Research article

Opinions of healthcare professionals at Federal Medical Centre Bida on barriers to successful implementation of electronic health record (EHRs) in Nigeria

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ABSTRACT

Background/Objective: Electronic health records (EHRs) have been available for decades, and yet hospitals, doctors, and other caregivers have been slow to adopt them especially in developing countries. The most common reported barriers to EHRs implementation include; cost of implementation and maintenance, inadequate computer skills, low computer literacy, issue of wireless connectivity, time involvement, knowledge and perception about EHRs and organizational preferences. ***Methods/Design:*** This is a cross-sectional study on the opinions of healthcare professionals on various perceived barriers to successful implementation of EHRs in Nigeria. ***Result:*** From the findings, the majority with Mean values of 3.95, 3.75, 3.65 and 3.53 respectively agreed that finance, change process and organizational characteristics of individual practices with issues relating to hospital management as well as formal training are the major barriers facing EHRs implementation in Nigeria. ***Conclusion:*** Despite the identified perceived barriers to successful implementation of EHRs in Nigeria, there appears to be readiness and eagerness among healthcare providers. Therefore, there is hope for open arm adoption of electronic health records in Nigeria. Political will by the federal government of Nigeria is solicited, the management of various healthcare institutions should also create an enabling environment and healthcare professionals are encouraged to welcome impending changes that will come along with EHRs services.

INTRODUCTION

Electronic health records (EHRs) are computerized information systems that collect, store and display patient's health information, with the purpose of facilitating continuity of care, education and research[1,2]. The patient's health records may include data from observations, laboratory tests, medical images, treatments, therapies, drugs administered, patient identifying information, legal permissions and so on[2]. The technologies (EHRs) were first developed in the 1960s as clinical information systems for storing and retrieving documents[3]. Electronic medical records (EMRs), electronic health records (EHRs), health information system (HIS) and health information technology (HIT) are used interchangeably. Though closely related, they distinctively connote different subsystems within health records systems[1]. Paper-based health records have been the only means of storing patients' health information/data for ages now and they have consumed space due to un-even-growing-end nature of the records. This has hampered the needed quality of healthcare services and has therefore led to increasing demands for EHRs[1].

The United States Institute of Medicine (IOM) has established that health information technology (HIT) is an essential tool to reduce healthcare costs, to improve patient safety and the quality and equity of care[4]. For example, Wang et al.[5(23)] estimated that the net benefit from using an electronic medical record for a 5-year period was $86,400 per provider. These accrue primarily from savings in drug expenditures, improved utilization of radiology services, better capture of charges, and decreased billing errors[5].

The roles of EHRs in realizing the potential benefits of healthcare services therefore include; enhancing the quality of healthcare provided through decision-support functions, increased collaboration among members of care teams, addresses healthcare providers' need of information and it decreases medical errors[6]. Others include; structuring the healthcare process, healthcare costs reduction, efficiency and safety[7]. EHRs also help in preventing loss of records, increasing accessibility of the records, improving medication management and empowering patients through greater engagement in their care provision[8]. Some other evidence-based reviews conclude that EHRs with its advanced functionalities have reduced medication errors and improved care processes[9]. That it has also enhanced adherence to evidence-based guidelines, patient engagement, and patient satisfaction[9(1)].

Electronic health records (EHRs) have been available for decades and yet hospitals, physicians and other healthcare givers have been slow to adopt them especially in developing countries[10]. In a recent study for instance, 93.5% of participants reasoned that a computerized system is better than manual owing to its speed, accuracy, ease of operation, data security and confidentiality[11]. Only 8.1 % of them however worked in settings, where a computerized system is in operation, as most hospitals in the country predominantly maintain paper-based health records systems[11]. Although there is an improvement in a more recent study, which shows that 20% of the participants came from facilities with full computerization of processes[12]. For example, in a US National survey of 2,758 physicians conducted between 2007 and 2008, 83% of participants have no EHR in place, 16% had just purchased, but not yet implemented, while 26% intended to purchase in the next two years[13]. A recent study revealed an objective correlation between the degree of adoption of technologies in healthcare and reduction of complications and mortality in hospitals. This is clear evidence that a real return on investment for these systems is possible.[14]

The most commonly reported barriers to EHRs implementation therefore include cost of implementation and maintenance, inadequate computer skills, low computer literacy, issue of wireless connectivity, time involvement, knowledge and perception about EHRs, organizational preferences[1,11,12,15-16]. Others include; interfaces with doctor-patient relationship, lack of incentives, disruption of workflow, limited physical space, expert support, concerns over security and privacy, concerns over the ability to select an effectively installed EHR system, inadequate training, congestion, reliability, inadequate data exchange, concerns over patience acceptance, professional barriers and legal and regulatory barriers[11,12,15,16]. In a study from Saudi Arabia, the most common barriers are human and financial, while that of Canada are design and technical barriers[15-17].

Despite the concerns and obvious interests in EHRs in both developed and developing countries, Nigeria has manifested apathy to adoption and implementation of EHRs. On this note, this study aimed at determining perceived barriers toward the adoption and implementation of electronic health records in Nigeria among healthcare providers at Federal Medical Centre, Bida, Nigeria.

METHODS
Study setting
This study was carried out at Federal Medical Centre Bida (FMCB), a 200-bed hospital located in the Efu-Etsu Yisa ward of Bida LGA. FMCB is the largest tertiary hospital in Niger State, Nigeria, which provides primary, secondary and tertiary healthcare services to people in Bida, Niger State and its

environs. The hospital is partially in its first phase of electronic medical records implementation with the adoption of OpenMRS in its Anti-Retroviral Therapy unit.

Study design
This is a cross-sectional study on the opinions of healthcare professionals on various perceived barriers to successful implementation of EHRs in Nigeria.

Study population
As available from the Human Resources unit of the hospital, the total population for this study is 631. These include the following categories; physicians 136, nurses 328, health records professionals 55, medical laboratory scientists 80 and pharmacists 32.

Data collection tool
A 36-item semi-structured self-administered questionnaire was deployed. The questionnaire elicited data on basic demography of participants, their computer knowledge and appreciation, availability of EHRs in Nigerian hospitals, perceived barriers to successful implementation of EHRs in Nigeria and the proposed solutions.

Sampling technique
The study deployed stratified random sampling technique. As such, each group sample size was computed as a ratio of the aggregate population.

Sample size
Included in the selection were 52 physicians, 124 nurses, 21 health records management professionals, 30 medical laboratory scientists and 12 pharmacists. Online sample size calculation software (www.surveysystem.com) was used to compute the sample size with the formula read thus:
$$SS = \underline{Z^2 \times (P) \times (1\text{-}P)}$$
Where Z= z-value (e.g. 1.96 for 95% confidence level).
P= percentage picking a choice, expressed as decimal   (.5 used for sample size needed).
c = confidence interval expressed in decimal (0.05)

Inclusion and Exclusion Criteria
Only those staff members, who possessed a minimum of national diploma certificate and above were considered professionals and as such selected for the study, while non-professionals in the selected departments were excluded from the study.

Data analysis and management
The statistical software SPSS v 16.0 (2007) was used to analyze the data. Discrete data was expressed as proportions and percentages, while continuous variables were expressed as mean ± and standard deviation.

Ethics
The ethics approval for this study was granted by the Health Research Ethics Committee of Federal Medical Centre Bida. Informed consent was obtained from every participant before questionnaire was administered.

RESULTS

A total of 168 questionnaires were returned out of 239 distributed, giving an overall response rate of 70.3%. Table 1 indicates that there were more female participants (51.8%) than their male counterparts and the majority of participants were below 20 years in their practice. By profession, nurses

and doctors constitute the highest number of participants with 45.2% and 26.8% respectively. The majority (70.8%) possess first degree certificates.

From our findings, the vast majority of participants (98.2%) believe that EHR is necessary in hospitals and will guarantee quality healthcare services (97.6%). Most participants (88.7%) can operate computer and a little above one-third (36.9%) are aware of hospitals with fully implemented EHR. From Table 2, finance, in most cases (80.9%), concerns over confidentiality at times (50.0%) and time in rare occasions, were some of the perceived barriers militating against adoption of EHRs in Nigeria.

DISCUSSION

Electronic health records (EHRs) are computerized information systems that collect, store and display patient's health information, with the purpose of facilitating continuity of care, education, and research[1,2].

Table 1: Socio-demographic characteristics

	F	%
Sex		
Male	78	46.4
Female	87	51.8
No response	3	1.8
Total	168	100
Category of professionals		
Nurses	76	45.2
Physician	45	26.8
Health records professionals	18	10.7
Medical laboratory scientists	18	10.7
Pharmacists	11	6.5
Total	168	100
Education level		
HND/1st degree	119	70.8
OND/PD/Technician	24	14.3
MSc/PhD	3	1.8
No response	22	13.1
Total	168	100
Years of experience		
<=10 years	93	55.3
10-20 years	52	31
21-30 years	10	6
31-40 years	3	1.2
No response	11	6.5

Total	168	100

In a recent study for instance, 93.5 % of participants reasoned that a computerized system is better than manual owing to its speed, accuracy, ease of operation, data security and confidentiality[11]. Only 8.1 % of these however worked in settings, where a computerized system is in operation, as most hospitals in the country predominantly maintain paper-based health records systems[11]. Our study is in agreement with this particular study as participants were aware of few hospitals with full or partial implemented health records in Nigeria. It is worthy to note that only two (National Hospital Abuja and Federal Medical Centre Keffi) of these hospitals are owned by the government, while others are private owned hospitals.

Table 2: Evaluation and ranking of barriers

	Mean	% Agreed	Decision
Finance	3.95	80.9	Agreed
Change process	3.75	68.9	Agreed
Organization	3.65	67.1	Agreed
Formal training	3.53	64.6	Agreed
Technical	3.36	60.8	Agreed
Expert support	3.47	59.4	Agreed
Inadequate data exchange	3.46	57.2	Agreed
Lack of incentives	3.39	56.4	Agreed
Psychology/Human	3.36	55	Agreed
Concerns over confidentiality and privacy	3.18	50	Agreed
Speed	3.12	46.7	Neutral
Social	3.12	46.4	Neutral
Concerns over ability to select an effectively installed HER	3.12	46	Neutral
Reliability	3.08	45.5	Neutral
Time	3.03	43.1	Neutral
Concerns over acceptability by patients	2.95	39.8	Disagreed
Interference with doctor-patient relationship	2.77	36.5	Disagreed
Legal and regulatory	2.87	34.6	Disagreed
Physical space	2.75	34.4	Disagreed
Disruption of workflow	2.81	31.2	Disagreed

In this 21st century, the implementation of EHRs in Nigeria is long overdue; however, studies have established some of the barriers stalling the process of EHRs implementation in developing countries like Nigeria. Our study reveals that the most common barriers to EHRs implementation

include cost of implementation and maintenance, unwillingness to adapt to changes and organizational characteristics of individual practices. Others include; inadequate or ill-suited condition for training, expert support, slothful migration from paper-based to electronic health records, lack of incentives, inadequate IT skills and disparaged connectivity, stakeholders attitude and concern over security and privacy.

Findings from this current study are congruent with previous studies, where cost of implementation and maintenance, inadequate computer skills, low computer literacy, issue of wireless connectivity, time involvement, knowledge and perception about EHRs, organizational preferences were identified as barriers[1,11,12,15-16]. Others include; interfaces with doctor-patient relationship, lack of incentives, disruption of workflow, limited physical space, expert support, concerns over security and privacy, concerns over the ability to select an effectively installed EHR system, inadequate training, congestion, reliability, inadequate data exchange, concerns over patience acceptance professional barriers and legal and regulatory barriers[11,12,15-16]. In a study from Saudi Arabia the most common barriers are human and financial, while that of Canada are design and technical barriers[15-17].

Nevertheless, our findings are not in tandem with others studies in the area of interference with doctor-patient relationship, limited physical space and disruption of work flow, concern over patient acceptance and legal and regulatory barriers respectively[11,12,15,16].This current study reveals that participants are well educated and have acquired a lot of experience in their chosen profession, so one can say that the decisions making by them can be adjudged to be very reliable and experience-based. It is also revealed that most of them have basic computer knowledge and possessed personal computer, which may be a pointer to their readiness for EHRs adoption and implementations.

For a seamless EHRs implementation, participants recommended training and retraining of healthcare personnel, political will by the government, eHealth advocacy among healthcare providers, procurement of equipment and necessary resources, increasing manpower both in quantity and quality, accepting and moving with changes, deployment of IT experts, meetings with stakeholders, constant power supply, passion by hospital management and enforcement, among others.

Study limitations

This study is based on participants' perceptions and factors they thought may militate against effective implementations of EHRs as not many of them have seen it implemented.

Conclusion

Most healthcare professionals at Federal Medical Centre, Bida are computer literate and many deploy personal computers in their personal activities, which may point to their readiness in the event of EHR's implementation. They believe that EHRs is necessary to improve healthcare quality in Nigeria. Despite the identified perceived barriers to EHRs, there appears to be readiness to adopt the technology among participants. There is therefore hope for open arm adoption of electronic medical records and EHRs in Nigeria as stakeholders exhibit interest as well, there is need to look inward with a view to proactively addressing probable barriers, when EMR is fully implemented.

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