LEAN THINKING FOR EFFECTIVE CARE DELIVERY OF EMERGENCY DEPARTMENT

– A CASE STUDY.

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ABSTRACT

The research paper focuses on the application of the Lean principles to improve the performance of the emergency department of a multispecialty hospital with more than two hundred beds, capable of receiving multiple emergencies. The major problems faced by the emergency departments are crowding, delayed response and increased transfer time to inpatient beds. The current level of efficiency of the emergency department has been examined and the ways in which lean principles can be implemented is discussed. An observational and analytical study approach is adopted here. The intensity of the emergency situation of each case, the triage system followed, work flow of the department, current response time, deviation from the standard response time, current manpower allotment in the department, organisational and human factors related to employee’s performances are studied. One hundred emergency cases were observed and analysed on the basis of the process followed. The current emergency response time has been analysed and control charts were used for plotting process capability and process variation. The response time analysis indicates few processes are statistically stable but showing variation within which may due to some common causes. However some processes showing extreme variation in data points, were statistically unstable due to the influence of special causes. The current process flow was analysed with the help of a process flow diagram, and an improved process flow is being suggested. Organisational and human factors related with employee performance were also observed and discussed in the study. The data collected from the staff is through individual depth interviews by conversation rather than through a structured interview. A questionnaire based on related factors, was used for the same. The findings of the study indicates that most of the emergency department processes showing variations in response time was either due to common causes or special causes which were leading to patient dissatisfaction. Process flow also showed the presence of non-value added activities, which were causing delays. The study also identified organisational and staff related factors which were casing departmental silos and leading to delays. The study concludes by providing suggestions which are based on lean principles which are less expensive and does not require significant additional manpower, operating resources or capital expenditure.

Key words

Emergency department, Triage, response time, performance metrics, process, process variation, key performance indicator, lean, control chart, control limits, process flow chart, sustainability of change, staff attitude, synergy, decision making, organisational silos.
1. Introduction

Emergency departments (ED) all over the world are facing challenges related with problems of overcrowding and excessive waiting times. Overcrowding and delays will lead to increased patient mortality, patient safety issues, patient and staff dissatisfaction, and inefficient use of resources. Moreover, as EDs are considered to be the heart of hospital’s problems they may affect the whole organization. Process flow problems and staff attitude are factors that contribute to delays and overcrowding. The need for improvement in ED with respect to the cost of care, the speed of service, crowding, patient satisfaction and safety are now widely accepted. To address these problems, EDs are increasingly implementing an approach called Lean thinking.

Lean methodologies are currently used in other industries but are not being much applied in Indian hospital settings. The goal of lean is to accelerate the velocity of any process by reducing waste in all forms. Through the application of lean concepts and tools, the process steps once considered were essential, may be now find unnecessary and their costs and delays are removable after lean tools have been applied. The difference between standards and practice are visible and we are able to differentiate the meaningful steps from those are adding cost for no benefit to the customers. Lean principles are focused on continuous improvement and waste reduction practices. The focus of lean, on the other hand, is on improvement of current process by the total elimination of waste, by giving priority to patient satisfaction in a hospital scenario. Cost reduction and employee satisfaction are the added advantages.

The common problems observed in EDs are overcrowding, increased waiting time, delayed response, increased number of patients leave without being seen by the consultant, employee stress etc. In the present conditions EDs are under scrutiny regarding efficiency and timeliness of care. As hospitals begin analysing patient flow and ED processes, there is a need for system wide performance improvement.

2. Review of literature

Randall & Diana L (2004) identified that that in face of rising health care costs, various measures have been initiated to increase operational efficiency and cost effectiveness of the healthcare delivery process. Of the various areas in the healthcare industry that policy planners and change agents have focussed their attention is on the ED. The EDs play a vital role in providing care to patients and are recognised for their contribution that they make to society. Poor service delivery often makes difference between life and death.

The ED service delivery process can be represented by the following set of core activities which occur in a sequential manner.

- Arrival
- Triage
- Nurse’s initial assessment
- Duty doctor assessment
- Initial diagnosis and treatment
- Further diagnostic testing
Admitting to in-patients beds and consulting physician
Discharge.

World Health Organisation (2005) describes ‘triage’ in the Guidelines for essential trauma care. The term ‘triage’ is derived from the French work *trier*, meaning to pick or to sort. Triage systems were first used to prioritise medical care during the Napoleonic wars of the late 18\textsuperscript{th} century. Subsequent wars have led to the refinement of systems for the rapid removal of the injured from the battlefield to places providing definitive care. In civilian medicine, triage systems have been refined and adapted for use within a range of settings. In all health care environments, the purpose of the triage process is for the reduction in the time taken to access definitive medical care which will improve patient outcomes.

Steven Oredsson and Hakan Jonsson (2011) stated that the purpose of triage in the ED is to prioritise the incoming patients and to identify those who cannot wait to be seen. The triage nurse performs a brief focussed assessment and assigns the patient triage acuity level, which is a proxy measure of how long an individual patient can safely wait for a medical screening examination and treatment.

Deborah Schofield (2009) explains triage is an essential function underpinning the delivery of care in all EDs, where any number of people with a range of conditions may present at the same time. Although triage systems may function in slightly different ways according to a number of local factors, effective triage systems share the following important features.

- A single entry point for all incoming patients (ambulant and non-ambulant), so that all patients are subjected to the same assessment process.
- A physical environment that is suitable for undertaking a brief assessment. It needs to include easy access to patients which balances clinical, security and administrative requirements, and the availability of first aid equipment and hand-washing facilities.
- An organized patient processing system that enables easy flow of patient information from point of triage through to ED assessment, treatment and disposition.
- Timely data on ED activity levels, including systems for notifying the department of incoming patients from ambulance and other emergency services.
- Triage decision-making is an inherently complex and dynamic process. Decisions are made within a time-sensitive environment, with limited information, for patients who generally do not have a medical diagnosis. Due to the multifaceted nature of the triage role, nurses are required to possess specialized knowledge as well as experience with a wide range of illness and injuries.11

Lloyd, Connelly, and Aaron (2004) described lean thinking is a bundle of concepts, methods, and tools derived from the Toyota Production System, the production philosophy of Toyota Motor Corporation. Lean was first implemented in US auto manufacturing in an attempt to replicate Toyota’s success and has subsequently spread to other manufacturers. Key principles of Lean are few chief among them is the need to eliminate unnecessary waste.

Richard Holden (2010). One of the key foundations of EDs is the ability and expectation to provide immediate access and stabilization for patients with medical and surgical emergencies.
Overcrowding is a serious and growing problem throughout the world. While patient satisfaction is complicated issue because of the high volume of patients, time consuming queues, wide variation in patient complaints, and complexities of acute care. Most patients remained in the ED more than half of the total time before admission was advised. The main reason of delay was multiple consultations followed by file making process, critical care management, investigation done on the way towards & multiple assessments in different ED areas and lesser number were delayed due to poor response of patients to ED management.

Tashkandy, Gazzaz, and Ayub ED layout and staffing should facilitate patient flow, improve patient care, and enable emergency staff to perform their duties more efficiently and safely. Increasing the capacity in the treatment and observation area has permitted patients waiting for outcome to be located where they ought to be, reducing overcrowding in the initial assessment area. This permits easy access to the initial assessment area and thus reducing the waiting time. However, the number of patients waiting for ED related factors has increased, especially because of the increase in patients waiting for test results and decisions over outcome. This has led to more patients being discharged from the treatment and observation area resulting in fewer (patients) waiting to find a bed and fewer admissions.

Brandon Carrus, Stephen Corbett, and Deepak Khandelwal (2010) explain waiting times in the emergency department are a source of dissatisfaction among patients. Because of these pressures triage by nursing staff has been formalized. A consequence of this is those most amenable to quick treatment often wait the longest. Efforts to triage patients with minor conditions may take as long as the time spent treating the patient. Quite often the medical assessment is a duplication of the triage assessment. Referral of the patient back to the waiting room after triage increases staff workload, as the patient must be re-routed back into the examination area again. While nurse practitioners can treat some of these patients, other complaints, both minor and major require medical evaluation. Combining doctor and nurse assessment and starting treatment immediately should provide greater efficiency.

Patrice Lindsay, Michael Schull (2002) states according to growing evidence that the timeliness of emergency care is associated with quality of care, there is internal and external motivation to improve ED operations. Having accurate and measurable metrics is critical in planning efficiency or quality improvement projects. Patients and families often correlate length of time spent in the ED with quality.

Handel and Epstein (2011) explained that many hospitals have tried to reduce ED wait times, but their efforts usually fail to produce sustainable results, for two reasons. The first is the narrowness of most performance-improvement programs, which focus solely on the ED. Many of the factors that contribute to ED overcrowding occur in other parts of the hospital and thus are beyond the department’s control. Hospitals are complex, high-stress systems that require significant cross-departmental and cross-role coordination at all times. Even something as seemingly simple as transferring a patient can require the involvement of six to ten clinical and nonclinical staff members. Therefore, the only way to make substantial operational improvements in one part of a hospital is to implement corresponding changes in other areas. The second reason that many ED-improvement programs do not produce long-lasting results is that they focus only on processes, not staff attitudes. If the changes are to be sustained, the staff must be willing to part with tradition and to collaborate across
physical and organizational divides. The hospital’s culture must enable teamwork. Creating this type of culture is, in many ways, the most difficult part of improving ED performance.

Nathan, Dominik (2008) 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.

3. Objectives of study

- To analyse the current response time taken and the current work flow of the ED
- To analyse the organisational and staff factors related with performance efficiency.
- To provide suggestions based on lean principles for the improvement of ED functions.

4. Methodology

Keeping in view of the analytical and observational approach, the study was conducted in a two hundred bedded multispecialty hospital capable of receiving multiple emergencies. The study has been conducted in to three phases.

1. Response time analysis
2. Process flow analysis
3. Analysis of organisational and staff factors leading to delays

The study is also attempted to give suggestions, based on lean principles, for a system wide improvement. The suggestions are inexpensive and not require any significant capital expenditure or additional manpower. Lean is a customer-centric methodology used for continuous improvement in any process through the elimination of waste from the current process. It is based on the idea of “Continuous Incremental Improvement” and “Respect for People.”

4.1 Research design

Research design constitutes the overall frame work of the research activities carried out in this study. It comprises the expression of research problem, type of sample, sample size, nature of data, collection of data, tools for data collection, tools for data analysis etc.. The research problem is identified as the lack of efficiency of ED functions due to delays and overcrowding. The study is attempted to address this underlying problem through implementing lean principles. The time frame of the study is three months.

4.2 Sampling

The population comprises all the patients visiting the hospital during the time frame of the study. The sample comprises patients visited the ED during this time. Cluster sampling method is used for selecting the sample because here the population is divided into many sub groups and each
subgroup has few elements which possess certain common criteria. Here the sub group selected is the 100 patients visiting ED. This subgroup possesses certain required criteria related with the study.

4.3 Nature of data

Quantitative and Qualitative data are collected and analysed in this study for addressing the research problem in a comprehensive manner. The quantitative data comprises the response time taken for the 100 individual patients visited the ED. The qualitative data comprises the responses collected from the staff working in the ED as well as the related functions.

4.3 Method of data collection

Observational time tracking sheets are used for collecting the response time taken for sample of 100 patients. The data collected from the staff through individual depth interviews usually in a conversational manner rather than a structured manner.

4.4 Tools for data analysis.

I-MR charts are used for analysing the process variation of ED response time. Root cause analysis is done for analysing organisational and staff problems causing poor service delivery in the ED.

5. Analysis and Interpretation.

Lean is a philosophy that is focused on eliminating non-value added activities from the current process. Its broad approach can be applied to all environments and all levels. It is highly effective at improving poor to moderate business processes. Good processes can also benefit from lean, as its many tools, techniques and philosophies lay the foundations for process excellence.

This paper is intended to provide suggestions based on lean principles for the improvement of ED functions. So much emphasis has given to study the ED process in detail. A detailed analysis of major activities of the ED has done in order to understand the ED process in total. ED response time is identified as a key performance indicator and response time analysis of 100 patients conducted to identify the deviations. A detailed analysis of current ED process flow is conducted to identify non-value added activities causing delays. A thorough understanding of current process, identifying non-value added activities, leveraging facilities and skills are necessary for delivering effective emergency care.

A questionnaire based on related factors is used for collecting employee response regarding function, facilities, coordination, scope of roles, awareness regarding process, key performance indicators etc. of the ED and related functions. The response of the staff is also analysed and results given.

Fundamental concepts about emergency departments

- Emergency department functions for 24 hours, serving an unscheduled patient inflow demanding for emergency medical care. So ED staff is increasingly faced with challenges.
• EDs operate with a group of workers with a mixed set of skills who normally work on shift basis. The work load of the emergency department staff is mostly unanticipated and unscheduled in nature.

• Adopting improved process flow, standard timelines, triage system, skilled manpower, appropriately designed emergency room etc. will improve the effectiveness of care delivery.

• Emergency response is also known as the golden hour within which the medical and support staff can save the life of an individual who would be critical. So response time is identified as the significant performance metrics which is greatly determining the effectiveness of emergency care delivery.

A detailed process flow analysis of hundred emergency cases conducted. This gives an idea on the triage system followed and the response time taken for each case. One hundred patient’s movements were observed within emergency department. Time recorded from the arrival of the patient till the response from the nurses and the doctors. Observational time tracking sheets are used for recording response time. The response time analysis is a real time study which is beneficial in assessing the gaps that occurs among the entire emergency process and to bring them down to as minimum as possible. Control charts are used for identifying the process variations.

In the current triage system patients are categorised on the basis of Priority levels. Life threatening/immediate (Priority I), urgent/semi-urgent (Priority II), and non-urgent patients (Priority III).

<table>
<thead>
<tr>
<th>Priority level</th>
<th>Response time</th>
</tr>
</thead>
<tbody>
<tr>
<td>P – I (Immediate / life threatening )</td>
<td>3 minutes</td>
</tr>
<tr>
<td>P – II ( Urgent / Semi urgent )</td>
<td>5 minutes</td>
</tr>
<tr>
<td>P –III ( Non-urgent )</td>
<td>15 minutes</td>
</tr>
</tbody>
</table>

The process flow is analysed through observation and prepared a present state process flow chart. On the basis of deficiencies identified in the process flow an improved process flow chart is proposed.

ED performance improvement programs do not produce long-lasting results if focus only on processes, not staff attitudes. If the changes are to be sustained, the staff must be willing to adapt the changes and to collaborate across physical and organizational divides. The hospital’s culture must enable teamwork and coordination. Creating this type of culture is, the most significant part of sustainable ED performance improvement.

A questionnaire is used for collecting employee response regarding function, facilities, coordination, scope of roles, awareness regarding process etc. of the emergency department. The response of the staff also analysed and results given.

Here a detailed process analysis of 100 patients visited the emergency department has taken to find out the response time taken for each case.

The following triage system followed for categorising the patients on the basis of priority levels.
Stage 1: Response time analysis

Sample distribution based on priority levels.

<table>
<thead>
<tr>
<th>Priority level</th>
<th>No. of patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>P – I</td>
<td>11</td>
</tr>
<tr>
<td>P – II</td>
<td>24</td>
</tr>
<tr>
<td>P – III</td>
<td>65</td>
</tr>
</tbody>
</table>

While doing the process flow analysis of ED functions the response time taken by the nursing and medical staff is identified as the key performance metric or the key quality determining factor, which has a significant impact on the process which is to be intended to improve. There are many factors contributing to the efficient care delivery of ED. However, response time is the aspect the patient cares most about.

**Response time**

T1 – Difference between patient arrival and nurse’s response.

T2 – Difference between patient arrival and doctor’s response.

**I-MR Chart**

I-MR chart is used for graphical method of displaying the process performance. These charts are used to plot continuous type of data. I-MR chart consists of 2 charts; Individual (I) chart and Moving Range (MR) chart. The Individual chart allows us to track the process level and the MR chart allows us to track the process variation. I chart displays individual values of each measurement of the process and the mean of these values. The MR chart displays the variation for each measurement from the previous measurement (i.e. the variation within the process).

I-MR chart is mostly used for 2 purposes.

- To see if the process is in statistical control and to detect signs of special causes that might take the process out of statistical control
- To compare the performance of the process at various stages within.

In I – MR chart the upper control limit (UCL) and lower control limit (LCL) has no significant statistical value. Control limits are not the same as the specification limits set by the customer. Control limits are not used to assess if the process falls within the customer specifications. It is used primarily to investigate the value and variation of the process and see if the process is in control or not.
Priority 1

I and MR Chart for T1 (in mins)

I and MR Chart for T2 (in mins)
Priority 2

I and MR Chart for T1 in mins

- Individual Value:
  - UCL: 4.915
  - Mean: 1.652
  - LCL: -1.612

- Subgroup:
  - 0 to 20

I and MR Chart for T2 in mins

- Individual Value:
  - UCL: 11.39
  - Mean: 4.739
  - LCL: -1.910

- Subgroup:
  - 0 to 20

- Moving Range:
  - UCL: 8.168
  - Mean: 2.5
  - LCL: 0
Here I – MR charts are used to plot the response time of three different priority level patients. I – MR chart typically consists of two charts. The top part of the chart is an Individual (I) chart, which plots the values of each individual observation, and provides a means to assess process centre. The bottom part of the chart is a Moving Range (MR) chart, which plots process variation as calculated from the ranges of two or more successive observations.

Consecutive patient number are plotted on the X – axis and the key performance indicator - the response time, in this process is plotted on the Y – axis. I – MR chart typically have the upper control
limit (UCL) and lower control limit (LCL) where the parallel central line is the mean and range respectively for chart 1 and chart 2 in each set.

The chart is showing some extreme values which may be an indication of the special causes they do exist and lead to extreme process variation. The control limits provide the basis for (1) determining the capability of the process and (2) identifying special causes.

While interpreting the above plotted charts, the moving range chart indicates the variation within the process. Which means each data point plots the difference (range) between two consecutive data points as they come from the process in sequential order. This indicates the variation exists within the process, probably due to common causes. There are few data points outside the control limits, and which means the process is not under statistical control mostly due to the influence of special causes.

**Priority level – I (T1).** The chart indicates the process is stable and within statistical control limits, however variation exists within the process.

**Priority level – I (T2).** The chart indicates the process is stable and within statistical control limits, however variation exists within the process.

**Priority level – II (T1).** The chart indicates the process is stable and within statistical control limits, however variation exists within the process.

**Priority level – II (T2).** The chart indicates the process is unstable and statistically out of control because few data points are plotted above UCL. Process variation is also exists within.

**Priority level – III (T1).** The chart indicates the process is stable and within statistical control limits, however variations exist within the process.

**Priority level – III (T2).** The chart indicates the process is stable and within statistical control limits, however variation exists within the process.

Response time analysis indicates that the processes are within the statistical control limits except Priority level – II (T2). But variations are existing within the process in all cases. While doing process improvement steps the special causes of variation should identify and address first to make the process under statistical control. In this case only one chart priority (T2) is exhibiting the presence of special causes. The remaining charts are also exhibiting process variation within due to the common causes. The special causes identified are the time taken for the arrival of a non-ED consultant and ED doctors were attending other cases. The common causes are medical and non-medical staffs were busy in attending other patients, time between triage, registration and initial physician assessment, ED volume or throughput, and ambulance off load time.

**Stage 2: Process flow analysis.**

A detailed analysis of the current process flow is done based on the sequential activities involved in the current system of emergency care delivery. The current process flow indicates that few activities are contributing for delayed response time. Some of the sequential activities can be done simultaneously and achieve the tasks in a speedier manner. It is observed that no parallel activities are
achieved in the current state. The current state is indicating that parallel decision making is also not done for assessing the patient’s condition immediately.

**Current process flow of ED**

The current process flow is not facilitating simultaneous task achievement and parallel decision making. So the patient is facing delay in many crucial points. This will lead to delay in response time and starting definitive treatment. The revised process flow is avoided the queue in the ED by merging two activities and to reduce the time in a waiting room prior to initial medical contact. The proposed process flow organizes tasks in such a way so that parallel processes predominate over serial processes.

The fundamental rule for ED process improvement is to implement changes that help the ED staff and physicians to 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 necessary buy-in, the front line workers must understand how those changes benefit them individually. 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 are 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 achievable.

Stage 3: Analysis of organisational and staff factors.

The overall performance of the ED and the sustainability of the organisational changes are based on different factors. If we are only addressing the issue of process variation it may not provide a system wide performance improvement. Hospitals are complex systems, consists of different functional units that require wider cross-departmental and cross-role coordination at all times. Even simple tasks require the involvement of many skilled people both from clinical and non–clinical areas. So leveraging facilities and skills are necessary for delivering effective emergency care.

This paper is attempted to understand the impact of organisational and staff factors in determining the efficiency of the ED performance. So staff awareness and opinion regarding these factors are also collected and analysed. A sample of 60 staff from ED as well as related departments is included in the study. For collecting the response from the ED staff a questionnaire is prepared based on selected factors. The data collected from the staff through individual depth interviews by conversation rather than through a structured interview.

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Organisational and staff factors determining effective care delivery.</th>
</tr>
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<tbody>
<tr>
<td>1.</td>
<td>Triage</td>
</tr>
<tr>
<td>2.</td>
<td>ED overcrowding</td>
</tr>
<tr>
<td>3.</td>
<td>Availability of skilled manpower</td>
</tr>
<tr>
<td>4.</td>
<td>Awareness about the process involved and role clarity</td>
</tr>
<tr>
<td>5.</td>
<td>Awareness about key performance indicator</td>
</tr>
<tr>
<td>6.</td>
<td>Coordination with other clinical and supportive services</td>
</tr>
<tr>
<td>7.</td>
<td>Communication internal / external</td>
</tr>
<tr>
<td>8.</td>
<td>Training</td>
</tr>
<tr>
<td>9.</td>
<td>Decision making</td>
</tr>
<tr>
<td>10.</td>
<td>Management involvement.</td>
</tr>
<tr>
<td>11.</td>
<td>Cultural shift.</td>
</tr>
</tbody>
</table>

Staff response indicated the primary causes of ED overcrowding include four factors over which the ED staff has no direct control: lack of free inpatient beds, a lengthy and sometimes convoluted admission process, difficulty in getting timely consultations from non-ED physicians, and difficulty getting diagnostic procedures scheduled and results returned.

Staff suggested that a streamlined triage and registration procedures can minimize the unnecessary administrative work that burdens of nurses and prevent them to do the core activities.
Many staff members may not have the skills needed to identify problems, develop solutions, or ensure that the solutions are sustained. Staff response indicated they need to train in a variety of clinical and administrative skills.

Staff response indicated employees are aware about the roles and responsibilities, but they are not aware about the end to end perspective of the process which they have involved.

Staff response indicate that nursing staff is not having autonomy in decision making during critical situations however medical staff is capable of facilitating action through critical decision making.

Staff are not well informed about key performance metrics which are determining process efficiency. Majority of the nurses found it is difficult to cope up with standard operating procedures initially but facilitate them once, they adapt with them.

Many staff members suggested it is necessary to initiate system wide performance improvement for sustaining the changes and to break down organisational silos which lead to a cultural shift.

6. Findings

- Response time analysis indicates that the processes are within the statistical control limits except Priority level – II (T2). But variations are existing within the process in all cases.
- Priority level – II (T2) exhibiting uncontrolled variation due to the presence of special causes identified such as late arrival of external consultant, ambulance off-load time etc.
- Remaining processes are exhibiting controlled variation due to the presence of common causes.
- The special causes identified are the time taken for the arrival of a non-ED consultant, ambulance off load time.
- The common causes are medical and non-medical staffs were busy in attending other patients, time between triage, registration and initial physician assessment, ED volume or throughput, and ambulance off load time.
- The current process flow analysis indicates that few activities in the sequence are contributing for delayed response time.
- Simultaneous decision making and task accomplishment is not is not done in the current state of process flow.
- This revised process flow chart proposing simultaneous decision making and task accomplishment
- Few factors related with delayed ED response time is not under the ED staff control.
- Better matching of staff levels with patient volumes can prevent patients from being left in the ED.
- Staff suggested for streamlined triage, registration procedures and transfer process in order to improve ED performance.
- ED needs to have more integration with other related departments.
- ED staff required skill development in variety of clinical and administrative areas.
- ED staff is not well informed about key performance indicators.
- ED requires well defined standard operating procedures.
- An overall cultural shift is also necessary for ED performance improvement.
7. Lean implementation for effective care delivery.

A performance-improvement program based on lean principles can be implemented at the department level to reduce wait times, overcrowding, delayed response time etc.. In most cases, the changes can be implemented inexpensively; they do not typically require new staff positions, unplanned capital expenditures, or significant additional operating resources. But their impact can be profound. Correcting the problems of ED requires an end-to-end transformation of multiple hospital processes.

**Process improvement**

Streamlined triage and registration procedures can minimize the unnecessary delay in performing core activities by nurses.

Adequate supply of the support staff will avoid the delay in ambulance off load time, transfer of patients to wards.

Better matching of staff levels with patient volumes can prevent patients from being left in the ED unattended because it is observed that sometimes support staff are not available to transport them to the wards. ED patients need to be transferred to wards in a timely and efficient manner. The lack of free beds in the inpatient wards prevents the faster admission of ED patients to wards. As a results ED beds are overcrowded.

Resolving the problems of lack of bed availability hospital not required to build new wards. More efficient discharge processes can usually sufficient to overcome capacity constraints, to eliminate the unnecessary delays that inappropriately extend length of stay.

Some of the changes needed for a speedy discharges process are quite simple: like doctors can write discharge orders earlier in the morning, for pre-planned discharges, summaries are prepared in the previous day or having housekeeping staff cleans the beds more quickly once they are vacant.

A streamlined transfer process that includes an electronic transmission of a patient’s records from the ED to the ward can help enormously in this regard. A Designated ED nurse can coordinate and alert others in the hospital whenever backups in the ED are starting to build. Bed assignments can then be made in real time - as soon as another patient is discharged, rather than after the bed is cleaned. The transfer and bed cleaning can be performed simultaneously.

Other process can also improve through bringing small changes may not require new support structures or skills. For example, discharge procedures can be expedited if the nursing staff develops checklists to ensure that all appropriate steps are taken and all paperwork is filled out before a patient is ready to be sent home. The streamlined procedures not only enable earlier discharges but also permit the nurses to spend more time on patient education. A daily, early-morning meeting or a web based report available to all staff members can increase collective awareness about bed availability.
Training

Training becomes inevitable part for inculcating new skills and sustaining the changes. Many staff members may not have adequate skills needed for problem solving and critical decision making. Key staff members should therefore be trained in a variety of skills - not only lean skills, such as process mapping and root-cause analysis, but also how to collaborate, build team trust, and influence others. These staff members can then become role models and coaches for others in the organization, helping them to improve their own capabilities.

Performance metrics

To sustain the impact of an improvement program, the hospital must clearly define its new operational accountabilities (who is responsible for doing what in the new system), as well as the performance metrics that will be used to determine how well the goals are achieved. Triage and registration time, ED response time, Time taken for giving definitive care, ED volume, ED crowding, Length of stay at ED etc. are identified as the performance metrics of ED. An effective evaluation system can formulate which involve front line staff, middle level managers and senior managers are. They discuss the results with the staff, determine why the problems arose, and set up plans to correct them as soon as possible. The senior executives can review the progress regularly and hold the midlevel managers accountable for delivering the desired results.

Cultural shift.

Getting the staff accustomed with the desired behaviours’ described is the most difficult task because it requires a shift in mind-sets. The staff must see the connection between their actions and effectiveness of ED functions and overall patient satisfaction. They should understand how the changed behaviour can improve patient care and reduce employee stress.

Communication.

A clear message carefully communicated to the staff can begin the process of cultural change. The shift can then be reinforced by improving the staff’s capabilities, strengthening management’s mechanisms to monitor performance, and providing strong, visible leadership from the hospital’s senior executives and change champions

8. Conclusion

There is no single “right” approach that can be applied at every hospital, but certain elements are essential for success. However lean thinking will enable organizations to achieve excellent deliverables through inexpensively, by incorporating small changes. The performance-improvement program can begin within the ED, but it can put across hospital wide. But a significant effort must be put into a cultural shift for a system wide transformation. The staff must come to understand how visibly small changes in their actions can improve patient satisfaction, patient safety and other system wide achievements. As the hospital’s processes became more efficient - patient safety, patient satisfaction, quality of care, and staff morale rose.
9. Bibliography


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