Addis Ababa University
College of Health Sciences
School of Public Health

Pre-Post Intervention Study on Reducing outpatient department waiting time to consultation at Mettu Karl referral hospital, Ilubabor administrative zone, Oromia region, western, Ethiopia, 2019

By

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Declaration

1. This capstone is my original work, and all those sources of material are used for the thesis has been duly acknowledged.

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Acronyms/Abbreviations

AAU Addis Ababa University

ART Anti-Retroviral Treatment

BPR Business Process Re-engineering

CEO Chief Executive Officer

E.C Ethiopian Calendar

EHRIG Ethiopian Hospital Reform Implementation Guideline

EHSTG Ethiopian Hospital Transformation Guideline

FGD Focus Group Discussion

FMOH Federal Ministry of Health

G.C Gregorian calendar

HPMI Hospital Performance Monitoring and Improvement Manual

HSMT Hospital Senior Management Team

ICU Intensive Care Unit

IPD Inpatient Department

KMs Kilo Meters

MCH Maternal and Child health

NICU Neonatal Intensive Care Unit

OPD Outpatient Department

ORHB Oromia Regional Health Bureau

OR Operation Room

RP Registration Process

SPSS Statistical Package for Social Science

TB Tuberculosis

Abstract

Background: In Mettu Karl Referral Hospital, long waiting time of registration until to consultation with physician is one of the most problems. Because Patient spend substantial amount of time to get service delivered by health professional in outpatient department of the Hospital.

Objective: The overall objective of the project is to reduce outpatient long waiting time from 128 minutes to 85 minutes and increase customer satisfaction from 5.8 scales to 7.0 by the end of June 2019.

Method: A pre-post interventional study was conducted at Mettu Karl Referral Hospital, from March to June 2019 G.C with sample size of 400 OPD patients both at pre and post intervention period and data was collected by using hospital performance monitoring and improvement manual (HPMI) checklist and all steps of strategic problem solving methods from Ethiopia Hospital Reform Implementation Guide (EHRIG) standard was used and the real root causes of outpatient long waiting time to consultation and low patient satisfaction in OPD identified were, long registration process and late starting clinic on time. Accordingly, re-arranging the registration process to reduce long process and awareness creation and discussion with physician was undertaken as an intervention, and data was entered and analyzed by using Statistical Package for Social Science Version 21 software. Descriptive analysis was used and results were presented in narration, graph and table.

Result: Patient waiting time and customer satisfaction improved based on pre and post intervention comparisons. Patient waiting time was 128 minutes before intervention and decreased to 83.5 minutes and the success rate of patients' satisfaction increased from 58 % to 71% respectively after intervention.

Conclusion and Recommendation: Committed management of arranging registration process until get physician and satisfaction of participants were the process could be effective to improve unnecessary waiting time in the hospital and continuous provision of follow up resulted in significant progress. Proper implementation and strong follow-up should be strengthened and the significant support from hospital leadership should be provided.

Key words: Waiting time, Outpatient department, Patient satisfaction, Consultation, Mettu Karl Referral Hospital

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CHAPTER ONE: INTRODUCRION

1.1 Organizational Description

Mettu Karl referral Hospital is found in Oromia Regional state, located in Ilu Ababor Zone 600 kms away from the capital city Addis Ababa & located at south west direction from the main road that stretched from Addis to Gambella. It is established in 1956 E.C by American Mission. Now the Hospital is serving for people coming from different catchment area that are Oromia, Gambella & South Nations and nationalities total of catchment above 2 million people. The hospital was staffed by 38 physicians 156 different Health Professionals and 141 administrative & supportive staffs. Currently the hospital has 222 beds. The average length of stay in the hospital was 5.6 days (From Annual report of the Hospital June 2011 E.C).

Major services provided by Mettu Karl Referral Hospital were:-

- ✓ OPD
- ✓ Emergency OPD
- ✓ IPD
- ✓ ART
- ✓ TB/MDR TB
- ✓ MCH,
- ✓ OR
- ✓ Dental service
- ✓ Laboratory, x-ray and pharmacy service
- ✓ Mental health
- ✓ Adult ICU and
- ✓ NICU

1.2 Background of the Study

Outpatient departments are considered as the back bone to hospital services and patient's impression of the hospital begins at this department. This impression often influences the Patient's Sensitivity to the hospital and therefore it is essential to ensure that outpatient department services provide an excellent satisfaction for customers (1).

Most of the time, it is observed that patients at the hospital OPDs have to wait for a long time before they consult with professional healthcare workers. Long waiting time in hospitals causes dissatisfaction among patients and negatively affects the hospitals ability to attract new patients (2,3).

Waiting time is the length of time from when the patient arrival to the hospital to the time when the patient contacting the doctor at outpatient clinic. It is the time a patient waits in the outpatient department before being seen by one of the health care providers of Hospital's staff (4,5).

A patient experience in waiting time influence their perceptions on quality of the service provided. Patient waiting time for healthcare services is also identified by the World Health Organization (WHO) as one of the key measurements of a responsive health system (6). Patient satisfaction is directly correlated with waiting times to see a doctor. According to study conducted in Nigeria, Ado-Ekiti State University Teaching Hospital revealed that, Prolong waiting time can cause poor utilization of health facility because it causes discontent among patients and because of prolonged waiting times; a substantial number of patients will leave outpatient departments (2).

In another study the reasons of long waiting time in OPD revealed that Registration time, payment process/cash billing/, recording classification/triaged time/, few human resources and work process are the determinants of patient waiting time in the general outpatient departments (1).

Waiting times for elective care have been considered a serious problem in many health care systems since it acts as barriers to efficient patient flows. The degree to which health consumers are satisfied with the care received is strongly related to the quality of the waiting experience (5,7).

In Mettu Karl referral Hospital, patients spend substantial amount of time in the OPD clinics waiting for services to be delivered by physicians and other allied health professionals. Therefore, this study aimed to identify the real causes that contributed for long waiting time of patients and was focused on reducing of outpatient department long

waiting time to Consultation and raising patient satisfaction at Mettu Karl referral Hospital.

1.3 Statement of the Problem

There was long Outpatient waiting time to consultation with Doctor at Mettu Karl Referral Hospital.

Patient waiting time is the total time from patient arrival at card room waiting area until consultation with a doctor at OPD clinic.

Out Patient department services are the most important service provided by the hospital as it provides services to a large number of patients. In any hospital the outpatient departments being the first point of contact between the patient and the hospital also the mirror of the hospital, which reflects overall functioning of the hospital. Hence, in our hospital Patients spend substantial amount of time in the clinics waiting for services to be delivered by physician and other allied health professionals.

The Institute of Medicine (IOM) recommends that, at least 90% of patients should be seen within 30 minutes of their scheduled appointment (8) . This is however, not the case in Mettu Karl referral hospital. In this hospital there was long waiting period for patient to consult with Doctors. So, to measure the magnitude of the problem baseline assessments were collected and outpatient long waiting time showed 128 minutes which is long against the standard in which patient waiting time to consultation with doctor is expected to be 22 minutes.

Yet there is no study conducted on the issues of reducing long waiting period in OPD and increasing customer satisfaction by identifying its root causes before in this study area. Therefore, this project was coming to solve the above problems.

1.4 Anticipated Outcome

This study provides evidence-based information to reduce outpatient waiting time and helpful to fill gaps which ultimately contribute to desirable quality of outpatient services in the hospital, thus improving its service delivery in terms of waiting time. In addition, enhancing the level of patients' satisfaction through updating service delivery, identifying sources of patient satisfaction, an organization can address system weakness; and reducing long waiting time and improving outpatient satisfaction from baseline of 128 minutes to 85 minutes and 5.8 scales to 7.0 respectively by the end of June 2019

1.5 Significance of the Study

The finding of this capstone project is significant for health care by reducing waiting time in outpatient department and increase patient satisfaction.

So, satisfied patients are more likely to follow specific medical regimens and treatment plans. It also maintains a consistent relationship of the patients with a specific health care provider. By introducing Simple, inexpensive and a well-planned system of intervention, it can improve the operation of the Hospital and can facilitate better patient need, by improving the accessibility and decreasing long waiting time, it also brings client satisfaction. Balanced waiting time in OPD could satisfy patients and they are less likely to be exposed to unnecessary expenses in private for-profit clinics and will have better course and outcome.

CHAPTER TWO: OBJECTIVES

2.1 General Objective

To reduce outpatient long waiting time to consultation and increase patient satisfaction in Mettu Karl Referral Hospital by the end of June, 2019 G.C.

2.2 Specific Objectives

- To reduce outpatient waiting time to consultation from 128 minutes to 85 minutes by the end of June 2019 G.C
- To increase patient satisfaction in outpatient department from 5.8 scale to 7.0 by the end of June 2019 G.C

CHAPTER THREE: ROOT CAUSE ANALYSIS

A root cause analysis will help to identify the factors that cause the problem. Different techniques applied to identify the root causes of prolong patient waiting time in outpatient department and low outpatient department patient satisfaction. As the result, many possible causes were identified as contributors to the existence of long waiting time to consultation and ineffective process and flow chart tool was carried out to see the process of patient flows.

Open focus group discussion was held with CEO, Medical director, OPD-director, Matron, OPD case team coordinator, OPD Staffs (physicians, nurses, cleaners, card room workers and runners), Cleaners head, and Quality management officers, Initial staff interview and observation of all the process starting from triage to consultation with doctors to find out the possible root cause of prolonged waiting time of OPD to consultation. Totally, about 20 hospital staffs were having been held in preliminary assessment (pre-intervention) period of this project.

3.1 Possible Root Causes Conducted

- Initial staff Interviews & Focus Group Discussion (FDG) for the following possible root causes

1. No coordinator person to manage the process.
2. Long process for registration
3. Late starting clinic on time
4. Poor staff commitment.
5. Shortage of manpower like cashier, runner and registrar,
6. Long distance between card room and OPD clinic
7. Shortage of computer
8. No computerized system at the time due to electricity interruption

3.2 Fishbone Diagram:

A fishbone diagram was developed based on the verbal information, staff interview and observation obtained from involved bodies to identify multiple possible root causes of a single problem. The problem statement is written at the “head” of the fish. The root causes were grouped in to four under the categories of people, process, environment and supply as follows:

People -What are staff behaviors or characteristics contributing to long waiting time to consultation in the Outpatient Department of Mettu Karl referral hospital?

Process/policy - What procedures or policy contribute to long waiting time to consultation in the Outpatient Department of Mettu Karl referral hospital?

Equipment/supplies– Is there shortage equipment including supplies, which contribute to OPD long waiting time?

Environment- Does the immediate environment (building or compound) or the broader environment (the community, nation) contribute to long waiting time?

The root causes for long waiting time in outpatient department was investigated using fishbone diagram. The fishbone diagram uses four different angles the details of which will be accounted below.

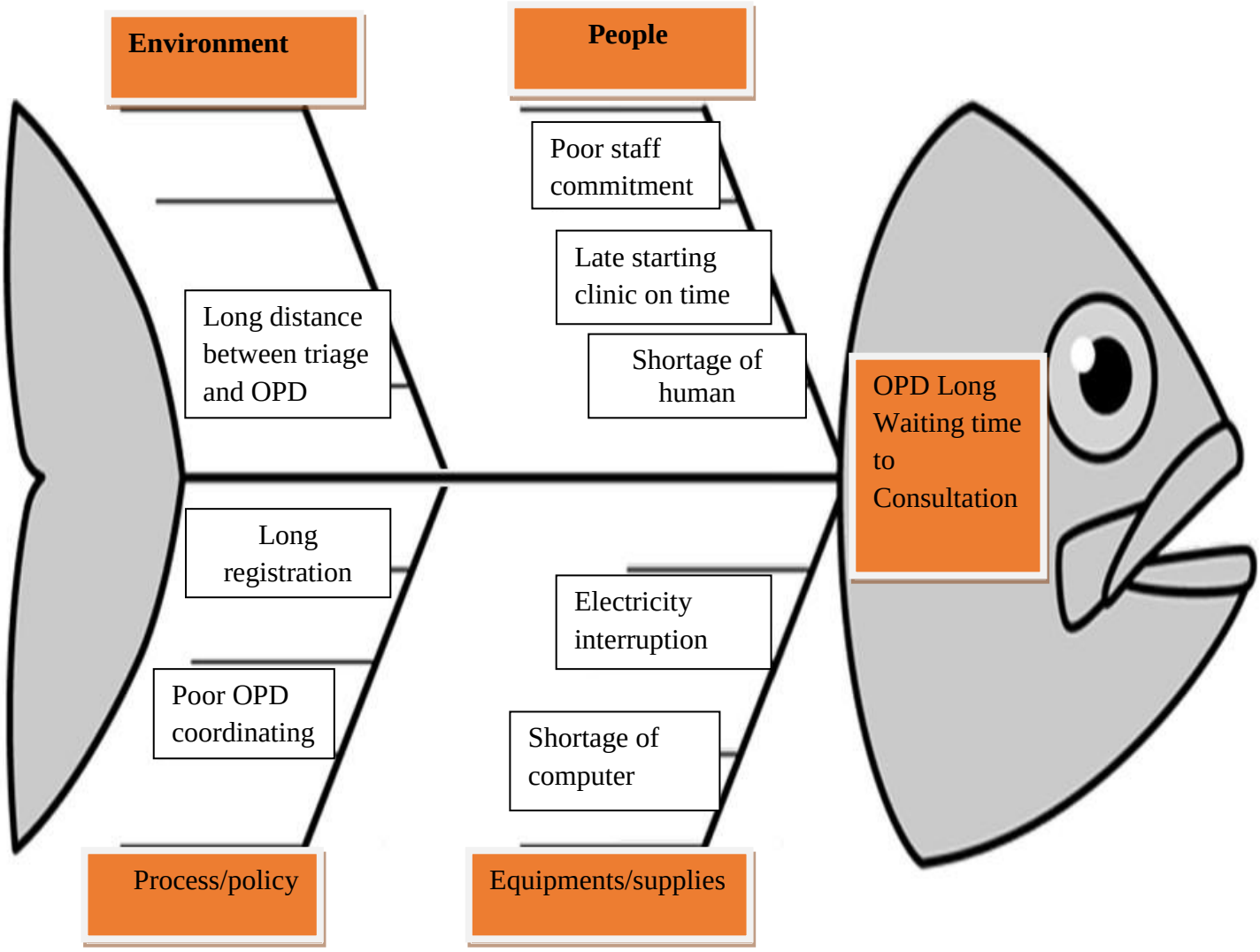

Figure 1: Fish Bone Diagram (problem: Long waiting time to consultation with doctor in Mettu Karl Referral hospital)

3.2 Identified Real Root Causes For The Problem of Outpatient Waiting Time.

- Long registration process
- Lack of supportive OPD coordinator
- Late starting clinic on time
- Poor commitment of staffs

Even though there were four real root causes, it is difficult to address all of them at the same time. So, by discussing with SMT of the hospital by considering feasibility, cost, impact and time the most feasible real root causes addressed.

3.3 Prioritization of Real Root Causes of Outpatient waiting time

Based on thematic problem in the baseline findings of the project FGD, observation and interview carried out with total of 20 participants. With 20 staff that selects the priority problems needs immediate action as follows. Long process of registration accounts 38%, late starting clinic on time 30% lack of supportive OPD coordinator 18% Poor staff commitment accounts 14%, (see figure 2).

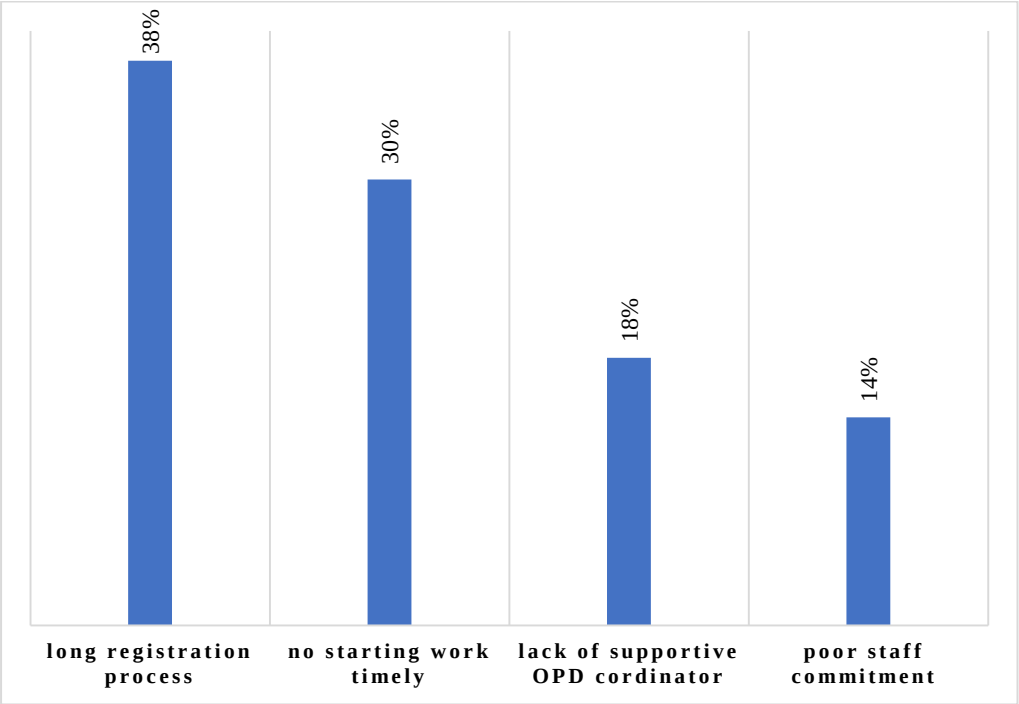

Figure 2: showing the priority of the root causes of the problem (N=20)

Pre intervention - Patient flow from arrival time to consultation with physicians In Mettu Karl referral hospital

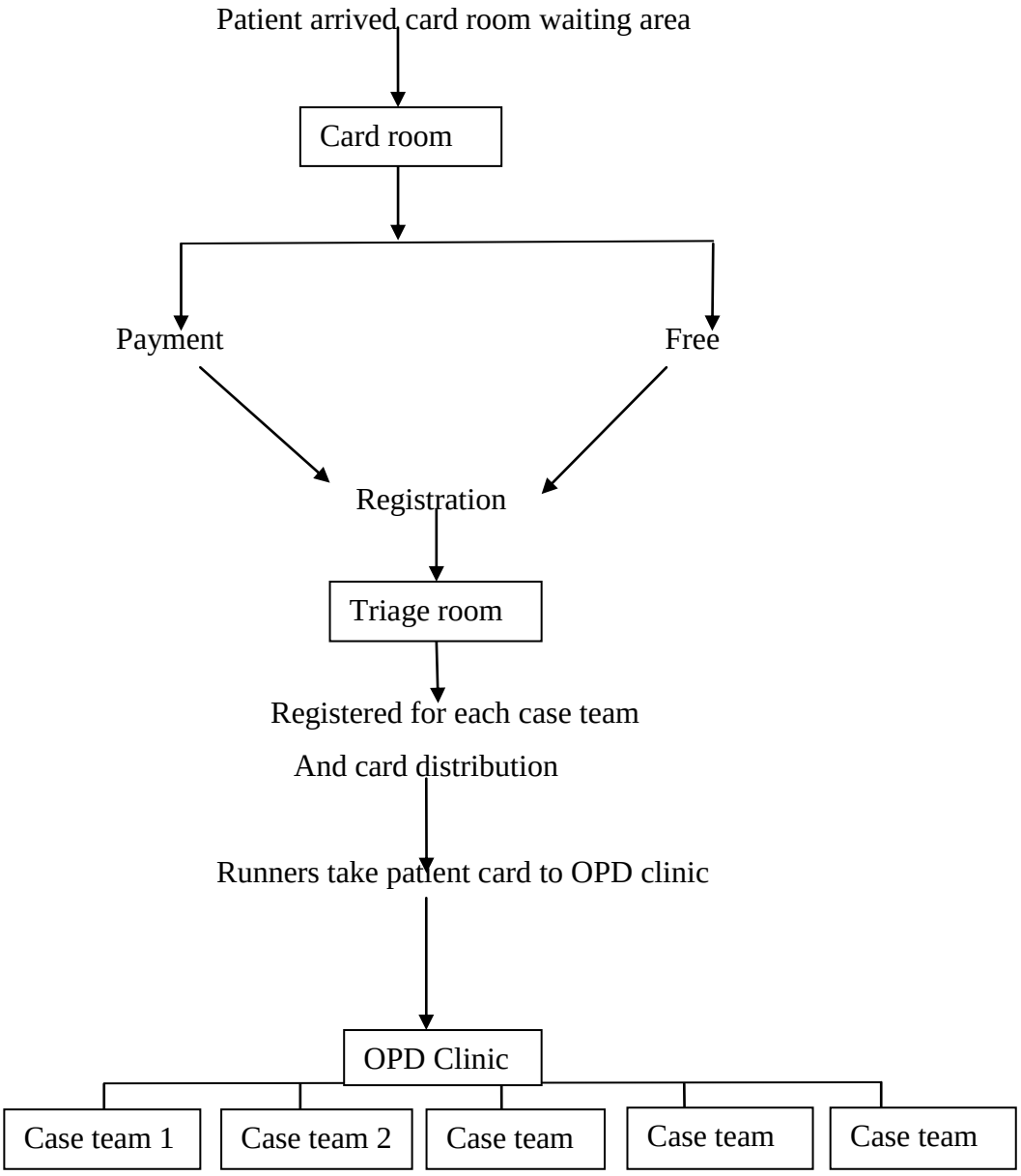

Figure 3: Patient Flow chart in Mettu Karl Referral hospital

CHAPTER FOUR: LITERATURE REVIEW

The duration of waiting time varies from country to country, and even within country it varies from center to center. Long waiting times have been reported in both developed and developing countries.

In the USA, the average patient waiting time in south Carolina was found to 20.3 minutes in outpatient (9) and India, Gujarat medical education research society hospital among outpatient was mean waiting time was 12.16±2.35 minutes (10).

According to study conducted in Bangalore Reducing waiting time and making sure that patients receive the right care at the right time, will have a significant beneficial effect on the quality of care patients receive. Patient waiting time is the amount of time for patients seeking care at healthcare units before being attended for consultation and treatment. In turn, this will improve patient outcomes and reduce the cost of care and it revealed that, patient waiting time was to be the average time a patient spends in the OPD was 40 minutes (8).

According to study conducted in Vietnam among outpatients of central surgical service in 2017 showed that, the average waiting time from registration to preliminary diagnosis in 2014 was 50.41 minute, and in 2015 was 42.05 minutes (11). However, the Institute of Medicine (IOM) recommends that, at least 90% of patients should be seen within 30 min of their scheduled appointment time (12). This is, however, not the case in most developing countries, as several studies have shown that patients spend 2-4 h in the outpatient departments before seeing the doctor (13).

In Ethiopia as various studies have shown, most hospitals have long OPD waiting time. For example, the measured waiting time in Felege Hiwot referral hospital mean waiting time was and its standard deviation 149.2±72.1 minutes whereas 94.2±58.3 minutes in Debere Markos referral hospital (1). Similarly in Yekatit 12 hospital in Addis among patients receiving service in Outpatient department the average waiting time is from 175.22 minutes to 93 minutes(14).

A patient's experience in waiting time will radically influence thier perceptions on quality of the service. Patients are customers, and most businesses try to focus on doing what the y can to keep their customers happy (15).

The problems which affect the efficiency of outpatient department (OPD) in hospital are Patient long waiting time. Long time patient waiting is a barrier to actually obtaining service and a stress and dissatisfaction for the patients.

However, the causes of long waiting times to consultation are many and differ from one country to other and from one hospital to other. According to study done in China, the causes of long waiting time in the Chinese health systems at the registration and admission windows is mainly due to the fact that most Chinese hospitals used not to schedule the appointment which make patients to wait a long time get registered.

The 2015 China National Patient Survey also found that the increasing patient turnover is the other cause of the long waiting time between the appointment time and the time patients are attended by doctors (16).

In Ethiopia, particularly in Debre Markos and Felege Hiwot hospitals in Amhara regional state, North West, unnecessary visits to outpatient department referral system, unnecessary arrivals, lack of resources, procedures and shortage of staffs are also raised as the causes of long waiting time (1). Unpunctuality of doctors when the doctor arrives late is also the other cause for the long waiting times of all patients in the hospitals. And also the determinants for the long waiting time of patients in one hospital may lies on the registration time process, payment process, human resources and overflow of the patients (14)

Different study has also shown that most common factors contributing to the long waiting time is inappropriate registration process and shortage of manpower. The studies done in India and North Nigeria on patient satisfaction showed that the main factors leading to long waiting time are identified at registration time due to a few numbers of staff at the country (9,13).

Longer waiting time in health care causes patient dissatisfaction and many studies also show that patient satisfaction was strongly associated with patient waiting time in different areas of services (3,5,17). A cross sectional study conducted in china, to assess customer satisfaction in public health care showed that, qualified doctors, affordable costs, adequate doctors and reasonable pricing of public health services were important factors to increase the probability of consumer satisfaction with public health care delivery (18)

According to study conducted in primary public health care in KwaZulu-Natal showed that, the degree to which health consumers are satisfied with the care received is strongly related to the quality of the waiting experience. Healthcare organizations that strive to

deliver exceptional services must effectively manage their clinic waiting time (19). The studies done in India and Malaysia on patient satisfaction showed that waiting time had a significant association with patient satisfaction. The main factors leading to long waiting time are identified at registration time and the number of staffs at the country. However, the waiting time for physician consultation demonstrates long delays of more than three hours in some cases.

A survey conducted to assess patients' satisfaction on outpatient services in the hospitals of the Amhara Regional state, Ethiopia shows that long waiting hours during registration and/or to consultation is the main source of dissatisfaction.

On the contrary a study conducted in Jimma university specialized hospital showed that 20% and more are reported that they served with in 15 minutes at the card room which is consistent with a report from London where 47% of the respondent's states that their doctor saw then within 15 minutes. These positive responses by clients in getting least waiting time are encouraged (20).

Therefore, since long waiting time at OPD is the one if common cause of patients' dissatisfaction, all the above studies and strategies focused to reduce long waiting times and resulting increase patient satisfaction. This capstone project well utilizes the above schemes to improve the waiting time by assessing its causes in Mettu Karl Referral Hospital.

CHAPTER FIVE: PROJECT METHODS AND MATERIALS

5.1. Study area and period

The capstone project was conducted from March to June 2019 among outpatient department at Mettu Karl Referral Hospital, Oromia region Western, Ethiopia.

5.2. Study design

A facility-based Pre - post interventional study was conducted to assess the time motion survey of waiting time studies and status of patients' satisfaction during March to Jun 2019.

5.3 Source population

All patients visit the hospital for outpatient services.

5.4 Study Population

The study includes adult patients who came to the hospital for outpatient services; those are present during data collection period.

5.4. Inclusion and exclusion criteria

- **Inclusion criteria**: regular outpatients
- **Exclusion criteria**: follow up patients, admitted patients and specialty clinics

5.5. Sampling size and Sampling technique/ Sampling procedure

Sample size was calculated by using single population proportion formula considering the average waiting time in Amanuel hospital at post intervention was 54.5 minutes (4) proportionally at 95% confidence level, 5% margin of error and 5% non-response rate.

$$\underline{n = (Z\alpha/2)2\ p\ (1\text{-}p)} = \underline{(1.96)^2\ 0.54(1\text{-}\ 0.5)} = 381_{+\ (}381*5\%) = 381 + 19 = 400$$
$$d^2 \qquad\qquad (0.05)^2$$

Where: n = Sample size of the study

P = estimated standard proportion

q = 1-P

Z= Standardized normal variable and its value that corresponds to 95% confidence Interval equals 1.96

d = the desired precision/ allowable error (0.05)

Nr = non response rate (0.05)

Finally, the sample size was 400

Considering different factors like cost and time, it is expensive to collect data from all the Populations. So, a sampling system is applied in this study, in order to investigate the behavior of representativeness to target population. The population of interest is all regular outpatient departments coming to the facility. Therefore, Systematic random sampling technique was used in this study.

5.6. Data Collection Procedure

The data was collected through using different data collection methods such as using structured questionnaire contained socio-demographic characteristics, patient waiting time indicators and different dimensions of OPD waiting time services and observation of outpatient department process was also included for further verification of overall implementation of the OPD process starting from patient arrival the Hospital to until consultation with Doctor.

5.7. Study Variables

- **Dependent variable**
  - Patient waiting time
- **Independent variable**
  - In this study, socio-demographic characteristics (age, sex) and
  - Comfortableness of waiting areas
  - Existence of good dialogue with service providers
  - Availability of physician
  - Adequacy of case team
  - Availability of triage
  - Appropriate card room is the independent variables

5.8 Operational definition

1. **Outpatient waiting time**: the amount of time a patient spends waiting for services from arrival at registration room to consultation with Doctor at hospital outpatient clinic.
2. **Patient satisfaction**: the customer's response to the evaluation of discrepancy between prior expectation and the actual performance of the product is perceived after its consumption.
3. **Arrival time:** the time that the patient reaches of the health facility.
4. **Outpatient department:** is the place where the first contact between the patient and the hospital start and regular outpatients receives diagnosis or treatment except emergency department, and who are not registered as inpatient at Hospital.

5. **Staff:** Hospital employees which includes health professionals and workers who are involved in providing outpatient services.
6. **Consultation:** the time patient begins discussion with Doctor at Outpatient clinic.

5.9. Data Analysis procedures

Data was collected, and then carefully edited, coded, tabulated and organized depending on the type of basic questions and nature of the data before analysis. The independent variables mainly include issues highlighted in the root cause analysis under four perspectives such as people, supplies, policies and environment. Baseline situation assessment was conducted to measure the magnitude of waiting time and to identify factors contributed to its occurrence prior to the intervention by using fishbone diagram and patient flow chart. Then appropriate strategies were implemented as an intervention. A thorough observation and ongoing analysis were conducted for about 3 months. The same data were collected at the post intervention period. Analyses of data from the two studies (pre and post) were performed using SPSS software version 21.

5.10. Data quality management

To realize the validity and reliability of the study data was carefully handled and daily checked for cleanliness, completeness and also consistence supervision by principal investigator was done during data collection. The researcher was used different mechanisms like Provision of training on objectives and process of the data collection for data collectors, Supervision of the data collection process and EHRIG's standardized was used.

5.11. Ethical Considerations

Written consent obtained from school of public health, college of health sciences, Addis Ababa University submitted to the respective organization Mettu Karl Referral Hospital and informed about the purpose of the study and permission granted from SMT to conduct study on OPD long waiting time to consultation and patient satisfaction. Verbal consent received from each client after explaining the objective of the study and Clients informed that refusal to participate the study does not affect their care. Personal identifiers such as Name, and address of patients were not collected to safe guard the confidentiality of the patient.

5.12. Dissemination Plan

The study finding was prepared by three copies and the original copy will be submitted to Addis Ababa University School of public health, the second copy was provided to Mettu Karl Referral Hospital in order to improve the gaps identified by this capstone project and the third copy was kept with the principal investigator.

CHAPTER SIX: INTERVENTION

After problem identification activities have been approved, root causes of the problems were identified and grouped into four different perspectives which include people, policy, environment, and supplies. All root causes were investigated in detail by collecting relevant data and discussing with hospital senior management, case team leaders, OPD coordinators and concerned staff members of the hospital to determine the true root causes. The true root cause was selected for intervention based on the political feasibility, cost effectiveness, time required and impact on productivity from March to June, 2019 G.C to achieve pre planed target.

The real root cause for long waiting time in the outpatient department was long registration process, as identified by the pre-intervention study. These include inappropriate sorting card, screening in triage professionals, payment time, taking card to OPD unit and late starting work.

6.1 Alternative intervention

After main contributing factors for the outpatient long waiting time were clearly identified, with different administrative and health care providers of hospitals/ professionals as total of 20 staffs and Comparative analysis of alternative was carried out to select the best interventions for the root cause of the problem. The following are a list of alternative intervention:

- Rearrange patient flow chain
- Awareness creation and discussion with physician
- Recognizing and encouraging best performers
- Reallocating existing manpower

Table 1: Alternative interventions for root causes at Mettu Karl Hospital, 2019

Root cause	Possible interventions
Long process of registration	Rearrange patient flow chain
	Awareness creation and discussion with physician
	Recognizing and encouraging best performers
	Reallocating existing manpower

6.2 selection of best intervention

Based on the real root cause (long process of registration) of the problem for outpatient waiting time was identified after deep discussion was held with CEO, Medical director, OPD-director, Matron, OPD case team coordinator, OPD Staffs (physicians, nurses, cleaners and runners), Cleaners head, and Quality management officers.

The Selections of best intervention was made using evaluation criteria, such as feasibility, cost, time and impact on the problem and comparison of intervention were done after evaluation of each intervention based on criteria. Each selection criterion was measured from 1 to 5 scales. Activities with the highest scores were considered as interventions to reduce long waiting time and enhance patient satisfaction in the outpatient department of the hospital (see table 2).

Table 2: Comparative analysis of strategic alternatives using the Quantitative alternative Appraisal at Mettu Karl Hospital, 2019

Decision Matrix/ 1-5 scale, each criterion has maximum score of 5, 1 the least possible, 5 stand to a maximum decision and total score is calculating out of 20 point.

Strategic alternatives	Major activities	Evaluation criteria				
		Impact on problem	Political feasibility	Expense	Time	Total
Awareness and discussion with physicians	-Medical director will conduct the sensitization program on the topic of reducing long waiting time for three days on morning meeting program -Hospital chief executive officer meeting them and discuss how we reduce long waiting time and enhance client satisfaction in outpatient department by improving OPD clinic starting time for outpatient department doctors. - Assigning Physician as department coordinator because doctors are the main person to solve patient waiting time occurs in the outpatient case team.	5	3	5	4	17
Recognize best performer	-Regular monitoring and evaluation should be exercised to get hard worker in outpatient department -Recognize active workers and develop hard working behavior in the department. -Giving award for best performer.	4	5	2	2	13

Rearrange the patient flow chain	-Rearrange long process and replace by necessity process. -Understandable and discussion for workers in outpatient department. -Unsatisfactory process must be correct to reduce long waiting time and increase client satisfaction.	5	5	5	4	18
Increase number of staffs(runner)	Reallocate the existing human power of the hospital Increase runners for OPD case team to solve work load in terms of taking patient card to OPD clinic at the time.	4	4	4	3	15

- The results of alternative intervention on table above illustrated that, Rearrange the patient flow chain was best intervention with a total score of 18, next Awareness and discussion with physicians by scoring a total of 17, Increase number of staffs(runner) with a total score of 15 and Recognize best performer by a total score of 13, However, since the impact of Option 1 and 2 on solving the problem were highest compared to Option 3 & 4 therefore, the selected Option 1 and 2 was received as the best intervention for solve the problem.

Chapter Seven: Implementation Accomplishment

7.1 Rearranging patient flow process to reduce long route in outpatient department.

-Discussion carried out with triage health professionals and card room workers how to shorter the work flow process and rearrangement of the procedure

7.2 Awareness and discussion with physicians

- Medical director conducted the sensitization program on the topic of reducing long waiting time for three days on morning meeting program with 9 physicians.
- Hospital chief executive officer and SMT meeting all physician and discuss how we reduce long waiting time and enhance client satisfaction in outpatient department.
- Physician assigned as department coordinator because doctors are the main person to solve patient waiting time occurs in the outpatient case team.
- The OPD coordinators were informed and trained on how to manage all activities processed in outpatient department including physician starting time. The OPD coordinator was replaced by other physician because the department coordinator assigned before pre assessment was busy by additional work in order to strengthen work process implemented in outpatient department to reduce long waiting time.

7.3 Inspiration and awareness created to improve work starting time and enhance good commitment among staffs

Inspiration and discussion for a total of 27 workers in outpatient department for two days on right and responsibility of civil servant by human resource management coordinator and chief executive officer on EHSTG Chapter 4, Hospital Performance Monitoring and Improvement Manual, August 2011 and business process Re-engineering manual 2004 to promote good commitment among staffs and improve work process carry out in outpatient department and patient satisfaction by reducing patient waiting time.

- Effective and sustainable monitoring and supervision in outpatient was established to reduce unnecessary waiting time and increase patient satisfaction. The medical director, department head and case team coordinator were facilitated this activity.

CHAPTER EIGHT: RESULTS

8.1 Socio-demographic characteristics of study samples

About 400 total respondents were participated in OPD, two hundred patients were surveyed during pre-intervention and two hundred patients were at post intervention yielding a response rate 100%. Of them respondents 210 (52.5%) are female while the remaining 190 (47.5%) male respondents. This indicates the sample comprises almost balanced sex ratio which is beneficial to provide dependable data.

Age structures of the respondents were start from 18 and above years. The majority (67%) of the respondents age is between 18-45 which indicates that they are matured enough to provide well contemplated and reliable response concerning the questions provided for them as stated under (see table 3).

Table 3: Socio-demographic characteristics of the respondents in Mettu Karl Hospital, 2019

Socio-demographic variables	Pre assessment		Post intervention	
N=400	N	%	N	%
Sex				
Male	98	49%	92	46%
Female	102	51%	108	54%
Age range				
18-35	56	28%	80	40%
36-45	56	28%	54	27%
46-55	66	33%	40	20%
56-64	18	9%	20	10%
>65	4	2%	6	3%
Maximum/minimum	**87/18**		**78/18**	
Mean ± SD	**41.49 ± 14.53**		**40.96 ± 13.26**	
Total	100	100%	100	100%

Source: Survey, March-June 2019

8.2 Pre and Post Intervention Changes in Outpatient Waiting Time

This study shows that, at pre intervention the Patient arrival time in the facility to start RP was 30 minutes and then at post intervention decreased to 23.5 minutes. Registration number taken time was 5 and 4 minutes at pre and post intervention respectively. The time referral paper collected was 5 minutes at pre intervention and reduced to 3 minutes at post intervention. The time waiting to seen by triage nurse were 15 and 10 minutes at pre intervention and post intervention respectively. The time to Payment or free service taken time was 20 minutes at pre intervention and decreased to 15 minutes at post intervention. The time consumed from card room to OPD clinic by card runner was 13 and 8 minutes and the time of consultation beginning with physician was 30 and 15 minutes at pre and post intervention respectively.

The study revealed, the mean (SD) 128.00 $\pm$ 39.70 minutes of waiting time in outpatient department at pre intervention and at post intervention was mean (SD) of 83.50 $\pm$ 23.17 minutes (see table 4)

Table 4: Reducing outpatient waiting time at Mettu Karl Referral Hospital, 2019

Time motion	Pre intervention	Post intervention
Patient arrival time in the facility to start RP	30	23.5
Registration number taken time	5	4
The time of referral paper taken	5	3
The time of seen by triage nurse	15	10
Payment or free service taken time	20	15
Registration completed time	10	5
Card taken by runner to OPD clinic	13	8
Time of consultation begin with physician	30	15
Total time	128	83.5
Total time mean (SD)	128 $\pm$ 39.70 minutes	83.50 $\pm$ 23.17 minutes

Source: Survey, March-June 2019

8.3 Pre and Post Intervention Changes in Outpatient patient satisfaction

The study revealed that, the satisfaction of patient in outpatient department were assessed during pre-intervention and post intervention. The satisfaction of patient in clearness of reception was 66% and 71% at pre and post intervention respectively. The patients of easy to move from place to place for registration were 60 % at pre intervention and increased to 67 % at post intervention. Patients' comfortableness for payment of outpatient services was 53% at pre intervention and increased to 68% after post intervention.

Generally, according to this study the average patient satisfaction before intervention was 58% and about 71% at post intervention, from detail questionnaire and observation of patient satisfaction at pre and post intervention (see table 5).

Table 5: Status of client satisfaction at Mettu Karl Referral Hospital, 2019

Client satisfaction	Pre intervention	Post intervention
Over all Objectives of patients satisfaction score	5.8	
Percentage of agree and strongly agree for the following item		
The way of reception was clear	66/100----66%	71/100----71%
Triage professionals and card room workers treated me with politeness and respect	76/100----76%	78/100----78%
There was enough waiting area at record room	71/100---71%	77/100----77%
Registration process has no problem	47/100---47%	67/100----67%
The outpatient department was clean	61/100---61%	76/100---76%
Easy to move from place to place for registration	60/100----60%	67/100----67%
I could distinguish doctors and nurses easily	38/100----38%	62/100---62%
Doctors and nurses explained things in a way I could understand.	34/100---34%	58/100----58%
The service delivered from registration until consultations has no impartiality	52/100----52%	78/100----78%
It was clear how to registered	52/100----52%	83/100---83%
The system of payment was clear	45/100---- 45%	56/100----56%
It was cleared to free registration	78/100----78%	90/100----90%
The distance between card room and outpatient clinic was near and easy to move.	57/100----57%	93/100----93%
The waiting time to get physicians is appropriate	78/100----78%	71/100----71%
There is enough outpatient clinic waiting area	68/100----68%	60/100----60%
I recommended to others to use this facility	50/100----62%	53/100----53%
I was comfortable for payment of this outpatient visit	53/100----53%	68/100----68%
Total average	58%	71%

Source: Survey, March-June 2019

8.4 Assessment of physician starting time in OPD before and after intervention

In this study the average physician stating time of OPD clinic before and after intervention was assessed for consecutive of one week's working day. The study revealed that, the average physician starting time at pre intervention was 3: 48h and 3:20 of local time after intervention (see table 6)

Table 6: Assessment of physician staring time before and after intervention in Mettu Karl Referral Hospital, 2019

Observation at OPD unit	Monday		Tuesday		Wednesday		Thursday		Friday		Average	
	Pre assessment	Post intervention	Pre assess ment	Post intervention	Pre assess ment	Post inter ventio on	Pre assess ment	Post inter ventio on	Pre assess ment	Post intervention	Pre assess ment	Post interve ntion
Physician Case team 1	3.35am	3.20 am	3.40 am	3.15 am	3.50 am	3.25 am	3.45 am	3.45 am	3.45 am	3.45 am	3.43 am	3.30 am
Physician Case team 2	3.45 am	3.15 am	3.40 am	3.25 am	3.45 am	3.25 am	3.45 am	3.25 am	3.45 am	3.25 am	3.44 am	3.23 am
Physician Case team 3	3.55 am	3.20 am	3.50 am	3.15 am	3.40 am	3.00 am	4.00 am	3.30 am	3.45 am	3.25 am	3.58 am	3.14 am
Physician Case team 4	3.50 am	3.10 am	3.50 am	3.20 am	4.00 am	3.00 am	3.55 am	3.25 am	3.35 am	3.10 am	3.58 am	3.13 am
Physician Case team 5	3.45 am	3.15 am	3.40 am	3.20 am	3.35 am	3.35 am	3.35 am	3.15 am	3.40 am	3.10 am	3.39 am	3.19 am
Average	3.46 am	3.16 am	3.44 am	3.19 am	3.54 am	3.17 am	3.56 am	3.28 am	3.42 am	3.23 am	3.48 am	3.20 am

Source: Survey, March-June 2019

Post Intervention restructured registration process by reducing repeated chain.

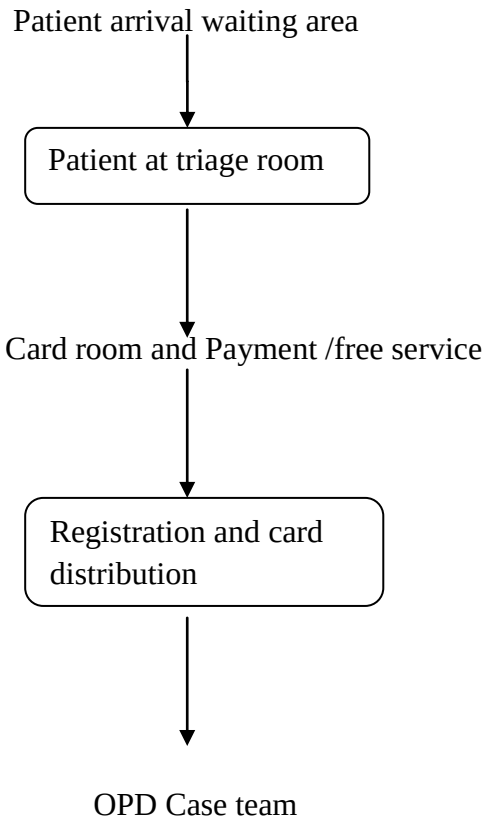

Figure 4: Patient Flow chart at Post Intervention restructured by reducing repeated chain in Mettu Karl Referral Hospital, June 2019.

9. Evaluation

9.1 Indicators

9.1.1 Process indicators:

- ❖ Numbers of Physicians in OPD inspired ---9/10---90%
- ❖ Numbers of staffs aware
- ✓ Card room workers ---10/14------71.4%
- ✓ OPD clinic nurses------8/10-------80%
- ✓ Triage workers----------3/3--------100%
- ✓ Runners----------3/4--------75%
- ✓ Cashier ----------3/4--------75%

9.1.2 Outcome indicators

- Decreased long waiting time 128 minutes to 83.5 minutes
- Increased patient satisfaction 5.8 to 7.1 by scaling 0-10 score
- Physician OPD clinic starting time improved 3.48 hours to 3.20 hours.

9.2 Pre and post intervention result

The implementation status of OPD long waiting time was decreased from 128 minutes to 83.5 minutes in pre & Post-intervention periods respectively. In this interventional period the reduction was made by 34.6 minutes from baseline data and also the client satisfaction score increased from 58% on the base line assessments into 71% in the post intervention period respectively. As a result of some basic implementation of the interventions like; the Rearranging patient flow process, awareness and discussion with physicians, Inspiration and awareness created to improve work starting time and enhance good commitment among staffs.

Table 7: A final description of patient waiting time reduced and client satisfaction increased with their indicators in Mettu Karl Referral Hospital, 2019.

Objective	Indicators	Pre intervention	Post intervention	Frequency
To reduce OPD long waiting time to consultation from128:00 minutes to 85:00 minutes at the end of June 2019	Number of staff trained	No	36	Two days
	Physician starting clinic time improved (time)	3:48	3:20	One week
	OPD waiting time to consultation (time)	128:00 minutes	83.50 minutes	Quarterly
To increase patient satisfaction from 58 % to 70 % at the end of June 2019	Percentage of patient satisfaction	58 %	71 %	Quarterly

CHAPTER NINE: DISCUSSION

In this capstone project, the surveyor founded that the time motion of patient arrival until to get physicians is longer which is 128 minutes comparing to the standard studied by the BPR reform program . Because the standard shows that patient registration, sorting and sending to case team requires 10 minutes, duration of consultation treatment in clinical staff requires 12 minutes. So the total outpatient waiting time starting from card room to clinical staff requires about 22 minutes.

According to table 3, Outpatient waiting time at Mettu Karl Referral Hospital during Pre assessment at an average was about mean (SD)128 $\pm$ 39.70 minutes for an individual from patient arrival time to consultation with doctors which was reduced to mean(SD) 83.50 $\pm$ 23.17 minutes (by 34.8%) during post intervention period as the data obtained from the respondents. This finding was higher than study done in Thailand in 2018, to asses patient waiting time satisfaction among outpatient service which was the mean (SD) of 175.87 $\pm$ 68.66 minutes of waiting time before of intervention and becomes to mean (SD) of 92.9 $\pm$ 43.4 minutes of waiting time at post intervention(21). This variation could be due to the study area and time. This study was comparable with study conducted in Addis Ababa in 2013, in Amanuel mental specialized hospital among outpatient with mean (SD) of 112 $\pm$ 58 minutes of waiting time in pre intervention and reduced to mean (SD) of 54.53 $\pm$ 9.86 minutes at pos intervention (4). In other hand this finding was slightly different from study conducted in Amhara, Debre Markos and Felege Hiwot hospital which was with mean (SD)149.2±72.1 minutes of waiting time at pre intervention and whereas 94.2±58.3 minutes of waiting time at post intervention(1)

It was recorded during survey that, Pre intervention period the longest time (30 minutes) is taken until registration process starts and the other 30 minutes for consultation with physician which was reduced to 23.5 minutes and 15 minutes during post intervention period respectively. This study finding was similar with study done in Addis Ababa in Yekatit hospital(14). The rest of the time like payment or free service time and time seen by triage nurse takes 20 minutes and 15 minutes which was reduced to 15 minutes and 10 minutes during post intervention period while the reimagining variables during pre-intervention period taking card to OPD clinic by runner (13 minutes), taking registration number (5 minutes), registration completion time (10 minutes) and the time of collecting

referral paper (5 minutes) which was reduced to 8 minutes, 4 minutes, 5 minutes and 3 minutes during post intervention period respectively.

From the above table 5, Patients' satisfaction was assessed using a Likert scale to identify the level of satisfaction respondents stated.

In this study patients who have reported to be satisfied and very satisfied were considered as satisfied whereas those who reported to be dissatisfied and very dissatisfied were considered as unsatisfied. It can be inferred that the status of client satisfaction at Mettu Karl Referral Hospital was 58% at an average rate during pre-intervention period resulted from poor structural arrangement and weak follow up while after intervention it was increased to 71% during post intervention period resulted from new reform system introduced by the surveyor which include rearranging long registration process, preparing some inspiring program for physicians during morning before starting their usual work. This finding was comparable similar with study done in Addis Ababa in St. Paul's Hospital Millennium Medical College, among outpatients, which was the average satisfaction of patient at start of study was 65% and increased to 73% after intervention(22).

Intervention selected and accomplished in Mettu Karl Referral Hospital was similar with strategies carried out in Yekatit 12 Hospital which was rearranging the patient flow chain and Sensitization and discussion with physician.

Assessment of clients 'satisfaction with health service deliveries at Jimma University Specialized Hospital in Ethiopia revealed that client satisfaction level was 57% in Jimma long waiting hours during registration. Comparatively Mettu (71%) is better than Jimma

As data in the table 6 above indicated the average clinic starting time of physicians in OPD at an average 3:48 local time range between 3:42 to 3:56 during pre-assessment period which was reduced to 3:20 hour range between 3:16 to 3:28 during post intervention period was slightly different from physician starting time assessed in Yekatit 12 Hospital that was at pre-assessment period 3: 39 hour range between 3:30 to 3:49 and reduced at post intervention 3:24 local time which was range between 3:24 and 3:39.

Waiting time studies to improve service efficiency at Mettu Karl Referral hospital:

Long waiting time during registration were associated with satisfaction on outpatient services in Mettu Karl Referral Hospital was (71%) in outpatient departments. This finding was slightly smaller than study done in Addis Ababa, in Yekatit 12 hospital it was (80%)(14). According to this study it indicates that the patients at Mettu Karl

Hospital are less satisfied by service provided in OPD. This is might be due to poor management of the department.

10. Limitation and strength of the Study

10.1 Strengths of the study

Being all the above factors tried to constrain the successful completion of the study so;

- The researcher explained the purpose of the Project to relevant Individuals and mitigates the problems.
- Using EHSTG checklist
- Good communication between principal investigator and data collectors
- Admirable support of Hospital administration especially, Hospital SMT, CEO, Medical Director and committed to support the staff on creates awareness through the Capstone Project Period.
- The Hospital staffs could understand about strategic problem solving methods during focus group discussion

10.1 Limitations of the study

- Short evaluation period for observation of sustainability of intervention
- The tools used to measure the problem excluded educational status
- Poor commitment and initiation at beginning of this assessment by the hospital Staff and they being busy most of the time.

CHAPTER TEN: CONCLUSIO AND RECOMMENDATION

10.1 Conclusion:

The project findings suggest that,

- The time motion of patient arrival until to get physicians is longer comparing to the standard studied by the BPR reform program that needs great attention.
- The status of client satisfaction at Mettu Karl Referral Hospital is 58% at an average rate during pre-intervention period resulted from long waiting time (128 minutes) and weak follow up.
- The new reform system which include rearranging long registration process, preparing some inspiring program for physicians and employees in OPD were made a significant changes within three months which set hopes for further improvement if the status of the inspiration continues in the hospital.
- The usual weekly schedule average work starting time of doctors at OPD is too late and poor responsibility compared to civil servant regular work starting time scheduled which made some changes during post intervention period compared to pre assessment period.

10.2 Recommendations:

To improve the existing situation of the hospital in terms of outpatient long waiting time to consultation take the surveyor forwarded the following recommendations.

- ✓ To avoid unnecessary visits to OPD referral system should be enforced by Hospital leadership and government board of the Hospital.
- ✓ Proper implementation and strong follow-up should be strengthened and the significant support from hospital senior management should be provided.
- ✓ Continuous training and inspiring program should be arranged for the workers by hospital administration.
- ✓ Ethiopian hospitals reform implementation guideline strategies should be taken into practice by Hospital SMT and by participation of all employees of the Hospital.

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Appendices/Annexes

Annex- a: A Profile of Mettu Karl Referral Hospital employees

Number of beds	222
Number of general practitioners	24
Number of specialists	6
Number of nurses & midwives	115
Number of integrated Emergency surgery officer(OBY/GYn)	2
Number of administrative staff	183
Number of Lab. Staffs (Lab. technology & technician)	16
Number of x-ray staffs(radiology technologist & radiographer)	3
No of pharmacy staffs(pharmacist & druggist)	14
Number of Optometry/Ophthalmic nurse	2
Number of Biomedical Engineering/Technician	2
Number of Anesthetist/Anesthetist nurse	8
Number of Environmental Health	2
Number of Psychiatrist	2
Number of outpatient visits per year	144038
Number of inpatient services per year	14459
Number of delivery per year	4489
Average Length of Stay	5.6

Annex- b. Assessment of outpatient waiting time

Research no _____ Name of facility _____ date _____

1. Sex Male ☐ B. Female ☐ Age_____

Regular Outpatient waiting time check list

1. Patient arrival time in the facility _____
2. Registration number taken time _____
3. The time of referral paper taken _____
4. The time of seen by triage nurse _____
5. Payment or free service taken time _____
6. Registration completed time _____
7. The time of card taken by runner to OPD clinic _____
8. Time of consultation begin _____

Annex - c. Assessment of Client satisfaction in outpatient department

Research no _____ Name of facility _____ date _____

1. Sex Male ☐ B. Fe☐ Age_____

S/N	Description	Very Disagree	Disagree	Agree	very Agree
1	The way of reception was clear	1☐	2☐	3☐	4☐
2	Triage professionals and card room workers treated me with courtesy and respect	1☐	2☐	3☐	4☐
3	There was enough waiting area at record room	1☐	2☐	3☐	4☐
4	Registration process has no problem	1☐	2☐	3☐	4☐
5	The outpatient department was clean	1☐	2☐	3☐	4☐
6	Easy to move from place to place for registration	1☐	2☐	3☐	4☐
7	I could distinguished doctors and nurses easily	1☐	2☐	3☐	4☐
8	Doctors and nurses explained things in a way I could understand.	1☐	2☐	3☐	4☐
9	The service delivered from registration until consultations has no impartiality	1☐	2☐	3☐	4☐
10	It was cleared how to registered	1☐	2☐	3☐	4☐
11	The system of payment was clear	1☐	2☐	3☐	4☐
12	It was cleared to free registration	1☐	2☐	3☐	4☐
13	The distance between card room and outpatient clinic was near and easy to move.	1☐	2☐	3☐	4☐
14	The waiting time to get physicians is appropriate	1☐	2☐	3☐	4☐
15	There is enough outpatient clinic waiting area	1☐	2☐	3☐	4☐

16	I recommended to others to use this facility	1 ☐	2 ☐	3 ☐	4 ☐
17	I was comfortable for payment of this outpatient visit	1 ☐	2 ☐	3 ☐	4 ☐
18	The value which I can give for this hospital from 0-10 is as follows (0 low -10 represent the better institution)	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10			

Annex - d. Gaaffilee waliigalaa rakkoo turtii sa'atii garee dedebi'anii yaalamuu qorachuuf qopha'e (dhukubsataaf)

Lakk. Qor _____ Maqaa Dhaabbatichaa _____ guyyaa_____

1. Saala Dhiira 1 ☐ Dhalaa 2 ☐
2. Umrii 1. 18-30 ☐ 2. 31-45 ☐ 3. 46-64 ☐ 4. >65 ☐

Lak	Mata duree Gaaffiwwanii	Baayeen itti wali hingalu	Itti walii hin galu	Ittin waligala	Baayeen itti waligaa
1	Yeroo ilaalamuu kana, haala naaf galuun simannan naaf godhame	1 ☐	2 ☐	3 ☐	4 ☐
2	Ogeessotni mana kaardii fi kutaa calallii haala gaariidhaan nakeessummeessan	1 ☐	2 ☐	3 ☐	4 ☐
3	Kutaan galmee fi calallii iddoo ta'anii eeggatan gahaa qaba	1 ☐	2 ☐	3 ☐	4 ☐
4	Adeemsa galmeef godhamu keessa rakkoon hin jiru	1 ☐	2 ☐	3 ☐	4 ☐

5	Kutaan deddeebi'anii yaalamuu qulqullinni isaa eegamaa dha	1 ☐	2 ☐	3 ☐	4 ☐
6	Galmeedhaaf bakkaa bakkatti socho'uun nama hin rakkisu	1 ☐	2 ☐	3 ☐	4 ☐
7	Yeroo ilaalamuu kana Doctorii fi narsii gargar baasee beekuu danda'eera	1 ☐	2 ☐	3 ☐	4 ☐
8	Doctori fi narsiin haala naagaluu danda'uun dhimma barbaachisaa ta'e nahubachiisaniiru	1 ☐	2 ☐	3 ☐	4 ☐
9	Tajaajilli mana kaardiitii hanga Doctorii bira galamutti godhamu keessatti nama wal caalchisuun hin jiru	1 ☐	2 ☐	3 ☐	4 ☐
10	Haalli itti kaardii baafatanii tajaajilaman ifaa dha.	1 ☐	2 ☐	3 ☐	4 ☐
11	Haalli itti kaffaltii raawwatan ifaa dha	1 ☐	2 ☐	3 ☐	4 ☐
12	Haalli itti baasi irraa bilisa kaaedii baasanii taajajilaman ifaa dha	1 ☐	2 ☐	3 ☐	4 ☐
13	Fageenyi mana kaardii fi kilinika kutaa deddeebi'anii yaalamuu gidduu jiru salphaa fi dhiyoodha	1 ☐	2 ☐	3 ☐	4 ☐
14	Turtiin Doktorii argachuudhaaf godhamu madalawaadha(kan nama nuffisiisu miti)	1 ☐	2 ☐	3 ☐	4 ☐
15	Kiliniika deddeebi'anii yaalamuu bira iddoon turanii eggatan gaha**a** jira	1 ☐	2 ☐	3 ☐	4 ☐
16	Namoonni biroo Hospitaala kanatti akka fayyadaman nan godha	1 ☐	2 ☐	3 ☐	4 ☐
17	Tajaaijila naagodhameef kaffaltiin raawwadhe natti toleera	1 ☐	2 ☐	3 ☐	4 ☐
19	Sadarkaan Hospitaalichaa skeeliidhaan 0-10 haala armaan gadiitiin ibsama. **0** gadi bu'aa ta'uu ibsa - **10** hospiitaalli kun cimaa ta'uu bakka bu'a	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ 1 2 3 4 5 6 7 8 9 10			

Annex - e Unka turtii sa’aatii dhukkubsattoota haaraa deddeebbi’anii yaalaman mirkaneessu itti guutamu.

Lakk. Qorannoo _____ Maqaa Dhaabbatichaa _____

Saala Dhiira 1 ☐ Dhalaa 2 ☐ Umrii_____

Yeroo Tajaajilaman 1. Waaree dura 2. Waaree booda

1. Sa’aatii itti Hospitaala gahan _____
2. Sa’aatii itti lakoofsa kaardii fudhatan _____
3. Yeroo itti waraqaan referralaa itti fuudhame _____
4. Yerootti tajaajila kafaltii fi kaffaltiirraa bilisaa itti raawwatan _____
5. Ogeessota kutaa calalliitiin yeroo itti ilaalaman _____
6. Yeroo itti adeemsa galmee xumuran _____
7. Sa’aatii keessumeessitootnii kaardii dhukkubsataa kutaa deddeebi’anii yaalamuutti geessan _____
8. Sa’aatii itti maqaan kessan waamamee gara hakiimaatti ol seentan _____

ASSURANCE OF PRINCIPAL INVESTIGATOR

The undersigned agrees to accept responsibility for the scientific, ethical, and technical conduct of the project and for provision of required progress reports as per terms and conditions of the Research Publications Office.

Name of the investigator _____

Date_____ Signature _____

Approval by the primary advisor

Name of the primary advisor_____

Date._____ Signature _____