

ELECTRONIC HEALTH INFORMATION MANAGEMENT SYSTEM AND QUALITY HEALTHCARE DELIVERY: EXPERIENCES OF HEALTHCARE PROVIDERS IN A QUASI-GOVERNMENT HEALTH FACILITY IN GHANA

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ABSTRACT

The transition from paper-based health records to Electronic Health Information Management Systems (EHIMS) addresses significant challenges such as data inaccessibility and transcription errors, and enhance clinical decision-making. However, the healthcare providers' experiences with the EHIMS and its impact on healthcare delivery is not adequately investigated using qualitative methods in Ghana. This study's aim was to explore healthcare providers' experiences and the impact of EHIMS on healthcare delivery at the Kwadaso Seventh Day Adventist (SDA) Hospital. A qualitative phenomenological case study design was used in this study. Fourteen (14) healthcare professionals, including clinicians, administrators, and health information managers, were purposively sampled. Data were collected through semi-structured interviews and analyzed thematically using both deductive and inductive coding approaches. Findings revealed that EHIMS improved the efficiency of healthcare delivery, enhanced the accessibility and security of patient information, and reduced medical errors. The system also fostered better interdepartmental collaboration and strengthened patient-provider relationships. However, challenges such as staff adaptation difficulties were also noted. This study recommended for a continuous training, system optimisation, and broader implementation of EHIMS to be prioritised to enhance healthcare service delivery in Ghana.

Keywords: Electronic Health Information, Data Management, Healthcare delivery, Ghana.

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INTRODUCTION

Globally, eight million deaths could be prevented with access to high-quality healthcare (Alkire *et al.* 2018). Individuals receiving poor-quality care may experience additional health issues, such as physical complications, persistent symptoms, diminished functionality, pain, and a lower quality of life. It is therefore obvious that, a mere access to healthcare does not guarantee the effective management of health (Telenti *et al.* 2018). The importance of ensuring enhanced quality of care at healthcare facilities cannot be overemphasised.

Since the introduction of the cooperation card in the United Kingdom (UK), healthcare practitioners have employed various iterations of the Paper Record System (PHR) to document medical information (Rybynok *et. al*, 2010). Patients carry these paper-based cards, and healthcare providers record the care provided during each visit, whether to community clinicians or hospitals, in designated folders (Hawley *et al.*, 2014). Health records were manually stored in extensive printed folders, necessitating effective records management practices for storage and retrieval facilitation (Amankwah, 2019). The utilisation of this system presented several drawbacks, such as restricting individual patient records to specific health service providers and facing limitations in booklet space for storage. This constraint of the paper record system led to an overreliance on abbreviations for reporting results and recording information, consequently elevating the risk of transcription errors (Bowman, 2013). This led to the introduction of the EHIMS, which the World Health Organization (WHO) asserted its significance in contributing to quality healthcare delivery, with countries like Denmark, the Netherlands, Sweden, the UK, and Northern Ireland widely using the system for primary care patients (WHO, 2004)

The EHIMS, also known as Electronic Medical Records (EMR) or Electronic Health Records (EHR), serves as the interface between people, processes, and technology. EHR, as defined by the International Organization of Standardization (ISO, 2011), is a secure digital repository of patient data accessible by authorised users within or between healthcare providers. EHIMS, also known by various names such as Computerized Patient Records, Computerized Medical Records, and e-records, maintains a partial or complete record of a patient's lifetime health history, which healthcare providers use to deliver timely, quality, and efficient healthcare (Omole, 2015). EHR usage acted as a stopgap solution to the challenges of the Personal Health Record (PHR) system, facilitating greater accessibility of data for healthcare purposes. The inclusion of clinical decision support capabilities in EHRs aids medical practitioners in making treatment and prescription decisions (Price and Singer, 2013). The EHR platform facilitates the management, interchange, and flow of information among various hospital departments, encompassing screening and laboratory results, diagnostic imaging results, prescriptions, and invoicing (Silow-Carroll and Edwards, 2012). Some EHR platforms also support primary healthcare professionals in referring patients to other healthcare facilities.

In sub-Saharan Africa, substantial investments have been made in EHIMS by hospitals to enhance healthcare delivery and over the period, it has been utilised in various settings including the management of conditions like HIV, tuberculosis, maternal and child health (Akanbi *et al.*, 2012; Mitchell *et al.*, 2012; Mtebe *et al.*, 2018) particularly in countries such as Kenya (Haskew *et al*, 2015), South Africa (Mate *et al*, 2009) and Ghana (Amankwah, 2019).

Since the implementation of Information and Communication Technology (ICT)-based registry systems, research has focused on the adaptation and implementation challenges (Adjorlolo and Ellingsen, 2013; Afarikumah, 2014; Acquah-Swanzy, 2015; Agyemang *et al.*, 2023). However, there appears to be a paucity of published works that have assessed the impact of the electronic health information management system in a quasi-government health facility using a qualitative approach. Therefore, this study was to explore healthcare providers' experiences and the impact of EHIMS on healthcare delivery at the Kwadaso Seventh Day Adventist (SDA) Hospital. This study contributes to building the knowledge base in this domain.

MATERIALS AND METHOD (METHODOLOGY)

Study Approach and Design

The study adopted a qualitative case study approach, with a phenomenological design. The phenomenological design was essential in obtaining an in-depth understanding of the lived experiences and perspectives of healthcare providers as regards the impact of the EHIMS on quality healthcare delivery.

Profile of Study Site

The SDA Hospital in the Kwadaso Municipality was selected as a case for this study due to its quasi-government status, making it possess some characteristics of both the public and private health facility in Ghana. In addition, the SDA Hospital is known to have started using the electronic health information management system in its health service delivery since 2007. The Kwadaso SDA hospital is a 150-bed facility that serves a wide catchment area in Ashanti and other regions. The facility currently has about 54 medical

doctors, aside from nurses, administrators, and other supporting staff. It serves as a referral point to neighboring facilities and regions and provides specialty services. In total, the facility has 670 healthcare professionals, of whom 450 use the EHIMS. The facility has Outpatient Department (OPD) services, which include Pharmacy services, Physiotherapy, Education and Counselling, Ophthalmic Services, Diagnostic Services, Emergency, Ear, Nose and Throat (ENT) services, and Urology. The 'In-patient' services of the facility constitute Male and Female Medical wards, a Paediatric ward, surgical services and ward, and Obstetric and Gynaecological Services. It also has a public health unit, comprising: family planning, antenatal and postnatal care, a child welfare clinic (CWC), an immunization centre, a health education unit, home visits, and community outreach. The facility also boasts of very good ambulance and general services.

Participants and recruitment

The study participants were persons who provide direct and indirect healthcare services to patients. The direct healthcare providers included medical doctors and Nurses. Those indirectly involved were administrators and health information managers.

Before recruiting participants, we had a face-to-face meeting with the hospital administration and another meeting with potential participants who met the inclusion criteria to explain the study rationale to them. The eligibility criteria included clinicians (medical doctors, nurses, and pharmacists), administrators, and health information managers who have had some work experience with the EHIMS. Thus, we employed a purposive sampling technique. Individual interviews were scheduled at a place and time convenient to both participants and research assistants. The sample size of this study was guided by the data saturation point.

A total of 14 participants were recruited for the study.

Data Collection, Analysis & Rigor

The study team developed an interview guide, which was subsequently piloted on four people at the Kwame Nkrumah University of Science and Technology (KNUST) hospital. The idea was to receive comments and modify the guide. With the final guide, research assistants (RAs) then conducted face-to-face semi-structured interviews with participants in the English language because they could all articulate the accounts of their experiences in English. The interviews were audio-recorded with participants' consent and lasted 30-45 minutes. The audio recordings were then transcribed verbatim and subsequently analysed. The data were collected between April and August 2023.

The data were thematically analysed using both deductive and inductive coding approaches. We used the framework approach by matching the statements to our existing themes and sub-themes, and those that did not match were discarded (Hackett, A. and Strickland, K. 2018). The data analysis was done manually by the research team. Firstly, the transcripts were read by the study team to identify relevant and significant statements. The team then discussed differences in the statements and arrived at a consensus on significant ones. Secondly, the significant statements were matched to fit into the existing main and sub-themes. In all, two sub-themes emerged inductively, and four were deductive from the existing framework. An initial description was written

of participants' experiences regarding using the electronic platform. Then the themes were used to write a detailed explanation and to arrive at the study objective.

Ethics

Ethical approval was obtained from the Committee for Human Research Publications and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology (CHRPE/AP/1098/23). Both information leaflets and informed consent were presented to participants, and those who consented were interviewed. The study ensured participants' confidentiality and privacy throughout the study period by ensuring no use of name identifiers in data collection, analysis, and data presentations. Audio recordings and transcripts were stored on a password-protected laptop, accessible only to the study team.

RESULTS

Participants' Characteristics

Fourteen (14) participants were included in the study (see Table 1 for demographic distributions). Male participants were marginally more (57.1%) than female participants (42.9%). Their ages ranged from 25 to 54, and 51.1% of them had at least Diploma education. Participants were fairly distributed in professional backgrounds and work experience. In terms of years of EHIMS use, the majority (57.1%) had more than two years of experience. For EHIMS training, only 28.6% did not receive any training as compared to 71.4% who received training.

Table 1 Socio-Demographic Characteristics of Participants.

Characteristic	Frequency (N)	Percentage (%)
Age group (years)		
25-34	6	42.9
35-44	5	35.7
45-54	3	21.4
Gender		
Male	8	57.1
Female	6	42.9
Professional Background		
Clinicians	6	42.8
Administrators	4	28.6
Health Info Managers	4	28.6
Educational Level		
Diploma	8	51.1
Bachelors	4	28.6
Masters	2	14.3
Work Experience		
< 5 years	4	28.6
5-10 years	6	42.8
>10 years	4	28.6
EHIMS Experience		
<1 Year	2	14.3
1-2 years	4	28.6
>2 years	8	57.1
EHIMS Training received		
Yes	10	71.4
No	4	28.6

Participants' Experiences

Participants shared various experiences, which were matched and placed under the existing framework of themes and sub-themes.

In all, there were two main themes and 6 sub-themes, which included two inductive and four deductive. Table 2 summarises them.

Table 2: Research objective and thematic areas.

Main Objective	Main Themes	Sub-Themes
To explore the impact of EHIMS on quality healthcare delivery	Impact of EHIMS on Overall Quality of Healthcare Delivery	Efficiency in healthcare delivery Easy accessibility to patients' information Easy transfer of patients' records across facilities
	Impact of EHIMS on Healthcare Provider and Patient Relationship	Reduction in time-wasting Reduced medical errors Enhanced collaborative care intervention

Impact of EHIMS on Overall Quality of Healthcare Delivery

Participants reported on the overarching impact of EHIMS on the quality of healthcare delivery. They reported on the efficiency of healthcare delivery, easy access to patients' information, and easy transfer of patient records across facilities.

Efficiency in healthcare delivery

Nearly all the participants mentioned the huge impact the technology has had, with emphasis on time efficiency, which is in contrast to using the traditional method of writing or paper record keeping. Some participants remarked that the EHIMS addresses issues of missing folders and improves the overall management of patient records, thus eliminating delays and ensuring accessibility even after discharge.

"So we can now say that, because of this system, we do not spend most time in writing. We just ensure that the necessary information has been keyed in, and then us to copy and paste, and we change the basic patient particulars if the things we need to document are similar. So we don't waste time and then that has enhanced our work and then ensuring that we are giving up to date care and then writing up to date on patient's care" (Participant 5)

Additionally, some participants expressed an increase in patient satisfaction during time optimisation.

"It's good because it saves time. Gone are the days... maybe we have to write things down and you know with paper, it can easily get missing and sometimes too folders are not being found at the records and even after discharge. Some patients will come and complain that when they went to the records, their folder is nowhere to be found. So with this it has actually saved time" (Participant 7).

On the contrary, one participant made a revelation that, even though the electronic system has improved healthcare delivery, especially in the efficient retrieval of patient data, the older folks still prefer to write or use the old ways of doing things, as they claim it is more convenient for them than using the technology. This could be a setback and serve as a barrier to efficient and accurate service delivery, impeding quality health outcomes.

"Okay it has been good, and its....electronic it has made work easier and faster especially at the records side but if you ask the elderly they will tell you that writing is faster than typing or entering the information on the system but for the young girls they are cool with it due the capability of retrieving of data compared to the old system and it has also remove duplicate record" (Participant 6).

Easy accessibility to patients' information

A majority of participants expressed that, throughout the hospital, the EHIMS acts as a single platform for patient data. It facilitates collaboration and communication by allowing healthcare practitioners to access and add to patient data. The transfer of patients' information across departments had been made easy with the introduction of the EHIMS, as revealed by some participants. Healthcare professionals can view patient information from anywhere at any time by using their folder number. In addition to increasing productivity, this accessibility promotes care continuity by guaranteeing that medical personnel can regularly access and contribute to the patient's medical history and continuing care.

"The positive effect is excellent because all patient information is stored on the computer. When the patient arrives at the lab, everything is already there. The lab worker simply needs to open the folder and enter all the patient data. This results in a very positive outcome." (Participant 1)

"...Yes, so long as you know the patient's folder number, you can view the patient's information at any time and from any location. Additionally, it encourages care continuity" (Participant 2)

Easy transfer of patients' records across facilities

A few additional participants mentioned that the EHIMS's launch has resolved the issue of moving patient records from one hospital to another for ongoing medical treatment. To maintain continuity of medical treatment at the new institution, the paper method necessitated the sending of folders from one facility to another, the folder getting lost or being mishandled by patients. A few

individuals mentioned that the EHIMS allows patient data to be transferred safely between facilities as the data is sent electronically.

"The system is linked to the systems of other hospitals..... Absolutely, it is related. Once you arrive and have a patient with a Komfo Anokye Teaching Hospital (KATH) number, you can evaluate their information from this point on. It's secured because,... well, while I was talking about this, I mentioned that, in order to obtain a patient's information at KATH's number, you had to be an official health practitioner" (Participant 14).

Impact of EHIMS on Healthcare Provider and Patient Relationship

Participants reported a reduction in time wasting, a reduction in medical errors, and enhanced communication, improving provider-patient relationships.

Reduction in time-wasting

Some participants mentioned that the time spent between healthcare personnel and patients has reduced drastically. Other participants asserted that the EHIMS streamlines administrative tasks, allowing healthcare providers more time for direct patient care. The system's rapid access to patient details could improve appointment efficiency and result in more targeted and customised encounters.

"just as I said earlier, waiting for your particulars to be initiated into the system has now decreased drastically. So patient don't waste much time at the OPD just to get a folder.... a system opened for them" (Participant 1)

"Since the introduction of this software, patients have been able to, in other words, go through the system promptly and leave the facility on time. In contrast, before the software's introduction, patients had to wait

for extended periods, which led to numerous issues' (Participant 2).

However, one participant explained that the time spent between a patient and the healthcare provider is dependent on the proficiency of the healthcare provider in operating the software.

"Yes, at first it was difficult because people were unfamiliar with the system. As a result, waiting times increased because, for example, if I had to look up my name before seeing a patient, they would have to wait. This was a common complaint. However, now that more people are familiar with the system, I believe that waiting times have decreased" (Participant 3)

Reduction in medical errors

Participants said that since the facility's EHIMS was implemented, errors made by medical professionals that might harm patients' health have significantly decreased. This could suggest that the facility's overall delivery of quality healthcare as a result of the introduction of EHIMS has increased.

"The reason for the decrease is that, going forward, their pharmacy will save based on the information on the EHIMS. Once that is done, you may simply wait for the previous medication when you visit for a review and decide to repeat it. Medical errors have decreased as a result" (Participant 3)

Similarly, other participants expressed that the software gives room for sharing ideas on matters relating to medication and treatment. However, a participant said that due to the complex nature of the software, vigilance and care are needed when keying in information into the system, as it is difficult to correct mistakes in the system, even though he admitted that those errors are rare.

"Medical errors are incredibly rare. This is because, should you make a mistake, there

won't be a way for you to rectify it or it will be difficult until IT staff steps in. That being said, you use the EHIMS with great care whenever you need to. As a result, even after typing or utilizing the system in any other way, you must take your time and thoroughly review everything to make sure that everything is proper before saving or sending. Errors are therefore exceedingly uncommon." (Participant 9)

Additionally, the majority of participants also expressed the fact that the EHIMS has brought some level of collaboration between the various departments at the facility to help address pertinent issues.

"With EHIMS that we have now and also retrieving of information has been easy and it has also improved inter-departmental collaboration because during that time different department will be chasing for one patient folder and that increased a lot of confusion but everything is fine" (Participant 14)

DISCUSSIONS

Findings of this research indicates that the Electronic Health Information Management System (EHIMS) have a positive impact on efficiency in healthcare service delivery, easy accessibility to information, secured transfer of patient records across facilities, and help reduce medical errors. The findings are similar to those of other studies (Silow-Carroll et al., 2012; Bauer et al., 2014; Acquah-Swanzy, 2015; Trout, 2016), as efficiency in healthcare delivery, easy access to information were discovered as the impact of EHIMS on healthcare delivery. Similarly, Tumbo (2020) revealed that EHIMS were effective in healthcare service delivery as they promoted easy sharing of information, transparency, and time-saving, ensured security of information, and proper data management. Much as the easy accessibility to the patients' record add

to the efficiency EHIMS, the unrestricted nature of the system poses potential risk of access to the patients' data by unauthorised individuals, hence, compromising the patients' confidentiality.

Although this study found many advantages of the EHIMS, the participants' subjective assessments of the EHIMS did not have enough evidence to support Upadhyay and Hu (2022) who reported that the EHIMS helps reduce medical errors and improve patient safety. This is because, the medical errors before and after the implementation of the EHIMS was not assessed in our study. The sources and forms of medical errors were not also assessed, and therefore, we are unable to assume that the elimination of the manual or handwritten prescriptions have adequately resolved the errors, such as dosing errors.

A qualitative study reported that the EHIMS improved the storage and quality of medical records and easy retrieval of records by healthcare practitioners, and has helped reduce wasting time at the OPD department (Antwi, 2022). Addo and Agyepong (2020) reported in their study that health professionals showed a positive attitude towards the use of EHRs and are ready to continue using it since it has a positive impact on clients and also improve efficiency (Addo and Agyepong, 2020). Furthermore, according to Burlison *et al.* (2018), EHRs enable pharmacy staff members to enter drug expiration dates into the system and receive warnings when a drug approaches its expiration date, preventing it from being provided to customers without their knowledge. This reiterates the fact that the EHIMS helps reduce medical errors in healthcare delivery, as reported in this study.

On the other hand, Esquivel *et al.* (2012) found that EHRs are being utilised more frequently to help with referral communication in the outpatient context. However, even with technological assistance, primary

care physicians and specialists' referral communication is frequently inadequate and cannot completely prevent care delays. One possible reason for this could be a partial disregard for the role that information and communication technology plays in the social context of healthcare. A complex socio-technical strategy is needed to make electronic referral communication effective.

Implications of the study

The outcome of this study could help policy makers channel more resources in terms of effective usage and provision of better and effective machinery and a more advanced technological innovations to provide comprehensive care quality services for the Ghanaian people. This study could also serve as the basis for further studies into quality healthcare delivery and technological advancement.

Limitations

There are limitations of this study; the study was limited to just one facility instead of several others. We acknowledge that the perceptions of this study's participants might be different from those of other facilities and therefore, we cannot conclude that the positive impact of the EHIMS established in this study is the same in other facilities. Additionally, the study was limited to the perceptions of providers instead of the combination of providers and receivers to better appreciate the impact of the system.

CONCLUSION

The findings of this study revealed that EHIMS has helped enhance efficiency in healthcare delivery, increased accessibility to patients' information, ensured the secured transfer to records access facilities and helped reduce medical errors. The study also affirmed that the EHIMS has helped reduce time wasting,

reduced medical errors, and enhanced collaborative care intervention. However, while nurses were positive about improving efficiency with EHR, others regarded EHR as time-consuming. This study recommends for an objective assessment of the impact of the EHIMS on healthcare delivery using a quantitative method. This will provide good evidence to support other qualitative studies to inform policy for scaling up the use of EHIMS in most health facilities in Ghana.

DATA AVAILABILITY

The data supporting this work is available with the first author and the corresponding author upon a reasonable request.

COMPETING INTEREST

All authors declare no competing interest.

FUNDING

No external funding was obtained for this study. The study was funded from authors contributions.

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