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Enhancing the Healthcare Service Using Quality Function Deployment and Database Management System in the Outpatient Department of a Government Hospital of Bangladesh

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Abstract:

Purpose: *In Bangladesh according to Directorate General of Health Services (DGHS) most of the people especially the rural individuals receive health care services from the outpatient departments of the Government hospitals. Patient satisfaction should be the most anticipated outcomes of health care system, and only an efficient utilisation of health service can provide that purpose. The objective of the study was to speculate upon a method for the improvement of healthcare service quality provided in the outpatient department of Government hospitals.*

Design/Methodology/Approach: *Through the systematic random survey, 50 patients were selected and interviewed at exit point using face to face interview technique. Process analysis had been done, and QFD had been used to understand the requirements of the patients and to deploy their voices for the continuous improvement. The importance of service characteristics was calculated using QFD. A database management system (DBMS) has been developed to computerise the front office management which is user-friendly, simple, fast and more cost effective.*

Findings: *Through process analysis inconsistencies and problems with the existing system had been identified. Process analysis had enlisted some corrective actions for improvement of the service quality of the outpatient department. By using QFD, the importance of service qualities had been identified. DBMS provides data which can be very useful to the health statisticians and hospital authorities to track different public health parameters and further service improvements. Mistakes done on calculators are dispensed out entirely by this method. It works with the assembly of patient's info, diagnosis details etc.*

Practical implications: *Our work describes the numerous opinions and suggestions of the patients that can undoubtedly improve the bondage between the receivers and providers of healthcare service. Customer response and feedback system have helped a lot to improve overall service quality and eventually convey greater end consumer gratification.*

Originality/value: *We create a house of quality diagram to identify the importance of service qualities. Logical and entity relationship diagram was used to design and MySQL, PHP, HTML, CSS and JavaScript languages were used to create the database.*

***Key Words*: Outpatient Department, Process Analysis, Continuous Improvement, Quality Function Deployment, Database Management System.**

1. INTRODUCTION

By providing extensive health care facility, the hospital works as an incredibly multifaceted socio-economic methodical organization. The outpatient department (OPD) of a hospital, delivers analysis and upkeep for patients who do not require to stay overnight. The outpatient section is a dominant part of the total running of a clinic. It is usually combined with the in-patient facilities and operated by expert doctors and surgeons who furthermore attend patients in the wards. Many patients are inspected and provided treatment as outpatients previously being admitted to the hospital at a future period as inpatients. If discharged, they can attend the outpatient for additional treatment. [1-3]

The outpatient facility is one of the most vital parts of management as an operative OPD can decrease the unnecessary patient burden in wards. [4]

Quality Function Deployment (QFD) is a planned method to describe customer requirements and inferring them into defined strategies to produce products to encounter those wants. The "voice of the customer" is the word to define these stated and unstated consumer requirements. The term is apprehended in a diversity of methods: straight discussion or meetings, reviews, emphasis groups, customer conditions, surveillance, guarantee data, field reports, etc. Getting to know the customer needs is then abridged in a product improvement atmosphere. These conditions are used to interpret higher standard "what's" or desires into inferior level "how's" - product supplies or practical features to content these wishes. [5]

QFD is one of the excellent powerful tools presently used for developing new products and procedures based on the current strategies and, even more usually, for new and revolutionary ideas. [8]

Applying QFD in the provision sectors is a comparatively new term for the production-based engineers but nothing innovative. In the healthcare sector, QFD execution can expose new entrances to patient gratification and overall amenity and community health enhancements. [8]

Two case studies have been conducted by Mazur, Gibson, and Harries to illustrate the comprehensive approach for service QFD. The authors followed the traditional steps in gathering the VoC, measures of the VoC, functional requirements, etc. One of the case studies was performed in a therapy clinic, whereas the second one was in a telephone company. They concluded that QFD could be commendably applied to service processes. [9]

Dijkstr and van der Bij distinguish the applicability of QFD in environments other than in the industrial domain. [11]

Lim, Tang, and Jackson advocate that hospitals use QFD for detecting and improving the unmet patients' expectations. [10]

Dijkstra and van der Bij distinguish the applicability of QFD in environments other than in the industrial domain. [11]

On the other hand, Omachonu and Barach argue that the application of the QFD in the healthcare industry has been inadequate because of the product of healthcare is ill-defined and intangible.[12]

In a healthcare system, unlike the majority of other systems, a customer is instantaneously the owner of the system. Different dynamics come into the picture if we just compare it to a product that in general, is produced by the owner of the system and used by the customer, where typically the customer and owner are not the same individuals. [6]

Networking of the hospitals is an inevitable part of the society right now. It upsurges the precision and speed of patient information circulation which results in better services for patients. It also augments the working efficiency of the hospital system. [7]

2. OBJECTIVES

- To detect and delineate the process of healthcare service in a Government hospital outpatient department.
- To identify rudiments of this process that have the most significant impact on overall service quality.
- To use quality function deployment (QFD) to improve the service quality.
- To incorporate a database management system within the process.

3. METHODOLOGY

Data Source: Nurul Haque Adhunik Hospital, Noakhali, Bangladesh.

Phase 1: Analyzing and studying the process of patient treatment in the outpatient department of a Government hospital.

- Observing and summarizing the process in which an average patient goes through to receive health care.
- Understanding the inconsistencies of the total process and problems to be identified in that respect.

Phase 2: Usage of Quality Function Deployment for refining the service excellence.

- Recognizing patient's necessities and quality rudiments related to it in the outpatient department.
- Finding and describing various features of service accomplished by the outpatient department.
- Executing a survey amongst 50 patients to measure the present degree of gratification with those features of the facility.
- Designing a house of quality diagram to identify the essential service facilities in respect to patient requirements.

Phase 3: Developing a database management system using CSS, PHP, HTML, JavaScript and MySQL.

4. PROCESS ANALYSIS

The procedure where some mediocre patient goes through to obtain health upkeep from the outpatient department of Nurul Haque Adhunik Hospital had been observed in our study. Problems associated with the total process had been identified, and some corrective actions had been determined by consulting the doctors, authorities and patients.

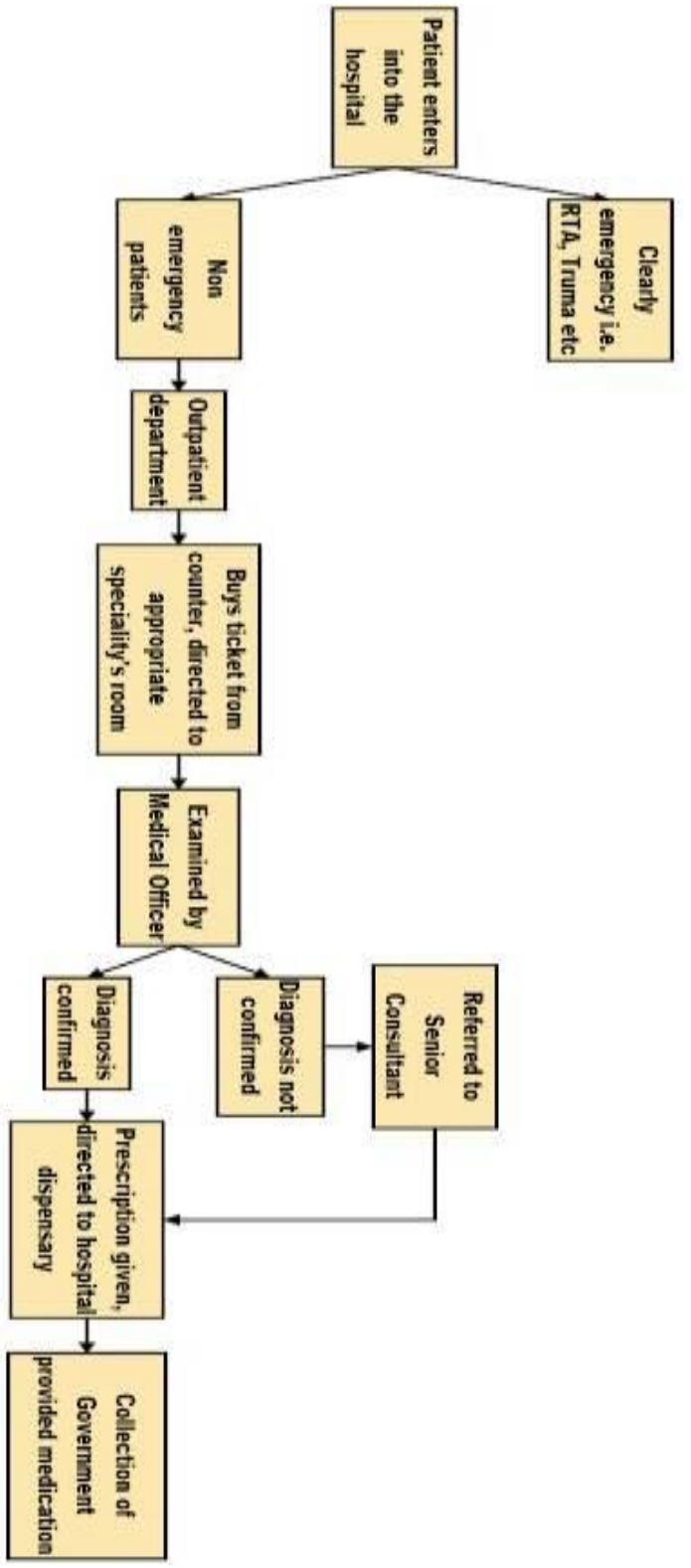

Fig -1: Process Flow Diagram of OPD

4.1 Time and duration of OPD service provision

The OPD is open 6 days a week, usually from 9:00 AM to 2:00 PM. Patients who wishes to or are compelled to receive service outside this period are treated as emergency patients by the Emergency Medical Officers.

4.2 Discussion on problems and weaknesses in the system

The flow of patients, crowd control and easy access: The outpatient department of the hospital handle an enormous patient load, they are real hubs where thousands of people gather around every day. Despite that very little thought is given in the architecture or arrangement of the departments and offices to facilitate movement of people and ensure an environment which does not seem suffocating or jam-packed. For example, the NHAH has the ticket counter for OPD patients on the right side just after the entrance which causes the queues in the form of the ticket counter to almost completely block the open space immediately after opening. New patients who enter are easily confused as to where to go, and the pathway to emergency room also gets stuck. The constant shifting of the people in the queue as they are right in the path of people walking causes them to shift always, this, in turn, creates undue scuffles and an undisciplined environment. Thousands of new patients are continually coming in every day. As a result, it also makes sense to arrange for clear signs with instructions for further patients on where to go to receive their required service, though the efficacy of this can be questioned as a significant portion of the patients in the periphery hospitals are not able to read at all.

Registration and ticket purchasing: Every patient who enters the hospital for OPD services has to purchase a ticket; this provides an excellent opportunity to record a significant amount of statistics on patient complaints, the load on each department, estimation of service the hospital is providing etc. Yet the data that is recorded in this tap is rudimentary and done without any technology. Implementation of a database management system in this step can speed up the process and provide an incredible amount of data to policymakers and researchers.

Allocation of staff: The following problems arise in this stuffing pattern:

- As nurses are extremely hard pressed to provide services to a large number of indoor patients, where patients load is often 2 or 3 times the capacity, they are almost never assigned to OPD in practice.

Each clinical department gets its separate staff, yet the OPD in total gets 14 staff, though the OPD has to deal with patients from every department. It makes little sense to assign people to OPD separately in this way, instead if each clinical departments handled their outdoor patients and contributed to OPD with their stuff much of the stuffing problem could be solved.

5. QUALITY FUNCTION DEPLOYMENT (QFD)

In this study on the outpatient department of a Government hospital this methodology presents the growth of a review to comprehend the patient necessities, present patients

concerning its purposes to these demographics, and interprets these significances using quality function deployment into practical needs to progress service assistance. The concluding deliverable of this practice is a house of quality (HOQ) that is built by mixing customer wants to be collected through a survey to recognise and expand the most significant service amenities in admiration to patient necessities.

5.1 Identifying Patient's Requirements

To gather the patient requirements, we conducted interviews with a group of doctors and patients and asked them what is significant to them in the service or product being accessible. "Why" is requested abundant periods until the respondent replies with the same answer each time. This is the ultimate patient concern that the patient needs from using the service or product. These reactions were gathered using an affinity figure and used to advance a meaningful survey questionnaire that imprisonments all things vital to the patients.

Patient Requirements		Quality Elements
1st Level	2nd Level	
Proper Treatment	Proper Information at Reception	Kind attitude and easy Access to hospital
	Less Waiting Time before Taking Service	Immediate attention and effective service, Information about visiting time
	Proper Condition of Examination Room	Quiet room, pleasing and silent environment
	Time Spent with Doctor	Proper examination
	Patient Counselling	Probable diagnosis, advise and treatment
	Less Waiting Time to Collect Medication	Immediate attention and effective service

Table -1: Patient's requirements and quality elements associated with it

To safeguard that the appropriate number of responses is gathered, we have performed the study among 50 patients throughout the survey; they were requested to assess the requirements contentment in the outpatient department on a standard 5 point Likert scale. The defendant was also entreated to weight all significance on how noteworthy it is to them on a 5 point Likert amount. These marks and weightings will be increased to create a weighted score to contain both the enactment rating and the implication for every result. With this sign, we resolute which of the provisions are the highest essential and also the worst in performance and assign them to the uppermost position.

5.2 Developing Service Requirements

Service requirements are specified by the outpatient department operational or managerial resource allocation plans to satisfy the patients. The critical question to ask in this step is "how" the OPD delivers services. These requirements had been grouped by such functional service units provided by the staffs and doctors of outpatient department. Additional functional units and elements have been added as needed. Table 02 shows the degree of services provided by OPD.

OPD Services	Amount of Time
	Kindly Behavior
	Experienced Staff
	Cleanly Environment
	Attentiveness of the Staff
	Number of Patients per Staff
	Number of Patients per Doctor

Table -2: Executed services identifying the OPD activity

Patient Requirements	Rating of Importance (A)	OPD Now(N)	Plan (P)	Ratio of Improvement (B)	Service Point (C)	Absolute Weight (D)	Demanded Weight (E)
Proper Information at Reception	5	3	5	1.67	1.2	10.02	17.12
Less Waiting Time before Taking Service	4	3	4	1.33	1.5	7.98	13.63
Proper Condition of Examination Room	4	3	5	1.67	1.2	8.016	13.70
Time Spent with Doctor	5	2	4	2	1.2	12	20.50
Patient Counsel ling	5	2	5	2.5	1	12.5	21.26
Less Waiting Time to Collect Medication	4	3	5	1.67	1.2	8.016	13.70

Table -3: Quality characteristics weight of patient requirements

Here,
D= A * B * C
B= P/N
E= (D/Total) * 100

5.3 Constructing House of Quality

Based on the above calculations a house of quality has been constructed. Figure 2 shows the partial house of quality for accessing relative weight of service in OPD.

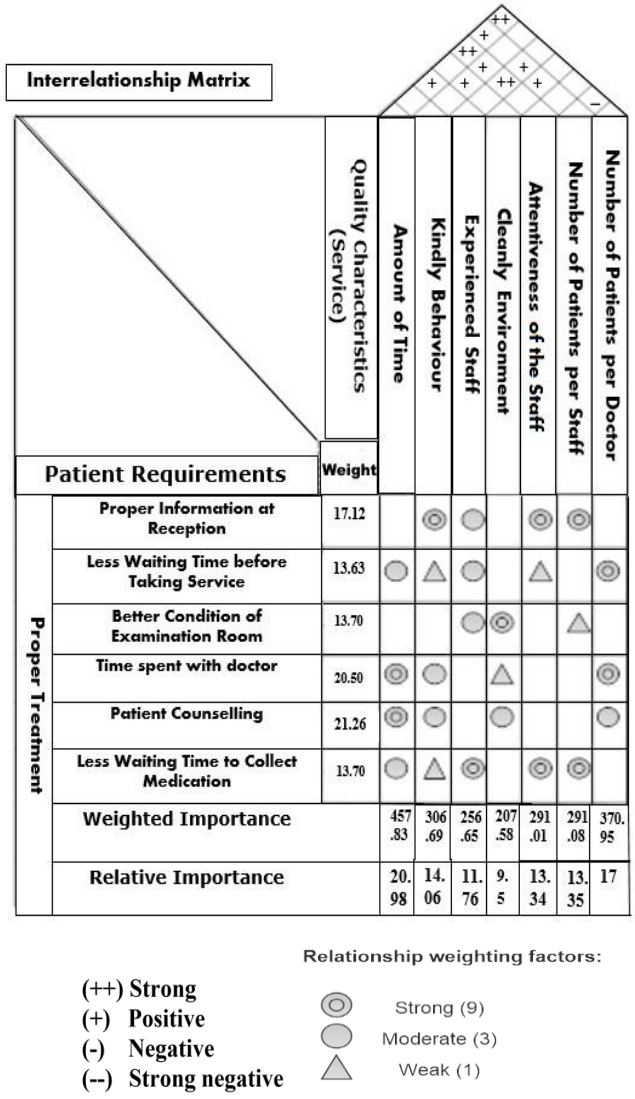

Fig -2: The house of quality (partial)

6. DATABASE MANAGEMENT SYSTEM (DBMS)

The database application has been achieved using MySQL for the file development; server side scripting was completed in java embedded in HTML, java web server, and PHP which facilitate simultaneous processing.

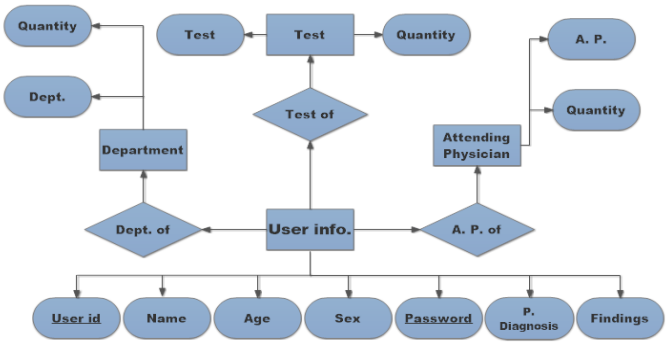

Fig -3: The ER Diagram

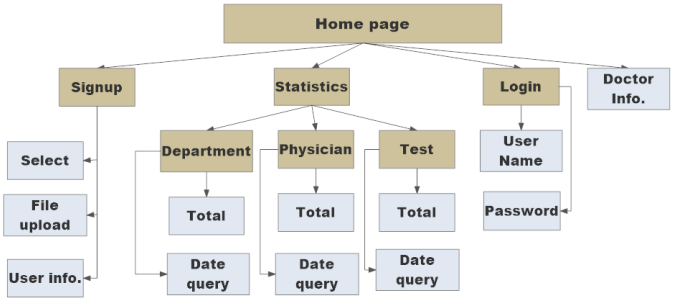

Fig -4: Block Diagram

6.1 Main page/Homepage of the Database

The homepage is used to ease steering to additional pages on the site, by giving associates to essential and current articles and pages. In sign up page information about patients can be entered and saved. The saved information can be found by entering patient's name and password. Each patient have a unique user id and a password.

6.2 Features of the Database

This database includes the following features

Doctor Information Page: This page contains information about doctors who are to consult with the patients seeking health care from the OPD.

Statistical Analysis: This feature enables the hospital management to count the number of patients visited in the OPD in several sub-departments. It also allows identifying the number of patients treated by each doctor and tests given. Statistical data can be found on two bases: total number and according to date.

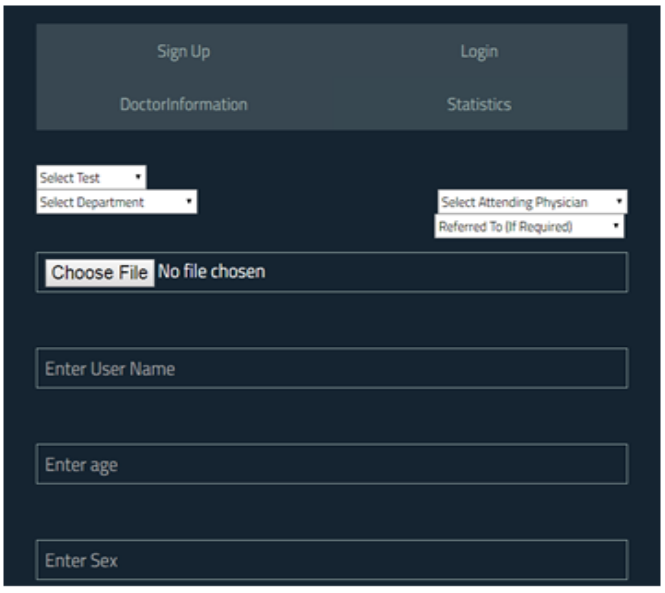

Fig -6: Main homepage or sign-up sheet for DBMS (A)

Fig -7: Main homepage or sign-up sheet for DBMS (B)

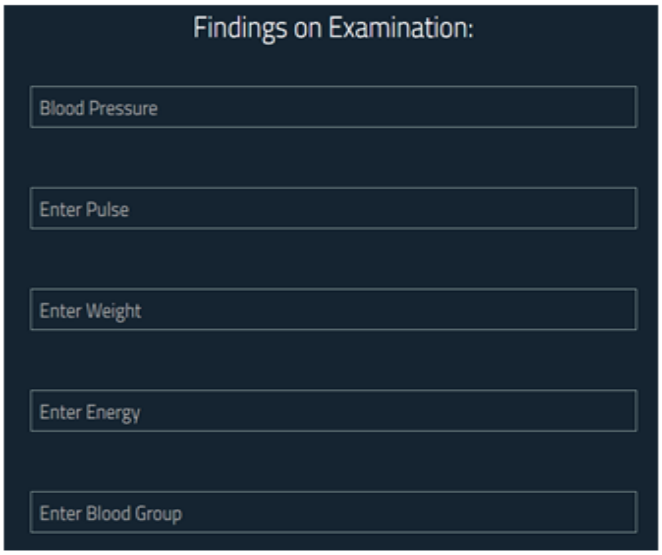

Fig -8: Main homepage or sign-up sheet for DBMS (C)

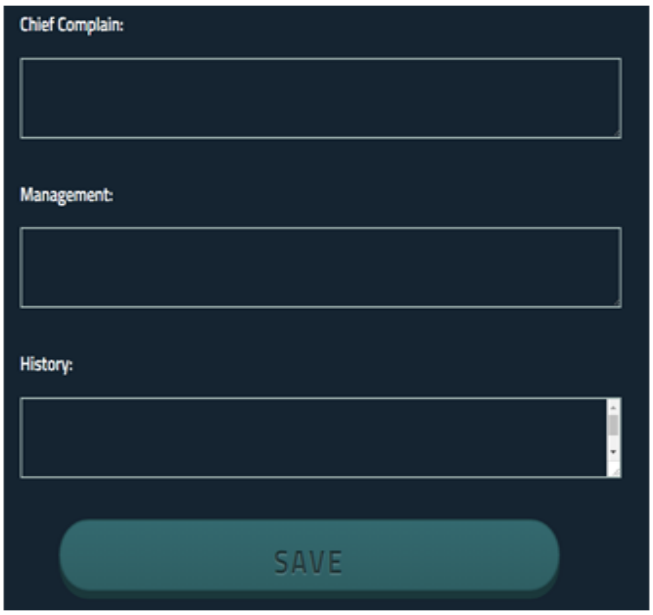

Fig -9: Main homepage or sign-up sheet for DBMS (D)

Fig -10: Doctor Information Page

Fig -11: Statistical Query Page

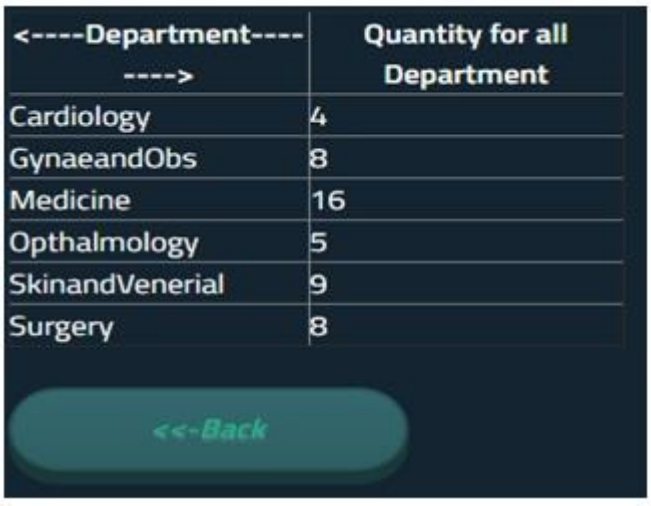

Fig -12: Surveyed 50 Patient's Statistics According to Departments

7. RESULT AND DISCUSSION

Throughout the process analysis, several problems associated with the outpatient department of Nurul Haque Adhunik Hospital had been identified, and corrective actions had been stated for increasing patient satisfaction and minimising the inconsistencies related to the OPD. Patient's requirements have been defined and by conducting a short survey among 50 patients the percentage of the fulfilment of these requirements had been determined. The essential service qualities had been identified. By using Quality Function Deployment method, a plan for improvement of these service qualities concerning patient requirements had been generated. The percentage of service qualities need to be improved in fulfilling the patient requirements of our proposed plan had been calculated and determined using QFD.

The database management system we developed, contains all the information needed to be maintained in the OPD of the hospital. As we have computerised the whole system via a database, the maintenance is very convenient and efficient and also retrieval of data according to demand is speedy. The existing system is manual and it becomes a tedious process to keep track of all the information in paper files. Therefore, our planned system is a good and useful implementation.

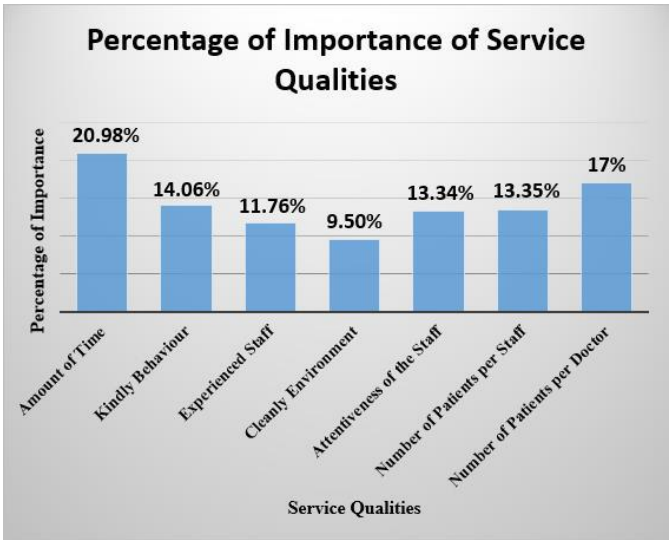

Fig -13: Percentage of importance of service qualities

8. CONCLUSIONS

The purposes of the Government hospital's outpatient department are adequately recognised and outstretched. However, the roles are not accomplished continuously to the provisions which include the effectiveness of the service which occurs due to the commercial construction of our country does not convoy the population progress. It is confirmed that the funds and the investments in the healthcare do not contain the requirements of the patients. Entirely to the swelling demand for excellence, there occurs condition of continuous upgrading of the health care system.

Process analysis, quality function deployment, the house of quality and database management are the numerous tools that have been deployed in this study. It has been exemplified how these procedures could be applied in the service to upsurge the patient gratification level, eminence of the facilities being provided. Through the practice of QFD scrutiny, the hospital administration will be capable of progressing the service value of the outpatient department by concentrating on patient necessities which will diminish quality control complications. Patient's consummation will be momentously increased, and the service delivery will also enjoy a decent working atmosphere.

The fundamental goal for the formation of automating patient registers management scheme in the outpatient is to allow the hospital supervisors in a suitable, fair and apt manner. The Database Management System is an excellent development over the labour-intensive system using case fields and paper. The automation of the system has hurry up the process. In the current order, the front office handling is very slow. The system was meticulously checked and verified with mock data and thus is found to be very dependable.

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