

DMAIC Approach to Streamline the Process and Reduce the
Waiting Time of Outpatient Department at Burjeel Hospital,
Abu Dhabi

By

Sidra Ashraf

*Dissertation submitted in partial fulfillment of the requirements of the degree
MBA Hospital and Health Management*

Academic year, 2018-2020



The IIHMR University, Jaipur

1, Prabhu Dayal Marg, Sanganer, Airport
Jaipur 302029, Rajasthan
Ph: 0141 3924700, Fax: 3924738
Website: www.iihmr.edu.in

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56331

Internship Completion Certificate

This certificate is awarded to

Dr. Sidra Ashraf

In recognition of having successfully completed her
Internship in the department of **Operations**
and has successfully completed her Project on

**A DMAIC approach to streamline the process and reduce the
waiting time of outpatient department at Burjeel Hospital,
Abu Dhabi**

Internship Date: 10th February 2020 to 31st May 2020

We wish her all the best for future endeavors.

For Burjeel Hospital, Abu Dhabi

Manish Jain

Mr. Manish Jain
Director - Operations



Dr. Sanjai Kumar

Dr. Sanjai Kumar
Head - Human Resources



THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled A DMAIC approach to streamline the process and reduce the waiting time of outpatient department at Burjeel Hospital, Abu Dhabi and submitted by Sidra Ashraf Enrollment No 0836 under the supervision of Dr. J P Singh for award of MBA in Hospital and Health/ Pharmaceutical / Rural Management in Health and Hospitals of the University carried out during the period from 10 February 2020 to 31 May 2020 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.

Signature

ABSTRACT

Objectives: This study addresses the issue of longer patient waiting time in the outpatient department (OPD) of a private hospital in Abu Dhabi. The objective was to find out the waiting time of the patients in the outpatient department, identify the steps where delay occurs and to give recommendations to improve the same. **Methods:** In this cross-sectional study, Define, Measure, Analyse, Improve and Control (DMAIC) model of Lean Six Sigma was used to analyse the problem. Each patient was tracked step by step and time was noted for each step and process map was designed. **Key results:** When total time taken by the patients at the OPD was analysed, it was found that 41% of the patients took more time than ideal, while 59% of the patients finished the consultation at the ideal time. The main steps where the possible delay can be eliminated are the first and second steps of the OPD consultation process. **Conclusion:** Following the recommendations on the basis of the Six Sigma methodology with regular follow up of the Key Performance Indicators and audit will help in reducing waiting time of patients and will improve patient satisfaction and experience.

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LIST OF SYMBOLS AND ABBREVIATIONS

Abbreviation	Full form
OPD	Outpatient department
DMAIC	Define Measure Analyse Improve Control
TAT	Turnaround Time
LSS	Lean Six Sigma
SIPOC	Supplier Input process Output Customer
MR	Medical record
UCL	Upper Control Limit
LCL	Lower Control Limit
OT	Operating Theatre
HIS	Hospital Information System

1. INTRODUCTION

An outpatient department or outpatient clinic is the part of a hospital designated for the treatment of outpatients, that is, people with health issues who visit the hospital for diagnosis or treatment, but do not require overnight care or treatment. Modern outpatient departments offer a wide range of diagnostic tests, treatment services, and minor surgical procedures.

The outpatient department is an important part of the overall functioning of the hospital. It normally works in integration with the in-patient services and has consultant doctors who also attend inpatients in the wards. Many patients are examined and given treatment as outpatients before being admitted to the hospital for further treatment as inpatients. The follow-up treatment after discharge is also done in the outpatient department.

Outpatient department is considered as prototypical to hospital services and play an important role in building patient's impression towards the hospital. This first encounter often affects the patient's perception towards the hospital and therefore, it is of utmost importance to ensure that the outpatient services provide their clients with an exceptional experience.

The waiting time of a patient at outpatient department can be described as the time duration between the patients entering the OPD till he meets the doctor for consultation. Waiting time in outpatient departments is a major problem in almost all of the hospitals. The length of waiting time in the outpatient department has been one consistent feature of patient dissatisfaction. Many of the hospitals find the patient waiting time as a serious issue and constantly channelize efforts to reduce it. This also becomes a barrier to efficient flow of patients.

“Lean Six Sigma is one of the most modern strategies and well-established methodologies for improving the speed, quality and cost of manufacturing and service industries” (Johnstone et al., 2011). “Literature survey shows that lean principles were also successfully applied in healthcare” (LaGanga, 2011; Riley et al., 2010). “Six Sigma is a philosophy that employs a well-structured continuous improvement methodology to reduce process variability and drive out waste within the business processes using

statistical tools and techniques” (Banuelas and Antony, 2003). “It has proven to be a customer-focused, data driven and robust methodology with a goal of reducing the number of mistakes/defects- to as low as 3.4 per million opportunities” (Parker et al, 2007). “These benefits of Six Sigma are achieved through the utilisation of a systematic approach, the define, measure, analyse, improve and control process (DMAIC)” (Feng and Manuel, 2008). [1]

1.1. RATIONALE: - The purpose of the study was to estimate the waiting of patients in the outpatient department since it directly affects patient satisfaction. The OPD is considered to be the shopping window of the hospital, hence it requires maximum effort to achieve patient satisfaction. It was found that complaint regarding long waiting times was maximally registered in outpatient clinics. As a note to address this issue as priority, OPD of the busy Family Medicine, Internal Medicine and Pulmonology clinics was considered to reduce the waiting time of the patients.

1.2. RESEARCH QUESTION: -

- ☐ What is the waiting time for patients at the Family Medicine, Internal Medicine and Pulmonology clinics?
- ☐ What are the main steps where possible delay can be eliminated?
- ☐ What are the causes of delay and gap in processes?

1.3. OBJECTIVES: -

- ☐ To understand the process flow of the Family Medicine, Internal Medicine and Pulmonology clinics in the outpatient department.
- ☐ To analyse the waiting time and gap at each step of the process flow.
- ☐ To provide recommendations using Six Sigma DMAIC approach for the same.

2. LITERATURE REVIEW: - It is commonly seen that many hospitals face the problem of overcrowding and long waiting time. Due to various reasons, patient after initial waiting for registration waits for consultations, diagnostics and treatment or even for collection of medicines at pharmacy.

- According to Bergenmar, waiting time can be described as “time duration that is evaluated for the quality of service one receives with respect to individual’s expectations.” [2]
- “Delayed access to healthcare is assumed to negatively affect health outcomes due to delays in diagnosis and treatment plus unforeseen cost implications on the patients and public health systems. A service industry approach would identify and eliminate all steps that do not add value for the patient. Removing wasteful steps has the dual effect of increasing both patient satisfaction and staff satisfaction while reducing cost.” [3]
- “One index in healthcare delivery by which the quality of service provided to patients can be evaluated is the uninterrupted movement of patients, known as patient flow. Patient flow, similar to a production flow in the production department, is the capability of the hospital to serve patients quickly and efficiently so that there is very little wait time between sections or stages. Obstruction in the flow of patients can actually amplify waiting, thus having an impact on healthcare outcomes.” [4]
- “Reducing OPD waiting times has been the focus of a great number of studies as waiting and treatment times are usually regarded as performance indicators of service. However, regardless of the affirmed significance of ensuring apt access to care, little research has, in reality, calculated how long patients wait and also inspected any observed relations with patient wait time at OPD.” [5]
- “Consultation length often varies from one country to another and is determined by both patient’s and doctor’s characteristics. Studies from abroad have shown that the average consultation time in a primary care setting ranges between 10 to 15 minutes.” [6]
- “With the increasing demand of healthcare services, the patients waiting in a queue are significant problem faced by our healthcare system. The government health services have limited system capacity due to which this problem is severe there. Private healthcare system is trying to fulfil the increasing population needs. Due to the ever-growing demand of better health services, the system is facing problem of waiting lines. Overcrowding and congestion in the healthcare system are few major problems, if not dealt effectively, could lead to huge loss to human life. The patients who need an overall support or who wish to get services at single place to save on time and resources come to such comprehensive centres as there is collective availability of doctors. This leads to

excessive pressure on the system overall which results in the formation of queues. Effectively managing patient flow in an outpatient unit is a key to achieve operational excellence as well as ensuring clinical quality. That is essentially true for an outpatient department in a large hospital as it handles very large volume of patients with a diverse case mix. Quality improvement in Health care based on Patient Satisfaction, takes place only when there is a process based on management. As a Quality improvement practice, hospitals have to manage the waiting time. To achieve excellence, the outpatient unit must be effectively managed in terms of patient flow. The mismatch between the available hospital resources and the needs for care causes waiting. This mismatch is generally attributed to having insufficient resources to meet demand for health care. However, other reasons like lack of planning, coordination, communication in delivering health care services are also responsible for this unsynchronized system.” [7]

- “Continuous quality improvement initiatives have become an integral component of healthcare. Increased patient awareness and medical insurance have led to increased expectations of patients from healthcare providers and therefore there is a need for scientific, reliable and sustained methods of quality improvement in healthcare. Although the Lean Six Sigma methodology has been used by many industries for quality improvement, its effectiveness has not been studied well in healthcare. Lean methodology focuses on the needs of the customer. It maps every step of a process as value added and non-value added activities. One of the most commonly used tools in lean methodology is called value stream mapping (VSM). This tool graphically displays the process of services with use of inputs, throughputs and outputs. Lean six sigma is the synthesis of lean and six sigma. It focuses on dramatically improving flow in the value stream and eliminating waste and reducing variation in processes and thereby reducing errors. It offers a structure for organizing continuous improvement of routine task.” [8]

3. METHODOLOGY: -

3.1.Study design – cross sectional study

3.2.Study setting – Family Medicine, Internal Medicine and Pulmonology clinics in the OPD of Burjeel Hospital, Abu Dhabi were chosen as they are the busiest clinics in the outpatient department.

3.3.Study population – patients visiting the Family Medicine, Internal Medicine and Pulmonology clinics in the OPD of Burjeel Hospital, Abu Dhabi.

3.4.Research procedure - quantitative data was collected, that is, turnaround time (TAT) from when the patient arrived in the hospital to the time when the patient exits the hospital. It was measured by calculating TAT at every step involved in outpatient process.

Observational time and motion study of existing process: Each patient was tracked step by step and time was noted for each step and process map was designed. A format was developed, and data was entered on daily basis in Microsoft Excel.

3.5.Sample size – 100 patients

3.6.Sampling method – purposive sampling

3.7.Inclusion criteria – all the walk-in patients coming in Family Medicine, Internal Medicine and Pulmonology clinics.

3.8.Exclusion criteria – all the pre appointment patients coming in Family Medicine, Internal Medicine and Pulmonology clinics.

3.9.Approach – Six Sigma DMAIC methodology has been used.

Six Sigma is a data driven quality strategy for continually improving processes. It is used to reduce process variability and drives out waste within the business processes using statistical tools and techniques. It has proven to be a customer-focused, data driven and robust methodology with a goal of reducing the number of mistakes/defects – to as low as 3.4 occasions per million opportunities. These benefits of Six Sigma are achieved through the utilisation of a systematic approach, the define, measure, analyse, improve, and control process (DMAIC). LSS principle focuses on adding value to customers, reducing defectives and wastes, streamlining value flow, and improving on time delivery. Thus, combined efforts of LSS methodology are gaining significance both in manufacturing and in-service organisation.

3.9.1. **The define phase:** The first phase starts with an objective to identify the goal of the project by forming a case study, identifying the scope of the project and the areas of the process to be improved. Process improvement goals may be aimed at increase output of hospital bringing about the employee and patient satisfaction. The defined goals should in align with patient demand and strategic goals of organization.

3.9.1.1. Process Flow

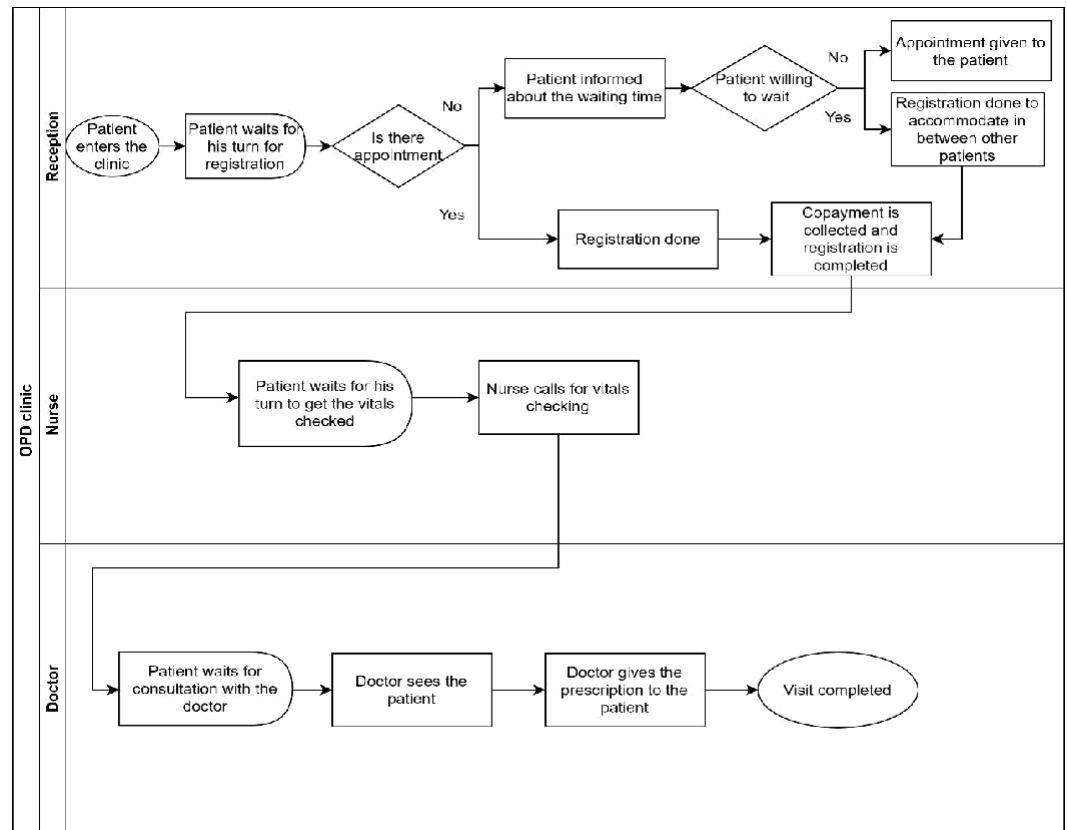


Figure1: The OPD process flow

3.9.1.2. Problem Statement

Longer patient wait time at the Family Medicine, Internal Medicine and Pulmonology clinics due to delay in outpatient procedures such as registration, nursing assessment and consultation.

3.9.1.3. SIPOC

SIPOC is a management tool that divides any given process into five segments: Supplier, Input, Process, Output, and Customer. It is basically a visual tool for documenting a business process from beginning to end. Each of the segments is clearly defined. It shows the vital relationship of one segment to another and how they affect each other's performance.

SUPPLIER	INPUT	PROCESS	OUTPUT	CUSTOMER
Registration front desk executive	Registration	Manage appointment and registrations	Generate unique registration number and other details required i.e. MR no, claim forms	Patients
Nursing station	Vitals checking and Pre-assessment	Takes the vital signs and Inform doctor	Call for consultation	Patients
Consultation	Assessment	Prescribe medicine in system	Pharmacy service	Patients

Table 1: SIPOC

3.9.1.4. Project Charter

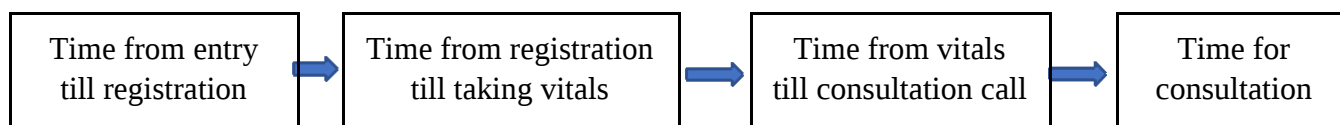
A project charter is a document stating the purpose of the project. It acts as a platform that helps the team to stay in line with the goal of the project to be carried out. It includes project title, background and aim of the project, expected benefit, schedules, etc.

<i>Project Title:</i> A DMAIC approach to streamline the process and reduce the waiting time of outpatient department at Burjeel Hospital, Abu Dhabi		
<i>Background and reason for selecting the project:</i> With the increasing demand of healthcare services, the patients waiting in a queue is significant problem faced by our healthcare system. Obstruction in the flow of patients can actually amplify waiting, thus having an impact on healthcare outcomes. This situation gives slow service and decreases productivity in the organisation, thus affecting quality of service to the patients.		
<i>Aim of the project:</i> To understand the process flow of the Family Medicine, Internal Medicine and Pulmonology clinics in the outpatient department. To analyse the waiting time and gap at each step of the process flow. To provide recommendations for reducing the same		
Characteristics of product/process output and its measure		
CTQ	Measure and Specification	Defect Definition
Waiting time	Time in minutes and within 60 minutes	Any waiting time more than 60 minutes is considered as a defect
Expected customer benefits:	Reduced waiting time for patients at the outpatient department.	
Schedule	Define: 1 week Measure: 2 weeks Analyse: 3 weeks Improve: could not complete Control: could not complete	

Figure 2: Project charter

3.9.2. The measure phase: The measure phase involves evaluation of the baseline performance of the system prior to any changes that the team might suggest. This phase includes data collection, determining the actual process flow of the system and performance, measuring and validation of influential factors. The key measurable is the patient wait time for consultation at this OPD. The waiting time data at the OPD has been collected for a period of two weeks from 9:00 am to 6:00 pm during Saturday to Thursday. Each patient was tracked step by step and time was noted for each step. Timing for each step was classified as: 0-5 minutes, 6-11 minutes, 12-17 minutes and 18 minutes & above. Total time was classified as: 0-15 minutes, 16-30 minutes, 31-45 minutes, 46-60 minutes and 61 minutes & above. The average time taken to complete the entire process was

considered as 60 minutes, any deviation from ideal time was considered as delay. Time for the following steps was recorded:



Ideal time distribution at each step is:

Steps	Time limit (minutes)
Time from entry till registration	10
Time from registration till taking vitals	15
Time from vitals till consultation call	15
Time for consultation	20
Total	60

Table 2: Time limit for each step

3.9.2.1. Control charts

A control chart or Shewhart chart was introduced by Walter A Shewhart and is also called as Process Behaviour chart. It is used to monitor, control and improve the process performance over time by studying the variation which can be due to common causes or special causes. It has one central line or mean line (average), one Upper Control Limit (UCL) and one Lower Control Limit (LCL). The upper control limit and lower control limit are three standard deviation distances from the centre line on both sides. It helps in verifying whether the process is stable enough to improve and make necessary improvements in the process wherever required. Control charts are prepared based on data collected i.e before improvement phase.

Steps	Mean	Standard deviation	Upper control limit (UCL=mean+3* $\sqrt{\text{mean}}$)	Lower control limit (LCL=mean-3* $\sqrt{\text{mean}}$)
Entry to registration	8.03	4.43	16.79	-0.73
Registration to vitals	14.70	6.27	26.46	2.94
Vitals to consultation call	13.80	4.67	24.93	2.67
Consultation finished	20.65	4.64	34.27	7.03
Total time	57.18	11.88	80.07	34.29

Table 3: Mean, Standard deviation ,UCL and LCL for each step

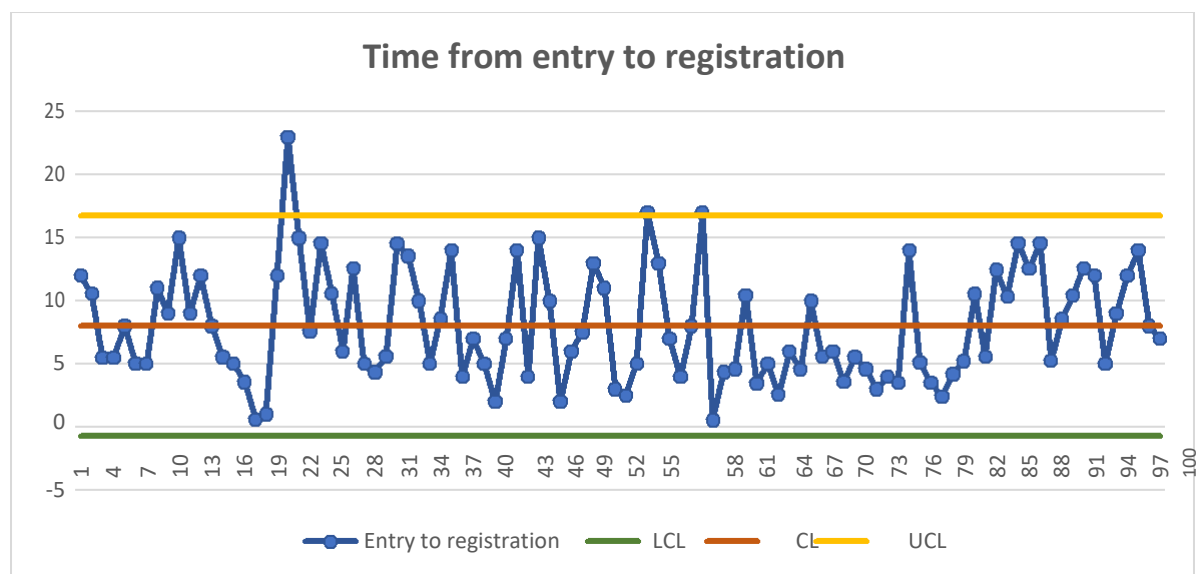


Figure 3: Control chart for time from entry to registration

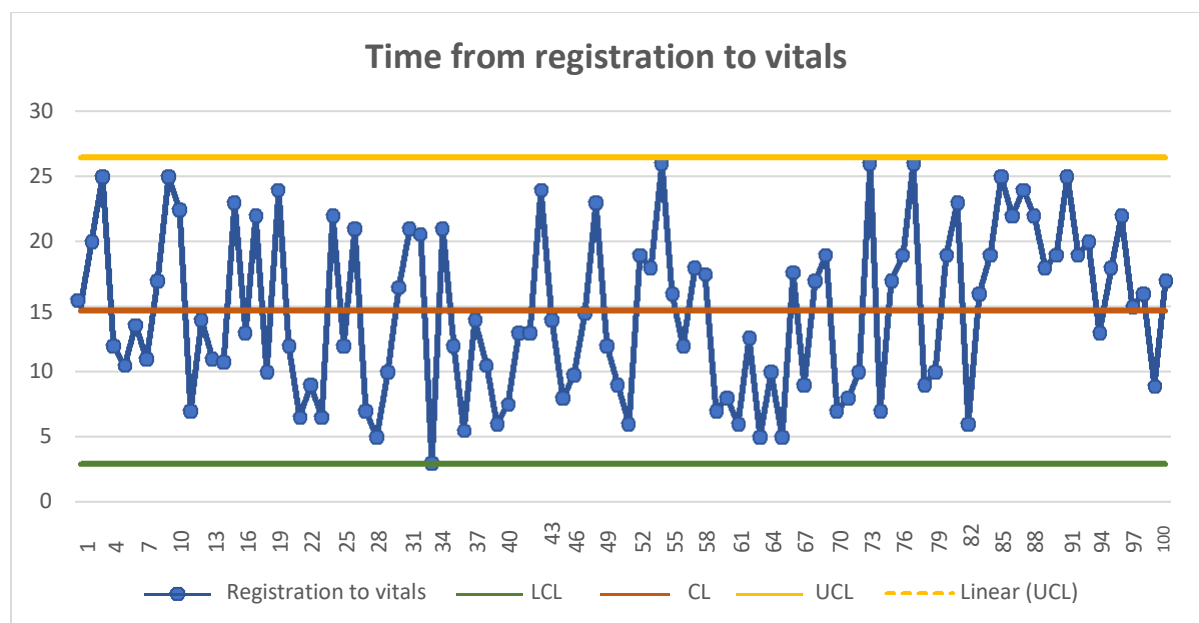


Figure 4: Control chart for time from registration to vitals

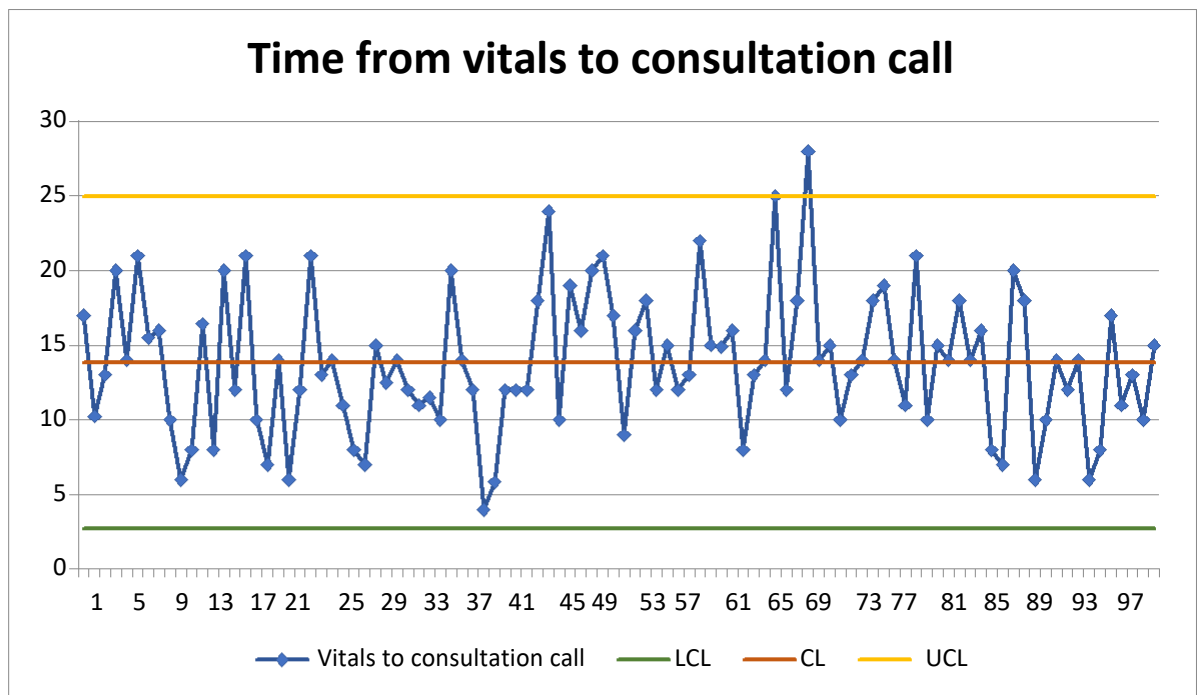


Figure 5: Control chart for time from vitals to consultation call

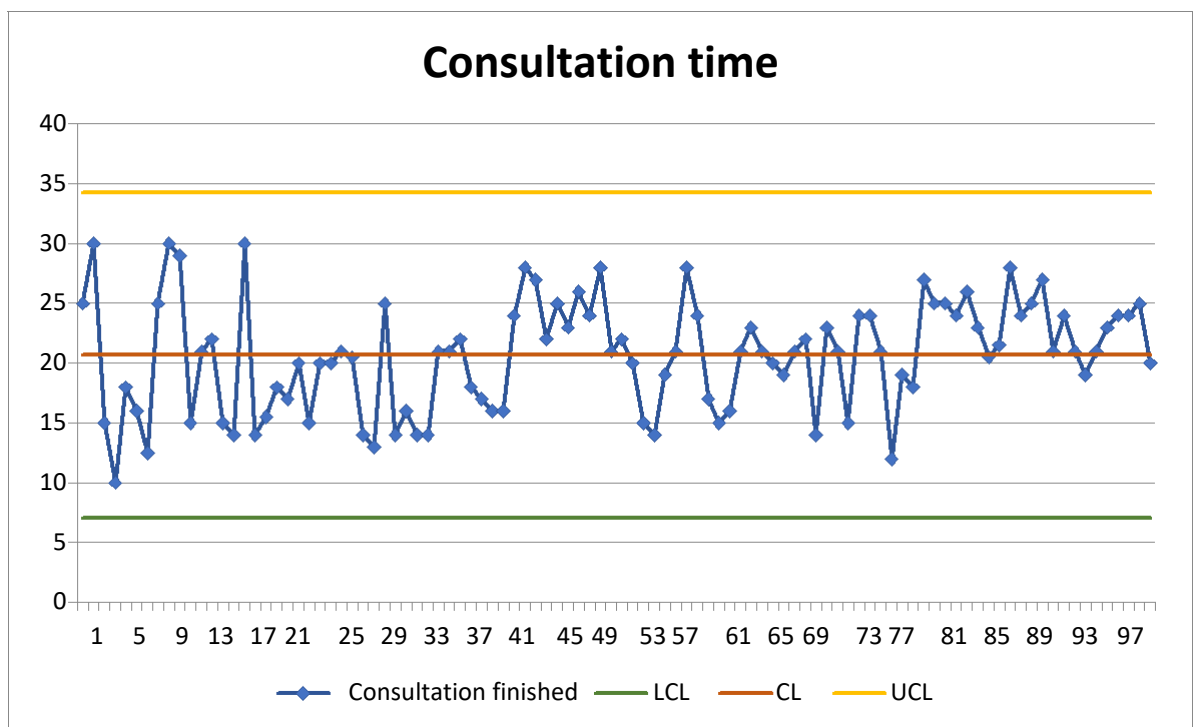


Figure 6: Control chart for consultation time

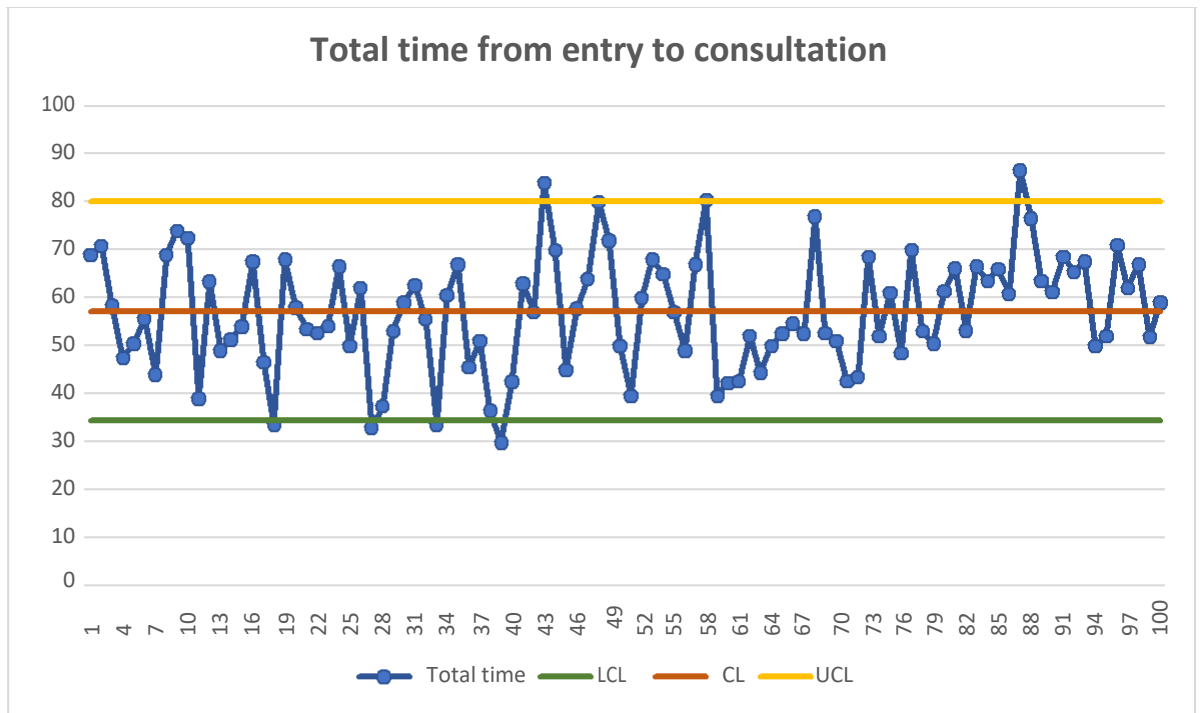


Figure 7: Control chart for total time from entry to consultation

It was observed that some values in a few steps crossed the UCL and LCL and also the turnaround time set by the management. The process requires improvement for increasing patient satisfaction.

3.9.2.2. Graphical representation

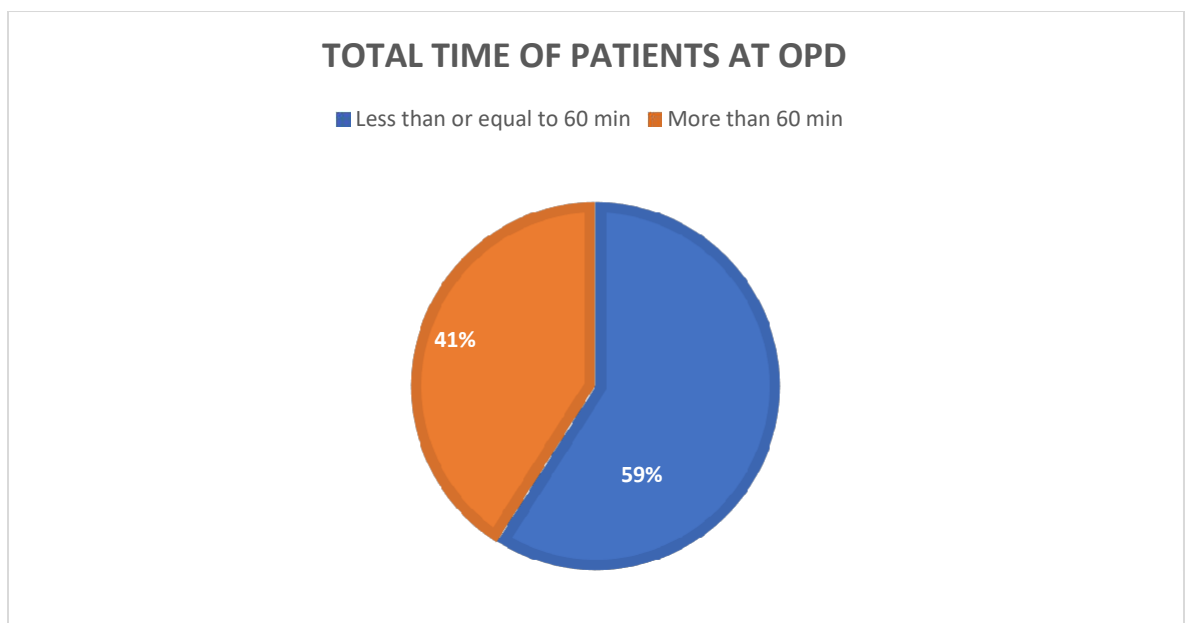


Figure 8: Percentage distribution of total time taken by the patients at the OPD

When total time taken by the patients at the OPD was analysed, it was found that 41% of the patients took more time than ideal, while 59% of the patients finished the consultation within the ideal time.

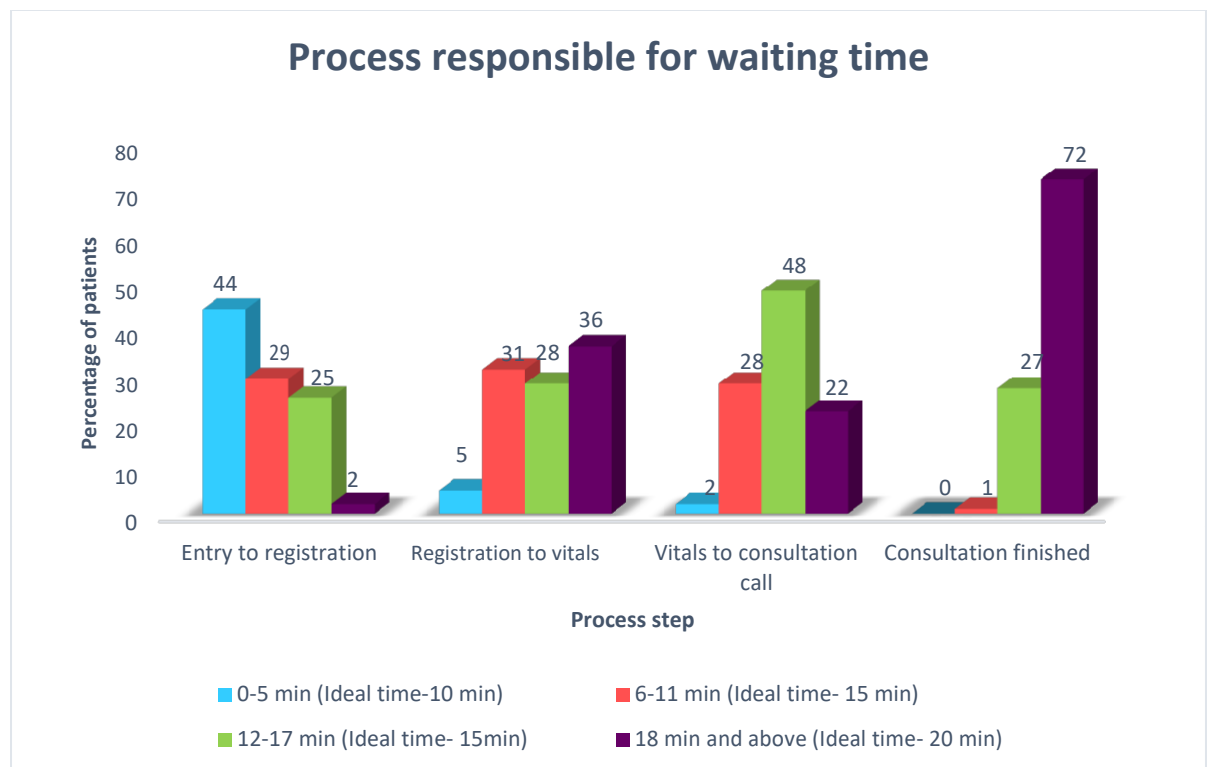


Figure 9: Time taken at different steps of OPD visit

The ideal time waiting time from entry till registration was 10 minutes. On analysis, it was found that 44% of patients took 0-5 minutes, 29% of patients took 6-11 minutes, 25% of patients took 12-17 minutes and 2% of patients took 18 minutes and above.

The ideal waiting time from registration to vitals checking was 15 minutes. On analysis, it was found that 5% of patients took 0-5 minutes, 31% of patients took 6-11 minutes, 28% of patients took 12-17 minutes and 36% of patients took 18 minutes and above.

The ideal waiting time from vitals checking to getting a consultation call was 15 minutes. On analysis, it was found that 2% of patients took 0-5 minutes, 28% of patients took 6-11 minutes, 48% of patients took 12-17 minutes and 22% of patients took 18 minutes and above.

The ideal time for the consultation was 20 minutes. On analysis, it was found that 1% of patients took 6-11 minutes, 27% of patients took 12-17 minutes and 72% of patients took 18 minutes and above.

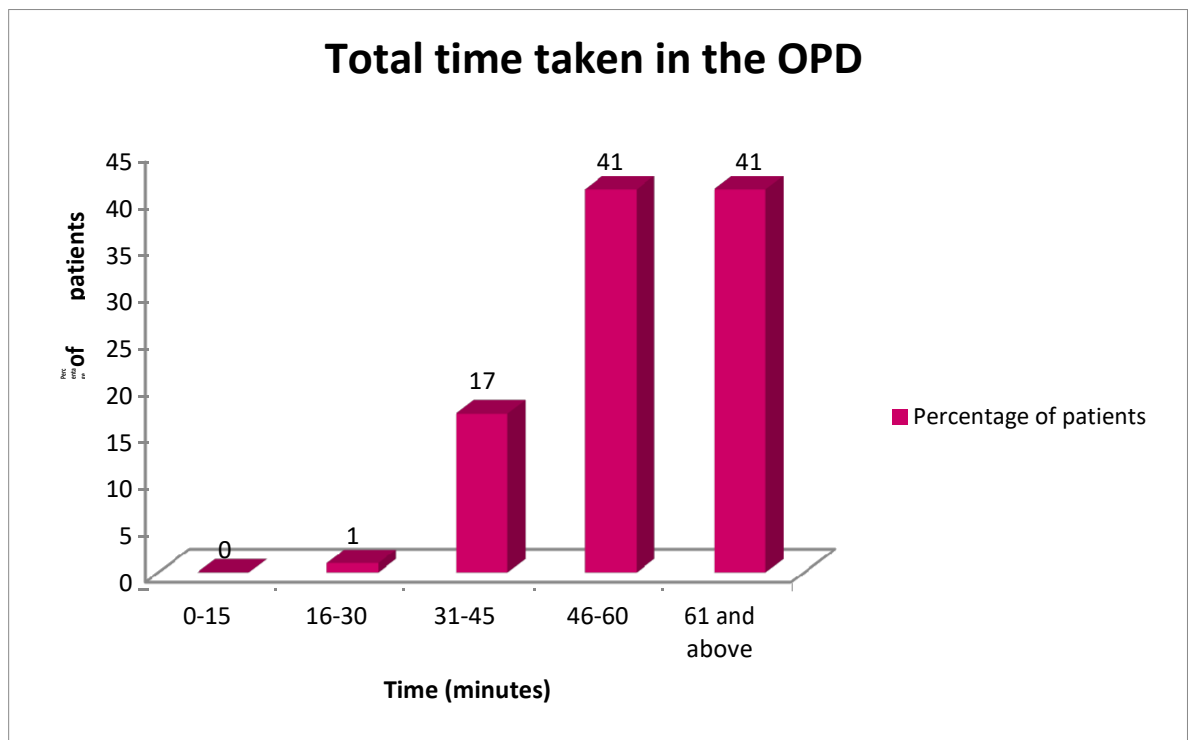


Figure 10: Total time taken in the OPD

The overall ideal time set by the management was 60 minutes in the OPD. On analysis, it was observed that only 1% of patients completed the OPD visit within 16-30 minutes, 17% of patients visited the visit within 31-45 minutes, 41% of patients completed the visit within 46-60 minutes and 41% of patients completed the visit in 61 minutes or above.

3.9.2.3. Results and Findings

- It can be seen that maximum (36%) of people experience delay in the second step of the process, that is, after registration to checking of vitals.
- The second highest (27%) of people experience delay in the first step only, that is, from entry till the completion of registration.
- Hence, the main steps where the possible delay can be eliminated are the first and second steps of the OPD consultation process.
- 41% of patients had a total time in the OPD of 61 minutes or above, which is more than the time set by the management.

3.9.3. The analyse phase: The main objective of this phase is to find the root cause of inefficiency. It identifies the gaps between actual performance and target performance, determines the causes and opportunities for its improvement. This phase starts with exploring all possible causes to the main problem. Then these causes are verified and validated through hypothesis and

statistical tools. The outcome of this phase is verified root causes- which need to be acted upon to improve the process.

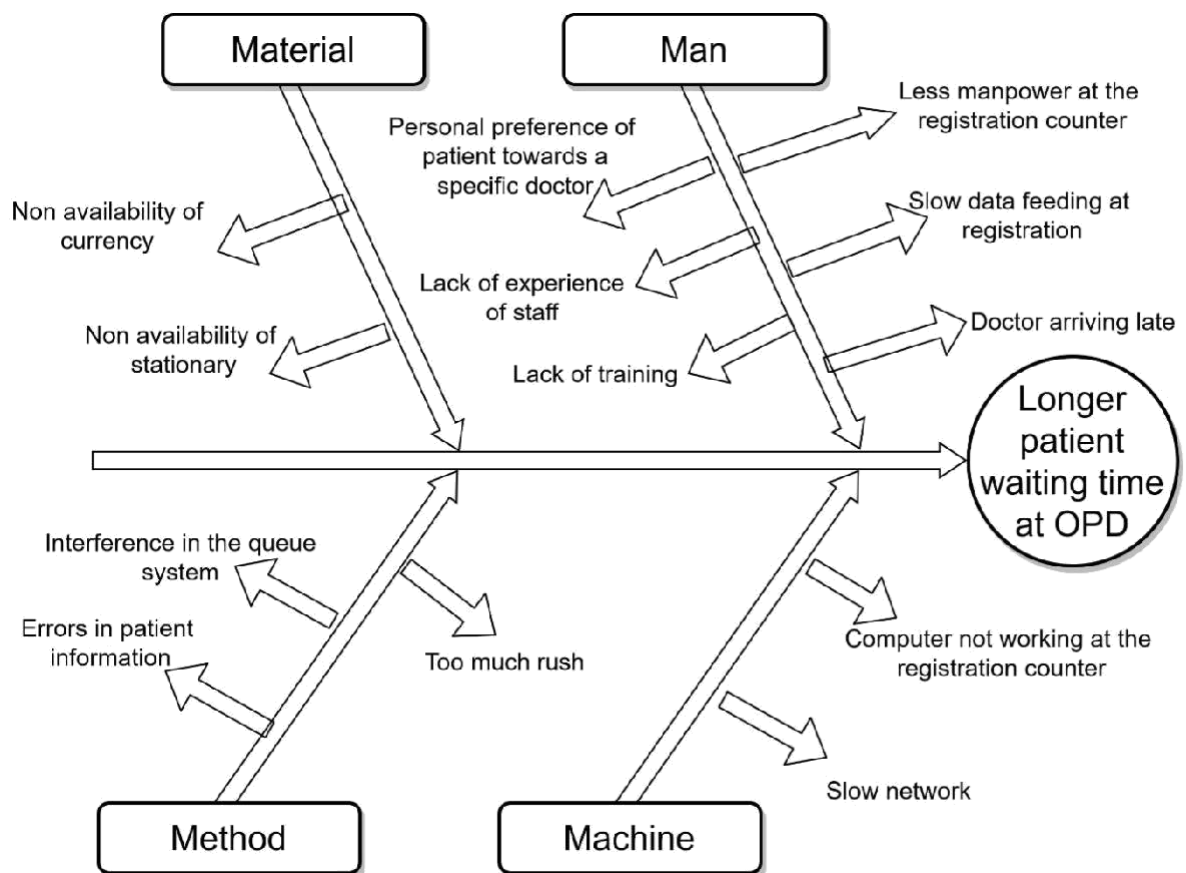


Figure 11: Fishbone diagram showing the causes of longer patient waiting time at OPD

4. RECOMMENDATIONS: -

General recommendations:

- ☐ Introduction of token system using a kiosk machine to manage the queue of patients at the reception waiting for registration, since there is a single reception for all the three clinics.
- ☐ Integration of entire details of kiosk with every computer system on the reception to like number of walk-in and appointment patients, display of waiting time of each patient.
- ☐ Staff should be present at the kiosk machine to guide the patients regarding use of the same and avoid confusion and inconvenience.
- ☐ Patient should be informed about rescheduling of appointments if he/she gets late for appointment or shall be entertained at last.
- ☐ Token number should be displayed at respective front desk counter so to increase convenience for patients. Token display board should be in direct visibility to patient seating in waiting area.

- ☐ Television should be made available at reception area to pass long waiting hours. It should display procedure to use machines available in hospital, general health awareness and current advances in healthcare.
- ☐ Regular training of communication behaviour should be conducted for front desk and call centre executives to increase patient satisfaction and experience.
- ☐ Detail information should be recorded by front desk executive such as emergency number, alternate contact number, relationship to patients etc, so as to enquire for final confirmation of appointment one day prior. Wrong number or missed alternate number leads to clash of appointments.
- ☐ Hardware problems such as hang of system, slow process should be addressed as early as possible, as it was another important factor for increasing waiting time.

Front desk:

- ☐ Reshuffling of staff according to peak hours would help in managing crowd.
- ☐ Availability of a separate staff at the reception to handle the billing and payments. This shall reduce the burden on the guest service executives and allow them to focus on registration.

Consultation:

- ☐ Doctors should be encouraged to follow the consultation times fixed in the HIS as strictly as possible to avoid lining up of patients.
- ☐ Any non-availability of physician should be informed to patient immediately and re-scheduling of appointment should be done to avoid chaos.
- ☐ If the consultant is busy in OT or Emergency, then another doctor with same qualification should be appointed for consultation or the patients should be informed priorly about the absence of the doctor.
- ☐ Visiting time of the doctors in the inpatient wards should be fixed and the doctors' schedule for appointments should be blocked for that time.
- ☐ Doctors should be provided with a medical transcriptionist to aid them in entering of physicians' notes and prescriptions in the HIS.
- ☐ Tele-consultation time slots of the doctors should be blocked for physical consultations to avoid clashes between the two types of patients and resulting chaos.

5. **CONCLUSION:** - With the above analysis it can be concluded that following the above recommendations with regular follow up of the Key Performance Indicators and audit will help in reducing waiting time of patients and will improve patient satisfaction and experience.

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