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Abstract: Diverse patients' health information requires an appropriate approach that meets the plethora of needs of both healthcare providers and patients for effective management. The exchange of medical information between professionals is critical to the delivery of quality care. Ekiti State University Teaching Hospital (EKSUTH)'s information exchange is currently paper-based and error-prone. As a result, an electronic health record (EHR) is being developed where data can be transferred between members of healthcare in the hospital. This paper demonstrates how EHR improves the management of patients' health information. A cross sectional study design was used where a total population of HIM professionals at EKSUTH were given questionnaires on related questions. The results showed that there is environmental support towards ICT and the benefits and barriers towards the implementation of EHR were identified. Summarily, healthcare information management will thrive in the face of EHR when adopted and integrated into healthcare services.

Keywords: healthcare information management; HIM; electronic health record; EHR; healthcare professionals; ICT; health information management professionals; healthcare providers; information technology; IT; healthcare quality; patients' health information; healthcare services.

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1 Introduction

Healthcare is primarily concerned with maintaining and improving people's health through the prevention, diagnosis, treatment and cure of diseases. This is a service typically provided by healthcare professionals and people in the related health field. Quality healthcare helps prevent disease and improve people's quality of life. Effective communication between healthcare providers can help improve care delivery and the well-being of those seeking care. Healthcare information management is the responsibility of everyone involved in patient care management. In the past, patient information was carried from one location to another on paper. This has created some challenges for both the patients and the healthcare management team, including poor communication, illegible handwriting, output errors, missing records, and avoidable workload for healthcare team members such as physicians, healthcare information management professionals, nurses, laboratory scientists, pharmacists, and others within the healthcare organisation. The goal of collecting and storing patient information is to make it available for making good treatment plans at the point of care and disease profiling for strategic interventions. It is important to recognise that most individual patients have multiple sources of care. It is vital that their personal patient information is available at all points of care. For this to work, patient information should be linked to improved communication (Akinyemi et al., 2022). Essentially, regardless of where a

patient accesses care, whether at the primary, secondary, or tertiary level, their information should be available at all times and well managed for better management of healthcare. The timeliness and availability of information will enable healthcare providers to make better decisions and provide better care. Given these high expectations and current technological advances, this is only possible through the use of electronic health records (EHR), which have been growing rapidly in developed countries but are just beginning to gain popularity in developing countries.

2 Background

Communication and access to patients' health information and management of their records should not be limited to one department or healthcare facility but should be managed using a good software system from wherever they wish to access care, without necessarily going into a specific one or having to go to a hospital where they had previously received care. There should be a standard model that allows for the electronic transmission of patients' health information and records management, either within a hospital electronic medical record (EMR) or well beyond the geographic area of the institution EHR. In the last two decades, the adoption of EMRs has been advocated, even today's paper-based medical record systems are widely used in healthcare. Meanwhile, healthcare organisations/providers have improved the standards for records made in clinical settings. Most hospital patient records include details, name, address, family history, complications, and patient care outcomes. Patient documentation in hospitals is gaining popularity as it is vital to the safety of both patients and healthcare providers. It can therefore be used in all countries after healthcare providers realise that they can better treat patients with competent and accurate medical stories (Emeka and Lalit, 2020). One of the main advantages of using computer systems in healthcare lies in the ability to provide healthcare professionals with useful information for decision-making, so their main goal is to increase the quality and efficiency of healthcare. To fulfil these purposes, health information systems must meet interoperability standards, quality, security, scalability, reliability, timeliness, data storage and processing conditions (Sandra, 2013). Patient healthcare management strategies have been accessed in traditional paper-based record keeping (TPBRK) for many years. Its simplicity, low cost to set up and maintain, universal recognition and acceptance, and ease of data entry have stood the test of time. Nonetheless, the fragility of paper-based large- scale storage mastery, the time it takes to organise paper records, the consistency of data recording, the susceptibility to errors, insufficient multiple access at the same time, the absence and misplacement of paper records/medical notes are among the disadvantages of paper-based documents include complications, inability to access them remotely, attaching number of new paper pages to patient records, which can lead to overloading of the shelf or an additional storage facility (Pathak et al., 2021). The main problem with paper-based procedures is the timing of accessing patient data, which the physician needs immediately to assess the historical patient data, the prescription, and a decision. Time is very important in healthcare. Paper-based cannot be considered a safe media format, it can be exposed to moisture, water and fire (William, 2021). Conversely, all medical information must be enclosed in a storage/secure area to ensure the privacy, integrity and protection of the medical data.

Norris (2002) recognised EHRs as one of the holy grails, touted as a universal cure for healthcare information management problems, but also identified challenging areas

including security measures and privacy issues that arise at the point of data storage and transmission. EHR includes health information about a patient's medical/personal history, laboratory test results, and diagnostic films stored in a digital layout and available over a computer network to healthcare providers contributing to patient care (Norris, 2002; Akinyemi et al., 2023). EHRs involve the use of various computers networked together through a terminal. It facilitates patient management by providing appropriate access to longitudinal patient data, enabling timely and efficient diagnoses, effective patient outcome assessments, and correct therapeutic treatments without repeated examinations or tests (Da et al., 2021). The data, its timeliness and availability will enable healthcare providers to make better decisions and provide better care (Babu and Thiyagarajan, 2023). Boonstra et al. (2014) wrote that EHR implementation initiatives are typically driven by the promise of improved patient data integration and availability, by the need to improve efficiency and cost – effectiveness through a changing doctor-patient relationship toward shared care team of healthcare professionals and/or by the need to deal with a more complex and rapidly changing environment, these showed that it is worthwhile to implement EHR considering that it has more positive effects on health management, especially with regard to patient information and file management (Boonstra et al., 2014). In recent times, there had been further development of active participation of patients in their EHR which will assist in better care management and active participation in the management of their health (Kruithof et al., 2023).

2.1 Transition from paper-based to EMR systems

The integration of data in a paper-based medical record with an electronic record offers significant clinical and operational benefits for the healthcare provider and patients. Effective integration of paper-based to EMRs in the healthcare system involves thorough monitoring, coordination of various facets, execution, training and maintenance (Castarlenas et al., 2021). Paper-based integration with the EMR brings with it the process of changes, use of a new technical tool, procedural training that could lead to changes in the roles of healthcare professionals within the practice. Acceptance of EMR will be difficult without assessing clinical workflows, information needs, and insufficient planning during go-live, which can result in falling back to paper. By considering the workflow along with understanding the expected benefits, the EMR implementation could be a success.

2.2 Electronic medical records

The acceptance of information communication and technology (ICT) in the healthcare institution provides effective and safer delivery of healthcare services, improves procedures, practices, regulations, standards and protocols, leading to system transformation (Thielst, 2007; Omotosho et al., 2019). ICT is becoming a key enabler for active business and clinical ventures. The development of EMR technology replaces many of the tasks of the traditional paper card and the application of EMR systems guarantees significant advances in patient care. EMR mostly occurs in an electronic version of the paper-based record. It is a computer-based system for storing, organising and retrieving patient data that offers tremendous potential for increasing the value and safety of healthcare. EMR could take lots of information like full name, full address, date

of birth, gender, person to report in case of emergency, insurance, medication, details of current and past history, allergies, lab and test results; immunisation, medical, surgery and hospitalisation history; as well as the documentation of the patient's progress assessment, vital signs, care plan, education and research, which can be accessed from different locations within the hospital, respecting the security, privacy and confidentiality of the patient (Binkheder et al., 2021). EMR is a computerised medical record that can be accessed by numerous integrated systems at any point of care within the healthcare organisation when caring for patient privacy, confidentiality, and security (Nordin et al., 2021). It is in electronic form to replace paper. The condition of practicing before EMR is cumbersome, e.g., difficulty in reading various handwritten notes, manual filing system, and most information is written by a healthcare professional, which is usually transcribed and could be difficult to interpret (Pérez-Morales et al., 2022). The process of filing and retrieval can result in delays in treatment, increased length of hospital stay, and increased medical errors due to missing or inaccessible data (Ogamba et al., 2023), while EMR can facilitate a centralised archive of patient information and enable documented records of patient care that reflect current and future medical care support professionals and provide a medium of communication between healthcare professionals that contributes to the healthcare of patients.

2.3 Recommend policies for the patient's health record

The following are recommended principles that can guide medical records services. Patient nomenclature, address, date, record number, clinic name, and the name of the physician treating the patient should be included in the submission of records to the clinic/unit. There should be a deadline for feedback on all records requested by doctors by the end of each day, e.g., discharged patients' records must be returned to the medical records department by the day after the patient's discharge. Health records staff should follow up on any records that are not returned within the required timeframe. Computerised systems allow medical record workers online access to appointment schedules. In this case, the department employees can decide when to print the requests. Emergencies, non-routine inquiries and outpatient care should be answered urgently without an appointment. Critical inquiries should be made by phone, WhatsApp or email and health record personnel are required to carry out the requesting procedures without undue delay. Develop automated data quality assessment and validation tools and methods that can be used prior to EHR applications when conducting desk research studies, building phenotyping algorithms, and performing data analysis.

2.4 Electronic health cross-service management

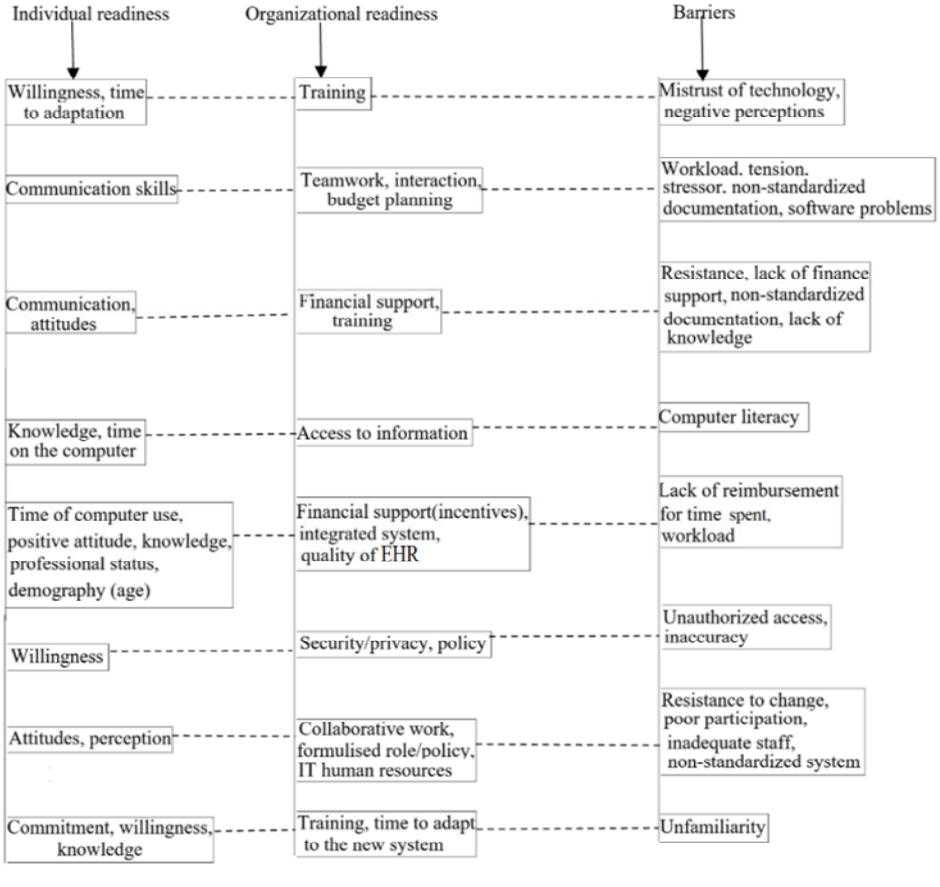
Electronic health cross-service management (EHCM) is aimed at the hospital staff, where data can be exchanged between health actors and doctors with the other departments of the hospital. The web-based EHCM allows medical records professionals and physicians to access and share patient-related data between different settings and departments (Ngusie et al., 2022). The EHCM includes all liaisons of hospital doctors, as well as liaisons of health workers, nurses and other healthcare professionals within the hospital. This includes patient information on diagnoses, medication, prescriptions for medical aids, symptom-related treatment plans, information on specialist medical care such as wound documentation, ventilators and an overview of authorised persons. EHCM

synchronised the medical information of the patents on the doctors' and health professionals' computers. For example, when a patient is discharged or a patient has a new diagnosis, the comprehensive information appears in the EHCM for all healthcare professionals to know. EHCM is a platform that provides all the information about hospital patients and their planned treatment for the healthcare professionals to view them from different locations with the most up-to-date medication plan, the date of the doctor's appointment and any changes necessary for the doctors and healthcare professionals involved in the patient are available (Zhang and Saltman, 2022).

2.5 Theoretical framework

The maintainability and performance factors of EHR performance are described in Figure 1. The willingness of hospital management and healthcare professionals to collaborate in conducting the EHR will initiate the process and outcome. When the level of readiness is high, all barriers and obstacles can be removed to produce quality and make healthcare satisfactory.

Figure 1 Enabling factors and barrier



2.6 Conceptual framework of EHR

The conceptual framework, readiness and adoption of EHR can be described in Figure 1. The success of EHR depends on the organisational readiness of the hospital management and the individual readiness of the hospital staff. Both individual and organisational readiness are influenced by psychological and structural factors.

2.7 Enabling factors and barrier

The first consideration when implementing EHR is the activation factor. This enabling factor is like an inspiration driving EHR readiness in any organisation (Alsadoun et al., 2023) as shown in Figure 1. Individual readiness must be supported by organisational readiness to overcome the barrier. Any deficit in individual or organisational readiness will impact the implementation of EHR.

3 Methods

The study was conducted among health information management (HIM) professionals at Ekiti State University Teaching Hospital (EKSUTH), Ado Ekiti. EKSUTH is a government Teaching Hospital in South-West Nigeria that provided all the services expected of a tertiary level hospital. Assessment for the study was conducted using the total survey of all the 61 HIM Professionals who manage patients with EHR at EKSUTH Ado Ekiti. These had been purposively chosen because they are the managers managing the health information of the patients. Respondents were specifically selected because they are directly involved in the creation, retention, management, and disposal of patient health information. This study population has limitation and sampling bias in that it focuses on a sole department among all other professionals contributing to patients' care and thereby may not be a true representative of the whole hospital. Future research may be based on assessing a larger survey or population. A structured questionnaire was developed to assess the level of usage, knowledge and challenges they encounter in using EHR for healthcare information management. The questionnaire had two sections. Section A consisting of questions 1–4, were demographic questions, where respondents can check any box, while Section B included questions 5–10 on level of skills in Information technology (IT) use for record keeping, environmental support for use of ICT, attitudes of staff towards the switch to electronic records, types of electronic patient care, level of agreement with the benefits of integrating patient's records into an electronic system and level of agreement with the barriers to electronic integration of patients' data and records management. The structured questionnaire was self-distributed and collected after proper completion. The retrieved questionnaire was subjected to analysis using frequency distribution and percentages and one sample test.

4 Results

Table 1 The sex of the respondents with their age

		Frequency	*Percent*
Sex	Male	10	16.7
	Female	50	83.3
	Total	60	100.0
Age	20–30	18	30.0
	31–40	25	41.7
	41–50	15	25.0
	51–60	2	3.3
	Total	60	100.0

Table 2 Length of service of respondents

Length of service	*Frequency*	*Percent*
< 10	37	61.7
10 – < 20	23	38.3
Total	60	100

Table 3 Respondents' skills in the usage of some computer/smartphone's software/functions

	One-sample statistics			
	Frequency	*Mean*	*Std. deviation*	*Std. error mean*
Microsoft (MS) excel	59	3.81	1.152	0.150
Microsoft (MS) word	59	4.22	1.052	0.137
Microsoft (MS) access	58	3.50	1.354	0.178
Email	58	3.83	1.272	0.167
WhatsApp	58	3.98	1.221	0.160

Table 4 Respondents' opinion on availability of environmental support for EHR usage

Item	*Responses as frequency (%)*						*n*	*Mean (SD)*	*p-value*
	Strongly disagree	*Disagree*	*Slightly disagree*	*Slightly agree*	*Agree*	*Strongly agree*			
Reliable internet connection	2	2	-	7	26	23	60	5.03	< 0.001*
Reliable power supply	2	-	1	3	24	28	58	5.26	< 0.001*
Availability of technical support at all stages	1	-	-	3	42	11	57	5.07	< 0.001*
Sufficient and reliable computers	3	-	-	13	22	21	59	4.93	< 0.001*
Back-up power e.g., solar/inverter/ generator	1	-	-	3	23	32	59	5.46	< 0.001*

Note: * Indicates significance at the 95% level.

Table 5 Responses to barrier at 3.5 test value

	Test value = 3.5					
	t	*Df*	*Sig. (2-tailed)*	*Mean difference*	*95% confidence interval of the difference*	
					Lower	*Upper*
Staff shortages	4.964	58	0.000	0.873	0.52	1.22
Large numbers of patients	3.919	57	0.000	0.776	0.38	1.17
Lack of ICT navigation skills among the staff	3.813	58	0.000	0.720	0.34	1.10
Poor staff attitudes towards electronic record keeping	1.469	58	0.147	0.297	–0.11	.70
Inadequate ongoing training for those who need it	6.649	58	0.000	1.195	0.84	1.55
Lack of availability of line thermal printers on EHR network	2.308	55	0.025	0.536	0.07	1.00
Lack/shortage of scanners for scanning previous records	2.450	58	0.017	0.568	0.10	1.03
Lack of needed funding	4.252	58	0.000	0.839	0.44	1.23
Concern about privacy and confidentiality	5.019	57	0.000	1.034	0.62	1.45

Table 6 Benefits of EHR at 3.5 test value using one sample test

	Test value = 3.5					
	T	*df*	*Sig. (2-tailed)*	*Mean difference*	*95% confidence interval of the difference*	
					Lower	*Upper*
Patients' waiting time will be reduced	10.763	57	0.000	1.603	1.31	1.90
Reduction in medical errors, e.g., wrong diagnosis, medication errors, etc.	15.690	56	0.000	1.868	1.63	2.11
A longer time span of patients' information can be stored	14.941	56	0.000	1.851	1.60	2.10
Enable quick and easy access of past medical records thus ensuring prompt continuity of care	15.667	57	0.000	1.931	1.68	2.18
Patients' information is easily accessible from anywhere	8.253	56	0.000	1.482	1.12	1.84
Access to healthcare at any location since medical records would be easily accessible	16.503	57	0.000	1.724	1.51	1.93
More efficient/faster ward rounds	11.933	57	0.000	1.655	1.38	1.93

Table 6 Benefits of EHR at 3.5 test value using one sample test (continued)

	Test value = 3.5					
	T	*df*	*Sig. (2-tailed)*	*Mean difference*	*95% confidence interval of the difference*	
					Lower	*Upper*
Reduction in staff workload	15.751	58	0.000	1.788	1.56	2.02
Reduction in the number of duplicate diagnostic tests ordered	11.655	56	0.000	1.763	1.46	2.07
Reduction in loss of patients' information	12.789	57	0.000	1.724	1.45	1.99
Information can be shared across disciplines and specialties for quick decision making	14.295	57	0.000	1.793	1.54	2.04

5 Discussion

From the total population of all HIM professionals used, respondent 43 was removed from the study as she only gave demographics which does not add any value to the study. A few others did not answer many more, but they have been retained for whatever they did contribute, these are the reason why the total number reported in the table may not be up to 61. As shown in Table 1, the highest percentage of the respondent were females with 83.3% with the highest age range of 31–40 having 41.7%. The highest respondents were those who have spent less than ten years in service with 61.7% as shown in Table 2. Questions were raised on the knowledge skills of the respondents on the use of some computer/smartphone's software/functions. It can be deduced that efficiency in using each of the computer applications was rated significantly above the average rating of '3'. These respondents rated their efficiency highest for MS Word and lowest for MS Access as shown in Table 3. In addition, question was also raised to assess the environmental support availability for EHR, respondents were asked to indicate their level of agreement (from 1 = strongly disagree to 6 = strongly agree) that specific aspects of the environmental support exist for effective usage of ICT. As shown in Table 4, it is noted that there is significant agreement that environmental support exists for the effective use of ICT. Questions were raised highlighting possible barriers to the adoption and usage of EHR in patient information management, the following barriers were highlighted: shortage of staff, large numbers of patients, lack of navigation skills among the staff, and so on as seen in Table 5. It was deduced that there is significant agreement to all the barriers except for poor staff attitudes towards electronic record keeping which has neither significant agreement nor significant disagreement as shown in Table 5. However, the benefit of using EHR outweighs the barriers. In Table 6, the 3 highest responses to the benefit of using EHR for healthcare information management were that: it enables quick and easy access of past medical records thus ensuring prompt continuity of care, longer span on patients' information can be stored and reduction in medical errors, e.g., wrong diagnosis, medication errors in descending order. Other benefits are as indicated on the Table 6.

6 Conclusions

Our findings have shown that there is an agreement of staff readiness and organisational readiness for the implementation of EMR to improve healthcare information management, also barriers with other identified challenges as inadequate ongoing training for those who need it and concern about privacy and confidentiality among others have been outlined. However, the numerous benefits will assure effective healthcare information management. The barriers identified should as a matter of urgency be attended to by policy makers and Hospital management in other to avoid reduced healthcare quality and patients' satisfaction. In a bid to address the identified barriers, policy makers and Hospital management should ensure continuous enlightenment on the subject matter, constant training and education for staff through departmental meetings and Hospitals grand round. Managerial willingness and support in the provision of the inadequate/unavailable hardware will help a long deal and lastly, employers and employee should be encourage to be ICT compliant and considered an important criteria for job selection process.

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