Management of patient's clinical electronic health records and healthcare service delivery in Southern Cross River State - Nigeria

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Introduction

Health and well-being are the most important elements of life. They are both a necessity and right of any human. The United Nations (UN) Resolution (2012) urges governments to provide all her citizens with affordable quality health care services. In this resolution, the UN emphasized healthcare provision as a compulsory requirement for international development and therefore urged civil society and international organizations to collaborate with governments in prioritizing healthcare provision in the world. The Health Sector in Cross River State and many other states in Nigeria is facing the challenge of quality medical treatment and services. This is owing to the rising population and indulgence in unhealthy life practices, and the quest for a higher quality of life, and the shortage of medical personnel in health centers and/or the lack of experienced manpower to administer quality and timely health services. Thus, the flexibility and quick response approach required for the smooth functioning of a health care system can only be achieved by deploying digital systems to facilitate healthcare service delivery.

Electronic health record (EHR) is an authorized well-being documentation for an individual shared among multiple facilities and agencies to improve efficiency, effectiveness, quality healthcare and reduce costs (Oyegoke, 2013). It certifies reliability of patients information such as; previous diagnosis, prescriptions, lab test, blood type, family maladies, allergies etc. Electronic health information system afford sharing of various forms of health data such as; coded text, clinical imaging, (e.g., x-rays), and videos. This would include the patient daily life long-term data and information effectively managed. Electronic health care information if properly managed will save more lives, increase live span, save cost, and ensure quality service delivery in healthcare service institutions. This is because; proper health records are among the most vital tools that hospitals require in attaining quality, accuracy, accessibility, authenticity and efficient service delivery. Therefore efficient medical service is dependent on both training and knowledge of doctors/ nurses as well as proper medical records keeping processes. (Obotu, Uganneya & Ogezi, 2018).

The whole essence of electronic health records (EHRs) is to improve on healthcare service delivery and reduce cost. However, these goals have not been realized in most state-owned hospitals, specifically in Cross River State as manual medical records of births, mortality, communicable disease persist, most of which are not properly recorded due to incomplete, illegible handwriting and use of confusing abbreviations as such prone to mutilation, deterioration and disaster Doctors spend two-third of their time doing paperwork rather than attending to patients, new case sheets are created each time a patient visits the hospital. Obotu, Uganneya and Ogezi (2018) posited that health records such as Patients' medical history, diagnosis, and medical prescription, appointments attended and missed are manually recorded. This creates excess paperwork and repetition of medical examination. Data generated is re-entered manually into multiple access databases This creates a great challenge to the medical silos and ultimately leading to a complex patient journey and poor patient experience.

Despite the growing importance of electronic health records in the World, Cross River Southern zone is under severe threat and is fraught with challenges ranging from inadequate skills and knowledge, poor financial resources, infrastructural deficit, as well as political and bureaucratic constraints. Manual health record keeping system, are carried by hand as such prone to mutilation, deterioration and disaster which can be man made or natural, the information stored on paper fades due to aging paper and ink. This is more severe as government hospitals and service centers are limited by low knowledge level of electronic systems, manpower and tools to carry out these services effectively. The thrust of this paper therefore is first to ascertain the extent to which clinical electronic health records management can improve healthcare service delivery and reduced cost in southern senatorial zone of Cross River State. Second is to find out if doctors spend two-third of their time doing paperwork rather than attending to patients, new case sheets Third is to find out the extent of low knowledge level of electronic systems, manpower and tools to carry out these services effectively The remainder of this paper is organized as follows: Section 2 presents the theoretical underpinnings and empirical literature of the studies; Section 3 describes the methodology using qualitative data. Finally, the article concludes with a summary of the main findings, policy recommendations and suggestions for future research.

Literature and theory

The diffusion theory by Rogers (1962)

This paper uses the diffusion theory of Rogers (1962) as a lens to illuminate understandings of clinical electronic health records management. This theory was first popularized by Rogers in 1962. It seeks to explain how, why, and the rate at which new technologies and ideas spread in a system. This theory is important in understanding how willing and readily some individuals or communities can adapt to change. Adapting to change involves two stages. The first group of individuals or communities to adapt to change and new ideas serve as models or change agents. While the later set to adjust to change are known as early adopters. Both groups tend to make choices based on logical thinking and proficiencies informed by logical reasoning and proof of results. Those late adopters are inspired by social influences such as friends than by rational thinking. Therefore, the importance of this theory is that, the adoption of the diffusion theory will be useful especially in a situation where medical personnel's of government owned hospitals within the southern senatorial zone of Cross River State are ready and willing to change to a new technology of electronic health records which may likely serve as models for others to adopt and influence the late adopters. The diffusion theory can be used to influence individuals within a community, group, community and political setting to achieve desired behavior

Clinical patient records can be any contemporaneous notes taken by a health care practitioner about a patient such as patient identification, tests results, treatment plans, disability assessments, progress reports, referral letters, X-rays and photographs, laboratory evidence-histology sections, ECG traces, cytology slides and printouts from automated analyzers, death certificates and autopsy reports, insurance as well as patient discharge summaries. Record keeping in healthcare service delivery has in recent times evolved as an essential discipline in hospital management (Ajala, Awokola et al., 2015). Clinical electronic health component are made up of both nursing and Computerized Provide Order Entry (CPOE). Through the CPOE, orders required for patient management are directly inputted into the computer. This module uses clinical evaluation tools such as drug-diagnoses interactions and drug-drug, drug-allergy

To ensure best practices, these medical records are legally and morally obligated to be managed under complete patient confidentiality and protection from loss and unauthorized use.

Mc Cord and Hemkens (2019) in a study of electronic health records for clinical trials, they conclude that it has enormous potentials to increase and change the capacity of clinical health research by facilitating randomized control trials (RCTs) in the real-world settings. For Anderson (2015), health record, or medical documentation could mean a patient's physical folder comprising the totality of patient's health history. They are personal document with ethical and legal issues. Awareness of patient health records (PHRs) started in the early 1970s. The original intention was to upsurge patient engagement and empowerment. While the objective was to allow continuousness care, treatment choice, error reduction, as well as patient-provider trust building (Lina, Anna &Balaji, 2019). Kasaw, Mucheye and Semalegne (2019) surmise that clinical healthcare records demand operational and well-organized medical records for evidence-based mediation.. Healthcare professionals are open to improving their distribution, monitoring, recording, and preventive measures to lessening morbidity, which can be achieved through accurate, complete, comprehensive, and consistent information. Odekunle (2016) studied current roles and applications of electronic health records in the healthcare system. The study showed that the key motivation for increasing the application of EHR in healthcare systems is to improve patient safety, access, reduce cost of medical expenditure and competence in healthcare service delivery.

Public confidence on electronic health records system

There exist several concerns among social groups, doctors, and patients about patient privacy. When UK discovered that the health records of her citizens were held locally without coordination, she launched a national care records service in 2002 to deliver an electronic health record across the country. However, this failed because the template did not address patient confidentiality. Other issues were enormous cost overruns and overambitious timescales (CPI, 2017). From the supply component, the stakeholders recognized that paper work in data transmission and registration takes so much times and create inefficiency in the system. The Electronic Health Records have been critiqued for weak management, and poor value for money, over-centralized and poor sensitivity to local circumstances (AMRC 2015).

Benefits of hospital information systems

Hospital Information Systems increase workflow and improves access to health care by patients (Ouma & Herselman, 2008). Sisniega (2009) asserts that information and communication technologies could facilitate the permeating and prompt communication between stakeholders and organizations. Through the adoption of ICT, organizations and individuals accomplishes an effective and uninterrupted workflow. This also allows for an efficient and effective networking by physicians in terms of drug prescription, patients review and treatment. Sammon, et al. (2009) held that with enhanced storage analysis of patient information, physicians may reach improved and quality clinical decisions through the adoption of associated patient data analysis systems (PDAs). For enhanced efficient , prompt and cost effective clinical decisions clinical information is key(William & Boren 2008). Another key challenge in health care systems is the incorporation of software that can solve diverse necessities in the health care system

Information technology allows intra networking within units of an organization for effectual information flow. Analytical software systems facilitates proper diffusion and fluidity of information in decision making thereby placing the organizations in comfortable competitive edge in the marketplace (Keenan, Nguyen, &Srinivasan, (2014), That not using the communication billing software is capable of worsening the process causing a breakdown. For Phillips (2009) using integrated system suggest a theoretical data flexibility and integration abilities. This encourages a user- friendly interface with e-records repository and retrieval. Electronic health systems help in the optimization of clinical time and compliance to lay down

rules (Georgiou, Westbrook, Braithwaite,& Iedema, 2005). Keenan et al. (2006) sees electronic medical records system as effective tool for training physicians and would be physicians.

Challenges in health records management practice

For manual records, one of the most disturbing challenge is lack of space to store the cumulative number of health records. With this concerns, Dollar (2002) sees this as a reoccurring problem for institutions. The inability to apply analytical tools has been identified as a constraint to achieving effective decision making for health service delivery. This can also be attributed to poor training for community health workers. This is consistent with results from (Spyrou, 1993) and Yusof,Kuljis, Papazafeiropoulou and Stergioulas (2008) in primary care organization in the UK (Yusof, Kuljis, Papazafeiropoulou, &Stergioulas, 2008). The study stressed complete cycle learning and training (Spyrou, 1993; Yusof, Kuljis, Papazafeiropoulou & Stergioulas, 2008).

Another problem is the inability to apply appropriate tools to transform information for quality health decision making. Efe (2013) submits that a passionate and comprehensive information dissemination is needed for effective management of public health care services in the grassroots. That huge volumes of papers are accumulated in hospital shelves after a given period. This poses the challenge of locating records and insufficient storage space. However the challenges identified for electronic records include system failure, high costs of installation, lack of skilled manpower and cyber-crime. Another challenge is that of legal requirement which may include the need to sign, by hand, a document to authorize a medical operation on a patient, International Record Management Trust (2006). Nevertheless, in the event of request for paper content of registers legal or archival purposes, therefore, appropriate measures must be taken before any decision is made than relying solely on the electronic system . These legal requirements may also include the need to sign, by hand, a document to authorize for instance, a medical operation on a patient.

Overview of Southern Zone of Cross River

The southern zone of cross river state is housed by seven local government areas; Biase, Odukpani, Akamkpa, Calabar Municipal, Calabar South, Akpabuyo and Bakassi. The choice of this zone is based on the fact that, it housed the state capital and presume to have more better health facilities, because of government presence, NGO's, Companies and industries. To the North of the zone is Yakurr Local Government Area, to the East is Abia State; to the West is, Akwa Ibom and Ebonyi States of Nigeria, and to the South is the Atlantic Coastline. Its population is estimated at about 3.3 million according to the National Population Commission (NPC) census figures of 2006.

Methodology

The study adopted survey design using questionnaire. Cross River State is located in the South-South geo-political zone of Nigeria with a population of 749 respondents which was used to get responses on the measurement of the extent of electronic management system on healthcare service delivery, with a sample of 710, which comprise of 355 medical personnel and 355 inpatients, stratified proportionate random sampling was used in selecting equal percentage in a population as sample, which is divide into strata, each hospital form a stratum where 60 percent of staff and inpatient were selected as sample. hospitals, and 355 in-patients of which 60 percent was taken from each hospital out of the six hospitals used for the study. In the entire population, there were eight (8) doctors, One hundred and nineteen (119) caregivers, Ninety (90) administrative staff in general hospital Calabar; Two (2) doctors, thirty (30) nurses and fifteen (15) administrative staff in St. Joseph Hospital Akpabuyo. For general hospital Akamkpa, there were Four (4) medical doctors, thirty Seven (37) caregivers, Nineteen (19)

administrative staff. In Cottage Hospital Oban, there was One (1) doctor, eight (8) nurses and five (5) administrative staff. In Cottage Hospital Biase, there was One (1) medical doctor, Fourteen (14) care-givers and Twenty one (21) administrative staff. Comprehensive Health Center Okoyong, there was one (1) doctor, eight (8) care-givers and Eleven (11) administrative staff. For inpatient, 60 per cent was used as sample, which was about three hundred and fifty five (355). Descriptive statistics (mean and standard deviation) was used to summarize the data that were generated from the questionnaire. because descriptive statistics provide a useful starting point for analyzing data, as they can help to identify outliers, summarize key characteristics of the data, and inform the selection of appropriate statistical methods for further analysis, while One-way Analysis Of Variance (ANOVA) was used to test the hypotheses The distribution of the table is shown in Table 1A and B.

TABLE 1A: Distribution of population and sample: Health Personnel

S/N	Hospital	Total number of health personnel	Percentage of health personnel used (60%)
1	General Hospital, Calabar	361	217
2	St. Joseph's Hospital, Akpabuyo	79	48
3	General Hospital, Akamkpa	104	62
4	Cottage Hospital, Oban	24	14
5	Cottage Hospital, Akpet	54	33
6	Comprehensive Health Centre, Okoyong	34	20
	Total	656	394

Source: Ministry of Health Calabar, 2023

TABLE 1B: Distribution of population and sample for inpatients

S/N	Hospital	Total number of in-patients	Percentage of in-patients used (60per cent)
1	General Hospital, Calabar	159	96
2	St. Joseph's Hospital, Akpabuyo	80	48
3	General Hospital, Akamkpa	85	51
4	Cottage Hospital, Oban	80	48
5	Cottage Hospital, Akpet	94	56
6	Comprehensive Health Centre, Okoyong	94	56
	Total	592	355

Source: Field survey 2023

Presentation of results

Hypothesis one: The extent of healthcare service delivery in state-owned hospitals in the Southern zone of Cross River State is not significant. For this hypothesis, the only variable involved is healthcare service delivery in state-owned hospitals in the Southern zone of Cross River State. To test hypothesis one, Population t-test analysis is used. Find result is in Table 2 and 3. Table 3 shows that p-level (0.78) is greater than the level of significance (.05) and the calculated t-value of 1.774 (P> .05) is less than the critical t-value of 1.976 and 345 degrees of freedom. With this result, hypothesis one is retained. This implies that the extent of healthcare service delivery in Southern zone of Cross River State is not significant or is significantly low.

TABLE 2: Summary of descriptive statistics

Variables	N	Mean	Std. Dev
Healthcare service delivery	355	20.30	2.07
Patient management of electronic health records	355	20.69	2.30
Clinical electronic health records	355	20.33	2.21

Source: Field Survey, 2023.

TABLE 3: A population t-test analysis of the mean scores of responses on the extent of healthcare service delivery in Southern zone of Cross River State.

	N	Mean	Std. Dev.	Std. Error	Mean diff.	t-cal	Sig.
Healthcare service delivery	355	20.30	2.07	.169	.300	1.774	.078

p> .05 t (354) (not significant at p> .05)

Patient management of electronic health records does not significantly influence healthcare services. For this hypothesis, the dependent variable is healthcare service delivery while independent variable is utilization of patient management electronic health records in Southern zone of Cross River State. Based on the six items that measured utilization of patient management electronic health records in the hospitals, subjects who scored 9-17, 18-21 and 21-24 were classified as low, moderate, and high respectively. To test this hypothesis, the mean of healthcare service delivery in Southern zone of Cross River State were computed and compared from low, moderate and high levels of utilization of patient management electronic health records using one-way analysis of variance (ANOVA) and descriptive statistics.

The result is presented in Table 4 and 5. The result of the analysis in Table 4 revealed that the p-value (.000) is less than .05 level of significance and the calculated F-ratio of 38.910 is greater than the critical F-ratio of 3.06 at 0.05 level of significance . Based on the foregoing result, the null hypothesis is rejected and the alternative hypothesis accepted. This means that utilization of patient management electronic health records significantly influence healthcare service delivery in state-owned hospitals. To determine the direction, three levels of influence, a post hoc multiple comparison test was applied using Fisher's Least Significant Difference (LSD) method as presented in Table 5 below. The result in Table 5 shows that significant differences exist between low and moderate group (t=5.82), between moderate and high group (t=3.96) and between low and high group (t=8.77). This result shows that even with suggestive variance among all the groups, the difference is greater between the low and the high group.

TABLE 4: One way analysis of variance on the impact of patient management electronic health records and healthcare service delivery

Group	N	Mean	Standard Deviation	Standard error	
Low (9-17)	123	17.68	2.39	.511	
Moderate (18-21)	163	20.13	1.55	.193	
High (22-24)	69	21.31	1.55	.190	
Total	355	20.30	2.07	.169	
Source of variation	SS	Df	MS	F-ration	P-value
Between groups	221.359	2	110.679	38.910	.000
Within groups	418.141	352	2.844		
Total	639.500	354			

**P<0.05 df=2, 352 (significant at P< .05)*

TABLE. 5: Fisher's (LSD) multiple comparison test analysis on the impact of patient management electronic health records and healthcare services

Group	Low (n=122)	Moderate (n=161)	High (167)
1. Low	17.68a	-2.44b	-3.66b
2. Moderate	-5.82*c	20.13a	-1.18b
3. High	-8.77*c	-3.96*c	21.31a

Significant at .05

a. Group means placed on principal diagonal

b. Difference between group means placed above diagonal

c. Fisher's LSD t-values placed below diagonal

Clinical management of electronic health records does not significantly influence healthcare service outcomes in Southern zone of Cross River State.

In this hypothesis, the dependent variable is healthcare service delivery while independent variable is clinical management of electronic health records, in southern Cross River. Based on the six items that measured clinical management of electronic health records in the hospitals, subjects who scored from 10-17, 18-21 and 21-24 were classified as low, average, and high respectively. To test this hypothesis, the mean of healthcare service delivery in Southern zone of Cross River State from low, average and high levels of clinical management of electronic health records were computed and analyzed using one-way analysis of variance (ANOVA) and descriptive statistics.

Based on result of the analysis presented in Tables 6 and 7. Table 6 shows the p-value (.000) less than .05 level of significance and the calculated F-ratio of 50.065 greater than the critical F-ratio of 3.06 at 0.05 significance level. From the result, the alternative hypothesis is accepted while the null hypothesis is rejected. This implies that clinical management of electronic health records significantly influences healthcare service delivery in Southern zone of Cross River State. To determine the direction of significance among the three levels of influence, a post hoc multiple comparison test was applied using Fisher's Least Significant Difference (LSD) approach. The result in Table 7 reveals existence of a significant difference between low and moderate group (t=5.98), between moderate and high group (t=6.12) and between low and high group (t=10.07). This result implies that though there exist a significant difference among all the groups, the difference is greater between the low and the high group.

TABLE 6: One way analysis of variance on the influence of clinical management of electronic health records and healthcare service delivery

Group	N	Mean	Standard Deviation	Standard error	
Low (10-17)	119	17.42	2.65	.608	
Moderate (18-21)	168	19.88	1.55	.191	
High (22-24)	69	21.57	1.13	.140	
Total	355	20.30	2.07	.169	
Source of variation	SS	Df	MS	F-ration	P-value
Between groups	273.900	2	136.950	50.065	.000
Within groups	365.600	352	2.487		
Total	639.500	354			

**P<0.05 df=2, 354*

TABLE 7: Fisher's (LSD) multiple comparison test analysis on the influence of clinical electronic health records on healthcare service delivery

Group	Low (n=119)	Moderate (n=166)	High (165)
1. Low	17.42a	-2.45b	-4.14b
2. Moderate	-5.98*c	19.88a	-1.69b
3. High	-10.09*c	-6.12*c	21.57a

Significant at .05

a. Group means are placed on the principal diagonal

b. Difference between group means are placed above the diagonal

c. Fisher's LSD t-values are placed below the diagonal

Discussion of findings

Electronic health records is saddled with several challenges in Cross River State; these challenges range from poor financial resources for effective (full-scale) implementation, infrastructural decay, low skill and knowledge to use new technologies. There are also political and bureaucratic constraints. If health records are fully implemented through the electronic

system, this practice could be reliable and provide valuable information for enduring patient care; guard the legal concerns of physicians, patients and the hospital; and meet prerequisite for acceptable standards and researches for improved healthcare service delivery (Abdulkadir et al., 2010).

Patient management electronic health records and healthcare service outcomes in state-owned hospitals in Southern zone of Cross River State. The result reveals that patient management of clinical electronic health records has a suggestive impact on healthcare service delivery in state-owned hospitals. Hence the outright rejection of the null hypothesis. This result suggests that patient management of clinical electronic health records has implication on ease of access to patients' health record by healthcare professionals, and consequently improve healthcare service delivery to patients. More so, patient management of health electronic records facilitates registration of patients, admission of patients, and transfer of patients from one hospital to another thereby, leading to improved clinical service delivery to patients.

This result conforms to the findings from this study are inline with the General Accounting Office (GAO) 1991report on automated medical records, which showed that by providing automated patient records healthcare service outcomes can be improved by providing medical personnel with quality, faster data access and retrieval. Furthermore, the GAO report also suggests that automated patient record supports quality assurance and decision-making. That electronically capturing clinical information could assist patients care Garrett et al. (1986).

However, the study by Salome, Paul, Joseph, Carolyn and Albert (2009) is a departure from the findings of the foregoing; they found no relationship between electronic notes and blood pressure control among asthma patients. Similarly, they found no association between electronic reminders system and blood pressure control. Although, the study showed some reasonable degree of association between angiotensin converting enzyme inhibitors and diabetic patients through application of electronic processes. The study therefore, submits that electronic health records could improve quality healthcare.

Conclusion

From the result of the study, it is established that management of patient clinical electronic health records on healthcare service delivery in state-owned hospitals in Southern Zone of Cross River State is not significant. However, patient management of clinical electronic health records have a significantly influenced healthcare service delivery in state-owned hospitals in Southern Zone of Cross River State. It can therefore be summarized that electronic health records system has great impact on the quality of healthcare service outcomes in state-owned hospitals in Southern Cross River State.

Recommendations

Based on the findings of this study, the following recommendations are made;

1. The procurement and installation of equipment for electronic health records should be taken as a serious health concern in the southern zone of Cross River State.

2. Health personal should be encouraged to undergo periodic training on use, retrieval and management of electronic health records for effective healthcare service delivery.

3. The state government should deploy an effective supervisory mechanism that will checkmate the poor attitude of health workers in state-owned hospitals in Southern Cross River State. This will help to improve healthcare service delivery in state-owned hospitals in the Southern Zone of Cross River State.

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