



## EVALUATING THE ADOPTION OF ELECTRONIC HEALTH RECORDS (EHR) IN REFERRAL HOSPITALS, UGANDA

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### ABSTRACT

*Electronic health record is a response that covers the need of all engaged parties including patients, doctors, clinical staff, insurance companies, health care providers and policy makers by providing timely information. Limitations of paper-based records are influencing a transition across the globe towards Electronic Health Records (EHR). However, despite the well documented benefits of electronic Health records, adoption in developing countries particularly Uganda remains a great challenge. This study was aimed at identifying the different factors that influence the adoption of EHR in referral hospital of Uganda. Most of these factors were identified and as part of future work, more studies need to be done to find out of similar factors influence adoption in smaller health units and other countries.*

**Keywords:** *Electronic health records (EHR), Adoption, factors, and Uganda*

### 1. INTRODUCTION

Electronic health records and electronic medical records are computerized systems that store patients' health information. These systems have a slight difference and they collect information over a period of time. These systems improve information availability and sharing.

Electronic health records have recently been implemented by an increasing number of hospitals around the world. This is mainly due to several initiatives driven by government regulations or financial incentives in most developed countries. These EHR implementation initiatives are usually motivated by the need for enhanced integration and availability of patient data, the need to improve efficiency and cost-effectiveness, a changing doctor-patient relationship toward one where care is shared by a team of health care professionals, and the need to deal with a more complex and rapidly changing environment (Boonstra et al., 2014).

Although electronic health records are widely viewed as vital to modernizing the organization and delivery of sustainable, high quality health care, the uptake of such records in hospital has tended to be

slow (Robertson et al., 2010). At the same time, studies indicate that some systems have not been successfully implemented; there are many examples of total failure and partial failure (Kaduruwane, 2012).

#### 1.1 Adoption of EHR in Developing Countries

Developing countries are starting to embrace information and communication technologies as a means to deal with health service delivery problems of access, quality and costs. Electronic health record systems provide the basic infrastructure upon which other electronic health solutions can be laid. There exists evidence to show that electronic medical records are gaining ground in the health sector in developing countries like Uganda. For example, the OpenMRS provides a user-friendly interface for electronically storing medical data and has been very successful in Kenya (Sood, 2008). The Mosoroit Medical Record System (MMRS), in Kenya, the Lilongwe EMR used in Malawi; Partners in Health (PIH)- EMR, Peru; HIV-EMR system, Haiti; Careware, Uganda; PEPFAR project, Tanzania; National EMR, project Zambia (Sood et al., 2008).



## 1.2 Adoption of EHR in Uganda

Although the developing countries are willing to adopt EHR, they are still facing some barriers and challenges that have slowed down the adoption of these systems some of which were also observed in the history of EHR adoption in developed countries as well. These barriers and challenges differ from place to place (Kalogiropoulos et al., 2008) and to these factors, the adoption and implementation of EHR has been very slow in developing countries (Hassibian, 2013). In Uganda these barriers include;

Shortage of technical personnel: computer-based patient records users in Uganda still have limited knowledge and necessary skills to fully exploit software benefits (Tushabe, 2008). According to world health organization, many clinicians are still hesitant to use computers systems while attending to patients due to resistance to change as they prefer to write on paper files whereas others lack enough knowledge to use the systems (World Health Organization, 2006)..

World health organization further notes that the high cost of equipment, software and lack of funds is also a major issue in the adoption of EHR. Despite the several benefits of EHR, the initial costs and maintenance costs of the systems are so significant and due to the lack of funding, EHR systems have not been adopted (World Health Organization, 2006).

There is lack of involvement of clinicians and hospital administrators in the development process of the systems which to acquisition of systems that are not customized to meet the needs of the users. According to Ogwang points out that it is important to involve users within the software development process. User specifications and input are therefore important to the acceptance of the system. This leads to systems with terminology that is wrong and limited knowledge of how to make corrections in the systems (Ogwang, 2006).

The difficulty in converting older records to be captured in the Electronic HealthRecords. The process involved in conversion of the physical records to EHR is expensive and time consuming and there is limited or no personnel to convert it as most hospitals already have a shortage of clinicians and the paper work is too much which would make it hard to convert to digital. As a result clinicians are reluctant to adopt EHR (World Health Organization, 2006). Other factors have also been

cited as contributors to the slow adoption of EHR which include the unstable supply of electricity which makes the systems unreliable to the users.

## 2 RESEARCH DESIGN

There are 14 referral hospitals in Uganda and mbarara regional referral hospital was used as a case study. This hospital has several electronic systems for patient records which include OpenMRS, DHIS2, and MVRS among others. Mbarara Regional Referral Hospital was used because it is the largest referral hospital in Uganda second to Mulago National Referral Hospital. This study targeted staff (doctors, nurses, administrators, laboratory attendants, pharmacists, etc.) in the hospital that interacted with EHR.

### 2.1 Sampling Technique

Purposive sampling was used in this study. Purposive sampling technique enabled the researcher to have access to a particular group of staff and excluded those that did not use or have knowledge about the system. According to Lewis & Sheppard (2006), in purposive sampling the researcher decides what needs to be known and sets out to find people who can and are willing to provide the information by virtue of knowledge or experience. For this study, clinicians using EHR were selected to participate.

### 2.2 Sample size

Structured interviews were carried out and all the individuals who interact with EHR, which is 15 respondents of which 11 (73%), were male and 4(27%) were female. These were interviewed as the researcher noted down their responses and therefore 100% response rate.

### 2.3 Data analysis

The data gathered were analyzed using the Statistical Package for Social Scientists (SPSS) software tool. The data analysis process involved summarizing the information collected so as to extract the factors that have influenced the adoption of electronic health records.

## 3 FINDINGS

This section presents the findings from the study. The respondents were interviewed about the different factors that influence adoption of EHR as



suggested by different literature the results were as follows;

**Resource availability:** out of 15 respondents, 13(87%) agreed that the presence of the required resources had an impact on the adoption of EHR. It is noted that lack of equipment like hardware, software; internet among others hindered the use of EHR and also limited the number of individuals that use EHR hence the persistent use of paper files. It was also noted that lack of stable electricity supply and standby generators also made EHR unavailable to users in times of shortages hence the use of paper files. On the other hand, 2(13%) respondents were not sure if it had an impact on adoption or not.

**System training:** 10 (67%) of the respondents indicated that training the system users to be equipped with knowledge about EHR if helped to adopt the system. This made it easy to use hence improving the productivity of the workers and hence system adoption whereas 5(33%) of the respondents were not sure if system knowledge had an impact on system adoption.

**Technical assistance availability:** 80% of the respondents cited the need for qualified personnel to assist them in the use of the system for example trouble shooting in case of a system problem. Respondents noted that it was a requirement considering that they were not trained to fix system problems and therefore lack of assistance to led failure to use the system in case of system problem and 20% were not sure of its impact on system adoption.

**External influence:** 80% of the respondents indicated that they were compelled to use the system because the people they associated with used it. This gave them morale to try using it since their peers were able to cite for them the advantages of involving the system in their day today work hence influencing their decision to use EHR. Also, to some, it was mandatory and therefore had to use it.13% of the respondents were not sure if it had an impact on their adoption of the system whereas 7% thought it did not have any impact.

**Transition difficulty and user involvement:** 73% of the respondents agreed that it was not easy to switch from using paper files to the use of EHR as the system was different from their way of data keeping in files for example the way disease names and medicine names were written was different

considering that this system was built with their involvement and also the interfaces were not clear.13% of the respondents were not sure about the impact whereas 13% disagreed.

**Table 1: Factors influencing the adoption of EHR in referral hospitals, Uganda**

Adoption Factors	Agree (%)	Neutral (%)	Disagree (%)
Resource availability	87	13	0
System training	67	33	0
Technical assistance	80	20	0
External influence	80	13	7
Transition difficulty and user involvement	73	13	13

#### 4 DISCUSSION

According to the findings, it is evident the resource availability is very significant in the adoption of EHR or even any other system as it is important for the system to exist for example availability of hardware, software ,electricity and others like internet if the system is to perform to its full potential. This is in agreement with other researches, in one study, it is indicated that lack of computers hinder adoption of electronic Health amongst hospitals in the rural areas (Ouma & Herselman, 2008), in another study, OMary *et al* (2009) pointed out that the low rate of internet penetration and low bandwidth are among the challenges to electronic Health adoption in developing countries. Omary *et al* (2009) points out that due to poor ICT infrastructure and internet penetration, the majority of areas in the country cannot support internet deployment, which in turn, affects eHealth adoption.

With the availability of infrastructure, there is still need for the system users to be equipped with the relevant skills to operate and make use of the system. This calls for both the initial and routine refresher courses to provide the users with the necessary knowledge to use the system as well as technical assistance. This makes training and technical assistance significant in the adoption of EHR as supported by several other researches carried out in other developing countries. Abraham *et al* (2011) argue that optimal use of IT towards the improvement of health care requires IT knowledge in the medical sector. The relationship between ICT skills and adoption of eHealth is also discussed by Juma *et al* (2012) who points out that



lack of ICT skills in the health sector in Kenya explains the low adoption of eHealth.

System adoption is also influenced by both the peers and management involvement/influence. Voluntariness has been shown to determine the use of information technologies (Phichitchaisopa & Naenna, 2013). However, in some studies it has been evident that making system usage compulsory gives the users no option but to adopt. An example is, in developed countries like Denmark where the rate of ePrescribing improved greatly by making e-prescribing mandatory for primary care providers by the governments. However, in a study conducted by Muathe, Wawire & Ofafa (2013), on factors affecting ICT by SMEs in the Kenyan health sector, voluntariness was not a major factor towards adoption of ICT by SMEs in the health sector. Therefore making the use of EHR mandatory could lead to improved adoption rates.

Adaptation difficulty is a situation where a system user finds it difficult to switch from their traditional way of doing things for example using paper files to the use of the new system. This is very significant in cases where the new system is not customized to fulfill the needs of the users. This usually occurs when the users are not involved in the development process of the system. The results are consistent with studies by McGill (2008), who found that user participation influences success by increasing system use. Harris (2009); Mattia (2008) in their studies also point out that user involvement in Information System development activities leads to Information System success.

## 5 CONCLUSION AND RECOMMENDATIONS

This paper has pointed out the various factors that influence adoption of EHR in referral hospitals of Uganda which have been seen to have low adoption rates electronic health records unlike their developed counterparts. These determinants can be summarized as follows: resource/infrastructure availability, system training, external influence, technical assistance availability, and adaptation difficulty and user involvement. To address the problem of low adoption based on the factors, various recommendations can be proposed.

Firstly, user involvement at all levels is essential in order to improve adoption of EHR. It is important to come up with customized systems with the help of the users so as to make adaptation easy. This is

consistent with Khoja *et al* (2007) who point out that all healthcare providers must be involved in planning, development and implementation of new systems and their success.

Secondly, necessary infrastructure or equipment required for the system to run must be set up. Further, emerging technologies in electronic health like PACS, telemedicine, cloud computing, and 4G mobile communications among others should be further explored to find out how they can be utilized in developing countries.

Thirdly, resources should be set aside for continuous training and refreshers courses to the system users. This should also involve visiting countries that have fully adopted these systems so as to acquire more knowledge on system use.

In addition, lessons from front-runners in electronic health such as Denmark should be contextualized within developing countries. This way, the possibility of avoiding mistakes and challenges that were encountered or made by early adopters goes down thereby increasing the rate of adoption by developing countries.

Lastly, Research in electronic health records in Uganda appears to be fragmented and so far few studies have been conducted to indicate its progression. This needs to be overcome through broad ranging studies, which offer standardized concepts that enable data to be collected across multiple points in time. Studies involving several hospitals are also limited. Therefore, factors in this paper in need to be looked into as regards smaller health units and other countries and to find out other factors affecting EHR adoption.

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