FACTORS INFLUENCING WAITING TIME IN OUTPATIENT PHARMACY OF LAGOS UNIVERSITY TEACHING HOSPITAL

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ABSTRACT
Time, money and expertise are resources that are indispensable to productivity, performance, efficiency, success and growth of any health institution. This research was aimed at identifying and measuring some of the factors influencing patient waiting time in an outpatient pharmacy. The study employed the use of time monitoring card and time study analysis to volunteered participants. A situation analysis conducted revealed an average of 167 minutes of waiting time. The dispensing time averaged 17.65 minutes, and 67.97% of total waiting time by the patient was due to delay components. The major delay components included patient queues for billing of prescription sheets, payment to the cashier and subsequent time wait before drugs are dispensed. The total waiting time for the dispensing process averaged 55.11 minutes. Generally, there were undue delays caused by the dispensing procedure with a 32.03% lag of processing components and operations in the pharmacy. Factors indentified to influence the outpatient waiting time included, queuing and queuing characteristics-type and integrity of queue, adherence to hospital visits and medication for special disease programs, dispensing time, average waiting time (service time plus queuing time), nature of illness or disease presentation, admission status of patient(s), accrued time from other health services provided to the patient prior to services provided by the pharmacist, incentives for providing efficient services, management structures and operational procedures of outpatient hospital pharmacy, implementation of legal rights on waiting time, inadequate treatment or dispensing facilities, technological innovations of automation and computerization , service efficiency and internal operational factors.
Keywords: Processing component, delay component, waiting time, dispensing time.

INTRODUCTION
Patient waiting time deals with the period or lead time a patient or client has to hold or wait for therapy or care to be served. The time spent is usually to access the diagnosis, treatment, laboratory investigation, counsel or nursing care for a particular infection, disease, ailment, deleterious substance or a discomforting state. For the purpose of this study, it has been defined as the length of time from when the patient actually received his or her medication and left the pharmacy[1,3]. Excessive waiting times may be symptoms of inefficiencies in the healthcare system and should be addressed as part of good management practice. The experience of waiting can be extremely distressing in itself. Some waiting periods have either saved the life of a client/patient (e.g. the case of spotting a medication error or an ADR signal) or aided to proper diagnosis/counsel. The client/patient's family life may be adversely affected by waiting. Sometimes patients would have to wait a long time. If such a waiting situation is not addressed, they clients might leave and never come back. Patients will leave a practice if they feel that their time has been disrespected," said Stephen Albrecht, a family physician and medical director of Olympia Family Medicine in Washington[5]. Experts emphasize that waiting times do not have to be long to annoy patients and the way to solve a wait-time problem will be different for every practice and setting. The initial challenge was to look at how patients moved from the parking lot to the waiting room, then to the counseling room and to identify where the most common bottlenecks occurred[4]. This research was aimed at identifying and measuring factors influencing patient waiting time in an outpatient pharmacy and to proffer recommendations that could be implemented by boards of hospital management to improve health care performance.

AIMS AND OBJECTIVE
The research was aimed at identifying and measuring some of the factors influencing patient waiting time in an outpatient pharmacy.

MATERIALS AND METHODS
Study Setting
The research covered the outpatient pharmacy department of Lagos University Teaching Hospital (LUTH) in Idiaraba, Lagos State, Nigeria. It was established at the inception of LUTH for full operation in the hospital in 1962. The outpatient pharmacy served all patients attending OPD clinics that lived in and around Surulere and Mushin; located in Lagos, a major urban city in the Southwestern part of Nigeria. The staffing strength of the pharmacy was made up of the head of outpatient pharmacy unit, one principal pharmacist, four pharmacists, and six intern-pharmacists. No pharmacy technician or pharmacy assistant had been deployed to the outpatient pharmacy at the time of this study. The scope of this work involved only patients who patronized and were served by the out-patient pharmacy during the period of the study that spanned from May to September, 2010.

Population of the Study
The study consisted a sample size of 500 patients recruited consecutively for each component of the dispensing procedure and was obtained using systematic random sampling of every other patient on the queue at the outpatient pharmacy, within the period of this study, which awaited dispensing and counseling services provided by the pharmacy in this hospital.

Research Instrument
The operational research employed the use of time study analysis and a time monitoring card (see Appendix I) given to volunteered participants. These instruments enabled for balanced observations in both subjective and objective parameters towards drawing relevant conclusions. Data were collected by unobtrusive participant observation on time; discarding the first ten daily entries to reduce bias. One stop clock for each component of the dispensing procedure was used to estimate mean waiting time and all the stop clocks used were synchronized at the beginning of the research. The measure of average patient waiting time before and after an intervention was carried out. Records of time were collected when the service system was well adjusted to the setting in the pharmacy, and then the whole procedure was replicated over a three-week period for consistency and reliability. The work sampling analysis involved a study of the procedural elements using a checklist to record the task components on each defined activity in the pharmacy. Each of the activities involved manual operations and the task components of outpatient dispensing procedure as well as the associated time elements. The quantitative analysis required the use of a workflow checklist for the

sequence of activities involved in the dispensing procedure, and this formed a basis for designing the time monitoring card as shown in Appendix I. A properly listed chronologically order was obtained as follows; (1) Queuing to have prescription(s) screened and billed by the Pharmacist (2) Vetting the prescription(s) by the Pharmacist (3) Billing of the prescription item(s) (4) Payment to cashier (5) Queuing to submit prescription for filling (PFQ) (6) Prescription filling (PF) (7) Waiting on a chair/bench to have prescription filled (packed) and to be served (8) Drug/drug product collection by patient and counseling (9) Client/Patient leaves the system with value(s) that can be assessed by humanistic outcomes from the patient.

Study design
The study design involved a prospective case study for time measurement. The dispensing procedure in the pharmacy was first studied and then divided into process and delay components. Process components were the part of the dispensing procedure that involved the pharmaceutical services provided to the patient for his/her health, safety and satisfaction, e.g. the billing of the prescription sheet by the pharmacist or the counseling of patients on the use of their medication. Delay components, however, were the components that involved a hold on time; waiting on a queue before prescription was collected by the pharmacist for billing, or the wait for collection of prescribed medicines and medication counseling form good examples. The rate limiting barrier in estimating the efficiency of a time based operating system was dependent on the delay component of the dispensing procedure. A 3-hour period was spent each day for 21 days, and the time block was sampled within the eight-hour daily work period for a pharmacist in the hospital, bearing in mind that the pattern of activities on daily basis would vary slightly. The operation would start with the arrival of a prescription to the pharmacy by the patient and its subsequent flow through vetting by the pharmacist for appropriateness in drug combination and dosage, billing of the prescription items, payment to the cashier, collection of prescription from cashier and queuing to submit prescription back to the Pharmacist for filling. The Pharmacist then passes the prescription to assistant(s) for filling and packaging under his supervision, medicines are then placed on the dispensing table by the assistant(s) for another experienced pharmacist to instruct, dispense and counsel the patient on how to take the dispensed medication.

Statistical Analyses
Analyses were done for frequency distribution and cross tabulations. Tests for statistical significance were done by Student's t-test for mean patient waiting time and chi-square test for categories of nominal data under consideration. Quantitative analysis of the time study was done and the results of data obtained and the inferential statistics drawn from them were tested and analyzed, using the Student's t-test, chi-square and Fisher's statistics at p<0.05 level of significance. All the analysis of this research was done using EpiInfo version 3.5.1 (2008) and WinPepi version 6.9 (2008). Ethical clearance was obtained from the Hospital's ethical committee.

RESULTS
Table 1 below shows the results of time study systematically collected over three weeks. Queuing time gave a significant difference in variability over this period while all other variables measured; beginning from assessment and billing down to collection and counselling gave no significant differences in variability. Table 2 below shows the waiting time for each process and delay component considered in this research as well as the average waiting time for the outpatient pharmacy in Lagos university teaching hospital. Table 3 revealed a direct comparison between the baseline waiting time of the dispensing processes and average waiting time for patients before and after a streamlined process of work was instituted into the outpatient pharmacy, respectively, and measured afterward. A significant difference between these two measures was

obtained. Table 4 is a table of association between demographics factors and waiting time for respondents (patients). Sex and occupation showed no association with patient waiting time. However, residential status of proximity within the area of hospital location or outside the area, revealed a strong association that was significant (p = 0.021). Figure 1 shows the chart of the frequency distribution of hospital arrival periods for patients visiting pharmacy and reveals that up to 30% of patients arrive at the hospital before work resumes by 8.00am. The list reported arrival time is in the range of 8.30-9.00am. 18% of respondents reported to arrive at the hospital after 10.00am. Figure 2 shows the chart of the percentage distribution of participants revealing the time spent in the Hospital Outpatient Pharmacy. 52% of the respondents reported to spend <30 to 50 minutes in the hospital prior to arrival at the hospital pharmacy, while another 48% reported to spend one hour or more at the pharmacy.

DISCUSSION
From results of the work done, most of the waiting time in the hospital pharmacy can be accounted for majorly by delay and then processing components of the dispensing procedure. Factors indentified in affecting outpatient waiting time included the following; dispensing time, average waiting time (dispensing time plus queuing time), accrued time from other health services (provided by doctors, nurses, laboratory scientists) prior to services provided by the pharmacist, incentives or remunerations for providing efficient services (which is dependent on hospital management decision and existing policy in hospital or country), management structures and operational procedures of outpatient hospital pharmacy, no legal rights on waiting time - like the one existing in Denmark, Sweeden and Norway - who are already practicing an unharmonized version of the law[11], inadequate/insufficient treatment or dispensing facilities; service efficiency includes the time spent in pharmaceutical care services like packaging, labeling, dispensing, counseling, solving drug therapy problems, poisoning interventions, accident and emergency interventions[3], internal operational factors that majorly determine outpatient waiting times include; arrival pattern of prescriptions, sequencing of work, percentage of staff at work, interaction between the pharmacy service providers i.e. assessor and technician interaction or technician and counselor interaction[8]. Table 1 showed the results of the time study which was collected over three weeks. Queuing time before assessment of prescriptions gave a significant difference in variability which could be due to random arrivals from consultation room[5]. All other variables measured from assessment and billing until collection and counseling gave no significant differences (p<0.05) in variability and this strengthened reliability of the dispensing time measured. Time study analysis of processing and delay components for the out-patient pharmacy was done as seen in Table 2. The waiting time for the process and delay components considered gave results of 17.65 minutes and 37.46 minutes, respectively. The average waiting time (after instituting an intervention) for the outpatient pharmacy in Lagos university teaching hospital, at the time of this research was 55.11 minutes. The results of waiting time obtained were higher compared to other empirical studies carried out in Nigerian hospitals[1] and in other parts of the world. Average waiting times in those institutions gave a range 10-30 minutes[1,2]. The results obtained from LUTH revealed that the process component accounted for 32.03% of average waiting time, while the delay components of the dispensing procedure accounted for 67.97% of the average waiting time. The process component appears lower but this is not so when compared with 26.97% accounted for as delay process in another research conducted in a university teaching hospital[1] that had an average waiting time of 17.09 minutes. This further underscores the need for more pharmacists to be posted or employed into this pharmacy unit

to improve the service system. The coverage efficiency can be optimized by increasing the number of servers up to a point of balance with number of patients in need that are served[10]. The delay component with an average of 37.46 minutes is a considerable portion of the average waiting time measured. An encounter consisting of patient contact to monitor adverse effects, duplicate therapy, or compliance took an estimated three minutes on average from a study done by Yongtae and colleagues. Problems related to appropriateness of therapy or drug interactions required an additional 1.8 and 0.5 minutes, respectively. Four additional minutes were required for provider contact unless the contact involved a simple clarification (additional 2.6 minutes). Patient referrals required an additional 2.5 minutes. The time requirements related to the problem addressed and action taken were not additive. The incremental time requirements across alternative problem-action clusters ranged from 2.9 to 9 minutes. A fee-for-service payment system appears to be feasible for pharmacist counseling services[12]. Moreover, for intervention time to be acceptable to payers, any reimbursement system for counseling by pharmacists must specify a limited number of services that are verifiable and reflect the cognitive services provided. To be acceptable to pharmacists, this system must cover the most common types of counseling required in an outpatient pharmacy setting, be relatively easy to administer, and reflect the significant differences in the time required to provide each type of counseling. Therefore, the analysis for a research group reduced the number of categories to a workable size that reflected the services provided and the pharmacists' time inputs in the data collected by the Kaiser/USC Patient Consultation Study[12]. Table 3 is a table of association between demographics factors and waiting time for respondents (patients). Sex and occupation showed no association with patient waiting time. These results were inconsistent with other studies carried out on waiting time in the outpatient pharmacy. However, residential status of proximity within the area of hospital location or outside the area, revealed a strong association that was significant ($p = 0.021$). 74% of the patients reported that the waiting time was either long or too long. Figure 1 shows the chart of the percentage distribution of hospital arrival periods for patients visiting pharmacy and reveals that up to 30% of patients arrived at the hospital before work resumes by 8.00am. The respondents reported the most frequent arrival time in the range of 8.30-9.00am. 18% of respondents reported to arrive at the hospital after 10.00am. These results can be related with a similar research carried out by Madaki[6]. 60% of the respondents reported spending four hours and above at the clinic with some cases where participants spent the whole day after coming two hours earlier than opening time. Figure 2 showed the chart of percentage distribution of participants revealing the time spent in the Hospital Outpatient Pharmacy. 52% of the respondents reported to spend <30 to 50 minutes in the hospital prior to arrival at the hospital pharmacy, while another 48% reported to spend one hour or more at the pharmacy. A similar study was carried out to investigate patient satisfaction with pharmaceutical services in Nigeria teaching hospital. This cross-sectional survey was conducted with a sample of 500 outpatients recruited consequently at the University of Benin teaching hospital, Nigeria[9]. A self-completion questionnaire that employed a Likert-type scale showed that nearly half of the patients (46%) rated the amount of time the pharmacist offered to spend with them as poor.

CONCLUSION

This study has shown the dispensing time to be an average of 17.65 minutes and the total waiting time for the dispensing process averaged 55.11 minutes. There were undue delays during the dispensing procedure with 67.97% of total waiting time attributed to delay components and 32.03% time lag was due to processing components and operations in the pharmacy. Factors identified to influence the outpatient waiting time involved queuing and queuing characteristics, adherence challenges, nature of disease presentation, admission status of patient(s), accrued time from other health service providers prior to services provided by the pharmacist, incentives or remunerations for providing efficient services, inadequate/insufficient treatment or dispensing facilities, existing management structures, lack of incentives for services rendered, absence of legal rights on waiting time, inadequate innovations of automation and computerization, service time and efficiency of internal operational factors. Effort should, therefore, be made by hospital management board, pharmacists and by their staff to reduce the time wait on the components of the dispensing process so that effective care provided by pharmacists will be more efficient and optimized periods could be devoted to counselling of patients and solving drug related problems prior to the collection of their drugs.

Limitations of the Study

Erratic power supply and shortage of power supply was a major challenge to collection of data and often terminated the data collection process. Prescriptions that were not properly written by the doctor or labelled by the pharmacist added unduly to the waiting time recorded since intervention time was due to an error in the system. The selection criteria for respondents in this dynamic work limited the number of patients that were used for this work.

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Table1. Summary of time study measures collated over a three-week period.

Variable	Period	n	x̄ (mins)	SEM (SD/√n)	F-Statistic	p-value
Queuing Time	(a)	163	8.5	0.074	7.8864	0.0005*
	(b)	68	15.3	0.018		
	(c)	93	11.5	0.014		
Assessment Time &Billing	(a)	157	3.8	0.007	0.0803	0.9229#
	(b)	36	4.3	0.011		
	(c)	90	4.1	0.006		
Cashier Time (Payment)	(a)	148	15.8	0.021	2.3540	0.0971#
	(b)	29	9.1	0.020		
	(c)	77	19.2	0.017		
PFQ Time	(a)	130	12.7	0.011	1.2915	0.2768#
	(b)	27	9.2	0.018		
	(c)	80	11.1	0.010		
PF Time	(a)	129	16.0	0.086	0.4767	0.6214#
	(b)	27	6.3	0.014		
	(c)	83	7.2	0.008		
C & C Time	(a)	124	4.7	0.026	0.3102	0.7336#
	(b)	23	4.2	0.016		
	(c)	84	2.4	0.002		

Key: Values are written as (Mean (x) ± SEM);
(a), (b), (c): Period of first, second and third weeks, respectively, during which data was collected. n: Sample size, p-value: Probability, x: Mean of samples, F-statistic: Fisher's statistic, SD: Standard deviation, PFQ Time: Prescription filling queuing time, SEM: Standard error of mean, PF Time: Prescription filling time, #: no significant difference, C & C Time: Collection and Counselling time, *: significant difference (p <0.05).

Table2. Time study analysis of processing and delay components for the outpatient pharmacy

Variables of dispensing components	Number of samples	Components of dispensing procedure			
		Processing Mean ± SEM (%) Time spent(mins)		Delay Mean ± SEM (%) Time spent(mins)	
Queuing time (before validating prescription)	324			11.76±0.034	21.34
Assessment & Billing Time	283	4.06±0.003	7.91		
Time to pay at the Cashier	254			14.70±0.051	26.68
Prescription Filling Queue (PFQ)	237			11.00±0.018	19.96
Prescription Filling and Packaging time (PF)	239	9.83±0.054	17.84		
Collection and Counselling Time	231	3.76±0.012	6.82		
Total		17.65±1.16	32.03	37.46± 2.32	67.97

Footnote: Average patient waiting time is 55.11 minutes or (17.65+37.46) minutes; SD: Standard deviation.

Table3. Time study analysis of baseline and average waiting time for the out-patient pharmacy

Variable	N	x̄	SEM (SD/√n)	Student's t-statistics	P-value
Baseline Waiting Time (before intervention)	30	203.0	0.348	38.63*	p<0.05
Average Waiting Time (after intervention)	300	55.11	3.48		

Key: n: Sample size, x̄: Mean of samples, SD: Standard deviation, SEM: Standard error of mean,*: significant difference, p-value: Probability (at 0.05 level of significance).

Table4. Cross tabulation of respondents' demographics factors and waiting time.

Demographic Factors	Waiting Time (minutes)				Total	χ²	p-value
	Short	**Adequate**	**Long**	**Too Long**			
Sex							
Male	1(2%)	3(6%)	9(18%)	8(16%)	**21(42%)**	0.91	0.431# 0.515#
Female	3(6%)	6(12%)	13(26%)	7(14%)	**29(58%)**		
Total	**4(8%)**	**9 (18%)**	**22 (44%)**	**15 (30%)**	**50(100%)**		
Occupation							
Student	0(0%)	2(4%)	3(6%)	3(6%)	**8(16%)**	1.62	0.240# 0.300#
Applicant	1(2%)	3(6%)	2(4%)	2(4%)	**8(16%)**		
Government worker	1(2%)	4(8%)	7(14%)	4(8%)	**16(32%)**		
Non-gov worker	2(4%)	0(0%)	10(20%)	6(12%)	**18(36%)**		
Total	**4(8%)**	**9(18%)**	**22(44%)**	**17(30%)**	**50** (100%)		
Residence							
Yes	2(4%)	7(14%)	9(18%)	2(4%)	**20(40%)**	6.25	0.014*
No	2(4%)	2(4%)	13(26%)	13(26%)	**30(60%)**		0.021*
Total	**4(8%)**	**9(18%)**	**22(44%)**	**15(30%)**	**50(100%)**		

Key: χ²: Chi-square, *: Significant difference observed at (p<0.05), df: degree of freedom, #: No significant difference observed, p-value: Probability, Non-gov: Non-Government.
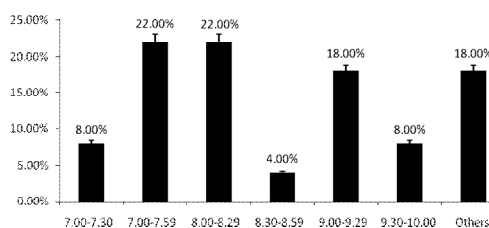

Figure1. Percentage distribution of participants showing hospital arrival periods for patients patronizing the pharmacy
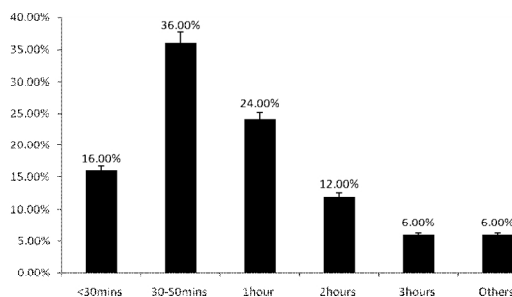Key: Error bar

Figure 2. Percentage distribution of participants showing the time spent in the hospital outpatient pharmacy
Key: Error bar

Appendix I
Time Monitoring Card

Variable	Time In (mins)	Time Out (mins)	Time Difference (mins)
Arrival Time			
Queuing Time (before billing)			
Assessment Time			
Cashier Time			
Prescription Filling Queue Time			
Prescription Filling Time			
C & C Time			
Departure Time			
Total			

Key: C & C time: Counselling and collection time