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Factors affecting waiting time in Outpatient Pharmacy at Hospital Raja Perempuan Zainab II (HPRZII)

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ABSTRACT

Introduction: World Health Organization (WHO) has identified that patient waiting time as one of the most important measurements of a responsive health system for healthcare services. Outpatient pharmacy is associated with patient waiting time as the indicator for satisfaction of the services. This study aimed to determine the factors affecting waiting time in Hospital Raja Perempuan Zainab II, Kelantan.

Method: A cross-sectional study was conducted by collecting prescription received in outpatient pharmacy from 1st October 2020 till 31st December 2020. All prescriptions prescribed manually were excluded. Multiple linear regression was performed to determine the factors affecting waiting time and the data were analysed using SPSS version 25.

Results: A total of 248 prescriptions were collected in outpatient pharmacy. The mean waiting time in outpatient pharmacy was 23.0 minutes (SD = 11.0). Waiting time was found to be associated with number of medications in the prescription, number of staff working on that day, prescriptions which required intervention and filling personnel.

Conclusion: The waiting time at the outpatient pharmacy of HRPZ II indicated the acceptable range of quality services which met the patient's satisfaction. Future studies are needed to confirm the satisfaction level of patients and further improve quality of the service.

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Introduction

Outpatient pharmacy refers to the pharmacy department in charge of dealing with patients that do not occupy the beds in hospitals or other inpatient settings (Hammouda & Hammouda, 2012). The outpatient pharmacy is often associated with the waiting time as the degree to which the patients are satisfied with the care received and strongly related to the quality of the waiting experience (Nosek Jr & Wilson, 2001). The aim and vision to improve healthcare quality has always been a great concern in healthcare services. Quality itself can be defined as conformance to specific requirements and standards given (Alodan et al., 2020). Therefore, pharmacy unit needs to improve the services quality as regulated according to the Ministry of Health.

Several studies used different techniques to overcome healthcare services problems and improve quality. A study utilized Six Sigma processes and able to reduce waiting time by 50% in an outpatient pharmacy in a local hospital specialized in cancer treatment in Pakistan (Arafeh, Barghash, Sallam, & AlSamhouri, 2014). Suss *et al.* (2017) implemented a patient flow project to improve efficiency spends in pharmacy queues to reduce waiting time. Every problem was given solutions and a framework was provided to evaluate pharmacy performance based on simulations (Suss, Bhuiyan, Demirli, & Batist, 2017).

World Health Organization (WHO) has identified that patient waiting time as one of the most important measurements of a responsive health system for healthcare services (Sun et al., 2017). Waiting time in outpatient pharmacy has been defined as the length of time from when the patient received the queue number at the counter to the time the patient being called to the counter (Afolabi & Erhun, 2003). Excessive waiting time shows the lack of efficiency of pharmacy services. Such delay leads to dissatisfaction, loss of patronage and poor patients' compliance (Kusumowardhani & Ilyas, 2019; Lin et al., 1999). Therefore, waiting time should be addressed as part of good management practice.

The waiting time in the outpatient pharmacy is usually attributable to the tedious process of packaging, labelling and prescription intervention (Ndukwe, Tayo, & Sariem, 2011). In addition, internal operational factors also contribute to the increase in time spent, for example, prescription requires extemporaneous preparation, low percentage of staff at work and long list of medication in one prescription (Ndukwe et al., 2011). The factors affecting the waiting time are somehow multifactorial and to date, studies determining factors affecting waiting time have been inadequate especially in local setting in Malaysia. Therefore, we aim to determine the mean waiting time as well as factor affecting waiting time in outpatient pharmacy in Hospital Raja Perempuan Zainab II (HRPZ II), Kelantan, Malaysia.

Methodology

Design and study population

A cross sectional study was conducted for 3 months from 1 October 2020 until 31 December 2020. The inclusion criterion was all electronic prescriptions received at the outpatient pharmacy during the study period whereby any manual prescription was excluded.

Data collection

The waiting time in HRPZ II's outpatient pharmacy was defined as the time taken from when the patient received the queue number at the counter to the time the patient was called at the counter using Queue Management System (QMS). The QMS was utilised to determine the length of time taken for each prescription being called at the counter. There are four main dispensing counters available. All prescriptions were given numbers based on the number of medications and the type of diseases in the prescription. Prescriptions with 3 medications or less with acute diseases were given queue number 2, 3 medications or less with chronic disease were given queue number 3, more than 3 medications were given queue number 4 and queue number 5 was given to prescriptions which requires extemporaneous preparation.

For each queue number, systematic random sampling was applied to pick the prescriptions for this study. The sampling interval was determined by dividing the average daily number of prescriptions with the number of samples required for each queue number. Then, random starting point was determined using random table and the sampling interval was repeated to choose subsequent prescription. A form which consists of all the necessary data and possible factors affecting waiting time was collected and attached with the copied prescription.

Sample size calculation was calculated for each objective. Single mean formula was used for determination of mean waiting time. The values of two-tailed $\alpha = 0.05$, $\sigma = 20$ and $d = 2.5$ were entered in the equation which yielded a minimum of 246 prescriptions (Ndukwe et al., 2011) .For the second objective, 200 was set as the minimum sample size based on the rule of thumb as suggested by Green for any regression analysis (Green, 1991). Thus, by comparing the samples required for both objectives, the minimum prescriptions needed was 246.

Statistical analyses

Data analyses were carried out by using SPSS version 25.0 (IBM Corp, 2017). The descriptive statistics were presented in categorical and numerical data. The categorical data were summarised in frequencies and percentages. Meanwhile, numerical data were presented with mean and standard

deviation (SD). Multiple linear regression was utilised to determine the factors associated with waiting time. Statistical significance was set at 95% confidence level.

Ethical approval

This research has obtained ethical approval from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (NMRR-20-2610-57076) while permission to conduct the study at the site was granted by the Director of HRPZ II.

Results

Sociodemographic characteristics

A total of 248 prescriptions were collected during the study duration. The mean age of the patients was 41.9 years (SD = 21.7) and more than half of them were female. Half of the prescriptions were obtained from queue number 2 and majority of them were collected on Wednesday. The average number of staff was around 23 people. The mean waiting time for outpatient pharmacy was 23.0 minutes (SD = 11.0).

Most of the prescriptions were chronic diseases, with ≤ 5 medications, contained standard medications, from outpatient clinics, only one clinic and arrived during peak hours. In addition, the majority of them were new prescriptions, did not require SPUB, contained no extemporaneous preparations, not required intervention, medication filled by others and counterchecked by pharmacists (Table 1).

Table 1: Sociodemographic characteristics of patients/prescriptions (n=248)

Characteristics	n	%
Age (year)	41.9*	21.6#
Gender		
Male	110	44.4
Female	138	55.6
Queue number		
2000 – 2999	124	50.0
3000 – 3999	38	15.3
4000 – 4999	65	26.2
5000 – 5999	21	8.5
Day of visit		
Sunday	27	10.9
Monday	42	16.9
Tuesday	59	23.8
Wednesday	79	31.9
Thursday	41	16.5
Number of medications	3.3*	2.4#
Types of medication		
Standard medications	218	87.9
Others (e.g. Special medications)	30	12.1
Number of staff	23.7*	1.2#
Types of patients		
Discharged	18	7.3
Outpatient	230	92.7
Sources of prescription		
One clinic	243	98.0
Multiple clinic	5	2.0
Patient's arrival time		
Peak hour (10am- 1pm)	132	53.2
Non-peak hour (8am- 10am, 1pm-5pm)	116	46.8
Types of prescription		
New	195	78.6
Refill	53	21.4
SPUB prescription		
Yes	18	7.3
No	230	92.7
Extemporaneous prescription		
Yes	22	8.9
No	226	91.1
Intervention prescription		
Yes	12	4.8
No	236	95.2
Filled by		
Pharmacist	102	41.1
Others	146	58.9
Counterchecked by		
Pharmacist	191	77.0
Others	57	23.0

*mean
#standard deviation (SD)

Factor associated with waiting time

In univariable analysis, there were no statistically significant differences in types of patients, sources of prescriptions, types of prescriptions, SPUB prescriptions and extemporaneous prescriptions towards waiting time in outpatient pharmacy (Table 2). The multivariable analysis was carried out for all significant variables to determine which factors associated with waiting time. Total number of medications, total number of staff, prescription requiring intervention and filling personnel were found to be significant factors which associated with waiting time. An increase of one medication in the prescription, will increase the waiting time by 1.4 minutes (95% CI = 0.90, 1.94). The waiting time will be reduced by 1.8 minutes (95% CI = -2.87, -0.65) if the number of staff is increased by one person. Prescriptions with intervention increased the waiting time by 10.0 minutes (95% CI = 4.09, 15.94). The waiting time is reduced by 3.1 minutes (95% CI = -5.68, -0.52) if the medication in the prescription is filled by pharmacist in comparison to other personnel such as PRP, pharmacy assistant and student.

Table 2: Factors associated with waiting time in outpatient pharmacy (n=248)

Variables	SLR[a]			MLR[b]		
	b[c]	95% CI	*P*-value	adj. b[d]	95% CI	*P*-value
Types of disease						
Acute						
Chronic	2.87	0.14, 5.60	0.040			
Number of medications	1.49	0.96, 2.03	< 0.001	1.42	0.90, 1.94	< 0.001
Types of medications						
Special medication						
Standard medication	-3.26	-7.45, 0.93	0.126			
Number of staff	-1.09	-2.27, -0.09	0.070	-1.76	-2.87, -0.65	0.002
Types of patients						
Discharged						
Outpatient	1.77	-3.53, 7.06	0.512			
Sources of prescriptions						
One clinic						
Multiple clinic	0.92	-8.85, 10.69	0.853			
Arrival time						
Non peak hour						
Peak hour	8.60	6.07, 11.13	< 0.001			
Types of prescriptions						
New						
Refill	-1.94	-5.28, 1.40	0.253			
SPUB prescriptions						
Yes						
No	-1.29	-6.57, 4.00	0.633			
Extemporaneous prescriptions						
Yes						
No	-2.03	-6.8, 2.79	0.408			
Intervention prescriptions						
No						
Yes	10.56	4.31, 16.82	0.001	10.01	4.09, 15.94	0.001
Filling by						
Others						
Pharmacist	-2.47	-6.26, -0.49	0.081	-3.10	-5.68, -0.52	0.019
Countercheck by						
Others						
Pharmacist	-4.74	-20.07, .10.60	0.544			

[a]Simple Linear Regression
[b]Multiple Linear Regression (R^2 = 0.182; The model reasonably fits well; Model assumptions are met; There are no interactions between independent variables and no Multicollinearity problem)
[c]Crude regression coefficients
[c]Adjusted regression coefficients

Discussion

This study reported the mean (SD) waiting time of 23.0 minutes (SD = 11.0) which is lower than waiting time reported in other studies in Malaysia. Yi et al. (2021) reported that the waiting time in Klinik Kesihatan Bandar Mentakab and Klinik Kesihatan Temerloh were 29.7 minutes and 28.4 minutes respectively (Yi et al., 2021). A study by Huang (1994) concluded that patients were satisfied if the waiting time is not more than 37 minutes (Huang, 1994) whereas a study by Afolabi & Erhun (2003) mentioned that the average waiting time should be between 10-30 minutes for patient's satisfaction (Afolabi & Erhun, 2003). Our findings were within the recommended range of waiting time, but we did not investigate the level of satisfaction in our population. Different population may have different perceptions on the length of time they need to wait to get their medication.

There were four factors which had significant effect on the waiting time in our study which were 1) number of medications in the prescription, 2) number of staff, 3) prescriptions required intervention and 4) filling process. The number of medications in the prescription influenced the waiting time by increasing the time by 1.4 minutes per item in the prescription. According to a study conducted by Loh et al. (2019), a reduction in average waiting time was shown when a fast-track dispensing window was introduced to dispense prescription with three medications or less (Loh et al., 2017). Another study by Yang et al. (2019), also suggested that prescriptions with less item reduced the chances of medication error and thus reduces the waiting time (Yang, Liao, Lin, & Wu, 2019). This is because number of errors tend to increase with more numbers of drug orders in each prescription. As a result, waiting time increased due to the medication errors, with some of the processes need to be repeated before medications being dispensed. Another study also proved that a fast-track counter containing items less than 3 medications showed a reduction in the waiting time from 20 to 23 minutes to an average of just 4 minutes (Sadi, Harb, El-Dahiyat, & Anwar, 2019).

In our study, it was found that the number of staff working reduced the waiting time by 1.8 minutes when the staff was increased by one person. Understaffing creates instability in the pharmacy operations leading to long queues and long prescription preparation times (Arafeh et al., 2014). This then causes longer waiting time. Another study has shown that a higher number of pharmacy technicians was associated with higher percentage of prescription served less than 30 minutes (Loh et al., 2017). This indicated that pharmacy technician plays an important role in medication dispensing activity, assisting in recording, packaging and labelling of medications (Loh et al., 2017). Another study suggested that lack of staffing is a known major contributor to lengthy waiting time in hospital outpatients and public health clinics (Ahmad, Khairatul, & Farnaza, 2017). Therefore, a recommendation was made to increase the number of registration staff to two members to cope with the tasks (Ahmad et al., 2017). A previous study revealed that waiting time was highly dependent on the number of pharmacists. It was suggested that employing 2 additional pharmacists, could lower the maximum patient waiting time from 58.2 minutes to 27.0 minutes (Tan, Chua, Yong, & Wu, 2009).

Third factor that affecting waiting time is when certain prescriptions required intervention. Based on our study, prescription that required intervention increased the waiting time by 10.0 minutes. Intervention of the prescription was the main contributing factors of increased waiting time because pharmacist needs to contact the prescriber to rectify any problem before it can proceed to the next steps. Kim and Schepers (2003) reported that majority of the error (76%) did not reach to the patients but had significant potential to cause morbidity and mortality (Kim & Schepers, 2003). In addition, another study revealed that high dose errors were the most common category of interventions which constitutes for 43.6% of interventions (Alderman & Farmer, 2001). This shows the importance of intervention to optimize patient therapy although it will lead to an increase in waiting time.

The filling process was also proven to affect the waiting time. The waiting time was reduced by 3.1 minutes if the item in the prescription was filled by pharmacist in comparison to other personnel such as PRPs, pharmacy assistants and students. Pharmacists are challenged with keeping up on the increasing number of new drugs and literature. Drug information and literature evaluation skills are crucial for building clinical knowledge and providing evidence-based recommendations. A study conducted in 2015 has shown that time taken to fill up the prescriptions were shorter when it was done by pharmacists because they are more familiar with the medications (Ghaibi, Ipema, & Gabay, 2015). Perhaps, similar exposure in term of Continuing Professional Development (CPD) should be given to other staff as well in order to ensure they are also familiar with the medication and thus can help in reducing waiting time.

The limitation of our studies include that we did not investigate the satisfaction level of patients with the current waiting time. Future studies may investigate this aspect to ensure healthcare services can be improved in term of efficiency, effectiveness and patient satisfaction. According to a study conducted by Fauzia et al., (2017), the patient's satisfaction with the outpatient hospital pharmacy was influenced by the dispensing process, consultation service by pharmacist, and general satisfaction aspect where the dispensing processes includes the time for filling prescription (Fauzia,

Setiawati, & Surahman, 2017). Therefore, improving and making the filling process efficient and timely is an effective method to improve service quality and improve customer satisfaction. Our study did not find a significant association among other predictors like age, gender, queue number, day of visit, types of disease, medications and burden of prescriptions. Based on R2 value, R2 = 18.2% indicated there are still many factors which are not considered in this study but might influence waiting time in outpatient pharmacy. However, this study still might be useful in providing insights on current level of performance to improve to even better service for the public in future.

Conclusion

The waiting time at the outpatient pharmacy of HRPZ II indicated the acceptable range of quality services which met the patient's satisfaction. The factors contributed to waiting time included number of medications in the prescription, number of staff working on that day, prescriptions requiring intervention and filling personnel. Future studies are needed to confirm the satisfaction level of patients and further improve quality of the service.

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Conflict of Interest

The authors declare that they do not have any personal conflict of interest that may arise from the research publication.

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