

Use of Six Sigma to Reduce Medication Turnaround Time of IP Pharmacy

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Abstract

In this study six sigma, DMAIC was applied to the IP pharmacy (one of the most revenue generating department of the hospital) in order to reduce the medication turnaround time. Six sigma was found beneficial in reducing the overall average turnaround time from 75.4 minutes to 61.58 minutes (t test 6.72; $p < .05$), average turnaround time for normal indent was reduced from 79.2 minutes to 65.41 minutes & average turnaround time for the urgent indent was reduced from 43.8 minutes to 30.13 minutes. There was also seen an improvement in the sigma level. Hence it was concluded that six sigma is beneficial management tool that can be used to reduce turnaround times.

Keywords: Six sigma; Hospital; Pharmacy.

Introduction

Organizational quality improvement practices have gained wide acceptance in manufacturing industries over the last several decades. The healthcare industry however has been slower to adopt these methods, although anecdotal evidence suggests they are now being gradually diffused throughout hospitals on an increasing basis (Langabeer et al., 2009). Health care organizations will need to adopt effective strategic tools, such as Six Sigma, to improve efficiency and effectiveness (Carrigan & Kujawa, 2006). It was first introduced by Motorola in the late 1980s.

In this study six sigma was applied to one of the most important department of the hospital i.e. in patient pharmacy. The major expectation from the pharmacy department in the hospital is to make right drug available at the right time. The delays in delivering of drugs and medical consumables interrupt in the smooth functioning of pharmacy and hospital (Raghuvanshi & Choudhary, 2013).

Medication turnaround time is an important metrics that measures the time interval from the time a medication was indented/ordered to the time medication was delivered. (Raghuvanshi & Choudhary, 2013)

Hospitalized patients may experience delays in care

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due to delays in medication administration, which can lead to horrifying effects like high mortality and morbidity rates for the hospital. This study mainly focuses on reducing medication turnaround by improving the quality of the current process using DMAIC methodology

Material and Methods

This study was a prospective study, Six Sigma DMAIC methodology was used to reduce the medication turnaround time in IP pharmacy. The study was conducted in a time frame of 6 weeks. A total of 350 indents using convenience sampling were taken for study. Data was analysed using Microsoft excel 2013.

Deamic Methodology Define

Define is the first step which forms the main base for the project and poses the maximum challenge of all. This step focuses on selecting the problem and setting of the objectives accordingly. In this study, the problem was defined as to reduce the medication turnaround time of the IP pharmacy. Timeline for the completion of study was decided as follow:-

- Define Phase : 2days
- Measure Phase : 21 days
- Analyse Phase : 10days
- Improve Phase : 7days
- Control Phase : 6days

Measure

This step includes gathering, validating and quanti

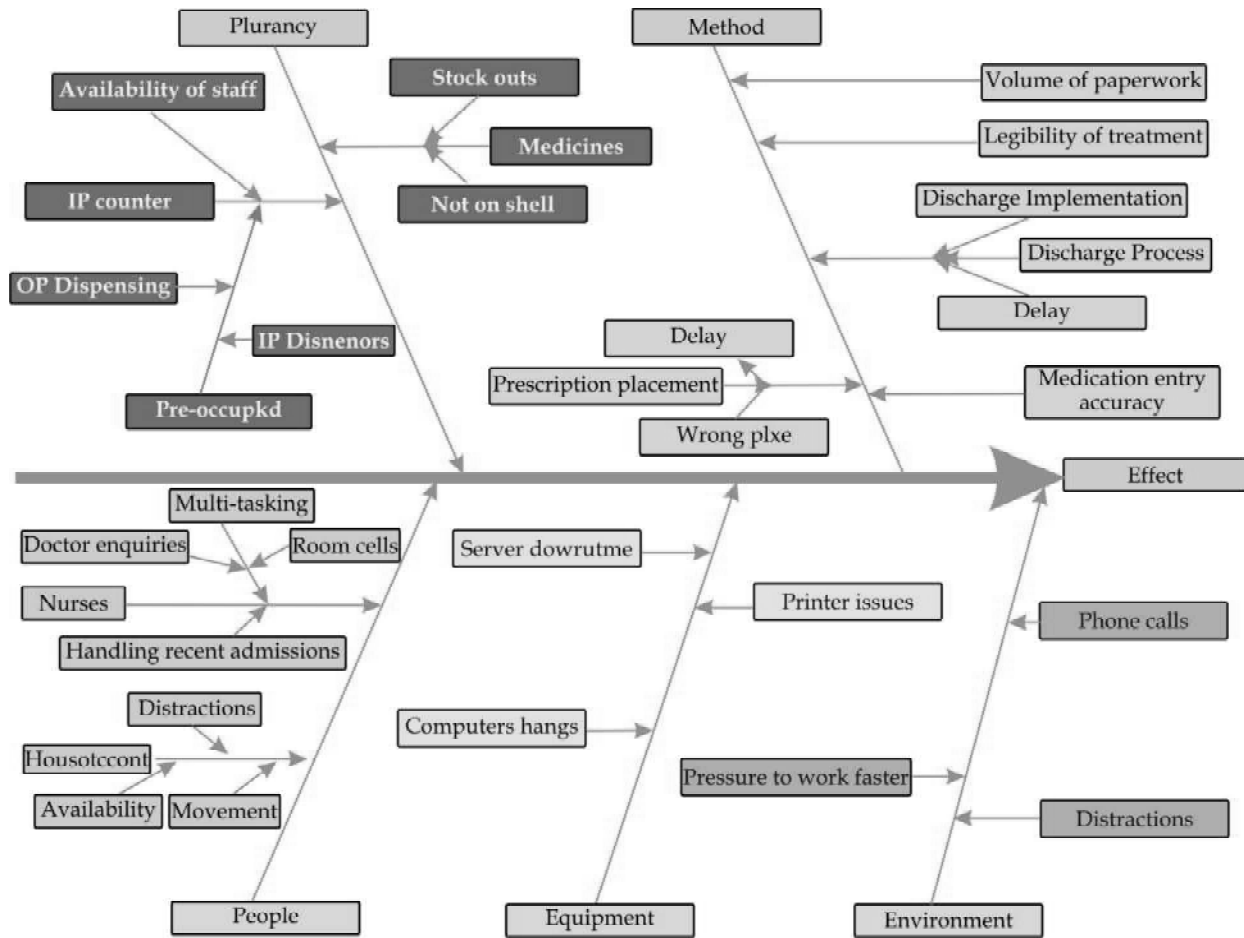


Fig. 1.1: Fish bone diagram.

ifying the problem. During this phase, the process of IP pharmacy was observed and staff (pharmacist, nursing, helpers etc.) was interviewed regarding it. This help in creating a work flow process of IP pharmacy (Flowchart-1). A total of 350 indents were noted and observed during this phase. Turnaround time for each indent was noted. Total time was divided into 4 parts i.e. time within which indent was acknowledged & printed, time within which indent was prepared by the pharmacist, time after which indent was dispatched and time within which indent was received after being dispatched.



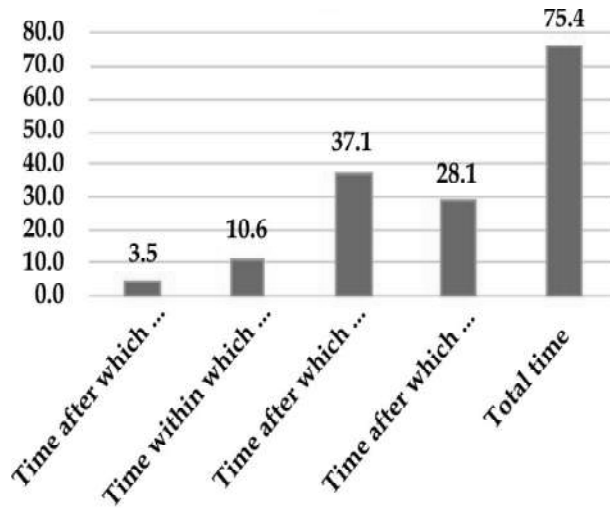
Work flow of the IP pharmacy (Flowchart-1)

Analysis

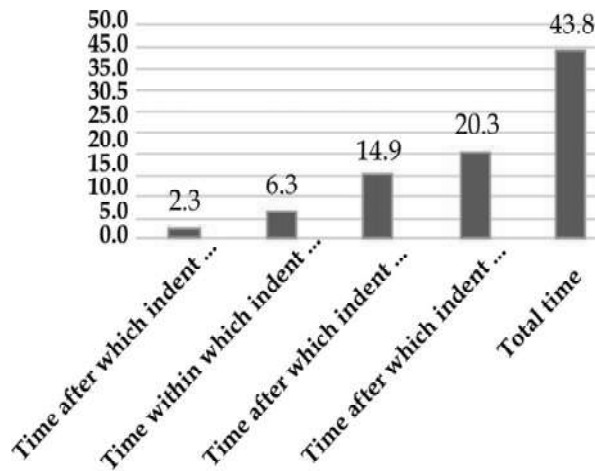
This step helps in understanding of the problem and resolving it. It helps find the root cause that caused the problem.

In analysis phase hypothesis is formed to determine the true root cause which can then be verified with the data. In this study Ishikawa diagram/Fishbone diagram was used to evaluate cause effect analysis (Figure 1.1).

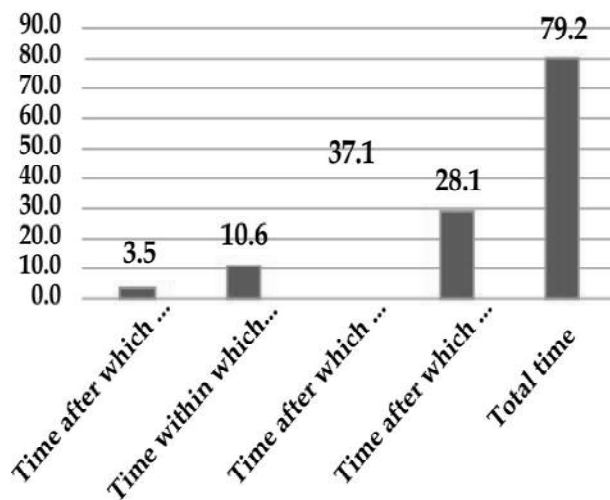
Based on the data analysis, bar graphs were used to represent the data. Graphs underneath showed that the overall average time came to be 75.4 minutes (Graph 3.1), average time for the urgent indent was 43.8 minutes (Graph 3.2) & average time for normal indent was 79.2 minutes (Graph 3.3). Average time was much more than those mentioned in the standard operating procedure of the hospital i.e. 30 minutes for a normal indent and 15 minutes for the urgent indent.



Graph 3.1: Overall average time for each process.



Graph 3.2: Average time taken for urgent indent.



Graph 3.3: Average time taken for normal indent.

Improve

This step helps in choosing the best remedy from the available alternatives. All possible solutions and remedies are evaluated on various factors like cost and likely benefits so that best option can be chosen. Based on the study and interaction with the staff, a list of possible problems and causes for delay was made. Few of the main reasons for the delay were as follow:-

Table 1.1: Improved in sigma level

Parameter	DPM	Sigma Level	Improved Sigma Level
Phone calls	437143	1.70	2.2
Wrong medication entries	274286	2.1	2.5
Other process (like discharge clearance, returns etc)	145714	2.6	3.1
Stock outs	62857	3.1	3.5
Other paper work	54286	3.2	3.5
System issue	48571	3.2	3.5

1. Delayed and lazy attitude of the staff- Pharmacist didn't acknowledged the indent immediately.
2. Phone calls - Pharmacist has to attend multiple calls as the nursing staff was not trained enough with the Pharmacy module of HMIS.
3. Wrong medication entries caused delay in the process.
4. Other processes- Pharmacist are 1. sometimes busy with other processes in pharmacy like discharge clearance, returns etc. which causes delay.
5. Stock out medicines- Stock outs of drugs was another cause that caused the maximum delay in the process.
6. Other paper work- Pharmacist need to complete a lot of paper work in pharmacy which causes delay in.
7. System issue cause delay in the process
8. Other - A full time helper was not available in pharmacy that caused lead to delay in the compilation of the indent.
9. Others- Employees were new and need to be trained.

Control

This step helps in sustaining and prevents snapping back to old habits and processes. It help in providing a long term impact by focusing on ways to monitor the process and creating response plan for dealing with the problem.

Various ways used during study to preventsnapping

back to old habits are as follow:-

1. Regular training need to be provided to both the nursing staff who indents and to the pharmacy staff.
2. Entries in the system were revised to reduce wrong mediation entries.
3. System was used to calculate the lead time and to reduce the number of the stock outs in pharmacy.
4. Regular audits were scheduled for the pharmacy for updating and improvising the software issue related to the master in the software.
5. A Stop watch was placed in pharmacy so that pharmacist can self-analyse the time taken for the indent.

Conclusion

Six sigma was beneficial in reducing the overall average turnaround time from 75.4 minutes to 61.58 minutes (t test 6.72; $p < .05$), average turnaround time for normal indent was reduced from 79.2 minutes to 65.41 minutes & average turnaround time for the urgent indent was reduced from 43.8 minutes to 30.13 minutes. There was seen in an improvement in the sigma levels (table 1.1). Therefore, it can be concluded

that six sigma is a beneficial management tool.

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