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Outpatient Satisfaction at a Health Centre

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ABSTRACT Patient satisfaction is an important indicator and commonly used to measure the quality of healthcare services. The objective of this study is to assess the patient satisfaction at an outpatient clinic of a public university health centre. This study was carried out in two stages; face-to-face interviews with the patients regarding satisfaction towards facilities, staff, and waiting line at the clinic, and observation on the queuing system based on a queuing model. The queuing data were recorded for four days (Monday to Thursday). A single-line multiple-channel queuing model was considered. From face-to-face interviews, the majority of patients (70%) were satisfied with the facilities, staff and waiting time at the clinic; however, 39% claimed that the waiting time was too long. The results estimated from the queuing data showed otherwise; the maximum number of patients in queue was 4.36 and the maximum average time in queue was 9.98 minutes. These results were supported by the theoretical values of the queuing model. Hence, there was no issue regarding the waiting time. It can be concluded that the outpatient clinic is providing good healthcare services to university staff and students with a good level of satisfaction.

Keywords: **Outpatient, Patient Satisfaction, Healthcare Services, Waiting Time, Queuing Model**

1. Introduction

The difference between demand for a service and capacity available to meet the demand would result into delays [1]. This is usually transitory and due to the length of time required to provide the service and natural variability within the time of the demand. A simple example would be healthcare clinic where patients arrive without appointments in a random fashion and require a wide range of treatments. The variability between arrival and service processes make the dynamics of service system very complex. It is not possible to determine the capacity needed to achieve certain level of performance without the help of queuing models.

To improve healthcare services, especially at outpatient departments, many institutions used queuing models [2, 3, 4, 5, 6]. Regarding the efforts made by health facilities in preventing harms that could be caused by the delay of services, the presence of queuing models would enable them to track the availability of resources. Queues will always exist if the customers are not served at once when arriving at service facilities. In healthcare institutions, patients are considered as customers, and different departments such as pharmacy, pediatric and outpatient can be referred as service facilities [7]. An outpatient department can be defined as a healthcare department where doctors see outpatients which consists of consulting rooms and supporting areas. The department also provides diagnostic and treatment services. The patients do not require to stay overnight for medical observation.

Waiting time is the time interval for which one has to wait after placing a request for service and before the service actually occurs [8, 9]. Dushime *et al*. [7] studied the waiting time at an outpatient department using an observation approach. The times when a patient enters and leaves the department were recorded. They found that a large number of patients waited too long in the queue before they can see a physician. The data were analyzed using correlation analysis, and revealed that there was a negative correlation between the days and patient arrivals; more patients on Monday compared to other days. Vass and Szabo [10] conducted a study to approximate the number of human resources and the average waiting time at a healthcare service facility. The purpose was to give guidance to the management in making optimal decisions and organizing optimal workflow. The results showed that a physician could deal with more than one patient within 20 minutes in majority of cases.

A study by Olorunsola *et al*. [11] applied a simple queuing network to analyze waiting lines. The network composed of only two service stations placed in tandem. They examined the average stay to determine the optimal bed counts in Intensive Care and Medical and Surgical wards. Heaney *et al*. [12] studied the factors influencing waiting time and consultation time in general practice. Consultation time was found to be affected by the total number of patients attending a particular surgery, while waiting time was affected by an individual patient's place within that surgery queue. The results suggested that patients seen at the end of large surgeries were likely to get different services from their doctors than they would have done earlier in the session. A survey conducted by Statistics Canada [13] revealed that on average about 29% of Canadians who required health care reported difficulty accessing the services. The most frequently reported reasons were waiting times and difficulty getting appointments. One out of four complained that their waiting times were unacceptable, and one out of five reported that they experienced adverse effects such as anxiety, stress and pain. It was proven that the waiting time in getting healthcare services is an issue for some patients.

Service time can be defined as the actual time a patient spent face-to-face with a doctor in consultation [14]. The service time is recorded when a patient entered and left the consulting room. Healthcare service is a patient-oriented service that requires continuous interaction with patients [15, 16]. Patient satisfaction is the key indicator in determining the quality of healthcare services. It is a measure of the effectiveness of a health centre. Umar *et al*. [17] carried out a cross-sectional descriptive study at an outpatient department. The results showed that 31% of the patients waited less than an hour, while 96.6% spent less than 30 minutes with

the doctor. Majority of the patients waited for more than one hour before being attended to. More than half (55%) of the patients were satisfied with the services. Healthcare institutions need to take appropriate measures to reduce waiting time and ensure patient satisfaction.

The public university health centre considered in this study was established to provide primary medical and healthcare services to all university staff and students. The centre provides services that can be classified into six different units; Medical Unit, Public Health Unit, Diagnostic and Quality Management Unit, Oral Health Unit, Pharmacy Unit, and Administration Unit. Outpatient services are provided under the Medical Unit, called Medical Outpatient Clinic. There were complaints from some patients regarding outpatient healthcare services provided at the health centre especially the long waiting time. Therefore, this study aims to assess the patient satisfaction at the outpatient clinic.

2. Methodology

To realize the objective of this study, the responds from outpatients (students) were obtained from face-to-face interviews, and the queuing data at the clinic were recorded for four days (Monday to Thursday) for the periods 8am-12pm and 2pm-4.30pm (6.5 hours per day). Friday was not considered since most students are not in the campus on Friday. This study was carried out in two stages as follows.

2.1 Patient Satisfaction

Face-to-face interviews were conducted with the patients (students) on items regarding satisfaction towards facilities, staff, and waiting line at the clinic. The items considered are waiting area, consulting room, helpfulness of staff, and waiting time. Each respond was measured based on a Likert scale 1 to 5 (‘strongly disagree’ to ‘strongly agree’). The responds were recorded and analyzed using descriptive statistics via SPSS software. Descriptive statistics describe the main features of a collection of data quantitatively [18].

2.2 Queuing System

Currently a single-line, multiple-channel, infinite calling population and infinite maximum queue system ($M/M/s$) is implemented at the clinic. In other words, arrivals of patients occur randomly with an average rate of λ per unit time according to a Poisson process, service times are exponentially distributed with an average service rate of μ per unit time, s channels (consulting rooms) serve patients simultaneously (one room one patient at a time) according to a first-come first-served discipline, and no limits on both number of patients arriving at the clinic and number of patients waiting in queue.

The queuing data were collected as follows: When a patient arrives at the clinic, a temporary queuing number will be given. A nurse at the counter will call the patient for verification and the patient will get a new queuing number. The patient will wait for his/her turn to see a physician or doctor and the arrival time is recorded at this point. Once the patient’s number is called to the next available consulting room, the calling time is recorded.

The consulting room is observed until the patient leaves the room and the departure time is recorded. Then the service time can be determined. Therefore, using the collected queuing data, the number of consulting rooms, the average arrival rate (patients per hour), the average service time (in minutes), the average number of patients in queue, the average number of patients in clinic, the average time in queue (in minutes), and the average time in clinic (in minutes) for each day can be estimated.

Finally, the estimated average arrival rate per hour (λ) and the estimated average service rate (μ) were used to analyze the queuing system at the clinic based on a queuing model ($M/M/s$) by calculating the following parameters [8]. In this model, it is assumed that s consulting rooms are available, and $\lambda < s\mu$.

Probability that no patient in clinic = $$P_0 = \frac{1}{\sum_{n=0}^{s-1} \frac{1}{n!}(\rho)^n + \left[\frac{1}{s!}(\rho)^s \frac{s\mu}{s\mu - \lambda}\right]}$$ (1)

Average number of patients in queue = $$L_q = \frac{\lambda\mu(\rho)^s P_0}{(s-1)!(s\mu - \lambda)^2}$$ (2)

Average number of patients in clinic = $$L = L_q + \rho$$ (3)

Average time in queue = $$W_q = L_q / \lambda$$ (4)

Average time in clinic = $$W = W_q + \frac{1}{\mu}$$ (5)

Server (consulting room) utilization = $\rho = \lambda/s\mu$ (6)

3. Results and Discussion

3.1 Patient Satisfaction

The face-to-face interviews were conducted with 43 outpatients (students) who were waiting for consultation at the clinic. The responds (based on a Likert scale 1 to 5) were analyzed using descriptive statistics. Table 1 summarizes the responds on all items.

Table 1. Responds From Face-to-Face Interviews

Item	No. of Responds	Likert Scale 1-5		
		Min	*Max*	*Mean*
Waiting Area (comfort, clean, and pleasant)	43	2	5	3.91
Consulting Room (clean, pleasant, and quiet)	39	1	5	3.85
Helpfulness of Staff	22	3	5	4.00
Waiting time (not too long)	43	1	5	3.44

The results in Table 1 showed that all items have means between 3.44 (neutral) and 4.00 (agree). For the item waiting area, the mean value of 3.91 indicates that the majority of patients (73%) agreed the room is comfortable, clean and has pleasant surroundings. For the second item, the mean value of 3.85 indicates that 71% agreed the consulting rooms are clean pleasant and quiet. For the third item, although only 50% of the patients responded, 75% agreed that the staffs are helpful with mean 4.00. Finally, for the waiting time, 61% agreed that the waiting time was not too long with mean 3.44. Overall, with average mean of 3.80, the level of patient satisfaction regarding facilities, staff and queuing system at the clinic was recorded at 70%.

3.2 Queuing System

Table 2 summarizes the estimated values of all required parameters that calculated using the queuing data collected at the clinic for four days; Monday to Thursday, 8am-12pm and 2pm-4.30pm (6.5 hours per day). Although there are 24 consulting rooms, not all were opened at the same time and not all were operated 6.5 hours per day. The number of consulting rooms for each day was estimated based on the total room-hours of operation on that day.

There were more patients on Monday as compared to other days. This agreed with Dushime *et al*. [7]. Monday had the highest number of consulting rooms (10) with the highest number of patients (172). The lowest number of patients was on Thursday (91) with only six consulting rooms. The average service times were approximately equal except for Wednesday (4.6 minutes). The daily averages of the number of patients in queue were between 2.89 and 4.36, while the daily averages of the number of patients in clinic were between 4.22 and 6.39. The maximum average time a patient spent in the queue was 9.98 minutes (Tuesday), while the maximum average time in clinic was 16.56 minutes. Based on these values, it can be concluded that there was no issue on the waiting time at the clinic.

Table 2. Estimated Values of Parameters for Four Days

Parameter	Mon	Tue	Wed	Thu
No. of Consulting Rooms – s	10 (10.08)	8 (7.68)	7 (6.53)	6 (6.12)
No. of patients attended	172	130	107	91
Average arrival rate (patients/hour) – λ	26.5	20.0	16.5	14.0
Average service time (minutes) – μ	6.20	6.58	4.60	6.29

Average number of patients in queue – L_q	4.06	4.36	2.89	3.37
Average number of patients in clinic – L	6.35	6.39	4.22	4.84
Average time in queue (minutes) – W_q	7.60	9.98	7.33	9.53
Average time in (minutes) clinic – W	13.80	16.56	11.93	15.81

Next, the theoretical values for all parameters were calculated using Eq. 1 to Eq. 6, and compared with the estimated values (Table 2), as shown in Table 3.

Table 3. Theoretical Values of the Queuing System for Four Days

Parameter	Mon		Tue		Wed		Thu	
	Theo	Est.	Theo	Est.	Theo	Est.	Theo	Est.
No. of Consulting Rooms – s		10		8		7		6
Arrival rate (patients/hour) – λ		26.5		20.0		16.5		14.0
Service rate (patients/hour) – μ		9.7		9.1		13.0		9.5
Probability that no patient in clinic – P_0	0.07		0.11		0.28		0.23	
Average number of patients in queue–L_q	0	4.06	0	4.36	0	2.89	0	3.37
Average number of patients in clinic – L	2.73	6.35	2.2	6.39	1.27	4.22	1.48	4.84
Average time in queue (minutes)–W_q	0	7.60	0	9.98	0	7.33	0	9.53
Average time in clinic (minutes)– W	6.19	13.80	6.6	16.56	4.62	11.93	6.32	15.81
Server (consulting room) utilization– ρ	0.27		0.27		0.18		0.25	

The theoretical values for all parameters and days are much lower than the estimated values. For example, the estimated values of the daily averages of the time in clinic were between 11.93 minutes and 16.56 minutes, while the corresponding theoretical values are between 4.62 minutes and 6.6 minutes. These large differences between estimated and theoretical values were due to most of the doctors or physicians in consulting rooms spent more time to update the records and prescribe the types of medication for the previous patients before ready for the next patients. This was supported by the low values of server (consulting room) utilization with the maximum percentage of 27% (i.e., only 27% of the operated consulting rooms were fully utilized). The time taken by a doctor or physician in a consulting room to update a patient's medical record and prescribe the type of medication was not considered in this study.

4. Conclusions

The interviews conducted with the patients at the clinic revealed that majority of patients (73%) agreed the waiting area is comfortable, clean and pleasant, while 71% agreed that the consulting rooms are clean, pleasant and quiet. The staffs at the clinic are helpful at 75%. For the most important item, 61% agreed that the waiting time was not too long, or 39% claimed that it was too long. Hence, it can be concluded that the level of patient satisfaction regarding facilities, staff, and waiting time at the clinic is satisfactory at an average level of 70%.

The observation on the queuing system at the clinic showed that there were more patients on Monday as compared to other days. Monday had the highest number of patients with the highest number of consulting rooms (10). The lowest number of patients was on Thursday with only six consulting rooms. The maximum average time in queue was 9.98 minutes (Tuesday), while the maximum average time in clinic was 16.56 minutes. Based on these values, there was no issue regarding the waiting time. This contradicts with the 39% of the patients who responded that the waiting time was too long. The comparison between estimated values and theoretical values showed that the theoretical values were much lower. The large differences between estimated and theoretical values were due to most doctors spent more time to update the patients' records and prescribe the medication. This was not considered in this study. The low values of consulting room utilization (maximum 27%) clearly agreed with this claim. As the final conclusion, the outpatient clinic is providing good healthcare services to university staff and students with a good level of patient satisfaction.

For future work, the time taken by a doctor or physician to update a patient's record and prescribe the type of medication should be considered in the data collection process. Furthermore, computer simulation software such as Arena® may be employed to model and analyze the queuing system at the clinic [9, 19].

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