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## IMPLEMENTING SIX SIGMA TO IMPROVE HOSPITAL DISCHARGE PROCESS

Kirti Udayai\* and Piyush Kumar

International Institute of Health Management Research (IIHMR), Plot No-3, HAF Pocket, Sector 18A, Phase II Dwarka, New Delhi 110075, India

Jaypee Medical Center, Sector -128, Noida, Uttar Pradesh, India

### ABSTRACT

Privatizations of health care have changed the functioning and demand of health care system. As today's competitive environment leaves no scope for error, we need to delight our patients, look for new ways to exceed their expectations on continuous basis, with a focus on improvement in technical skills, human skills and to develop cost effective methodologies. To meet challenges, implementation of six sigma is the utmost solution. The concept is still in its nascent stage in Indian health care system. Six sigma is a scientific concept, provides measurement of every activity in the hospital by using various statistical tools. Alternatively delay in discharge of patients was a chronic problem among Indian Hospitals. Good discharge management is vital to ensure patient satisfaction; bed availability for emergency and elective admissions; and quality of patient care remains high. This paper attempts to study six sigma aspects in the discharge process of a corporate hospital.

#### Keywords:

Six Sigma,  
Discharge Process,  
Hospital,  
DMAIC (Define, Measure, Analyze,  
Implement and Control)

#### Correspondence to Author:

**Kirti Udayai**

International Institute of Health  
Management Research (IIHMR), Plot No-3,  
HAF Pocket, Sector 18A, Phase II Dwarka,  
New Delhi 110075, India

E-mail: [kirtiudayai@iihmr.org](mailto:kirtiudayai@iihmr.org)

**INTRODUCTION:** When the global economy is services-driven and more than 75% of the GDP of most developed countries is contributed by services, India, though known globally for services offered in the field of IT, BPO, Finance, Healthcare, Telecommunication has to improve the quality of services offered and the skills of the workforce to maintain sustainable competitive advantage<sup>1</sup>.

Quality management became imperative for the manufacturing sector in the 1970s and 1980s, for service organizations in the 1980s and 1990s, and, finally, for the healthcare industry in the 1990 onwards<sup>2</sup>. Today, there is ever growing demand for improved public service delivery especially in Medical world. Health care today is highly dynamic and offers creative advances in technology and treatment. It is a complex web overburdened by resource limitations, other constraints inefficiencies, negligence, errors and other

issues that threaten the safety of patient care and service delivery. In the current competitive scenario, the demanding corporate strategies and the ever rising branding world many hospitals and healthcare set-ups strive to implement the best and stand out as a benchmark in their relative domain<sup>3</sup>.

Pioneered at Motorola in the mid-1980s, Six Sigma was initially targeted to quantify the defects occurred during manufacturing processes, and to reduce those defects to a very small level. Motorola claimed to have saved several million dollars.



Another very popular success was at GE. Six Sigma contributed over US \$ 300 million to GE's 1997 operating income.<sup>4</sup> Today Six Sigma is delivering business excellence, higher customer satisfaction, and superior profits by dramatically improving every process in an enterprise, whether financial, operational or production. The term "Six Sigma" refers to the ability of highly capable processes to produce output within specification. In particular, processes that operates with six sigma quality. The defects levels are below defect levels below 3.4 defects per (one) million opportunities. Six Sigma's implicit goal is to improve all processes to that level of quality or better.

The Six Sigma quality certification was established by the International Quality Federation in 1986, to judge the quality standards of an organization. While the particulars of the methodology were originally formulated by Bill Smith at Motorola in 1986, Six Sigma was heavily inspired by six preceding decades of quality improvement methodologies such as quality control, Total Quality Management and Zero Defects.

#### Key Elements of Six Sigma:

- Based on voice of customers- To meet customer requirement and achieve their satisfaction level in a minimum time.
- Quantify the defects and opportunities- To measure the causes of defects and to identify opportunity to improve.
- Defining processes and metrics- Three important metrics of six sigma are sigma level, defects per million opportunities and yield. It is important to determine all these values to measure the current performance of the organization.
- Team building and involving employees- Because six sigma leads to implement new methodologies based upon HR shift, new job description and classification to improve process by reducing defects.

The fundamental objective of the Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction through the

application of improvement projects. This is accomplished through the use of two Six Sigma sub-methodologies: DMAIC and DMADV. The Six Sigma DMAIC process (defines, measure, analyze, improve, control) is an improvement system for existing processes falling below specification and looking for incremental improvement and also used to develop new processes or products at Six Sigma quality levels. It can also be employed if a current process requires more than just incremental improvement.

Both Six Sigma processes are executed by Consultants who are Six Sigma Green Belts and Six Sigma Black Belts, and are overseen by Six Sigma Master Black Belts and Champions<sup>5</sup>.

#### Six Sigma edge over other quality initiatives:

1. Demands and provides a rigorous control mechanism and tools such as "Dashboard" to maintain long term improvement.
2. Leadership support and driven by those closest to the process
3. Targets process variability instead of aiming at averages
4. Supports and aligns with organizational vision and strategy

**METHODOLOGY:** Delay in discharge of patients is one of the organization's top concerns. It leads to patient dissatisfaction, delay further availability of beds which all impact on ultimate revenue generation for the organization. Following a process of selection and scoping, a Six Sigma project assigned to reduce the discharge time of cash patients in the first phase.

**Define the Problem:** By analyzing voice of the customer (patient feedback form) it was indicated that there is need to reduce discharge time, which was the main reasons of inpatient dissatisfaction. The data provides the summary of the total turnaround time taken for all the patients with Upper Specification Limit (USL) is taken as 120 minutes. The USL is decided in consultation with the concerned Head of the Department (HOD). For every Six Sigma project, the 'opportunity' and 'defect' must be defined before the Measure phase can begin.

For this project, an opportunity was the time from a written discharge order to the time patient leaves the patient room. A defect is any opportunity exceeding the upper specification limit. 2 months project timeline was assigned. CEO of the organization work as sponsor a demonstrated the commitment and support on behalf of the organization.

**Measure the current process and data collection:**

Work break down structure of discharge process:

- Consultant confirms discharge and inform to nurse
- Preparation of discharge summary
- Details (Pharmacy, Consumables list) send to Multi Task desk ( MTD) for final billing
- Confirmation received by nurse station and patient attendant sent to MTD to settle the payment
- Settlement of bills by patient attendant
- Explanation of discharge summary and medicine by nurse to the patient
- Patient leave the room

A time motion study was used to measure each step in the process to determine factors impacting the overall process. Three nursing units, during both day and

evening shifts and representing approximately 1/3 of the total beds, were measured and used as a statistically significant sample for the entire hospital. Time targets and upper specification limits were set for each of the sub-processes based on the organizations protocols and the expectation of the customers. Further, Time Trap study was conducted at the Multi Task desk which takes maximum time and results in delay of discharge. Summary of key findings with several reasons for the process were noted which was analyzed in the next step.

**RESULTS:**

**Analysis of Data: Table 1** represents the defects in each sub processes against Upper specifications limit. Since the average time taken at the multi task was coming very high so in order to find out the cause of delay, time trap analysis was conducted at MTD. It helps in calculating the number of activities going on at a particular time (complexities) and the value added time and the non-value added time .It helps in calculating the units in queue and the queue time .The activities which hinders the actual process are known as time traps and should be eliminated from the process to reduce the waste and to increase the speed of the process (**Table 2**).

**TABLE 1: OBSERVED MEAN TIME AGAINST USL OF DISCHARGE SUB PROCESS**

Process	Observed mean time (in min)	USL (in min)
Consultant confirm discharge, Preparation of discharge summary and signed and handed over to nurse by consultant/RMO	40	30
Details (Pharmacy, doctors visiting list, consumables list) send to Multi Task desk (MTD) for final billing	66	20
Bill settlement at Multi Task desk and inform to nurse station to inform patient regarding payment settlement	82	30
Settlement of bills by patient attendant	9	10
Explanation of discharge summary and medicine by nurse to the patient	30	15
Patient leave the room	20	15
<b>Total</b>	<b>4 hour 11 min ( 247 min)</b>	<b>2 hour ( 120 min)</b>

**TABLE 2- TIME TRAP STUDY AT MULTI TASK DESK (MTD)**

Processing time (morning shift)	180 minutes
Units in queue	21 (7 discharges)
Queue time	123 minutes
Complexity	5
Queue time for discharge	78 minutes
Processing time (afternoon shift)	180 minutes
Units in queue	16 (3 discharges)
Queue time	82 minutes
Complexity	5
Queue time for discharge	43 minutes

Further root cause analysis was done by fishbone variability in the process (Fig. 1). diagram helped to visually map the drivers of

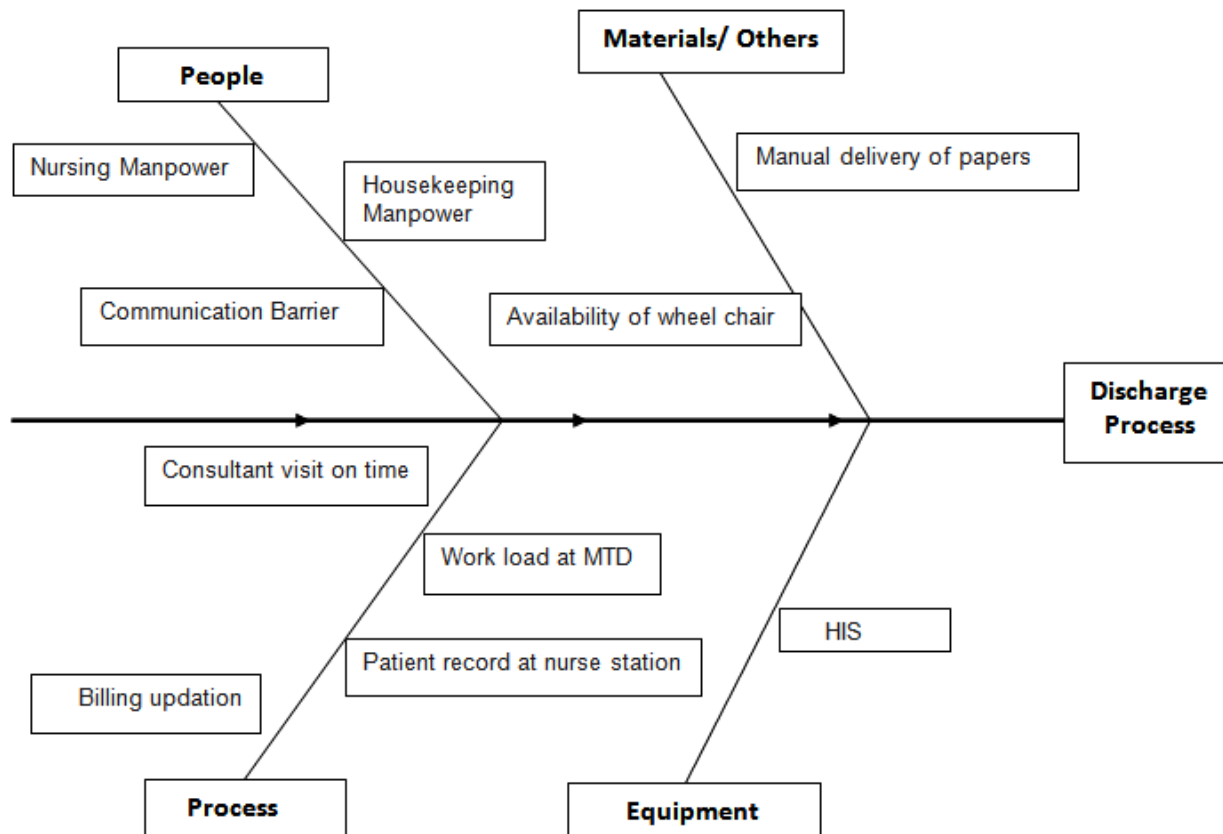


FIG. 1: FISHBONE DIAGRAM

**Action taken (Improve phase):** During the Improve phase, with root causes uncovered and prioritized, actions were taken to improve the time from discharge. Billing hour started from 8 am Instead of 9 am. Responsibility was directed to billing executive in evening shift to update all inpatient bills till time, every day. Nursing supervisor directed to audit patient record at nurse station in daily basis and train nurses on the same. At peak hours from 9 am – 12pm one dedicated front office executive for inpatient admission and discharge.

A priority for ‘pending discharge’ was added on the computer that listed patients needing an X-ray, lab report, medicines etc. This ensured that a patient needing any of the above before discharge became a priority; therefore reducing the time the patient

needed to remain in the room. Increased in number of ward boys at peak hour (adding one) and trained to be competent with the technological advances in hospital wherever required. Discharge process flow developed and placed on inpatient room, so that discharge expectations are communicated early in their hospital stay. After the implementation of the suggestions an improved data is collected to study the turnaround time in the department. Overall, time for discharge process was reduced from 247 to 195 minutes, a 21% decrease!

**Control and Monitoring:** Process improvements only work if they lead to long-term changes in performance (Table 3). A checklist was created and implemented to track results And to ensure that the improved process remains improved over the long pull.

TABLE 3: PROCESS CHECKLIST TO MONITOR AND CONTROL IMPROVEMENT

<b>Project name</b>	<b>Improvement in discharge process</b>										
<b>Location</b>	Nursing Station - 1,2,3,4										
<b>Target 1</b>	Maintain Upper Specification Limit of at least 195 min										
<b>Target 2</b>	Reduce Discharge time from 195 min to 120 min										
<b>TAT of the month</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>July</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>		

Consultant confirms discharge and inform to nurse

Preparation of discharge summary

Details (Pharmacy, consumables list) send to Multi Task desk ( MTD) for final billing

Confirmation received by nurse station and patient attendant sends to MTD to settle the payment

Settlement of bills by patient attendant

Explanation of discharge summary and medicine by nurse to the patient

Patient leave the room

**CONCLUSION:** The project resulted in more patients being managed every month resulting in a direct revenue impact and also affected the satisfaction level of patients positively. Leadership support and active participation from employees were key factors in successful project completion. Organization planned to train in house staff as Six Sigma Green Belts and Black belts. Current areas of interest include Supply chain management; Housekeeping and infection control, pathology, imaging and other support services. Thus in competitive world, with the increase focus on customer requirement and pressure to deliver best quality every time with optimize cost, Six Sigma is ultimate solution to address mentioned concerns and challenges.

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