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Benefits and challenges of adopting Electronic Medical Records in Nigerian Federal Capital Territory Hospitals-lessons learned

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Abstract

Electronic Medical Records (EMR) is a digital version of paper-based medical records designed to enhance patient outcomes. EMR in the healthcare system is fundamental to the continuity of patient care and the improvement of quality services. However, the lack of adequate and sustainable funding for health system utilization remains a significant challenge to the successful adoption of EMR. This study aims to identify the benefits and challenges associated with the adoption of Electronic Medical Records in the Federal Capital Territory (FCT) Hospitals in Abuja, Nigeria. A qualitative research method was employed to examine the benefits and challenges of adopting EMR in FCT hospitals. Questionnaires were administered to 310 participants, and collected data were analyzed using a thematic approach. The implementation of Electronic Medical Records (EMR) in FCT hospitals led to better healthcare services such as prompt tracking of patients' records, and reduced costs associated with repetitive medical tests arising from the loss of patient files. Despite these benefits, a lack of sustainable funding and inadequate infrastructure technology were identified as major obstacles to the successful adoption of EMR in FCT hospitals. To ensure the continued use of EMR in FCT hospitals, it is essential to maintain efficient governance and regulation alongside upgrading the hospitals' Information Communication Technology (ICT) infrastructures.

Keywords: Electronic Medical Records; Patients; Hospitals; Nigeria

1. Introduction

Electronic Medical Records (EMRs) have been recognized as a key factor in improving healthcare quality and safety, reducing adverse events for patients, advancing clinical research, and achieving optimal clinical performance (Benedictis et al., 2020). As a result, healthcare institutions are now embracing EMRs to improve their operations. Despite the growing interest in implementing EMRs in the healthcare sector, there remains a significant gap between adequate planning to achieve the intended outcomes (Bisrat et al., 2021). Electronic Medical Records systems are designed to improve quality care and better patient outcomes. These systems collect, store, and display patients' records more effectively than traditional paper-based Medical Records (Janssen et al., 2021). The use of EMR supports detailed patient documentation, improves access to patients' information for continuity of care, and ensures accurate data collection and processing to support clinical decision-making (Lin et al., 2020).

EMR offers a wide range of features that present health and clinical services in a more advanced format (Janssen et al., 2021). Data stored in Electronic Medical Records can provide a comprehensive patient history that extends beyond the data collected in the provider's practice area (Shah et al., 2014). EMR improves patient care and health care service and guarantees the confidentiality and security of patients' information (Bisrat et al., 2021). With the use of EMR, healthcare givers now have quick access to patients' information and to fast-track the receipt of laboratory and diagnostic results leading to a reduction in patient waiting time (Bisrat et al., 2021).

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Despite the numerous benefits of EMR, studies have investigated factors that impact the reliable adoption of Electronic Medical Record systems. It was found that internal factors such as Information Technology (IT) infrastructures, hospital location, organizational culture, and environmental factors are linked to EMR adoption (Lee et al., 2018). However, few studies have explored the connection between the level of EMR system adoption and healthcare IT infrastructure, with a focus on organizational features (Lee et al., 2018). The effective functioning of EMR relies heavily on a diverse array of hardware and software components that must work together seamlessly (Razi et al, 2011). In addition, a team of experts, whether internal or outsourced, should be readily available around the clock for a period of several months to a year to monitor the system's operation (Razi et al, 2011).

With the continual advancement of EMRs, there is immense potential for these tools to enhance clinical practices and bring numerous benefits to the healthcare sector (Benedictis et al., 2020). These benefits can only be sustained if EMRs are properly implemented. For EMR to improve the quality of care and patient outcomes, there is a need to address the barriers that affect the implementation of EMR in healthcare institutions. This study will assess the benefits and challenges associated with implementing Electronic Medical Records in FCT Hospitals and suggest viable solutions to the issues identified.

1.1. Implementation of EMR in Federal Capital Territory Hospitals Abuja

The Federal Capital Territory (FCT) is a multicultural community of indigenous groups, politicians, public officers, and businessmen. FCT has a rapid population growth rate of 9.3%, a rate significantly high and above the national average of 3.2% (FCT, 2018). The FCT population growth is attributed to the enormous influx of people from all regions of the country, placing a huge strain on available services, particularly healthcare services (FCT, 2018). The community faces several challenges, but healthcare is the most crucial as it directly impacts their overall well-being (FCT, 2018). Malaria, malnutrition, and measles are significant contributors to child mortality, accounting for 76.2% of morbidity cases. Hypertension contributes to 70.8% of all non-communicable diseases which is certainly a cause for concern (FCT, 2018). The FCT Human Immunodeficiency Virus (HIV) prevalence rate is significantly higher at 8.6% than the national average of 4.1% (FCT, 2018). In FCT, Maternal Mortality Rate (MMR) and under-5 mortality are high. The maternal mortality rate accounts for 142 maternal deaths per 100,000 live births. The Infant Mortality Rate (under 2 years) is 11 per 1,000 live births, while the Child Mortality Rate (under 5 years) is 27 per 1,000 live births (FCT, 2018).

The FCT Health sector comprises fourteen secondary hospitals. These hospitals are managed through the Health and Human Services Secretariat (HHSS), a key secretariat of the Federal Capital Territory Administration (FCT, 2018). These hospitals are grouped into three categories: City hospitals, Suburban hospitals, and Satellite hospitals. City and Suburban hospitals provide healthcare services to residents in urban areas, while satellite hospitals cater to those living in rural areas (FCT, 2018). Most hospitals in FCT share similar healthcare challenges such as patients missing files, Long waiting times, poor clinical documentation, and misrepresentation of hospitals' generated revenue (FCT, 2018). The implementation of Electronic Medical Records in hospitals was driven by the belief that digitizing the healthcare system would address the healthcare issues in the FCT. Consequently, the Health and Human Services Secretariat implemented a four-year (2016-2020) FCT e-health policy implementation strategy (FCT, 2018). The goal of the e-health policy was to promote Universal Health Coverage (UHC) and to meet the population's health needs through digital health. The policy provides opportunities for medical personnel to enhance their technical skills and to deliver effective healthcare services to the communities, with all e-health initiatives adhering to international practices and guidelines (FCT, 2018). Following the FCT e-health policy, EMR was implemented in six out of fourteen secondary hospitals to enhance healthcare standards, monitor public health, facilitate clinical research, and overall promote healthcare systems to better patient health outcomes (FCT, 2018).

1.2. Study location

This research was carried out in six FCT hospitals that transitioned from paper-based records to Electronic Medical Records. These hospitals include Maitama District Hospital, Bwari General Hospital, Gwarinpa General Hospital, Kubwa General Hospital, Asokoro District Hospital, and Wuse District Hospital (FCT, 2018). Of the six hospitals that transitioned to EMR, three are situated in the city area, with the remaining three located in the suburban area of Abuja. These hospitals provide 24-hour in-patient and outpatient services. The in-patient services provide healthcare services to all admissions and transfer patients while the outpatient services provide care to specialty units such as internal medicine, obstetrics and gynecology, pediatrics, and ear nose, and throat (ENT). The EMR system was implemented across all service points, including patient registration, clinical consultation, laboratory and imaging services, drug prescriptions, clinical coding and indexing, and payment services.

2. Materials and Method

A qualitative method was utilized in this study, which involved creating and administering a questionnaire to healthcare professionals from the six FCT hospitals that transitioned to EMR. To ensure a fair representation of doctors and nurses from various specialties and wards, a cluster sampling technique was employed in this research. The study participants include doctors, nurses, Health Information Managers, laboratory scientists, physiotherapists, radiologists, pharmacists, and accountants. A total of 310 staff members participated in the study by completing a semi-structured questionnaire. The questionnaire was structured into two sections: the first section collected data on the participants' socio-demographic characteristics, and the second section assessed the benefits and challenges of adopting Electronic Medical Records in these hospitals. Collected data were analyzed using a thematic approach.

2.1. Statement of Informed Consent

Study participants were given a self-administered questionnaire to provide data. The questionnaire had a brief overview of the study on its front page. Informed consent was obtained from all individuals who participated in the study.

3. Results

The study investigated the benefits and challenges of implementing EMR in hospitals in FCT. The largest group of participants were Health Information Managers (19.3%), followed by doctors (17.7%) and radiologists (3.2%). Most participants (29%) had 0-5 years of work experience, while (22%) had 16 or more years. All participants were computer literate, but (67%) of them encountered challenges while using EMR. Despite this, all participants supported the use of EMR in their hospitals.

Table 1 Summary of themes, sub-themes, and responses generated from qualitative data

| Themes | Sub-themes | Participants Response |
|--------------------------|-----------------------|---|
| Benefits of EMR adoption | Patients' outcome | Improved the quality of healthcare delivery. Fast-tracking of patient files thereby reduced patient waiting time. Reduce costs of repeated medical investigations arising from patients' missing medical files. Eliminate illegible writing. Improved hospital-generated revenues. secure access and confidentiality of patient information. Better clinical decision-making, and effective collaboration between healthcare providers. |
| Barriers/ challenges | ICT Infrastructure | Software inefficiencies. Network instability. Lack of equipment/standard hardware |
| | IT support | Unstable power supply. Poor response to EMR challenges. Shortage of IT personnel. |
| | Human factor | Resistance to change among some healthcare workers. Poor documentation Non-use of some EMR platforms due to software inefficiencies. Workload on healthcare workers. |
| | Organizational factor | Lack of sustainable funding Poor project management |

Participants in the study reported that the implementation of EMR in FCT hospitals has multiple benefits. These benefits include reduced stress levels, error-free patient records, shorter waiting times, fewer repeated medical investigations,

increased legibility of medical records, higher hospital revenue, ensured access and confidentiality of patient information, informed clinical decision-making, and effective collaboration among healthcare providers. However, they also identified several challenges to successful EMR adoption, including poor documentation, software user-friendliness issues, a shortage of IT personnel, software inefficiencies, network instability, hardware problems, power supply issues, poor project management, and inadequate response to EMR challenges.

4. Discussions

This study revealed the Implementation of EMR in FCT hospitals has improved the quality of healthcare delivery, reduced patient waiting time, reduced costs of repeated medical investigations arising from patients missing medical files, eliminated illegible writing, improved hospital-generated revenues, secured access and confidentiality of patient information, better clinical decision making, and effective collaboration between healthcare providers. The availability of patient information in electronic format is strategic to improving quality care and patient experience. Healthcare providers in FCT hospitals can now access patients' vital signs, drug interaction assessments, Framingham, and BMI calculators through electronic medical records, enabling better clinical decisions. Electronic Medical Records provide healthcare gives the opportunity to set a treatment goal or a reminder when some specific treatments are approaching a due date or are outdated (Manca Donna, 2015). EMRs have the potential to review and evaluate treatments provided to patients in a healthcare organization. By doing this, poor quality services are identified and corrected promptly to promote quality care. For instance, EMRs improve adherence to clinical rules and regulations especially when templates are used to manage chronic conditions (Lau et al, 2012). Ultimately, EMR has a huge potential and useful resource for improving quality healthcare. Transforming the healthcare system from a paper-based system to Electronic Medical Records is possible through the utilization of electronic processes to deliver quality care (Menachemi et al, 2011).

Accessing and sharing patients' health information has led to improved collaboration among healthcare providers in FCT hospitals. Patient records play a crucial role in the continuity of care, especially when available to inform clinical decisions (Najaftorkaman et al, 2013). With the help of Electronic Medical Records, doctors from various specialties can access a patient's information to share ideas on complications and co-morbidities leading to a better understanding of a patient's illness (Manca Donna, 2015). To effectively meet patients' diverse needs it is crucial to have reliable sources of information and a team of skilled experts and specialists (Manca Donna, 2015).

The implementation of Electronic Medical Records in FCT hospitals has resolved issues with illegible handwriting. Illegible clinical notes could cause problems for healthcare professionals and occasionally lead to delays in clinical decision-making (Sokol et al, 2006). From the patient's viewpoint, illegible writing could delay treatment, result in wrong prescription, and dose administration leading to complications and death (Sokol et al, 2006). For instance, in 1999, an illegible prescription from an American Cardiologist led to the death of a 42-year-old patient as the pharmacist misread 20mg isordil as 20mg plendil (Sokol et al, 2006). This indicates that Illegible writing has great implications for patients' treatment and could result in medico-legal actions. Without a doubt, the adoption of Electronic Medical Records in FCT hospitals has improved the quality of care and promoted patient experience.

Improved hospital-generated revenue is one of the benefits of the adoption of EMR in FCT hospitals. Before the adoption of EMR, revenues were generated through a manual method as patients were issued a paper receipt for all hospital payments (FCT, 2018). Hospital revenue teams may experience delays due to the use of paper and manual processes as recording cash received at the hospital can be a time-consuming task and is prone to human errors (Ranjan et al., 2018). With the adoption of EMR in FCT, revenues are auto-generated making it possible to track daily, weekly, and monthly payments using the generation of electronic receipts of individual cash entries (FCT, 2018). Payment summaries are now generated automatically and through a dashboard available to hospital accountants (FCT, 2018). In addition, clinicians along with other healthcare providers in various service points in the FCT hospitals can now access patient-generated electronic receipts before services are provided to patients.

One of the benefits of implementing EMR in FCT hospitals is the improved security and confidentiality of patients' information. EMR systems utilize security measures like access control and encryption to safeguard patients' data from unauthorized access (Najaftorkaman et al, 2013). This ensures that only authorized staff members can access the patients' information. With access to comprehensive histories and clinical data, clinicians can handle large numbers of patients more efficiently (Manca Donna, 2015). This saves physicians time that would otherwise be spent searching for results and reports. EMRs offer a multitude of advantages such as remote access to patient charts, improved availability of laboratory results, alerts for medication errors, and reminders for preventive (Manca Donna, 2015). To protect the sensitive patient information obtained within health care systems, medical records must be stored in secure and reliable databases that adhere to strict information security principles. This ensures the confidentiality, integrity, and availability of patient information are secured (Najaftorkaman et al, 2013).

By adopting EMR in FCT health facilities, there have been considerable outcomes in healthcare services and a decrease in the cost of repeat medical investigations arising from patient missing files. Access to laboratory data reduces the need for repeat investigations arising from missing patient files and lowers costs for patients. Before the adoption of EMR in FCT, accessing healthcare services may pose a challenge for patients whose files are missing. Patient missing files occur due to misfiling or misplacement of patient folders by some caregivers (Manca Donna, 2015). As a result, patients bear the financial burden of repeated medical investigations and are subjected to treatment using a duplicate file which can put patients at risk as these records may contain incomplete or inaccurate medical history (McClellan Molly, 2009). Patients missing files have a lot of implications for a patient and for the treating clinicians such as repeating all laboratory investigations, long waiting times in an outpatient clinic, and prolonged admission waiting lists. Clinicians are faced with the challenge of starting patients' treatment all over again when a patient file is missing (Najaftorkaman et al, 2013). The adoption of Electronic Medical Records in FCT Hospitals has reduced patient waiting time, with accurate and timely patient information provided to clinicians for continuity of care.

With the introduction of EMR in FCT hospitals, patient waiting times have significantly decreased. This improvement is due to the elimination of missing files and the shortage of manpower needed to retrieve patient records. Timely access to patient records has reduced the time patients spend in the waiting hall or with a doctor, as doctors spend less time searching for lab reports and other relevant information and this has positively impacted patient revisit rate (Salem Albagmi, 2021). On the contrary, previous studies indicate that doctors are worried about the time required for data entry, they have expressed that the time spent on data entry could be better utilized to offer direct patient care (Jabour Abdulrahman, 2020). When assessing the effects of EMR on patients, it is crucial to examine EMR's influence on patients' experiences (Jabour Abdulrahman, 2020). With EMR, the duration of time patients spend in the waiting area correlates significantly with their level of satisfaction and likelihood of revisiting a hospital (Jabour Abdulrahman, 2020).

Without a doubt, the implementation of EMR in the FCT hospital has significantly improved the quality of care, reduced healthcare costs, increased the security and confidentiality of patient information, and enhanced prompt access to patient information leading to a reduction in patient waiting times. Although the implementation of EMR has brought significant benefits to health service delivery in FCT healthcare facilities, this study identified several challenges. These challenges include underutilization of EMR systems due to software deficiencies, reluctance to change, shortage of ICT staff in hospitals, and inadequate technology infrastructure, which hinder effective utilization of EMR in FCT hospitals.

The implementation of EMR systems in healthcare facilities requires adequate hardware such as computers, phone lines, and internet connections (Boonstra et al, 2010). However, some Healthcare lack the necessary hardware to support EMR adoption, hindering the effective utilization of EMR (Boonstra et al, 2010). The lack of information technology infrastructure was identified as a challenge to the effective adoption of EMR in FCT hospitals. EMR hardware and software require interconnectivity with other devices to function appropriately. A lack of an effective system remains a major challenge among hospitals who already implemented EMRs (Boonstra et al, 2010). Although the start-up costs associated with implementing EMRs are often higher and require more resources. Moreover, incompatibility with existing practice systems is a major concern, as physicians are reluctant to replace functional systems with integrated EMR systems (Boonstra et al, 2010). The lack of adequate technological infrastructure is a major issue that impacts the decision of healthcare providers to adopt EMR (Qureshi et al, 2013).

A significant barrier to implementing EMR in FCT hospitals was the reluctance to change. This study found that certain staff members were uncooperative with utilizing EMR due to software inefficiencies and network instability, which hindered the effective delivery of services. According to a previous study, Physicians often face issues with poor service and support from vendors, such as inadequate training and follow-up on technical issues (Boonstra et al, 2010). This lack of technical expertise with the inherent complexity of the systems makes it challenging for physicians to use EMRs without proper training and support (Boonstra et al, 2010). To promote the use of EMRs and to ensure that hospitals make the best use of EMRs, vendors are required to provide adequate support for effective system utilization.

One of the reasons that hindered the implementation of EMR was the shortage of Information and Communication Technology (ICT) personnel in most FCT hospitals. Hospitals under the FCT offer round-the-clock healthcare services and rely on the expertise of ICT staff to provide all technical support, particularly network problems (FCT, 2018). The majority of EMR networks rely heavily on wireless connections that are susceptible to interference from other networks (Bisrat et al., 2021). Unfortunately, due to a shortage of ICT staff to provide round-the-clock service, network issues often arise causing instability and network failures (FCT, 2018). These issues are particularly challenging during the night shift when the emergency unit receives most of its cases. As a result, medical personnel may face challenges accessing patient information when it is needed most, and this can be very problematic when dealing with complex cases.

5. Conclusion

The implementation of EMR systems in FCT Hospitals has greatly enhanced the healthcare delivery system, resulting in higher patient satisfaction and more efficient health outcomes. However, successful implementation requires appropriate coordination among relevant stakeholders, refresher training for all staff to ensure knowledge of the benefits of EMR, and sustainable funding for effective system utilization. Effective implementation of an EMR system demands uncompromising collaboration between clinical and technical professionals to ensure that all the nuances of patient care are captured with utmost precision.

Sufficient logistical resources and updated hospital ICT infrastructure are crucial to establish a reliable and functional EMR system in FCT hospitals. Clinician engagement in the design and roll-out of the EMR and upskilling of all end-users can encourage successful implementation. Providing continuous support is important to ensure that health professionals remain invested in using EMRs.

Compliance with ethical standards

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Disclosure of conflict of interest

The author declared no conflicting interest in this research.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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