EXPLORING THE IMPACT OF ELECTRONIC HEALTH RECORDS SYSTEM ON THE PERFORMANCE OF GHANAIAN HEALTHCARE ORGANISATIONS-A QUALITATIVE REVIEW

ABSTRACT

Introduction: The application of the Electronic Health Record System has been extensively acknowledged as an instrument by many establishments, especially, healthcare establishments to increase healthcare efficiency, operational effectiveness and successfully boost revenue generation.

Aim: This study aimed at empirically appraising the impact of electronic health record system on the performance of Pentecost Hospital in Madina in the La Nkwantanang-Madina Municipality in the Greater-Accra Region of Ghana.

Methodology: The study adopted a qualitative approach with a case study design. In-depth interviews and a focus group discussion of a total of thirty-five (35) respondents including ten (10) key informants of the Pentecost Hospital were purposely selected to participate in the study due to their role in the implementation of electronic health record system policies in the facility.

Results and discussions: The study revealed that frequent loss of data, inadequate knowledge in the management of the system, desire to improve upon work efficiency, longing to have easy access to health records of patients, intermittent waste of client or beneficiary time were among the main factors that led to the introduction of the Electronic Health Record System. The study also identified simplification of activities of the various departments of the hospital, improvement in clients' satisfaction, reduction in waiting time and speed delivery of healthcare, storage of information being faster and lasting, improvement in revenue generation of the hospital and improvement in quality healthcare delivering as some of the effects of the introduction of electronic patient record management on healthcare delivery at the Pentecost Hospital in Accra.

Conclusion: It is imperative to mention that efficient electronic health record system which is geared towards efficient quality healthcare provision would flourish when parity, effectiveness, efficiency and responsiveness of resource utilisation for quality healthcare are considered as the building blocks.

Keywords
information, electronic health record system, resource utilisation, revenue generation, healthcare delivery, and improvement

INTRODUCTION

Information processing, its storage and retrieval are very critical to functioning and performance of any organisational decision-making. This is more crucial in the health sector where accuracy and timeliness of patients' records are essential to enhance effectiveness and efficiency in diagnosis, treatment and saving lives. Patients' records are essential documents that compile facts about patients' lives and health. These capture data on past and present illnesses and treatment written by health care professionals caring for the patients (WHO, 2006). The concept of electronic records "refers to records that are dependable on relevant machines for access or reading, that is, computer hardware and software such as e-mails, database and word processing" (Tafor, 2003).

Knowledge of the file, ability to get it on time and appropriateness of patients' medical records at the right time help in no small way to save lives and to avoid medical complications. This point has been summarised by Thomas (2009) that "poor records mean poor defence, no records mean no defence". He explained that patients' records include a variety of documentation of patients' histories, clinical findings, diagnostic test results, preoperative care, operation notes, post-operative care, daily notes of patients' progress and medications.

Typically, patients' records serve four key functions: *administrative*, which includes demographic and socio-economic data; *legal* which includes a signed consent for treatment by appointed doctors and authorisation for the release of information; *financial*, which relates to the payment of fees for medical services and hospital accommodation and most importantly, *clinical* on patient, whether outpatient or emergency patient (WHO, 2006). On the financial aspect, Thomas (2009) provides that patients' record keeping is that the increasing use of medical insurance for treatment makes the insurance companies at times require proper record keeping to prove the patients' demand for medical expenses and that improper record keeping can result in declining medical claims and challenges.

However, the traditional way of capturing, storing, accessing and retrieving patients' records at the health facilities in many a case creates some challenges to health professionals and puts patients in a more or less 'dangerous' mood. For instance, Chauke (2008) observes that medical specialists at Nkhesani Hospital in South Africa found it very difficult to carry out a surgical operation on a patient because of 'a missing file'. This patient had been a victim of a car accident in the year 2005 and had had a partially paralysed leg and needed to be operated on. What appears to be much more problematic with the traditional patient record keeping is that papers could easily get mixed up and might not be found at the time it is needed most.

With people's health and lives at stake, such explanations cannot be endured because as good as one tries to put it, it can never cater for the worsening medical situation of a patient whose records got missing. From the foregoing, it suggests that appropriate patient records keeping is important for proper medical dispensation, whilst poor patients' records keeping may result in high patient complications and even loss of lives. For instance, it has been noted almost about 80% of complications that occur in health facilities are as a result of inaccurate information in medical records, inaccessible records, mislabelled specimens, and misfiled or missing charts (US Department of Health and Human Services, 2006).

Coming to recognition that patient medical records handling is a hub to medical processes and effective healthcare. Scholars and practitioners have advocated a need to adopt a more effective, accurate and just-in-time processes of capturing, storing and retrieving patient information. Barry (2001) suggests that organisations need to come up with an electronic system to comply with and implement electronic records management as a matter of necessity. It is a good clarion call which would not only enable improvement in health care option but would in the long run result in efficiency, in terms of money, time and energy to ensure speedy and more interactive service delivery. For instance, the web-based personal medical records (PMRs) enable health professionals, 'via interaction and contra-indication checks' to engage with patients in a lifelong health information coordination and access to both patients and health service providers (Clarke & Meiris, 2006).

In Ghana, many health facilities have begun to adopt electronic patient records management to improve service delivery. This study seeks to assess the rationale for its adoption and impact of electronic patients' records management on the performance of the Holy Pentecost Hospital. The study sought to achieve the following:

i. Identify factors that led to the introduction of electronic patient record management system at the Holy Pentecost Hospital in Accra; and
ii. Assess the effects of electronic patient record management on healthcare delivery at the Holy Pentecost Hospital in Accra.

LITERATURE REVIEW

Overview of Electronic Health Records (EHR)

The Electronic Health Record (EHR) according to Bates et al., (2003), is a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, medications, vital signs, past medical history, socio-economic history, immunisations, laboratory data and radiology reports. Ammenwerth et al., (2001), also noted that the EHR is a system that automates and streamlines the clinician's workflow.

Comment [H1]: Author should provide recent situation in the stated Hospital. The situation may have change in the last 13 years

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The EHR has the ability to generate a complete record of a clinical patient encounter as well as supporting other care-related activities directly or indirectly via interface, including evidence-based decision support, quality management, and outcomes reporting. In the view of Herbst et al. (1999), an EHR is also a digital version of a patient's paper chart. EHRs are real-time, patient-centred records that make information available instantly and securely to authorised users.

While an EHR contains the medical and treatment histories of patients, an EHR system is built to go beyond standard clinical data collected in a provider's office and can be inclusive of a broader view of patient care. Rotman et al., (2005), also posit that EHRs can contain a patient's medical history, diagnoses, medications, treatment plans, immunisation dates, allergies, radiology images and laboratory and test results. They postulate that they allow access to evidence-based tools that providers can use to make decisions about a patient's care and automate and streamline providers' workflow.

One of the key features of an EHR is that health information can be created and managed by authorised providers in a digital format capable of being shared with other providers across more than one health care organisation (Littlejohns et al., 2003). EHRs are built to share information with other health care providers and organisations such as laboratories, medical specialists, medical imaging facilities, pharmacies, emergency facilities, schools as well as clinics so they contain information from all clinicians involved in patient's care (Rotich, 2003).

Primary Objective of Electronic Health Records

The electronic health record (EHR) is increasingly being deployed within health care organisations to improve upon the safety and quality of care (Ammenwerth et. al., 2001). However, to achieve these goals, the EHR must be used by clinicians. This however, remains a major challenge. Various factors appear to be associated with EHR use. Maximisation of the technical characteristics supporting the system such as speed and value-added functionalities such as order entry systems or automated reports (Beuscart-Zephir et al., 2004), have been documented with higher rates of EHR use.

User-related characteristics (Herbst et. al., 1999) as well as training (Bredfeldt et al., 2013) are also believed to be important. The integration of the EHR into clinical workflow must be taken into consideration in the early phases of planning in order to optimise the integration of the system into routine clinical use. Indeed, the need for a respectable fit between the EHR and repetitive medical preparation is acknowledged as essential (Bowens, 2010), and time efficiency is one of several factors that are used to assess the quality of this integration.

Clinicians spend the majority of their time providing direct care to patients (Bradshaw, 2011), and hope that an EHR could increase this patient-interaction time and consequently the quality of care delivered (Chaudhry, 2006). On the other hand, provision of care requires the documentation of clinical information as an intrinsic aspect of routine clinical activity and is essential from both professional and legal standpoints. Thus, clinicians will consider a system to be efficient if the system reduces their documentation time (Aggelidis, 2008), even if the time savings do not translate into better patient care and related outcomes.

For this reason, in evaluating the impact of EHR on clinician activities, some studies use documentation time as a primary outcome and direct patient care time as a secondary outcome (Leung, 2003). The importance of evaluating time efficiency in documentation is also related to the observation that increased time for documentation is one of the most commonly stated barriers to successful implementation of an EHR (Chen, 2012).

The EHR implementation requires considerable investment with most projects averaging several millions of United States dollars. In the view of Tierney (2010), for the EHR to be successful, it is essential that managers are able to identify and manage elements of EHR implementation that are critical to enhance time efficiency of documentation by physicians and nurses. Clinical information systems and user populations vary in their characteristics, and for this reason, individual studies are unable to identify common trends that would predict EHR implementation success (Clarke, 2017). Therefore, medical institutions must have the concern for implementing EHR as it provides efficiency and effectiveness.

Benefits of Electronic Health Records

Potential benefits of an EHR according to Menachemi (2011) can be categorized as: potential productivity and financial improvement; quality of care improvement; job satisfaction improvement and customer satisfaction improvement.

(i) Potential Productivity and Financial Improvement

- Fewer chart pulls.
- Improved upon efficiency of handling telephone messages and medication refills.
- Improved upon billing.
- Reduced transcription costs.
- Increased formal compliance and clearer prescriptions leading to less pharmacy call backs.
- Improved upon coding of visits.

Gross (2014) adds that additional potential benefits may include: population management and proactive patient reminders; improved upon reimbursement from payers due to EHR usage and participation in pay-for-performance programmes.

(ii) Quality of Care Improvement

- Easier preventive care leading to increased preventive care services.
- Point-of-care decision support.
- Rapid and remote access to patient information.
- Easier chronic disease management.
- Integration of evidence-based clinical guidelines.

(iii) Job Satisfaction Improvement

- Fewer repetitive, tedious tasks.
- Less "chart chasing".
- Improved intra-office communication.
- Access to patient information while on-call or at the hospital.
- Easier compliance with regulations.
- Demonstrable high-quality care.

(iv) Customer Satisfaction Improvement

- Quick access to their records.
- Reduced turn-around time for telephone messages and medication refills.
- A more efficient office leads to improved care access for patients.
- Improved upon continuity of care (fewer visits without the chart).
- Improved upon delivery of patient education materials.

~~MATERIAL AND~~ METHODOLOGY

The study employed a qualitative method with a case study design. According to Bhandari (2020), qualitative research entails gathering and analysing non-numerical data, for example, text, video or audio.

The study used both primary and secondary sources of data. In this research, primary data were collected through a well-structured flexible interview guide and focus group discussions of five respondents in each group of seven to collect data on the following specific objectives:

i. ~~i.~~ Identify factors that led to the introduction of electronic patient record management system at the Holy Pentecost Hospital in Accra; and

ii. ii. Assess the effects of electronic patient record management on healthcare delivery at the Holy Pentecost Hospital in Accra

In this ~~qualitative~~ study, the researcher employed tools such as stenography, grammarly, quetext, field note book and audio recorder. The stenography assisted the researcher to record the responses of respondents in the short hands to aid ~~enable~~ the interview process ~~move faster than expected without necessarily writing long sentences~~. The grammarly helped in identifying spelling mistakes and equally correcting grammatical errors during the report writing. The quetext helped to determine plagiarised contents and worked towards their rectification. Additionally, all ethical considerations were strictly ~~highly~~ followed.

In using the ~~in depth flexible~~ interview guide, questions asked were based on the two specific objectives. Permission was sought from respondents to record the interview the interview session. ~~between the researchers and the respondents and w~~Where respondents declined to be recorded, field notes were taken. To solidify the

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interview results~~researchers' responses from the respondents~~, a focus group discussion ~~method~~ was added to the interview guide ~~for the purpose of~~ in order to attain data~~-~~triangulation.

The study also ~~made~~ uses ~~of the~~ internet, ~~journals, articles~~journal articles, reports and other ~~already~~ published documents which ~~constituting~~ constitutes the secondary sources of data. The ~~study population was~~ population of the study consist of the entire Pentecost Hospital in the La Nkwantanang-Madina Municipality in the Greater Accra Region of Ghana with a sample size of thirty-five (35). The study employed both convenience and purposive sampling techniques. In terms of data analysis, the study employed descriptive analysis method.

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RESULTS AND FINDINGS

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Factors leading to the introduction of electronic patient record management system at the Pentecost Hospital in Accra

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Frequent Loss of Data

The preliminary study revealed that there were a number of factors that led to the introduction of the electronic health records in the Pentecost Hospital in Madina in the La Nkwantanang Municipality. The interviews conducted revealed that several factors informed management of the Pentecost Hospital to shift from the paper – record keeping system to a paperless electronic health management record system.

Comment [H7]: The author should mention the interview guide to which each factor is addressed

A respondent of the hospital mentioned that one of the key factors that informed management's decision to adopt the electronic health management record system was the frequent loss of clients' data. He explained that in many a time, the hospital usually lost the medical records of its cherished clients due to the regular movements of files and other records from one department to another and this habit often occasioned the loss of such documents. The administrator lamented that:

> *The hospital has decided to go electronically because of the constant "loss of medical records of our cherished clients and some of them are beginning to lose confidence in our data management system. For this reason, the management thought it economically wise to move from the paperwork to computerised system of keeping the data of our clients".*

Inadequate knowledge in the management of the system

An employee in the records department of the hospital added that the management of the hospital had issues with their data management system. She explained that the management of the health records of the hospital had become very difficult to handle even with the help of trained records keepers in the records department. She buttressed her fact by saying that formerly, the records keepers of the hospital had to spend long minutes or sometimes hours in search of clients' health records, often delaying the health care delivery chain. She bitterly mentioned that clients had to be waiting for several minutes or hours causing a hold up at the hospital. She was quick to add that in the event of any disasters, clients' data will be lost. She lamented that:

> *"It was because of long waiting time of patients and the loss of patients' information which triggered the adoption of the electronic health record management system".*

She added that:

> *"The electronic health record management system has been identified as the best form of data storage by experts".*

However, she was quick to mention that the hospital needed to train the personnel of the ICT and the Records Departments to be able to management the electronic health record management system very well.

Improving upon Work Efficiency

Furthermore, two of the nurses in the hospital concurred on the fact that the hospital introduced the electronic health record management system as a way of improving upon its work efficiency. They explained that after the introduction of the NHIS, there was an increase in the number of patients who visited the out-patient department (OPD) of the hospital. The hospital knowing how the paper-record keeping system would slow its operation opted for a more efficient and accurate system of data management. This was done in order to achieve the aim of providing affordable and quality health care to all persons, especially the poor and vulnerable in the community. A respondent said:

> *"The introduction of the electronic health record management system by the Pentecost Hospital was necessitated by the increase in the number of clients who visited the facility with the introduction of the NHIS".*

Easy Access to Health Records of Patients

A patient of the hospital could not hide his excitement. The patient explained that the introduction of the electronic health record had relieved them the stress they had usually battled with in getting their folders before they could start the treatment process. He intimated that:

> *"The implementation of the electronic health record management system of the hospital willmake record keeping easier, make work faster and enhance data collection".*

On the contrary, he advised the hospital managers to constantly supervise, review and audit the system to check breakdowns and failures.

The author should provide more contexts between the data collected and the interview responses. This will add flesh to the analysis and consequently convince the readers on the research findings.

Effects of electronic patient record management on healthcare delivery

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Simplification of activities of the various departments

The preliminary study revealed that the introduction of the electronic health record management system had had positive effects on the operations of the hospital both in terms of productivity and profitability. The maiden study identified that the hospital has benefited tremendously from the introduction of the EHRS since both patients and management had lauded the benefits accrued to the EHRS since its inception.

A key informant of the hospital explained that the introduction of the EHRS had simplified activities of the various departments, especially, the records department. He added that the EHRS had incredibly increased revenue and reduced patient waiting time. He intimated that:

> *"The hospital has made sufficient gains in the areas of operations and revenue generation".*

The key informant was swift to mention that in spite of the tremendous benefits the hospital had gained, the installation of the system was very expensive. He added that it could take only management that was strongly committed to providing quality healthcare services to invest so much in the provision of efficient and effective EHRS.

Improvement in Clients' Satisfaction

Another key informant of the facility explained that one of the reasons for introducing the EHR system was to improve upon clients' satisfaction. He added that the long queues usually seen at the hospital was inexcusable. He bolstered his point by saying that it previously took clients long hours to retrieve clients' records. Conversely, the introduction of the EHR system has improved upon clients' satisfaction. Health information could now be easily retrieved at the request of the client or a medical staff. During the treatment of certain conditions for instance, the non-communicable diseases (NCDs) and weight management, the previous medical records were key in determining whether there had been an improvement or not. He intimated that:

> *"The EHR is able to curtail long waiting time of patients (usually patients could wait the whole day) but this time the situation has changed due to the EHR".*

However, the respondent was quick to mention that even though it had reduced the waiting time, patients who were not computer-inclined usually found it difficult to come to terms with the system.

Reduction in waiting time and speed delivery of healthcare
A patient in the OPD and another in the maternity ward explained that the introduction of the EHR has equally made the work of the personnel of the hospital faster and waiting time has been reduced for us.

A nurse at the OPD explained that the paper-record system was difficult to manage. She opined that unlike the paper-record system, the EHR made the updating of patients' records less tedious. She compared the two methods of keeping patients records and concluded that with the paper-record system, when patients' folders were not found, the facility needed to issue new folders to patients, making it very difficult for the physician to track changes.
At the pharmacy, a representative said the EHRS was said it was a system that simplified the operations of the physicians at the hospital. The respondent said for example that:

> *"It has made retrieval of documents easy by just a click of a button;*
> *It has made the retrieval of documents easy by just a click of a button".*

The pharmacist explained that records keepers did not have to search through dusty folders to search for patient's folder. He re-echoed that:

> *"A click of a button gives you all you need to generate years of information for you to access".*

Storage of information was faster and lasting

The study further revealed that the EHR was fast and stored information longer than the paper-record system since some of the documents could be damaged due to rain and other forms of disasters. A respondent was captured saying:

> *"It is easier, fast and stores information for a long time compared to manual and updates patients' records and easy to retrieve information".*

Improvement in revenue generation

The preliminary study further revealed that efficient and effective use of the EHR improved upon revenue generation of the facility. The study observed that the use of the EHR system had reduced the expenditure on procuring stationery even though no financial data were made available. It was also easy to retrieve fled bills. The system kept the information of patients who had outstanding bills to pay to the health facility. They did not only track individuals who had absconded but were able to locate their area of residence since their bio data were captured. It instructed the payment of the previous bills before they were given any other form of healthcare.

Improvement in quality healthcare delivery
The study identified that the hospital recently installed the EHR to provide quality healthcare services to the people in the catchment areas and even beyond. A respondent at the Finance department remarked that:

> *"The EHR of the Pentecost Hospital has provided efficient and accurate information to the facility and has increased revenue as compared to the manual system".*

A patient in the maternity ward stated that:

> *"The EHR makes work easier, helps keep patient records very intact including their locations to prevent absconding; some of the patients will run away after receiving treatment so this system will help the facility to track the bad ones among us".*

CONCLUSION

This study was carried out at the Pentecost Hospital in Madina, a suburb of Accra with the aim of assessing their Electronic Health Record System. The study revealed that frequent loss of data, inadequate knowledge in the management of the system, desire to improve upon work efficiency, longing to have easy access to health records of patients, intermittent waste of client or beneficiary time were among the main factors that led to the introduction of the Electronic Health Record System. The study also identified simplification of activities of the various departments of the hospital, improvement in clients' satisfaction, reduction in waiting time and speed delivery of healthcare, storage of information being faster and lasting, improvement in revenue generation of the

hospital and improvement in quality healthcare delivering as some of the effects of electronic patient's record management on healthcare delivery after its introduction, giving hope to the health facility.

Author should state in the conclusion his general views and perception regarding the research findings and not only state the outcome of the study.

What is the research implication? And please provide arears of further research.

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