

## EVALUATION OF PROGRESS AND CHALLENGES IN IMPLEMENTING THE ELECTRONIC MEDICAL RECORD SYSTEM IN RWANDA: A CASE OF BUTARO DISTRICT HOSPITAL

Girukubonye Ignace<sup>1,2,\*</sup>, Renzaho Jean Nepomuscene<sup>2</sup>, Hakizimana Janvier<sup>1,2</sup>

<sup>1</sup>Social Sciences, Mount Kenya University, Kigali-Kicukiro-Rwanda

<sup>2</sup>Partners In Health/ Inshuti Mu Buzima

\*Corresponding author email: [ggirunace@gmail.com](mailto:ggirunace@gmail.com)

### Abstract

**Background:** Electronic Medical Record (EMR) System is a technique of digitization of the patient's health records and all information about their illness history including medications taken, diagnosis, demographics and treatment plans to name but a few. This system has proved its successfulness after being implemented not only in economically rich nations but also even in resource-limited countries like those in Africa.

**Objective:** To evaluate the progress and challenges in implementing the Electronic Medical Record (EMR) system in Butaro District Hospital, in Burera District of Rwanda, Northern Province.

**Methods:** A descriptive study design along with the qualitative approach was used with 44 healthcare providers grouped into three main strata (specialist doctors and General Practitioners), Registered Nurses, as well as social workers and cashiers); they participated upon random sampling. Structured questionnaire was used. The thematic analysis was conducted and the qualitative information was grouped into themes and sub-themes.

**Results:** The research findings revealed that the usefulness perceived from the implementation of the Electronic medical Record (EMR) system in Butaro hospital include mainly: The care providers can view the patient's past history, information can be exchanged among health care providers through the system, the service delivery has become faster, fostering adequate care delivery. It is safer to keep patients' data with increased security apart from the high-quality data that allows manipulability and ease of transfer and use.

**Conclusion:** Successful implementation of the Electronic medical Record (EMR) system heavily depends on faster and stable internet, electricity uptime 24/7, and staff training plan for new incomers as well as enough and new pieces of electronic equipments.

**Keywords:** Electronic Medical Record (EMR) system, Health Record.

### Introduction

In this era, the implementation of the Electronic Medical Record (EMR) System or any other form of digitization of patient's health information is almost sine qua non for faster clinical services delivery and clinical decision making in both private and governmental health facilities [1]. EMR is a term used to refer to the patient's paper chart or file, which is used as a digital form of it [2] and it is used to make patient information interopera-

ble [3]. On the international scene, the estimation of the adoption of the Electronic Medical Record (EMR) system among some developed countries is very high. Recent findings show that it is estimated at (96%) in the Republic of the China, (92%) in the Brazil, (85%) in the France as well as (93%) in Russia [4]. Governmental aspirations to adopt health information systems (HIS) have been taking place on the international level in most nations to promote health, quality and efficiency of the health of clients [5]. Nearly all types of organizations and businesses opt to use digital methods of storing their day to day generated data for easy review and management of their businesses. Hospitals and clinical institutions are not left behind as they completely strive to use electronic systems to gather and safe-keep patients' data and other clinical information in such a way that these data can be accessed simultaneously and remotely by eligible health care providers [6]. According to the recent research by [7], Rwanda like many other low-and-middle income countries in Africa has been engaged in finding ways to meet demands of high quality, cheap and accessible health services to all. To solve that problem and reach designated targets, Rwanda made tremendous strides in adopting the information and communication technology (ICT) and at the same time remain in line with the WHO's recommendation for nations to implement m-Health projects like OpenMRS and EMR systems[8]. In as recent as 2 decades ago, Rwanda saw increased requests to make data backed decisions, which resulted into the desire to purchase, adopt and use health information systems (HIS) in health facilities to ensure readily available data for that purpose. In line with this move, several health facilities, public and private, started to install their own Electronic Medical Record (EMR) systems, in conjunction with OpenMRS and Open Clinic [9]. Health facilities in East Africa were also encouraged to use EMR system to foster better patient information safety and management, allowing easy data use[10]. The most recent study conducted in Rwanda was done at one of the Teaching Hospitals in Rwanda (CHUK), and it only looked into evaluating the perception and satisfaction level of health care providers with regard to the new Electronic Patient Record system known as Open-Clinic/EMR [11]. As the most recent information about the progress about the spread of EMR system in Rwandan hospitals was last checked in 2017 [11], there is a need to find out the current progress of EMR implementation in Rwanda, specifically at Butaro District Hospital and to uncover any possible challenges encountered by health care providers who implement the EMR system. The present study undertakes to investigate the progress and identify the whole burden of challenges incurred in the full implementation of the EMR system, at Butaro district hospital.

## **Methods and Materials**

### **Research Design**

This was a “Descriptive case study research design” implemented through a “qualitative methodology” for data collection. In this respect, 44 in-depth interviews were conducted to understand the current progress of the implementation of the Electronic Medical Record (EMR) system at Butaro Hospital, as well as the encountered challenges.

### **Sample size and sampling**

The term “population”, usually denotes all individuals that are of interest to the researcher [12]. Therefore, the whole population of interest was composed of 148 health care providers at Butaro District Hospital spread out to three strata including specialist doctors (11), general practitioners (15), registered nurses (103), cashiers and social workers (19). The health care providers who use the Electronic Medical Record system or OpenMRS at the Butaro Hospital are 148 according to Butaro Hospital (Butaro Hospital, HR Annual Report, 2020). The researcher opted for a simple stratified random selection from each stratum and gathered a total of 44 health care

providers as sample size. To do that, the researcher randomly picked approximately 30% from each stratum, that is to say 7 specialist doctors, 31 general practitioners and 6 registered nurses and social workers.

### **Data collection methods**

A semi-structured questionnaire was used to collect the information. The questions were developed in such a way that they bring information about the current usefulness of the Electronic Medical Record System as it is being used by the health care providers at Butaro district hospital. The collected information from participants was recorded and then transcribed for the thematic analysis.

The process of data collection started with obtaining ethical approval from the university of Mount Kenya, followed by the approval of Butaro hospital research committee, upon which participants also signed their informed consent forms before their involvement in the research. Then the participants were briefed on the research expectation. The researcher also explained to the participants that the research is meant for the academic purpose and for informing future implementers to assure them that the information given in the research process was not disseminated for any other personal gain or contrary to academic ethics. The questions were asked translated in Kinyarwanda. Interviewees took place in a private room to ensure privacy and confidentiality. The interviews were no less than 30 minutes and no more than 1 hour.

### **Data Analysis**

During the data collection, the non-numerical information (qualitative data) collected were processed with a thematic analysis approach, beginning by coding process in order to generate themes and sub-themes. Direct quotes were taken as and where necessary for presenting the data, and showing ways that the EMR implementation process has contributed to the delivery of health care services delivery at Butaro hospital.

### **Ethical consideration**

Before, the process of data collection the ethical clearance was obtained from Mount Kenya University. Permission was also sought from the Butaro district hospital. The consent forms were signed and obtained from all respondents. The researcher assured the respondents that the collected data were not used contrary to academic, meaning that their information was treated in full confidentiality to avoid any risk to the respondents.

### **Results presentation**

#### **General characteristics of the respondents**

A total of 44 health care providers participated in the study; of these, 24 (54.5%) were males and 20 (45.5%) were females. With regard to the years spent in the service using EMR system, staff who sent between ½ to 2.5 years are 14(31.8%) while surprisingly only 2 staff spent between 2.5-5 years, in contrary of the huge group that spend above 5 years 28(63.6). The lowest level of education among participants was A<sup>2</sup>, with only 3(6.8%) participants. The participants having completed A<sup>1</sup> were 20(45.5%), while for A<sup>0</sup> and Masters Level, these counted for 21(47.7%).

#### **Theme one: The EMR system has improved the accessibility, process and flow of patients' information.**

The respondents reported that the care providers (even a new one) are able to view the past history of the patient, including medical tests and the results as well as medications taken, all this information can be found in the system. *“The EMR system helps to easily get the patient's health data faster, because you don't lose time*

going to look for hard paper files in the archive room”(Nurse 4); “The EMR allows the laboratory test results to be available faster in the system, you call the laboratory scientist and they enter the result (Nurse 27); “All the treatment that the patient has taken before, I can see it in the system and this helps to make proper decision” (Doctor 3). Also, the EMR system has allowed faster information exchange among health care providers. Once the results are entered into the system, the doctor who ordered the tests can immediately see the results (Nurse 5); “When I look into the system, I can see the types of tests that the patient got before and those that she still needs to have; I can then order them if necessary” (Doctor 7)

### **Theme two: The EMR system has improved the Security and quality of health data.**

The participants expressed that among the benefits perceived by implementing the EMR system in Butaro hospital include also the reliable security and improved quality of patients data. It is easier to notice and correct any wrong, missing or unnecessary information. They confirmed it in these quotes: “The system shows a red-flag on the errors and problems in the stored data (like when the patient died or in case of missing information)” (Social worker 2); “The data stored on the EMR system is safe and it is well organized” (Nurse 17); “The patients’ information saved into the online is saved into well-designed forms, you can use it easily as you like” (Doctor 4). EMR system is additionally, so efficient in terms of keeping patients’ data with confidentiality and security. “Only the authorized care provider enters into the system (Nurse 15); To find a patient on the EMR system, we use only provided user account and a password, so the saved information is secure” (Nurse 1); “No-one else from outside can have access to the electronic health information” (Doctor 3). Data stored on EMR are more secured by not allowing just anyone whosoever to access to the data, and only authorized personnel has access, and this also varies according to the level of privilege/credential or authority: To find a patient on the EMR system, we use only provided user account and a password, so the saved information is secure” (Nurse 1); “When you miswrite some information, correcting it in the EMR system is easier than in paper files (Social worker 2); “Having all the patient’s data online, you can access it on any computer any where ” (Social worker 4).

### **Theme three: The challenges in implementing the Electronic Medical Record System in Butaro District Hospital**

The implementation of the electronic medical record (EMR) system in Butaro hospital has brought such many advantages. Nevertheless, the health care providers encounter some persisting challenges. It is a fact that the implementation of the Electronic Medical Record (EMR) system relies heavily on the available faster and stable internet connection, but in Butaro hospital the internet still breaks down sometimes, usually due to power cut. “The internet goes off intermittently especially as soon as there is power-cut (Nurse 13); “When the electricity goes away, we lose internet immediately” (Doctor 5); “Sometimes we delay to provide care because there is no internet” (Doctor 3). This is combined to and is linked to old computer equipment, which isn’t also enough in the points of care. “We don’t have enough computers in the room” (Nurse 23); “We have one computer, which is also not new” (Nurse 19); In addition to that, the participants revealed not receiving training as frequent and as timely as it is needed: “No recent training has been given to us” (Nurse 11). The staff didn’t have either formal initial training or a refresher training for those who were trained some time back: “I was taught by my colleagues before I was given formal training on EMR” (Nurse 23); “The administration delays to organize training for staff” (Doctor 4). In overall, the EMR system works really well, but they regret the fact that it still lacks some treatment forms: “In the EMR system, some patient forms are not yet made available like the social worker forms,” (Social worker 6); “The imaging processing feature is missing from the EMR system” (Doctor

3).

## Discussion

Findings of this study revealed that the implementation of the Electronic Medical Record (EMR) system has really **improved the accessibility, process and flow of patients' information**. Many respondents expressed this in different terms, like (*"The EMR system helps to easily get the patient's health data faster, because you don't lose time going to look for hard paper files in the archive room"* (Nurse 4); *"The EMR system is good. It made our work easier: you don't need to look into the many illegible pages with different handwritings"* (Nurse 11) The same was confirmed by [13] in their study, saying that EMR system speeded up health care delivery by reducing 10% of the waiting time in low-limited resource setting of Sub-Saharan Africa. It was also echoed another studies such as [14], [15] & [16] arguing that care providers can simultaneously log into the EMR system and use it for clinical purposes. This was therefore similar to our findings we got from Butaro hospital staff. The EMR system improved the quality and security of patients' data [17], and our participants also reported similar information, *"Only the authorized care provider enters into the system"* [Nurse 15]; *"To find a patient on the EMR system, we use only provided user account and a password, so the saved information is secure"* (Nurse 1). With regard to the shortcomings that hamper the implementation of EMR system at Butaro Hospital, respondents expressed the challenge of lack of regular capacity building *"There is a need of capacity building on using EMR system"* (Nurse 27), *"We really need a kind of refresher training on EMR"* (Social worker 5), *"There has been so much time since we last were trained on using EMR"* (Nurse 30). The same was found out by Bennett [18] who discovered that *"Care providers have little or no practical skills using computer equipment as well as lack of professional training in this domain."* The implementation of EMR system faces usual challenges as has been found out by other studies; these challenges include staff turnover, lack of computer equipment and insufficient literacy and training on EMR system, frequent power-cuts and slow internet connection [19],[15]&[13]. The following responses are testimonies for these challenges: *"The internet goes off intermittently especially as soon as there is power-cut"* (Nurse 13); *"We have one computer, which is also not new"*(Nurse 19), *"When the electricity goes away, we lose internet immediately"* (Doctor 5). The other studies like [20] reiterated the same issues having to do with the slow internet and lack of training on the side of health care providers especially newly appointed ones. our respondents reported the same challenges: *"There has been so much time since we last were trained on using EMR"* (Nurse 30); *"We really need a kind of refresher training on EMR"* (Social worker 5); *"No recent training has been given to us"* (Nurse 11); *"The care providers have to make a report using EMR system, so we need more training"* (Nurse 13).

## Conclusion

- The Electronic Medical Record (EMR) significantly improved the health care services delivery in Butaro District Hospital since its adoption, and the quality of patients' information was also stored electronically, safer than on hard papers because only authorized care providers can have access to the patients' information in relation to the health care provider's level of privilege in the system. The waiting time for services was reduced, so patients do not move around in the hospital settings from one department to another. Besides, there are still challenges that bring about the need for capacity building and formal training for the clinicians, as well as the need for enough electronic pieces of equipment like printers and laptop machine.

## Recommendations

- Health care providers expressed the need to have the ability to use EMR system in their smartphones and therefore be able to access the system more conveniently and easily.
- As there is frequent slow internet connection, the IT manager and EMR system developers are recommended to do all possible to ensure that internet connection stays on all time and upgraded so that it is faster
- The leadership is requested to advocate that the EMR system be installed into smartphone for friendly management and use of the Electronic Medical Record system, not only by health care professionals, but also by care seekers as well.
- The leadership is also advised to make follow up and ensure that all health care providers whether new or those who have spent more time in the hospital, have received an initial and/or refresher training on the use of the EMR system for health care delivery.
- This goes hand in hand with providing new laptops and printers to allow printing and scanning patients' attachment files faster, which reduces the waiting time especially for the patient.

## Suggestions for further Study

- Conduct comparative research in public hospitals currently using EMR system and those that are still using hard papers
- Undertake another research about knowledge, skills and attitudes that health care providers have vis-à-vis electronic Medical Record (EMR) system

## Authors' contribution

Girukubonye Ignace designed the study, collected, analyzed and interpreted the data and writes this manuscript. Janvier Hakizimana as advised and shared experience regarding the best way of conducting this study. Jean Nepomuscene Renzaho helped in writing this manuscript Rutayisire Erigène, supervised the study, contributed to data analysis and manuscript writing. All authors have read and approved the manuscript for publication.

## Declaration of conflict of interest

The authors declare no conflict of interest concerning this research and authorship of this article.

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