

DETERMINATION OF PATIENT WAITING TIME AND ASSOCIATED FACTORS AT GENERAL OUT-PATIENT DEPARTMENT (GOPD) OF IRRUA SPECIALIST TEACHING HOSPITAL (ISTH), IRRUA, NIGERIA - AN ELECTRONIC MEDICAL RECORD SETTING

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Abstract

Background:

Prolonged waiting typically affects patients' satisfaction and may deter subsequent utilization of healthcare facility. There is a paucity of information regarding waiting time in hospitals where the Electronic medical record is been utilized particularly from the patients' viewpoint. The aim of this study was to assess the waiting time and associated factors at the GOPD clinic of Irrua Specialists Teaching Hospital, (ISTH) where the EMR is fully adopted and operational.

Subjects and Methods:

An institutional-based descriptive cross-sectional study was carried out among 318 adult patients aged 21 and above who attended the GOPD of ISTH, Irrua, Nigeria. Patients were selected by simple random sampling and a structured questionnaire was used to collect data at the last service point. Data collected were cleaned and analyzed using the Statistical Package for Social Sciences version 20. Level of significance was set at $p < 0.05$.

Results:

The average waiting time for the clinic was 217 ± 37 minutes. Patients who were first-timers took much longer time (226.1min) than returning patients (206.1min) ($p = 0.019$). The primary reasons for the delay were: the clinic's bad physical layout, with the radiology and laboratory department located far from the consultation rooms, the instructional services provided to medical students during consultations, and the lack of reliable intranet connectivity with the EMR.

Conclusion:

Patients visiting the GOPD clinic experienced considerably long waiting hours even with the full implementation of the EMR. The foremost cause of this delay was the unstable EMR intranet at both the service point and payment stations. The EMR intranet connectivity should be improved upon to provide seamless services and reduce waiting time.

KEYWORDS: Patient Waiting Time, Electronic Medical Record, Intranet.

INTRODUCTION

Patient waiting time is the amount of time a patient stays at a facility from the moment they arrive at the registration desk until they depart or receive their last service.¹ At least 90% of patients, according to the Institute of Medicine (IOM), should be seen within 30 minutes of the time of their scheduled appointments. Several studies have indicated that patients in underdeveloped countries spend 2-4 hours in the outpatient department prior to seeing a doctor, indicating that this is not the situation in majority of them.² In their study on customer satisfaction at the GOPD of Usman Danfodio University Teaching Hospital, Sokoto, Oche et al. in 2012 found a mean waiting time of 168min with almost 61% of respondents having to wait between 90 and 180 minutes, and 36.5% having to wait longer than 180 minutes. This was attributed to the large number of patients, and few health workers, especially physicians.³ A study by Enabulele et al. in 2018 on waiting and consulting times also revealed a mean waiting time of 146 minutes; however, the time patients spent evaluating pharmacy and laboratory services was not taken into account.⁴ In another study conducted at the GOPD of the University of Port Harcourt Teaching Hospital (UPTH), Ogaji and Mezie Okoye (2017) found that the average wait time was 274 minutes. They considered that the most likely causes were numerous referrals and insufficient staffing and facilities to manage the enormous workload.⁵ Studies by Biya et al. (2022) reveal that waiting times in some public hospitals in Ethiopia were observed to be 93 minutes, with domicile and educational status being the main contributing variables.⁶ Hemmati et al. conducted a study in which they identified the main causes of patients' prolonged waiting times in a few Tehrani hospitals. The causes were ranked in order of preference and included overcrowding, long wait times between units, poor communication, a lack of manpower, a shortage of physicians, inadequate timetables and planning, a lack of medical equipment, a lack of skill and knowledge on the part of the staff, and a slow pace at which the patients were attended to.⁷

Long wait times have been demonstrated to have a negative effect on patients' intended therapeutic outcomes. It's frequently linked to people skipping appointments and not adhering to their prescribed regimen. Additionally, research indicates that patients who do not receive the appropriate attention when leaving the hospital are likely to be unsatisfied and may not return, while other patients may depart without receiving any care at all.⁸ The income and

finances of the hospital are eventually impacted by this. Consequently, it puts patients and healthcare providers in a losing situation. Thus, the length of time patients spend visiting the hospital to receive medical care is a crucial factor in assessing how satisfied they are with the facilities they use.

Osunida and Opekein their study in 2017 to determine the cause of delay in health facility service, reported imbalance in the doctor-patient ratio as the commonest indicators given by respondents. Furthermore, they recommended implementation of the Electronic Medical Record (EMR) to eliminate waiting times encountered at the record section and doctors' consultation period.⁹ Lin et al, in 2020 study showed improvement in patient satisfaction and healthcare quality with EMR fully developed and implemented.¹⁰ Conversely, Jabour in a recent study reported that time spent by patients at various tasks in some primary Health centers with EMR were the same with those using paper-based medical records.¹¹ Even though there are plethora of studies on this subject, imperative to note that most were carried out in health institutions that were still operating with the mundane paper record system. Thus, in Nigeria were there's a gradual penetration of the healthcare delivery market with this innovative technology, carrying out this study in a facility where the EMR has been fully deployed will provide us the requisite insight and knowledge about the patient waiting time and overall satisfaction as well as the implicated factors.

Hospital managers nowadays have been implementing tactics and medical technology on a constant basis to improve the quality of care they provide, which will ultimately lead to the highest level of patient satisfaction. The most recent of these efforts was the implementation of the Electronic Medical Record (EMR) by a few tertiary institutions and health organizations in Nigeria and other Sub-Saharan African countries. Electronic medical records (EMRs) are essentially digital versions of paper documentation. They often retain records of a patient's diagnosis, course of treatment, dates of vaccinations, allergies, lab findings, and doctor's notes from a single practice or environment.¹²

EMR is a computerized medical record that is used to collect, store, and communicate information among healthcare providers within an organization, supporting the delivery of health services to patients, according to the national ehealth strategy toolkit that the WHO and ITU co-developed.¹³ Amongst the avalanche of benefits the EMR proffers, is the fact that it improves the quality of care by allowing for streamlined and efficient workflow. For example, it saves time for medical and office workers by serving as a consolidated database and eliminating the need to sift tedious paper records.¹⁴ However, the impact of the EMR on overall patient waiting time remains a subject of controversy.

Globally, several studies have been conducted on patient waiting time, both in developed and developing countries. However, it is pertinent to state that majority of them were carried out in institutions operating with the convectional paper medical record system. Therefore, the aim of this study was to assess the patient waiting time and identify associated factors at a healthcare facility where the EMR is been fully deployed and utilized in order to suggest ways of shortening patients' waiting time and improve patient satisfaction. Furthermore, most previous studies were done by eliciting information from healthcare professionals (end users), however, this study exclusively focuses on the patient's account or perspective on waiting times.

SUBJECTS AND METHOD

Study setting

In the GOPD of Irrua Specialist Teaching Hospital, Irrua, Edo state, Southern Nigeria, this study was conducted from October 2023 to November 2023. Though it is one of the two tertiary institutions in the state, the majority of its patientele comes from nearby rural villages. Primary care is offered at the clinic; mild and moderate conditions are treated, and those in need of more specialist care are referred.

Study design

An institutional -based descriptive cross-sectional study.

Sample size

According to statistics obtained from the medical records, an average of 60 patients visit the GOPD daily (300 patients weekly) during working days (Monday-Friday). A minimum sample size of 325 was estimated for the study using the standard formula.

$Nf = n/1 + (n/N)$ where $n = Z^2pq/d^2$

N=estimated population size for 6weeks= 1800

Nf=desired sample size for population less than 10,000. n=desired sample size for population greater than 10,000.

Z= standard normal deviation at 95% confidence interval=1.96

Simple random P=prevalence of the factor under study (50% will be used for this study)

q=1-p

d= tolerable margin of error=5%

In total a sample size of 325 subjects were recruited into the study.

However, seven (7) respondents left with referrals and could not complete the study, giving a response rate of 97.8%.

Data Collection

Simple random sampling was employed to select participants from all patients who attended the clinic during the study period. A total of 325 subjects were recruited into the study (179 New and 139 Returning patients) . The selected respondents were approached and requested for a written consent after explanation regarding what the research entailed. After consenting, the researcher or her assistants followed the respondent while recording the waiting time at each service point up to the last service point (pharmacy section) and interviewed the patient using a pretested, structured questionnaire at point of exit.

Instrument and Procedure

Data was collected from Monday-Friday for Six (6) weeks study period. The first tool used was the time and motion tool that measures time by using independent observation of the patient in each service point. This tool tracked patient flow from the point of entry into the clinic through the different service points, until the moment the patient exits the last service using an adjusted watch. The second tool used was an interviewer administered questionnaire. This tool was used to assess the various factors associated with wait time.

Data analysis

The filled questionnaires were checked for completeness and correctness at the end of each day by the researcher (PI). The data was cleaned and analysed using Statistical Package for Social Sciences (SPSS) 20. Analysis of variance (ANOVA), and cross tabulation was used to establish associations between them.

Ethical approval and consent to participate

The Institutional Review Board (IRB) of Irrua Specialist Teaching Hospital granted ethical approval (protocol number: ISTH/HREC/20231309/493). Prior to the collection of data, all study participants provided written informed consent. To preserve privacy, the names and other identifying information were not written down. Every procedure was carried out in compliance with the applicable rules and regulations.

RESULTS

Socio-Demographic Characteristics

A total of 325 (100%) participants were included in the study and majority 318 (97%) participated in the exit interview and their results analysed. Amongst them 108 (34%) were males whereas 210 (66%) were female respondents that were surveyed. Regarding their educational qualification: 70 (22%) had elementary education, 54 (17%) secondary, and 77 (24.2%) tertiary school. However, 116 (36.5%) had no formal training. The marital status shows that 45 (14.2%) were single, 222 (69.8%) married with partners; which constitute the bulk, 6 (1.9%) separated and 45 (14.2%) accounted for others not categorized. Furthermore, the studies revealed 32 (10.1%) were students, while majority of the respondents 129 (40.6%) were merchants (traders), 7 (2.2%) farmers, 51 (16%) civil servants, 19 (6%) retired veterans and 80 (25.2%) represented others not categorized. Nevertheless, it is important to state that majority 216 (67.9%) were predominantly resident in rural areas, whereas 102(32.1%) lives in urban centres (Table 1).

1. SOCIO-DEMOGRAPHICS DATA

S/N	VARIABLE	FREQUENCY	PERCENT (%)
1	Age Range		
	21-30	44	13.8
	31-40	31	9.7
	41-50	36	11.3
	51-60	71	22.3
	60 and above	136	42.8
	Total	318	100
2	Sex		
	Male	108	34.0
	Female	210	66.0
	Total	318	100

3	Education		
	Literate	199	62.6
	Illiterate	119	37.4
	Total	318	100.0
4	Qualification		
	None	116	36.5
	Primary school	70	22.0
	Secondary school	54	17.0
	Tertiary school	77	24.2
	Total	318	100.0
5	Marital status		
	Single	45	14.2
	Married	222	69.8
	Separated	6	1.9
	Others	45	14.2
	Total	318	100.0
6	Employment status		
	Student	32	10.1
	Merchant	129	40.6
	Farmer	7	2.2
	Civil Servant	51	16.0
	Retired	19	6.0
	Others	80	25.2
	Total	318	100

S/N	VARIABLE	FREQUENCY	PERCENT (%)
7	Tribe		
	Esan	204	64.2
	Yoruba	66	20.8
	Igbo	27	8.5
	Hausa	4	1.3
	Others	17	5.3
	Total	318	100.0
8	Religion		
	Christian	247	77.7
	Islam	69	21.7
	Others	2	.6
	Total	318	100.0

9	Place of residence		
	Rural	216	67.9
	Urban	102	32.1
	Total	318	100.0

Service – related Characteristics

Most of the respondents 268 (84.3%) were self-referred and largely first timers 179 (56.3%). The main visiting hours was morning with 283 (89%). Mondays are mostly overcrowded with 94 (29.6%) of respondents. A significant number of them had not visited another facility 227 (71.4%), while the few who had, mostly utilized retail pharmacies 43 (13.5%). When asked about their level of satisfaction, majority of the respondents 272 (85.5%) said they were satisfied with the waiting time and service delivery of the hospital (Table 2).

2. SERVICE-RELATED CHARACTERISTICS OF RESPONDENT AT GOPD

S/N	VARIABLE	FREQUENCY	PERCENT (%)
1	Purpose of visit		
	Appointment	50	15.7
	Self-referred	268	84.3
	Total	318	100.0
2	Visit frequency		
	First time	179	56.3
	Returning	139	43.7
	Total	318	100.0
3	Time of visit		
	Morning	283	89.0
	Afternoon	35	11.0
	Total	318	100.0
4	Day of visit		
	Monday	94	29.6
	Tuesday	68	21.4
	Wednesday	52	16.4
	Thursday	56	17.6
	Friday	48	15.1
	Total	318	100.0
5	Visited another facility		
	Yes	91	28.6
	No	227	71.4
	Total	318	100.0

6	Previous facility visited		
	None	225	70.8
	Health centre	14	4.4
	Retail pharmacy	43	13.5
	Private clinic	19	6.0
	Herbal clinic	2	.6
	Others	10	3.1
	Total	318	100.0

S/N	VARIABLE	FREQUENCY	PERCENT (%)
7	Do you think there are enough physicians?		
	Yes	292	91.8
	No	26	8.2
	Total	318	100.0
8	Where did you encounter most delay		
	None	1	.3
	Booking	3	.9
	EMR Data Capturing	4	1.3
	Consultation	219	68.9
	Nurse station	52	16.4
	Laboratory	14	4.4
	Radiology	25	7.9
	Total	318	100.0
9	How satisfied are you?		
	Very satisfied	1	.3
	Satisfied	272	85.5
	Dissatisfied	45	14.2
	Total	318	100.0

Average waiting time at different service points

The radiology department was the service point with the longest waiting time. The registration process for new patients requires them to do bio data capturing as well as booking to see the doctor, while returning respondents only just needed to be checked in to see the physician. The mean registration time for First time patients was 18 ± 5 mins compared to repeat patients with 9 ± 4 mins. The average time spent by respondents to do data capturing was 6.4 ± 6.3 mins and booking 7.9 ± 3.4 mins. At the nursing station, patients spent average of 18.3 ± 6.8 mins for the nurses to take their vital signs. Most patients waited longest at the consultation rooms with the doctors. The mean consultation time was $26.7 \pm$

10.9 mins. The laboratory and other investigational units 21.59± 9.0 mins, while radiology and pharmacy had mean waiting time of 57.80 ± 8.3 mins and 11.02 ± 2.7 mins respectively (Table 3).

AVERAGE WAITING TIME SPENT BY RESPONDENTS AT VARIOUS SERVICE POINTS

S/N	Service Point	Average Waiting Time Spent by Respondents at Various Service Point (Min)
1	Data capturing process	6.4 ± 6.3
2	Booking	7.9 ± 3.4
3	Nursing station	18.3 ± 6.8
4	Consultation (Doctor area)	26.7 ± 10.9
5	Laboratory/ investigation unit Other	21.59 ± 9.0
6	Radiology	57.80 ± 8.3
7	Pharmacy	11.02 ± 2.7

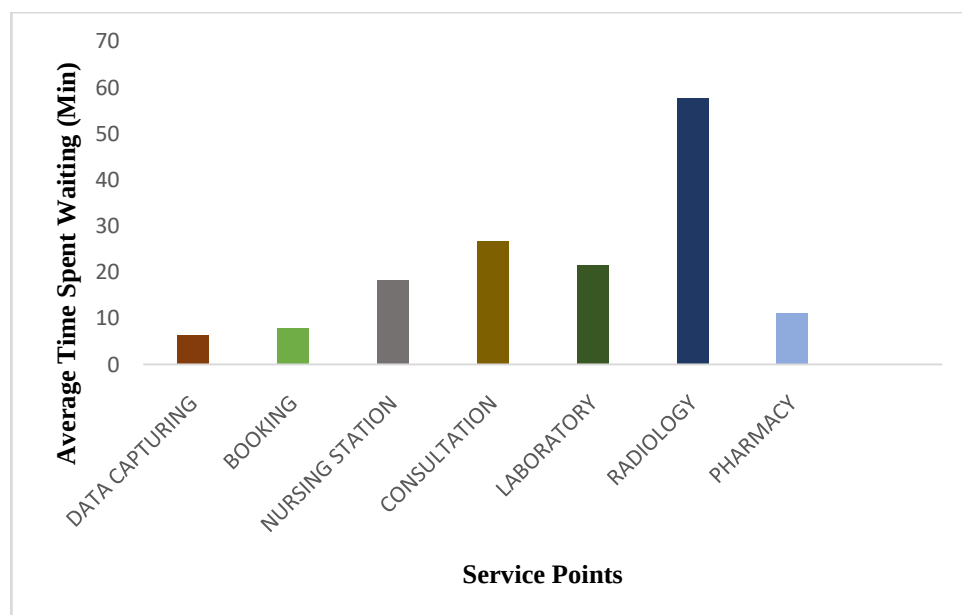


FIG 1: CHART SHOWING AVERAGE WAITING TIME SPENT BY RESPONDENTS AT VARIOUS SERVICE POINTS

Analysis of variance for the average (mean) time spent by Respondents at the various service points

ANOVA TABLE

Source of Variation	Degree of freedom	F-value	P-value
Between Groups	6	567.708982	0.0000
Within Groups	1662		
Total	1668		

NOTE: The highly significant p-value (0.0000) suggests that there are significant differences between at least two groups. With a large F-value (567.708982), the variation between groups is much higher than what would be expected by random chance. Therefore, there is a significant difference in time spent in some of the departments (e.g. radiology and consultation as shown in the table above) compared the rest.

Factors associated with Prolonged wait times of Patients at GOPD

The reasons given by patients for delay or prolonged waiting time were categorized into seven (7) factors. Majority(84.6%) of the patients were disgruntled by the lack of stable intranet supply for the EMR which they complained was the primary cause of the long waiting experienced at the clinic. This is shown in the figure 2 below.

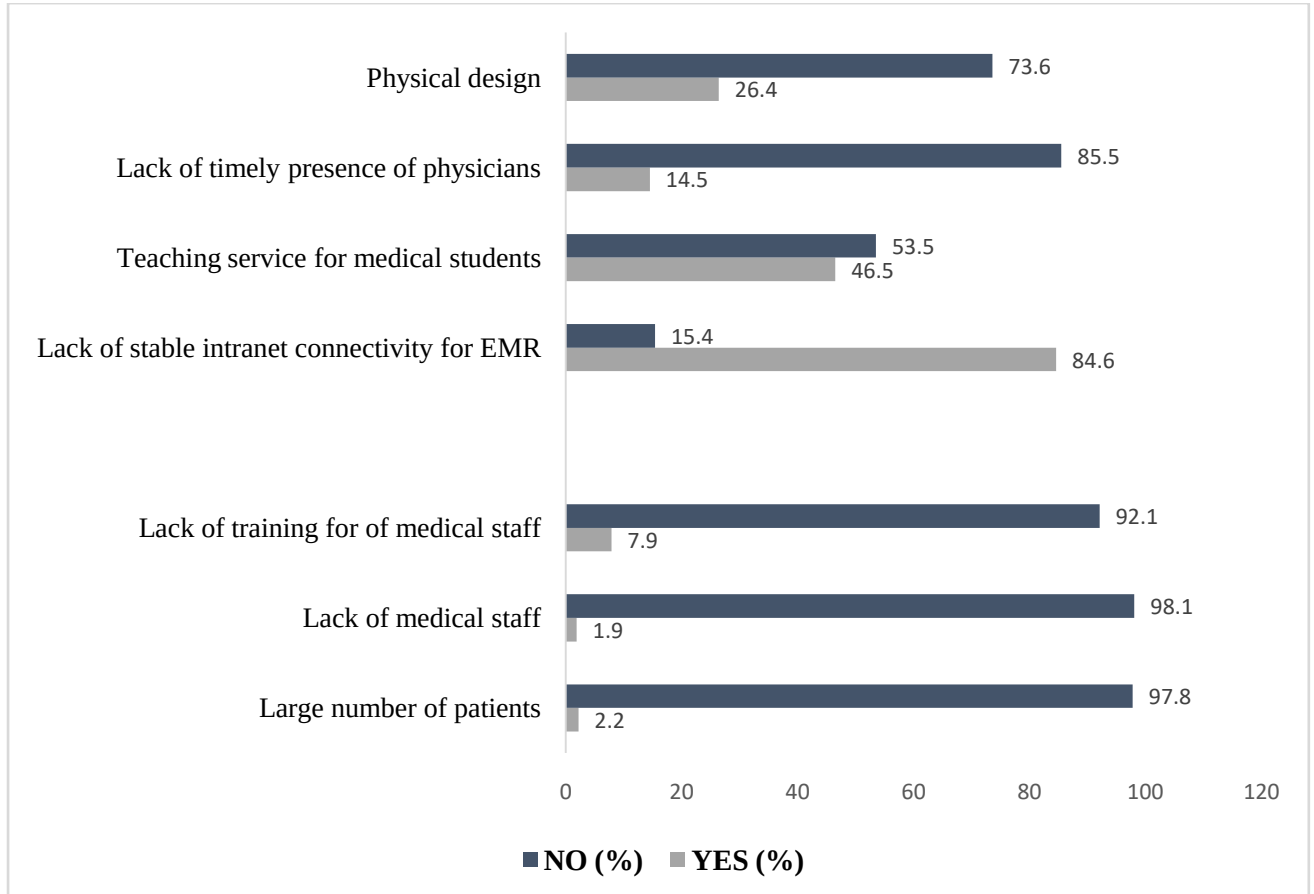


FIG 2: RESPONDENTS REASONS FOR DELAY AT SERVICE POINT

In addition, less than half of the respondents (46.5%) attributed long waiting time to the teaching services rendered to medical students. This according to them grossly impact on the consultation time. Furthermore, the physical layout of the clinic, which requires patients to walk several miles before accessing radiological services was identified as the third leading factor (26.4%). Other factors given by respondents include lack of timely presence of physician (14.5%), lack of training for medical staff (7.9%), large number of patients (2.2%) and the least lack of medical staff (1.9%).

Comparison of the waiting time between New and Returning Patients

There was a remarkable variation in wait times between new and returning respondents as shown in Table 4.

TOTAL WAITING TIME FOR NEW AND RETURNING RESPONDENTS

S/N	Respondent's Category	Average Total Waiting Time Spent (Min)
1	New Respondents	226.1 ± 62.1
2	Returning Respondents	206.1 ± 84.2
3	Total Respondents in the Study	217.3 ± 73.2

Ratio of Time Spent for New Respondents Compared to Returning = $\frac{226.1}{206.1} = 1.097$
approx. 1.1

New respondents spend an average total waiting time of 1.1times more compared to returning respondents.

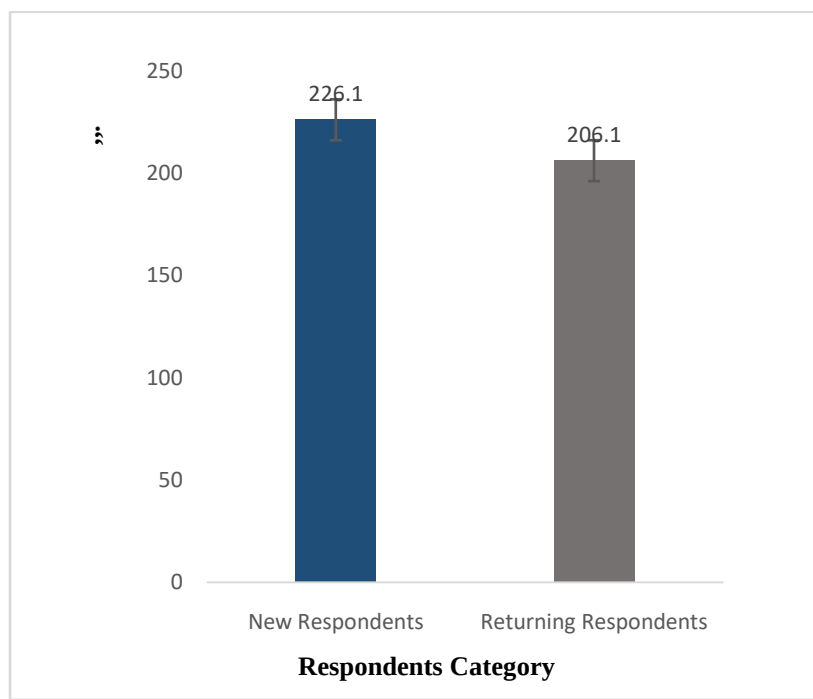


FIG 3: TOTAL WAITING TIME FOR NEW AND RETURNING RESPONDENTS

T-test P-value = 0.019118b

NOTE: The obtained T-test P-value of 0.019 indicates a statistically significant difference in the time spent between new respondents and returning respondents. This suggests that there is a notable variation in the duration of their respective visits. The finding suggests that, on average, new respondents tend to spend a significantly longer amount of time during their visits compared to returning respondents.

DISCUSSION

The waiting time pattern observed were similar to previous studies conducted in other clinics with EMR .This study found that the mean total clinic waiting time was 3hours 37mins (217mins). This finding is higher when compared to a study conducted in selected hospitals in Addis Ababa, in which the average waiting time was 60.2 mins at Yekatit 12 Hospital medical college; although it only took account of the registration and consultation time with the doctor. The service time for nursing care, laboratory and pharmacy services were not taken into cognizance.¹⁵ However, this long waiting period may be largely due to the erratic intranet connectivity with the EMR that patients encountered at the different point of care which disrupted service delivery. Additionally, the socio demographic characteristics, particularly educational status, with vast majority of patients not having attained tertiary education may be another reason for it.⁶

This study showed the average waiting time for registration of new and returning patients was 18mins and 9mins respectively. This is higher than the standard recommended time of 7mins given by the Business Process Reengineering (BPR) program. Similarly, its higher than 5.5mins obtained in a study conducted on two (2) primary health centres (PHC) in Saudi Arabia operating with EMR.¹¹ This could be as a result of difference in clinic setting; the current study location been a tertiary hospital while the previous one was carried out at primary health centres.

In this study, the average wait time for a doctor's consultation was 26.7 minutes. This is way beyond the international standard of 5minutes.¹⁶ Although the physicians are still familiarizing with the system but this long consultation time may not be unconnected with the improved communication or rapport between the patient and physician that is been fostered by the EMR which allow them freely share information about their health, eventually resulting in higher levels of satisfaction.¹⁷ Furthermore the study revealed that the educational training provided to medical students by the family medicine physicians had a significant influence on the overall consultation period.

Findings from this study showed that a mean waiting time of 21.59 mins was spent in the laboratory and other investigational units. Although with limited laboratory facilities servicing all category of patients, that is, in-patient and out-patient, this lab wait time may be considerably fair. One of the primary reasons may be, the result of doctors' clear, legible and unambiguous lab requests being accessible with ease, regarding the details that are available on the EMR.¹⁸⁻²²

It is noteworthy that in this study patient waited the longest accessing radiological services. This could be attributed to fewer equipment. The mean waiting time at the pharmacy department was 11.02 min. This is at variance with the 1.49min obtained at some primary health centers in Saudi Arabia.¹¹ This may be due to differences in clinical setting and workflow practices.

Upon comparing wait time between new and returning respondents, this study found that new patients waited 1.1 times more than the repeat patients which was found to be statistically significant ($p\text{-value} < 0.019$). Typically, new patients are required to first have their biodata captured on the EMR before booking to see the doctor. This two-phased registration process makes them spend more time at the clinic.

In the current study, over one-third of the respondents lack any formal education while over two-third had never attained tertiary education which could be partly responsible for this extensive waiting time. This is in consonance with a study conducted in some public hospitals in Ethiopia where it was found that patients who was unable to read and write spend 2.25 times longer waiting times compared to those with tertiary education.⁶

Regarding the factors responsible for long waiting time in the clinic, this study found that the most significant cause of prolonged waiting by patients was the unstable EMR intranet connection. It affected all service points from registration or scheduling appointment to see the doctor right until they collect prescribed medications from the pharmacy. Also, profound to elucidate that the paypoints where patients are billed for consultation fee, laboratory and other investigational procedures, radiological services and even medications were not exempted.

Limitation of the study

- During the exit interview, the customer could exhibit courtesy bias.
- There may be a shortage of qualitative components because not all departments were included in the study.
- The study was cross-sectional in nature and did not consider the cause and effect over an extended period of time.
- Although the EMR used in the study center was approved by the ministry of health, the generalizability of our findings to clinics that use a different EMR and/or with internet is unknown.
- The paucity of studies on this subject made it difficult for us to compare our findings with that of other research work.

CONCLUSION

Our study showed that patients still experienced prolonged waiting time visiting the clinic even though tasks has been computerized through the EMR. The predominant causes of this excessive wait times according to the respondents were the inconsistent EMR intranet, teaching services offered medical students which further impacted on the consultation time, and the physical design of the clinic that requires patients to walk several distances to get radiological services. Moreover, the rural setting this study was conducted, where over two-third of the respondents had not attained tertiary education may have had considerable impact on the overall waiting time. This could have made it difficult for them to understand the intricacies and the operational procedures of the EMR. Therefore, it is important for hospital administrators and all other stakeholders to work on improving efficiency of the EMR, provide a more suitable infrastructure in terms of the clinic's physical layout. Also, there is urgent need to enlighten patients about the modus operandi of the EMR.

REFERENCES:

1. Musinguzi C. Patient waiting time and associated factors at the assessment center, general out-patient department, Mulago Hospital Uganda. 2015.
2. Thornton CS, Tsai WH, Santana MJ, Penz ED, Flemons WW, Fraser KL, Hanly PJ, Pendharkar SR. Effects of wait times on treatment adherence and clinical outcomes in patients with severe sleep-disordered breathing: a secondary analysis of a noninferiority randomized clinical trial. *JAMA Network Open*. 2020 Apr 1;3(4):e203088-.
3. Oche MO, Adamu H. Determinants of patient waiting time in the general outpatient department of a tertiary health institution in North Western Nigeria. *Annals of medical and health sciences research*. 2013;3(4):588-92.
4. Enabulele O, Ajokpaniovo J, Enabulele JE. Patient waiting and consultation time in the general practice clinic of the University of Benin teaching hospital, Edo State, Nigeria. *J Family Med Community Health*. 2018 Mar 23;5(2):1146.
5. Ogaji DS, Mezie-Okoye MM. Waiting time and patient satisfaction: Survey of patients seeking care at the general outpatient clinic of the University of Port Harcourt Teaching Hospital. *Port Harcourt Medical Journal*. 2017 Sep 1;11(3):148-55.

6. Biya M, Gezahagn M, Birhanu B, Yitbarek K, Getachew N, Beyene W. Waiting time and its associated factors in patients presenting to outpatient departments at Public Hospitals of Jimma Zone, Southwest Ethiopia. *BMC Health Services Research*. 2022 Jan 25;22(1):107.
7. Hemmati F, Mahmoudi G, Dabbaghi F, Fatehi F, Rezazadeh E. The factors affecting the waiting time of outpatients in the emergency unit of selected teaching hospitals of Tehran. *Electronic J General Med*. 2018 Jul 10;15.
8. O'Malley MS, Fletcher SW, Fletcher RH, Earp JA. Measuring patient waiting time in a practice setting: A comparison of methods. *The Journal of ambulatory care management*. 1983 Aug 1;6(3):20-7.
9. Osundina KS, Opeke RO. Patients' waiting time: Indices for measuring hospital effectiveness. *International Journal of Advanced Academic Research| Social & Management Sciences*. 2017 Oct;3(10):2488-9849.
10. Lin HL, Wu DC, Cheng SM, Chen CJ, Wang MC, Cheng CA. Association between electronic medical records and healthcare quality. *Medicine*. 2020 Jul 31;99(31):e21182.
11. Jabour AM. The impact of electronic health records on the duration of patients' visits: time and motion study. *JMIR medical informatics*. 2020 Feb 7;8(2):e16502.
12. Keshta I, Odeh A. Security and privacy of electronic health records: Concerns and challenges. *Egyptian Informatics Journal*. 2021 Jul 1;22(2):177-83.
13. Hamilton C. The WHO-ITU national eHealth strategy toolkit as an effective approach to national strategy development and implementation. In *MEDINFO 2013* 2013 (pp. 913-916). IOS Press.
14. Akwaowo CD, Sabi HM, Ekpenyong N, Isiguzo CM, Andem NF, Maduka O, Dan E, Umoh E, Ekpun V, Uzoka FM. Adoption of electronic medical records in developing countries—A multi-state study of the Nigerian healthcare system. *Frontiers in Digital Health*. 2022 Nov 21;4:1017231.
15. Kitesa G, Mamo E, Teshome A, Binu W, Abi H, Abdisa F. Effect of Electronic Health Records on Patient Satisfaction and Waiting Time at Selected Hospitals, in Addis Ababa. 2021
16. Al Faris EA, Al Dayel MA, Ashton C. The effect of patients' attendance rate on the consultation in a health centre in Saudi Arabia. *Family practice*. 1994 Dec 1;11(4):446-52.
17. Ibrahim AA, Zamzuri MA, Ismail R, Ariffin AH, Ismail A, Hasani MH, Manaf MR. The role of electronic medical records in improving health care quality: A quasi-experimental study. *Medicine*. 2022 Jul 29;101(30):e29627.
18. Manca DP. Do electronic medical records improve quality of care?: Yes. *Canadian Family Physician*. 2015 Oct 1;61(10):846-7.
19. Radley DC, Wasserman MR, Olsho LE, Shoemaker SJ, Spranca MD, Bradshaw B. Reduction in medication errors in hospitals due to adoption of computerized provider order entry systems. *Journal of the American Medical Informatics Association*. 2013 May 1;20(3):470-6.

20. Sokol DK, Hettige S. Poor handwriting remains a significant problem in medicine. *Journal of the Royal Society of Medicine*. 2006 Dec;99(12):645-6.7.
21. AlSarhed AH: The impact of enhancing outpatient Clinic Management Software in Reducing Waiting Time in Saudi Hospitals. Doctoral dissertation, Prince Sultan University; 2016. Retrieved on 20th September,2020.
22. Albagmi S. The effectiveness of EMR implementation regarding reducing documentation errors and waiting time for patients in outpatient clinics: a systematic review. *F1000Research*. 2021;10.