

Waiting Time Analysis of Pharmaceutical Services with Queue Method In PKU Muhammadiyah Hospital Bantul

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Abstract- The increasing number of patient visits in the Outpatient Pharmacy Installation of Pku Muhammadiyah Hospital Bantul in 2016, impact on the number of recipes that should be served by the higher staff. This leads to long queues due to the slow service process that also affects long waiting times. Knowing the picture of waiting time of outpatient pharmacy service, Identify model of queuing system, and identify any factors influencing waiting time of outpatient pharmacy service. This research is a quantitative research with descriptive observational research method from samples taken and to support this approach, the researcher also conducted qualitative observation by doing observation interview. The average waiting time of outpatient pharmacy service is 39.23 minutes with the longest service time reaching 54.08 minutes and the fastest time of 19.04 minutes. The process of service delay at the time prior to delivery of the drug is the most contributing greatly affecting service time. From result of analysis using queuing method obtained queuing system Pharmacy Outpatient PKU Muhammadiyah Hospital Bantul have pattern of arrival of Poisson distributed patient, time of patient service of Poisson distribution and result, as follows: $L_q = 14,27$; $L = 16.15$; $W_q = 0.3036$; $W = 0.3436$; $P_0 = 3.09\%$, and Officer busyness level is 94%. The percentage of unemployed time officers whose value is 6% then the number of IFRS of PKU Muhammadiyah Bantul is not ideal yet. There are factors that influence the service time, among others; Availability of tbps means of infrastructure, delay, and peak hours of service. The level of busyness of the officers is very high 94%, need additional staff to decrease workload (utility) officer and waiting time service.

Index Terms- waiting time, outpatient pharmacy, queuing system

I. INTRODUCTION

The hospital is one of the important networks of health services, the conditions with the tasks, burdens, problems and hopes that are hung on it. The development of number of hospitals in Indonesia, followed by the development of disease patterns, the

development of medical technology and health and the development of public expectations of hospital services. It should be realized that the main purpose of hospital activities is to serve patients and their families, in various forms of service [1]. One part of the hospital service that is busy every day is outpatient pharmacy service. The large number of patients served by the number of officers who serve also affects the speed of service. If the service personnel is too little while the patient must be served greater then it will impact on service quality and patient satisfaction. On the other hand, if the service personnel is more than the optimal number, this means needing excessive capital investment, but if the amount is less than optimal result is delayed service [2]. Increased outpatient visits, especially in the Outpatient Pharmacy Installation service in 2016 with an average visit of 118,838 per month. The impact is the number of recipes that the officer must serve higher. This leads to long queues due to the slow service process that also affects long waiting times.

The average waiting time depends on the average rate of service. The queuing process is a process associated with the arrival of a customer at a service facility, then waits in a row (queue) if all the maids are busy, and finally leaves the facility. A queuing system is a set of customers, servants, and a rule governing the arrival of customers and processors of the problem [3].

There are several important factors that are closely related to the queuing system. Factors that affect the queue and service line according to Kakiy are as follows:

1. Distribution of arrival In queue system,
2. Time Distribution Service Distribution time of service related to how many service facilities that can be provided.
3. Service Facilities Service facilities are closely related to the line of queues to be established.
4. Service discipline

Service discipline is closely related to the order of service for that customer. The discipline of service is divided into four forms, namely:

- a. First come, first served (FCFS = first come first service)
- b. Last come, first served (LCFS = last come first service)

No	Recipes Flow	Fastest Time	Oldest Time	Average (minutes)
1	Reception prescription(verification)	1,57	5,32	3,39
	Delay	1,00	4,57	3,10
2	Material Taking	1,52	4,37	3,21
	Delay	1,00	4,27	2,26
3	Writing Etiquette	0,30	2,01	1,03
	Delay	3,49	10,57	7,27
4	Counseling	0,48	1,59	1,11
	Average Waiting Time Overall	22,37		

c. Service in random order (SIRO = random service)

d. Priority service which means the service is done specifically on the main customer (VIP customers) [4].

5. Size in Queue

The amount of queue of customers who will enter the service facility also needs to be considered. There are two designs to choose from to determine the magnitude of the queue: Unlimited arrival size (infinite queue) and limited arrival size (finite queue)

6. Calling Resources

In service facilities, which serve as a source of calling can be

No	Recipes Flow	Fastest Time	Oldest Time	Average (minutes)
1	Reception prescription(verification)	2,31	6,58	4,59
	Delay	2,56	6,57	4,62
2	Material Taking	2,51	5,37	3,58
	Delay	1,25	4,58	3,33
3	Compounding (indirect)	3,00	9,06	6,32
	Delay	1,13	5,36	3,30
4	Writing Etiquette	0,49	2,52	1,22
	Delay	3,54	16,56	11,37
5	Counseling	0,57	2,34	1,29
	Average Waiting Time Overall	41,22		

either machine or human. If there are a number of machines that are damaged, then the source of the call will be reduced and can not serve the customer. There are two types of calling sources: Finite calling source (finite calling source) and unlimited calling source (infinite calling source)

II. METHODS

This research uses quantitative approach and supported by qualitative. Quantitative method is used in observation of prescription service waiting time to be analyzed using queuing method, while qualitative research with direct observation and in-depth interview to know the factors that influence service waiting time.

III. RESULTS AND DISCUSSION

1. Outpatient pharmacy service waiting time

Based on the observation of outpatient pharmacy waiting time for non-concrete recipes, it is known that the average waiting time is 22.37 minutes, can be seen in Table 1 below Table 1. Waiting Time of Non-Raised Prescription Service of PKU Muhammadiyah Hospital Bantul

While the result of direct observation of waiting time of pharmacy service of special outpatient of prescribed concoction known mean waiting time is 41,22 minutes, with the longest service time reach 54,08 minutes, can be seen in table 2.

Table 2. Description of Waiting Time Prescribed Prescription Service

From the observation and calculation of service waiting time of IFRS of PKU Muhammadiyah Bantul, both direct recipes and recipes must be made mixed, the most contributing part causes the waiting time to be long can be seen in table 3.

Table 3. Percentage Average Waiting Time Match Flow

Size of System Performance	System Performance
Probability no customers (Po)	3,09 %
Average Number of Customers in the system (L)	16 people
Average Time spent in system (W)	0.3436 hour
Average number of subscribers in the waiting queue served (Lq)	14 people
Average time spent in line to wait served (Wq)	0.3036 hour
Employee's busyness level (ρ)	94 %

The most delayed service time causes the waiting time to be longer, with the average delay time reaching 57.06%, the delay time before the delivery of the drug to the patient (counseling) is the longest delay time with the average delay time reaches 11, 37 minutes or 28.74%.

2. Queuing Analysis

The outpatient pharmacy instalation unit of PKU Muhammadiyah Hospital Bantul is the place to be analyzed to determine the queuing model. An analysis of the steady-state size of the performance is presented in Table 4. An analysis of the queuing system model is presented in Table 5

Table 4. Measures of Steady State Pharmacy Unit Outpatient PKU Muhammadiyah Hospital Bantul

From the results of the above table was found outpatient pharmacy unit PKU Muhammadiyah Hospital Bantul condition is not steady-state, the state is not steady state then the queue model and performance of pharmacy outpatient queue system can not be known because it does not meet the requirements.

Prescription Flow	Average Wait Time	Percentage			
Reception prescription(verification)	4,59	11,58			
Delay	4,62	11,6			
Material Taking	3,58	9,03			
Delay	3,33	8,40			
Compounding (indirect)	6,32	15,95			
Delay	3,30	8,32			
Writing Etiquette	1,22	3,07			
Delay	11,37	28,74			
Installation Counseling	C	Λ	1,29	$\rho = \frac{\lambda}{c \times \mu}$	Steady-state
Pharmacy	1	47	25	1,88	Not Fulfilled

Table 5. Measurement Queue Performance System with Multi Channel

The outcome measure of queue pharmacy queue system performance with multi-channel that is probability no customer (Po) is 3.09%. The average number of subscribers in the system (L) is 16.14 people and the average number of subscribers in the waiting queue served (Lq) is 14.26 people. The average time spent in the system (W) is 0.3436 hours and the average time spent in the queue to wait served (Wq) is 0.3036 hours. Employee's busyness level is 94%. The waiting time of prescription service both non-concoction drug and concoction in IFRS PKU Muhammadiyah Bantul is 39.23 minutes.

From the result of performance calculation, we get the best queuing model structure with the characteristics of IFRS PKU Muhammadiyah Bantul is $M / M / 2: FCFS / \infty / \infty$, which means arrival rate following poisson distribution (M) and service level following poisson distribution (M) . Number of servers receiving 2 recipes with First Come First Serve (FCFS) service rules. Unlimited queue length (∞) and unlimited population size (∞). In accordance with the results of research Wahyuningtyas (2013), obtained queue model at the pharmacy of Dr.Kariadi Hospital Semarang is $M / M / 2: FCFS / \infty / \infty$ with service level berpistribusi poisson or random and level of poisson distribution service, The number of server 2 with the rule of First Come First Serve (FCFS). Unlimited queue length (∞) and unlimited population size (∞).

3. Factors that affect service time

The cause of the long waiting time of prescription service process at IFRS PKU Muhammadiyah Bantul was analyzed by qualitative data collection method (observation), among others;

a. Employee

There are several service points that the number of employees is less, especially during peak hours of service, among others at the time of drug compounding (AA) and drug delivery (pharmacist). Lack of employee resulted in a longer service delay time. According to Margaret, the way to reduce delay time is by increasing the number of "payment units" or servers, especially during peak hours [5]. It has considerable potential to decrease the lag (delay) time. The addition of workers can streamline services to IFRS PKU Muhammadiyah Bantul, but also need further consideration with the addition of employees or workers require a fee, so that the addition of employees can be done at peak hours just to be more effective.

b. Infrastructure

The area of the building (room) IFRS PKU Muhammadiyah Bantul narrow, has not fully provide comfort to employees. At the time of many concoctions recipe, employees alternately disperse the drug due to a less extensive area.

c. Service Hours

One of the external factors affecting waiting time is the practice of concurrent Doctors, especially poly-recipes making polishes such as poly diseases, child poly, and skin poly.

According to Nurjanah, as for the problem of waiting time of prescription service to be long that is the availability of labor and visiting hours of patients [6]. So these factors have an impact on patient satisfaction in terms of waiting time service

IV. CONCLUSION

Based on the results and discussion then it can be concluded:

1. Outpatient pharmacy service waiting time at IFRS PKU Muhammadiyah Bantul as follows:
 - a. Waiting time of service either direct recipe or recipe indirectly got average time 39,23 minutes
 - b. The longest service time reaches 54.08 minutes, while the fastest service time is 19.04
 - c. The point of the waiting time of prescription service is seen in the delay process before the drug administration (counseling) is 9.32 minutes. The existence of a delay component that contributes greatly causes the process to be long. Delay is caused, among others, lack of officers for pursuing other activities.
2. Characteristics of IFRS model of PKU Muhammadiyah Bantul
 - a. The best queue model for IFRS Pku Bantul is $(M/M/2):(GD/\infty/\infty)$
 - b. The performance of the IFRS Pku Muhammadiyah Bantul queuing system, the probability of no customer (P_0) is 3.09%. The average number of subscribers in the system (L) is 16.15 people and the average number of subscribers in the waiting queue served (L_q) is 14.27 people. The average time spent in the system (W) is 0.3436 hours and the average time spent in the queue to wait served (W_q) is 0.3036 hours. Employee's busyness level is 94%.
 - c. The level of busyness of the officers is very high 94%, need additional staff to reduce workload (utility) officer and waiting time service.

V. SUGGESTION

Outpatient pharmacy service waiting time at IFRS PKU Muhammadiyah Bantul, especially indirect drugs, has not yet reached the indicator of waiting time of IFRS PKU Muhammadiyah Bantul. This is due to the lack of stability, between the patient's arrival rate and the number that can be served. It is expected that the management should pay more attention to the following matters:

1. Review the number of employees available today, especially on shifts when service is busy.
2. Seeking repair or improvement of infrastructure facilities especially outpatient pharmacy room, for the convenience of

employees and pay attention to waiting room of patient because still found patient standing did not get seat while waiting for drug service.

3. Coordinate with your doctor or clinic regarding the practice schedule

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