



QUEUING MODEL STUDY: AVERAGE OUTPATIENT WAITING TIME AT A TERTIARY CARE GOVERNMENT MEDICAL COLLEGE HOSPITAL

Medical Science

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ABSTRACT

Average waiting time to avail the required service is crucial indicator for any process improvement. Tertiary & super specialty care provider Government Hospitals with lot of patients walking in very much requires the queuing model studies to evaluate the average waiting time. Usually patients are unaware of their exact specialty care consultation required for their problem, they prefer consultation of the specialist as suggested by their relatives, friends or at registration guidance. Scientific evaluation of patient condition has to be made by a general physician, who is the right person to judge the patient requirement. Specialty doctor time can be properly utilized if proper screening of the patients by a general physician is done before elective outpatient registration. Average time per outpatient is 33 minutes.

KEYWORDS

Queuing Model, Tracer Methodology, Gantt chart, PACS, X ray, MRI & CT Scan

INTRODUCTION:

Sample of Average waiting time to avail the required service is crucial indicator for any process improvement. Tertiary & super specialty care provider Government Hospital with lot of patients walking in very much requires the queuing model studies^[1] to evaluate the average waiting time. Usually patients are unaware of their exact specialty care consultation required for their problem. They prefer consultation of the specialist as suggested by their relatives, friends or at registration guidance. Scientific evaluation of patient condition has to be made by a general physician, who is the right person to judge the patient requirement. Specialty doctor's time can be properly utilized if proper screening of the patients by a general physician is done before elective outpatient registration^[2].



Gandhi Hospital was established in the year 1851 as infirmity with 3 wards, in the year 1900 it is developed as a cantonment hospital with 95 beds, which later was renamed as King Edward Memorial Hospital in the year 1913 with addition of more beds. Post-independence of British India the hospital is scaled up as a teaching medical institute and is named as Gandhi Medical College and Hospital in the year 1958. At present the commissioned bed strength of the hospital is 2000, but the demand of patients and addition of more beds makes it a 2200

bedded hospital. Gandhi Hospital is one of the oldest government medical college & hospital not only in Telangana state situated at capital city Hyderabad, India but is one of the oldest medical college hospitals in the country. It caters to a daily average of 2000 outpatients visit to various medical and surgical specialty / super specialty clinics.

METHODOLOGY:

Sample of 30 patients is taken for identifying the waiting time at each service point for a critical path taken to avail outpatient services at the Gandhi Hospital. The convenient random sample of patients visiting the outpatient clinics is taken for the study.

Tracer methodology^[3] is adopted for the data collection, wherein each patient identified randomly on arrival at the registration counter. It is a double blind study where the patient and service providing staff are not disturbed. Unbiased observational metrics are tabulated, outliers are eliminated and the data is validated. Data is analyzed using the simple statistics to find the basic demographic information and the average waiting time at each service point.

Nine major service points are observed and time taken for completion of each service is recorded. The major service points are 1 Outpatient registration, 2 Consultation with doctor, 3 Laboratory registration, 4 Sample collection, 5 Radiology registration, 6 X Ray diagnosis, 7 Ultrasonography diagnosis, 8 MRI / CT Scan diagnosis, 9 Pharmacy dispensing. The study is excluding the commuting time taken by patient from one service area to another. Each patient tracer is unique, the combination and number of facilities availed by patients vary depending on their clinical condition and diagnostic procedure instructed by the doctor.

Among the 30 patient randomly selected for the tracer observation study, 33% are female patients and 67% are male patients. The medical specialty wise and gender wise and age wise patient are shown in the table below

Medical Specialty	Female												Male												#	%	
	27	28	34	36	39	44	45	51	56	62	28	32	35	39	41	42	43	47	48	51	53	58	59	60			61
Orthopaedics												*	*	*				*	*		*	*				7	23.3
General Medicine			*				*									*					*	*				5	16.7
General Surgery				*		*								*				*								4	13.3
Urology															*		*							*		3	10.0
Dermatology														*				*							*	2	6.7
Gastro-enterology								*										*								2	6.7
Neurology		*								*									*							2	6.7
Neuro-surgery									*		*															2	6.7
Obstetrics & Gynaecology	*				*																					2	6.7
Cardiology																				*						1	3.3

FINDINGS:

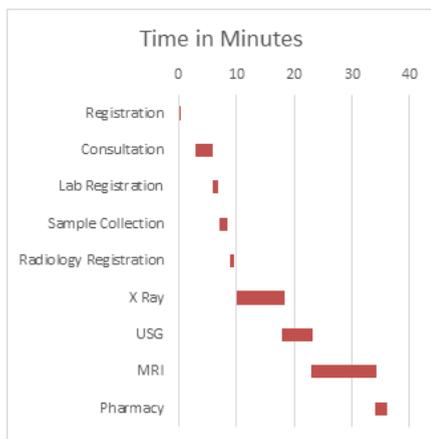
From observations of the convenient patient tracers the evaluations are made. The elective study of outpatient is made with the queuing model. Duration of each patient outpatient consultation tracer is done with respect to the waiting time at each facility component; the measure of time is recorded as total minutes and seconds.

Inference of the data after validation and elimination of outliers shows that the minimum time taken for outpatient consultation is (23 Minutes and 02 Seconds), maximum time is (42 Minutes and 05 Seconds). An average time is (33 Minutes and seven seconds) for the patients to complete his end to end process requirements as an elective outpatient at the hospital OPD department. The time taken is the sum of all the points of care of facilities visited by the patient, starting with when the patient is entering each care facility with joining in a queue. Ends with the time when patient exits the last facility queue after consultation either with scheduled appointment with doctor advise or with completion of the service required at that facility. Then suggested to collect report later on.

The key observations for the study are tabulated as minimum, maximum and average time taken in minutes and seconds at each service facility in the following table.

Sr. No	OPD Facility	Time in Minutes			Average Percentage
		Min	Max	Average	
1	Registration	10.00	28.24	19.30	1%
2	Consultation	60.48	267.36	170.54	9%
3	Lab Registration	27.12	78.00	54.05	3%
4	Sample Collection	5.00	120.00	92.58	5%
5	Radiology Registration	30.00	52.00	41.29	2%
6	X Ray	455.12	534.00	495.24	25%
7	USG	236.48	380.00	310.38	16%
8	MRI	502.00	842.24	669.53	34%
9	Pharmacy	55.12	197.36	131.45	7%
Total Minutes		1381.32	2499.20	1984.36	100%
Time - Minutes and Seconds		23.02	42.05	33.07	33.07

PATIENT TRACER – GANTT CHART^[4]



Average time line of patient tracer at each service point is recorded. The data reveals that majority of time the patient is waiting in queue is at Radiology diagnostic facility. About 34% of time the patient is waiting for MRI / CT diagnosis facility and includes the study with plain and contrast mediums for the patient, as advised by doctor. About 16% of time the patient is waiting for Ultrasonography diagnostic facility – patient for fulfilling the full bladder and getting urge for urination is taken in for consideration.

- Doctor at outpatient consultation room is examining each patient and prescribing investigations / medicines in an average time of 3 minutes and 37 seconds.
- Pharmacist at outpatient pharmacy counter is reviewing the patient prescription and explaining the dosage suggested, dispensing medicine in an average time of 2 minutes and 31 seconds.
- Registration counter staff is taking an average time of 2 minutes and 38 seconds for completing each patient registration and giving them the registration slip.

- About 7 minutes and 26 seconds time is taken by registration, doctor consultation and pharmacy dispensing facilities. 26 minutes and 21 seconds of time patient is spending at diagnostic facilities.

OBSERVATIONS: Capacity building for improvement of Radiology diagnostic facility to reduce waiting time is required. There are two reasons for longer queue length 1. There is only one MRI scan machine, two CT scan machines. Additional Ultrasonography machines are required due to increase in patient flow due to existing Government schemes for maternal health. 2. Patients are visiting multiple times, once to slot their appointment, another visit is for actual diagnostic test and next to collect the report – this process can be improved by incorporation of picture archival and communication system (PACS^[5]) for eHMS, which will help in elimination of redundant work of the staff and share the images over HMIS for the convenience of the treating doctor.

Service wise Waiting Time



63% of patients visited the Radiology Department for their investigations. Among them, 37% patients belong to Orthopedics, Neurology and Neurosurgery. They were advised for X Ray/CT/MRI investigations. 26% of patients are visiting General Surgery, Obstetrics and Gynecology and Gastroenterology and are advised Ultrasonography Scan investigation at Radiology.

LIMITATIONS / FUTURE SCOPE: The present study is limited for simple observation of patient at each facility point. Information about the facilities at required service and slotting of appointments for next visit with advise to patient, like investigations done with special preparations, is not considered in the scope of the present study.

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