

## Electronic Health Record System: A Survey in Ghanaian Hospitals

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### Abstract

Developing countries are slow adopters of new technologies, particularly with regards to the health services of these countries. This study explores the data collection and management challenges in four Ghanaian hospitals using a survey study approach and proposes implementing an Electronic Health Record (EHR) system as a solution to these challenges. Some challenges that would impede the implementation of EHR in a Ghanaian hospital are the initial huge start up costs, poor computer skills of healthcare professionals, poor maintenance culture, and lack of policy to spearhead the implementation of the system. The weak state of information infrastructure at the hospitals is another challenge in an EHR implementation. EHR could potentially reduce waiting times for patients, reduce the cost of the hospital's operations, improve interdepartmental communication and collaboration, provide opportunity for sharing best practices among physicians within Ghanaian hospitals, and enhance better resource allocation. The data an EHR could primarily capture would be patients' demographics, care plans, laboratory results, billing and NHIS claims information.

**Keywords:** Electronic health record; Information and communication technology

### Introduction

Appropriate information and Health Information Systems (HIS) are seen as crucial to strengthen the health system in developing countries [1] and in pursuing the Millennium Development Goals (MDGs) [2]. On the ground, however, HIS and especially hospital information systems development in developing countries has proven difficult due to organisational complexity [3], fragmented and uncoordinated organisational structures all maintaining their own HIS [4], and unrealistic ambitions [5].

The important role, influence, and impact of Information and Communication Technology (ICT) in all sectors of our society have long been recognized [6-12]. In the health sector, ICT-tools are being more and more developed, recommended, and used to improve the quality of work in administration, patient records, health services, and research [13-15]. During the nineteen-eighties, at the inception of the use of ICT-tools in most developed countries, the use of ICT-tools were not an issue or at best a matter of low priority in Less Developed Countries (LDC) [16].

Given the complex nature of healthcare delivery and the numerous decisions that must be made, sometimes under very challenging circumstances, the need for accurate, reliable and timely information becomes very crucial. Paper-based records cannot provide the flexibility and leverage that Electronic Health Record (EHR) presents.

The ministry of health (Ghana) clearly identifies the need for an efficient health information management system.

Medical work is a highly complex, distributed, dynamic, regulated, knowledge-intensive and often time-critical activity. To make treatment of ill and/or injured patients possible in these time-critical, specialised and physically distributed work settings, medical staff constantly needs to cooperate with each other. Cooperation in these distributed medical work settings requires extensive coordination between the medical actors involved. To facilitate this coordination medical work is heavily regulated by procedures and conventions, as well as supported by a number of technologies like paper documents and analogue films that are used by a large number of medical actors for many different purposes. These technologies are not isolated artefacts but social and material parts of work.

Over the years, the government being the principal health care

service provider has implemented a number of policies to improve care delivery development, unfortunately these policies have not yield the necessary success expected due to lack of accurate and timely data. On the other hand, most developed countries are experiencing improvements in care delivery by implementing various kinds of health information systems such as electronic medical record, computerized provider order entry and clinical decision systems. It is therefore the focus of this study to examine the benefits of EHR and its contribution to care delivery, development in less developed countries.

### Materials and Methods

Literature and report of on-going electronic health record system projects in Ghana, current health challenges and the quality of the local manpower were examined.

Information was collected by reviewing documents on current practices at the various hospitals and by site visits. The following hospitals were used for the study: Effia Nkwanta Regional Hospital, Takoradi, Western Region, Komfo Anokye Teaching Hospital, Kumasi, Ashanti Region, Korle-Bu Teaching Hospital, Accra, Greater Accra Region and Tamale Teaching Hospital, Tamale, Northern Region. These four major hospitals in Ghana were studied and the type of records system being used at these facilities. National reports on health, and national health insurance scheme reports were reviewed.

Only public hospitals were involved in this study.

### Korle-Bu Teaching Hospital (KBTH)

The KBTH is a tertiary hospital in Ghana. It is one of the busiest hospitals in the sub-Saharan. It has the only Cardiothoracic Centre in the country.

The hospital was founded in 1923 as the Gold Coast Hospital. The then Governor, Gordon Guggisberg laid the foundation for Korle-Bu

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Hospital in 1921, and it was finally opened on 9<sup>th</sup> October, 1923. The hospital has expanded in phases and now has 1600 beds.

### **Effia Nkwanta Regional Hospital (ENRH)**

ENRH was established in 1938 as a military hospital by the then British West African Royal Frontier Force (BWARFF) based in Takoradi, Western Region. The hospital is currently the third largest hospital in the country after Korle-bu and Komfo Anokye Teaching Hospitals.

The administration, with the Medical Director as the head, has the oversight responsibility of the daily operations of the hospital. The hospital is organized into an Outpatient Department (OPD) and an Inpatient Department. The OPD is usually the first point of call for all visiting patients. At the OPD, patients are triaged and referred to the appropriate consulting rooms. Based on the outcome of the consulting, patients are either admitted as inpatients or outpatients. The hospital is also organized into several wards, namely the Maternity Clinic, Paediatric Ward, Surgical Ward (Male/female), Intensive Care Unit, Causality Ward, and the Gynaecology Ward.

The hospital has a bed capacity of 416 and a total workforce of about 572. It offers practical training for health service administrators, student nurses and other medical house men and interns.

### **Komfo Anokye Teaching Hospital (KATH)**

KATH is located in Kumasi, the Regional Capital of Ashanti Region with a total projected population of 3,204,609 (1998).

The geographical location of the 1000-bed KATH, the road network of the country and commercial nature of Kumasi make the hospital accessible to all the areas that share boundaries with Ashanti Region and others that are further away. As such, referrals are received from all the northern regions (namely, Northern, Upper East and Upper West Regions), Brong Ahafo, Central, Western, Eastern and parts of the Volta Regions.

The hospital became a Teaching hospital in 1975 for the training of Medical Students in collaboration with the School of Medical Sciences of the University of Science and Technology, Kumasi.

### **Tamale Teaching Hospital (TTH)**

TTH is located in the Northern part of Ghana, Tamale, the capital of the northern region. It serves the Tamale metropolis (with 300,000 inhabitants), it also serves as a referral facility for hospitals within the Northern region and others in two neighbouring regions, Upper East and West regions.

### **Training and Development in Health Informatics**

There have been reforms in the health information management systems recently aimed at improving the quality of health information, and this has largely been in response to requests from donor agents like the UNDP and also as a commitment to meeting the Millennium Development Goals (MDGs) [17]. The National Health Insurance Scheme (NHIS) of Ghana, which was passed by an act of parliament in 2003, promises to be a lead promoter for the introduction of ICT in the Ghanaian health service. NHIS has introduced electronic identification cards to help minimize fraudulent claims and also for easy identification of NHIS clients at health facilities throughout the country. Of the various interventions in Health Management Information Systems (HMIS), the UNDP supported Maternal and Child Health Information System is the most extensive and significant. Piloted between 1987 and

1993 in three out of the ten administrative regions of Ghana, it focused on organized collection of data and reporting at the departmental level [17]. Little is mentioned of the success of this intervention though, and whether it had been replicated in the remaining seven regions of Ghana. The District Health Information Management System (DHIMS) is one of Ghana's first attempts of modernizing health information capture using ICT. It was first piloted in twenty districts across the country and then deployed in all district/municipal health hospitals/administrations throughout the country in 2007. The software is used to capture data solely for management and policy development. The data captured is forwarded to regional Health Administrations for analysis and onward transmission to the National Health Administration (the Ghana Health Service [GHS] and/or the Ministry of Health).

The Ministry of Health has however identified poor human resources, low levels of investment in ICT, and the uncoordinated nature of Health Information Systems (HIS) deployment as some of the start-up challenges of an effective HIS. Steps have been taken by the Ministry of Health to address the human resource challenge through the development of a curriculum to train health information officers at the Kintampo Rural Health Training School. Some public and private universities have also started running programmes in health informatics to augment what the ministry of health is doing. The University of Ghana and Kwame Nkrumah University of Science and Technology have started Master of Science programmes in health informatics whilst the Catholic University College is running a Bachelor of Science programme with specialisation in health informatics. These universities are helping to provide the human resource for the implementation and management of health/medical informatics projects in the country.

### **Implementation of Electronic Health Record (EHR)**

The primary purpose of the EHR is to provide a documented record of care that supports present and future care by the same or other clinicians. This documentation provides a means of communication among clinicians contributing to the patient's care. The primary beneficiaries are the patient and the clinician(s) [18].

The demands for equitable and quality healthcare are far from been met in developing countries, especially in the face of limited resources, both human and financial. Ghana, a developing country is no exception and still grapples with the problem of providing equitable and quality healthcare to its citizens. With a population of around 23 million, access to healthcare, especially for those in the rural communities is very limited. Even in most rural communities where there are clinics, the healthcare professionals to run these facilities are usually inadequate in number or inadequately trained to carry out these duties.

Implementing an EHR system could help to significantly address these gaps of inadequate access and poor healthcare quality currently delivered in rural Ghana. This could help create a national repository of health data, and will therefore make the deployment of telemedicine applications easier in the future. Far to reach communities presently referred to as "overseas" in Ghana could have access to specialist's services with a functional telemedicine application in place.

Implementing a new technology (such as EHR), especially in complex work environments such as in the health sector requires a careful thought out plan and strategy, not only to ensure a successful implementation but also to strike a balance between conflicting important goals. Important goals such as patient safety and privacy, healthcare quality, process efficiency, the organization's business plans and goals and the EHR usability all need to be balanced [19].

Implementation of EHR should not be a mere automation of existing workflows, but rather it should be geared towards the development of new and efficient workflows.

Electronic health record implementation could be a problem or technology led; where in the former the existence of a problem necessitates the development of a technological solution to solve it, whereas for the latter an existing technology is used to facilitate or improve present workflows. The existence of data collection and management challenges in Ghanaian hospitals will necessitate the use of technology to solve these challenges.

### Change management in EHR implementation

It is important to recognize that an organization is like any other social system and change - where everything and everybody's actions are interrelated and is not limited to one entity [20]. All departments in an organisation are integrated and interdependent. Implementation of change in one department affects the function of another. It is also likely that change, although embraced in one department, may be completely resisted by another. Additionally, there may be other changes occurring within the organization that affect or will be affected by the proposed system implementation. Managers must completely assess the effects of change on the entire organization and develop a plan to motivate each department to participate in the implementation and adapt to change [20].

Classic work suggests that behaviour in an institutional setting is not a static habit or pattern but a dynamic balance of forces working in opposite directions within the social-psychological space of the institution [21]. Lewin identified three stages for accomplishing changes in behaviour: unfreezing the existing equilibrium, moving toward a new equilibrium, and refreezing the new equilibrium. To initiate the unfreezing of the equilibrium, there are three strategies.

- Increase the number of driving forces
- Decrease the number of resisting forces
- A combination of the two preceding factors

In an organisation experiencing change, these driving forces should be carefully managed so as to attain a suitable and sustainable balance. The key components that engineer the interplay of these driving forces are the people/organizational issues, the hardware and the software. In managing organizational change during the implementation of an EHR, the people/organizational issues should be prioritized.

Usually managements and IT supporters first focus on hardware and software and then - if at all on people/organizational issues. This might be because of lack of the understanding for - or lack of knowledge about the importance of the people/organizational issues, when implementing new IT-systems. This aspect is however extremely important. As [22] have shown, the greatest problems when implementing EHR are those of organisational nature in the form of resistance from the employees towards the new system, and thus not of technical nature [22]. It has also been found, that the resistance is focused on different aspects:

- Against those responsible for the changes (political)
- Against the frequency of changes
- Against changes in the organization
- Against the specific IT-system which is to be implemented.

### National policies on EHR

There is a national policy on e-health now in Ghana which came into being in 2010. There is no legislation on personal and health-related data to ensure privacy of personally identifiable data and to protect personally identifiable data specifically in EHR.

There is no legislation for sharing health-related data between health care staff through EHR within the same health care facility and its network of care providers and with different health care entities within the country and with health care entities in other countries.

The country doesn't have policy guidelines for the implementation of EHR and the sharing of data between hospitals and medical staff. This is very crucial for the implementation of EHR.

### Implementation challenges of EHR

The challenges encountered in the implementation of EHR projects have been more with commitments from staff and users of the system. Most of the time, users are ignored in the beginning of the projects but are expected to use it after its completion.

There are no policy guidelines to promote the implementation of EHR in the country. Although there is an e-health policy now, implementation is another issue since the commitment from top management which trickle down to users.

### Discussion

With the emergence of the National Health Insurance Scheme (NHIS) almost every hospital in Ghana has one stand alone personal computer for the purposes of the scheme.

The situations in these hospitals differ since each has reached a level of implementation. Some are implementing EHR by using the incremental approach whilst some have not even started with the implementation.

KATH already has a system in place for their patient records and they have a strong Information Technology (IT) Unit that is in charge of supervising the system. KATH is using customised pro-medical software for the patient records alongside the paper records until the paper records phase out. This is just at the records section and thus using the incremental approach.

ENRH has a personal computer in every office connected to the internet. In the wards, doctors' office and other units, there exists an intercom telephone to relay important information. In this hospital, there are only stand-alone computers in offices; they are not using any EHR software. The computers are only used for secretarial services. ENRH has been fully wired ready for the implementation of a new software program, in March, 2011. For now, their records system is mainly paper-based. The hospital has an IT Director who oversees all issues on ICT.

Korle-Bu Teaching Hospital has some of their departments computerised, surgery and cardiothoracic departments have some of their record computerised and some are still kept on paper. Patients are allowed to take their records home and bring to the hospital whenever they visit the hospital. Although the hospital has an IT Unit, not much has been achieved with reference to EHR. The hospital is still struggling to fully implement the EHR system.

Tamale Teaching Hospital has no EHR system in place. They only have computers at various departments for secretarial purposes.

With the almost completion of the national fibre optic project, these teaching/regional hospitals will have no excuse as to why they have not implemented EHR system.

Despite the known importance of EHR, some major hospitals in Ghana are yet to fully benefit from these.

The challenges of implementing EHR in Ghanaian hospitals will be a daunting one. A lot of effort will have to be put in the restructuring and reorganisation of workflows to effectively implement a successful EHR. Information infrastructures in Ghanaian hospitals are still weak and data collection and management is a serious challenge yet to be surmounted. Some of the immediate challenges of successful EHR implementation in Ghanaian hospitals will be human resource and the funds to procure and maintain hardware; sustainability of such system will be another issue.

## Conclusion

The potential of EHR system to transform medical care practice has been recognized over the past decades to enhance health care delivery and facilitates decision making process. Subsequently, EHR and other clinical decision support system tools are currently used in both primary and secondary health care facilities in most developed nations. However, implementing an EHR system or any HIS in a clinical practice is a daunting task. It requires good planning, strong management and physician leadership and supportive staff. The most immediate benefits of EHR system include accurate medication lists, legible notes and prescriptions, immediately available charts, decreased chart pulls, lower transcription costs, medical errors reduction and improve quality care and standard in patient safety. Unfortunately most countries in sub Saharan Africa and other poor nations lack the experts, fund and ICT infrastructure necessary for the implementation of such modern health care technology to ensure continuity of care.

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