Six Sigma Report on
Reduction of Medication Delivery Turnaround Time for
Newly Admitted In-Patients

(A leading hospital in Sharjah)

Company Project Report
Semester – IV
Institute of Management Technology, Dubai

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Acknowledgement

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Furthermore, we would like to thank our Dean, Dr. Seth from the Institute of Management Technology, Dubai for granting us this project and introducing us to the wonderful world of Total Quality Management, in particular the Six Sigma process.

Dr Vinod Prabhu
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Executive Summary

The project that we were involved in was the reduction in the Medication Delivery Turnaround Time for newly admitted In-patients. We began this project in December 2008 and our project supervisor was Ms. Pooja George, Assistant Manager – Quality.

Our main objective was to look for an existing process in the hospital which would have scope for significant improvement. Once this particular process was identified, we would use the Six Sigma methodology to help improve and, hopefully streamline this particular process.

Our chosen focus area was the Medication Delivery process for newly admitted in-patients. Using the DMAIC model, we were able to chart the process map, observe and note down the time it took for the medication to be delivered, analyze the various bottlenecks and delays and make recommendations for improvement based on our study using statistical analysis.

The ten weeks we spent at the Hospital was a great learning experience and taught us, on the whole, majority of the aspects of implementing a Six Sigma improvement plan in the healthcare sector.

Introduction

Six Sigma - A new name for an old vision: Near-perfect products and services for customers. Six Sigma is a smarter way to manage a business or a department. Six Sigma puts the customer first and uses facts and data to drive better solutions. It is a collection of managerial and statistical concepts that focus on reducing variation in processes and preventing deficiencies in a product or service.

It targets three main areas:

1) Improving customer satisfaction

2) Reducing cycle time

3) Reducing defects

Although it involves measuring and analyzing an organization's business processes, Six Sigma is not merely a quality initiative; it is a business initiative. Achieving the goal of Six Sigma requires more than small, incremental improvements; it requires breakthroughs in every area of an operation. In statistical terms, "reaching Six Sigma" means that a process or product will perform with almost no defects. It is a total management commitment and philosophy of excellence, customer focus, process improvement, and the rule of measurement rather than gut feel. Six Sigma is about making every area of the organization better able to meet the changing needs of customers, markets and technologies – with benefits for employees, customers, and shareholders.

Its background stretches back eight-plus years, from management science concepts developed in the United States to Japanese management breakthroughs to "Total Quality" efforts in the 1970s and 1980s. But its real impact can be seen in the waves of change and positive results sweeping such companies as GE, Motorola, Johnson & Johnson, and American Express.

Reaching Six Sigma targets requires a great deal of organizational teamwork. It means having the systems to provide customers what they want, when they want it and providing employees with the time and training to tackle work challenges with some basic, and some sophisticated, analytical tools.

We can define Six Sigma as –

1) A statistical measure of the performance of a process or a product

2) A goal that reaches near perfection for performance improvement

3) A system of management to achieve lasting business leadership and world-class performance

Six Sigma As A Statistical Measure

The lower Greek letter sign σ stands for standard deviation. Standard Deviation is a statistical way to describe how much variation exists in a set of data in a group of items or a process. A stated sigma level, such as Six Sigma is used to describe how well the process variation meets the customers' requirements. For a stable process, the data is represented by a bell shaped distribution.

Using the calculated value of the Standard Deviation (σ), the distance from the process centerline to any value can be expressed in sigma units. Although a normal distribution table will indicate the probability of exceeding six deviations (i.e. $z = 6$) is two times in a billion opportunities, the accepted error rate for six sigma is 3.4 defects per million opportunities (DPMO).

When Motorola was developing the Quality System that would become Six Sigma, an engineer named Bill Smith, considered the father of Six Sigma, noticed external failure rates were not well predicted by internal estimates. Instead, external defect rates seemed to be consistently higher than expected. Smith reasoned that a long term shift of 1.5 sigma in the process mean would explain the difference. In this way, Motorola defined the Six Sigma process as one which will achieve a long term error rate of 3.4 DPMO, which equates to 4.5 standard deviations from the average.

Six Sigma As A Goal

When a business violates important customer requirements, it is generating defects, complaints and costs. The greater the number of defects that occur, greater is the cost of correcting them, as well as the risk of losing the customers. The goal of Six Sigma is to help people and processes aim high in aspiring to deliver defect-free products and services, by setting a performance target where defects in many processes and products are almost non-existent.

Six Sigma As a System Of Management

A significant difference between Six Sigma and seemingly similar programs of past years is the degree to which management plays a key role in regularly monitoring program results and accomplishments. As a management system, Six Sigma is not owned by senior management (although their participation is key). Their ideas, solutions, process discoveries and improvements that arise from Six Sigma take place at the front lines of the organization. It is a system that combines both strong leadership and grassroots energy and involvement.

An ever-growing number of health care organizations are using Six Sigma to improve processes from admissions to discharge and all the administrative and clinical processes in between. This adoption is driven by several factors including the need to improve the organization's bottomlines, eliminate medical errors and position themselves for an imminent global customer-centered health care revolution. Medical errors range from prescription errors to a failure to wash hands. Many health care consumers began to question why increasing costs did not equate to increased quality. Accordingly, the health care industry found itself at crossroads – to continue on the current path, while the other would lead to potential redemption. Many organizations have chosen a path of redemption – Six Sigma.

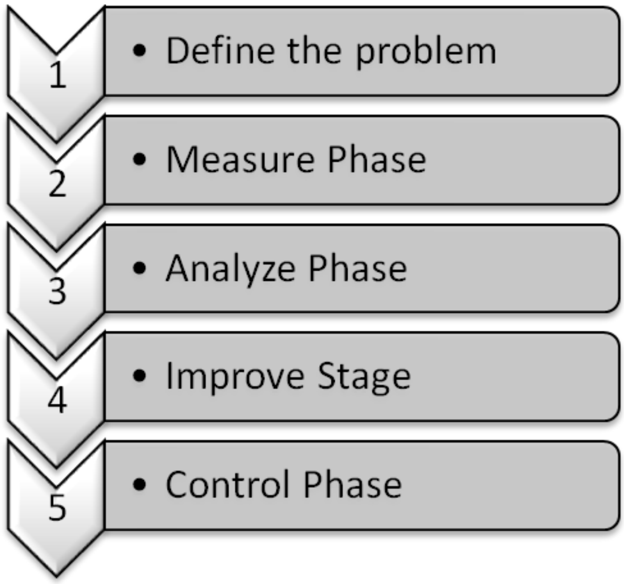
Introduction to the Hospital, Sharjah

It is a full fledged, multi disciplinary hospital and diagnostic centre with Out-patient and In-patient facilities. What started off as a 30 bed set up with basic facilities for gynecology, obstetrics, surgery, medicine and pediatrics in 1992, today boasts of 75 in-patient beds. Sprawled over an area of 6000 square meters, the Hospital of today has over 140 personnel, inclusive of 35 qualified doctors, 50 staff nurses and a host of paramedical staff. Over 400,000 patients have availed their special care and specific treatment. A staggering 5000 surgeries have been carried out to date. The Cardiac care, Intensive care, Neo-natal Intensive care and Burn units have super speciality beds. The Hospital, specialists of obstetrics and gynecology in UAE, has now gone ahead to scale newer heights in diverse specializations gaining respect and reputation from the medical fraternity and population.

Methodology

The main objective for us was to look for an existing process in the hospital which could warrant for a significant scope for improvement. It was decided that the Six Sigma methodology would be used as the preferred choice for process improvement. After initially mapping out the process flows for a few critical processes of the hospital, we chose to focus on the Medication delivery turnaround time for newly admitted in-patients.

The Six Sigma Team's problem Solving process (DMAIC): Improvement, problem-solving and process-design teams are the most visible and active component of a Six Sigma effort. Keeping in mind the complexity of the process and the diversity of the team members' backgrounds, it is critical to have a common process or model that all members can share to get their work done. The common model is called DMAIC [Define – Measure – Analyze – Improve – Control]. By following this process, a flexible but powerful set of five steps for making improvements happen and stick, the team works from a statement of the problem to implementation of a solution, with lots of activities in between.



Step 01 – Define the problem

The first step sets the stage for the project as a whole and often poses the greatest challenge. There is an array of questions which come up such as:

- What are we working on?

- Why are we working on this particular problem?
- Who is the customer?
- What are the customer's requirements?
- How is the work currently being done?
- What are the benefits of making the improvements?

In this phase, we had to identify potential projects, select and define the project, and set the objective. We first mapped out the complete process for a few critical hospital processes such as

a) Patient Admission
b) Outpatient procedure
c) Working of pharmacy

We initially focused on reducing the medication delivery time for Outpatients from the pharmacy counters. We mapped out the process flow in detail and started to calculate the average time required in each step for the dispensation of medicines by the pharmacy staff to outpatients. But, we soon realized (in consultation with our project supervisor) that there would not be a significant reduction in the delivery time for outpatients. So, we decided to change our focus area to the medication delivery turnaround time for the IP (In Patients) department. This would cover medications required for newly admitted in patients requiring medication immediately after admission. The reason for selecting this area was the larger number of variables needed to be defined & measured and the complexity of interactions. We would measure cases from all three wards in the hospital and would cover all shifts across different days.

The first step after defining the problem was to draw up the timeline necessary for completion.

Since there were five stages, we divided it as follows:

- Define Phase: 10 days
- Measure Phase: 30 days
- Analyze Phase: 10 days
- Improve Phase: 15 days
- Control Phase: 7 days

We then drew up the Project Charter as follows:

Organization	**A Leading Hospital, Sharjah**
Champion	Dr. Suresh Menon
Project Owner	Dr. Alexander Varghese
Project Leader	Ms. Pooja George
Project	Medication Delivery TAT for Newly Admitted patients
Problem Statement	Long waiting times for a newly admitted patient to receive their first medication
Project Objective	To reduce the patient waiting times for medication
Project Team	Dr. Vinod Prabhu and Mr. Sameer Murdeshwar
Metrics	Minutes
CTQ	Quicker drug dispensation

Note: Please refer to the Appendix 3.1.1 for the detailed Project Charter

The end objectives that we wanted to achieve were:

- Significant improvement in the existing process
- Greater customer and employee satisfaction
- Streamlining of the process
- Savings in terms of time – Medication Delivery Turnaround Time for newly admitted inpatients

The process flow was mapped out into nine distinct steps

Note: Please refer to the Appendix 3.1.2 for the flowchart of the Process

Step 02 – Measure Phase

Measure is a logical follow-up to Define and is a bridge to the next step: Analyze. The Measure step has two main objectives:

- Gather data to validate and to quantify the problem/opportunity. Usually, this is critical information to refine and complete the first full project charter
- Begin testing out facts and numbers that offer clues about the causes of the problem

It will identify key product parameters and process characteristics and measure the current process capability.

We first started out with observing the process for 3 – 4 days and questioned all the people involved (Nurses, Housekeeping staff, Supervisors, Pharmacy staff etc.)

A total of 40 cases were observed and the times for each stage were duly noted. These cases were a cross section across all three wards and all shift timings. There were two types of inpatient cases that were excluded from the study – Daycare cases and Delayed medication cases. We took care to be as discreet as possible so as not to introduce bias into the study.
The overall timings can be summarized in the below three rows which denote the Average time, Maximum time and Minimum time stage wise.

	a-b	c	d-e	f	g	h	i	j	k	Total	Items
Average	*5.99*	*10.61*	*6.40*	*2.58*	*0.78*	*8.15*	*3.26*	*2.69*	*23.73*	*64.19*	*4.225*
Maximum	*32*	*71.15*	*17.84*	*9.77*	*4.32*	*21*	*32.5*	*7.67*	*58.34*	*123.69*	*7*
Minimum	*0*	*1.84*	*0*	*1*	*0*	*1.82*	*0*	*1*	*3.45*	*17.42*	*1*

Note: Please refer to the Appendix 3.2.1 for the Stage wise Measurement table of the 40 cases

Step 03 – Analyze Phase

In this step, the DMAIC team delves into the details, enhances its understanding of the process and problem, and if all goes as intended, identifies the culprit behind the problem. The team uses the Analyze step to find the "root cause(s)". One of the principles of good DMAIC problem solving is to consider many types of causes, so as not to let biases or past experience cloud the team's judgment. Some of the cause categories to be explored are

- Methods: The procedures or techniques used in doing the work
- Machines: The technology, such as computers, copiers, or manufacturing equipment, used in a work process
- Materials: The data, instructions, numbers or facts, forms, and files that, if flawed, will have a negative impact on the output
- Measures: Faulty data resulting from measuring a process or changing people's actions on the basis of what's measured and how
- Mother Nature: Environmental elements, from weather to economic conditions, that impact how a process or a business performs
- People: A key variable in how all these other elements combine to produce business results

These cause categories are sometimes dubbed as the "5Ms and 1P".

DMAIC teams narrow their search for causes by what we call the Analyze Cycle. The cycle begins by combining experience, data/measures, and a review of the process and then forming an initial guess, or hypothesis of the cause. The team then looks for more data and other evidence to see whether it fits with the suspected cause. The cycle of analysis continues, with the hypothesis being refined or rejected until the true root cause is identified and verified with data.

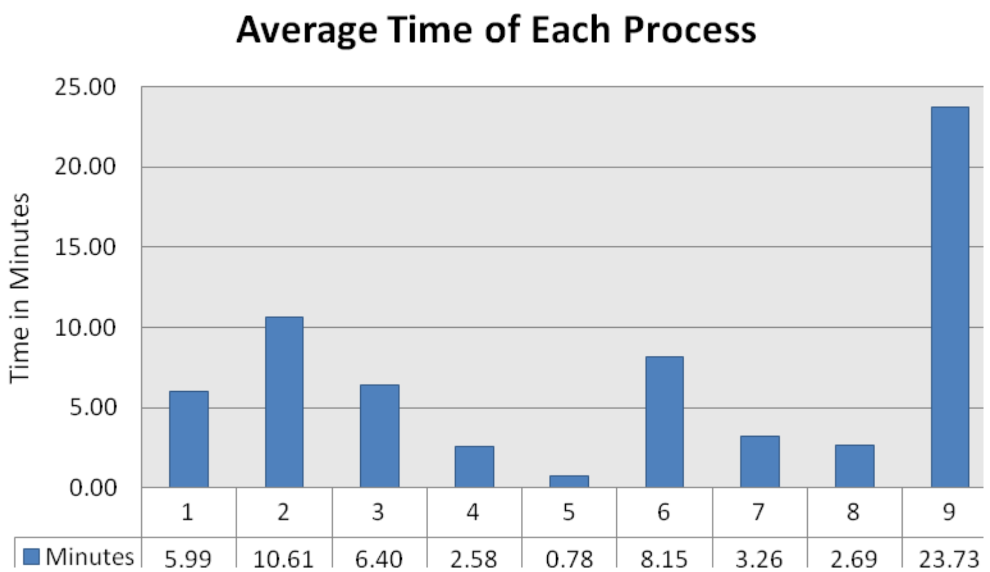
Firstly, a Root Cause Analysis was performed to list the most critical causes for the issue. We listed down all possible causes and drew an Ishikawa (Cause and Effect) diagram.

The Major Causes along with the instances occurring is as follows:

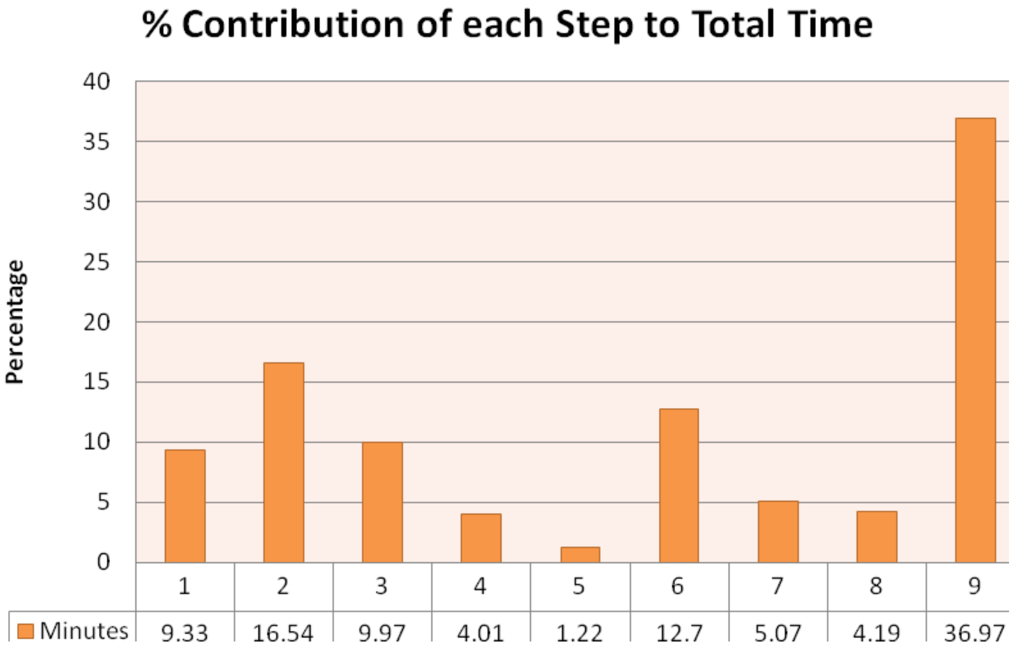
Major Causes	Instances
Multitasking – Doctor Enquiries and Patient room calls	10
Nurses handling other recent admissions	9
Nurses focus on doing the paper work	6
Indent not kept on shelf immediately after printout was taken	6
Housekeeping busy with their primary work	5
Distractions – Telephone calls	2

Note: Please refer to the Appendix 3.3.1 for the Fishbone Diagram

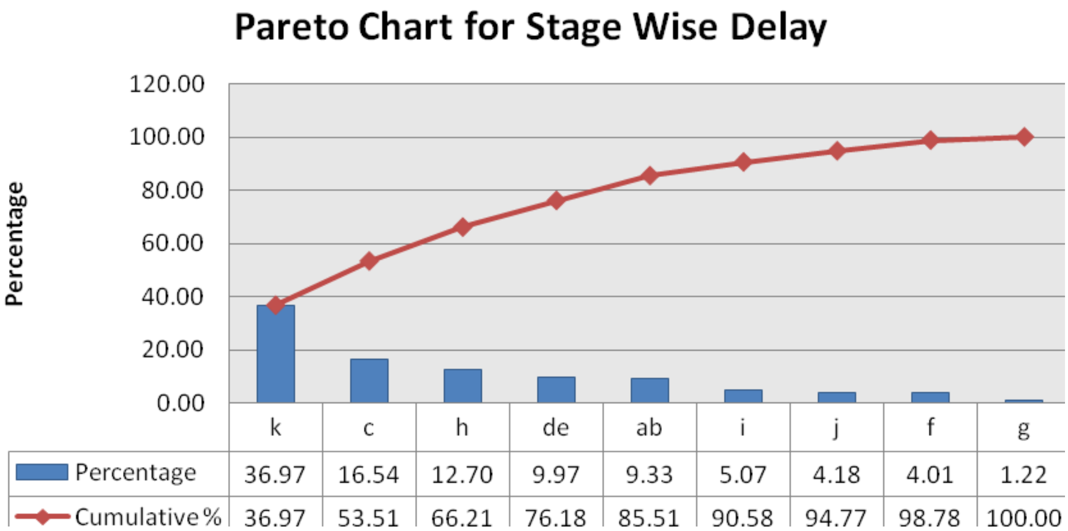
The chart for the average time for each process is as follows:



The chart for the percentage contribution of each step as compared to the total time is as follows:



A Pareto Analysis was done as well, which shows that the four main stages (which take up approximately 80% of the time) are Stages K, C, H and D-E.



Step 04 – Improve Stage

This phase designs a remedy, proves its effectiveness, and prepares an implementation plan. The steps here are to evaluate alternate remedies, design a remedy, and prove the effectiveness of the remedy. Once several potential solutions have been proposed, several criteria, including costs and likely benefits, are used to select the most promising and practical solutions. The final solution or series of changes must always be approved by the Champion and often by the entire leadership team.

Based on the study and interactions with all the staff (Nursing, Housekeeping and Pharmacy), we made a list of recommendations which were submitted and presented to the management which was approved. The recommendations are listed under the section Assessment and Recommendations.

Step 05 – Control Phase

Avoiding the "snap" back to old habits and processes is the main objective of the Control step. Ultimately, having a long-term impact on the way people work and ensuring that it lasts is as much about persuading and selling ideas as it is about measuring and monitoring results. Both are essential.

Specific Control tasks that DMAIC teams must complete include:

- Developing a monitoring process to keep track of the changes they have set out
- Creating a response plan for dealing with problems that may arise
- Helping focus management's attention on a few critical measures that give them current information on the outcomes of the project and key process measures

The ultimate success of the Six Sigma project rests with those who do the work in the area the project was focused on. Ideally, as these people see the value of the new solutions developed through the DMAIC process – and the results they offer – they too will begin to understand the potential that the Six Sigma system can provide.

Issue Analysis

Our chosen focus area was to reduce the Medication Delivery Turnaround Time for newly admitted in-patients. After observing the process for a few days, we mapped out the process flow as a series of nine distinct steps.

The nine steps are as follows:

A-B The new admission file arrives at the ward either from the Admissions Cell or the Emergency Room. If it is from the admission cell, then the staff of the IP cell/housekeeping assisting the patient hands over the file to the nurse. If it an admission directly from the emergency room, then the ER nurse comes to the ward with the file, explains the case to the ward nurse and then formally hands over. In this stage, the time being tracked is from the moment of the file handover till such time that the nurse goes to the computer to enter details.

C The nurse enters the details of the patient into the system. Along with this, the printout of the medication list is also taken. In this stage, the time being tracked is from the movement the nurse goes to the computer till such time as the nurse keeps the prescription on the nursing shelf and/or the housekeeping staff is notified.

D-E The time taken from the moment the prescription is kept on the nursing shelf and/or the housekeeping staff is notified till the housekeeping staff picks it up.

F There are 3 wards, on the 1st, 2nd and 3rd floor. The pharmacy is near the main entrance of the hospital. Here, the time taken for the housekeeping staff to deliver the prescription to the IP counter of the pharmacy is noted.

G The housekeeping staff will keep the prescription at the IP counter. If there is a ward pharmacist sitting at the IP counter, the prescription will be accepted immediately. If there is no ward pharmacist at the IP counter, the delay time will be noted. There are 5 counters at the pharmacy, out of which 4 cater to OP patients, while one is dedicated to IP prescriptions.

This is the time taken for the prescription handover from the housekeeping to the ward pharmacist.

H The time taken by the ward pharmacist to process the prescription and ready the medicines.

This includes approving the prescription, checking for any drug interactions and gathering and labeling the medicines.

I Once the ready medicines are assembled and kept on the shelf for pickup, the housekeeping staff will collect them to take it back to the ward. If there is no housekeeping staff to collect the medicines immediately, the delay time will be noted.

J Here, the time taken for the housekeeping staff to deliver the medicines back to the ward is noted.

K The nurse receives the medicines from the housekeeping staff and then prepares them to be administered to the patient. The time being tracked is from the moment the nurse receives the medicine to the time it is administered to the patient.

We made a total of 40 observations across all wards and shifts.

After making a note of the timings, we found out that the average time for each case was 64 minutes, in which the step which takes the average maximum time is Step k (24 minutes) which accounts for 37% of the time.

Assessment and Recommendations

Based on the study and interactions with the staff (Pharmacy, Housekeeping and Nursing), we made a list of recommendations which were presented to the Management, which were considered for implementation.

A. Process Re-design

The existing process flow consists of 9 major steps – A to K as shown in the flowchart. Our new re-design will aim to eliminate a few steps altogether, whilst make the remaining more efficient.

What currently happens is that the nurse enters the patient medicines into the computer and generates a printout which is to be kept on the shelf / Housekeeping notified. The housekeeping staff will pick the prescription up, take it down to the pharmacy and give it to the IP pharmacist.

In our new re-design; we propose that the soft copy of the prescription will be sent via email as an attachment from the nursing station to the computer at the IP counter. The IP pharmacist will then proceed to prepare the medicines.

One issue in the existing method is that multiple entries may exist in the system for the same drug sheet and the pharmacist has to wait for the hard copy to arrive to know which prescription to prepare. In the new method, an extra step is introduced into the system which is, attaching the prescription soft copy to the e-mail and sending it. Since it involves an additional step, it will encourage the nurse to verify with their colleagues if an indent has already been made for the same patient.

It will be made clear to the nursing staff that the prescription mailed will be executed promptly and delivered to them. So, in case of frequent returns, the nurse herself would have to go down to the IP counter to return the medicines. This will serve as a deterrent against carelessness.

B. Dedicated Housekeeping staff

We propose a single dedicated Housekeeping person at the IP counter to deliver the assembled medicines back to the ward. This will reduce the waiting time delay which occurs in the existing process when the medicines are kept on the pharmacy shelf and there is no one present to collect it. This staff will be used to deliver the medicines to all wards in the hospital.

C. Medical file re-design

At present, on receipt of the IP file by the nurse, she adds new documents according to the department treating the patient i.e. Medical, Surgical, OBG and Pediatrics. A lot of time goes in re arranging the papers and filing them.

We propose that document bundles be made which should be arranged in the necessary order at the first point of contact, as it is known beforehand the department under which the patient would be under the care of. This plan can appreciably reduce the workload on the nurses and their time consumption, which in turn they can dedicate to other important tasks at hand

D. Digital Clock

Analog clocks, which are being used in the hospital, are at best only approximate. There is also more room for mental manipulation on visualization of the clock.

We propose that digital clocks should be used for greater precision and more clarity, at least at the nursing stations and the pharmacy, if not the entire hospital.

Synchronization of the time throughout the hospital, across all devices is necessary.

E. Printing priority

Generally, the nurse first prints the indent for investigations and then after a period of delay, the prescription is printed.

We propose a modification of the current system, where the nurse will print both the indents simultaneously and then proceed with doing the investigations. (The argument can be that – Why should medicines be given preference when they cannot be administered before performing the investigations? The answer to that would be – The medicines can be given immediately after the investigations if the prescription was given equal importance initially, as it takes time for the medicines to arrive from the pharmacy)

F. Discharge Sheet proposal

Currently, when the discharge summary has to be written, the nurse is asked to provide it to the doctor.

What we propose is one of the two following improvements –

1) The discharge summary sheet can be bundled in the IP file at the first point of contact

2) A stand that holds the discharge summary pad can be kept on the nursing station shelf instead of the health / disease information brochures, as they already occupy a separate place.

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Appendix

3.1.1 Project Charter

PROJECT CHARTER

Project Name	Medication Delivery Turnaround Time
Organization	A Leading Hospital, Sharjah

1. PROJECT GOALS

Business Objective:
1. To identify the need and area of concern where Six Sigma could be implemented in the hospital process.
2. To attain improved patient satisfaction levels

Business Need: To improve the efficiency of the medication delivery process for newly admitted in-patients

Business Opportunity: To assess the efficacy of Six Sigma process, which was being tried out for the first time in the organization

Problem statement: Long waiting times for a newly admitted patient to receive their first medication

2. DELIVERABLES

1. Map a Detailed Process Flow: Provide how things happen on the ground as compared to how they ought to.

2. Measure Timing that each step contributes to overall process: It is important to understand why each step takes as much time as it does.

3. Deliver a Drastic Reduction on current timings of the process: Achieved through researching root causes and providing specific solutions to fix them

3. SCOPE DEFINITION

Scope In

a. In-patient wards
b. In-patient Pharmacy counter

Scope Out

a. Out-patient department
b. Out-patient Pharmacy counters
c. Medicine Stock-outs
d. Day-care cases
e. Delayed medication patients
f. ICU

Metric: Minutes
CTQ: Quicker drug dispensation, overall

4. PROJECT MILESTONES

Define Phase: 10 days
Measure Phase: 30 days
Analyze Phase: 10 days
Improve Phase: 15 days
Control Phase: 7 days

7. PROJECT ORGANIZATIONAL STRUCTURE

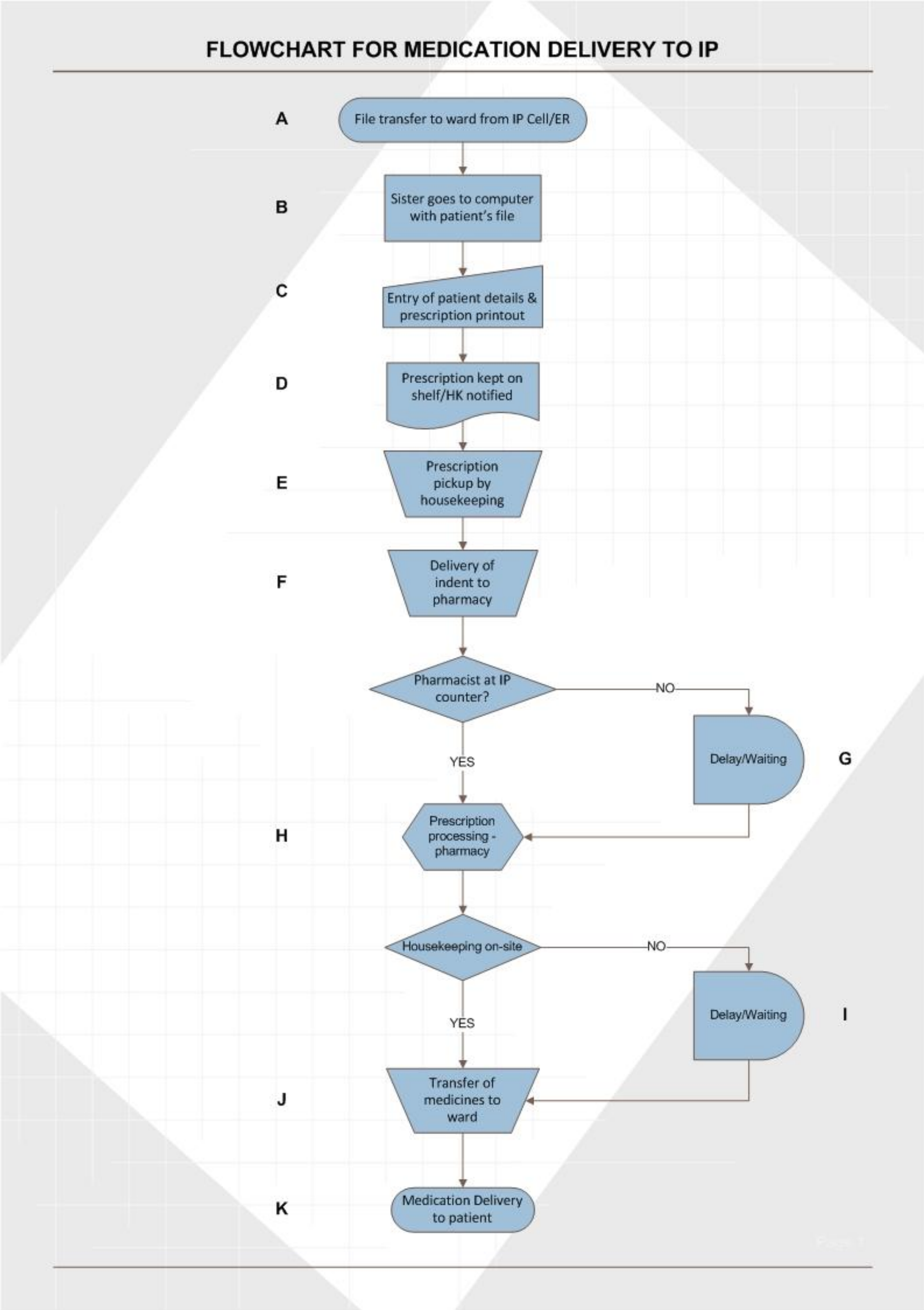
Identify the key stakeholders and team members by function, name and role.

Function	**Name**	
Champion	Dr. Suresh Menon	
Project Owner	Dr. Alexander Varghese	
Project Leader	Ms. Pooja George	
Project Team	Dr. Vinod Prabhu Mr. Sameer Murdeshwar	

8. PROJECT AUTHORIZATION

Approved by: Approved by:	Dr. Suresh Menon, Director, Administration & Quality Dr. Alexander Varghese Deputy Director, Administration & Quality	Date Date

3.1.2. Flowchart for the Process



3.2.1. Stage wise Measurement Table for the 40 cases

	a-b	c	d-e	f	g	h	i	j	k	Total	Items
1	3.45	1.92	15.42	1.17	0	2.84	0	1.17	32	57.97	3
2	0	10.5	2.25	1	0.87	4.84	0	1.88	28	49.34	3
3	1	8.75	0	7.25	0.92	3.92	0	3.75	37.5	63.09	1
4	8.64	71.15	7.88	1.92	1.25	9.9	0.45	3.5	19	123.69	5
5	8	1.84	9.92	2.25	0.25	21	22.75	1	44	111.01	4
6	0.78	5.5	8.08	1	0	12.75	0	1	36.2	65.31	5
7	2.95	8.54	4.5	2.25	0.67	6.84	0	1.5	16.5	43.75	1
8	21	12	0	1.08	3	1.82	0	1.3	50.68	90.88	1
9	2.5	2.67	0	1.25	0	4.42	0	2	4.58	17.42	3
10	10.53	3.25	2.05	1.52	0	19.55	0	7.67	17.88	62.45	5
11	1.67	2.67	6.34	1.17	0	1.84	0	4.67	6.17	24.53	1
12	2.84	5.1	17.84	2.17	0	2.17	10.5	2.5	36.5	79.62	3
13	3.34	4.17	11.67	2.17	0	13.34	6.17	2.5	42.17	85.53	6
14	0.5	3.22	5.67	5.17	0	6.42	0	2.74	10.25	33.97	5
15	3.67	6.5	12	2.5	0	8	32.5	3.67	9.84	78.68	7
16	0	10.25	2.64	9.77	0	5.2	2.6	2.9	29	62.36	4
17	4.72	65.98	17.48	2.42	0	9.97	4.84	2.57	14.34	122.32	7
18	0	8.22	4.72	4.43	3.35	12.32	2.58	3.15	3.45	42.22	7
19	0	4.17	0	1.08	2.14	5.72	0	1.74	16.6	31.45	5
20	12.5	17.43	3.9	1.25	0	4.97	0	3.47	19.17	62.69	4
21	4.55	9.47	15.12	1.35	0.12	5.02	0	2.3	25.1	63.03	3
22	3.53	40.37	13.47	2.72	0	1.9	0	2.8	3.7	68.49	1
23	4.52	3.18	6.95	1.72	0	6.43	0	1.64	28.2	52.64	5
24	32	3.88	7.68	1.67	0.25	9.64	6.72	1.9	58.34	122.08	7
25	8.7	9.18	9.54	2.37	1.55	7.82	0	2.9	36	78.06	4
26	5.9	3.12	0	4.17	0	16.82	0	4.72	24.64	59.37	6
27	4.62	7.38	5.12	1.55	0	14.34	3.08	4.17	25.34	65.6	5
28	4.18	7.22	4.17	2.38	3	6.3	8.3	2.15	32.5	70.2	5
29	8.34	5.25	2.44	1.9	0	2.5	1.18	1.77	41.75	65.13	2
30	0	6.9	2.67	2.12	0	8.82	1.44	3.77	16.68	42.4	5
31	0	5.7	5.37	4.87	0	9.25	0	2.62	37.28	65.09	4
32	6.25	5.8	8.45	2.82	0	7.52	0	2.38	16.9	50.12	6
33	4.15	6.68	5.34	3.37	0	9.17	0	3.74	7.38	39.83	7
34	7.05	5.44	7.27	1.58	3.44	11.52	0	3.96	14.9	55.16	5
35	21.54	4	8.42	2.45	4.32	14.46	3.72	1.72	9.47	70.1	6
36	3.67	8.22	9.55	1.28	0	8.54	5.37	1.84	7.62	46.09	4
37	8.46	7.8	2.34	3.72	0	5.35	0	2.48	23.3	53.45	3
38	8.28	5.32	5.07	2.42	1.82	9.27	6.42	1.77	20.18	60.55	4
39	6.38	7.48	4.64	3.64	4.28	5.44	7.68	1.6	37.58	78.72	5
40	9.4	18.37	0	2.15	0	8.12	3.94	2.54	8.64	53.16	2
Average	5.99	10.61	6.40	2.58	0.78	8.15	3.26	2.69	23.73	64.19	4.225
Maximum	32	71.15	17.84	9.77	4.32	21	32.5	7.67	58.34	123.69	7
Minimum	0	1.84	0	1	0	1.82	0	1	3.45	17.42	1

3.3.1. Fishbone/Ishikawa Diagram