change management. The chief nursing executive (CNE) was very active as the project sponsor and consistently attended all flow committee meetings and the project activities.

Communication was consistently provided to the remaining executive team and to the hospital and medical staff members. In addition to the management involvement, frontline staff members were valued for their input and encouraged to participate in the design of their ideas. This level of empowerment made the implementation of their strategies fairly smooth.

#### Strategies/Implementation

- Tracked percent of discharges that occurred prior to 11:00 am and found that only five percent of patients actually leave before 11:00 am
- Each morning when the ED had inpatient boarders the CNE, managers, and assistant managers round in the ED on the boarders
  - The managers and assistant managers return to their units and do a review of potential discharges and identify what is holding up the process and then address those barriers. If required, physicians are notified to assist with the discharge process.
- Daily flash reports are sent electronically to everyone that has access to hospital email. This includes the status of the facility due to volume, inpatient boarders and diversion status
- A Discharge Lounge was trialed and found not to be very effective as nursing was resistant to moving their patients

- A redesign for the medical screening examination (MSE)/triage area was performed
- Bed Huddles were held in the ED Monday through Friday in the morning, at 1:30 pm, and at 8:00 pm with managers, charge nurses, house supervisors and the admit nurse
- ARMC's administration is apprised daily on patients boarding in the ED
- They developed a change of culture that the admitted patients belong to the assigned inpatient services and not the ED
- There was continual collaboration with the provider staff on changes to processes in the department as well as house wide

#### Overcoming Barriers

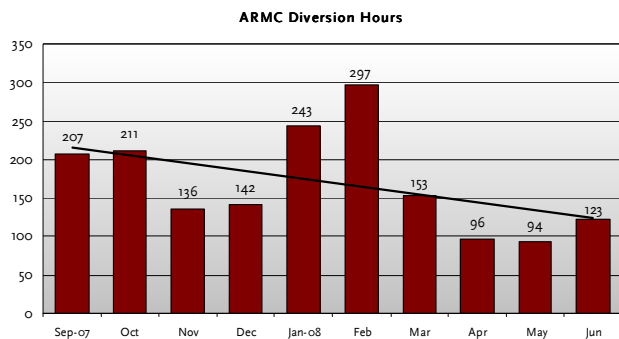
Overcoming barriers took executive commitment, which ARMC had with the ED medical director and the CNE giving direct support, while the CFO, CEO and COO provided indirect support. The executive team took accountability for oversight in improving patient throughput throughout the organization.

Expectations were developed to ensure there was a level of ED engagement for continual improvement in processes by the ED management and staff.

ARMC also ensured that there was level of in-house engagement which they improved with continual process changes to promote service to the patient while meeting the needs of the organization.

#### Results and Next Steps

ARMC started the diversion study with 207 diversion hours in September 2007; they peaked at 297 hours in February 2008 and were the lowest in May with 94 hours.



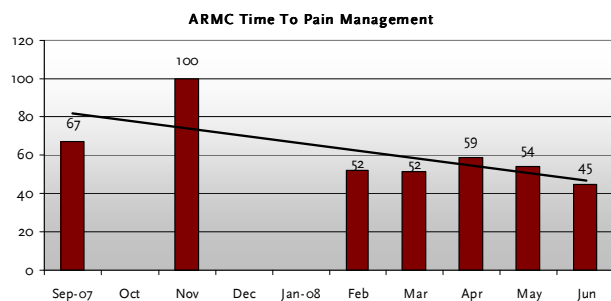
The following table shows the percent and absolute change for ARMC’s diversion hours comparing September 2007 to every third month.

ARMC			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Percent Change	-31.4%	-26.1%	-40.6%
Absolute Change	(65)	(54)	(84)

Throughout the project, ARMC’s diversion hours decreased for all three comparison periods. There was a spike in January and February 2008 due to the flu season. Overall, hours dropped by 40.6 percent from September 2007 to June 2008.

ARMC chose the “orthopedic pain management” as the clinical KPI and data were unavailable for October, December, and January.

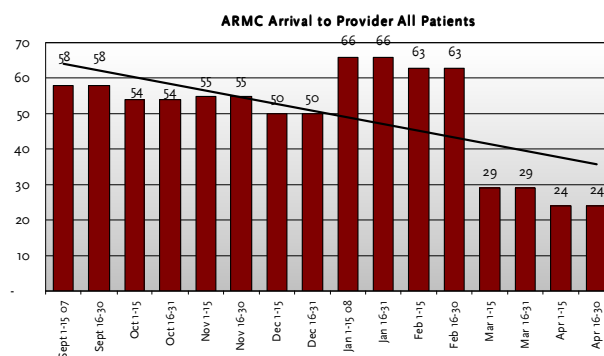
The following graph shows ARMC was able to drop the length of time for patients to receive pain management in the ED by 22 minutes from September 2007 to June 2008.



The total patient turn-around-time was not submitted by ARMC and data for the ED turn-around time were submitted for all treatment

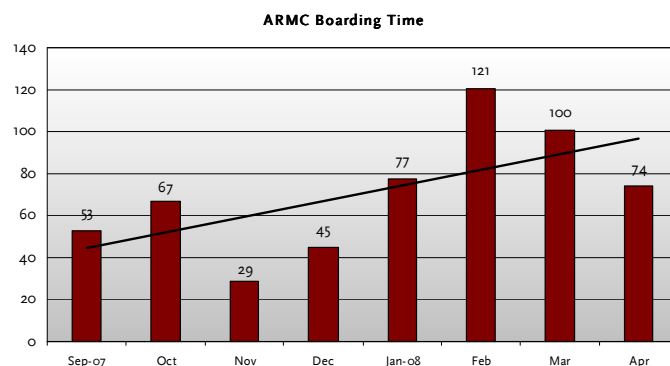
pathways (i.e., admitted, treated and released, and fast track) combined.

The time of arrival to be seen by a provider for all patients declined by 58.6 percent from baseline when compared to the last reporting period in April 2008 (the last period ARMC reported for this KPI).



The provider-to-disposition KPI data were submitted from December 2007 through June 2008 separately for each pathway. Admitted patients had a 37 percent decline in their time, Fast Track patients had an 15.8 percent decline and the treated and released patients saw a 20.2 percent drop. The disposition decision-to-actual-disposition KPI data were also submitted from December 2007 through June 2008. Admitted patients had a 3.5 percent increase in time, Fast Track patients had a 22.6 percent drop and the treated and released patients had a 22.7 percent drop in times.

Boarding hours went up 22 hours when comparing September 2007 (53 hours) to April 2008 (74 hours), the last month data were provided.



During the project ARMC saw a 5.7 percent increase in volume and a 12.6 percent increase in ED admissions. ARMC saw improvements in almost all KPIs; this is very impressive given the increase in volume and acuity experienced at the hospital.

ARMC plans to continue to build their capacity and reduce diversion. Future plans include adding 84 inpatient beds to accommodate the influx of the population.

With the increased awareness from the collaborative on inpatient throughput and the need to decrease inpatient boarding hours in the ED for patient safety, a dramatic decrease has been seen in their ED diversion hours (51.3 percent). This significant change was only achieved by an organizational effort. ARMC plans to continue to modify their processes to meet the needs of the community as well as the organization. In addition, there are plans to redesign the ED in the next few years to meet the continued growing needs of the community.

The organization has reached a turning point in that now there is a heightened awareness of ED over crowding which is now seen as a hospital issue as opposed to a problem for which only the ED should be accountable.

The current redesign of the ED intake process has reduced the arrival to be seen by a provider time to 24 minutes and at the same time, increasing patient, staff and provider satisfaction.

#### Lessons for other hospitals

- Perseverance and understanding human behavior is critical to success. ARMC experienced and are still experiencing push-back from nursing and medical staff
- Recognize that any change to the department has a ripple effect on other departments, which has the potential to create secondary barriers to the change process
- Consistency in managing and sticking to new processes is important

- Commitment is required from the leadership at all levels, i.e. medical staff and nursing leadership, including charge nurses

### **Loma Linda University Medical Center**

#### Overview

Loma Linda University Medical Center (LLUMC), which is part of the Seventh Day Adventist Network, opened in 1967. Today the organization has 749 tertiary care beds and is the only Level I regional trauma center for Inyo, Mono, Riverside, and San Bernardino counties. LLUMC operates some of the largest clinical programs in the United States in areas such as neonatal care and outpatient surgery. It is recognized as the international leader in infant heart transplantation and proton treatments for cancer. Each year, the institution admits more than 33,000 inpatients and serves roughly half a million outpatients<sup>31</sup>. The ED has 18 adult and 18 pediatric beds, with a four-bed CDU and four-bed Fast Track. LLUMC saw 53,481 ED patients in 2007.

#### Where They Started

During the initial phase of the collaborative the ED nurse and medical directors were the only staff involved in the project. The ED nurse director resigned the position in November leaving only the ED medical director. The ED medical director had a high level of energy for change management and was very talented in obtaining buy-in from administration, the medical staff and ED staff. The medical director was able to create an environment of thinking outside the box and had many preliminary ideas already in motion when the project started.

Improving the diversion time and patient flow for LLUMC was seen as a global issue to be addressed by the executive and ED leadership. However, at the department head level to the front line inpatient staff level, improving diversion was seen as an ED issue that only the ED could fix. Very little enthusiasm existed beyond the ED and administrative walls for the project and patient flow improvement. This was further evidenced by the lack of

participation by the inpatient champion during the project.

#### Gaining Momentum for Change

During the first few months the project was stalled with the resignation of the ED nurse director. However, the project sponsor and the ED medical director had a strong drive to continue in the project and to improve patient flow. By the January site visit, a new ED and inpatient champions were assigned and LLUMC's participation took off. The new ED champions stayed on top of the project timeline and submitted their data on time.

Addressing the silo effect from the inpatient units was a challenge for the project sponsor and ED champion, which was only overcome during the last part of the collaborative. The project faculty member was instrumental at helping gain administrative support.

#### Strategies/Implementation

- Budgeted expansion of the triage area; the remodel took 12 weeks
- Developed two sub-waiting rooms and rapid cycled tested it for two weeks
- Hired a bed czar in January
- Hired a Patient Flow Director, responsible for ED and OR flow
  - Identified throughput barriers
  - Removed those barriers
  - Reports directly to CNO
- Triage staff was increased to two registered nurses, two ED technicians, and one LVN
- The sub-waiting room policy for implementation when the ED is at capacity
  - Nursing begins treatment in this area using written protocols
- Developed a Code Capacity Program for safe handling of adopt-a-boarder program (see Appendix)
  - Conducted several table top exercises for the inpatient units and medical staff prior to implementing the Code Capacity Program
- Developed a Service Designation Program for ED admissions
  - This program addresses ED patients that are admitted to a teaching service

- When delays occur in the teaching service, the ED physician has the ability to admit the patient with transitional orders for the appropriate service
- During the peak of influenza season LLUMC utilized their Surge Tent to stay off diversion and meet the increased community needs
- Implemented an admission algorithm
  - Checklist to assist with patient movement
- Created a liaison partnership policy
  - ED physicians are partnering with department chairs to enhance physician relationships
- Instituted a physician bed czar role
  - Arbitrator will decide when turf battles occur and adjudicate
  - Will not hold up moving patient
  - Will have the authority to change services
- Created Internet ED registration
  - Patients will register from home and be put in the queue
- Rapid Medical Exam® (or RME)
  - Triage nurse does initial quick registration with chief complaint, name and birth date
  - Secondary nurse completes history and starts nursing protocols
  - Patients wait in lobby for further testing (i.e. radiology) and results
  - Not seen by provider until nursing protocol started
  - Utilized nurse practitioner to initiate RME® process and/or to provide dispositions to patients within the RME® system
- Developed metrics
  - Monitor flow
  - Determine bottle necks
  - Find solutions

#### Overcoming Barriers

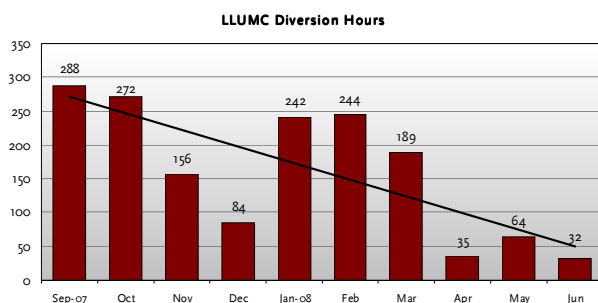
LLUMC had difficulty in achieving buy-in from the ED nursing staff and the implementation of the sub-waiting rooms. To overcome this resistance the ED leadership listened to the concerns of the nursing staff and made adjustments to the process based on the feedback received.

Implementation of the bed czar and Patient Flow Director began late in the project but appeared to likely be instrumental in improving patient flow. The Patient Flow Director will be an important role for obtaining buy-in from the inpatient units to improve patient flow and moving patients out of the ED.

**Results and Next Steps**

- The expanded triage coverage improved efficiency for the RME® process
- The sub-waiting rooms resulted in marginal improvement in turn-around times
- The discharge area is under construction
- Diversion was 142 hours for the two-week period beginning in September 2007, but plummeted to 6 hours by the end of the project, despite a 5.6 percent increase in ED volume
- No change in amount of ambulance traffic with decreased diversion hours
- LLUMC will evaluate the Code Capacity Program and make changes as needed

LLUMC had an 88.9 percent decrease in diversion hours from September 2007 to June 2008. The highest month for diversion occurred in September 2007 with 288 hours, while the lowest occurred in June 2008 with 32 hours.



The following table shows the percent and absolute change for LLUMC’s diversion hours comparing September 2007 to every third month.

LLUMC			
	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Diversion Hours			
Percent Change	-70.8%	-34.4%	-88.9%
Absolute Change	(204)	(99)	(256)

Throughout the project the diversion hours continued to decrease steadily. In fact, LLUMC had the largest decline in diversion hours of any single hospital in the project.

LLUMC was not able to provide data for the inpatient KPIs. In addition, data were submitted monthly as opposed to the requested bi-monthly because of the challenges they faced collecting the data.

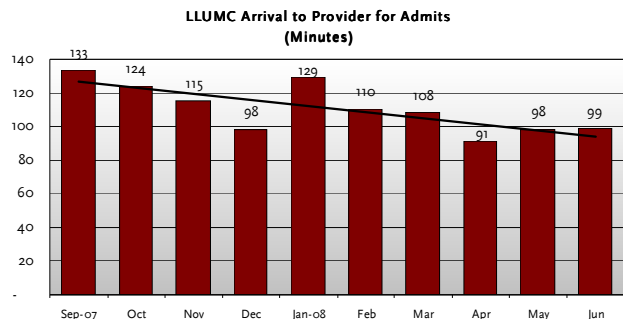
LLUMC chose to submit the “time to heart treatment” for the ED clinical KPI. Data were submitted inconsistently with only five out of the ten months available for this KPI due to resource challenges. Comparing September to March (the last submitted data), there was a 34.5 percent improvement in the patient arrival time to intervention.

Data for the ED turn-around-time for admitted patients ranged from a high in February 2008 of 12 hours and 6 minutes to a low in December 2007 of 9 hours and 6 minutes. There was no change when comparing the first month of the project (September 2007) to the final month (June 2008). Both data points were 10 hours and 18 minutes. However, the turn-around-time for Fast Track patients experienced a 5 percent drop (or 12 minutes) for the same time period, while treated and released patients experienced a 6 minute reduction in time (again, for the same time period).

The provider to disposition KPI time did not improve (the data were provided combining the three clinical paths – admitted, Fast Track and treated and released). From September 2007 to June 2008, it rose 29 minutes. The disposition decision to discharge KPI was also reported with all pathways combined. It had a nominal improvement – moving from 6 hours and 38 minutes to 6 hours and 31 minutes for the same time period.

ED turn-around time for the arrival to be seen by a provider KPI was reported for all pathways and experienced a decrease in all three clinical pathways during the study. The admitted patients were highest in September 2007 with

2 hours and 13 minutes and lowest in April 2008 with 1 hour and 31 minutes. This KPI had the largest improvement with a 25.6 percent decrease in time.



Fast Track patients had a 14.4 percent decrease with the highest time in February 2008 of 2 hours and 27 minutes and the lowest time in December 2007 (1 hour and 37 minutes). The treated and released patients had a 12.9 percent overall decrease with February (2 hours and 29 minutes) as the highest time and December (1 hour and 24 minutes) the lowest time.

Inpatient boarding hours were nominal for LLUMC throughout the project. They ranged from a low of 3 hours and 48 minutes in December 2007 to a high of 6 hours and 30 minutes in February 2008. When comparing September 2007 to June 2008, there was no change (4 hours and 30 minutes).

ED admissions and volume rose by 6.4 percent and 5.6 percent, respectively from the start to the finish of the project. The percent of patients who left without being seen went from 4.1 percent in September 2007 to 3.5 percent in May 2008 (the last reported period).

#### Lessons for other hospitals

- Find an inpatient champion who embraces improvement to patient flow through the whole continuum of care
- Identifying a physician champion who can overcome resistance to change is one of the best assets to change management a hospital can have

- Define baseline data points early in the process to ensure everyone is on the same page

### **St Mary Medical Center**

#### Overview

St. Mary Medical Center (SMMC) is located in the high desert community of Apple Valley, California in San Bernardino County. It is part of the St. Joseph Health System of Orange, which covers regions in Northern California, Southern California, West Texas, and Eastern New Mexico<sup>32</sup>. For greater than 50 years, SMMC has grown from a small facility in 1956 to a comprehensive 186-bed, Joint Commission accredited hospital. SMMC is the area’s only full-service cardiovascular surgery program and the area’s only Level II Neonatal Intensive Care Unit. The ED has 25 beds and experienced over 61,000 ED visits in 2007.

#### Where They Started

At the beginning of the project there was no inpatient flow team and the ED flow team was very isolated from the rest of the hospital and frustrated that any changes made would only be done in the ED because the rest of the hospital had not embraced ED over crowding and diversion as a system issue. Ownership for patient flow and ED diversion was limited to the ED and the some of the executive team.

#### Gaining Momentum for Change

Momentum for change was very slow for this facility. The executive team decided to approach patient flow with the Toyota Lean Process and a facilitator was hired in December 2007 to spread the “St. Mary Way” throughout the organization. By February 2008, patient movement was flowcharted and bottlenecks were identified throughout the continuum of care. Each bottleneck was then prioritized to be addressed by Rapid Improvement Event teams.

By the April 2008 site visit, the frustration and isolated feelings the ED staff experienced started to evaporate and the walls among departments were coming down.

Having the right person responsible for change management is crucial. The St. Mary Way facilitator and the new COO as the executive sponsor played the major factor in turning this organization around in how they addressed ambulance diversion and ownership of patient flow. The cultural change taking place for SMMC began moving from a “this is your patient” to a patient-centered culture.

The initial inpatient champion resigned and several months went by before another champion was assigned and when the new champion was identified, they were not very involved due to their new position within the hospital. The critical care manager stepped up and became the unofficial inpatient champion.

#### Strategies/Implementation

- Front end was process redesigned
- Commitment to have all patients seen by a provider before going to the waiting room
- Front end team leader created
- Inpatient and ED patient flow teams meeting once a month
- Reverse physician rounding RCT
- Written goals for the flow teams
- Bypass triage and bedside registration
- Changed chart racking for physicians
- Using Toyota Lean process
- Monthly Rapid Improvement Events started in February
- Standardized process for floors to transport patient to their unit with bedside report given in the ED
- Completion of Rapid Improvement Event with new process development for bedside report in ED
- Standardized process where inpatient nurse receives report in ED and takes the patient to the floor
- Currently collecting data for a goal of bed assignment to report less than 15 minutes
- Completion of Rapid Improvement Event on medication reconciliation to decrease medical errors
- Turn-around times in ED as well as decrease delay in inpatient discharge
- Completion of Rapid Improvement Event with Hospital Shift Supervisor (HSS) process

- Participation from Executive Management Team
- Bed meetings twice a day in the house shift supervisor’s office held at 11:00 am and 2:45 pm with attendance from ED, inpatient management, environmental services and case management

#### Overcoming Barriers

The ED staff and physicians were very engaged in improving access to care for the community. They overcame the barriers by having an ED physician champion guide and help with improving patient flow. With the development of the Rapid Improvement Events the culture started to shift towards a hospital wide goal of tackling patient throughput. The increased involvement of senior leadership and the St. Mary Way facilitator led to increased inpatient involvement. Routine hospital wide leadership meetings addressing patient flow resulted in decreasing silos among departments. The ED leadership has committed to improving relationships between the ED staffing and ancillary departments with a goal of having a collaborative team. SMMC had the following specific barriers:

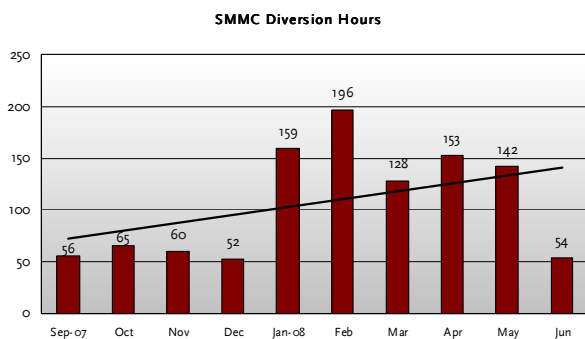
- The 4:1 nurse ratio for telemetry patients implemented in January 2008
- Lack of ownership in moving patients
- No pulling of patients
- Not all of the executive team was on board
- EMS goes “shopping” for hospitals by looking at bed delays
- Still working on development of pull versus push culture change
- Capacity issues (currently looking forward to ED re-design)
- Medication reconciliation
- Inconsistent use of Teletracking bed product/lack of knowledge (currently in process of re-educating all staff and management)
- Long call back times from on-call physicians for admit orders
- Occasional long admit to bed placement times due to varied reasons
- Data collected on a monthly basis, and now has to be reported bi-weekly
- Limited personnel for data collection

**Results and Next Steps**

SMMC has seen the following results from the implemented strategies:

- Improved patient satisfaction
- Improved patient to provider times after changing the chart racking system
- Transport of patients and bedside report
- An improvement and buy-in by inpatient unit nurses in the last months of the project
- Goal to have primary nurse transport admissions from the ED
- 15 minute average from bed assignment to report in ED
- Percent of incomplete treatment in ED consistently less than 2 percent
- Door to heart (door to balloon) consistently less than 90 minutes
- Door to provider consistently less than 30 minutes on average

SMMC started with 56 diversion hours for the first period in September 2007 and ended with 54 diversion hours for June 2008. February 2008 experienced a spike to 196 hours due to the flu season.

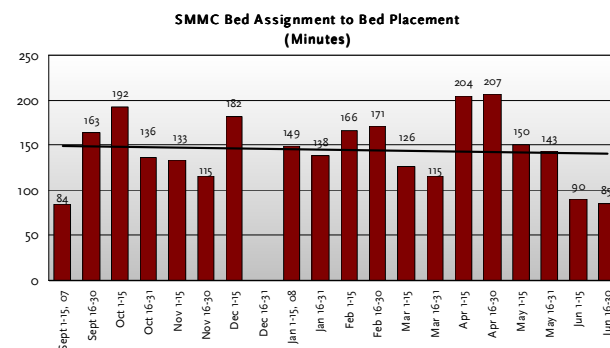


The following table shows the percent and absolute change for SMMC’s diversion hours comparing September 2007 to every third month.

SMMC			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Percent Change	-7.1%	128.6%	-100.0%
Absolute Change	(4)	72	(2)

Inpatient KPIs did not show any improvement with the exception of the bed assignment to

bed placement KPI. The data showed a slight improvement when comparing from the start of the project to the end. The goal for this KPI was 90 minutes which was obtained in reporting periods 1, 19, and 20.

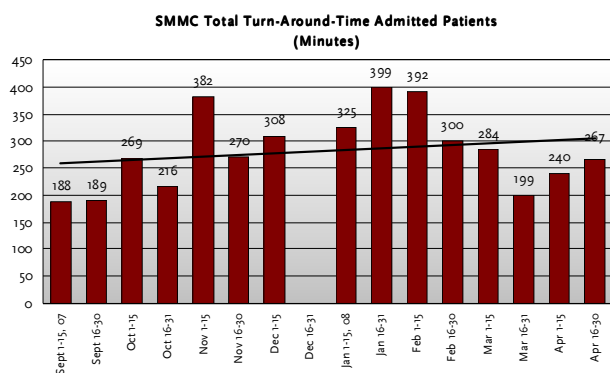


Bed turn around started in September at 2 hours and 2 minutes and ended in June at 2 hours and 28 minutes, up 26 minutes. Average discharge times were at 3:01 pm for the first reporting period and were at 3:35 pm for the final period, a 34 minute increase.

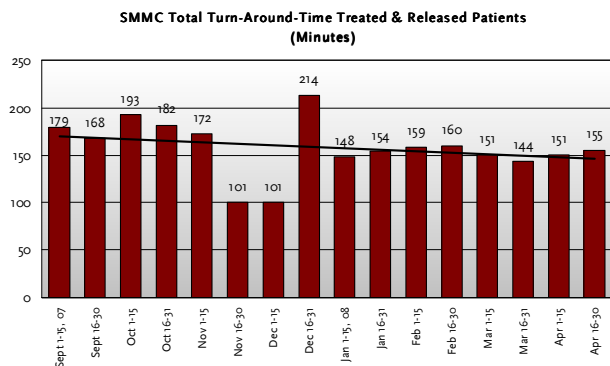
Inpatient hospital discharges increased 19.9 percent from September 2007 (840) to June 2008 (1,007). This increase in hospital discharges was probably a contributing factor to the challenges of improving inpatient flow. However, the largest contributing factor was the lack of an inpatient champion and buy-in from the inpatient units for improving inpatient flow that this facility had earlier in the project

SMMC submitted their clinical KPI on time to heart treatment. During the collaborative, SMMC made significant improvement, reporting 2 hours and 28 minutes in September 2007 and ending in June with a whopping time of 22 minutes for an 85.1 percent improvement.

The total turn-around time for admitted patients for the first period in September 2007 was 3 hours and 8 minutes and mostly went up from there. The last reporting period SMMC submitted data for reflected a time of 4 hours and 27 minutes (April 16-30, 2008) with no obvious explanation other than the lack of inpatient involvement on this project.



However, the turn-around-time for those patients treated and released showed an improvement of 24 minutes from the first reporting period to the last period SMMC reported data for. (SMMC does not have a Fast Track in their ED.)



ED turn-around times were only reported for all patients and not broken out by treatment paths. SMMC had the following changes from the first reporting period to the last:

- The patient arrival time to seen by a provider had a 46.6 percent improvement from 30 minutes to 16 minutes
- Patients seen by provider to disposition decision had a 5.4 percent improvement, from 1 hour and 32 minutes to 1 hour and 27 minutes
- The patient disposition decision to actual disposition went from 18 minutes to 39 minutes

Impressively, SMMC had a decrease in boarding hours going from 4 hours and 43

minutes to 3 hours and 5 minutes. In addition, their percent of patients who left without being seen was less than 2 percent for every month (except February, which hit 2.2 percent).

At the same time, SMMC saw a 2.7 percent increase in ED volume and 14.2 percent increase in ED admissions.

#### Lessons for other hospitals

- Consistent, open communication with inpatient leadership and the ED makes a difference
- Commitment is needed from inpatient units in order to make improvements
- A change in culture is crucial from “ED an concern to a hospital-wide concern” for success

#### SANTA CLARA COUNTY EMS AGENCY

Santa Clara County EMS Agency (SCCEMSA) is located in San Jose and is charged with the oversight and regulation of the delivery of EMS within the county. Specifically, SCCEMSA is responsible for developing and coordinating an integrated emergency medical care delivery system, which is composed of education agencies, hospitals and specialty care facilities. Responsibilities include system planning, training program approval, provider and hospital designation, the establishment of appropriate medical, operations, and quality standards, monitoring and facilitating compliance, and the certification, authorization, and accreditation of personnel. SCCEMSA is also responsible for disaster medical-health planning and response.

SCCEMSA was originally slated to participate in this project. However, the administrator of the agency was added the responsibility for another assignment during the start of this project and was unable to fulfill the duties of both roles plus adding the rigorous demands of the collaborative. They were available for consultation and supportive measures but did not actively participate in the project.

## Regional Medical Center of San Jose

### Overview

Since 1965, Regional Medical Center of San Jose (RMCSJ) has served Santa Clara County's public and private health care networks. With a licensed bed capacity of 204, RMCSJ is an acute-care hospital that offers an array of inpatient and outpatient services. Located in San Jose, California, RMCSJ is an affiliate of HCA, which is composed of approximately 180 hospitals and 91 outpatient surgery centers in 23 states, England and Switzerland.

With 34 ED treatment beds, RMCSJ had a total ED volume of 54,903 in 2007, and admitted 17 percent of those, accounting for 89 percent of all hospital admissions. A Level II trauma center, RMCSJ had an occupancy rate of 69 percent, and total hospital admissions amounted to 10,791 in 2007.

RMCSJ joined this collaborative from the beginning. However, they ceded participation in April 2008 due to conflicting priorities at both the organizational and corporate levels. At that time they were involved in several corporate-mandated activities comparable to this project, resulting in the collection and reporting of similar data and were overwhelmed with the time and resources required to continue participation. Notably, they were very committed and made significant improvements during their participation in this project and they were able to report six months of data, September 2007 through February 2008, prior to their departure.

### Where They Started

Outlined below are some of the initial baseline factors, challenges and metrics for RMCSJ at the beginning of this project:

- While RMCSJ experienced low diversion and low incomplete treatment rates, they experienced significantly increasing boarding hours
- RMCSJ experienced an inpatient average length of stay (ALOS) of two days greater than the Medicare average

- RMCSJ was without a permanent ED nursing director throughout their participation in the project
- Disposition decision to actual disposition for admitted patients was excessive in the ED at the start of the project (4 hours and 5 minutes during the first reporting period)
- RMCSJ began a robust RME program in 2007, resulting in 25 percent of their ED patients never requiring services in the main ED
- Concurrently, they performed 100 percent bedside registration, with the registrars physically located in the nursing pod
- While RMCSJ did have an ED information system they did not have an inpatient tracking system, making data collection difficult as well as hindering throughput efforts to a degree

### Gaining Momentum for Change

RMCSJ had a very strong and dedicated ED medical director and very supportive executive leadership. There was some involvement from the general medical staff, with the group's representative attending at least one site visit and remaining interested in the goals of the project. The team was cohesive and had a good understanding of operational aspects in addition to clinical care. The greatest key to encouraging change at RMCSJ was pulling together multi-disciplinary teams, involving front-line staff in decision-making, and gaining buy-in from a variety of decision makers as well as the staff.

### Strategies/Implementation

Below are some of the initiatives implemented as a result of the strategies utilized by RMCSJ:

- In order to address capacity issues at RMCSJ, the teams examined various options for patient placement during high boarding hours and peak capacity. For example, RMCSJ is actively pursuing the adopt-a-boarder concept with the state of California.
- They also considered additional product lines such as an ED observation unit (EDOU). The capacity high impact team (HIT) initiated the use of the post-

anesthesia care unit (PACU) as an overflow unit during nighttime hours for ED patients. Additionally, they re-configured space on the second floor to use as a hybrid EDOU/rapid admission unit to be operated by the hospitalists. Cardiac monitors were ordered for all of those beds to make them universal in nature.

- Given that there was excessive disposition decision to actual disposition times, a HIT was created for each patient population affected: admitted and treat and release.
- They expanded their RME process beyond the intake area to include nursing and other protocols that would expedite the care even for patients arriving by ambulance, such that treatment could be initiated upon arrival and facilitate more timely care delivery.
- To facilitate throughput by addressing over-utilization of tests and procedures, the ED medical director was provided benchmarks to analyze current practices at RMCSJ, and closely tracked individual practices. The ED medical director then followed up discreetly with those providers who showed above average rates of ordering, which is a very common cause of ED crowding and delays.
- The inpatient HIT that was created to analyze long bed placement times from the ED implemented a model to staff environmental services to demand and decreased their inpatient bed turnaround times by 56 percent.
- Another HIT was formed to analyze the problem of late inpatient discharge times and the extended ALOS. Individual physician discharge times were tracked and those with routinely later than acceptable times were consulted and held accountable for earlier discharges.
- Additionally, more case managers were sought and dedicated case managers for the ED were created.

Overcoming Barriers

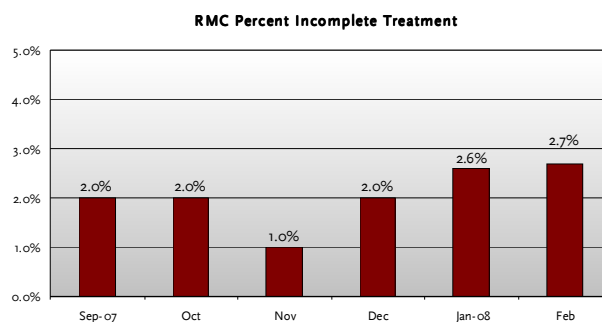
RMCSJ faced many barriers that eventually led to their withdrawing from the project. This included the lack of an ED nursing director; they did have an interim director but she was

faced with many other duties in addition to running the department on a temporary basis and attempting to manage the duties of this project as the ED champion. Additionally, RMCSJ had approximately three other major initiatives concurrently requiring them to collect large amounts of data.

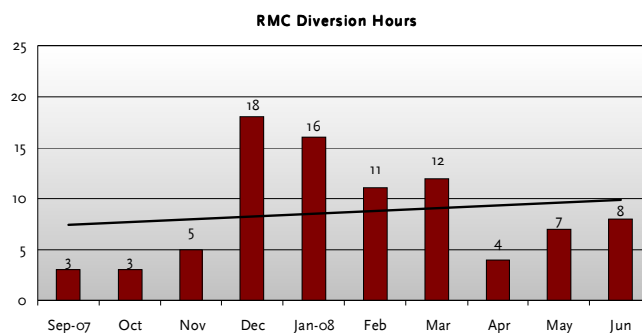
Results and Next Steps

RMCSJ experienced a demanding increase in ED volume of 15.1 percent and a 10.9 percent increase of ED admissions during their participation in this project. At the same time they faced a nearly six-fold increase of inpatient boarders remaining in the ED (from 27 hours in September to 153 hours in February).

Despite these stressors they managed to keep the population of patients with incomplete treatment under three percent, largely as a result of the expanded RME process.



While they did experience an increase in diversion hours during the flu, the total number never exceeded 18 hours in any month which is very low relative to most of the other participant hospitals.



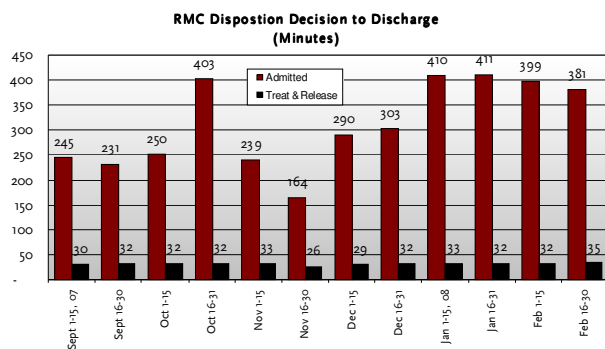
The following table shows the absolute change for RMC’s diversion hours comparing September 2007 to every third month.

RMC			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Absolute Change	15	9	5

While the total ED turn-around times increased for both admitted (34.1 percent [from 6 hours and 53 minutes for the first reporting period to 9 hours and 14 minutes for their last reported period]) and discharged patients (5.9 percent [from 2 hours and 49 minutes for the first reporting period to 2 hours and 59 minutes for their last reported period]) during the project, RMCSJ realized several successes in individual throughput metrics.

For example, time from seen by provider to disposition decision decreased by 39 minutes for discharged patients and by 16 minutes for those who were admitted. RMCSJ does not operate a Fast Track (in lieu of the RME program).

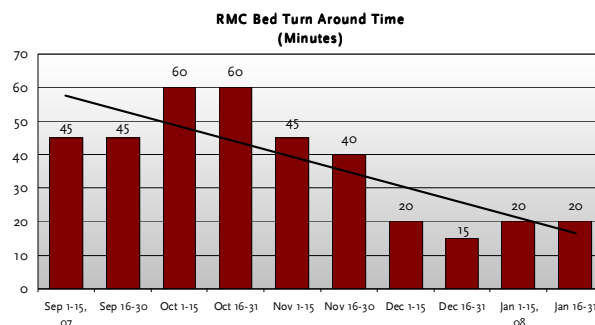
Disposition decision to actual disposition for admitted patients was excessive at the start of the project and grew even higher (381 minutes in the last reporting period, or 6 hours and 21 minutes).



This was likely related to the large number of inpatient boarders. However, for discharged patients they remained near or below their goal of 30 minutes.

As a result of the environmental services staffing to demand, and a focus on getting

inpatient beds cleaned quickly and facilitated by the inpatient HIT, RMCSJ obtained a 55.6 percent reduction in overall bed turn-around times (data were not submitted for the month of February).



A final success realized by RMCSJ was a 30 percent reduction in time from patient arrival to PCI for patients experiencing STEMIs, with two reporting periods being below the goal of 90 minutes.

#### Lessons for Other Hospitals

RMCSJ truly embraced the HIT/RCT concept and had major successes using this model. This included using both front line staff, as well as management, and ensuring multi-disciplinary groups. It should also be noted that in order to successfully participate and complete a collaborative such as this, in the wake of competing corporate priorities, additional resources need to be deployed for data collection, group leadership, and other required activities. Also key to the project for RMCSJ was ensuring ongoing collaboration among physicians and staff, as well as executive leadership members. Finally, another lesson learned was that it was tedious and cumbersome to obtain and analyze data expeditiously and accurately without having computerized systems on the inpatient areas.

#### VENTURA COUNTY EMS AGENCY

##### Overview

Ventura County EMSA (VCEMSA) is located in southwestern California and comprises various disciplines and agencies, including fire departments, ambulance services, and other public and private agencies. ALS service is contracted through the Gold Coast Ambulance

Service, AMR, and Lifeline Medical Transport. These agencies respond to approximately 30,000 emergency calls per year that result in 20,000 annual transports to EDs in hospitals throughout Ventura County. There are eight hospitals in Ventura County. Four are "base hospitals" which coordinate care, provide medical control for the paramedics, and provide continuing education through experienced ED physicians and pre-hospital care coordinators (who are registered nurses).

Baseline data for the hours of diversion were readily available for the participating hospitals and VCEMSA by way of the ReddiNet diversion tracking system. The following are some of the challenges faced by VCEMSA:

Project Challenges

- There was not as much formal collaboration as desired between the LEMSA and the region’s hospitals and between the hospitals themselves
- There was inconsistency among hospital practices regarding diversion
- There was inconsistency and some confusion regarding how individual hospitals tracked diverted patients
- Shortly before the start of the project, one of the hospitals had a complete closure for six weeks due to an infection control issue, placing an increased demand on the LEMSA to communicate with the hospitals, as no diversion was permitted during that time.

Note: during that time of no-diversion, all project hospitals as well as the LEMSA reported that operations were “smooth” and “everything went fine.” Communication among the organizations increased and despite being without services of an entire ED, all patient transports and procedures operated well and there were no significant problems reported by any participating entities.

Steps Taken

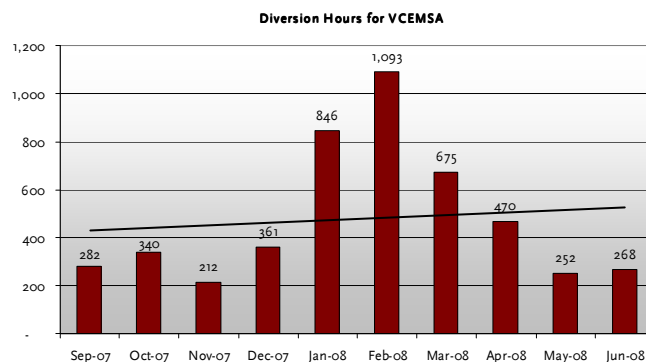
The following steps were taken to support the goals of the project:

- Diversion hours were collected from ReddiNet and uploaded bi-monthly to the project extranet
- The LEMSA contacted the two dispatch centers and collaborated with them to devise a plan for collecting the number of patients diverted
- The LEMSA administrator worked to create a monthly collaborative meeting with all the hospital leaders to begin discussions of a county-wide no-diversion plan
- Financial data were obtained to share with hospital administrators to demonstrate the impact of diverting patients to other hospitals

Results

Below are some of the key results following this project for Ventura County:

- VCEMSA did a consistent job tracking most of the data required for this project, including the monthly progress reports
- There is now a plan to move to a county-wide no-divert policy at the beginning of 2009 that will coordinate with the implementation of a regional trauma system at that time
- The vast majority of the hospitals are supportive of a no-divert policy and the LEMSA has a committed leadership to hold hospitals accountable to this plan
- There were 282 diversion hours at the start of the project, as shown in the following graph, with a significant increase during the flu season; however, May and June 2008 showed a decline in hours.



- The highest reporting month was February 2008 with 1,093 total hours, and the lowest reporting month was November 2007 with 212 hours.
- The following chart shows the percent and absolute change for diversion hours and patients diverted for VCEMSA comparing the first month to every third month.

VCEMSA			
	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Diversion Hours			
Percent Change	28.0%	139.4%	-5.0%
Absolute Change	79	393	(14)
Patients Diverted			
Percent Change	67.3%	371.4%	18.4%
Absolute Change	33	182	9

- All hospitals showed a spike in diversion hours during the influenza season (January-March)
- One project hospital made remarkable improvement over 2007 prior to and throughout the project
- A second hospital started low and remained low (with a spike during influenza season)
- A third hospital had significantly high diversion hours and made major improvements
- The fourth hospital had moderately low diversion, spiked during influenza season, then decreased back to their baseline

#### Lessons Learned

VCEMSA learned that at times there are substantial discrepancies between the electronic data collection systems utilized by the LEMSA as compared to those metrics maintained by the hospitals, especially as it relates to number of patients diverted, making data analysis difficult. However, VCEMSA and the associated hospitals also learned that when there is appropriate planning and communication. They are able to elevate to a no-divert policy as evidenced by the closure of a key hospital in their service area for several weeks. It is expected they will be successful moving to this policy in the near future.

## Community Memorial Hospital

### Overview

For over a century Community Memorial Hospital (CMH) has served Ventura County. CMH has 240 beds and is a non-profit facility which is part of the Community Memorial Health System. Located in southern California in Ventura, CMH provides many different medical services and programs, with an extensive array of specialists serving almost any medical need. They have a team of internists and family practice physicians that work together with specialists to provide medical care. The hospital is accredited by the Joint Commission. In 2007, CMH had an occupancy rate of 61 percent, a total ED volume of 36,943 and total admissions of 13,041. Of those admissions, approximately 48 percent were generated from the ED, which has 22 licensed treatment beds.

### Where They Started

Outlined below are some of the initial baseline factors, challenges and metrics for CMH at the beginning of this project:

- CMH had and continues to have a relatively low number of inpatient boarders
- The intake/triage process was cumbersome and there was significant resistance to change, such as triage bypass and bedside registration despite having the technology to do so
- The registration staff has no reporting relationship to the ED. They report solely to the CFO and business officers at CMH, which can create challenges when changes in processes related to their workflow is required
- CMH experienced long time of arrival to ED bed placement as well as long inpatient bed assignment to actual bed placement times
- There was no official structure for change management, such as HITs
- The ED nursing director was relatively new to CMH at the beginning of the collaborative, although very experienced and motivated for change

- Timeliness of consultation for ED patients by subspecialists and hospitalists was lengthy at times and there was an opportunity for improved collaboration among the physicians

#### Gaining Momentum for Change

The ED medical director at CMH was a strong operational leader and showed a great interest for change. This was important for gaining teamwork among ED nursing and physician leadership. Additionally, there was strong collaboration among the ED and inpatient leadership, namely the inpatient champion for this project as well as the nursing bed controller. This was a key component to pulling together and trying new ideas to facilitate patient flow and avoidance of ambulance diversion. A final factor that proved very helpful in the change management process was creating physician staff buy-in and collaboration among the ED and inpatient physicians, namely the hospitalists.

#### Strategies/Implementation

Below are some of the initiatives implemented as a result of the strategies utilized by CMH:

- One of the early strategies was to initiate an ED physician and hospitalist task force with monthly meetings. This greatly enhanced communication and resulted in some early wins for patient throughput. As a result of this task force, the ED physicians agreed to implement transitional admission orders when the hospitalist was unavailable or was going to be substantially delayed.
- A HIT team was created to examine the intake process, including registration. A new nursing line was created to provide double coverage at triage during times of peak capacity. One idea considered was to have a greeter, rather than a nurse, walk patients directly to a bed when the ED was operating at less than 75 percent capacity. (At the time of this writing that particular process was still being designed and trialed.)
- A HIT was created to examine the Fast Track processes. CMH considered

expanding the hours of operation after studying the demand for these patients, and are negotiating with the physician group to increase physician staffing to cover necessary expansion.

- CMH is considering some new product lines, such as a provider in triage and an EDOU. They are working to expand and hone the use of nursing-driven protocols to maximize the efficiency of care for those patients who meet protocol driven guidelines, which can expedite care when patients must wait in the lobby prior to seeing a provider.
- Along with those processes, registration was being encouraged at the bedside.
- An inpatient HIT was developed to examine the telemetry overflow unit, for potential use when capacity was an issue. The unit is now being utilized for ED overflow and/or boarders, and criteria for the use of this unit were re-defined with specific triggers for the opening and utilization of it.
- Metrics were examined to determine inpatient flow needs and discharge times to design processes to facilitate these. CMH created several daily bed huddles which include all patient care units where they discuss patient needs (e.g. admissions, staffing issues and any other topics affecting smooth patient flow and satisfaction).
- One of the most effective measures undertaken by CMH was the implementation of a true Capacity Command Center, complete with a nurse bed controller, electronic bed board, as well as support services such as centralized transport, environmental services and staffing.

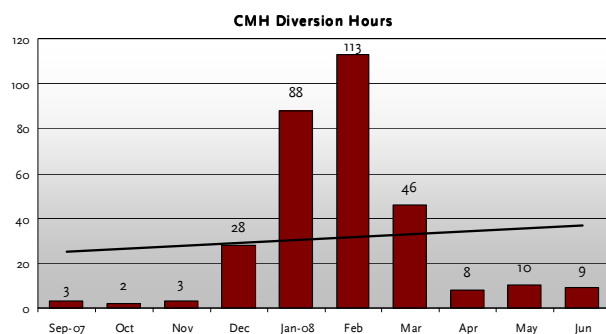
#### Overcoming Barriers

Once the people and processes were in place to collect all of the data points, the project became much easier for CMH. However, a major barrier faced by CMH was that they experienced turnover in key positions from their primary data collection staff member (hindering data reporting in the latter periods), as well as executive team members the

executive project sponsor. Yet the ED and inpatient champions maintained a strong degree of teamwork, setting a good example for respective staff members. Perhaps the greatest barrier was gaining buy-in from physicians to expedite admissions and discharges, along with other change factors; however pulling together the physician task force and enhancing that communication seemed to have a significant impact on flow and internal satisfaction.

### Results and Next Steps

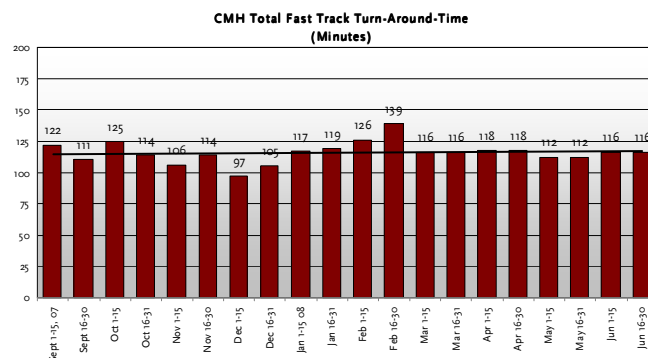
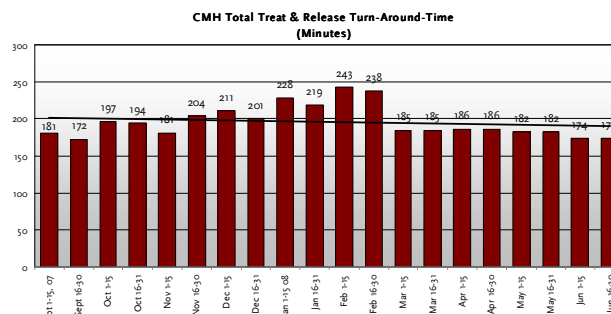
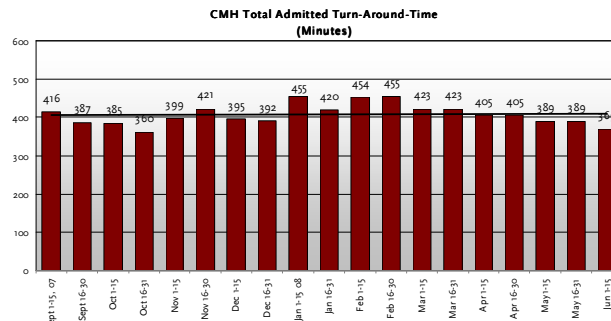
CMH is extremely supportive of moving to a no-divert policy for the county. During five of the ten reporting months, they had nominal diversion hours. While there was a peak during the influenza season, the hours still remained relatively low compared to other hospitals.



The following table shows the absolute change for the number of diversion hours comparing the first month to every third month.

CMH			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Absolute Change	25	43	6

As a result of their efforts, CMH realized a decrease in total ED turn-around times in all clinical pathways of patients from the first to the final reporting periods as follows: admitted declined 11.3 percent; treat and release declined 3.9 percent; and Fast Track decreased by 4.9 percent.

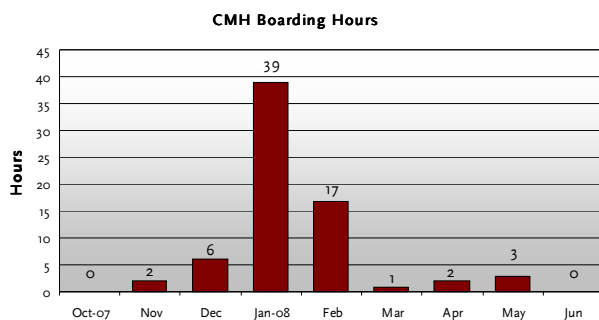


The peaks in turn-around-times during January and February are primarily attributed to the flu season and the increased ED volume. From December to January, ED volume rose 6.6 percent and hovered around 3,300 patients per month for January, February and March.

While there was large variation in time from seen by provider to disposition decision for treat and release and Fast Track patients, there was a 41 minute reduction in this KPI for admitted patients, likely as a result of the collaboration between the ED physicians and the hospitalists (the time went from 3 hours and 36 minutes to 2 hours and 55 minutes). Further, in the time from disposition decision to actual disposition, CMH realized a decrease

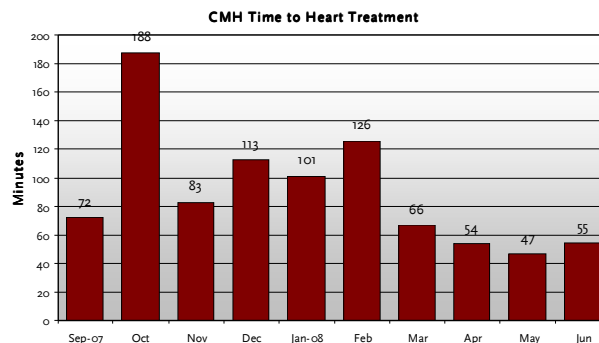
from 1 hour and 20 minutes to 26 minutes for discharged patients and an even greater drop in time for Fast Track patients, starting at 1 hour and 5 minutes and moving to 11 minutes. (Note: CMH provided ED turn-around-time data from 9/1/07 through 2/28/08.)

CMH won two VHA Awards during this project: one for the daily bed huddles and their effect on patient care and throughput; the second for effective organizational planning and leadership during the closure of the regional hospital shortly before the start of this project. Their Capacity Command Center is truly a best practice, facilitating patient throughput and communication throughout the entire organization. Additionally, the use of the overflow telemetry unit has greatly facilitated removal of boarders from the ED, which peaked during the influenza season which is when they decided to begin use of the overflow process, bringing that metric down to nominal figures again.



The Capacity Command Center and related communication efforts also led to an improvement in the median inpatient discharge times. From the initial reporting period (median time 3:17 pm) to the final one (2:40 pm) there was an overall success of 37 minutes in earlier discharge times. The period with latest discharge times (4:50 pm) was December 1-15. (Note: due to insufficient resources, not all data were received for this KPI.)

Finally, CMH greatly improved their time to PCI for STEMI patients, with six out of the ten reporting periods being below the goal of 90 minutes.



### Lessons for Other Hospitals

CMH recognized the need to have a structure in place for change management, such as utilizing the HIT model, along with RCT new ideas. Additionally, the leadership also realized that there was no true vision for the ED and there had been a lack of strategic and forward thinking; rather the ED had been historically reactive to patient flow and capacity issues. Further, gaining buy-in and ownership of the processes from the medical staff is an absolute necessity in any change process that involves patient throughput. A final factor for others to consider is that it might be important for key staff (e.g. registration) working in the ED to have some level of reporting relationship to ED management so that there is greater likelihood of gaining buy-in when change processes are required related to their positions.

### St. John's Regional Medical Center

#### Overview

St. John's Regional Medical Center (SJRMC), a member of Catholic Healthcare West (CHW), was established in 1912 by the Sisters of Mercy. The hospital grew from a six-room wooden structure on ten acres of land to a licensed 265-bed regional medical center on a 48-acre parcel in northeast Oxnard, in southern California. In addition, this campus has a 23-bed acute rehabilitation center. In 2007, SJRMC had a total of 10,746 hospital admissions, of which 47 percent were generated by the ED. The ED, which has 24 treatment beds, had 34,410 total visits in the same year, admitting 13 percent of those patients. The hospital experienced an occupancy rate of 69 percent during that

timeframe. SJRMC is accredited by the Joint Commission.

#### Where They Started

Outlined below are some of the initial baseline factors, challenges and metrics for SJRMC at the beginning of this project:

- One of the primary stressors for SJRMC was the fact that they had recently experienced an entire closure of their facility for several weeks due to an infection control issue, and they were still recovering from this near the beginning of this project
- SJRMC began this process with a total of 66 closed inpatient beds, although 44 had been closed for years due to construction, for a net loss of 22 beds due to the recent hospital closure
- SJRMC was experiencing high rates of ambulance diversion, but was interested in moving towards a no-divert policy for the county
- The ED was experiencing very high numbers of inpatient boarders
- There were unacceptably long times from time of arrival to time seen by provider
- There was not a capacity management plan in place, and inpatient nurses were routinely called off regardless of the acuity levels or capacity situation in the ED
- Patients were waiting in the ED lobby for extended periods merely due to the strict California nurse to patient ratios
- SJRMC had few electronic systems making data collection difficult and tedious
- The ED Throughput Committee had been recently resurrected at the start of this project, providing a platform for change management
- SJRMC has a fully staffed hospitalist program

#### Gaining Momentum for Change

SJRMC truly began to identify individual problems, put together teams to examine those issues, identify solutions, and implement new ideas. They maintained a cohesive team with members from both the ED and inpatient units and were fortunate to have a key leader who was responsible for both the ED as well as

inpatient areas, namely critical care. While it was a difficult start as a result of the hospital closure, the groups quickly got on track and tried many new ideas and were excited with their successes, including a decrease in diversion hours.

#### Strategies/Implementation

Below are some of the initiatives implemented as a result of the strategies utilized by SJRMC:

- SJRMC wanted to explore more pull systems and utilized RCT for this purpose; inpatient boarders in the ED were a major factor of this strategy; communication was also a key focus for these initiatives.
- They created a HIT to specifically examine the problem of inpatient boarders in the ED and continue to pursue initiatives to minimize this crowding practice.
- In an effort to increase communication efforts, SJRMC instituted an interface that allows the inpatient bed tracking product to be visualized throughout the hospital such that staff members on any given unit can see which beds are available, ready to be cleaned, or ready to receive patients.
- To cement more pull systems from the ED, SJRMC implemented an Admission/Discharge/Transfer (ADT) Nurse after rapid cycle testing the concept and now have three full-time ADT nurses operating Monday through Saturday.
- They also rapid cycle tested faxing nursing reports to a unit then expanded the concept to multiple units after working out conflicts.
- The intake process in SJRMC's ED was cumbersome and inefficient, so they instituted a HIT to examine this and made appropriate changes to streamline this important area. SJRMC implemented the RME process in the ED in December 2007, with substantive results.
- Another area of focus for improving throughput was to analyze the inpatient discharge times; the executive leadership collaborated with physicians with high volumes of admitted patients. After meeting with these physicians, SJRMC

began scheduling 85 percent of their inpatient discharges.

- Another strategy was to examine the efficiency of the actual workflow processes in the ED. A HIT was assigned to this subject with a few meetings designed to analyze and solve the problem of inefficient use of supplies. As a result par levels and supply selections were analyzed and revised to decrease re-work and increase efficiency.
- The staff identified a delay in the treatment of repeat patients as a result of missing medical records and a group looked at what could be implemented to solve this dilemma. As a result, the group implemented “chart reconciliation”. Now, whenever a patient leaves the ED, the entire medical record is scanned into a computerized system so that it is easily retrievable if the patient returns and there is no delay in an effort to find missing portions of a given chart. This reportedly decreased unnecessary delays for this patient population.
- The hospital is well underway with the planning of an eight-bed CDU

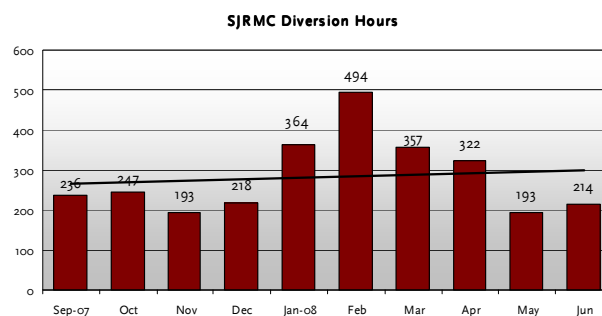
Overcoming Barriers

One of the barriers faced by SJRMC was that initially the ED champion was faced with too many duties and was not able to delegate some of the work. She was also taking on another major role at the same time. A new position was hired similar to hers and that person took on the champion role, and more delegation occurred. SJRMC formed a team of various members who were cohesive and worked together throughout this project. They were present for the didactic calls and site visits and other activities which assisted with communication efforts and teamwork.

Results and Next Steps

SJRMC considered having physicians write day before discharge orders to expedite inpatient discharges. They also considered creating a dashboard with pertinent throughput metrics to be visible to all staff and physicians house-wide as a motivational tool.

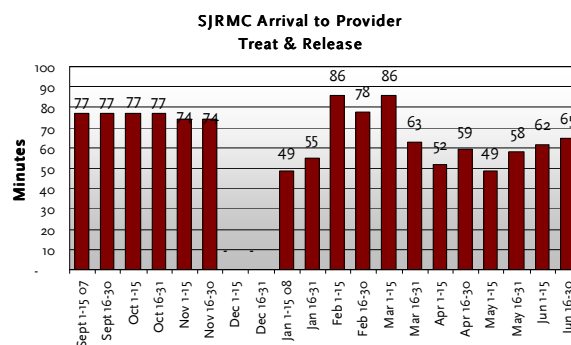
SJRMC started the project with 236 diversion hours in September 2007. As was the case with all the other Ventura County hospitals, there was an increase during the flu season. Overall, their diversion hours declined by 9.3 percent from September 2007 to June 2008.



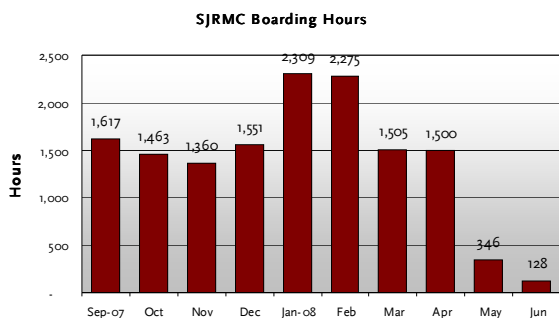
The following table shows the percent and absolute change for SJRMC’s diversion hours comparing September 2007 to every third month.

SJRMC			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Percent Change	-7.6%	51.3%	-9.3%
Absolute Change	(18)	121	(22)

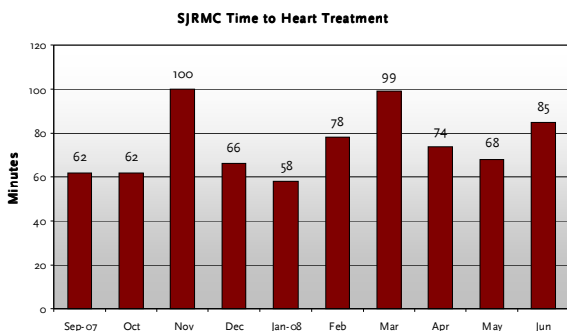
The RME® process was implemented in December 2007. While there are a couple data points missing, it is obvious there was a decrease in time from arrival to seen by provider for treat and release patients shortly after this was implemented. There was a brief increase during the flu season, and then the numbers dropped again and were sustained. Overall there was a 12 minute drop in this KPI from the first reporting period to the last reporting period.



The boarding HIT seems to have had a major influence on the boarding hours, which have historically been quite high at SJRMC. There was a drop of 1,489 hours in boarding hours from the first to the final reporting period; the hours were highest during January (2,309) and lowest in June (128 hours). As this continues to be a challenge, the boarding HIT will continue to address these issues which significantly contribute to ED crowding and diversion.



Time to heart treatment at SJRMC remained below the goal of 90 minutes for eight out of the ten reporting periods. The highest reporting period was in November with 100 minutes and the best month was January with an average of 58 minutes for STEMI patients.



### Lessons for Other Hospitals

SJRMC struggled with having virtually all manual systems by which to pull data. A lesson for other hospitals is the need to automate systems wherever possible to be able to efficiently and accurately analyze real-time data. SJRMC also learned the value of sampling medical records and other sources of information when electronic systems do not exist in order to gain valuable information. Learning proper sampling techniques is

invaluable when collecting data to make sure to cover all shifts, days of week, and patient populations. A final lesson learned was that it is imperative to have executive level support for initiatives such as these that require teamwork across all entities in the organization for patient-centered care.

### Simi Valley Hospital

#### Overview

Simi Valley Hospital (SVH), in operation since 1965, is part of Adventist Health, a non-profit, faith-based health system. SVH is currently licensed for 201 beds, and is accredited by the Joint Commission. They provide a wide array of medical services and offer care to nine surrounding communities in Ventura County. In 2007, SVH operated at an average occupancy of 51 percent, with 5,500 total hospital admissions. The total ED volume was 23,406, with 3,190 of those being admitted, meaning the ED was responsible for 58 percent of all admissions in 2007. SVH is located in Simi Valley in southern California.

#### Where They Started

Outlined below are some of the initial baseline factors, challenges and metrics for SVH at the beginning of this project:

- SVH was experiencing late inpatient discharge times as a result of several physician groups making patient rounds at other facilities prior to arriving at SVH on a daily basis
- The utilization review process was not designed in the most effective manner for managing inpatient throughput and discharge and SVH was experiencing extended inpatient ALOS
- The time from disposition decision to actual disposition for admitted patients was lengthy
- There were a lack of basic throughput product lines at SVH, such as a Fast Track, Capacity Command Center, and triage bypass processes
- The ED is under-bedded at SVH; they currently utilize ten licensed spaces and eight hallway spaces routinely. This is an average of 2,341 patients per licensed

treatment bed, significantly higher than the benchmark of 1,600.

- SVH had a high number of boarding hours, primarily telemetry and critical care patients
- SVH was experiencing delays due to the physician dictation process
- At the beginning of the project, the ED champion was attempting to serve as both the ED and inpatient champion. This proved challenging from both having credibility from the inpatient staff as well as time resource management on her behalf, despite her enthusiasm for the process.

#### Gaining Momentum for Change

Although the key players were extremely enthusiastic from the beginning, SVH struggled with maintaining momentum for change as a result of the substantive amount of turnover in positions important to this project. The most promising aspect that helped keep the momentum going at SVH was the energy and dedication to improvement by the champions, and the eventual cohesive nature of the final team once all positions were in place. The ED and inpatient teamwork was above average and impressed upon the staff the need for patient-centered care and helped to eliminate the silo effect frequently identified in hospitals experiencing throughput and capacity issues.

#### Strategies/Implementation

Below are some of the initiatives implemented as a result of the strategies utilized by SVH:

- SVH created an ED Working Group, which meets routinely to minimize patient throughput times, and increase staff morale and patient satisfaction. The ED Working Group worked on implementing, among other things, a Capacity Management Protocol for diversion avoidance in times of peak volumes in the ED and main hospital.
- SVH also worked on a triage bypass process to immediately bed patients when possible and perform bedside registration.
- A new ED nursing director was hired during the course of this project, and she

came with modern ideas and practical experience. The new director implemented several new processes including:

- The ED charge nurse must now contact the ED nursing director prior to going on diversion (resulting in decreased hours)
- Sharing throughput information and expectations with front-line staff (e.g. patient throughput is now a standing topic for all monthly staff meetings)
- Adding front-line staff to the ED Working Group, which was historically management-driven
- One of the strategies utilized by SVH was to increase physician buy-in as to their role in the throughput and diversion avoidance processes. This process resulted in a change to the physician by-laws such that consultants must now respond in person to the ED within 60 minutes of being contacted about a patient.
- Another strategy was to increase inpatient buy-in to eliminate the culture that diversion and ED crowding were “ED problems.” A HIT was created to examine time of disposition decision to inpatient bed placement. The focus on improving inpatient staff buy-in resulted in increased education by the inpatient champion (namely boarders are a “hospital problem” and not an “ED problem”) and the inpatient staff began pulling their patients up to the units when the ED was busy.
- A final strategy that SVH focused on was to decrease the unacceptably long inpatient ALOS. To address this, the utilization review department was reorganized to a case management model reporting to the hospital’s quality director, from which they reported very positive effects on ALOS (these data were not required for reporting).
- For future planning, to eliminate the delays in the dictation process, SVH is planning to move to 100 percent use of the electronic information system currently in place in the ED by fall 2008.

### Overcoming Barriers

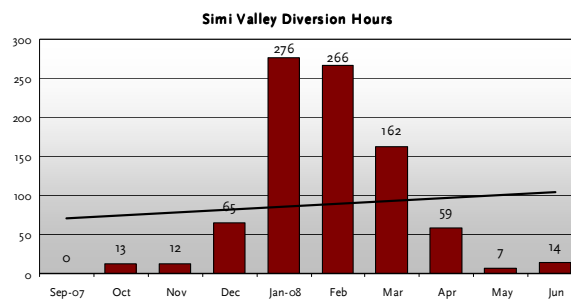
During the time of the collaborative SVH saw turnover and/or replacement of many key positions including the ED champion, inpatient champion, ED nursing director, CEO, and CFO. This was a major obstacle for maintaining continuity of the processes required for participation in the project, but they persevered and there was exceptional teamwork demonstrated between the ED and inpatient leadership. Data collection was easier in the ED where they had electronic systems in place to capture it, but on the inpatient side some systems were computerized and some were manual, making it difficult to organize methods in the beginning.

### Results and Next Steps

SVH moved into a new bed tower in June 2008, which increased their bed capacity from 185 to 201 licensed beds, and is expected to alleviate some of the ED crowding dilemma. At the same time, SVH recognized that simply adding more beds will not solve all their throughput issues and at the culmination of the project were considering some new initiatives such as a provider at triage during peak times. SVH trialed this practice early in 2008 with anecdotally positive outcomes. The following are additional steps and/or results:

(Note: As mentioned, SVH experienced much turnover during this process and a second ED champion was trained half-way through the project. The ED champion was off work for the months of June and July; therefore they were only able to submit data through the month of May. Additionally, during the transition from the first ED champion to the second, some data points were not captured during November and December.)

SVH is extremely supportive of a county-wide no-divert policy. In September 2007, SVH had zero hours of diversion and peaked with 273 hours during the month of February 2008. However, with the new process of gaining approval via the ED nursing director and the increased communication efforts, the diversion hours were substantially lowered, to only 14 hours in June 2008.



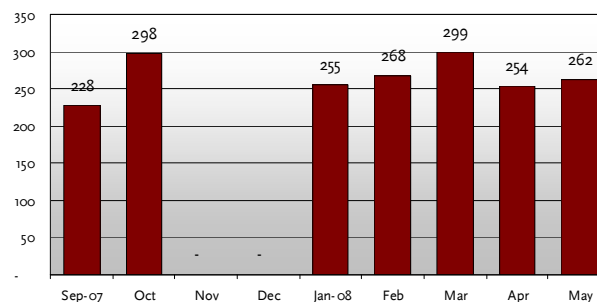
The following table presents the percent and absolute change for SVH's diversion hours from September 2007 to every third month.

SVH			
Diversion Hours	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Absolute Change	65	162	14

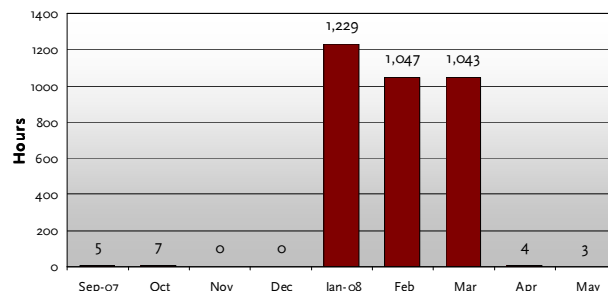
Note: 9/07 had no diversion hours.

SVH's ED volume remained relatively flat; however the increase in acuity levels was evidenced by a 14.9 percent increase in ED admissions from September 2007 to March 2008. This escalated during the influenza season when boarding hours were uncharacteristically high. (SVH did not provide data for November or December 2007.)

Simi Valley ED Admissions

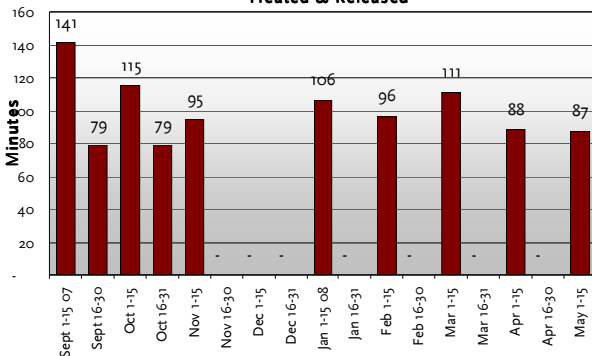


Simi Valley Boarding Hours



While the total ED turn-around times for both admitted and treat and release patients were likely to fluctuate (greatly increasing during the influenza season), SVH experienced a decrease in time seen by provider to disposition decision time by 38.3 percent for discharged patients (from 2 hours and 1 minute to 1 hour and 27 minutes).

**Simi Valley Provider to Disposition Decision Treated & Released**

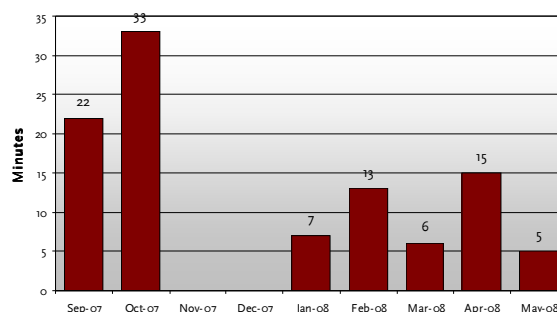


Although there are several reporting periods that were not available, overall SVH had an improved their inpatient discharge time by two hours and 21 minutes from September 1-15, 07 (median time 5:00 pm) to May 1-15, 08 (median time 2:39 pm). The best reporting periods were January 1-15, 08 and February 1-15, 08, which both had median discharge times of 2:00 pm.

Additionally, they improved their inpatient bed cleaning times by 12 minutes, from 1 hour and 13 minutes to 1 hour and 1 minute.

SVH chose to measure time to treatment for orthopedic patients as their clinical process KPI. They had great success with this, reaching their goal time of five minutes by their final reporting period of May 2008, which was a 17 minute reduction in time from the initial reporting period in September.

**Simi Valley Time to Pain Management**



Lessons for Other Hospitals

With the personnel turnover SVH experienced, one of the lessons learned was to reach out to those who can assist in a time of need. For example, the initial ED champion learned the skill to delegate more and also have a clearly identified and involved inpatient champion. After the first ED champion resigned the second one was attempting to not only learn the new role of pre-hospital care coordinator, but also take on all the duties of this project. With encouragement and request by The Abaris Group, the VCEMSA was asked to support her in her new role however possible and agreed to do so.

Additionally, despite the large amount of turnover, this group of ED and inpatient leaders put the patient at the center of care and refused to adopt the “us” versus “them” mentality. This resulted in a truly cohesive team regardless of lack of past experience working together as a team. They pulled together and focused on what was best for the patient rather than what was best for individual units or departments. SVH had consistently strong support from their CNE, and they would recommend taking measures to gain physician staff involvement to take success to the next level in the change process.

**Ventura County Medical Center**

Overview

Ventura County Medical Center (VCMC) is a full-service, acute care hospital, and the hub of the county medical service system. The hospital is licensed for 208 beds and is the only academic institution in Ventura County

and they are affiliated with the University of California, Los Angeles (UCLA). VCMC serves all of Ventura County, with special emphasis on providing access to care for the underserved and those facing barriers to access and has a very strong trauma program. These individuals, referred to as the “safety-net” population, comprise over three quarters of the care provided by VCMC. The hospital is accredited by the Joint Commission.

In 2007, VCMC had a total ED volume of 31,940 with 17 treatment beds. The inpatient occupancy rate in 2007 was 64 percent with total hospital admissions of 15,135, with 28 percent of those generated from the ED. VCMC officially joined this collaborative in December 2007, although they were able to submit the majority of KPIs dating back to the initial submission date of September 2007. VCMC is located in Ventura in southern California.

#### Where They Started

Outlined below are some of the initial baseline factors, challenges and metrics for VCMC at the beginning of this project:

- The closure of a nearby hospital for six weeks just prior to the start of the project served as a major learning experience for VCMC as patient volumes increased and ambulance diversion was not permitted during this time. They were staffed accordingly and had increased communication with the LEMSA.
- VCMC had strong physician support in the ED, as well as the inpatient and administrative areas that were all committed to making positive changes.
- The beds in the ED were not universally outfitted, making immediate patient placement and ease of patient flow for all varieties of patients difficult at times.
- There were opportunities for more formalized methods for change management in the organization (e.g. HITs).
- VCMC was almost exclusively using manual data systems, which made data mining a major challenge throughout the project, particularly at the beginning.

#### Gaining Momentum for Change

The director of nursing (DON) at VCMC, who served as the inpatient champion, had experience as an ED nurse and experience on the inpatient side as well, and understood the need to bring both entities together and put the patient at the center of change management. Once data collection processes were in place, the key for gaining momentum for change was to involve front-line staff in decision making processes and use creative thinking to gain buy-in from those affected by change, from technical and nursing staff as well as physicians.

#### Strategies/Implementation

Below are some of the initiatives implemented as a result of the strategies utilized by VCMC:

- In order to decrease diversion hours they communicated with front-line staff and implemented a new process whereby the ED charge nurse must contact the house supervisor, and ultimately the DON, before going on diversion.
- The charge nurse and triage nurse devised a plan whereby patients were immediately bedded when possible and registration is performed at the bedside
  - In order to maintain the strict California nursing ratios, the charge nurse maintained care of the patient until another was discharged and then care was turned over to the staff nurse
  - The triage nurse began the initial assessment at the bedside when possible
- VCMC focused on methods to smooth the intake process as well as speed the diagnosis and treatment of STEMI patients. They added the ability to perform 12-lead EKGs at triage to accomplish this test within 10 minutes of patient arrival, thereby decreasing the overall time to treatment for this critical population of patients.
- Some initiatives to maximize capacity and enhance patient throughput in the ED and throughout the organization

included the institution of a color-coded capacity management plan that elevated measures taken based on the current color designated by pre-defined capacity factors.

- The most successful tool reported by VCMC to be implemented to address capacity was an initiative titled “Bed Crisis Mode” which is initiated by the DON or the vice president for medical affairs
  - This tool sent a text message to residents, attending physicians and nursing supervisors
  - At that time they ceased what they were doing and made patient rounds, immediately discharging patients who were eligible and performed any other duties that could facilitate throughput, such as downgrading critical care patients to telemetry where appropriate
- They worked to collaborate even more with the physicians to educate them as to their role in throughput. The administrative team met with all service line medical directors and educated them to their vital role in the patient flow processes. The medical staff provided feedback as to their needs (e.g. timely completion of inpatient discharge orders such as laboratory studies) to enhance the process and encouraged a collaborative environment.

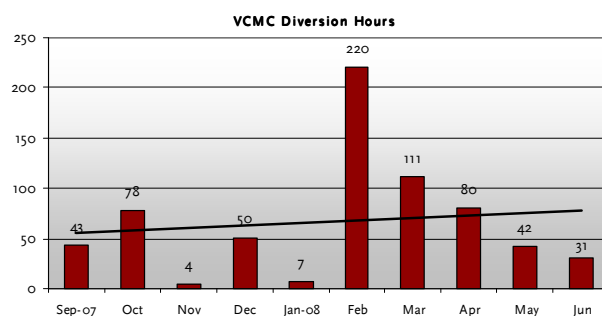
Overcoming Barriers

The greatest strategy to overcoming barriers at VCMC was engaging the physicians and creating an even more cohesive environment than was present previously. At VCMC, the nursing executive leadership was extremely supportive of this process and was frequently in the ED and rounding through the inpatient units, consistently aware of the current status of patient throughput and capacity needs. This showed top-level leadership for all levels of the organization and was important for gaining buy-in among various groups in the hospital. Finally, as with most EDs, there was substantial resistance to change with new

processes such as triage bypass. The team worked together to avoid exceeding ratios (the primary cause cited for past resistance to change) and found a creative and collaborative solution to this problem and eventually changed the culture and made the process successful.

Results and Next Steps

VCMC had many successes in this collaborative. Although there was a spike in diversion hours during the influenza season, the diversion hours at VCMC decreased throughout the course of the project and returned to below baseline by the last reporting month.



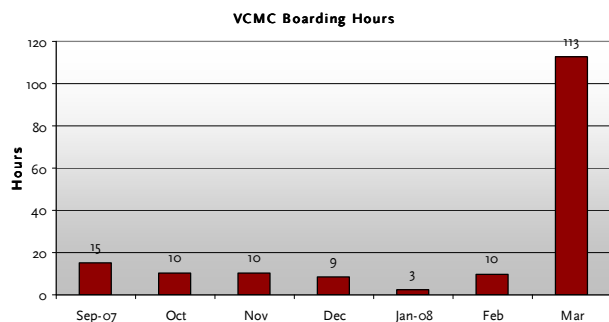
The following table presents the percent and absolute change for VCMC’s diversion hours from September 2007 to every third month.

VCMC			
	Sept 07 to Dec 07	Sept 07 to Mar 08	Sept 07 to Jun 08
Diversion Hours			
Percent Change	16.3%	155.8%	-27.9%
Absolute Change	7	67	(12)

VCMC has considered making changes to the operating room schedule to assist with capacity problems, such as delaying or suspending elective cases during saturated periods, or examining various smoothing techniques.

At the time of this report VCMC was also planning to resurrect a HIT team that would examine their increasing boarding hours to determine the root causes and find solutions to this challenging problem. VCMC experienced a sharp rise in boarding hours from 10 hours in February to 113 hours in

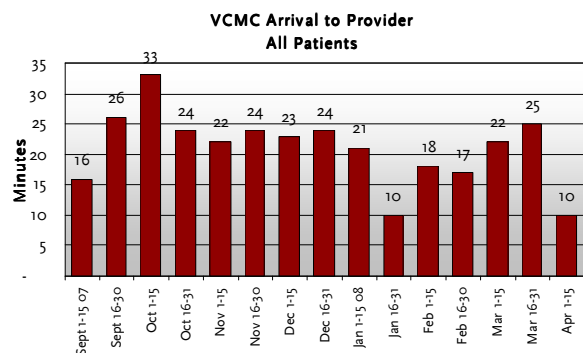
March (the last month VCMC provided boarding hour data).



Although total volumes remained relatively flat, they did experience a four percent increase in admissions from the ED.

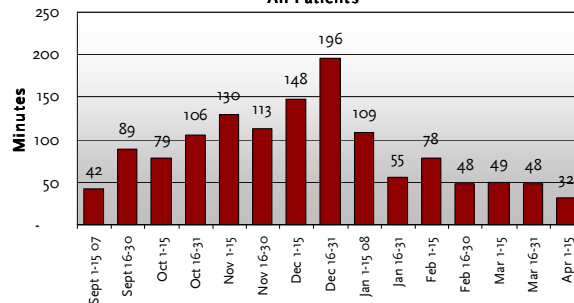
VCMC also experienced a doubling in the rate of incomplete treatment patients, going from three to six percent, which could likely be related to the high number of boarders.

Despite this, they were able to decrease the time of arrival to time seen by provider by 6 minutes for all patients. This was likely a result of the new process of immediately bedding patients and bypassing triage when able.



Further, they were able to decrease the time from seen by provider to disposition decision by ten minutes.

VCMC Provider to Disposition All Patients



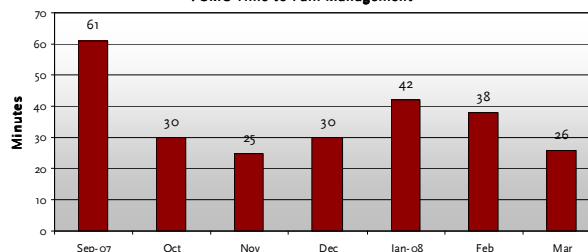
However, the time of disposition decision to actual discharge increased by 18 minutes, likely due to the significant increase in boarding hours.

The total ED throughput time at VCMC remained about the same at approximately 3 hours and 15 minutes. (Note: Data were not provided by the three clinical pathways due to resource issues. Furthermore, the total ED throughput times were only submitted through December 2007.)

VCMC was able to decrease the time from bed assignment to actual placement by 6 minutes from the beginning to the end of the project. However, there was no significant change in the median inpatient discharge time which remained approximately 3:30 pm.

Finally, VCMC made a major improvement in their time to pain management for orthopedic patients, again likely due to the immediate bedding of patients and triage bypass. There was a decrease by 35 minutes in this category.

VCMC Time to Pain Management



### Lessons for Other Hospitals

One lesson VCMC would suggest for other hospitals would be the need for electronic patient and data tracking systems so that information is readily retrievable to be shared with physicians and staff and progress toward goals can be made clear. This would make the processes more real-time and after goals are clearly defined, the physicians and staff can strive for those and understand at any given time where they stand on throughput and diversion related issues.

Another important lesson stressed by the staff at VCMC is to have a hospital-wide capacity tool such as the Bed Crisis Mode that eliminates the historical mindset that diversion is an “ED problem” and engages the entire hospital to take ownership in maximizing capacity in times of greatest need. They anticipate that this tool will help to alleviate the number of boarders and thereby minimize diversion hours further.

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## ENDNOTES

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- <sup>5</sup> “Hospital Emergency Departments - Crowded Conditions Vary among Hospitals and Communities.” *United States General Accounting Office*. Ibid.
- <sup>6</sup> McCaig LF, Burt CW. Ibid
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- <sup>21</sup> Vilke GM, Castillo EM, Metz MA, et al. Community trial to decrease diversion hours: the San Diego County Patient Destination trial. *Ann Emerg Med*. 2004; 44: 295-303.
- <sup>22</sup> During 2002, San Diego County implemented a “home hospital” policy where a managed care patient is transported to their payer contracted hospital irrespective of the hospital’s diversion status. Thus, diversion hours may overstate the total diversion problem as each diverted ED may still receive ambulance patients.
- <sup>23</sup> Urgent Matters see: [urgentmatters.org](http://urgentmatters.org) (last accessed November 8<sup>th</sup>, 2008)
- <sup>24</sup> Los Angeles County Board of Supervisors <http://bos.co.la.ca.us>
- <sup>25</sup> Los Angeles County Health Services, [www.ladhs.org](http://www.ladhs.org)
- <sup>26</sup> [http://www.whittierpres.com/about\\_us/history.shtml](http://www.whittierpres.com/about_us/history.shtml)
- <sup>27</sup> <http://www.stfrancismedicalcenter.org>
- <sup>28</sup> A separate area in the ED that treats patients seeking emergency care for minor injuries or illnesses.
- <sup>29</sup> A designated area within the hospital where discharged patients wait for their transportation.
- <sup>30</sup> A process to rapidly access and treat patients with minor injuries or illnesses in a dedicated area without using the traditional treatment bed. The concept was developed by CEP America.
- <sup>31</sup> <https://lomalindahealth.org>
- <sup>32</sup> <http://www.stmaryapplevalley.com>



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