

# How to Modify Lean for Emergency Department Implementation

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PAPER



## An EmCare White Paper

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## Contents

Introduction.....	2
Modified Lean Implementation: An Overview.....	2
Lean Methodologies .....	3
Fundamental Concepts to Improving Any Emergency Department.....	3
Overcoming Obstacles Commonly Presented Around Change .....	5
The Importance of Teamwork Among Nursing and Clinical Providers .....	6
Keys to Implementing New Processes.....	7
Measuring Outcomes and Results.....	8
Summary.....	11
About EmCare® .....	11
Contributor Biographies.....	12
Acknowledgments.....	13
Contact EmCare .....	14



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*EmCare incorporates individual ideas, implements changes, modifies processes, and develops best practice recommendations for efficient, quality emergency care.*

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<sup>1</sup> Physician refers to all medical practitioners including physician assistants and advanced practice nurses who commonly supplement the physician workforce.

## Introduction

Six facilities of a national hospital chain located in the Southeast United States teamed up with EmCare® to review recent best practice publications, incorporate individual ideas, implement changes, modify processes and develop a standard best practice recommendation for efficient, quality ED care. The main goal was to satisfy the patient’s primary need in presenting to an ED – the desire to see a physician as soon as possible.

The concepts herein have been proven to work in various size and volume EDs. The following chart outlines the descriptions of the six facilities involved in this effort.

### Hospital Profiles

	ED Bed Size	ED Volume	Facility Bed Size
Hospital One	21	~27,000	217
Hospital Two	27	~38,000	302
Hospital Three	31	~63,000	235
Hospital Four	18	~28,000	294
Hospital Five	26	~30,000	256
Hospital Six	24	~35,000	290

## Modified Lean Implementation: An Overview

As a result of the increasing demand on emergency departments (ED) to accommodate additional capacity, the six hospitals partnered with EmCare, Inc., their ED management group, to perform a shared training and implementation process. Lean and time management principles were taught to ED staff and medical providers, and best practices were introduced to both groups. Lean principles were learned, modified and applied to create an effective model that would satisfy every department’s individual situation. The strategy was derived from the traditional five day Kaizan Lean event and modified to fit the culture, productivity and budgetary needs of an ED. This paper outlines the important key factors to consider in any ED process modification.

All of the facilities included in this paper have seen significant improvements in performance metrics. The door-to-physician<sup>1</sup> times and the percentage of patients leaving without being seen by a physician dropped as much as 67 percent and total patient length of stay as much as 60 percent. The facilities have also been able to maintain performance improvement despite volume growths of up to 33 percent.



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*Lean is a process improvement technique designed to identify and minimize excess steps in a process.*  
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## Lean Methodologies

Lean is a process improvement technique designed to identify and minimize excess steps in a process. Lean participants are taught how to use techniques such as value stream mapping, 5S, Kaizan events, Spaghetti Diagrams, etc., to help visualize excess process steps or “waste.”<sup>2</sup>

Lean was first applied in a vehicle manufacturing plant with a goal of reducing repetitive steps on an assembly line, allowing workers to produce more goods with less effort. The idea was “fewer man-hours, less inventory, the highest quality cars with the fewest defects of any competing manufacturer.”<sup>2</sup>

### ED versus assembly line

Although Lean principles were designed with a manufacturing setting in mind, it soon became obvious that Lean techniques could be applied to virtually every industry, particularly health care, where increased utilization has created an ongoing need for improved quality and efficiency.

This need is especially pronounced in emergency departments, which are continually challenged to perform an increasing number of high quality services to treat an increasing patient population. As the demand for high-quality health care by patients, payers and regulators has continued to surge, EDs continue to look for more efficient processes to handle increasing demands. One proposed solution is the adoption of several of the processes and strategies utilized in an assembly line environment. The challenge has been adapting the process to the nature of emergency medicine, which involves variability in arrival census, acuity and level of care.

## Fundamental Concepts to Improving Any Emergency Department

### Adapt to the ED culture

The traditional five-day Kaizan Lean event is an all-hands-on-deck approach to process improvement. Although there are similarities between this traditional Lean event and the recommended program explained in this paper, there are some key differences in an ED that require modification of a traditional Lean program:

1. An ED is a 24-hour operation, unlike most manufacturing settings. Every worker in an ED setting cannot be taken off of the floor to

<sup>2</sup> Liker, 2004. *In The Toyota Way*. Madison, WI: CWL Publishing Enterprises, Inc.



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*The first fundamental rule for ED process improvement is designing a patient-centric process.*  
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- complete a traditional five-day event. In addition, key decision makers in the facility cannot focus their attention solely on the ED for such a time without affecting the rest of the facility.
2. EDs operate with a group of workers with a mixed set of skills who traditionally work 12-hour shifts. The availability of any given worker from day to day is not predictable and there is a greater proportion of part-time workers in an ED than in a manufacturing setting.
  3. Since the ED cannot be shut down, the direct cost of a five-day Kaizan event would involve the backfill of additional part-time workers to cover the ED operations. Indirect costs would also increase if managers were committed to the program for five days.

To develop the most appropriate strategy for an ED setting, the team reviewed the benefits and costs of shortening the traditional five-day Kaizan event. To balance the shortened intensive time for education and design, the team lengthened the implementation time table. In most cases, total implementation took about two to six months.

### **Create a patient-centric process**

The first fundamental rule for ED process improvement is designing a patient-centric process. Not only does it follow the Lean approach of single piece flow, it also meshes with traditional medical teaching of placing the patient first in all situations. This synergy increases compliance and acceptance. It also means that the entire process should be reviewed from the patient's point of view.

Waiting and walking excessively are the major types of waste from a patient's perspective. A patient will have a positive experience if an ED can effectively:

1. Reduce the time in a waiting room prior to initial medical contact.
2. Organize tasks so that parallel processes predominate over serial processes.
3. Segment patient cohorts according to acuity, and thus indirectly according to resource needs.

### **Reduce unnecessary steps for the ED staff and medical providers**

The second fundamental rule for ED process improvement is to implement changes that help the ED staff and physicians complete their jobs more efficiently. A change in everyday process is difficult to implement without buy-in from the workers. In order to obtain the



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hardest obstacle that the  
design team of a new  
process must overcome.*  
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necessary buy-in, the front line workers must understand how those changes benefit them individually. Therefore, you must design a process that will:

1. Reduce redundancy of tasks.
2. Organize paperwork and data collection so that it is easier to complete.
3. Stage resources so they are closer to the point of care.

### **Position the front-line staff to be the owners of the process design**

The next fundamental rule for the effective implementation of ED process change is to provide autonomy to those who will be actively making the change happen. To obtain complete buy-in of any process change, the ED staff and providers must feel that they had a say and fully agree with the new approach. This is accomplished when:

1. Staff is included in the breakdown and redesign of changes that will be implemented.
2. Staff feels that they will receive what they need in order to do a better job.
3. Staff feels that the goals they were able to set are obtainable.

### **Overcoming Obstacles Commonly Presented Around Change**

Many people fear change, especially when it involves their work environment. Change can break up the normal daily routine. It can also become difficult to come to work every day when you know that the stable anchor that is your work environment is undergoing change.

Change also adds a level of required thinking that must take place in order to adapt to the new system. Despite all good intentions, workers will always find excuses to forestall a process change. Fear of change is the hardest obstacle that the design team of a new process must overcome.

### **Provide adequate training and support for preparation and the act of changing**

Every staff member and provider should be taught how to see the situation, or current process, from another's perspective – primarily the patients'. All too often, ED processes have evolved to a point where they



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*Sorting, Straightening, Sweeping, Standardizing and Sustaining, provides a continuous improvement opportunity that is very straightforward and can be accomplished at the staff level.*  
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are primarily worker-centric, not patient-centric. This is a fundamental mind-set that must be changed.

Staff members that are selected to be a part of the redesign team will learn the most about Lean concepts, but everyone on the staff will be affected by the change and must have a working knowledge of why the change must happen. Most ED workers are goal-directed type-A personalities who can adapt if the new process is presented in the proper context.

Through a process of trial and error, we found that the three Lean techniques that work the best in an ED are:

– **Value stream mapping**

This technique allows the staff to see, develop their own thoughts, and provide feedback on why delays occur and how those delays can create frustration for the patients and care givers. This generates the will and the insight that allows them to develop a solution that will reduce frustration during the day.

– **5S**

This standard Lean technique, which stands for Sorting, Straightening, Sweeping, Standardizing and Sustaining provides a continuous improvement opportunity that is very straightforward and can be accomplished at the staff level. It fosters team building with a minimum expenditure of resources and little ongoing supervision from leadership.

– **Gemba Walk**

Gemba, which is similar to management by walking around, brings the design team to the place where the value is being created and invites them to view it from the patient's perspective. This can be a powerful experience, especially when non-medical members of the team can add their viewpoints.

## The Importance of Teamwork Among Nursing and Clinical Providers

Successful ED operation is a team sport. Nurses rely on clinical providers to make crucial decisions regarding care. Ancillary support departments need to mesh their operations with the ED's operation. Emergency physicians need to interact with their colleagues both inside and outside the hospital to coordinate care. It is easy to see why teamwork among all parties is so important for any process redesign consideration.





The ED nurses and clinical providers make up the crucial combination of caregivers. ED process improvement cannot take place without these two teams fully involved and dedicated to working together. It takes cooperation among both these groups to accomplish the following high impact process changes:

1. Maximize simultaneous tasks by assessing the patient together.
2. Break down silos by instilling community ownership of the patient rather than individual ownership.
3. Foster a greater degree of communication and accountability than traditionally existed.

## Keys to Implementing New Processes

In addition to the essential, which is physician-nurse teamwork, a new process or substantial change to an existing process will never be successful long-term unless everyone understands and accepts the need for change. Once a new process is developed by the team, several steps are necessary for proper implementation.

### **Provide leadership support**

The most important players for long term success are the leadership teams from both the facility and the physician management group. They are tasked with ensuring accountability and providing financial support. The expertise of the workers develops the process change plan, but it is leadership that is essential for the support in implementation.

A Lean implementation is the combination of grassroots project development and C-suite backing. When the workers outside of the initial development team see that leadership is fully supportive and engaged with the project, they get the message that change is inevitable.

### **Educate the entire staff**

Education is challenging because the energy of the creative team must be harnessed and shared with a relatively uninterested set of workers. Mandatory, multi-disciplinary classes are effective in educating the entire staff on the new process flow. A brief introduction to Lean thinking and a summary of the two-day design event will also prove helpful. Individual roles and responsibilities and a definite timetable should be presented and the creative team should address concerns and allay fears.

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 determined without  
 measurements.*  
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### Encourage continuous improvement

All staff members and physicians should be encouraged to pursue continuous improvement of the ED process. This type of thinking shows that the entire ED staff, including physicians, learned and gained something from the program education.

It is important to realize that this may lead to changes in the new process design. If that does occur, no changes should be finalized without the input of the entire design team. Deviation from this strategy will leave the staff feeling as if they no longer have a role in improving their work environment and may potentially identify their previous design efforts as unsuccessful.

### Measuring Outcomes and Results

Success cannot be determined without measurements. To evaluate what the program has done for your ED, you must document your baseline metrics and measure ongoing changes.

Reduced process turnaround time (TAT) means that the ED can better care for a growing population of patients. Reduced waiting time prior to initial physician contact leads to better quality of care.

### Patient arrival to physician greet

Patient Arrival to Physician Greet (A2G) measures the efficiency and quality of the patient intake process. Rapid contact with the physician satisfies the main goal that brought the patient to the facility in the first place. To the patient, it is a measure of quality of care because it is a frame of reference that they can relate to.

The following charts outline the results of the modified Lean implementation in the six facilities.

### Patient Arrival to Physician Greet

	Implementation Date	Percent Improvement
Hospital One	Sept 2007	60%
Hospital Two	Sept 2008	49%
Hospital Three	Nov 2008	-14%
Hospital Four	June 2009	30%
Hospital Five	July 2009	31%
Hospital Six	Nov 2009	54%
<b>Total</b>		<b>39%</b>



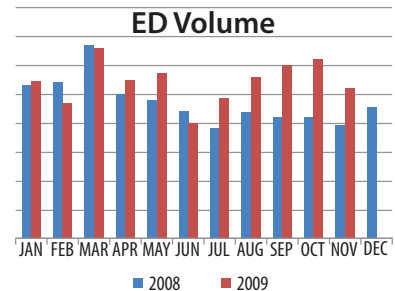
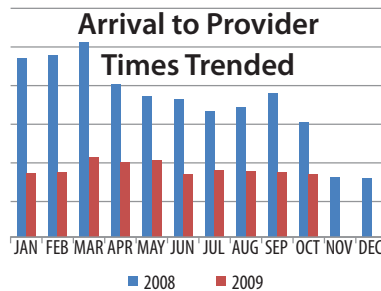
## Patient Arrival to Patient Leave

	Implementation Date	Percent Improvement
Hospital One	Sept 2007	26%
Hospital Two	Sept 2008	13%
Hospital Three	Nov 2008	60%
Hospital Four	June 2009	4%
Hospital Five	July 2009	13%
Hospital Six	Nov 2009	12%
<b>Total</b>		<b>16%</b>

Hospital Two successfully reduced A2G times by 49 percent. The facility participated in a process redesign in September 2008 and immediately improved its metrics. It has sustained that improvement for one year while taking care of 14 percent more patients.

### Hospital Two

#### Patient's total length of stay



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*Hospital Two sustained improvement for one year while taking care of 14 percent more patients.*  
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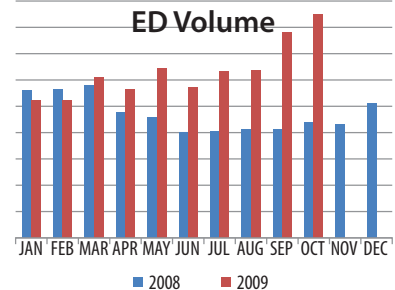
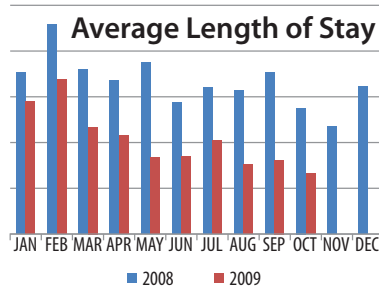
The patient's total length of stay is a relative measure of the efficiency of the entire ED stay. Reducing the average length of stay through the removal of waste and the creation of additional care areas leads to less patients in the ED at a given time and greater capability to handle surges of patient arrivals. Although the EDs evaluated had many opportunities to reduce the length of stay, it is important to note that for many clinical situations there is a minimum amount of time required to treat a patient, and further time reductions may result in the decrease of quality of care.

Hospital Three successfully reduced patient total length of stay by 60 percent over a one year time span. This facility participated in a process redesign event in November 2008 and has successfully completed continuous improvements since. It has seen a gradual improvement in metrics over the subsequent year despite caring for 33 percent more patients during that year.



### Hospital Three

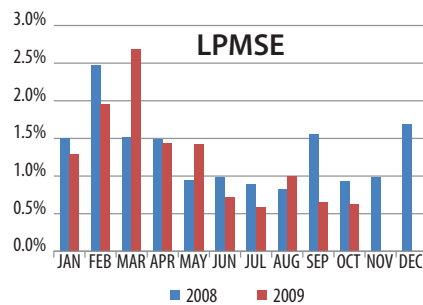
#### Percent of patients leaving prior to medical screening



The situation of a patient presenting to the ED but leaving prior to being seen by a physician must be avoided for several reasons. From the clinical perspective, patients who leave overcrowded inefficient EDs prior to a medical screening exam (LPMSE) have been shown to be as least as ill or injured as those who chose to stay and wait for treatment. Furthermore, there are federal and state laws and regulations which could impose penalties on hospitals if patients are not properly evaluated for an emergency medical condition. Finally, from a financial perspective, an LPMSE is the loss of a potential paying customer.

Hospital Four successfully reduced the number of patients leaving without treatment by 67 percent from 2008 to 2009. This facility showed immediate and sustained improvements following their program implementation.

### Hospital Four



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*The patient's total length of stay is a relative measure of the efficiency of the entire ED stay.*  
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## Summary

Lean processes have been shown to improve flow in the industrial setting. There are similarities between an ED and a manufacturing setting, but there are also some important differences. Although Lean can be adapted to improve ED operations, such adaptations need to take into account operational realities and techniques to change a relatively inflexible culture. Fundamental challenges that must be addressed include:

- Adapting to culture
- Creating a patient-centric process
- Identification and reduction of extraneous process steps
- Positioning of front-line staff to be the owners of the new process design

The major obstacle to change is overcoming the fear of change. To meet that challenge, it is important to demonstrate the need for change. You must also provide adequate training and support and have confidence in your staff-led design team.

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Fostering teamwork between nurses and physicians is essential to project success. Without this key component, the rest of the project will fail. In addition to this element, recruitment of the entire ED staff and leadership support is the only way to sustain improvements. All six facilities included in this project were initially selected due to their historically poor performance. All demonstrated significant and sustained improvements in Patient Arrival to Physician Greet, Turnaround Time and Left Prior to Medical Screening Exam. ■

## About EmCare®

EmCare is *the leader in physician services™* serving more than 500 hospitals nationwide. Founded nearly 40 years ago, today the company handles more than 9 million patient encounters annually. The integrated company consists of four service lines including emergency medicine, hospital medicine, anesthesiology and radiology/teleradiology. The company is focused on:

- Delivering high quality clinical care
- Improving performance metrics
- Achieving superior patient and staff satisfaction
- Managing costs

For more information on how EmCare can help your hospital strengthen its emergency medicine practice, feel free to visit us online at [www.EmCare.com](http://www.EmCare.com). Following the link “Solutions for Hospitals” will offer more information on the services EmCare’s other specialty divisions – Hospital Medicine, Anesthesiology, and Radiology / Teleradiology – can provide. You may also contact a business development representative directly at (877) 416-8079.

## Contributor Biographies

### **Michael Lozano Jr., MD, FACEP**

#### ***EmCare***

#### ***Regional Executive Vice President, SE Region***

Dr. Lozano is the Regional Executive Vice President for EmCare, and most recently, Medical Director and Chairman of the Department of Emergency Medicine at Northside Hospital in St. Petersburg, FL. He is also the Medical Director for Hillsborough County Fire Rescue in Tampa, as well as Florida Urban Search and Rescue System’s Task Force 3.

Dr. Lozano is a highly skilled professional with 20 years of medical and leadership experience.

Dr. Lozano holds many positions of distinction including State Co-Medical Director for the Florida Chapter of International Trauma Life Support, and immediate past president of the Florida Association of EMS Medical Directors. He is a Fellow in the American College of Emergency Physicians and is a Director for the Florida College of Emergency Physicians. He has been active in the American College of Emergency Physicians at both the state and national level.

Dr. Lozano attended Syracuse University. He received his Doctor of Medicine from the Mount Sinai School of Medicine, and completed residencies in Internal Medicine at NYU-Bellevue Hospital and Emergency Medicine at the Bronx Municipal Hospital Center where he served as chief resident. In 1994 he completed a fellowship in Emergency Medical Services through the Office of the Medical Director of New York City EMS. He has been practicing emergency medicine in Florida for the past 15 years.

**Donna N. Biehl, RN, BS****EmCare*****Vice President of Clinical Services, SE Region***

Born and raised in St. Petersburg, Florida, Donna has been in nursing for 40 years. Like most nurses, her career has taken various paths, from med-surg to the operating room, before finding her niche in emergency nursing. As the Nursing Director of an ED for over 15 years, she had an opportunity to develop clinical pathways and protocols, including an orientation pathway, and was recognized by JCAHO for best practices. As VP of Clinical Services, SE region for EmCare, her team interacts with emergency department clinicians to craft effective, practical and intellectual ways to bring “systems thinking” into process improvement. By offering value added resources to clinicians, they can build a better future for health care.

**Danielle J. Organ****HCA*****Management Engineer, West Florida Division***

Danielle has a Bachelor of Science degree in Industrial and Management Systems Engineering from the University of South Florida, and has worked towards improving health care processes for four years. Her background in data analysis and statistical evaluations has helped her achievements in using numbers and metrics to make operational decisions in health care with a goal of improving efficiency for patients and staff.

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