

A QUANTITATIVE ENQUIRY INTO THE PERCEIVED BENEFITS, USER SATISFACTION AND CHALLENGES ASSOCIATED WITH ELECTRONIC HEALTH RECORDS SYSTEMS

ABSTRACT

Background: Electronic Health Record System is considered the most important innovative application as part of the introduction of Information and Communication Technology in the healthcare industry. The EHR system is designed to alleviate the limitations associated with the paper-based record system and help to enhance the quality of healthcare delivery.

Aims: The study aimed at empirically examining the perceived benefits, user satisfaction and challenges of Electronic Health Records System as reported by end users at the Presbyterian Hospital in the Dormaa Central Municipality of the Bono Region.

Methodology: This study adopted a cross-sectional quantitative approach with descriptive survey, design through well-structured questionnaires to collect primary data from a sample size of 80 respondents across various units in the hospital. Data collected were analysed using the Statistical Package for Social Sciences version 20.0 (SPSS version 20.0) and results were presented in frequency tables, percentages, pie charts, bar charts, and text.

Results: Results showed that 51.3% were male whereas 48.7% were female with the majority in the age bracket of (20-29) and (30-39) years respectively. The majority, in general, indicated that there are benefits with the use of the EHR System as compared to the paper-based record-keeping system. The result indicated that overall, 70% were generally satisfied, 23% were very satisfied whilst 7% said they were somewhat dissatisfied with the use of the EHR System in the hospital. A major challenge identified by this study relates to the occurrence of network unavailability with the use of the EHR System.

Conclusion: The study showed that there were benefits associated with the use of EHR systems in the hospital and these benefits had collectively enhanced the overall quality of care in the hospital. The study recommends that management of the hospital evaluate the EHR System periodically to identify the lapses in the system and improve upon them. Also, capacity-building should be done for the staff by constantly retraining users so that majority can work with minimal challenges.

Keywords: Electronic Health Record System, Information Communication and Technology, Healthcare Delivery, Satisfaction, Quality of Care.

Introduction

Traditional health records are mostly paper-based, which implies the difficulty in using them for consistent and proper monitored care, randomly and consistently checking quality and control or eliminating medical mistakes and errors and as a result of storage problems and difficulty in easily retrieving and accessing these data when needed [1]. Health care providers and patients mostly have no idea about the costs or quality in deciding on medical care.

The role of Information and Communication Technology (ICT) in improving the general management of health information cannot be downplayed. This is affirmed by the ability of ICT to capture, store, retrieve, analyse and transmit large volumes of health information across various locations [2]. Health information is an essential factor that contributes to health care delivery support all over the world, ranging from patients' records to hospital administration records, logistics, and more. For planning and policymaking, health information must be reliable and dependable to help improve a country's overall health status and to help individual health facilities manage and improve upon their delivery of healthcare to the public [3]. The key function of Information and Communication Technologies in upgrading the general management of health records cannot be ignored.

The ability of ICTs to capture, store, retrieve, analyse and transmit large quantities of health information across various locations affirms this fact [2]. ICT's implementation and use in healthcare delivery are commonly referred to as e-health. There are numerous innovative applications and Electronic Health Records (EHR) System is an example of such an innovation [4]. Key findings from the World Health Organisation (WHO) indicate that there has been steady growth in the adoption of national electronic health record (EHR) Systems over the past 15 years and a 46% global increase in the past five years. Greater than 50% of upper-middle- and high-income countries have adopted the national EHR System. Adoption rates are much lower in the lower-middle and low-income countries the majority of Member States with national EHR Systems report integration of EHR Systems with laboratory and pharmacy information systems, followed by Picture Archiving and Communications Systems (PACS). The most frequently cited barriers to the implementation of EHRS were lack of funding, infrastructure, capacity, and legal frameworks. Although the EHRS is not patronised on the global scale, its adoption and promotion have become pertinent in developing countries whose healthcare systems are characterised by severe infrastructural, financial, technical, and human resource constrictions [4].

The Government of Ghana has invested hugely in ICT-based health information systems in an attempt to improve upon healthcare and the general performance of public healthcare facilities [4]. The adoption of ICT applications in the Ghanaian health sector has seen huge financial injections not only from government but also from other private individuals and institutions as well as other international **organisations**. ICT implementation in the Ghanaian health care system did not also leave out the electronic health records system.

Electronic Health Record system provides the avenue to readily access and make available this information. Parts of these data are patients' demographics, medical history and notes, drugs administered, vital signs, laboratory results, among others. Yet studies into how such investments promote the provision of quality healthcare in the country are limited. In the light of the above, this study sought to determine the perceived benefits of the use of the EHR system, deduce the level of satisfaction among health workers with the use of the **EHR** system and to identify the challenges associated with the use of EHR System amongst the health workers.

Methods

The study employed the quantitative research approach with a cross-sectional descriptive survey design. The study population included clinical staff of the hospital. **This** study design was selected because it captures data at a specific point in time and allows for analysis of multiple variables at one point in time.

A sample of eighty (80) clinical staff was purposively selected to take part in the study since they regularly use the EHR system of the hospital. **Administrative and support** staff were not

included in this study because they were deemed not to be front liners in the care delivery system.

The data collection tool employed was structured questionnaire which was divided into four sections (A to D) which involved the use of close-ended questions. Section 'A' captured questions on background characteristics of respondents. In the other three sections, close-ended questions were posed to seek the views or opinions of respondents on the topic under investigation with respect to the research objectives. This captured response using a five-point Likert Scale with responses ranging from "Strongly Disagree" to "Strongly Agree", checklist type multiple choice questions and dichotomous choice questions. Data collected were analysed using the Statistical Package for Social Sciences version 20.0 (SPSS version 20.0). The study complied with ethical requirements such as respondents' privacy and confidentiality of obtained information.

The study setting was Presbyterian Hospital, Dormaa Ahenkro in the Dormaa Central Municipality in the Bono Region of Ghana. The hospital was established in the year 1955 and is under the management unit of Presbyterian Health Service (PHS) which is a member of the Christian Health Association of Ghana (CHAG), one of the agencies under the Ministry of Health in Ghana. The Hospital is a Ministry of Health approved Municipal Hospital and the only hospital in the Municipality which serves the population in Dormaa Central Municipality and also serves as a Referral Centre for a number of nearby clinics, maternity homes and Community-based Health Planning and Services' compounds. It is a registered national health insurance provider under the National Health Insurance Authority.

Presentation of Findings

Results of this study are presented in line with the research objectives and are captured under the subheadings perceived benefits derived from the installation of the EHR System, user satisfaction and challenges associated with EHRS utilisation, respectively. Analyzed data has been presented in tables, bar charts and pie charts with their corresponding percentages and frequencies. The second part of this section deals with the discussion of the findings.

Demographic Information of Respondents

A total of 80 respondents participated in this study (n=80). The results of the demographic information of respondents from the various units in the hospital are presented in frequencies and percentages as shown in Table 1. In the sex distribution, 51.3% were male whereas 48.7% were female in the sample population. Among a total of 80 respondents who represented the sample population, majority were within the age category of 20- 29 and 30-39 representing 41.3% and 36.2% respectively. The educational level of the respondents ranged from certificate level to postgraduate level. Majority of the respondents were diploma holders representing 47.5% and graduate also representing 32.5%.

Respondents were selected across six departments and of this, 46.3% were from the Inpatient Department (IP), 27.5% from the Out-Patient Department (OPD) and the rest were from Records, Pharmacy, Laboratory and Account Department. In respect to their professional background, General Nurses were of majority (48.8%) followed by Midwives (13.8%), and Health Information Officers (10.0%).

Among the total sample population, majority (50%) had worked in the hospital for (1-4) years, 43.8% had worked for (5-9) years whereas 6.8% had worked for more than 10 years in the hospital.

Table 1: Demographics Characteristics of Respondents

Item	Frequency (n=80)	Percentage
Gender		
Male	41	51.3
Female	39	48.7
Age		
20- 29years	33	41.3
30- 39years	29	36.2
40- 49years	18	22.5
Level of Education		
Certificate	11	13.8
Diploma	38	47.5
Graduate	26	32.5
Post graduate	5	6.2
Department		
OPD	22	27.5
IPD	37	46.3
Records	8	10.0
Pharmacy	4	5.0
Laboratory	5	6.2
Account	4	5.0
Position at facility		
Medical Officer	4	5.0
Physician Assistant	5	6.2
General Nurse	39	48.8
Midwife	11	13.8
Pharmacist	4	5.0
Health Information Officer	8	10.0
Lab Scientist	5	6.2
Accountant	4	5.0
Working period		
1 – 4 years	35	43.8
5 - 9 years	40	50.0
10 years or more	5	6.2

Source: Field survey, 2021

Perceived Benefits Derived from Use of the EHR System

Table 2 presents result of benefits derived from the installation of the EHRS at the Presbyterian Hospital, Dormaa Ahenkro. Some key findings from this section include; more than half of the respondent (52.2%) stated that they strongly agree the EHR System makes it easier to retrieve patients past medical record. 47.5% stated that they agree the EHR System quickened clinical decision making while 8.7% disagree with that assertion. Also, 36.3% mentioned that they agree that patient waiting time is shortened with the usage of

EHR System. With respect to medical/prescription error 47.5% opine that they agree the EHR System has reduced medical/prescription error.

Greater proportion of the respondents (53.8%) allude that they strongly agree confidentiality of patient record has improved. Another 58.8% also mentioned that they agree there is improvement in the overall quality of care offered to patient. Comparing the traditional paper-based and the EHR System, 17.5% of the respondents agree they feel much better in control using paper-based record system than EHR System whereas 28.8% disagree to that assertion. Again, 33.8% of the respondents postulate that they disagree transition from paper-based to EHR System has interfered with their overall performance whereas 26.2% agree that it has interfered with their overall performance.

Table 2: Perceived benefits derived from Installation of the EHR System

Statement	Frequency	Percentage
<i>An EHR System makes it easier to retrieve patient's past medical Records</i>		
Disagree	6	7.5
Uncertain	7	8.7
Agree	25	31.3
Strongly agree	42	52.5
<i>An EHR System quickens the process of clinical decision-making</i>		
Disagree	7	8.7
Uncertain	9	11.3
Agree	38	47.5
Strongly agree	26	32.5
<i>With an EHR System the patient waiting time is shortened</i>		
Strongly disagree	3	3.7
Disagree	14	17.5
Uncertain	12	15.0
Agree	29	36.3
Strongly agree	22	27.5
<i>EHR System help reduce medication/prescription errors</i>		
Strongly disagree	2	2.5
Disagree	2	2.5
Uncertain	6	7.5
Agree	38	47.5
Strongly agree	32	40.0
<i>Implementing an EHR System improves confidentiality of patients' records</i>		
Strongly disagree	3	3.7
Uncertain	4	5.0
Agree	30	37.5
Strongly agree	43	53.8
<i>EHR System can improve the overall quality of care offered to Patients</i>		
Disagree	5	6.2
Uncertain	15	18.8
Agree	47	58.8
Strongly agree	13	16.2
<i>I feel much in control using paper-based patient records than using EHR</i>		
Strongly disagree	18	22.5

Disagree	23	28.8
Uncertain	17	21.2
Agree	14	17.5
Strongly agree	8	10.0
<i>Transitioning from paper-based to EHR System has interfered with my overall performance.</i>		
Strongly disagree	16	20.0
Disagree	27	33.8
Uncertain	12	15.0
Agree	21	26.2
Strongly agree	4	5.0

Source: Field survey, 2021.

User Satisfaction with Electronic Health Systems

User satisfactions among study participants with respect to the use of the EHR System is shown in Table 3. Majority (46.3%) of the respondents agree and 25.0% strongly agree that patient data can be accessed simultaneously at different sites. In responding to the storage capacity of the EHR System, 41.3% agree that it has huge storage capacity while 21.2% were uncertain about the storage capacity of the EHR System. Forty-five percent (45.0%) agree and 25% strongly agree that the EHR System reduces error rate.

In responding to whether or not the EHR System facilitates sharing of data with others in the hospital, 55.0% agree whilst 2.5% strongly disagree. More than half of the respondents (63.8%) agree that backup of data with the EHR System is safe. Also, 51.3% agree that technical support is readily available whilst 15.0% disagree to this assertion.

Majority (62.5%) of the respondents disagree that the EHR System put extra burden on users whilst 10% agreed it put extra burden on users. Overall, 41.3% disagree and 25% strongly disagree to lack of trust in the system whereas 12.5% agree and 2.2% strongly agree to lack of trust in the system.

Table 3: User Satisfaction

Item	Frequency	Percentage
<i>Patient's data can be accessed simultaneously at different sites</i>		
Strongly disagree	3	3.7
Disagree	12	15.0
Uncertain	8	10.0
Agree	37	46.3
Strongly agree	20	25.0
<i>Has huge storage capacity</i>		
Disagree	3	3.7
Uncertain	17	21.2
Agree	33	41.3
Strongly agree	27	33.8
<i>Reduces error rates</i>		
Strongly disagree	3	3.7
Disagree	11	13.8
Uncertain	10	12.5
Agree	36	45.0
Strongly agree	20	25.0
<i>Facilitates sharing of data with users in</i>		

<i>the hospital</i>		
Strongly disagree	2	2.5
Disagree	3	3.7
Uncertain	6	7.5
Agree	44	55.0
Strongly agree	25	31.3
<i>Back up makes data safe</i>		
Strongly disagree	1	1.2
Disagree	5	6.2
Uncertain	7	8.8
Agree	51	63.8
Strongly agree	16	20.0
<i>Technical support is readily available</i>		
Strongly Disagree	7	8.7
Disagree	12	15.0
Uncertain	10	12.5
Agree	41	51.3
Strongly agree	10	12.5
<i>Usage of EHR puts extra burden on clinicians/users</i>		
Strongly disagree	10	12.5
Disagree	50	62.5
Uncertain	9	11.3
Agree	8	10.0
Strongly agree	3	3.7
<i>Lack of trust in system</i>		
Strongly disagree	20	25.0
Disagree	33	41.3
Uncertain	15	18.7
Agree	10	12.5
Strongly Agree	2	2.5

Source: Field survey, 2021.

Level of Security and Usability of Electronic Health Systems

Figure 1 shows the result of how participants responded to the security and usability of the EHR System. All the respondents indicated that the system is password protected. Almost all (90%) mentioned that access to the EHR System is controlled whilst 10% mention that access to the system is not controlled. With respect to ease of operation of the system, majority (80%) report that the system is easy to operate with 20% of the respondents reporting that the system is not easy to use by them. Three fourth (75%) of the respondents mention that the response time for most operations is fast enough for them to perform their routines whilst the remaining one fourth (25) mention that the response time for most operation is not fast enough for them to perform their routines. Greater proportion of the respondents (82.5%) indicate that the use of the system improves upon workflow in the hospital but another 17.5% also indicate that the system has not improved upon workflow in the hospital since its implementation.

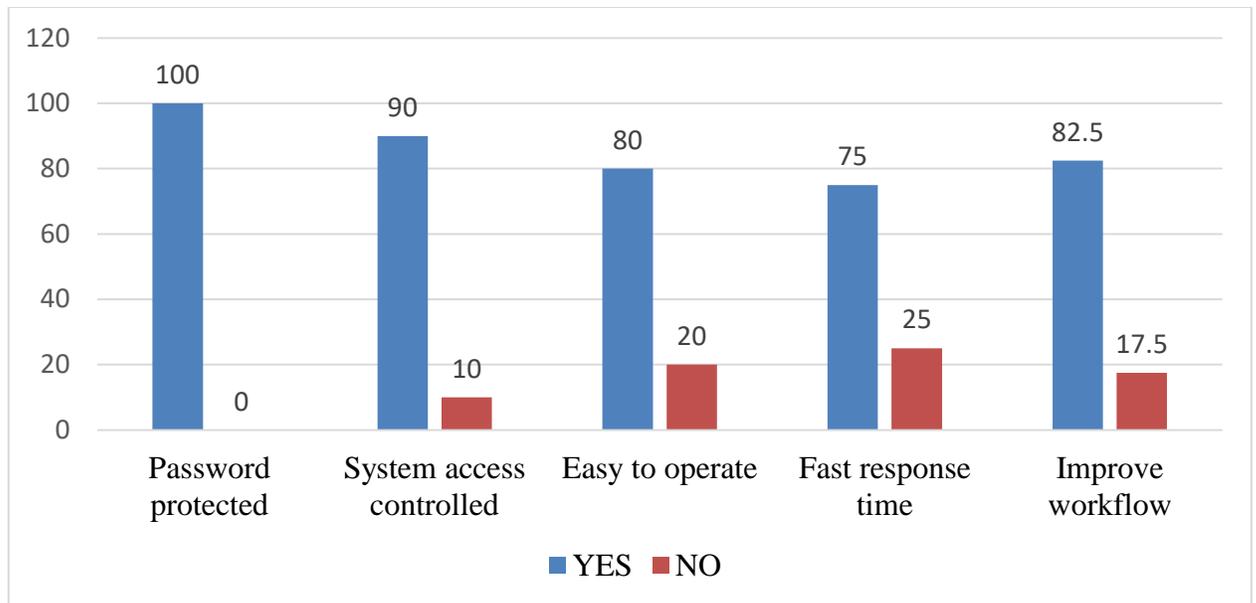


Figure 1: Level of security and usability of the EHR System.
Source: Field survey, 2021.

Overall Satisfaction with Electronic Health Systems

To further evaluate the level of satisfaction of the EHR System users, another means is to identify the overall level of satisfaction among users of the system at the hospital. Overall, the result of the study showed that, 70% of respondents reported that they are generally satisfied with the usage of the EHR System, 23% claimed to be very satisfied whereas 7% of the remaining respondents reported that they are somewhat dissatisfied.

(Pie chart removed and written out as recommended by the reviewer)

Challenges Associated with the Use of the EHR System

Table 4 depicts result of some challenges associated with the use of EHR System as reported by the respondents. More than half (58.8%) indicated that they seldom encounter problem when entering data whilst 25.0% respond that they often encounter problem when entering data with the EHR System. However, 37.5% indicate that challenges were always addressed. All respondents indicate that the system can be improved upon. Majority (66.3%) also agree that there is availability of EHR System tools for use.

Respondents of (37.5%) disagree whilst 35.0% agree and 22.5% strongly agree that they have to wait for someone to finish using the system before they have access. The average waiting time is a (1-5) minute representing 54.3% of the respondents and (6-10) minutes also representing 45.7% of the total respondents who agree and strongly agree to waiting for someone to finish before having access.

Table 4: Challenges of using EHR System

Item	Frequency	Percentage
<i>Problems encountered when entering data</i>		
Never	11	13.7

Seldom	47	58.8
Often	20	25.0
Always	2	2.5
Total	80	100
Challenges often addressed		
Seldom	20	25.0
Often	22	27.5
Always	30	37.5
Missing	8	10.0
Total	80	100
System improvement		
Yes	80	100
No	0	0
Total	80	100
Availability of EHR tools for use		
Strongly agree	13	16.2
Agree	53	66.3
Disagree	14	17.5
Total	80	100
Network Unavailability		
	63	78.8
Seldom	13	16.2
Often	4	5.0
Always	80	100
Total		
Waiting for others to finish using the system before you have access		
I strongly agree	18	22.5
I agree	28	35.0
I disagree	30	37.5
I strongly disagree	4	5.0
Total	80	100
Waiting time for others to finish using the system before you have access		
1 – 5 minutes	25	54.3
6 – 10 minutes	21	45.7
Total	46	100

Source: Field survey, 2021.

Challenge of Network Unavailability

In assessing the challenges associated with the use of the EHR System, network condition was a key indicator to look at. In finding out whether or not network unavailability occurs with the use of the system, majority (78.8%) mention it seldom occur, 16.2% opine it often occurs and only 5% indicate network unavailability always occurs as it is clearly represented in figure 3.

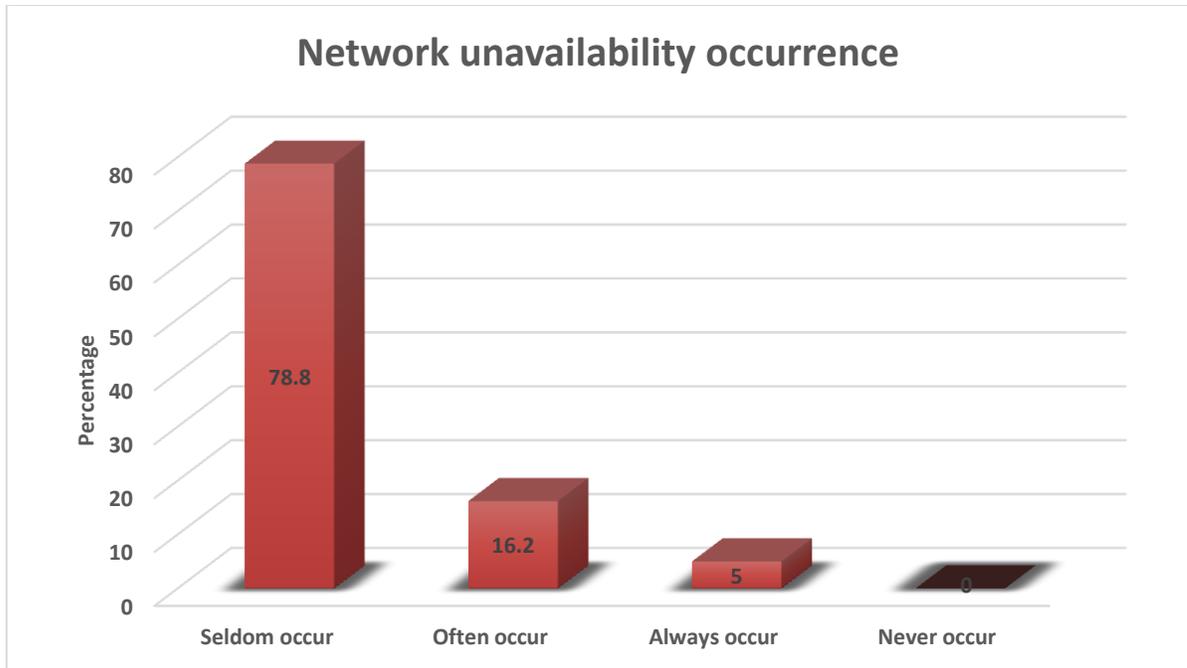


Figure 3: A bar chart showing network unavailability occurrence with the use of the EHR System.

Source: Field survey, 2021.

Discussion

The main purpose of this study was to examine the perceived challenges, user satisfaction and challenges of using the EHR system at Presbyterian Hospital in Dormaa Ahenkro in the Dormaa Central Municipality in Bono Region of Ghana. This section of the paper brings the discussion of the findings in respect to the research questions.

Benefits Derived from the Use of EHR System

One key and first question the researchers sought to answer was “What are the benefits of the use of the EHR system?” Indeed, the ultimate goal for the implementation of every EHR System is to have a positive bearing on the general delivery of healthcare. From the perusal of literatures, benefits of EHRs could be largely grouped under the following headings: Improve quality of care; enhanced productivity and efficiency; improved care coordination and communication; reduction of cost and protection of privacy of patient records.

From the responses gathered in relation to the benefit derived from the installation and use of the EHR System from respondents, it is a clear indication that the installation of the EHR System in Presbyterian Hospital in Dormaa Ahenkro has in general produced the benefits as grouped in the literature.

In relation to EHR System benefit of improve quality of care, more than half of the respondents (58.8%) mentioned that the EHR System had improved upon the overall quality of care since its implementation. In a similar empirical study conducted by DesRoches et al. [5], a majority of 97% of respondents indicated that EHRs add to timely access to health records whilst about 82% reported that EHRs positively affected the quality of clinical

decisions. Also, one of the dimensions of quality in healthcare is safety. In this regard, 47.5% agreed and 40% strongly agreed that the EHR System had reduced medical/prescription errors that hitherto was routinely encountered with the traditional paper-based record keeping system (folder) which enhances the safety of care provided in the hospital.

In respect to enhanced productivity and efficiency, in total 63.8% of the respondents indicated that the EHR System had shortened patients waiting time which meant that it had enhance productivity and efficiency in care delivery in the hospital since it allowed them to serve many patients within short period of time. This was as a result of the fact that record-keeping time had reduced leading to the optimisation of workflow efficiency and increase in the general productivity of health professionals [6]. Also, EHR System has saved or reduced the cost of keeping patient records. This is in agreement to the fact that the cost incurred in initiating and maintaining paper health records including clerical supplies, cost of paper, and printing costs were quashed or reduced when EHRs are used [7]. Comparing the usage of EHR System with the traditional paper-based system, little more than half of the respondents (51.3%) disagreed that they felt much better in control using the paper-based the using the EHR System.

Another benefit identified in the literature was improved care coordination and communication. A total of 83.8% (agree and strongly agree) of the respondents mentioned that the EHR System made it easy to retrieve past medical record and this had resulted in improvement in the coordination and communication in the hospital. In a study by Smith et al. [8], it was reported that one out of every seven hospitalisations was as a result of missing patient medical records.

With regard to protection of privacy of patient records, almost all (91.3% both agree and strongly agree) opined that the use of the EHR System had improved upon confidentiality of patient record in the hospital. According to Cisco [9], EHRs does not only ensure compliance with privacy regulations but also provide pliant security measures to protect patient information across the entire wired and wireless environment.

User Satisfaction with the Use of the EHR System

The researchers in this study deemed it necessary to also find out the level of satisfaction among users of EHR Systems in the hospital. According to Tang et al. [10], while satisfaction is subjective, general characteristics of satisfaction with the use of EHR System include: ease of operation; good storage capacity; ability to reduce error rate; back up data, availability of technical support; and trust in the system.

According to the result presented above, 80% thought the system was easy to operate, 75.1% (both agree and strongly agree) of the respondents believed that the EHR System in the hospital had a huge storage capacity, and majority were of the view that the back-up feature of the system made data safe. Another 70%, also mentioned that with the use of the EHR System, error rate had reduced drastically. In total 63.8% (both agree and strongly agree) indicated that technical support was readily available should they encounter any challenge in the operation of the system whilst 23.7% in total believed that technical support was not readily available anytime they encountered challenge. The rest of the respondents (12.5%) were uncertain to the assertion. Lastly, majority (66.3% in total) said they had trust in the system.

Overall, 70% of the respondents mentioned that they were generally satisfied with the implementation and usage of the EHR System in the hospital. Only 7% felt somewhat dissatisfied with the usage of the EHR System, meanwhile apart from the majority who were generally satisfied, another 23% said they were very satisfied with the use of the EHR

System in the hospital. In similar studies by Bonner et al. [11] and Christensen and Grimsno [12] on user satisfaction with the implementation of EHRs in some health facilities all revealed a general level of satisfaction among health professionals.

Challenges associated with the use of the EHR System

Challenges associated with the EHR System usage was also investigated as one key aspect of the research questions and objectives. Despite the benefits realised from the use of EHR System in the hospital, some challenges had been noticed which management needs to address. Scholars have noted that the advancement of EHRs in Africa had never been easy owing to many factors which were peculiar to developing countries [13,15]. Challenges identified relates to structural, functional and social factors.

A major challenge identified by this study relates to the occurrence of network unavailability with the use of the EHR System. Majority (78.8%) of the respondents mentioned that network unavailability occurrence was seldom, 13% opined it often occurs whilst 5% indicated that network unavailability occurs always. All respondents admitted that there were challenges with network. The provision of Internet services was a major bane that affects the implementation of ICT and telemedicine projects in Ghana and other developing countries [16].

Conclusion

Generally, the study sought to assess the current EHR System usage and how it influenced healthcare delivery at Presbyterian Hospital in Dormaa Ahenkro in the Dormaa Central Municipality in Bono Region of Ghana. Overall, the study demonstrated that the use of the EHR System had positively influenced healthcare delivery to a large extent in the hospital. The study showed that there were benefits with the use of EHR System in the hospital. Some of these benefits as revealed in this study include: improved upon the overall quality of care; shortened patient waiting time; assisted effectively in the quality of clinical decision; reduced medical/prescription errors; saved or reduced the cost of keeping patient records; easy to retrieve past medical records of patients; and improved upon confidentiality of patient record in the hospital. The study also showed that users of the EHR System in the hospital were generally satisfied. They mentioned among others that: the EHR System was easy to operate; had huge storage capacity; the back-up feature of the system made data safe; error rate had reduced drastically; technical support was readily available should they encounter any challenge with its operation; and they had trust in the system. Despite the enormous benefits realised from the usage of the EHR System as revealed in this study, there was a notable challenge. A major challenge identified in this study related to the occurrence of network unavailability. Hospital management must take appropriate steps to improve the effectiveness of the EHR system and eliminate the identified challenges to improve the satisfaction of staff with the EHR system. This will enhance the effectiveness and efficiency of the staff to deliver care in a timely manner.

Consent (Where Ever Applicable)

We authors have declared that written informed consent was obtained from the respondents before being permitted to take part in the study.

Ethical Approval (Where Ever Applicable)

We the authors want to state that we obtained all the necessary ethical approval from the University of Education, Winneba before the commencement of the study. It also confirms that the study was not against the public interest.

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