

CASE STUDY ON REDUCING CYCLE TIME FOR ADMISSION & DISCHARGE PROCESS OF A HOSPITAL FOLLOWING DMAIC STEPS OF SIX SIGMA

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Abstract

The sole purpose of any quality program is to improve business efficiency at a rate faster than the competition. The customers want better quality, predictability and value for money; the owners want growth, stability and profits. This case study was carried out in a reputed Indian private hospital for better patient satisfaction. For patient satisfaction, it is of paramount importance to reduce the cycle time for treating patients in a hospital for expeditious recovery by prompt and proper actions at a reduced cost. We need to work in three broad areas to enhance service quality; namely time taken in admission, time taken in complete recovery (medication) and time taken in discharge. This study has been done to enhance the service quality by reducing the cycle time in admission and discharge processes

For the admission and discharge processes the significant activities causing delay have been identified and the corresponding remedial actions have been suggested.

Keywords –HC (Health care), TQM (Total quality management), DMAIC (Define, Measure, Analyze, Improve and Control), ST DEV (Standard deviation)

Introduction

Quality management has become an important issue in healthcare organizations (hospitals) during the last couple of decades. The increased attention to quality is due to governmental regulations, influence of customers, and hospital management initiatives. So, the role of government as the main provider of healthcare (HC) services has changed. Additionally, the healthcare market is changing from a producer-oriented to a customer-oriented market due to the increasing influence of customers and public pressures. As a consequence, the patient is becoming a customer for the healthcare organizations, or more likely a direct strategic partner who participates in a decision-making process [7]. The changes in environment, society, and political policies have significant impacts on management in hospitals as well. There are many difficulties in managing healthcare organizations in a competitive marketplace with a little support from official bodies especially in a developing country like India. The evolution of concepts such as TQM and Six Sigma has only added to the repertoire of the word. TQM ‘Total Quality Management’ is practiced widely at different organizations and Hospitals are no exception to this. Many organizations are struggling to make progress in Six Sigma implementation. There are issues – some of them are technical issues and some others are management related issues. As far as the technical issues are concerned both proactive and reactive kinds of improvement initiatives are important from practical standpoint. Another important aspect out of these technical issues is concerned with process management, which deals primarily with holding the gain achieved out of improvement initiatives.

This study on process improvement in service industries deals with reducing cycle time in a hospital for admission and discharge processes. It is of paramount importance to reduce the cycle time for treating patients in a hospital for expeditious recovery by prompt and proper actions at a reduced cost. Therefore, this study has been done to enhance the service quality by reducing the cycle time in admission and discharge processes in a reputed Indian private hospital.

For the admission and discharge processes the significant activities causing delay have been identified and the corresponding remedial actions have been suggested. As a result, the ways and means of reducing the cycle time for treating patients in the hospital have been identified by taking into account the three vital processes – admission and discharge.

What is six sigma?

Six Sigma is a business-improvement approach that seeks to find and eliminate causes of mistakes or defects in business processes by focusing on outputs that are of critical importance to customers. As a result, process performance is enhanced, customer satisfaction is improved, and the bottom line is impacted through cost savings and increased revenue. Six Sigma is a strategic approach that works across all processes, products, company functions, and industries. Six Sigma has both management and technical components. On the management side, it focuses on getting the right process metrics and goals, the right projects and right people to work on the projects, and the use of management systems to complete the projects successfully and sustain the gains over time. On the technical side, the focus is on enhancing process performance (improving the average level of performance and reducing variation) using process data, statistical thinking and methods, and a disciplined and focused process-improvement methodology which has four key stages: measure, analyze, improve, and control.

System Architecture

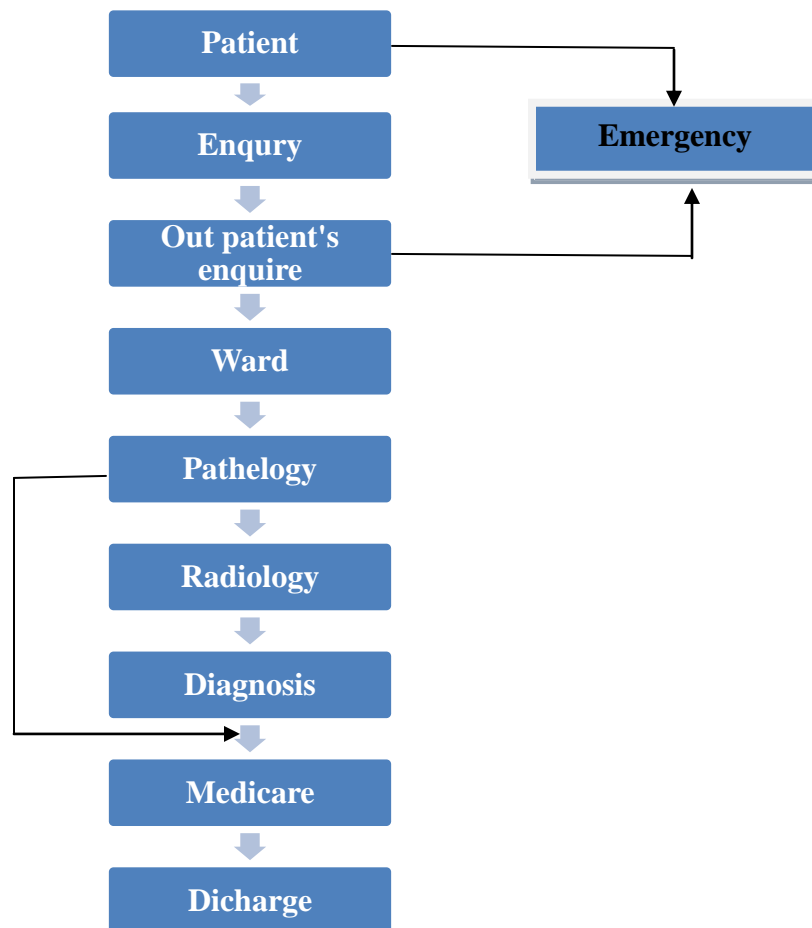


Figure 1 The Process Flow Chart

The ways and means of reducing the cycle time for treating patients in the hospital have been identified by considering the two vital processes – admission and discharge. Through this study the identification of significant causes of overstay led to adopting appropriate remedial measures. As a result, the ways and means of reducing the cycle time for treating patients in the hospital have been identified by considering the two vital processes – admission and discharge.

Results and Discussions

The activities causing significant amount of delay in the admission and discharge processes are mentioned in Table 1.

Table 1 Activities Causing Significant Amount of Delay

Process	Activity	Average Delay in Minutes	Remarks
Admission	Enquiry and Registration	2.60	Significant
	Carrying to The Specific Ward	4.60	Significant
	Visit by The Nurses	2.40	Significant
	Visit by The Housekeeping Staff	3.11	Significant
Discharge	Returning Excess Medicine to the Pharmacy	7.10	Significant
	Bill Payment and Receipt Collection By the Patients' Relatives	7.20	Significant

(a) The Findings at A Glance from The Measure Phase

1. With regard to the admission and discharge processes the following 6 activities are causing significant delay out of 15.
 - Enquiry and registration
 - Carrying the patient to the specific ward
 - Visit by the nurses
 - Visit by the housekeeping staff
 - Returning excess medicine to the pharmacy
 - Bill payment and receipt collection by the patients' relatives

(b) Analysis

In order to carry out the root cause analysis for the 6 significant activities causing delay with regard to the admission and discharge processes, Pareto analysis has been done. The pertinent results are given in Tables 2-7.

1. The Admission Process

Table 1: The Root Cause Analysis for Delay in Enquiry and Registration

S. No.	Causes	Number of Patients Faced The Problem	Contribution%
A	Lack of knowledge about the synonym of The test	16	45.72
B	Improper reference made by the outside doctors	7	20.00
C	Non-availability of proper housekeeping staff	2	5.71
D	low skilled operator	2	5.71
E	Illegible handwriting of the medical practitioner	2	5.71
F	Others	6	17.14
	Total	35	100.00

Table 2: The Root Cause Analysis for Delay in Carrying the Patient to The Specific Ward

S. No.	Causes	Number of Patients Faced The Problem	Contribution%
A	Non-availability of carriers	11	31.43
B	Men not at proper places	9	25.72
C	Less number of workers	7	20.00
D	Non-availability of men due to other tasks	6	17.14
E	Others	2	5.71
	Total	35	100.00

Table 3: The Root Cause Analysis for Delay in Visit by The Nurses

S. No.	Causes	Number of Patients Faced The Problem	Contribution%
A	Attending to other patients	14	40.00
B	Busy for discussion with the doctors	9	25.71
C	Inadequate number of nurses	5	14.29
D	Absenteeism	3	8.57
E	Having lunch	2	5.72
F	Others	2	5.71
	Total	35	100.00

Table 4: The Root Cause Analysis for Delay in Visit by The Housekeeping Staff

S. No.	Causes	Number of patients faced the problem	Contribution%
A	Improper housekeeping due to problems related to laundry	15	42.86
B	Negative attitude towards work	9	25.72
C	Busy in other works	5	14.29
D	Non-availability of cleanedbed sheets	3	8.57
E	Others	3	8.57
	Total	35	100.00

2. The Discharge Process

Table 5: The Root Cause Analysis for Delay in Returning Excess Medicine to The

S. No.	Causes	Number of Patients Faced The Problem	Contribution%
A	Concerned employee doing multiple tasks	13	37.14
B	Confusion about which excess medicine to be returned	8	22.86
C	Insufficient space at the counter	5	14.29
D	Non-existence of name and price on the medicine strap	4	11.43
E	Inadequate number of employees	3	8.57
F	Others	2	5.71
	Total	35	100.00

Table 6: The Root Cause Analysis for Delay in Bill Payment and Receipt Collection

S. No.	Causes	Number of Patients Faced The Problem	Contribution%
A	Settling the bed charge	12	34.29
B	Settling the cost of pathological tests	12	34.29
C	Non-receipt of the medicine bill	4	11.42
D	Engagement of the billing department head in meeting	2	5.71
E	Others	5	14.29
	Total	35	100.00

Table 7: The vital few root causes for delay in admission and discharge processes

Activity	The Vital Few Root Causes
Enquiry and Registration	<ul style="list-style-type: none"> • Lack of knowledge about the synonym of the test. • Improper reference made by the outside doctors
Carrying the Patient to The Specific Ward	<ul style="list-style-type: none"> • Non-availability of carriers • Men not at proper places
Visit by The Nurses	<ul style="list-style-type: none"> • Attending to other patients • Busy for discussion with the doctors
Visit by The Housekeeping Staff	<ul style="list-style-type: none"> • Improper housekeeping due to problems related to laundry • Negative attitude towards work
Returning Excess Medicine to The Pharmacy	<ul style="list-style-type: none"> • Concerned employee doing multiple tasks • Confusion about which excess medicine to be returned
Bill Payment and Receipt Collection	<ul style="list-style-type: none"> • Settling the bed charge • Settling the cost of pathological tests

(c) Improve

The practicable remedial actions taken to reduce the cycle time with respect to admission and discharge processes are outlined in Table 9.

Table 8: Remedial Actions with Respect to Admission and Discharge

Activity	The vital few root causes	Actions taken
Enquiry and registration	<ul style="list-style-type: none"> • Lack of knowledge about the synonym of the test • Improper reference made by the outside doctors 	<ul style="list-style-type: none"> • A comprehensive list of all the tests and treatments along with their synonyms have been prepared and made available. • The list of the physicians attached to the hospital for various disciplines have been sent to the doctors referring frequently.
Carrying the patient to the specific ward	<ul style="list-style-type: none"> • Non-availability of carriers • Men not at proper places • Less number of workers • Non-availability of men due to other tasks 	<ul style="list-style-type: none"> • Places have been earmarked for ready availability of the carriers. • The number of trained workers have been increased.
Visit by the nurses	<ul style="list-style-type: none"> • Attending to other patients • Busy for discussion with the doctors 	<ul style="list-style-type: none"> • The number of trained and skilled nurses has been increased.
Visit by the housekeeping staff	<ul style="list-style-type: none"> • Improper housekeeping due to problems related to laundry • Negative attitude towards work 	<ul style="list-style-type: none"> • Numbers of bed sheets and towels, their availability and periodic replacement have been ensured. • Department-wise manpower allocation has been made. • Motivational programs have been initiated.
Returning excess medicine to the pharmacy	<ul style="list-style-type: none"> • Concerned employee doing multiple tasks • Confusion about which excess medicine to be returned 	<ul style="list-style-type: none"> • Instructions have been given to the concerned RMOs for taking quick decision about refundable medicines
Bill payment and receipt collection	<ul style="list-style-type: none"> • Settling the bed charge • Settling the cost of pathological tests 	<ul style="list-style-type: none"> • The patient or the relatives are conveyed periodically about the expenses. • In place of one in-charge two persons are designated and authorized as in-charge for signing the bills.

All the actions have been approved for implementation. Management is implementing these actions as per an action plan.

For one particular process i.e. “Returning Excess Medicine to the Pharmacy” actions have been completed. Data for 35 patients were collected for the above-mentioned process.

A 2T test was performed to see if the improvement of the proposed action is significant or not.

Two-Sample T-Test and CI: Before, After

Method

μ_1 : mean of Before

μ_2 : mean of After

Difference: $\mu_1 - \mu_2$

Equal variances are not assumed for this analysis.

Descriptive Statistics

Sample	N	Mean	St Dev	SE Mean
Before	35	42.14	8.27	1.4
After	35	37.14	8.27	1.4

Estimation for Difference

Difference	95% Lower Bound for Difference
5.00	1.70

Test

Null hypothesis $H_0: \mu_1 - \mu_2 = 0$

Alternative hypothesis $H_1: \mu_1 - \mu_2 > 0$

T-Value	DF	P-Value
2.53	68	0.007

As the p value (0.007) is less than the critical value of 0.05, there is significant evidence to conclude that proposed actions have resulted in reducing the time for discharge. A box plot of before and after observations were also plotted as shown below

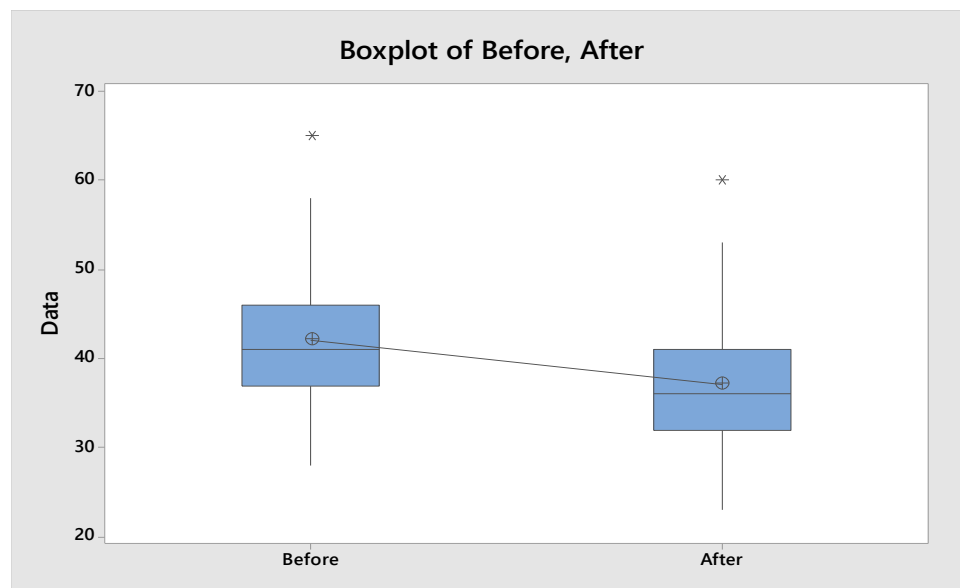


Figure 2: Boxplot for Preparing the Discharge Summary

c. Control

To see the stability of results i.e. the discharge time, an I-MR Control Chart was prepared which is shown below.

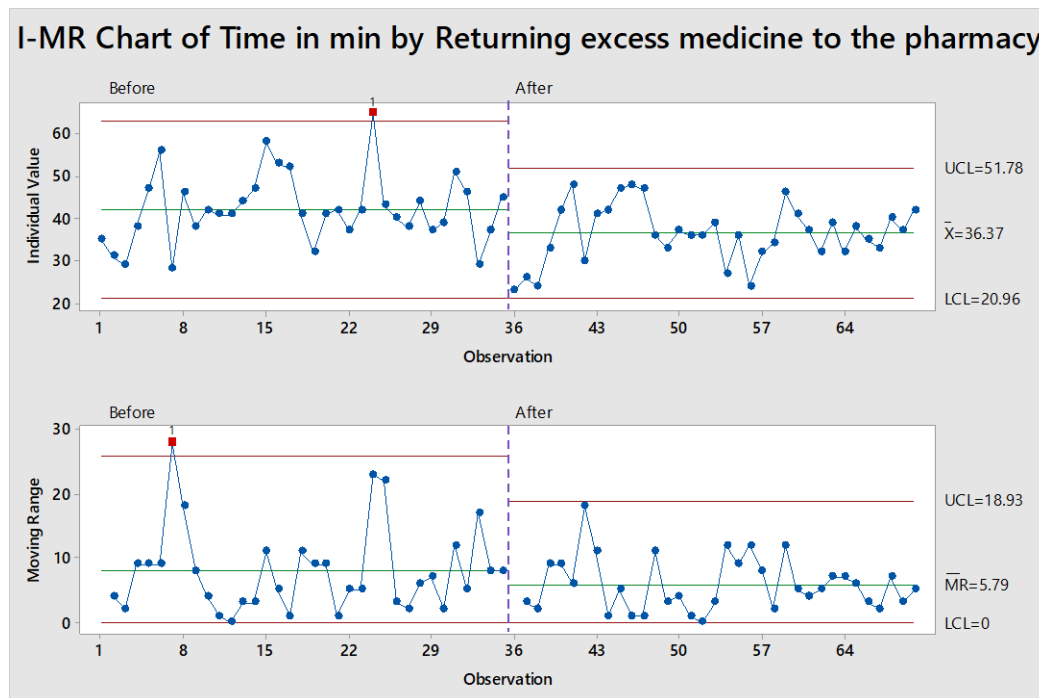


Figure2 : I-MR Chart of Preparing the Discharge Summary

Conclusion

This work deals with the issue related to cycle time reduction in health care sector following DMAIC steps of Six Sigma. Appropriate remedial actions have been taken subsequent to arriving at the root causes of significantly higher cycle time activities.

Also, it is concluded that DMAIC methodology can be implemented in the healthcare sector with good results. It can be implemented in other fields of healthcare also like medication, etc. and can produce fruitful results.

Successful implementation of DMAIC or any other TQM methodology in healthcare sector requires the following:

- Treating the patient as a customer and not as patients will increase the customer satisfactions.
- The involvement and commitment of all parties in providing the service to the patient.
- Barriers created by physicians' involvement may turn out to be the most important single issue impeding the success of quality improvement in medical care.
- The doctors view TQM as a program which will replace what was largely subjective process controlled by them, with as objective and statistically based discipline which is not under their control
- Building common believes among physicians by involving them from the early stages of TQM this involvement will increase the chances of success.

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