

# Identifying Areas to Overcome Waiting Time in Hospital Outpatient Department

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**Abstract :** This paper explores diverse areas to overcome waiting time problem in Hospital Outpatient Department in today's health scenario when a considerable percent of our total population is prone to diseases. It has been known as per the World Bank statistics that India has only 0.7 hospital beds per 1000 patients. Hence a study is required to find out the areas where the chances of formation of queue are strong, for betterment of our health delivery system. This study is an effort to find out the departments in the popular NCR (National Capital Region, India) hospitals, where the patient queues are mostly formed. The present study is limited to Noida and Greater Noida region of NCR. The study suggested that the most crowded outpatient departments in the region of study were General OPD, Orthopaedics and Gynaecology. Further, basic parameters of a patient arrival system have been studied for improving the system efficiency.

**Index Terms - Healthcare, Outpatient, Waiting time, Queues, Arrival.**

## I. INTRODUCTION

Ours is a service based economy and we wait in line every day. We also encounter queues at factories where jobs wait in lines to be performed at different machines, and machines themselves wait for their turn to be overhauled. In short, queues are pervasive. It's often one of the most frustrating parts about seeing the doctor. Undoubtedly, there are numerous factors—physical, psychological, and emotional, to name a few—that affect a patient's perception of the waiting experience.

Nowadays in health care, patients consider Comprehensive factor as the actual criteria for suitable and desirable treatment i.e. a treatment which is rapid and most suitable. Prompt treatment in a hospital means to minimize the time for getting a health service with an emphasis on the favourable treatment (Dansky & Miles, 1997). Effectively managing patient flow in an outpatient unit is a key to achieve operational excellence as well as ensuring clinical quality.

## II. REVIEW OF LITERATURE

A patient is considered waiting in a queue as soon as he enters the hospital or any healthcare system for registration until he consults with a doctor. Queue for registration i.e. including the payment process and record classification made is also part of patients' queuing and therefore waiting time. The other aspect i.e. waiting within the hospital can be reduced only through basic intervention approaches including deploying appropriate work force including doctors, staff etc.

A queue is formed when a line or a sequence of people or vehicles or data or items wait for their turn to be attended or to proceed or to be processed. Patients' queue are therefore formed when entities that request service, typically referred to as customers, arrive at a service facility and cannot be served immediately upon arrival. In healthcare delivery systems, patients are typically the customers and either outpatient clinics or diagnostic imaging centers or hospitals are the service facilities.

Waiting is a consequence of the mismatch between the available hospital resources and the needs for care. This mismatch may be attributed to having insufficient resources to meet demand for health care. But the lack of planning, coordination, communication in delivering health care services is also the reason why resources and needs are not adequately synchronized with each other.

There are several problems faced by Outpatients like in smooth Patient Admission System, Patient flow, Retrieval of Patient Information, during the examination process and also adjustments made for emergency cases.

Major challenges faced by hospitals over the years have led to development of several innovative management techniques which range from implementing queuing models, installing scheduling software to application of Six Sigma approach to deal with the increasing waiting time of patients.

Various types of Operation Research Models have been applied to deal with the problem of waiting time in the Healthcare sector. It has been noted that while conducting studies the authors have used many concepts of Operation Research namely Simulation, Linear Programming, etc. but Queuing Theory, has generated one of the best results and has proved instrumental in reducing Patient Waiting Time and improving Staff utilization in Hospitals.

## III. RESEARCH METHODOLOGY

### 3.1. Research Paradigm

The research study is based on observation and exploration. The study was conducted on hospital outpatients to find the peak time of patient arrivals along with the patients' opinion on areas of delay and reasons of delay in meeting the doctor.

The waiting time was considered from when the patient was registered, till he met the doctor. Also, the time of entry of the patient in the hospital till his registration has not been considered. The Turn Around Time (TAT) is considered from Patient's registration till he gets his prescription.

### 3.2. Study Area

The study was conducted within National Capital Region to identify hospital departments with maximum patients' footfall.

### 3.3. Study Population

The study conducted within National Capital Region included private hospitals in Noida and Greater Noida offering comprehensive healthcare services. These hospitals have specialties like Gynecology, Skin, ENT, General Medicine, Nephrology, Pediatrics, Pulmonary, Urology, and Ophthalmology. The hospital provides complete medical services of these specialties i.e. outpatient services, surgical services, diagnostics and medicinal services. Only the outpatients arriving at these hospitals were considered for this research study.

### 3.4. Sample selection

The method of systematic random sampling was followed, amongst the hospitals located within the National Capital Region. Also, random sampling method was followed for conducting the survey study with patients.

### 3.5. Sampling procedure

Out of all the NABH approved hospitals, 20 hospitals were short listed on the basis of no. of outpatients arriving each day, and the no. of beds. The sample was restricted to the hospitals with a bed size of 50 – 100 beds. These 20 selected hospitals were visited to further verify the details collected on phone. Then, they were analysed for 10days in person, to find the hospital with maximum foot fall. Then the hospital with maximum footfall was shortlisted for a month long analysis.

### 3.6. Theoretical Framework

#### 3.6.1. Dependent Variables

In this study, the dependent variable is the patient waiting time, service time, and doctors' idle time. For this research, patient waiting time is measured from the time as soon as he enters the hospital queue for registration until he consults with a doctor.

#### 3.6.2. Independent Variables

The Independent variables include the primary explanatory variables including all the post visit factors such as Arrival Time, Week day, Point of Delay and Reason of delay quoted by the patients

### 3.7. Data Collection

#### 3.7.1. General data collection

Data collection was done from secondary resources as well as primary resources i.e. hospitals and patients. At first, the data was collected using secondary resources like NABH website, Justdial.com and Yellowpages.com to get a list of hospitals situated in Noida and Greater Noida region that are NABH approved. NABH i.e. National Accreditation Board for Hospitals is the body for governing the quality standards in Hospitals. As per NABH guidelines, hospitals must maintain waiting time maximum up to 15minutes.

As a part of secondary research, the websites of these hospitals were visited to find the basic details about these hospitals. The required details included the exact location of the hospital, contact details, no. of beds in the hospital, the specialities available in it and the no. of doctors on panel in each speciality. These hospitals were, then, contacted on telephone to collect details related to the total patient footfall each day, busiest days of the week, busiest time each day.

For primary research data, the shortlisted hospitals having maximum number of outpatient arrivals per day were studied. The sample consisted of 50 – 100 bedded hospitals. The details collected in the telephonic interview were confirmed by making physical visits to 20 shortlisted hospitals. The primary data was collected for the patients arriving each day for 10 days to find busiest days of the week and peak hours.

**Table 1: Hospitals studied within NCR region**

Respondents	Total
Hospitals Studied	20
Region	Noida, Greater Noida
Bed-size	50-100 beds

Finally, to understand the pattern of patient footfall, the selected hospital with maximum footfall was observed for about a month to conduct the survey study. The observations made have been discussed further.

#### 3.7.2 Collection tools

Majorly, there were two data collection methods used in this study.

The first tool is telephonic survey method to understand the patient arrivals in the hospitals within National Capital Region. The second tool is the structured questionnaire which was administered by the researcher to the outpatients.

#### 3.7.3 Quantitative data

Each day, in the end, all filled up forms were checked for completeness, consistency of information. Any recorded mistakes were corrected. All variables data including the ones with missing information were entered using MS Excel sheets.

Variables that were recorded are; Arrival Time, Day of the week, Point of delay and reason of delay. The patient responses which were incomplete were deleted.

3.7.4 Research Objectives

**Objective 1:** To find the departments with maximum number of patients within National Capital Region.

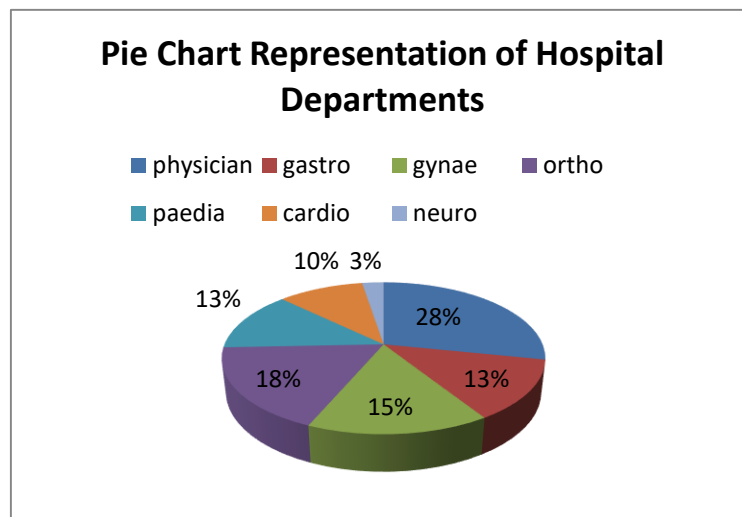
**Objective 2:** To find the peak time and days of the week during which the outpatient department suffers blockages.

**Objective 3:** To find the average arrival rate, average service rate, system utilization factor and the percentage of time doctor remains idle which was the service time.

**IV. OBSERVATION AND ANALYSIS**

To prepare the data for analysis, the data was entered into Excel sheets and was then represented using pie charts.

The pie chart presentation reflects that out of the twenty hospitals survey, the maximum no. of hospitals had General Medicine as the busiest one amongst all others, followed by Orthopedics, Gynecology, Pediatrician and Gastrology.



**Figure 1: Outpatient Departments with Maximum Patient footfall**

The patients’ statistics shows that the maximum patient footfall in the hospital outpatient department was during the 10am to 1pm. Also, maximum patient arrivals are on Mondays, Wednesdays and Saturdays. The patients were asked about why they had to suffer the delays in doctor’s consultation. Most of the patients stated that they waited for long time in the Triage section or when additional examination was to be done. They also mentioned that the main reason behind the delay was too many patients’ arrival within a short span of time.

**Table 2: Patient observations during Hospital OPD visit**

Patients’ Observations	
Arrival time	Percentage
9-10am	4.2
10-11am	25.4
11-12pm	28.5
12noon-1pm	34.5
After 1pm	7.5
Day of the week	
Monday	24.6
Tuesday	9.7
Wednesday	18.1
Thursday	12.6
Friday	3.3
Saturday	23.5
Sunday	8.2
Point of delay in Consultation	
Irregular patient arrival pattern	18.4
Due to waiting in Triage	29.4
Examination during consultation	26.8
Diagnostics	13.1
Chemist	12.2

Reason for delay	
Many patients	44.7
Staff inefficiency	30.5
Fewer staff	24.8

Therefore, System utilization factor was also studied to find the efficiency of this Outpatient service system.

#### 4.1. Observations:

The system was observed during the peak hours of OPD services. The patient arrival pattern on Monday as below gives following results.

**Table 2: Observations made on Monday during peak hours**

Time	Minutes (peak hour)	No. of Patients	Arrival Rate	Average Arrival Rate
<b>Start time</b>	0 min	8		<b>1.7</b>
	After 10 min	18	1	
	After 20 min	30	1.20	
	After 30 min	45	1.50	
	After 40 min	60	1.50	
	After 50 min	80	2.00	
<b>End Time</b>	After 60 min	111	3.10	

We consider the system as a Queuing model and calculate the following system parameters

1) Parameters of Queuing model:

- i. Average service rate of server,  $\mu$
- ii. Average arrival rate of customer,  $\lambda$
- iii. Utilization Factor,  $\rho = \frac{\lambda}{\mu}$
- iv. Percentage of idle workstation =  $(1 - \rho) 100\%$
- v. Expected no. of patients in system L,

Little's Formula:  $L = \lambda T$

where L is expected number of customers in the system,

$\lambda$  is average arrival rate of customer and

T is the average service time for a customer.

By using the value of L, we can calculate service rate,  $\mu = \frac{\lambda (1+L)}{L}$

#### 4.2. Calculations

It must be noted that on an average, each patient gets 5minutes to meet the doctor,

Expected number of patients in the system,  $L = \lambda T$

$$= 1.7 \times 5 = 8.5 \text{ patients}$$

Average Service Rate,  $\mu = \frac{\lambda (1+L)}{L}$

$$= \frac{1.7 \times (1 + 8.5)}{8.5}$$

$$= 1.9 \text{ p.p.m}$$

Utilization Factor,  $\rho = \frac{\lambda}{\mu}$

$$= \frac{1.7}{1.9} = 0.89$$

Percentage of Idle time of Doctor =  $(1 - \rho) 100\%$

$$= (1 - 0.89) \times 100\% = 11\%$$

## V. RESULTS AND DISCUSSION

The above study clearly reflects that the maximum no. of patients' turn out is for the General physician and next is the orthopaedic department followed by gynaecology, paediatrician and gastrology department.

It is revealed from the study that 11% of the times doctors are idle. But the expected number of patients in the system at once is 9 patients approximately. This means that despite 11% of the time doctors are idle, 8 to 9 people queue up during morning hours on Monday.

It suggests that more patients can be sent to the doctors to reduce the number of waiting patients in the OPD department

It is understandable from the analysis that the hospital departments with maximum no. of patients turn out is more likely to face the problem of queue formation in comparison to others. However, as per the results, 11% of the time, doctors are idle. The patients are asked to wait for longer duration than the required time putting extra pressure on the overall system as it increases the total no. of patients in the system.

Hence, the hospital administration needs to pay more attention towards making it policy driven for improving the efficiency of hospital OPD department and get a comprehensive system analysis done.

## VI. STUDY LIMITATIONS

The research was limited to the outpatient department. The research was limited only to post-visit factors related to the outpatient department.

## VII. CONCLUSION

Patients are dealing with the problem of waiting in a queue due to different issues in the medical care units at several levels such as Appointment systems, progressive Patient flow, Patient records, Examination procedures etc. Due to this patients are left highly dissatisfied. Hospitals are trying to tackle this problem taking help of techniques such as queuing models, process models, Hospital Information System, Six Sigma, Simulations.

In NCR region, the maximum number of patients' turn out is with the general physician followed by orthopaedic department, gynaecology, paediatrician and gastrology. Also, it was revealed that despite 11% of the time doctors are idle, 8 to 9 people queue up during morning hours on peak days.

Also, the maximum patient turn out in general physician department needs to be checked. For this, an appointment scheduling system is recommended for the OPD services to improve the average no. of patient arrivals during peak hours and maintain uniformity in the arrivals.

The study to find the average arrival rate of OPD patients and other parameters of the service has given crucial inputs to the Hospital Administration to effectively deal with the overcrowding problem during OPD peak hours to improve the patient satisfaction level.

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