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Reducing Waiting Time in Outpatient Services: Six Sigma Approach

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Abstract:
OPDs, also called as the window or face-of hospital services are hospitals impression to the patients. This impression often influences the patient's sensitivity to the hospital and therefore it is essential to ensure that OPD services provide an excellent experience for customers. It is also well-established that 8-10 per cent of OPD patients need hospitalization. This study demonstrates:
1) Strong& inverse relationship between:-
   a) Short waiting time & positive feedback.
   b) Short waiting time & increase in patient footfalls.
2) Efficient use of human resource.
Purpose of Study: To increase patient satisfaction.
Goal of this quality improvement project was to reduce waiting time & to calculate cost of quality.
Methodology used was Lean Six Sigma (Define-Measure-Analyze-Improve-Control). The process starts from patient in OPD to consultation, was included in the project. The non-value added steps in the process were identified, and actions were initiated. A cause and effect diagram was prepared for high patient waiting time, and causes were validated with the help of data collected from the process.
Result: Significant reduction in waiting time was achieved in the OPD (p = .001) by using the six sigma approach. Average waiting time has come down from 90 mins.to 40 mins. Compliance to initial nursing assessment increased from 50% to 98.56%. Patient satisfaction score rose from 79% to 91% also increase in patient footfalls by 50% was observed with efficient use of human resource.
This project has helped the clinicians and the hospital management to identify the scope of improvement in the process. Also, the practicality of deploying six sigma in a healthcare scenario was justified with help of this study.

Keyword: Footfalls, nursing assessment, quality improvement, satisfaction index, six-sigma, waiting time

1. Introduction

→ Time waits for no one. What are you waiting for? (Scottle Somers)

Waiting for medical care is the most frustrating part in healthcare delivery. In this study patients waiting time is defined as patient waiting for out-patient consulting service from the time patients enters the outpatient department (OPD) in hospital to the patients leaves the consultation room. OPD is the first place where patients encounter & interact with hospital. Hence, it is important to build the outpatient department so as to be as efficient as possible and strive it to reach excellence. Our study focuses on the average time a patient, in the out-patient department of Aster Medcity, had to wait to consult their doctors, and the associated satisfaction levels.

To study the waiting time & reduce same, Six Sigma is a rigorous, focused and highly effective implementation of proven quality principles and techniques. Incorporating elements from the work of many quality pioneers, Six Sigma aims for virtually error free business performance. Traditionally companies accepted three or four sigma performance levels as the norm, despite the fact that these processes created between 6,200 and 67,000 problems per million opportunities respectively! The Six Sigma standard of 3.4 problems per million opportunities is a response to the increasing expectations of customers and the increased complexity of services rendered. Six sigma is variance based thinking, it is also believed that approximately 6 % savings on project turnover is guaranteed for any six sigma project[1].

2. Review of Literature

Six sigma introduce by Bill Smith an engineer while working at Motorola in 1986 is a set of techniques and tools for process improvement.[2,3] It is important for business operations because it can be used both to increase top-line growth and also reduce bottom line costs. In six-sigma process standard deviation (σ) should be so less that your process performance can fit 12σ within the customer specified limits. So, no matter how much your process deviates from target, you always meet what customer wants. A six sigma process is one in which 99.99966% of all opportunities to produce some feature of a part are statistically expected to be free of defects

(3.4 defective features per million opportunities)[4] . Six Sigma seeks to improve the quality of process output by identifying, removing & rectifying the causes of errors and controlling standard deviation[5]. Subjective & objective data along with statistical models are used to identify defects in processes and reduce variation.

3. Methodology

Study was carried out in Aster Multispecialty Department with average patient of 3000/month for duration of one year i.e. December 2014 – December 2015.

This study includes employees (Clinical & non-clinical) & selected patients. Methodology used for sampling was simple random sampling. The sample size was calculated in scientific manner:

- Retrospective data of 320 patients.
- VOC obtained from 110 patients.
- Waiting time of 200 patients during Analyze & Control phase.

Data was collected in following two:

- Voice of customer: Feedback form & interview.
- Direct observations.

Often customer requirement is hazy, hence customer requirement must be understood clearly. Voice of customer (VOC) is technique to the organization which helps to analyze & profile the customer requirement.

The tool used for quality improvement project was the lean six-sigma methodology using the DMAIC approach.

DMAIC is described briefly as follows:

Define (D): A lean six-sigma project is initiated with realistic problem & ends with realistic solution that helps to improve quality of process & also the business performance. This phase of project helps us to define the project. There are three main outcomes from this phase which includes project charter, SIPOC diagram, & overview flow chart.

Measure (M): A robust measurement system forms the basis of any Six Sigma project. In this phase, current performance is evaluated/assessed using collected data. The main outcomes of this phase are Performance standard for Y, Measurement system analysis, Baseline performance analysis, Sigma level, Process Capability Analysis.

Analyse (A): This phase helps us to understand "what went wrong?". Outcomes in this phase of project are Identification of potential X's, Validated Root causes, Gap Analysis.

Improve (I): In this phase the theme changes from analytics to Creativity. Outcomes from this phase are List of Potential Solutions, Selected solutions, Optimization of the Solutions Setting, Failure Modes & Effect Analysis, Impact of selected solutions on benefit, Pilot-As needed.

Control (C): In this final phase of project, the emphasis is on maintaining the achieved results. Outcomes of this phase are Control Plan, Audits/inspections, Mistake proofing, Data collection plan, continues monitoring of data (SPC).

4. Results & Discussion

The define phase of project helped to define project which included project goal, problem statement, goal, impact to business, benefit to internal &external customer. Also SIPOC diagram was drawn which help to understand input, output, supplier & customer of processes involved.

SIPOC				
Suppliers	Inputs	Processes	Outputs	Customers
Reception staff	Registration form	Patient registration	UHID No.	Patient
	UHID No.	Encountering	UHID Card	
	Cash/Card	Billing	Receipt	
Angels (Nurses)	UHID no.	Initial Nursing Assessment	Patient ready for Consultation	
Doctor	UHID no.	Consultation	Advise	
Coordinator	System	Coordination	Patient ready	

Table 1: SIPOC (Supplier, Input, Process, Output, Customer) Diagram

Table1 exhibits input, output, suppliers & customer for process like patient registration, encountering, billing, Initial nursing assessment, consultation& co-ordination. For all these processes customer remained same i.e. patient & suppliers were reception staff, nurses, doctor, and coordinator.

In measure phase of project, time taken for every process was measured in minutes.

Activity	Mean	Min.	Max.	St. dev.
Getting Registration Form	2	1	4	0.01
Time for filling form	6	2	18	0.04
Time for encounter	8	1	18	0.11
Completion of reg. form & submission	4	0	9	0.10
Time till encounter	19	3	69	0.17
Waiting time for Initial Nursing assessment after encounter.	27	3	51	0.30
Waiting time for consultation after enc.	48	1	98	0.48
Waiting time for consultation after Initial Nursing assessment.	47	1	121	0.47
Time taken for Consultation	22	3	44	0.60

Table 2: Mean time for every process and wait times for patients

Table 2 gives the general idea about waiting time for patients. The major wait times for patients is for consultation after initial nursing assessment average waiting time was found to be 48 minutes whereas maximum time as 121 minutes. Also it was found that average waiting time for nursing assessment also more. Overall mean waiting time for consultation was found to be 90 minutes whereas minimum & maximum time was zero minutes & 246 minutes respectively. Overall 50% of patients were served in 40 minutes, sigma level was found to be 1.55. Moreover, compliance to Initial Nursing Assessment was 50%

Being at Sigma level 1.5, cost of quality is approximately 40% of sale (Source: Six Sigma by Mikel Harry) i.e. hospital loses 50 patients/day approximately. Hospital earning per patient on an average = 1000 rupees. Loss due to poor quality per day = 50,000 rupees. Also hospital has to lose opportunity cost when there will be a chance of (Inpatient conversion) OP to IP. Value & non-value added activities were also measured, Value added activities were 94 & non-value added 38 out of total activities 132. Results of patient's feedbacks were measured; Overall patient satisfaction was found to be 81%.

A brainstorming session was carried out in order to get all the possible causes & responsible for the failure & its potential effects in the form of fish bone diagram. A Process Failure Mode and Effects Analysis (FMEA) was carried out. The top Risk Priority Number (RPN) were considered for further analysis, using 5WHY.

Potential solutions were listed for all the causes, from this list only apt causes were selected.

Causes	Solutions
2 registration counters.	3 registration counters
Lack of proper communication	Provided adequate training.
Signage	Appropriate Signage routing different directions, COEs, Receptions.
Delay in start OPD	Tracking of in-time in hospital by HR. OPD to be started by 9:00 am.
Nurses pulling out for procedures	Extra number of nurses given for procedures
EMR entry (Typing speed, skills, etc.)	Provided adequate training.
Breaks	Defined break timings.
Consultation	Defined consultation time.
Ambiguity in Job description	Specified JD
Delay in nursing assessment with increased patient volume.	Additional room provided for nursing initial assessment.
Complaints for waiting time specially for internal medicine.	Senior specialist allocated to consult walk-in and international patients which reduced the number of complaints drastically.
Nurses pull out for procedures- non-availability.	More nurses deployed (10+4).

Table 3: Solutions for each cause

In addition to these solutions, sensitization program was conducted where there was direct communication of staff with top management namely "Coffee with CEO".

Agenda for program included customer (Patients) Expectation, patient delight, employee's expectations, sensitization towards job description/responsibility, patient first Model.

In addition, 5S was conducted, 5S is the name of a workplace organizing method that uses a list of five Japanese words: seiri, seiton, seiso, seiketsu, and shitsuke. This helped to organize a work place for efficiency and effectiveness by identifying and storing the items used, maintaining the area and items, and sustaining the new order.

Significant reduction in waiting time was observed, after implementing these solutions. Pre & Post data was compared using 2 sample t-test, p-value was found to be below 0.05 at 95% confidence level. Compliance to initial nursing assessment was increased from 50% to 98%. Sigma level increased from 1.5 to 3.6. Also 50% increase in footfalls was observed.

In last step of project, control plans were made to sustain the achievements by monitoring data, Audits/inspections, Mistake proofing, Data collection plan, continues monitoring of data (SPC). VOC conducted to find any variation. It was suspected that there is no

reduction in waiting time for consultation, therefore the hypothesis formulated was Ho: There is no reduction in waiting time old & new. A t Test was conducted to ascertain this.

It was found that the p-Value was below 0.05 at 95% confidence level; the null hypothesis was rejected.

5. Conclusion

This project has helped the clinicians and the hospital management to identify the scope of improvement in the process.
Significant reduction in waiting time for patients with increase in compliance to Initial nursing assessment has been achieved. In Table 4

Indicators	Old	New
Mean waiting time	90 minutes	40 minutes
Compliance to Initial Nursing Assessment	50%	98%
Sigma level	1.5	3.6

Table 4: Old & new data

Table 4, gives average waiting time reduced from 90 minutes to 40 minutes i.e. shift in sigma level was observed from 1.5 to 3.6. From Jan-2015 to Jan -2016, 50% increase in patient footfalls was observed with same number of staff i.e. it can be said that the efficiency of the staff has increased, accommodating almost 50% of the patients. To achieve this lot of unwanted steps in system were removed & proper placements of staff was done:

1) Registration: Dedicated registration counters were made for new & follow-up patients & staff re-allocation done with competency matching to their profile.
2) Nursing assessment: Started up with additional nursing assessment room.
3) Doctors: Starting of OPD & breaks for refreshment strictly followed on stipulated timing.

For entire staff, documentation was reduced & HIS training was provided which helped them to speed up the documentation & also computer skill training was conducted. Centralize pick-up & drop facility for patient started with no charges. Project has helped organization & patients to reduce cost of waiting. Patients received faster service & due to free dropping facility patients need not wait for public vehicles. These savings are sustainable, since project team & area manage have constant eye on system which will continue as control phase of project.

6. Acknowledgement

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