

**OPERATIONAL FEASIBILITY ANALYSIS OF QUEUE MANAGEMENT
SYSTEM IN A DECENTRALIZED OUTPATIENT DEPARTMENT LAYOUT
AT RUKMANI BIRLA HOSPITAL, JAIPUR**

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfillment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

by

Dr. Ankita Kulshrestha

Under the Supervision and Guidance of

Mr. Vinod Kumar SV

2021

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DECLARATION BY STUDENT

I hereby declare that this dissertation titled Operational Feasibility Analysis of Queue Management System in a Decentralized Outpatient Department Layout at Rukmani Birla Hospital, Jaipur

is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

(Signature)

Dr. Ankita Kulshrestha

Date

CERTIFICATE

This is to certify that Dr. Ankita Kulshrestha in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur has successfully completed her/his internship at C. K. Birla Hospital, Jaipur during March 22, 2021 to June 19, 2021.

Place: Jaipur
Date:

Preceptor/Head of the Organization
Name of the organization

CERTIFICATE

This is to certify that dissertation titled Operational Feasibility Analysis of Queue Management System in a Decentralized Outpatient Department Layout at Rukmani Birla Hospital, Jaipur is a record of the research work undertaken by Dr. Ankita Kulshrestha in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and Health Management) from the IIHMR University, Jaipur under my guidance and supervision and her approach to the research study has been sincere, scientific, and analytical.

Faculty Guide
IIHMR University, Jaipur

Date

School Dean
IIHMR University, Jaipur

Date

ABSTRACT

Background: Operational feasibility is an important aspect when new technology is implemented the system and to measure its effectiveness and acceptability by patients as well as the Hospital staff. As the major means of measuring the same, patient-centered outcomes have assumed greater importance. To evaluate and describe the level of patient satisfaction with QMS /token system in OPD services in terms of patient's experience with new system. Also the acceptability, operational feasibility, ease of usage/convenience, reducing waiting time facilitated by QMS for patients visiting the OPD of Rukmani Birla Hospital.

Methods: We took patients who came to the OPD of Rukmani Birla Hospital in Jaipur for a doctor's consultation over a seven-day period for a cross-sectional descriptive study. The research instrument used for data collection was a structured questionnaire through Google form to assess the patient and staff feedback and their prospective. Comparative and KAP studies were used to categorize the experience and accessibility. Statistical analysis: Selection of patients who took token in OPD from them Convenience sampling was done. The data was analyzed using Microsoft Excel, a statistical programme.

Results: The patients had the best experiences from the OPD in terms of waiting reduction , display system , SMS for token preferred over paper token . Total experiences of 86 patients were computed to determine their experiences regarding QMS provided in the OPD of Hospital. Maximum no. of patients i.e. more than 80% showed high satisfaction, rate for the Queue management system, only few were dissatisfied .

Conclusions: The majority of respondents had a positive experience and provided positive feedback favoring the reduced waiting time although a less number of patients had poor feedback. Also, majority of patients had shown acceptability towards this new Queue Management System regarding wait time, service process and the working hours.

ACKNOWLEDGEMENTS

I am grateful to the wonderful folks at IIHMR, Jaipur, for their earnest advice in helping me maintain my practical and theoretical skills throughout my research.

Firstly, I would like to extend my note of thanks to my mentor at IIHMR University, Mr. Vinod Kumar SV (Professor, The IIHMR University) for his constant support and guidance. It is with his supervision that this work came into existence.

My sincere gratitude also goes to Cdr. Sandeep Puranik for providing me with internship chances at the Rukmani Birla Hospital (RBH) in Jaipur, where I was able to work on a variety of intriguing projects.

I would also thank my family who encouraged me throughout the time of my research and the positive attitude they showed for my work was very encouraging and supportive.

I am also thankful to my seniors whose challenges and productive critics, that have provided new ideas to the work.

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ABBREVIATIONS

ED - Emergency department

KAP - Knowledge, Attitude and Practice

LWBS- leave without being seen

OPD- Outpatient department

QMS - Queue Management System

RBH- Rukmani Birla Hospital

CHAPTER 1: INTRODUCTION

Healthcare facilities are under tremendous pressure to improve patient care while working with limited resources, as well as to improve patient experience and employee satisfaction, Rukmani Birla Hospital (RBH) is no exception to it. The attempts at improving the hospital system often led to increased stress for both patients and staff. Therefore, managing patient flow is of utmost importance in planning and streamlining staff's workload and making activities more predictable and manageable.

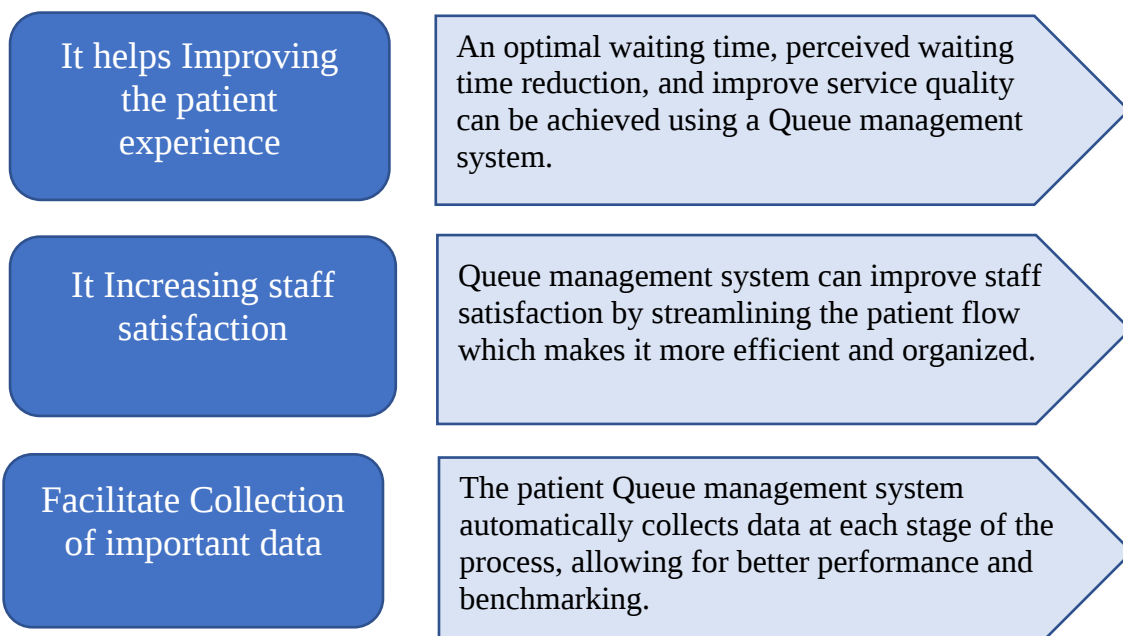
Patient flow management also generates data and insights that are used to promote continuous operational improvements. It also enhances patient and employee experiences while increasing productivity and profitability.

Operational Feasibility:

Human resources determine operational feasibility, which comprises anticipating whether the system will be accepted and used when it is established and implemented. Operational feasibility is a metric to know how well a proposed system can solve a problem and exploits opportunity discovered during scope definition, as well as how well it meets the criteria identified during the requirements analysis phase of system development.

Queue Management System (QMS):

Queue Management System (QMS) is one such system that can handle patient flow in a safe, productive, and efficient manner at multiple touchpoints of a patient's journey from check-in to discharge. The Queue management system is important for hospitals as:



A token management system, often known as QMS- queue management system, is software that is utilized to efficiently manage the crowds and lineups in customer-facing organizations and departments by issuing tokens. It shortens consumer wait times and improves service quality.

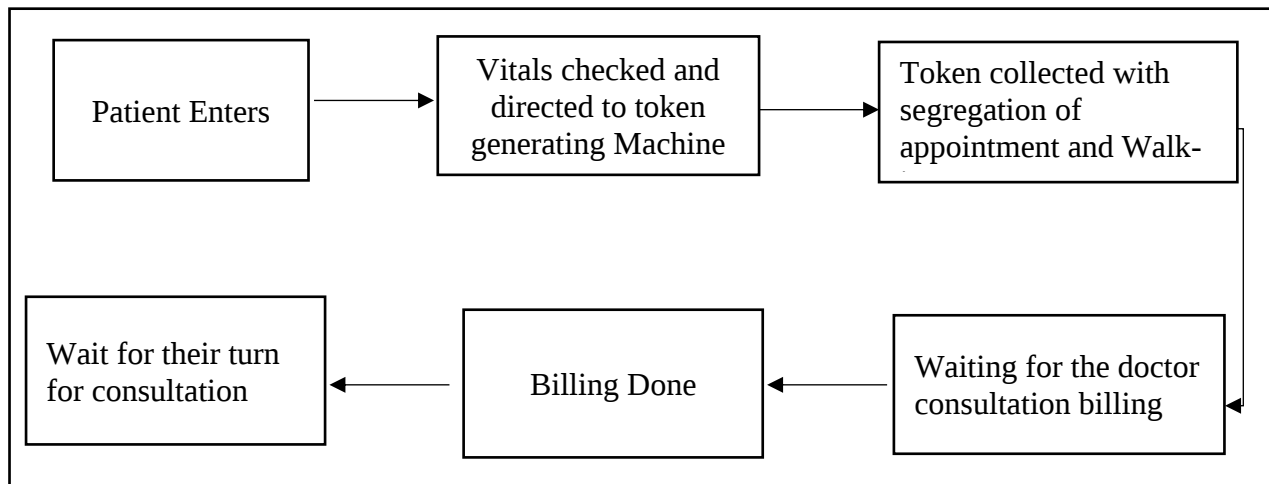


Fig1. Patient's journey from entrance to doctors consultation



Fig.2 Token generating machine with virtual queue (segregation walk-in and appointment patients).



Fig.3 Token Number display screens in waiting area for patients.

CHAPTER 2: REVIEW OF LITERATURE

According to Iteboje et al. (2019), QMS manages queues of people in various situations and locations in a queue area. The process of queue formation and propagation is defined as the 'queueing theory.' Applications of queueing theory are there in a doctor's office, accessing diagnostic procedures, specialist referrals, at billing counters. Prolonged wait time in hospitals, especially in emergency rooms, could become unwieldy for a sick patient and may lead to irrational behaviours like patient using inappropriate language, making unreasonable demands, and may even resorting to physical abuse.

With the emergence of the coronavirus (COVID-19) and the need to avoid crowds, it's important to remember that some diseases can be transmitted while patients and visitors are in close contact in a hospital setting. Therefore, it is imperative to devise a plan to reduce the usual crowd witnessed in various hospital units, especially in the outpatient department. Yange et al. (2020) developed a centralized queue control system that can be used in various areas of a hospital.

An alternative system for queuing management was proposed by Ngorsed et al. (2015) that could reduce inconvenience to the public. The establishment of this system was enabled by people queuing for services at hospitals and government agencies without committing to the estimated time for their diagnosis and treatment. Waiting for a service is inefficient, and it takes away an unreasonable amount of time from the patients' productive time. An improvement in the queuing management benefits both stakeholders through better time management utilization of the space available in hospitals.

Nkeiruka Ameh, et al (2013) said that the number of patients were satisfied with the general outpatient department's practice. However, there is a need to take steps to respond to ideas made by people who use hospital services. At the outpatient department, the Multiple Single-Server Queuing Model is used. This means that when patients arrive at the clinic, they will be placed in a queue to see one of the about 6 to 9 doctors who are consulting at the same time. People are sent to the lines by the clinic's nurses and record employees. Each doctor has a line of patients waiting to be seen. Patients are routed to the appropriate queues in the sequence in which they arrived. They go to the pharmacy, the payment centre, the laboratory, or their house

after seeing the doctor.

Jennifer L. Wiler (2013) said it's difficult to create mathematical models that fully capture the ED's unique and complex flow of patients. Future research is needed to confirm the model's validity across a variety of institutions. Overcrowding in emergency rooms (EDs) has gained a lot of public attention in recent years. The holding of patients admitted to the hospital in the emergency department (ED boarding) has also been identified as a developing concern that contributes significantly to ED overcrowding. Overcrowding in emergency rooms is known to lengthen patient wait times. With longer wait periods, the number of patients who Leave without being seen (LWBS) rises. Patients who leave the ED without being assessed by a clinician are at risk for poorer health outcomes, which costs hospitals money and reduces patient satisfaction.

A. H. Nor Aziati (2018) remarked that the public clinic's biggest concern is always the long wait to be served at the outpatient counter. In comparison to the other sections, the outpatient department of the public health clinic had the most queues. Patients have frequently expressed their dissatisfaction with this circumstance. As a result, at the outpatient counter, to patient's wait time and service time as well as to build an appropriate queuing system using simulation techniques is determined as the objective of this research . To develop a viable model, this work used descriptive analytical and simulation methods. The arrival rate and service rate of patients at the outpatient counter were used to collect waiting time for this investigation. Microsoft Excel was used to generate and evaluate the data. The simulation model revealed that the average waiting time for patients in line is 54.295 minutes, with an average total exit patient count of 327. As a result, the average wait time is 13.481 minutes. This study demonstrated that the clinic met the Ministry of Health patient charter's goal of waiting 60 minutes or less to see a doctor. The study also addressed a few issues discovered during the observation, and appropriate solutions were devised to reduce waiting times and increase usage percentages, including rearranging the scheduling of services.

CHAPTER 3: METHODOLOGY

Research question

How operationally feasible is it to implement QMS in the decentralized OPD layout of Rukmani Birla Hospital, Jaipur?

Objectives

- To assess the operational feasibility of QMS
- To evaluate the challenges for QMS implementation
- To document the effectiveness of QMS in improving hospital service delivery

Research design

Mixed research- both observational and Cross-sectional.

Study setting

The research was performed in a 230-bed multi - specialty hospital in Jaipur.

Study population

Patients who come to the hospital to receive services.

Study Tools:

Parameters to measure effectiveness and challenges of using QMS through survey. The data calculated is analyzed using Microsoft Excel.

- Patients Attitude towards the adaption of new system
- Patient Journey Time
- Patient total waiting time

Sample size

86 sample size

Sampling methods

Random sampling to access users by understanding Patient's journey

Data Collection

- A descriptive cross-sectional survey was conducted. A Questionnaire was given to patients who visited the general outpatient department (OPD). Observations were also made on the queuing model and the service discipline at the clinic. Questions were meant to obtain demographic characteristics and the time spent on the queue by patients before being seen by a doctor, convenience in use of QMS, their views about effectiveness and challenges of QMS. A total of 86 patients were surveyed. The staff who were deployed in the billing for the patients were also surveyed. The data report generated automatically captures the patient journey at every step in the process – helping enhance performance while opening up opportunities for benchmarking.

Comparative Assessment of process /system improvement:

Comparative analysis refers to the comparison of two or more processes, data sets. Here, comparative analysis is used to compare patients journey time records, Patients prospective to assess the effectiveness of new system.

Patient satisfaction level knowing their turn

To know about their attitude towards acceptability of token system /QMS helping Know their turn for consultation with doctor in Rukmani Birla Hospital of Jaipur city.

Display system:

People standing in large lines in front of hospital counters is a typical occurrence. These individuals are unable to do anything else until they are serviced. To avoid individuals the trouble of waiting in large lines, it is preferable to give each person a token and have them call in turn. Otherwise, one can remain occupied until that person's token number is flashed and notified. In such cases, the Token Display System can assist in creating a hassle-free atmosphere. Clients are served effectively and efficiently without having to wait in line. The token display system aids in the management of tokens and offers information to those who are waiting.

CHAPTER 4: RESULTS

The results from the Questionnaire for studying Patients/users perspective are as follows:

- Comparative Assessment of process /system improvement

Organizations challenge present system practises and assumptions, according to W. Edwards Deming's management theory, not by suggesting incremental improvements, but pointing to new method of manage the same.

Through the analysis of data collected it is found 71 out of 86 had visited the OPD before who said that the token system/QMS better than the system before, of manually keeping the patient files for their consultation with doctor that makes 90% of the study population favoring the new system. And more than 70 % patients find it time saving, also reduced the re-billing time.

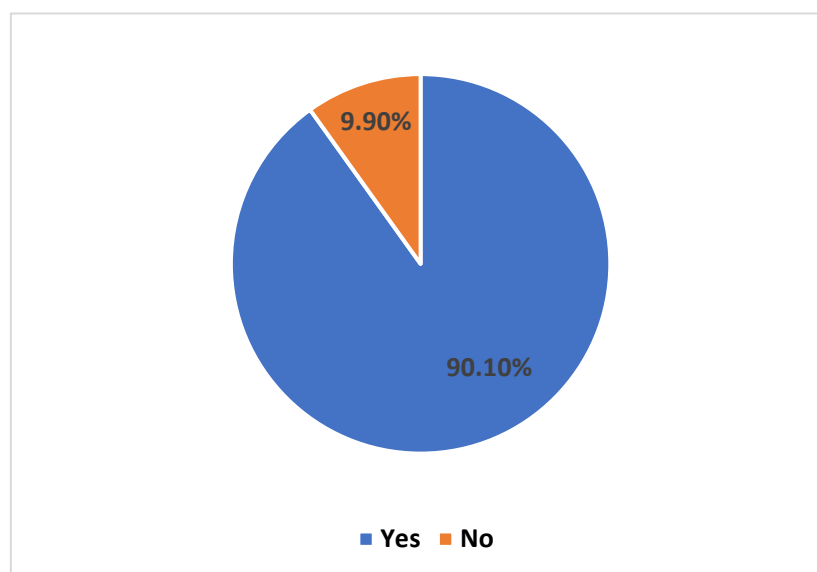


Fig.4 Percentage of patients who find QMS system better than system before

- Reduction in re-billing time

A rebill is a modified copy of an original invoice with adjusted charge amounts for various line items.

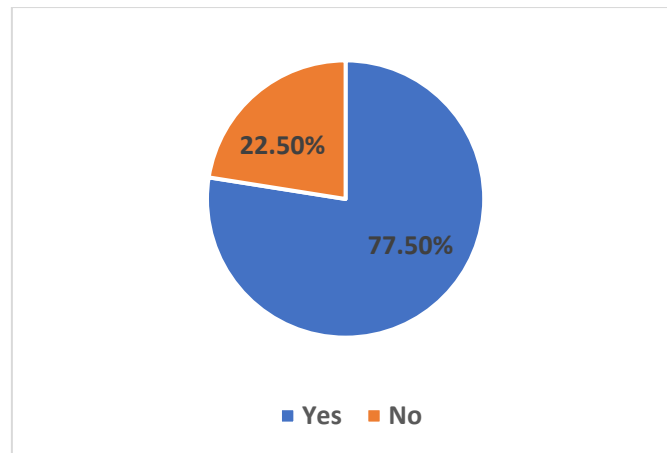


Fig.5 Response of patients on reduction in rebilling time

- KAP analysis

To measure the levels of various aspects of Knowledge there was a section having 9 questions in the google form. Different aspects of the QMS were asked, like the display system, the token no. message patients receive on their mobiles, satisfaction level, likes and dislikes about the system and the overall rating feedback for the QMS system.

Display system:

Out of 86 patients 94% said that the system was appropriate.

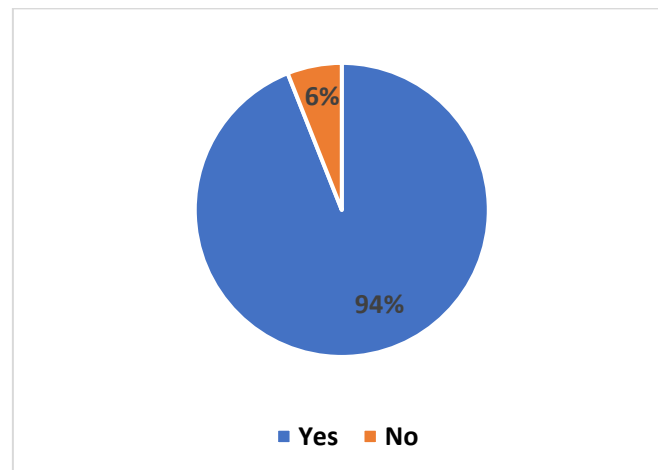


Fig. 6 Response of patients on appropriateness of display system

Patient satisfaction level

The patients were asked about the satisfaction level as they are aware of their consultation turn , about 95.3 % of the patients agreed that they are satisfied .

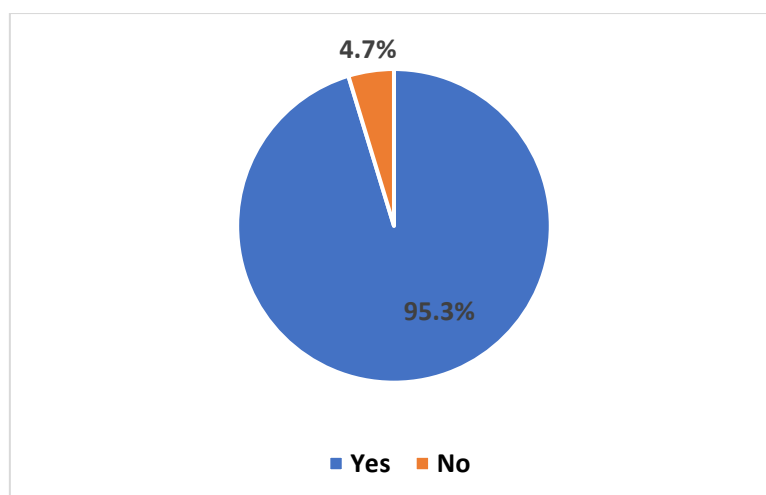


Fig. 7 Patient satisfaction level for knowing turn

Overall Rating feedback for the QMS system:

Feedback analysis involved identifying the needs and frustrations of customers, so that system can improve customer satisfaction and reduce churn.

Total experiences of 86 patients were computed to determine their experiences regarding QMS provided in the OPD of Hospital. Maximum no. of patients i.e. more than 80% showed high satisfaction, rate for the Queue management system , only few were dissatisfied .

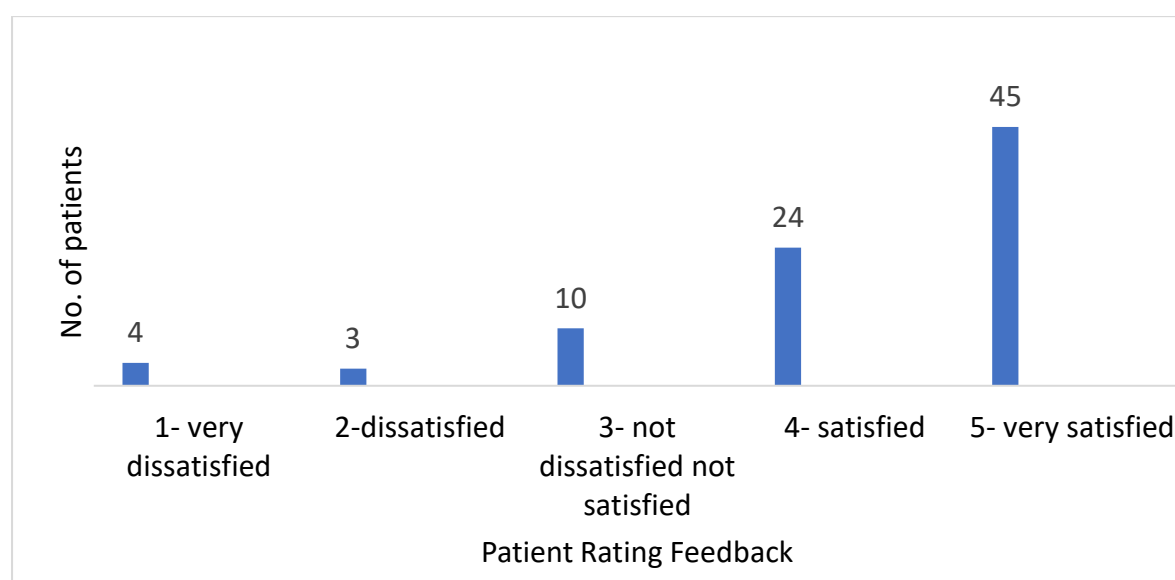


Fig. 8 Patient feedback for the Queue Management system

Staff Level of perspective towards QMS:

According to the 5 staff deployed at the billing counters where the QMS is installed, the 80% staff finds that the QMS reduces patient wait time and service time considerably.

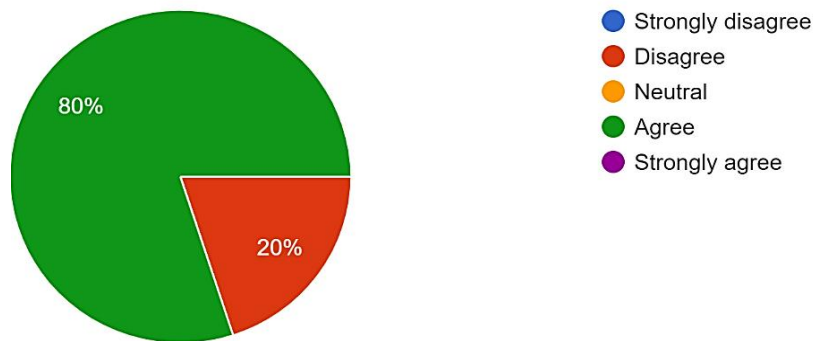


Fig. 9 Percentage of patient find reduced wait time

Also, according to most of them i.e.80% said that, QMS makes the service area less crowded with patients.

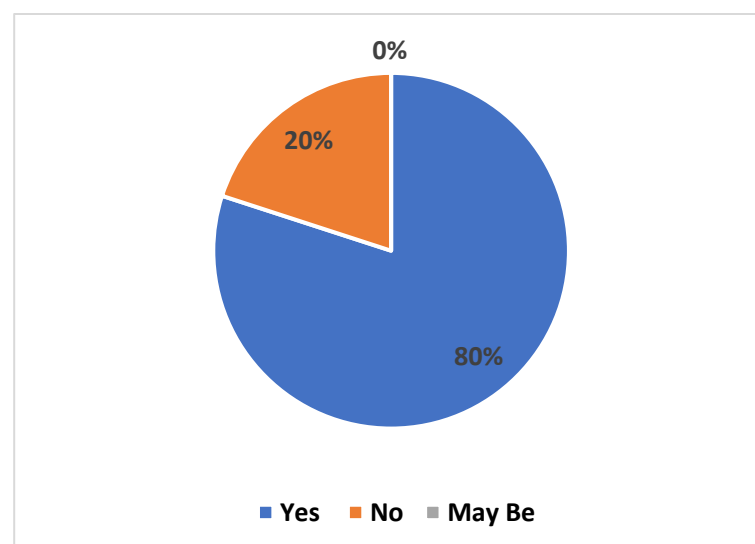


Fig. 10 Percentage of patient find reduced crowding

CHAPTER 5: DISCUSSION

Crowding and waiting makes patients to leave with dissatisfaction sometimes without even getting consulted by doctor. Queueing models are well suited to representing the OPD environment with both appointment and walk-in patients. Arrivals, servers, service principles, and the flow or routing of the customer through the system are the four components of queueing systems. The effect of varying demand on wait times, waiting tolerance, capacity, and utilisation measures is then described using these models.

According to a study, when wait times keep on increasing, the number of patients who leave without being seen (LWBS) also increase as well. Patients leaving the ED without being assessed by a clinician are having poorer health outcomes and having risk, which costs hospitals money and reduces patient satisfaction.

According to another study The greater the accessibility, the higher the level of patient happiness. Following an analysis, it was discovered that more than half (62%) of patients agreed that the waiting time for receiving treatment from a doctor is appropriate for them, implying that the accessibility for receiving a treatment card is poor, i.e. 38% of patients disagreed with the statement that the waiting time for receiving the OPD is appropriate for them. As a result, the hospital administration must pay attention to this issue. Similar outcomes were reported in a study conducted by Andrabi Syed Arshad to gauge patient satisfaction in a tertiary care centre, SKIMS, Soura, Srinagar. Approximately 42% of patients said the time it takes to get prescribed drugs from the pharmacy was too long for them, and that the pharmacy staff sometimes treated them unfairly while they waited.

Working Of Queue Management :

1. OPD Schedule gets divided into various OPD departments for example: NEURO Section, HEART Section etc
2. These OPD departments further getting divided into Particular No. of Doctors those are available in those particular departments.
3. Doctors are divided according to their respected OPD schedule for the Days on which the doctors are available in that hospital.

4. Days are further divided according to Time Slots for that day.
5. Patient's appointment will work on the basis of Date & Day that the patient have chosen for his/her appointment.
6. Patient will get entered into the waiting list according to the preferences he/she has chosen for their appointment.
7. If the time slot that the patient had chosen is available then the appointment gets confirmed.
8. If the time slot that patient had chosen is not available then patient have to chose another day and date for that time slot. But the patient get into the waiting appointment list as per by his/ her first entered/preferred date.
9. If anyone from the confirmed appointment cancels his/her appointment then patients from the waiting list gets notified with the message .
10. Then the patient from the waiting list can book for that vacant slot otherwise can continue with the confirmed slot.

Advantages of Proposed System

- Reliable process.
- Patients will save time, effort, and money by not having to wait in line to arrange an appointment using the suggested method.
- It makes it easier for both the patient and the doctor by scheduling an appointment for them.
- If the preferred appointment date by the patient is completely filled then he can still keep the choice open and will be allotted the same if a cancellation happens for that preferred date.

Limitation of the Study:

Given the fact that the study was carried out to the best of its ability, there were a few drawbacks, such as Queueing models necessitate a set of assumptions 1) Customer flow is unidirectional (patients move from one service to the next 2) Arrivals are always a surprise , and 3) The system's arrival rate is constant and stationary over time.

The sample size for measuring the patient's journey was just 86 people, which is insufficient to generalize the findings to the entire patient population: The sample size was changed due to a drop in OPD due to COVID-19 and the hospital's delayed implementation of QMS technology.

CHAPTER 6: CONCLUSION

The study on the Operational Feasibility Analysis of Queue Management System in a decentralized outpatient department Layout at Rukmani Birla Hospital, is a useful tool for assessing the system's practicality from the perspective of the patient and, to a lesser extent, the employees. The information obtained from this type of study is useful in bridging the gaps and making the hospital journey more appealing to patients.

The study found that patients were satisfied with all aspects of the system, including the display system, the message mode as a token system, time savings, and reduced re-billing time. Maximum number of respondents had very good feedback with 5 rating while just a small proportion of patients had a negative experience. In acceptability of the system to provide more information about the turn for doctor consultation, convenience of use of the system and time saving it was found to be acceptable by most of patients and staff. Some of the limitations found were that it requires an extra manpower to introduce the patients about the system because 59.3% patients were using this system for the very first time. As the waiting time was always major concern to patient. Majority of the patients had found this system which reduced waiting time, and also reliable as the queue is managed by a virtual system and their number of consultation with the doctor can't be altered manually. Also QMS found to fill the gap of The hospital administration should made continuous efforts based on the satisfaction level of the parameters in this patient satisfaction and operational feasibility study, to improve some aspects of the service.

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