

**To Improve Operational Efficiency In OPD of the Hospital Using
Six-Sigma Methodology**

**Internship Training
at
Burjeel Hospital for Advanced Surgery
Dubai, U.A.E.**

**By
Kritika Swaroop**

**Under the guidance of
Major (Dr.) Vinod Kumar**

**Post Graduate Diploma in Hospital & Health Management
2012–14**


**Institute of Health Management Research
Jaipur
2014**

**INSTITUTE OF HEALTH
MANAGEMENT RESEARCH**

1, Prabhu Dayal Marg
Sanganer Airport, JAIPUR - 302 011, INDIA
Tel. : 3924700, 2791431-32
Fax : 91-141-3924738
E-mail : iihmr@iihmr.org
URL : <http://www.iihmr.org>
Gram : HEALTHINST

To whomsoever it may concern

This is to certify that Ms. Kritika Swaroop,

student of Post Graduate Diploma in Hospital and Health Management (PGDHM)

from Institute of Health Management Research, Jaipur

has undergone internship training at Burjeel Hospital for Advanced Surgery, Dubai, U.A.E.,

from 19th February 2014 to 19th May 2014.

The candidate has successfully carried out the study designated to her during internship training and her approach to the study has been sincere, scientific and analytical.

The internship is in fulfillment of the course requirements.

I wish her all success in all her future endeavors.



Dr. (Col.) Ashok Kaushik

Dean, Academics and Students Affairs

IIHMR, Jaipur



Dr. (Major) Vinod Kumar

Associate Professor

IIHMR, Jaipur



This certificate is awarded to

Ms. Kritika Swaroop

In Recognition of having successfully completed her Internship in the department of Quality

And has successfully completed her Project on

TO IMPROVE OPERATIONAL EFFICIENCY IN OPD OF THE HOSPITAL USING LEAN SIX-SIGMA METHODOLOGY

From 19th February 2014 – 19th May 2014

At Burjeel Hospital for Advanced Surgery, Dubai, U.A.E.

She comes across as a committed, sincere & diligent person who has a strong drive & zeal for learning.

We wish her all the best for future endeavors.

Obaida
20-5-14

MS. Obaida Qatuni
Quality Manager
Burjeel Hospital for
Advanced Surgery
Dubai



Joe
Mr. Josan Joe
Recruitment/PR Manager
Burjeel Hospital for
Advanced Surgery
Dubai

**INSTITUTE OF HEALTH
MANAGEMENT RESEARCH**

1, Prabhu Dayal Marg
Sanganer Airport, JAIPUR - 302 029, INDIA
Tel. : 3924700, 2791431-32
Fax : 91-141-3924738
E-mail : iihmr@iihmr.org
URL : <http://www.iihmr.org>
Gram : HEALTHINST

Original Literally Work Declaration

INSTITUTE OF HEALTH MANAGEMENT RESEARCH, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the
Dissertation Titled:

To Improve Operational Efficiency
in OPD of the Hospital
Using Six-Sigma Methodology

Submitted by:

Ms. Kritika Swaroop

Enrollment No.:

17-1401

Under Supervision of:

Major (Dr.) Vinod Kumar

For Award of :

Postgraduate Diploma in Hospital and Health
Management of the Institute

Carried out during the period

19th February 2014 to 19th May 2014

From

Burjeel Hospital for Advanced Surgery, Dubai, U.A.E.

embodies my original work and has not formed the basis for the award of any degree, diploma
associateship, fellowship titles in this or any other Institute or other similar institution of higher
learning.



Signature

ABSTRACT

This report presents the results of a project designed to improve the quality of services provided in an outpatient department of the Burjeel Hospital for Advanced Surgery in Dubai. The project was conducted on the basis of the Lean six sigma methodologies and aimed at reducing waiting times in outpatient department. Duration of the project was 19th February 2014 to 19th May 2014.

Patient satisfaction is one of the important goals of any health system, but it is difficult to measure the satisfaction and gauge responsiveness of health systems as not only the clinical but also the non-clinical outcomes of care influence customer satisfaction.

In the recent past, studies on patient satisfaction gained popularity and usefulness as they provided a chance to health care providers and managers to improve services in the health sector. Patients' feedback is necessary to identify problems that need to be resolved to improve health services. Even if providers do not use this information systematically to improve care delivery and services, this type of feedback triggers a real interest that can lead to a change in provider culture and their perception of patients.

The present project is based on a comprehensive study conducted to increase the operational efficiency of the Outpatient Department by reducing the waiting time for patients. The main objective of this project is to list down the reasons why the waiting time in the OPD of the health facility is so large and to suggest possible measures to reduce the same.

Significant reduction in waiting time was achieved in the outpatient services of the hospital using the Lean six sigma approach. The average waiting time was reduced from 60 minutes to 30 minutes. Certain gaps discovered in the process which contributed to an increased

waiting time, included a common registration system, nursing station and billing counter, the absence of replacement staff during prayer/ lunch time, running out of printing paper and other stationery during peak working hours, etc.

As an off-shoot of the study, a new nursing station was installed, re-structuring of consultation rooms was done, ushers were appointed to guide patients, a front office supervisor was appointed to handle the waiting patients in the OPD and to take care of any situation from going out of hand.

All these measures greatly contributed to the decrease in waiting time at the OPD and resulted in an all-round patient satisfaction.

- X -

ACKNOWLEDGEMENT

I take this opportunity to express my profound gratitude and deep regards to my guide, **Dr. Vinod Kumar**, for his exemplary guidance, monitoring and constant encouragement throughout the course of this dissertation. The blessing, help and direction given by him from time to time shall guide me throughout in the journey of life on which I am about to embark.

I also owe a deep sense of gratitude to **Ms. Obaida Qatuni**, Head of Department, Quality, Burjeel Hospital for Advanced Surgery, for her cordial support, valuable information and guidance, which helped me in completing this task through various stages.

I am obliged to staff members of Burjeel Hospital, for the valuable information provided by them in their respective fields. I am grateful for their cooperation during the period of my assignment.

I thank almighty, my parents, sister and friends for their constant encouragement without which this assignment would not have been possible.

- X -

S. No.	Topic			Page No.
1	INTRODUCTION			
2	PREFACE			
	2.1	Initial Pages		1-5
		a	Cover Page	1
		b	Title Page	2
		c	Certificate from Guide and Dean	3
		d	Certificate from Organization	4
	2.2	Original Literally Work Declaration		5
	2.3	Abstract		6
	2.4	Acknowledgements		8
	2.5	Table of Contents		9
	2.6	List of Figures		10
	2.7	List of Tables		10
	2.8	List of Symbols and Abbreviations		11
	2.9	List of Appendices		
3	TEXT			
		3.1	Introduction	12
		3.2	Literature Review	14
		3.3	Methodology	16
		A	Research Design	16
		B	Research Procedure Adopted	17
		C	Sampling Method	19
		D	Research Instruments	19
		E	Statistical Methods Employed	26
4		3.4	Discussion	43
		3.5	Results	47
		3.6	Conclusion	49
	SUPPLEMENTARY			
	4.2	Bibliography		50
	4.3	Appendix		51

List of Figures

S. No.	Figure	Page No.
1.	Activity Planning	20
2.	Risk Assessment Chart	23
3.	Patient Flow in OPD	31
4.	Patient Flow in Joint Replacement Clinic	32
5.	Break up of patients' time in Sports Orthopedic Clinic	35
6.	Break up of patients' time in Pediatric Orthopedic Clinic	36
7.	Break up of patients' time in Cardiology Clinic	37
8.	Break up of patients' time in Neurology Clinic	38
9.	Break up of patients' time in Joint Replacement Clinic	39
10.	7 Wastes of Lean Management	40
11.	Representation of Various Causes leading to Increased Waiting time for Patients in OPD	46
12.	OPD Feedback Form #1	51
13.	OPD Feedback Form #2	52

List of Tables

S. No.	Figure	Page No.
1	Duration of time spent by patient in Sports Orthopedic clinic	52
2	Duration of time spent by patient in Pediatric Ortho clinic	53
3	Duration of time spent by patient in Cardio Orthopedic clinic	54
4	Duration of time spent by patient in Sports Orthopedic clinic	55
5	Duration of time spent by patient in Neurology clinic	56
6	Duration of time spent by patient in Joint Replacement clinic	57

List of Abbreviations

Approx.	Approximate
BHAS	Burjeel Hospital for Advanced Surgery
Cardio	Cardiology
Dept.	Department
DHA	Dubai Healthcare Authority
HAAD	Health Authority-Abu Dhabi
HOD	Head of Department
IPD	Inpatient Department
I.T.	Information Technology
Ortho	Orthopedic
OPD	Outpatient Department
Peds	Pediatric
SAP	System Application & Products

List of Appendices

Appendix 1	OPD Patient Feedback Form - Front
Appendix 2	OPD Patient Feedback Form - Back

INTRODUCTION

Burjeel Hospital for Advanced Surgery (BHAS) is a new hospital which started functioning in June 2103. This 35-bed hospital is part of the Life Line Group of Hospitals, (now rebranded as the VPS Group) and takes pride in being one of the few 7-star hospitals in the U.A.E. It promises its patients world-class services and latest technology for treatment. As the name suggests, Burjeel Hospital for Advanced Surgery is a super-specialty orthopedic hospital. The primary focus of the hospital is to provide the best possible treatment for Joint Replacement Surgeries.

Dr. Shamsheer Vayalil Parambath, who owns the Burjeel Hospital, was recently conferred with Pravasiya Bharatiya Award in 2014 by the President of India. Dr Vayalil graduated as a radiologist in 2003 and opened his first hospital in Abu Dhabi in 2007. His entrepreneurial skills have since enabled him to start and develop many hospitals in Abu Dhabi, Dubai, Oman and Qatar including this prestigious Burjeel Hospital for Advanced Surgery.

Dr. Samih Tarabichi, the foremost orthopedic surgeon in the Middle East, is the Director General of BHAS. A consultant for Zimmer International and on the design team for a new generation of knee implants, Dr. Tarabichi holds four orthopedics patents in the United States that cover various aspects of joint replacement surgery. He specializes in the characteristics of the Asian and the Arab knee and has published many papers in international medical journals on the differences between the European and the Asian knee. In 2012, he had a scientific exhibit at the American Academy of Orthopedic Surgeons meeting at Los Angeles that addressed the special characteristics of the Asian as compared to the European knee.

As part of maintaining a standardized and patient-friendly healthcare environment in the UAE, the Dubai Health Authority (DHA) and Health Authority Abu Dhabi (HAAD) have announced that any healthcare providing facility, specialized in Orthopedics, should not have a waiting time of more than 30 minutes for the OPD. As part of the continuous quality improvement process, Burjeel Hospital, Dubai decided to focus on this issue. As part of my dissertation project, “Increasing Operational Efficiency of the OPD”, I decided to focus on the aspect of waiting time at the OPD.

Whether it is the time used for registration of a patient, or a routine appointment for a doctor, or the actual treatment, or laboratory/diagnostic test, procedures, receiving the results of various tests, just about everyone seeking medical care has to go through a period of waiting. By reducing the waiting time for outpatients, we not only improve the service quality of the hospital, we are also able to reduce the agony of the patient faster, and with much more efficiency.

Optimization of Waiting Time for elective care has been recognized as a serious problem in many health care systems since it acts as a barrier to efficient patient flows. It is often one of the most frustrating parts about healthcare delivery system, and is also referred to as one of the **“pain points”** of a hospital. Waiting time has been defined as the “length of time from when the patient entered the outpatient clinic to the time the patient actually leaves the OPD”.

However, the main focus of this project is limited to OPD i.e. the time spent by the patient in the hospital before consultation with the doctor. The non-value added steps in the process were identified, and action was 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. As a result of this project, the average waiting time per patient reduced from 60 to 30 minutes.

LITERATURE REVIEW

Many studies have been conducted all over the world in the field of reducing waiting time in the OPD. :

- Potisek et al. (2007) performed a patient flow analysis to identify specific areas of inefficiencies in patient visits and thus improve patient visit efficiency through developing interventions to decrease the mean time of patient visit. It is found that patient flow analysis is an effective method for identifying the inefficiencies and efficiently collecting patient flow data. Generally, patient flow analysis is closely related to three main areas:
 - (i) patient scheduling and admissions,
 - (ii) patient routing and flow schemes,
 - (iii) scheduling and availability of resources (Jun et al., 1999).
- Patrick et al. (2008) addressed the incorporation of patient priority in a scheduling problem where patients are scheduled to the fixed scheduling slots of a diagnostic resource within the maximum waiting time recommended for each priority.
- St. John's hospital (Henderson et al., 2004) teamed up with Institute for Healthcare Improvement (IHI) to improve the patient flow in its emergency department. The first approach that they took is to provide a dedicated operating room for the unscheduled and "add-on" cases. By doing so, the number of surgical cases went up by 5 percent and the overall time decreased by 2 percent. Also, the staffing need could be more accurately predicted. Another major approach is to add a standardized fax report form to facilitate the communication between ED nurses and receiving nurses. This way, the time wasted on phone between different departments was significantly reduced. The median time from decision to admit to physical placement in an inpatient bed was reduced by 67%.

- Garcia et al. (1995) analyzed the effects of using a fast track lane to reduce waiting times of low priority patients in an emergency room. Emergency rooms were prioritized according to the level of patient sickness, hence low priority patients regularly wait for excessively long periods of time. A fast track lane is a lane dedicated to serving a particular type of patient. It was found that a fast track lane that uses a minimal amount of resources could greatly reduce patient waiting times.

METHODOLOGY

Research Question

OPD services are the front desk of a hospital and the backbone of all services which are provided by the hospital. It is therefore mandatory to identify and resolve all crucial problems faced in the OPD so that the overall services of the hospital can be improved.

The particular research question for this study is:

“What are the causes for delay in delivery of services in hospitals’ Outpatient Department, and how do they contribute to its low efficiency?”

Objectives

- To assess the causes of delay in availing OPD services
- To suggest possible remedial measures to improve it

1. Research Design

STUDY DESIGN & METHODS

a) Cross-sectional study

In this project, we employed the cross sectional study, with a view to finding out the length of the waiting time, the factors contributing to it, and to obtain an overall picture of the problem.

The researcher was present at the site of observation (Outpatient waiting area, Registration counter, Nursing Station, Billing counter). Process was observed first-hand before and after

the introduction of corrective measures. In this way, the variation in the waiting time could be measured, and thus the efficacy of the deployed measures could be assessed.

b) Primary Data:

In this study, primary data was collected by recording the flow of patients in the OPD, in terms of time taken for each of the following steps:

- Registration
- Waiting for Vitals check-up
- Vitals check-up
- Waiting for consultation after Vitals check-up
- Consultation

Staff from OPD was interviewed and brainstorming sessions were conducted among the Doctors, Nurses, Front Desk staff, OPD Manager, and patients to highlight all possible areas of delay which contribute to a higher waiting time.

c) Secondary Data:

Secondary data that was collected in this study was the time captured on SAP and feedback reports from patients who waited in the OPD. In addition, data related to the number of patients who left after waiting for a long time, was also compiled.

2. Research Procedure Adopted

Method:

The study was divided into six main steps (Refer Fig 1)

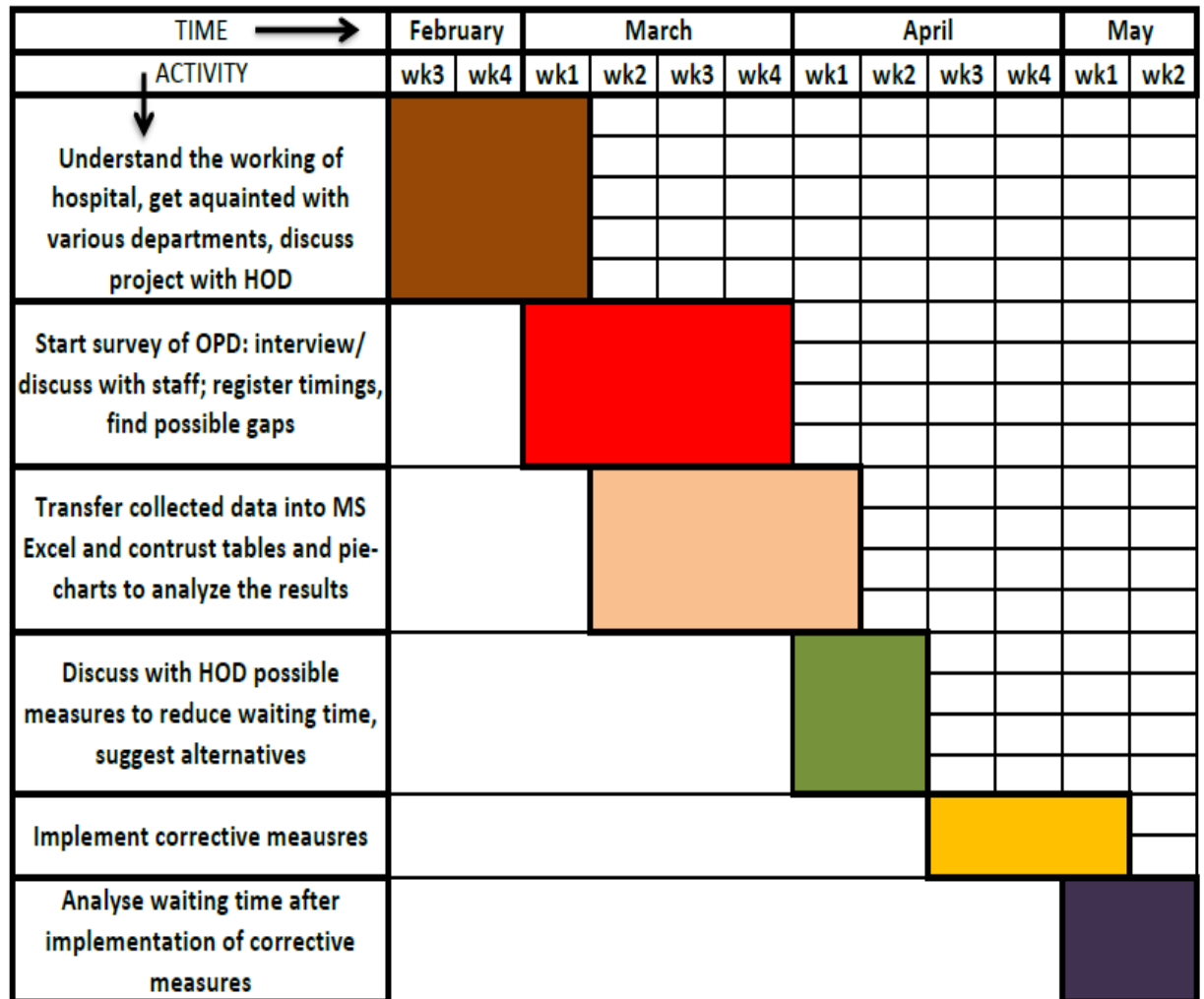


Figure 1: Activity Planning:

- The student spent the initial first week in understanding the workflow of the hospital's OPD. OPD staff (doctors, nurses, and front office) was consulted to identify areas which lead to delay in day-to-day work. On-site notes were prepared. Patient activity flow chart was created and duration of each step was manually registered. Data so collected was transferred to MS Excel and a pie-chart was created to depict the break-down of patients'

time in various activities in the hospital. After discussing these findings with the Senior Management of the hospital, several recommendations were proposed for reduction in the waiting time. Of these, many were implemented with immediate effect, like:

- Separation of Nursing Station from Reception Area on Ground Floor
- Different scheduling pattern of appointments of doctors
- Training to the front office staff, etc.

To assess the effectiveness of these measures, a week was spent in the OPD to assess the new waiting time, and it showed a significant improvement.

3. Sampling Method

Non-Probability Sampling

Non-Probability Sampling or convenience sampling refers to a method where researchers approach any individual who happen to be the easiest to access as a participant in the study. This is only done when the processes the researchers are testing are assumed to be basic and universal, and ones which can be generalized beyond a narrow sample.

For this particular study, the following methodology was employed:

- Sample selected was staff working at front office, the nursing staff, doctors, and patients.
- Recordings were made during the routine working hours and when the OPD was at its busiest.
- Interviews were conducted with staff when patient load was minimal, to avoid interruption.

4. Research Instruments

For this study, following tools were employed:

FOCUS PDCA (Refer Figure 12) - The FOCUS-PDCA model was developed by W. Edwards Deming and provides a model for improving processes. The model's name is an acronym that describes the basic components of the improvement process. The steps include:

i) **Find a process to improve**

OPD is considered as the window to hospital services and a patient's impression of the hospital begins at the OPD. 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.

The Outpatient department of the hospital receives many verbal complaints from the patients, regarding the long waiting hours, sometimes extending up to 70-80 minutes.

The Quality Department of BHAS has developed a Risk Assessment Chart (Refer figure 2). On the basis of this chart, risks are assessed based on two criteria, the occurrence of a risk and its severity.

The likelihood of occurrence of the risk is calculated, against its severity, and a score is given to that risk, ranging from 1 to 25, 1 being the lowest, while 25 the highest.

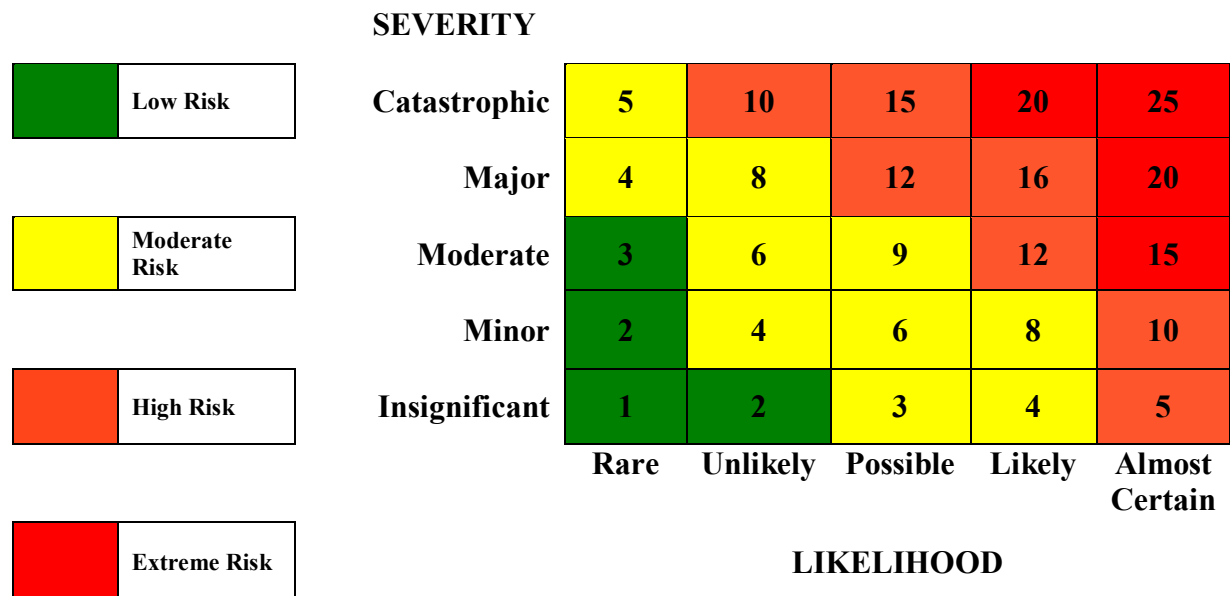


Figure 2: Risk-Assessment Chart

According to the Risk-Matrix, when we try to place the issue of Waiting Time in the above grid, we find that it lies in the **Major** Risk Area of the matrix, with a score of **12** (since it is a highly likely event, with a majorly severity possibility, owing to the discomfort felt by the OPD patients in the hospital)!!

This discovery prompted immediate response from the hospital staff, since a long waiting time is an issue of High Volume, High frequency and High risk.

After consultation with the Quality head, it was decided that to improve upon the Operational Efficiency of the hospital, the first and most crucial step to work upon would be the Increased Waiting Time for patients in the Outpatient Department.

ii) **Organize an effort to work on improvement**

To reduce the waiting time in the Outpatient department we needed to understand the exact flow of the patient, from the time he/she calls up the hospital for an appointment, till the time he/she has consulted the doctor. To improve upon the process, all the departments which were involved in outpatient visit were included in this study, i.e. Call center, I.T., Registration Desk, Reception, Nursing Dept., Medical Dept., Facility Dept., Billing Dept. Front Desk, Pharmacy, Radiology Dept. and Laboratory.

iii) Clarify current knowledge of the process

A brainstorming session was conducted among the Heads of the various departments.

- Director General
- Medical Director
- Orthopedic Surgeons
- Orthopedic Specialists
- OPD Manager
- OPD Nurse
- Operations Director
- Quality Manager
- Quality Executive
- Front Office supervisor

The discussion brought into limelight various causes which were contributing to the increased waiting time for patients. The researcher spent a time of 4 weeks in the outpatient department and observed the flow of patients. Discussions were held with the nursing staff and front desk staff to assess the possible reasons of delay in consultation. In the process various findings were made, which were otherwise not possible to assess through the brainstorming session among the HODs.

iv) Understand process variation and capability

(Fish Bone Analysis/ Ishikawa Diagram)

After a series of discussions with the steering committee, OPD staff (including doctors, nurses, front desk, porters), and patients, all reasons for extended waiting time were grouped under 6 major categories, namely:

1. Equipment
2. System
3. Site
4. Skills
5. People

Based on these major categories, a cause-and-effect diagram was created.

v) **Select a strategy for continuous improvement**

Discussions were held among members of the team, and after analyzing results of the brainstorming and fish bone analysis, the team decided on adopting various measures to improve patient waiting time.

The PDCA Cycle

PDCA (**Plan–Do–Check–Act** or **Plan–Do–Check–Adjust**) is an iterative four-step management method used in business for the control and continuous improvement of processes and products. It is also known as the Deming circle/cycle/wheel, Shewhart cycle, control circle/cycle, or plan–do–study–act (PDSA).

Another version of this PDCA cycle is OPDCA. The added "O" stands for **O**bservation or as some versions say "Grasp the current condition." This emphasis on observation and

current condition has currency with Lean manufacturing/Toyota Production System literature.

The project was started with the PDCA, and was very helpful in providing an insight into the situation. Steps in each successive PDCA cycle that were undertaken for this study were:

Plan (P of PDCA)

This step aims to establish the objectives and processes necessary to deliver results in accordance with the expected output (the target or goals). By establishing output expectations, the completeness and accuracy of the specification is also a part of the targeted improvement.

For this project, the plan/objective was to reduce the outpatient waiting time of patients, through the steps mentioned above. It is rightly said that “If you fail to plan, then you plan to fail.” A proper planning gave us a head start for the project, by enabling us to assess the patients’ needs and providing them with best solutions.

Do (D of PDCA)

The second step focuses to implement the plan, execute the process, and make the product. Data is collected for charting and analysis in the following "CHECK" and "ACT" steps.

The perceived reasons for delay were worked upon and corrective measures were employed with a view to reduce waiting time for patients.

Check (C of PDCA)

In the third step of PDCA analysis, we are required to study the actual results (measured and collected in "DO" above) and compare against the expected results (targets or goals from the "PLAN") to ascertain any differences. We look for deviation in implementation from the plan and also look for the appropriateness and completeness of the plan to enable the execution, i.e., "Do". Charting data can make this much easier to see trends over several PDCA cycles and in order to convert the collected data into information. Information is what we need for the next step, "ACT".

After the above given steps were introduced, the average time of waiting was calculated in the OPD. The results showed a reduction in average waiting time from 60 minutes time to 30 minutes, which gave us a clear indication that we were on the right track.

Act (A of PDCA)

In the final step of PDCA analysis, we requested for corrective actions on significant differences between actual and planned results. Analysis of the differences was done to determine their root causes. It was decided where to apply changes that would include improvement of the process. Even though there was an improvement in the waiting time, the results were still far from satisfactory.

The aim of this study was to bring down the average waiting time of the OPD from 60 minutes to the acceptable limit of 30 minutes and ensure that the benchmark of 30 minutes average waiting time achieved became a constant process. After achieving this result, there are still constant efforts being made as part of CQI to further reduce the waiting time.

5. Statistical Methods Employed

The time for each activity of the patient in the OPD was recorded, and duration was calculated for the same. The calculated time was recorded on a table under the following headings:

- | | |
|---------------------------|------------------------------|
| 1. Time of Appointment | 7. Vitals Over |
| 2. Patient-in Time | 8. Duration of Vitals |
| 3. Delay from Patient | 9. Consultation in-time |
| 4. Registration Completed | 10. Duration of Consultation |
| 5. Registration Duration | 11. Patient out |
| 6. Called for Vitals | |

The above list was created keeping in mind the various activities of a patient in the OPD and the process flow. After this process a pie chart was created for each clinic depicting the major areas of delay.

For the joint replacement clinic, there are two consultations - first by the assistant doctor, who examines the patients thoroughly, orders diagnostic tests (Radiology/ Laboratory) and assesses the results of these actions. After this, the second consultation is done by the senior doctor upon whose decision the patient is either admitted for surgery, or is discharged.

OBSERVATIONS

The patient flow in the hospital can be can be described by the following chart (Refer Fig3):

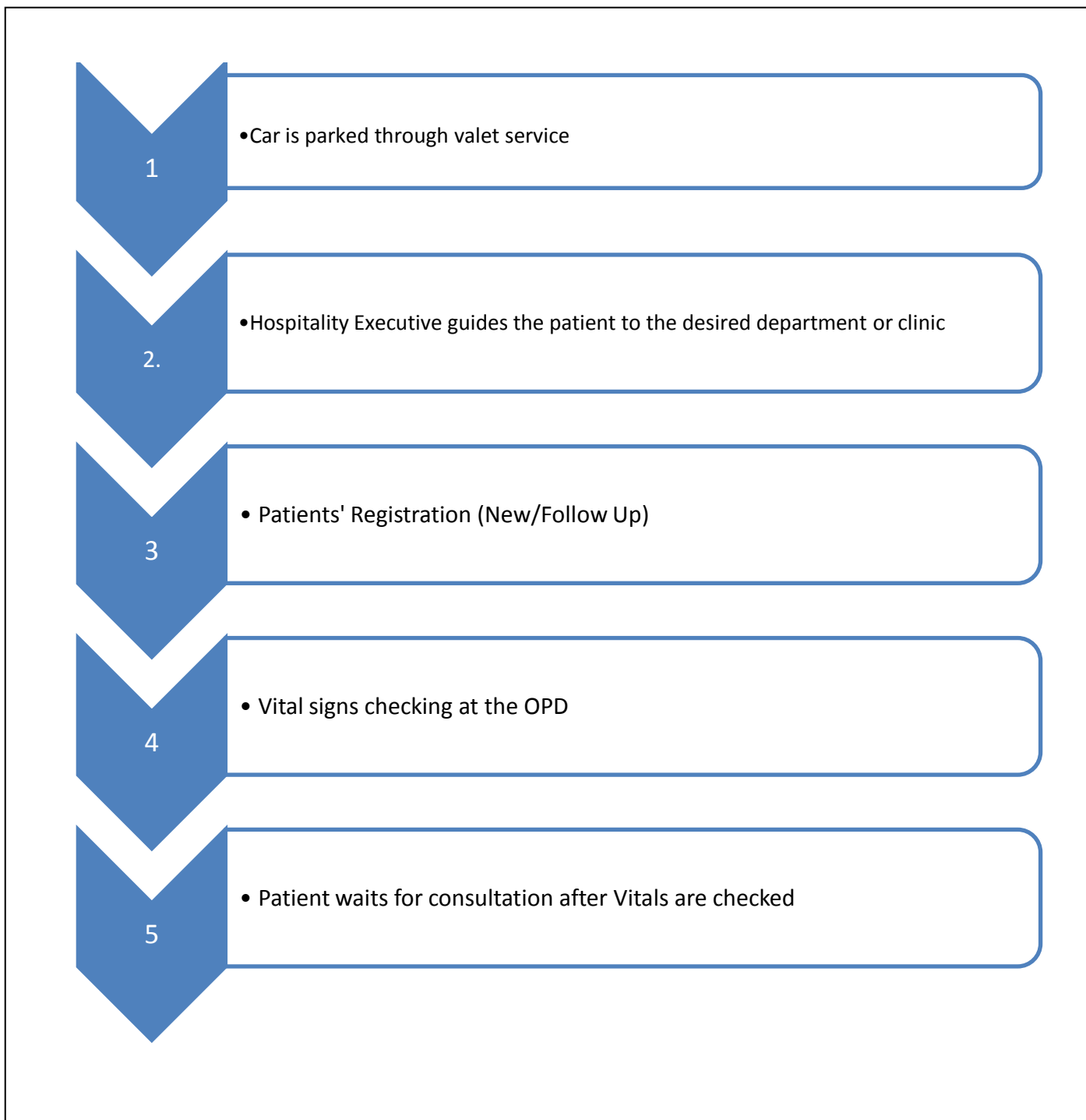


Figure 3: Patient flow in OPD

If the patient comes for joint-replacement consultation, the following is the process flow
(Refer Fig 4):

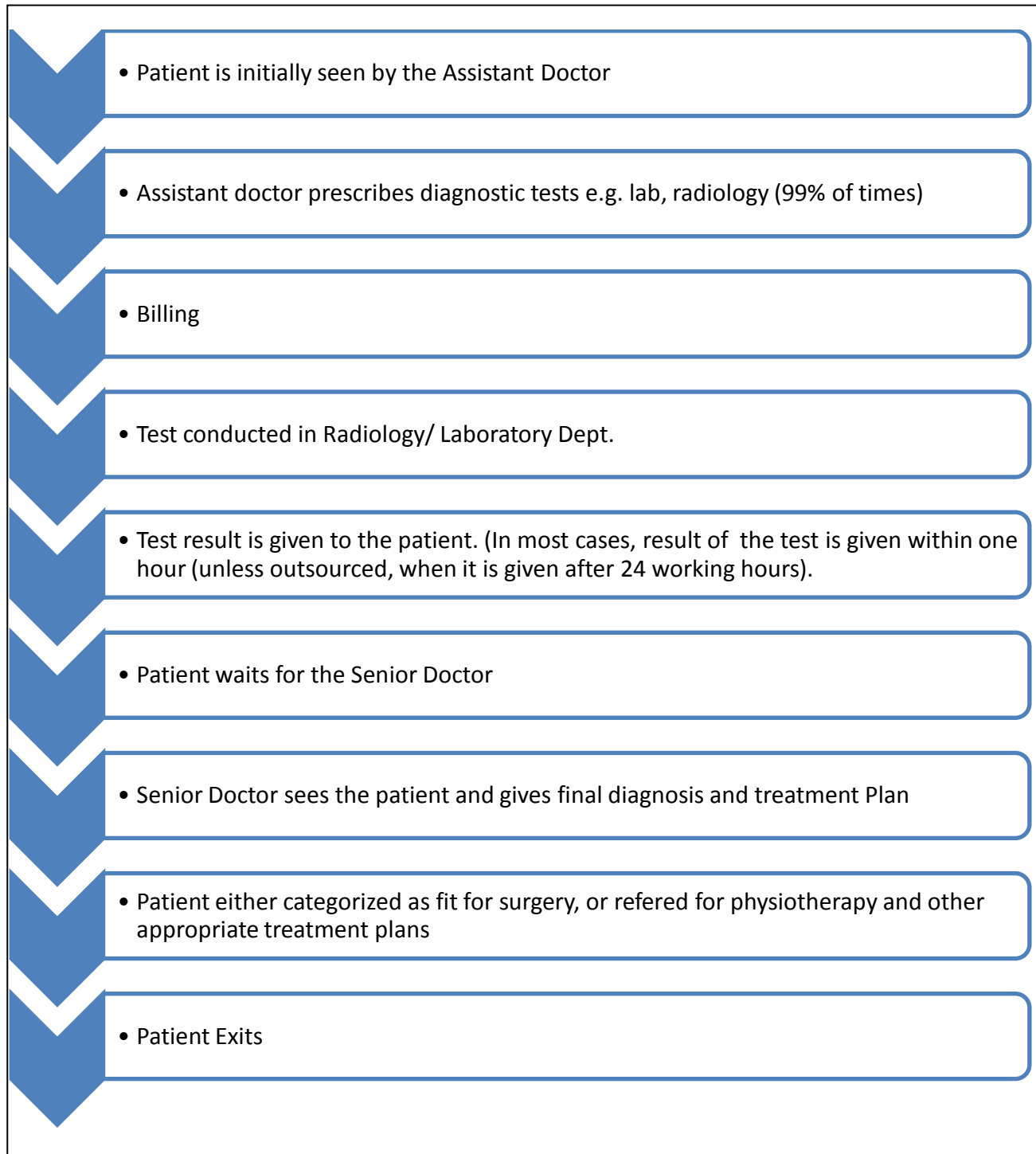


Figure 4: Patient flow in OPD (Joint Replacement Clinic)

In case the patient visits the hospital for any other ailment, following procedure is followed

(Refer Fig 5):

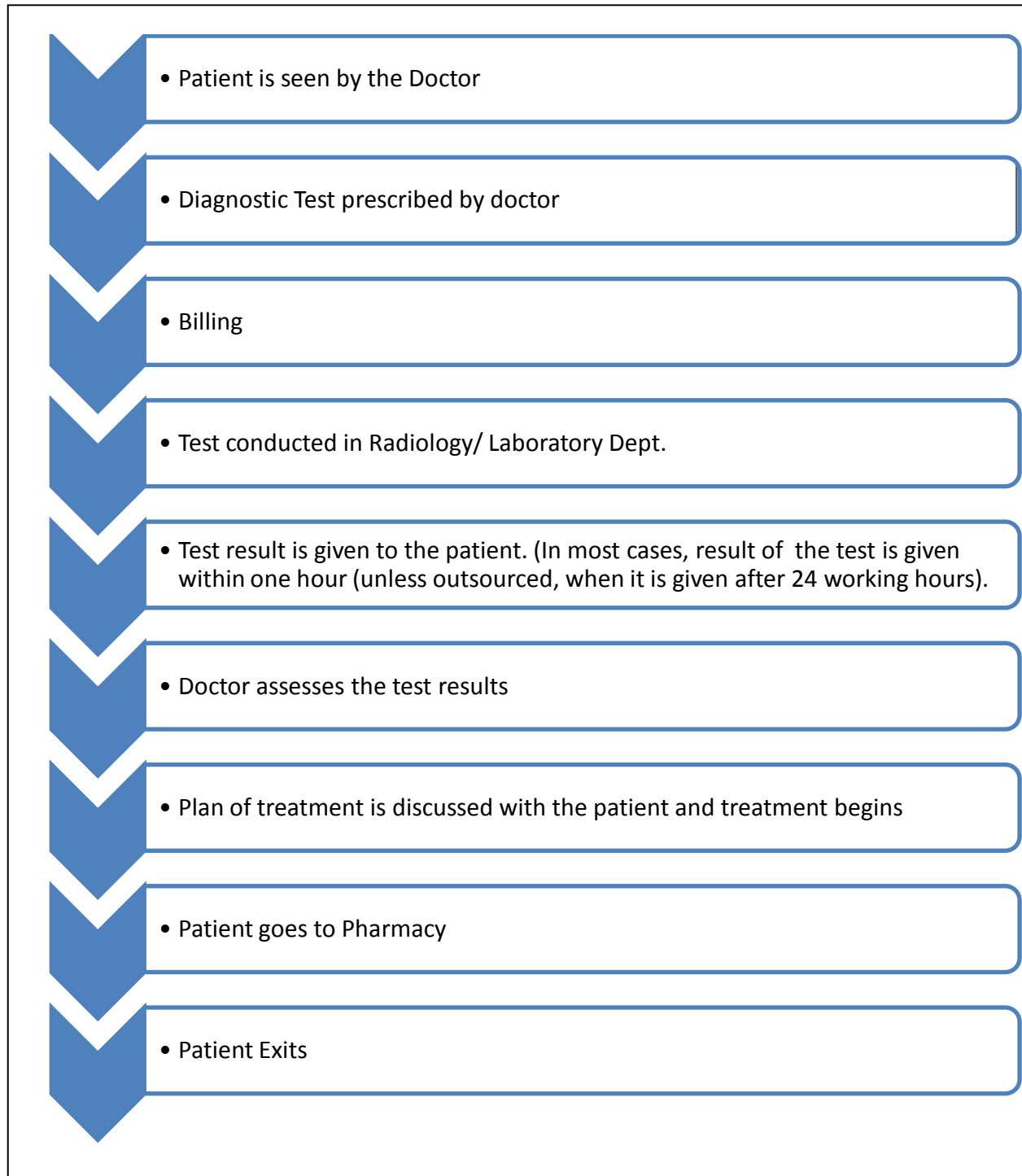


Figure 5: Patient flow in OPD (All other clinics other than Joint Replacement)

Patients' right to a second opinion is always encouraged at BHAS. The patients are given the copies of their diagnostic tests and medical records on the same day or the next day to make it easy for them to get a second opinion about a surgical procedure or any other treatment. Patients' rights and responsibilities are displayed at several key places in hospital.

The student spent about two weeks in the hospital's OPD, and manually recorded the time (in minutes) for various procedures in the patients' visit.

After this process, the collected data was then transferred to an excel sheet in the form of tables and pie-charts were created for each clinic to represent the average percentage of time spent for various activities by a patient.

1. Sports Orthopedic:

The Sports orthopedic clinic is situated on the ground floor OPD.

Break up of patient's time in the clinic can be displayed from the figure below (Refer Figure 6)

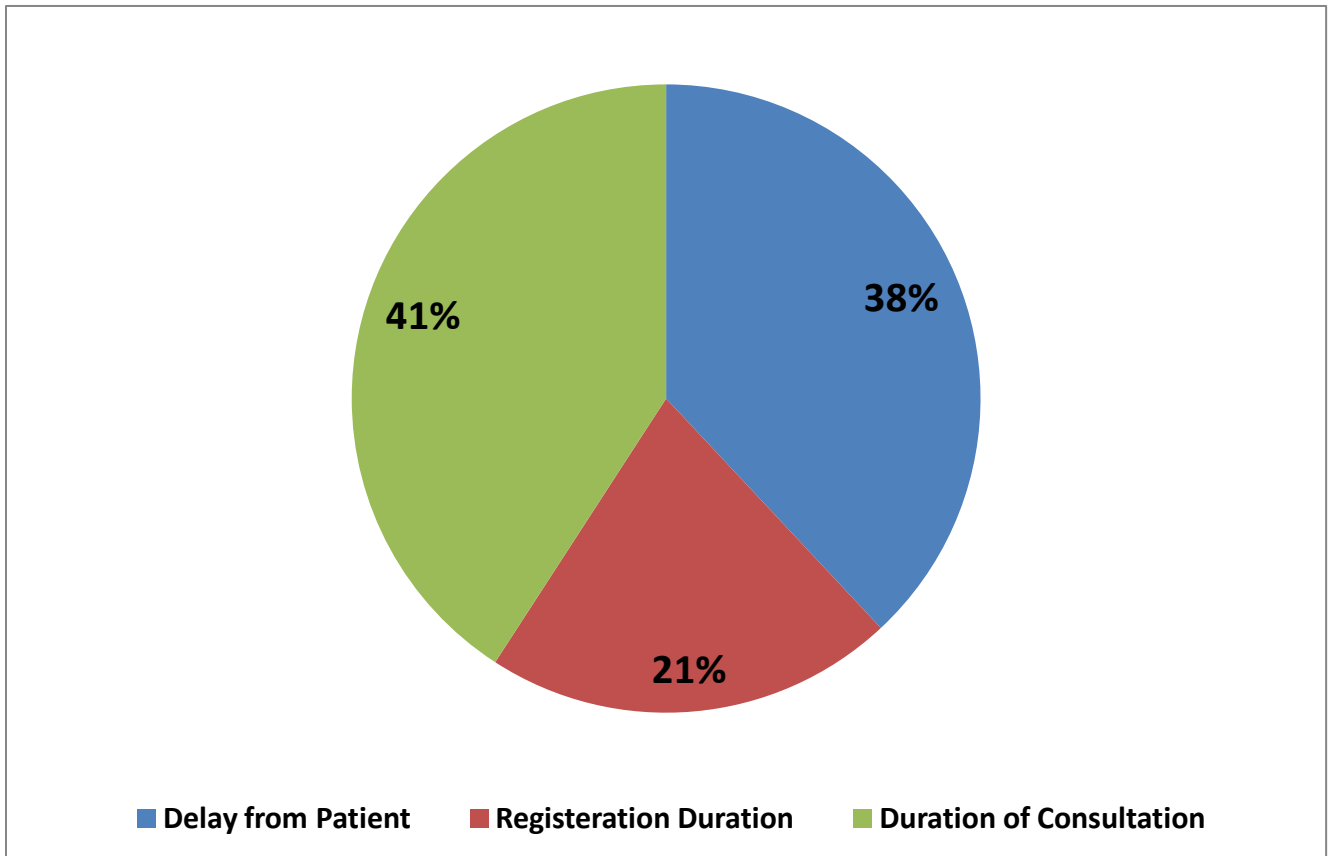


Figure 6: Break-up of patient time in Sports Ortho Clinic

The majority of the time spent by a patient in the Sports orthopedic clinic is consumed in consultation with the doctor, which indicates that most of the time spent by a patient goes in interaction with the doctor. A major reason for delay is that the patient arrives late for his/her appointment. Registration takes about 21% of the total time.

2. Pediatric Orthopedic:

The Pediatric orthopedic clinic is situated on the ground floor OPD.

Break up of patient's time in the clinic can be displayed from the figure below (Refer Figure 7)

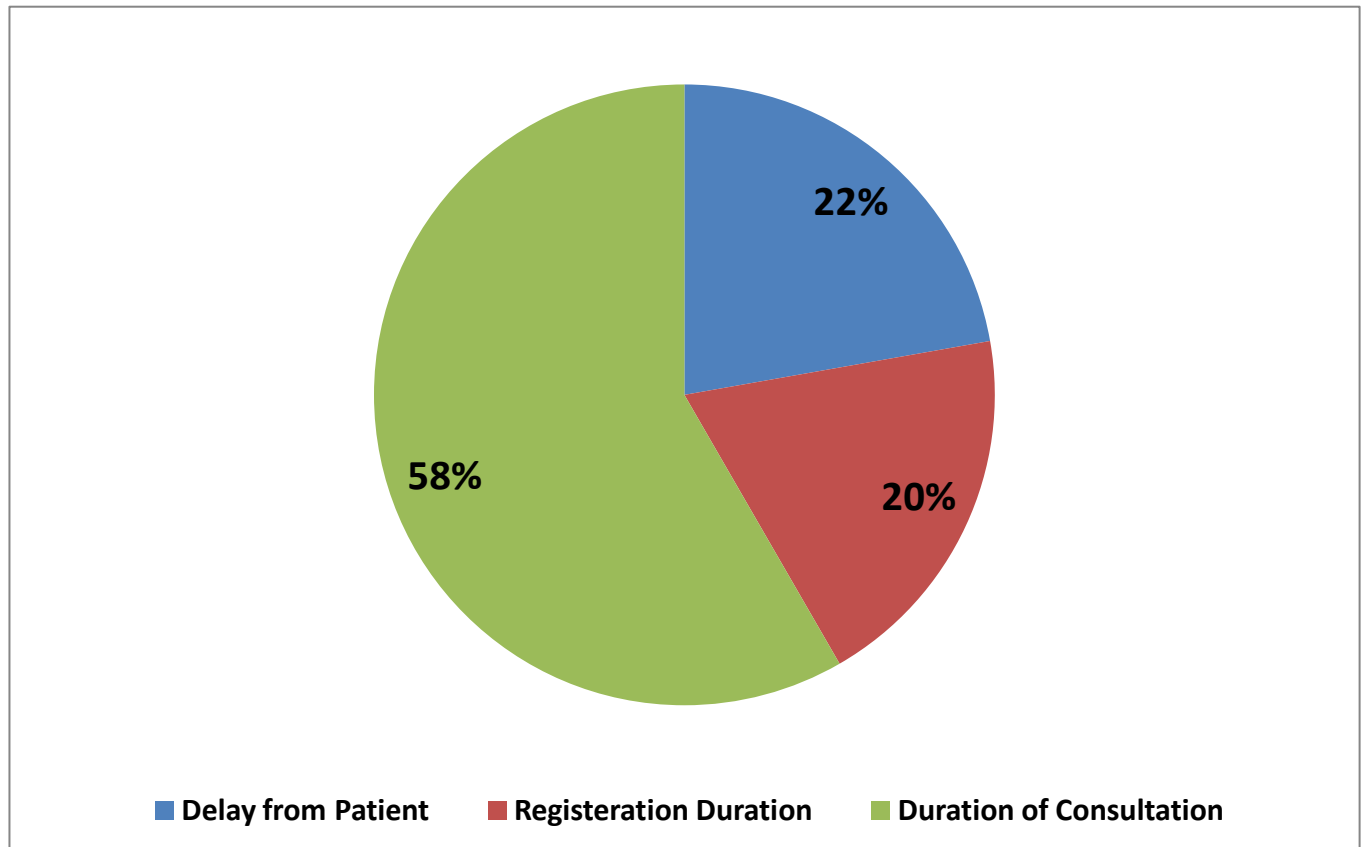


Figure 7: Break-up of patient time in Pediatric Ortho Clinic

In the Pediatric clinic, maximum time of the patient is utilized in consultation with the doctor. Delay caused due to patients accounts for 22% of the total time, while 20% of the time is consumed in registration.

3. Cardiology

The cardiology clinic is situated on the ground floor OPD.

Break up of patient's time in the clinic can be displayed from the figure below (Refer Figure 8)

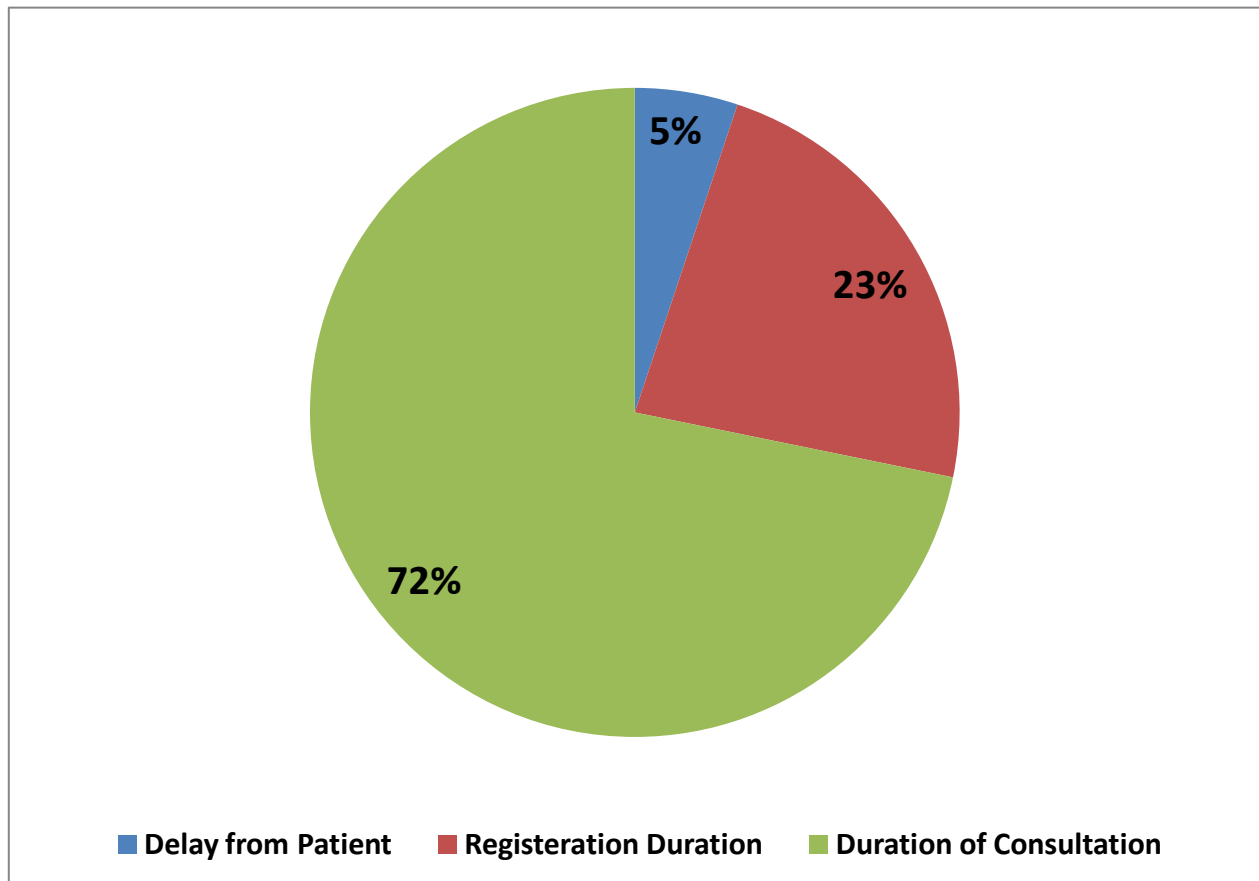


Figure 8: Break-up of patient time in Cardiology Clinic

An ideal situation can be seen in the cardiology clinic, where the patients are almost never late for appointments, registration does not take much time (23%), and the maximum amount of patients' time is spent in consultation with the doctor (72%).

4. Neurology

The neurology clinic is situated on the ground floor OPD.

Break up of patient's time in the clinic can be displayed from the figure below (Refer Figure 9)

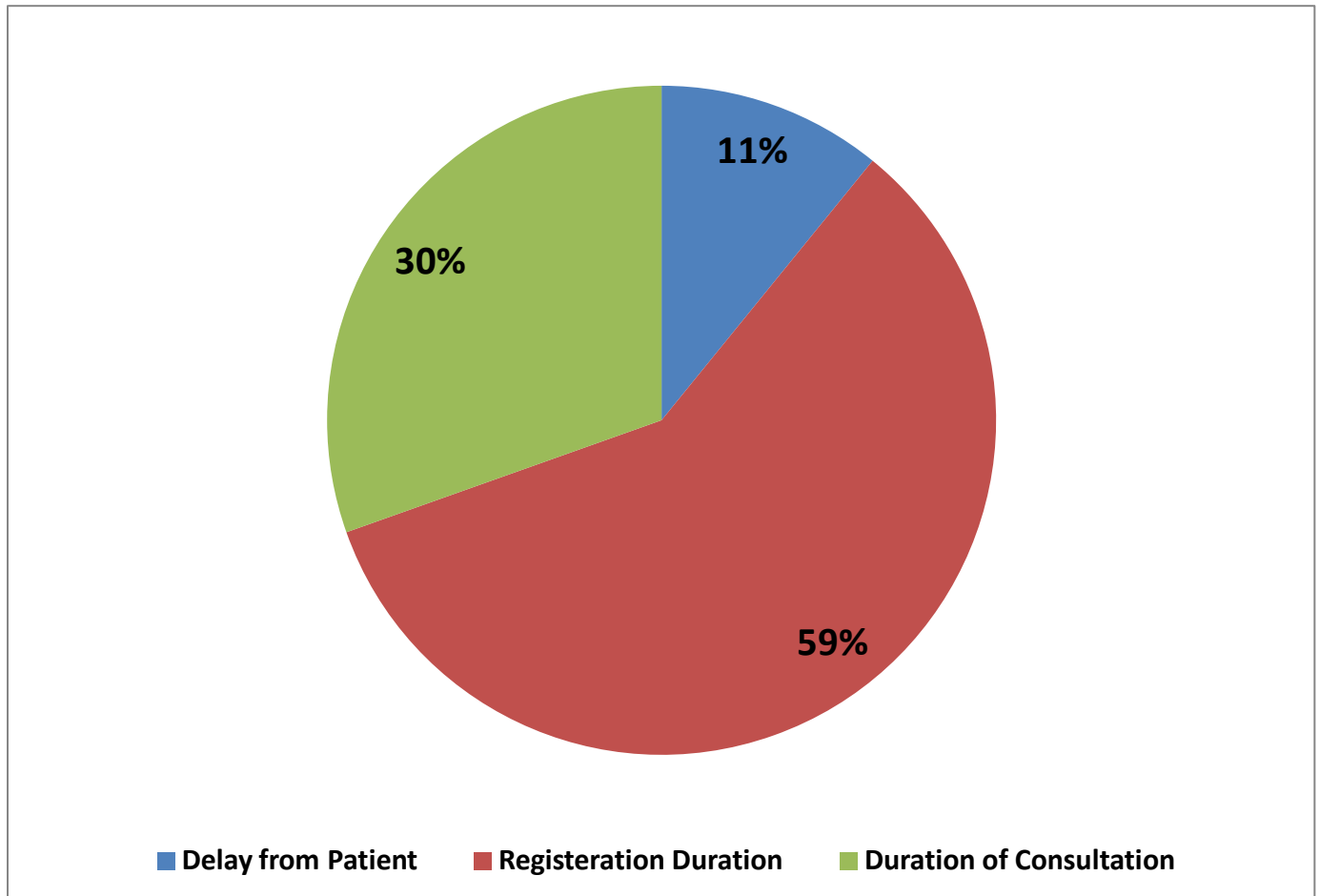


Figure 9: Break-up of patient time in Neurology clinic

In the neurology clinic, we can see that almost 63% of the patient's time is consumed in registration. Only a small percentage of time is wasted in delay by the patient, while the rest is spent in consultation with the doctor.

5. Joint Replacement

The joints replacement clinic is situated on the first floor OPD.

Break up of patient's time in the clinic can be displayed from the figure below (Refer Figure 10)

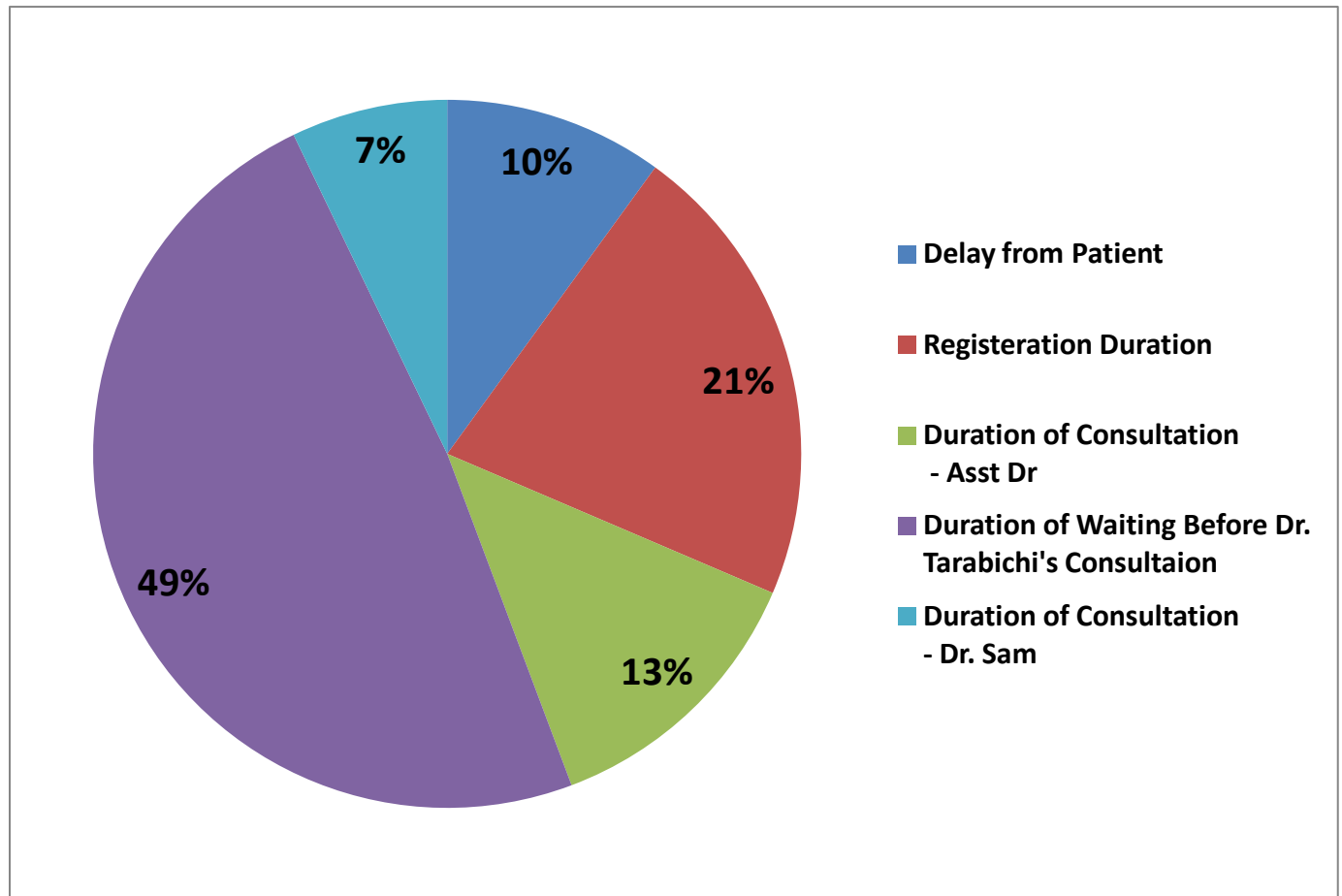


Figure 10: Break-up of patient time in Neurology clinic

This pie-chart depicts the break-up of time of patients who visit the joint-replacement clinic. As we can see from the figure, half the time a patient spends in the joint replacement clinic is consumed in waiting for consultation with the senior doctor, while a fairly large percentage of his/her time is also spent in registration.

The joint replacement clinic which is present on the first floor is the busiest clinic of the hospital, with a footfall of roughly a thousand patients a month. Patients who come for joint replacement therapy, first consult the assistant doctor, and are then prescribed a diagnostic test (Radiology/ Laboratory). After this, the senior doctor consults the patient.

From the data given above, we can easily see that almost half the time spent by the patients is consumed in waiting for the senior doctor for his consultation.

Considering the fact that the joint replacement clinic caters to the majority of patients visiting the hospital, this high percentage is even more alarming, and demands immediate attention and improvement.

According to the Lean concept, all waste generated can be classified under 7 categories (Refer Fig 13):



Figure 11: 7 Wastes of Lean

1. **Over production:** (Things which are not demanded by the customers)

- A patient who visits a hospital wants to pay only the consultation charges of the doctor. Many material/ non-material goods are produced during the process of consultation, which are mostly vital, and cannot be cut down upon, e.g. hospitality service, production charges of utilities like Television and electricity in the waiting area, registration procedure, etc.
2. **Inventory:** (Articles awaiting processing/ consumption)

All the extra stationary items, food articles (fruits/coffee powder, etc.), drugs kept in the pharmacy can be easily classified under this category.
 3. **Transport:** (Carrying of goods/articles from one place to the other and the customer is not willing to pay for these charges)
 - Files of patients being transferred from reception to doctor's room, blood samples being transported from the phlebotomy room to Laboratory, are a few examples of this.
 4. **Over-Processing:** (Overdoing non-required work, relying on inspection rather than employing corrective measures to improve the process)
 - In the OPD, an over reliance on the feedback by customers is one example of this and feedback forms are just one method of assessing the patient satisfaction. There are constant quality improvement efforts based on various other evaluating procedures.
 5. **Idle time:** (Waiting for an upstream process to deliver, or for a machine to finish processing, or for a supporting function to be completed, or for an interrupted worker to get back to work)
 - Time spent in waiting for hung computer systems or for the printer to start working, or even waiting for the doctor to finish consultation for another patient – all these can be considered as “idle time” by a waiting patient.
 6. **Operator Motion:** (Unnecessary motion of the employees)

- Registration desk employees having to physically move in the OPD, either to deliver patients' files to the Nursing station, or to show a patient the way to the Radiology Lab/Restroom could be considered a wastage, especially since in our study, registration of a patient consumes more time than necessary.
7. **Bad Quality:** (Whenever defects occur, extra costs are incurred reworking the part, rescheduling production, etc.)
- Sometimes due to overload of patients, at peak hours, the files of the patients are not completed at registration desks. Either the ID cards are not fully scanned, or sometimes sticker with patients name and hospital ID is not attached with the file.

6. **Discussions**

The Sports orthopedic clinic, Pediatric Orthopedic clinic, Neurology clinic and the Cardiology Clinic are all present on the ground floor OPD of the hospital. By looking at the percentage of time that is spent on the above listed activities, it can be seen that a large percentage of it is being spent on registration of patients.

This time spent in registration is mainly due to the fact that on the ground floor OPD, there is a common desk for nursing, billing and registration. This situation often hinders the routine work of the employees. A separate counter for each of these activities could ease the process flow and increase the efficiency.

On the first floor, 50 % of the time spent by patients in the hospital is spent in waiting for the consultation by the senior doctor

For our study, the main causes for the delay in waiting time were grouped under following categories:

- **Equipment**

1. The printer, computer and ID card reader used to hang up often.
2. Printer machine at the Registration desk was being used by staff other than the front-desk also (Nursing or Administrative).
3. Often the Insurance claim forms which are used in creating a patient's file in the OPD got exhausted or there was difficulty in extracting the right company's form for the patient, since they were not kept in any logical order.

- **Site**

1. It was noticed that there was a situation of over-crowding and mix-up at the Registration counter, mainly during the peak hours, i.e. 1:00 pm to 5:00 pm.

2. On the ground floor, the space which was dedicated for Registration was also being used as the Nursing Station and Billing counter.
3. No separate counter was present for patients who were already registered in the hospital. They approached the same registration counter on their follow-up visits.

- **Skills**

1. The front-office staff was a team of very competent and skilled people. But it was noticed on some occasions that an increase in the patient-flow affected their work e.g. they would forget to attach insurance-claim form, in-patient files, or would not be sufficiently polite to patients due to work overload and stress.
2. After the working hours of the OPD, patient files were not always kept in order, and sometimes were found lying unattended at the counter. This practice compromises on confidentiality of patients' identity.

- **System**

1. One of the findings during the observation period in OPD was that there was a need for a Replacement Staff during the Prayer/ Lunch timings. In one instance, the registration desk was found unattended for almost 30 minutes because there was no replacement staff.
2. Patients waiting for their appointments should be informed in advance about the approx. waiting time for consultation so that they are more comfortable by being reconciled to the wait.

- **People**

Doctor

It was noticed that there was a large variation (ranging from 5 to 40 minutes) in the consultation time given by each doctor to his/her patients. This variation caused disturbance in the smooth workflow of the OPD.

Patient

- The major reason for delay in waiting time was that most of the patients did not arrive in time for their appointment, the delay ranging from 10-50 minutes.
- Since walk-in patients do not fix any appointment, they quite often had to wait for consultation for more than an hour.

Based on these findings, a fish bone diagram was constructed (Refer fig 12):

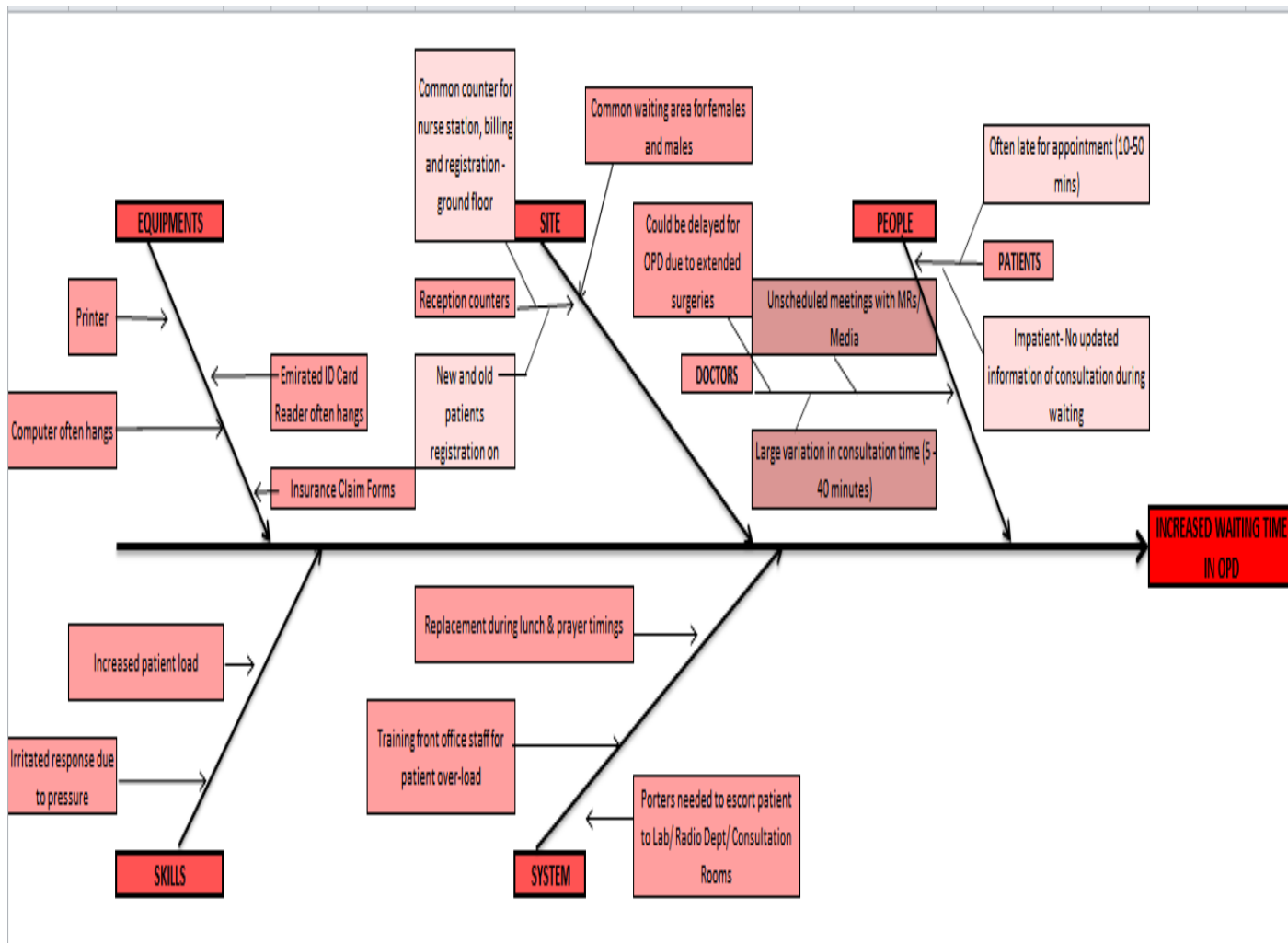


Figure 12: Representation of various causes leading to increased waiting time for patients in
OPD

RESULT

After a lot of efforts of BHAS staff, the measures listed above were implemented. There was a marked improvement in the waiting time of the patients. This finding could be reached by the positive feedback forms which were filled by the patients in the OPD. Also, the reduced number of complaints regarding the waiting time supported the study.

The core idea of incorporating Lean methodology in this process was to maximize Patient satisfaction (**customer value**) while minimizing waiting time for patients (**waste**) in the OPD. In simple terms, **more value for customers was created with fewer resources.**

The term "Lean" was coined to describe **Toyota's** business during the late 1980s by a research team headed by **Jim Womack**, Ph.D., at MIT's International **Motor Vehicle Program**.

Lean Management's main principle is to reduce the waste created during any process, in terms of money, human resources, time, quality, and increase the overall efficiency of process, in order to provide maximum satisfaction to the customers. The ultimate goal is to provide perfect value to the customer through a perfect value creation process that has zero waste.

To accomplish this, we tried to detect the maximum waste-generating processes in the OPD of the hospital and recommended measures to improve them.

Eliminating waste along the entire value streams, instead of at isolated points, creates processes that need less human effort, less space, less capital, and less time to make products and services at far less costs and with much fewer defects, compared with

traditional business systems. Organizations are able to respond to changing customer desires with high variety, high quality, low cost, and with very fast throughput times. Also, information management becomes much simpler and more accurate.

Lean applies in every business and every process. It is a way of thinking and acting for an entire organization.

CORRECTIVE MEASURES EMPLOYED

To ensure the most optimum and efficient solution for the issues mentioned above, employment of Lean Six Sigma methodologies seemed ideal. The hospital was aiming for a reduction in waiting time in the OPD, without having to add to its resources, in terms of manpower and finance. As a solution, we implemented the Lean Six Sigma strategies.

After many brainstorming sessions among the steering committee, (CEO, MD, Operations Director, Quality Manager, Nursing Director) the OPD staff,(doctors, nurses and front desk) and the front desk supervisor, the following measures were undertaken to reduce waiting time in the OPD to acceptable limits:

- Increased the number of Assistant Consultants so that more patients could be consulted simultaneously by different doctors.
- Decided that the Joint-Replacement specialist would devote an average of 15 minutes for consultation, with each patient.
- Decided to space appointments for Pediatric Orthopedics from 30 minutes to 45 minutes, since time for each consultation was roughly 60 minutes.
- Created Nursing Station on ground floor thereby reducing crowding at Registration counter.

- Reserved 8 out of 9 consultation rooms on 1st floor for Joint Replacement clinic OPD, and 1 for Hand Specialty clinic(since 95% patients come to hospital for joint replacement).
 - Shifted other OPDs (Pediatric Orthopedic, Cardiology, Spinal Surgery, Neurology, Sports Orthopedic and Rheumatology) to ground floor to reduce crowding of patients on first floor.
 - Approved a separate billing counter on ground floor - going to start soon.
-
- **Other Proposed Solutions - yet to be implemented after studying feasibility**
 1. Prepare intra-articular injection beforehand to avoid delaying patients who are required to be given injections. (To check acceptable period between mixing and giving the injection).
 2. To assign one nurse to organize the flow of patients in the clinic, to manage the queue of patients' movement to the consultation rooms and to escort the patients back from X-Ray.

8. Conclusion

The waiting time in the OPD of the hospital was proving to be a major concern for the management, owing to the fact that BHAS promises its patients world-class service delivery. This project highlighted many causes of increased waiting time in the OPD, and many suggestions were made with a view to reduce this time. At the end of 3 months period, a noticeable change was observed. The waiting time reduced from an earlier high of 60 minutes to an acceptable limit of 30 minutes.

As part of increasing the efficiency and improving the services provided to the valued patients, further measures are being strategized to bring down the waiting time further.

8. BIBLIOGRAPHY

Books:

- Lean Six SIGMA for Service: How to Use Lean Speed and Six SIGMA Quality to Improve Services and Transactions
- 10 Principles for Outstanding Outpatient Customer Service
- Reducing Consultation Waiting Time and Overtime in Outpatient Clinic: Challenges and Solutions

Web:

- <http://www.isixsigma.com/industries/healthcare/improving-process-turnaround-time-outpatient-clinic/>
- https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0CDAQFjAA&url=http%3A%2F%2Fonlinelibrary.wiley.com%2Fdoi%2F10.1002%2Fqre.1552%2Fabstract&ei=3QeDU53dMcKLuATOqoLQDw&usg=AFQjCNEhxXKRN_1C_N0l-ltOL3Q9mqYuNQ&bvm=bv.67720277,d.c2E
- https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=0CEcQFjAE&url=http%3A%2F%2Fwww.biomedcentral.com%2F1472-6963%2F9%2F21&ei=ZgiDU8WvGtSKuASH-YLwCQ&usg=AFQjCNEu9qafWov7b03v_IK_LEM4H747FQ&bvm=bv.67720277,d.c2E

10. Appendix

Appendix # 1 OPD Patient Feedback Form - Front

الشكر \ الإقتراحات
COMPLIMENTS/SUGGESTIONS

نراكم ونשמع صوتكم ونسعدكم سوف نأخذ الإقتراحات منكم بعين الاعتبار
Every comment is important to us and will be addressed as soon as possible.

Name:
الاسم:

Mobile:
التليف:

Email:
البريد الإلكتروني:

Payment method:
طريقة الدفع:

Doctor consulted:
الطبيب المعالج:

رأيك يهمنا
WE WOULD APPRECIATE
YOUR FEEDBACK

رجيل
burjee
hospita
مركز الخدمات
for Advanced Sur

تبيان رضا المتعاملين
PATIENT SATISFACTION SUR

For appointment call
04 4070100
info@burjeehospital.com
www.burjeehospital.com

DUBAI

Appendix # 1 : OPD Patient Feedback Form - Back

Annexure

Annexure 1

Table 1: Duration of time spent by patient in Sports Ortho clinic (#1)

Appoin tment	Patient In Time	Delay from Patient (mins.)	Registration Completed	Regist ration Durati on (mins)	Called for Vitals	Vitals Over	Consult ation	Duratio n of Consult ation (mins.)	Patient Out
11:20	11:20	0	11:42	22	11:46	11:48	11:48	7	12:05
12:00 noon	12:10	10	12:30	20	12:45	12:47	12:55	33	13:30
11:40	11:50	10	12:10	20	12:10	12:12	12:12	38	12:50
13:00	12:50	0	13:15	25	13:17	13:20	13:25	20	13:48
13:20	13:15	0	13:36	21	13:40	13:42	13:55	25	14:20
10:20	10:45	25	11:00	15	11:05	11:07	11:10	28	11:38
10:00	10:37	37	10:51	14	10:55	10:57	11:00	31	11:32
10:20	11:00	40	11:16	16	11:20	11:22	11:30	28	12:00 noon
10:40	11:25	45	11:40	15	11:41	11:43	11:47	29	12:18
13:00	12:45	15	12:55	10	12:58	13:00	13:00	32	13:32
10:00	10:37	37	10:50	13	10:55	10:57	11:12	32	11:42
11:00	11:35	35	11:49	14	11:50	11:52	12:01	31	12:32
10:40	11:30	50	11:40	10	11:40	11:42	11:45	29	12:14
13:20	13:42	22	13:57	15	13:50	13:53	13:53	33	14:25
11:00	11:50	50	12:04	14	12:05	12:08	12:10	29	12:39
14:40	13:40	60	14:30	16	14:37	14:39	14:39	34	15:13
Averag e (mins)		27		16				29	

Table 2: Duration of time spent by patient in Pediatric Ortho clinic

Appointment	Patient In Time	Delay from Patient (mins)	Registration Completed	Registration Duration (mins)	Called for Vitals	Vitals Over	Consultation	Duration of Consultation (mins)	Patient Out
10:00	10:05	5	10:09	4	10:11	10:13	11:37	35	12:15
13:30	13:15	15	13:32	17	13:32	13:34	13:50	33	14:23
12:00 noon	11:52	0	13:09	19	13:09	13:11	12:55	55	13:50
12:00 noon	13:07	67	13:20	13	13:20	13:22	13:22	53	14:15
10:00	10:17	17	10:30	13	10:30	10:32	10:32	42	
10:20	10:34	14	10:49	15	10:49	10:49	10:51	43	
12:30	13:07	37	13:20	13	13:20	13:22	13:22	53	14:15
11:00	11:18	18	11:34	16	11:38	11:40	11:40	44	12:24
14:00	14:00	0	14:20	20	14:25	14:27	14:30	46	15:16
14:30	14:44	14	14:56	12	14:58	15:00	15:00	40	
9:45	10:01	16	10:15	14	10:29	10:31	10:31	46	11:11
10:00	10:15	15	10:32	17	10:35	10:37	10:37	38	11:15
15:00	15:00	0	15:10	10	15:10	15:10	15:15	14	15:29
10:20	10:37	17	10:50	13	11:03	11:05	11:05	42	11:47
11:00	11:16	16	11:30	14	11:38	11:40	11:40	40	12:20
16:30	16:27	3	16:43	13	16:45	16:47	16:50	38	17:28
Av. Minutes		16		14				41	

Table 3: Duration of time spent by patient in Cardiology clinic

Appointment	Patient In Time	Delay from Patient (mins)	Registration Completed	Registration Duration (mins)	Called for Vitals	Vitals Over	Consultation	Duration of Consultation (mins)	Patient Out
11:00	10:45	0	10:49	4	10:50	10:57	11:01	53	11:54
10:56	10:57	1	11:03	6	11:45	11:47	11:55	15	12:10
12:05	10:55	0	11:10	15	11:55	12 noon	12:20	20	12:40
12 noon	13:00	60	13:11	11	13:15	13:17	13:00	27	13:27
11:00	11:14	14	11:21	7	11:30	11:32	11:35	28	12:03
11:30	11:40	10	11:49	9	12:00 noon	12:02	12:10	25	12:35
11:20	11:36	16	11:49	13	11:50	11:52	12:05	24	12:29
13:00	13:10	10	13:22	12	13:39	13:41	14:10	26	14:36
12:30	12:38	8	12:43	5	12:45	12:47	13:00	26	13:26
13:00	13:12	12	13:21	9	13:38	13:30	13:43	23	14:06
13:15	13:28	18	13:43	15	13:45	13:47	14:50	29	15:20
13:30	13:36	6	13:39	3	13:41	13:42	13:45	25	14:10
13:45	13:59	14	14:07	8	14:09	14:11	14:15	27	14:42
12:00 noon	12:10	10	12:20	10	12:21	12:23	12:30	27	12:57
15:00	15:00	0	15:08	8	15:09	15:11	15:22	17	15:39
10:00	10:12	12	10:21	9	10:23	10:25	10:30	25	10:55
Average Minutes		12		9				26	

Table 5: Duration of time spent by patient in Neurology clinic

Appointm ent	Patient In Time	Delay from Patient (mins)	Registrat ion Comple ted	Registra tion Duratio n (mins)	Called for Vitals	Vitals Over	Consultat ion	Duration of Consultation (mins)	Patient Out
10:00	9:20	0	9:24	4	9:24	9:26	9:52	4	9:56
10:15	10:20	5	11:03	43	11:03	11:05	11:19	21	11:40
9:15	9:19	4	9:49	30	9:49	9:51	10:00	14	10::14
9:30	9:31	1	9:55	24	9:55	9:57	10:00	14	10:14
10:30	10:23	0	10:56	33	10:56	10:56	10:57	17	11:14
10:15	10:17	2	10:52	35	10:52	10:53	11:03	15	11:18
10:45	10:47	2	11:11	17	11:11	11:13	11:26	13	11:39
9:00	9:04	4	9:31	27	9:31	9:32	9:44	12	9:56
9:30	9:15	0	9:45	30	9:45	9:47	10:10	16	10:26
10:30	10:33	3	10:57	24	10:57	10:59	11:16	17	11:34
10:45	10:46	1	11:21	25	11:21	11:23	11:34	11	11:45
11:30	11:31	1	11:57	26	11:57	11:59	12:00	14	12:14
11:45	11:15	0	11:48	28	11:48	11:50	12:04	13	12:07
9:45	9:47	2	10:25	29	10:25	10:28	10:43	15	10:58
10:45	10:48	3	11:23	25	11:23	11:25	11:40	14	11:54
11:00	11:02	2	11:31	29	11:31	11:34	11:50	16	12:06
Av. Minutes		2		27				14	

Table 6: Duration of time spent by patient in Joint Replacement clinic

Appointment	Patient In Time	Delay from Patient (mins)	Registration Completed	Registration Duration (mins)	Called for Vitals	Vitals Over	Consultaion by Assistant Doctor	Duration of Consultation (mins)	Duration of Waiting Before Dr. Tarabichi's Consultaion	Consultaion by Doctor Tarabichi	Duration of Consultation (mins)	Patient Out
11:30	11:27	0	11:42	15	11:40	11:42	Dr. Khan 11:53	9	58	12:51	4	12:55
11:45	11:27	0	11:43	16	11:42	11:44	Dr. Khan 11:53	9	67	12:55	3	12:58
12:25	12:30	5	12:33	3	12:33	12:34	Dr. Shaheer 12:40	7	7	12:47	3	12:50
12:45	13:02	17	13:05	3	13:41	13:42	Dr. Atallah 13:57	13	49	14:46	8	14:54
13:30	13:02	0	13:45	43	13:46	13:46	Dr. Khan 13:58	11	13	14:11	11	14:22
13:30	13:02	0	13:45	43	13:46	13:46	Dr. Khan 13:58	2	13	14:11	11	14:22
12:00	12:08	8	12:14	6	12:15	12:17	Dr. Khan 12:18	2	5	12:23	3	12:26
12:00	11:27	0	11:33	5	11:32	11:34	Dr. Khan 11:42	4	37	12:21	2	12:23
12:15	12:40	25	12:50	10	12:51	12:53	Dr. Atallah 13:00	14	47	13:47	3	13:50
12:15	12:08	7	12:15	7	12:18	12:20	Dr. Khan 12:27	7	50	13:20	2	1:22
12:45	12:38	0	12:52	14	12:54	12:56	Dr. Atallah 13:33	11	27	14:00	6	14:06
12:30	12:37	7	12:50	13	12:55	12:57	Dr. Khan 12:57	10	50	13:47	5	13:52
13:00	13:09	9	13:26	17	13:30	13:32	Dr. Khan 13:45	13	45	14:30	7	14:37

Table 6: Duration of time spent by patient in Joint Replacement clinic (...contd.)

13:45	13:50	5	14:05	15	14:05	14:07	Dr. Khan 14:7	8	48	14:55	10	15:05
14:00	14:04	4	14:24	20	14:24	14:26	Dr. Atallah 14:26	9	90	15:56	6	16:02
12:30	12:41	11	12:51	10	12:59	13:00	Dr. Atallah 13:15	7	65	14:20	4	14:24
12:45	12:52	7	13:17	25	13:27	13:30	Dr. Atallah 13:35	8	82	14:57	5	15:02
14:00	14:08	8	14:18	10	14:18	14:20	Dr. Khan 14:25	6	46	15:11	8	15:19
14:45	14:51	6	15:06	15	15:20	15:22	Dr. Khan 15:25	9	75	16:40	2	16:42
15:15	15:24	9	15:44	18	15:44	15:46	Dr. Atallah 15:55	13	43	4:47	9	16:56
16:00	16:05	5	16:17	12	16:22	16:24	Dr. Khan 16:25	8	49	17:05	7	17:12
16:45	16:52	7	16:17	25	16:17	16:19	Dr. Atallah 16:25	9	58	17:25	13	17:38
12:30	12:15	0	12:25	10	12:35	12:37	Dr. Atallah 12:47	15	34	13:27	9	13:36
13:15	13:00	0	13:15	15	13:15	13:17	Dr. Atallah 13:27	9	47	14:10	7	14:17
12:45	12:50	5	13:04	14	13:10	13:12	Dr. Atallah 13:20	15	95	15:18	10	15:28
14:45	14:54	9	15:06	16	15:06	15:08	Dr. Khan 15:08	8	28	15:36	14	15:50
14:00	14:08	8	14:25	13	14:25	14:27	Dr. Atallah 15:10	7	64	16:15	7	16:22
14:45	14:51	6	15:08	17	15:08	15:10	Dr. Atallah 15:40	9	48	16:25	13	16:38
15:15	15:22	7	15:37	15	15:37	15:39	Dr. Atallah 15:45	9	53	16:57	9	17:06
16:00	16:20	20	16:35	15	16:35	16:37	Dr. Khan 16:40	8	52	17:42	8	17:50
16:45	16:00	0	16:18	18	16:18	16:20	Dr. Khan 16:25	9	54	17:34	9	17:33

Table 6: Duration of time spent by patient in Joint Replacement clinic (...contd.)

12:30	12:35	5	12:47	12	12:47	12:50	Dr. Atallah 12:55	10	68	14:17	10	14:27
13:15	13:22	7	13:32	10	13:32	13:34	Dr. Atallah 13:39	10	61	15:50	12	16:02
12:45	12:52	7	13:07	15	13:07	13:09	Dr. Khan 13:16	8	83	14:50	6	14:56
14:45	14:51	6	15:05	14	15:05	15:07	Dr. Atallah 15:10	9	43	16:05	13	16:18
14:00	14:08	8	14:24	16	14:24	14:26	Dr. Khan 14:36	12	62	15:41	4	15:45
14:45	14:54	9	15:07	13	15:07	15:09	Dr. Atallah 15:18	11	56	16:15	5	16:20
15:15	15:20	5	15:37	17	15:37	15:39	Dr. Atallah 15:49	8	64	16:50	13	17:03
16:00	16:04	4	16:19	15	16:19	16:21	Dr. Khan 16:22	9	73	17:30	12	17:42
16:45	16:52	7	17:07	15	17:07	17:09	Dr. Atallah 17:10	10	66	18:15	9	18:24
12:30	12:41	11	13:00	18	13:00	13:02	Dr. Atallah 13:05	8	38	13:45	9	13:54
13:15	13:30	15	13:32	12	13:32	13:34	Dr. Khan 13:37	13	61	14:05	6	14:11
12:45	12:52	7	13:02	10	13:02	13:04	Dr. Khan 13:09	9	83	14:20	5	14:25
14:45	14:47	2	13:02	15	13:02	13:04	Dr. Khan 13:04	10	54	14:08	4	14:12
14:45	14:54	9	15:08	14	15:08	15:10	Dr. Atallah 15:10	14	51	16:10	8	16:18
14:00	14:11	11	14:27	16	14:27	14:29	Dr. Atallah 14:33	13	50	15:40	5	15:45
14:45	14:50	5	15:03	13	15:03	15:05	Dr. Atallah 15:05	12	63	16:02	6	16:08
15:15	15:24	9	15:37	13	15:37	15:39	Dr. Khan 15:39	11	61	16:39	10	16:49
		7		15				9	53		7	