International Journal of Healthcare Information Systems and Informatics
Volume 19 • Issue 1

Management of Electronic Health Records in Virtual Health Environments:
The Case of Rocket Health in Uganda

Tlou Maggie Masenya, Durban University of Technology, South Africa*
Francis Ssekitto, Makerere University, Uganda
https://orcid.org/0000-0001-8027-3794
Sarah Kaddu, Makerere University, Uganda
Sam Simati, Busitema University, Uganda

ABSTRACT

This article examined the management of electronic health records in virtual health environments using rocket health as a case study. The specific objectives of the study were to determine the healthcare services provided at rocket health; examine the electronic health records management practices adhered to at rocket health; and determine the inhibitors to effective electronic health records management at rocket health. A case study with a mixed-methods research approach was used. Data was collected using questionnaires, document reviews and structured interviews. The study finds that rocket health provided a range of healthcare services encompassing telehealth, pharmacy, last mile delivery, and an online store. These services predominantly operated in a digital format, resulting in the generation of electronic health records (EHRs), and therefore to capture and maintain these EHRs from multiple service points, rocket health implemented a cloud-based system.

KEYWORDS

Digital Health Service Providers, Digital Healthcare Services, Electronic Health Records, Health Records Management, Virtual Health Environment

INTRODUCTION

Globally, there has been an increase in the adoption of Information Communication Technologies (ICTs) for health care service provision. According to Adedeji et al. (2021), digital health has transformed the delivery of healthcare services globally. Digital health service providers, as highlighted by Akwaowo et al. (2022) and Namatovu and Semwanga (2021), play a crucial role in streamlining the process of healthcare service delivery. Building upon this, Kamulegeya et al. (2020) conducted an insightful study, noting that these providers offer a spectrum of healthcare services, including call centers, e-consultations, e-psychiatry, and e-health information dissemination. Their findings underscore the remote delivery of these healthcare services, facilitated by various ICTs,

DOI: 10.4018/IJHISI.342089 *Corresponding Author

thus emphasizing the pivotal role of digital health service provision. All these healthcare services are remotely delivered using different ICTs which facilitate digital health service provision. According to Kiberu et al. (2018), digital health by its nature requires ICT infrastructure for efficiency and to ensure sustainability. Therefore, when it comes to records management, digital health technologies facilitate the electronic capture, processing, storage, and exchange of health data, thus resulting in voluminous electronic health records (EHRs) (Namatovu & Semwanga, 2021; Ngusie et al., 2022).

Ngusie et al. (2022) define EHRs as: "repositories of patient data in digital form, stored and exchanged securely, and accessible by multiple authorized users" (p. 2). EHRs date back to the 1960s when Dr. Lawrence Weed developed problem-oriented medical records (Abdullah, 2022). However, the first EHRs were recognized in 1972, and became more common in the 1990s, the period when the Institute of Medicine replaced its paper-based medical records with electronic records (Abdullah, 2022). Currently, the adoption of EHRs has become pervasive, particularly within the realm of digital health service providers. These providers leverage EHR systems extensively to enhance the efficiency and quality of healthcare services. The seamless integration of EHRs has become a cornerstone in the operations of many health institutions, serving as a comprehensive digital repository for patient information.

Digital health service providers utilize EHRs to facilitate various aspects of healthcare delivery, including streamlined communication, prompt access to patient data, and the efficient coordination of care. This widespread integration of EHRs not only exemplifies the evolution of healthcare practices but also underscores their indispensable role in modern health institutions. The integration of EHRs stands as a testament to the ongoing digital transformation in the healthcare sector, fostering improved patient outcomes and overall healthcare management. Worth noting, EHRs are currently used in 96% of non-government hospitals in the United States and the United Kingdom, while in France and Australia, a digital health strategy has been adopted to digitize all patient records (Abdullah, 2022).

However, most developing nations are yet to digitize their patient records (Pai et al., 2021). In Uganda, while digital health service provision has mostly been part of donor-funded public health projects, there are private digital health service providers such as The Medical Concierge Group specializing in digital health service provision (Kamulegeya et al., 2020). These digital health service providers are also managing electronic health records. Adopting EHRs has the potential to improve service delivery for digital health service providers (Ngusie et al., 2022). This is because EHRs facilitate the management of accurate and complete information, reduce costs and medical errors, reduce the need for physical storage facilities and equipment, promote easy information access and retrieval, reduce waiting times, aid decision-making, and enhance records security, thus improving health care service delivery (Ngusie et al., 2022; Attafuah et al., 2022). However, despite the above benefits, the implementation of EHRs in most low-income countries has been a challenge due to poor infrastructure characterized by electrical power interruptions, digital divide, high internet costs, and resistance to technology (Ngusie et al., 2022).

Shaikh et al. (2022) also posit that the adoption of EHRs by many digital health service providers is constrained due to the costs involved and limited trained information technology (IT) health professionals. This has affected operational efficiency limiting digital health service provision. On the other hand, it has affected the quality of electronic health records. Attafuah et al. (2022) notes that poor or inaccurate EHRs jeopardize patient safety, as they may lead to improper diagnosis and treatment of patients. This cripples healthcare service delivery and leads to poor patient outcomes. Specifically, digital health service providers are affected greatly, as they heavily rely on EHRs to serve their patients and make informed decisions. Table 1 outlines some of the constraints in the adoption of EHRs.

This study thus examined the management of EHRs in virtual environments using Rocket Health as a case study. Rocket Health is a telehealth service provided by The Medical Concierge Group in Uganda. Some of the healthcare services it provides include a 24-hour medical call center, medication delivery, mobile laboratory, sample pick-up services, and an eShop (Kamulegeya et al., 2020). As a

Table 1. Constraints in the adoption of EHRs by digital health service providers

Challenges	Implications
Cost Constraints	• Limits adoption of EHRs due to financial constraints
	• Impacts operational efficiency of digital health providers
Limited IT Health Professionals	• Hinders widespread implementation of EHRs
	• Affects the quality of EHRs
Impact on Operational Efficiency	• Limits digital health service provision
	• Impacts decision-making processes
Quality of Electronic Health Records (EHRs)	• Poor or inaccurate EHRs jeopardize patient safety
	• May lead to improper diagnosis and treatment
	• Cripples' healthcare service delivery and results in poor outcomes

Source: Primary data (2023)

provider of digital healthcare services, the company creates and manages EHRs that contain patient information. Rocket Health is required to manage EHRs properly due to the sensitivity of patient information and the importance of EHRs in general. This study looked at how EHRs were managed at Rocket Health guided by the following research objectives which were to:

- Determine the healthcare services provided by digital health service providers at Rocket Health in Uganda
- Examine the implementation of the records management practices at Rocket Health in Uganda
- Determine the inhibitors to effective EHRs management at Rocket Health in Uganda

THEORETICAL FRAMEWORK

Record continuum model, social informatics framework, and Model Requirements for the Management of Electronic Records (MoReg) were used as underpinning theories to guide the study. These theories and principles serve as a guide for health information professionals in managing their electronic or digital health records effectively.

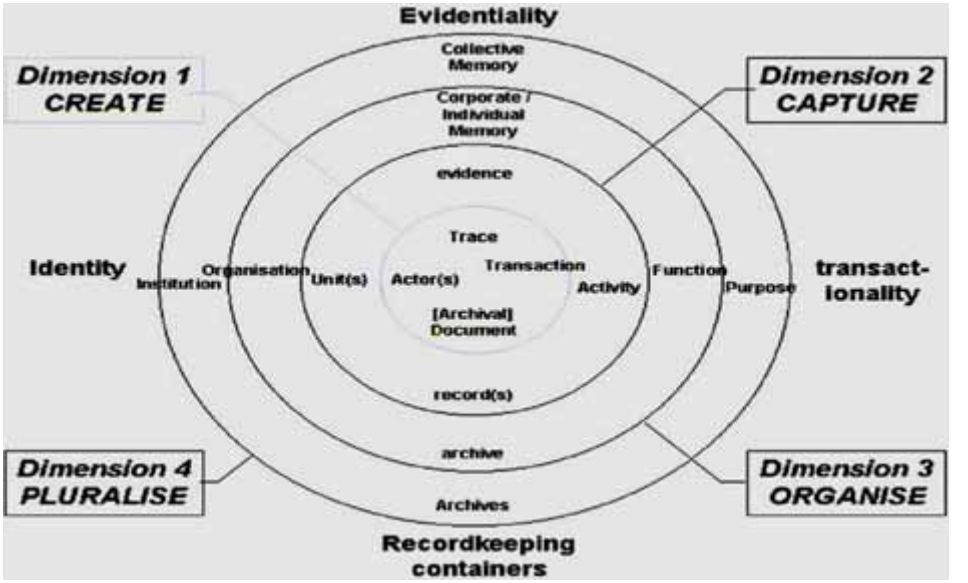
Records Continuum Model

According to Huvila et al. (2014), the records continuum model is built on four dimensions of recordkeeping, and these include: create, capture, organize, and pluralize, as depicted in Figure 1.

These four dimensions describe the movement of records from their original context to becoming part of a collective memory. For instance, when placed in an EHRs management system, a patient's records transform from just being connected to that patient to becoming part of all the patient records of a hospital. This record can also further become part of a bigger picture contributing to health research. The records continuum thus looks at records as evidence, transactions, record-keeping containers, and collective memory or identity. The contextual layers considered are: i) records creators moving away from individuals to organizations; ii) records transforming from individual records to archival records; iii) records changing from individual evidence to collective memory; and iv) records transforming from just being outcomes of acts to representing their purpose. These four dimensions thus explain what Huvila et al. (2014) described as the different contextual layers of the records continuum model.

According to Frings-Hessami (2021) and Matlala and Maphoto (2020), the model's four dimensions are the processes that can be applied to records. Create represents the process of creating records; capture represents the process of capturing records into various recordkeeping systems;

Figure 1. Records continuum model (Source: Upward 2000, p. 123)



organize represents the process of organizing records into archives; and pluralize represents the process of pluralizing records to meet stakeholder needs. All these dimensions happen concurrently. Therefore, with the records continuum model, records can undergo different processes at the same time and the recordkeeping process is continuous because records always evolve. This model is proposed for managing electronic records because different stakeholders can access and use records simultaneously, and this is the reason why the model was selected to guide this study.

Social Informatics Framework

The advent of the digital transformation era has brought forth a wide array of technical developments. However, understanding the integration of technology into human society extends beyond mere assessment of the technology in isolation. The social informatics framework (SIF) emerges as a prominent factor in this context. Kling (2007) described social informatics as an academic discipline that focuses on examining the intricate interplay between individuals, technology, and the social environments in which they are situated. The underlying principle of this operation is that technology does not exist in isolation. It is connected to and impacted by the socio-cultural and organizational context within which it functions. The reciprocal interaction between technology and society is a fundamental notion in the field of social informatics. The influence of technology on social practices, social norms, and organizational behaviors is reciprocal, since these practices and behaviors may also impact the design, development, and use of technology (Sawyer & Rosenbaum, 2000). Within the realm of virtual health environments such as Rocket Health, SIF may serve as a comprehensive framework for examining the ramifications of electronic or digital health records management and dissemination. However, the digital technologies may be either facilitated or hindered in their adoption by the fundamental policies and practices of an organization. Health information professionals and EHR managers may use the framework of social informatics in their virtual health environment to examine the presence of policies that either impose limitations or promote the utilization and adoption of digital technologies or certain platforms in managing electronic health records.

Social informatics framework may also assist EHR managers in answering these questions: Is there any provision for training and assistance for staff members in using digital tools in virtual

health environments? Do social or cultural variables play a role in shaping individuals' inclination to embrace or reject certain digital tools? As noted by Lamb and Sawyer (2005), when a digital tool becomes integral to the workflow of an organization, it is probable that it will have a more substantial influence on the information-seeking behaviors of the personnel and their overall job efficiency. Are EHR managers using digital tools in manners that deviate from their original design, and if so, what are the reasons for this phenomenon? The utilization of digital tools by staff members may thus be attributed to several aspects, such as their technological proficiency, the perceived usefulness of the tool, and their prior experiences, including both good and negative encounters (Lamb & Kling, 2003). An analysis may thus be conducted to assess the level of intuitiveness shown by these digital technologies among staff members in virtual health environments from a social informatics viewpoint.

It is also vital to contemplate the following inquiries when using the structured interview format: Has the use of dedicated digital platforms altered the attitude of staff members toward problem-solving? Are there identifiable trends in information-seeking behaviors after the implementation of new technologies? What is the impact of peer interactions on the use of digital technologies for information management and retrieval? The social informatics framework, which places significant importance on the interdependent connection between technology and society, is a great guide for comprehending the intricacies of technology uptake within Rocket Health. EHR managers at Rocket Health may develop a thorough grasp of the ramifications of digital transformation in many contexts by considering not just the technology itself but also the numerous social and organizational factors that interact with it.

Model Requirements for the Management of Electronic Records

Cain (2002) described Model Requirements for the Management of Electronic Records (MoReq) as an important document that carries high expectations in managing electronic records, and it has been seen as the culmination of a body of work on electronic records sponsored by the European Commission, which began in 1996 with the first European Document Lifecycle Management (DLM) Forum. The DLM Forum is a European membership community of public archives and parties interested in archives, records, and information management throughout the European Union. This forum is known for its creation of the MoReq series of records management standards. Fresko and Waldron (2001) further described MoReq as a generic specification for computerized systems designed to manage electronic records.

The MoReq1 requirements document was published in 2001, and the enhanced successor document MoReq2 was published in 2008. The purpose of MoReq is very broad, covering every sector of the economy (both private and public sector organizations). Additionally, MoReq is designed to be useful to an equally broad range of users, namely: electronic record management systems (ERMS) users as a basis for auditing or checking an existing ERMS; training organizations as a reference document for preparing records management training and as course material; ERMS suppliers and developers as a guide for product development by highlighting required functionalities (Cain, 2002).

LITERATURE REVIEW

The following section x-rayed the literature review with specific reference to sources that explored the management of EHRs in virtual or digital health environments, based on the objectives of the study.

Healthcare Services Provided by Digital Health Service Providers

Digital health service providers provide a wide array of healthcare services using digital platforms. These services are usually patient-centered or end-user-based to meet a given health outcome. According to Maier et al. (2021), these services are built around "eHealth, mobile or mHealth, telehealth or telemedicine, among others" (p. 1). It is said that digital health services constitute some form of information technology, artificial intelligence, and computer-aided diagnosis (Hossain et al.,

2022; Neves & Burgers, 2022; Al-Shorbaji, 2021; Sharma & Kshetri, 2020). These digital technologies assist in meeting the needs of many patients simultaneously or in a shorter time. They also improve preventive care, diagnostic turnaround time, and primary care. Hossain et al. (2022) share that digital health services include "digital pathology, digital radiology, digital patient management and digital health records" (p. 2). These services are expected to prevent health issues or improve outcomes by advancing healthcare systems. Numerous studies and industry reports corroborate this perspective, highlighting the transformative impact of digital health services on healthcare delivery. For instance, the study of Le et al. (2022) discusses telehealth services as alternatives to in-person consultations. Le et al. (2022) further demonstrated that the implementation of digital health records results in improved care coordination, reduced medical errors, and enhanced patient outcomes. Furthermore, Hermes et al. (2020) emphasized the preventive aspects of digital health services, expounding how technologies such as digital patient management contribute to proactive health monitoring, early intervention, and preventive care strategies. These findings collectively underscore the transformative potential of digital health services in not only addressing health issues but also significantly improving overall healthcare outcomes.

Equally crucial, telehealth services rely significantly on digital literacy skills and relevant technologies, as they are delivered remotely. Le et al. (2022) underscore the versatility of telehealth, emphasizing its applications in self-monitoring, follow-up care, telemedicine, and disease surveillance through teleconferencing. Notably, telehealth services are especially recommended for managing acute and curative conditions, particularly in young adults. Hermes et al. (2020) comprehensively studied digital healthcare services. The study notes that they include online forums and communities through which information is disseminated for learning purposes, advice, or peer support (Hermes et al., 2020). There are also teleconsultations through synchronous or asynchronous communication such as iCliniq (Hermes et al., 2020). Additonally, there are patient engagement platforms through which specialist prescribe medication and advise on diets, among other things (Hermes et al., 2020). Another digital healthcare service is remote monitoring which can either be in-house or offsite (Hermes et al., 2020). Other digital healthcare services discussed by Hermes et al. (2020) include: emergency communication and notification networks, doctor recommenders and online schedulers, wearables, biomarker collectors, health and wellness apps, electronic medical or health records, electronic prescriptions, healthcare planners, population management providers, diagnostic software, and cloud service providers. These are some of the healthcare services provided by digital health service providers around the globe.

Records Management Practices in Virtual Health Environments

Most of the records managed by digital health service providers are electronic given the fact that digital health service providers rely on digital technologies. The study of Obotu and Ogezi (2018) evaluated health digital records in selected in Nigeria. It was revealed that some of the EHRs included "patient case notes, x-rays, pathological specimens and preparations, patient indexes and registers, pharmacy and drug records, and nursing and ward records" (Obotu & Ogezi, 2018, p1). Drawing from the records continuum model, these records are created, captured, organized, and pluralized. EHRs are created by the conduct of health service delivery (Seymour, 2016). The create process consists of examining the records management practices followed when creating or generating electronic records. EHRs are either born digital using digital technologies or created through data entry with the help of uploading applications (Obotu & Ogezi, 2018; Rakemane & Serema, 2018). Some of these uploading applications included scanning paper records. Electronic records management systems can also be used to create EHRs (Öztemiz, 2019).

The capture process is composed of finding out the records management practices adhered to when capturing records in various records management systems. According to Obotu and Ogezi (2018), the metadata of each transaction may be captured using indexing applications. These applications capture key information such as dates and times of transactions, thus providing a verifiable audit

trail. Digital health service providers ought to ensure authenticity and confidentiality, among other controls. The metadata should meet particular compliance measures as well as access controls and audit capabilities (Wanyonyi et al., 2017; Seymour, 2016).

The organize process comprises investigating the records management practices applied in the process of organizing electronic records into archives. EHRs can be organised through automated storage and retrieval systems such as cloud computing. These reduce the risk of records users from returning records in wrong locations (Mukred et al., 2021; Obotu & Ogezi, 2018). However, the organize process greatly depends on how EHRs have been captured. If they have been captured wrongly, then the way they are stored and retrieved is affected. Additionally, it is recommended to have backup servers to reduce the risk of data loss (Obotu & Ogezi, 2018). Using electronic records management systems also facilitates the rganization of records because they provide efficient storage, retrieval, and records access systems (Öztemiz, 2019).

The pluralize process involves identifying the records management practices used to pluralize electronic records to meet stakeholder needs. Some of the ways in which EHRs can be pluralized is by using network scanning and routing to disseminate EHRs (Obotu & Ogezi, 2018). In this case, EHRs can be shared internally or externally using files such as Word or PDF documents. However, it is important to ascertain the security of the records. Therefore, records should be encrypted and preferably accessed with unique authentication codes. According to Obotu and Ogezi (2018), EHRs can also be disseminated with the aid of web-based storage and management which is cheaper. EHRs can also be disseminated with the aid of electronic records management systems (Öztemiz, 2019). These provide a structure for the access and dissemination of electronic health records.

Inhibitors to Effective EHR Management in Virtual Health Environments

Although there is a great deal of potential upside to digital transformation in virtual health environments, there are also many obstacles to overcome. Notably, virtual health environments, Rocket Health in particular, suffer a wide variety of challenges that slow down their progress toward digitization and management of their electronic health records. One of the inhibitors to effective EHR management is poor infrastructure, which directly affects EHR management (Zulkipli et al., 2022; Kegoro & Njenga, 2021; Romwald et al., 2019; Rakemane & Serema, 2018). According to Zulkipli et al. (2022), poor infrastructure limits recording of health issues. There is also a challenge of the lack of legal frameworks. Most digital health service providers work in environments without legal frameworks to guide EHR management (Romwald et al., 2019). This prevents standardization of EHR management, thus affecting the way EHRs are managed. Additionally, EHR management requires technical competence from health service providers, thus calling for the right staff. However, most digital health service providers are understaffed and have staff who have no prior training in records management (Kegoro & Njenga, 2021; Romwald et al., 2019; Rakemane & Serema, 2018). This leaves EHR management in the hands of unqualified staff. Limited financial capacity also cripples efforts of managing EHRs (Kegoro & Njenga, 2021; Romwald et al., 2019). Without sufficient financial resources, digital health service providers cannot recruit adequate staff, improve the digital infrastructure, or invest in other efforts which promote effective EHR management. There is also a challenge of limited top management support, which is required for proper management of EHRs (Romwald et al., 2019). However, in most digital health service firms, priority is not given to how records are managed, which limits effective EHR management. In addition, according to Zulkipli et al. (2022), the implementation of EHR management poses security threats which have to be managed for it to be successful. However, most digital health service providers have inadequate security measures which exposes patient health information to unauthorized personnel. This limits the effective management of electronic health records. Furthermore, for records management to be effective, staff need to be trained. However, most healthcare staff lack technical knowledge of records management which restricts them from using electronic records management systems (Zulkipli et al., 2022; Rakemane & Serema, 2018).

Most digital health service providers also lack the capacity to provide suitable training sessions due to insufficient resources such as time and finances, which affects the management of electronic health records. Poor data migration strategies also inhibit effective EHR management. Zulkipli et al. (2022) defines data migration as "the process of selecting and transferring data from one storage device to another" (p. 3). Poor data migration strategies increase the risk of incorrect migration of health information, which may result in clinical errors (Rakemane & Serema, 2018; Zulkipli et al., 2022). Such errors can affect patient outcomes. EHR management is further inhibited by staff resistance (Zulkipli et al., 2022; Kegoro & Njenga, 2021). Healthcare staff typically hold the responsibility of providing and retrieving health information. However, it is crucial to acknowledge that the effectiveness of health information retrieval can be influenced by the attitudes of these professionals. When healthcare staff exhibit poor attitudes, it can lead to suboptimal information retrieval processes. Sometimes they refuse to use EHR management systems (Zulkipli et al., 2022), and these actions affect the management of electronic health records. Poor electronic records management systems also affect the management of electronic health records. Most electronic records management systems lack technical integration, have weak security measures, and are sophisticated to use (Zulkipli et al., 2022; Romwald et al., 2019), which limits effective EHR management. Another challenge faced is the cost of implementing EHR management systems. It requires a lot of resources such as proper infrastructure, technical support, and maintenance and network fees (Zulkipli et al., 2022). Some systems also require patients to have access to digital technologies or the internet in order to access their information, which may not be the case for everyone. Therefore, this limits access and retrieval of information. It also affects proper management of electronic health records. Seymour (2016) also mentions poor data standardization as a challenge. Most EHR management systems are not inspected despite the risk of incompetent staff and errors that may affect the given data. This increases the likelihood of misdiagnoses and clinical errors. Lastly, EHR management coupled with digital health services limits physical visits, given that all data is captured digitally. This puts a responsibility on healthcare providers to identify and diagnose health issues correctly or risk losing their reputation (Zulkipli et al., 2022). The increased pressure is often challenging for healthcare providers who have to invest more time in understanding patients' medical issues as well as serving other roles.

METHODOLOGY

The study adopted pragmatism paradigm and, as a result, a mixed methods research (MMR) approach was used by interweaving or combining both qualitative and quantitative research approaches underpinned by a case study research design. MMR approach was selected to ensure that the findings are triangulated and to derive stronger conclusions According to Rashid et al. (2019), a case study research design explores a real-time situation or event within its naturally occurring context and enables the researcher to gain in-depth insights into the management of EHRs at Rocket Health. The study population was composed of 25 staff members from Rocket Health who participated in EHR management (as illustrated in Table 2). All of the 25 staff members were purposively selected, as the sample size and the study conducted structured interviews, and a questionnaire was distributed to all participants.

Document review was also used as another source of data collection to supplement the interviews and questionnaire. The purpose of conducting a document review in this study was to examine and understand the implementation of EHR management practices and electronic records management policies in place, procedures, and standards enabling effective management of digital collections in virtual health institutions, particularly at Rocket Health. For this study, document review began with researchers identifying and selecting documents on the basis of their usefulness and relevance to the study. Documents that were collected for review in this study included: electronic records

Table 2. Summary of the demographics of the sample

Demographic	Number of Participants
Gender	
Male	12
Female	13
Role/Position	
Physicians	8
Nurses	7
IT Specialists	5
Age Range	
25-35 years	10
36-45 years	8
46-55 years	7

Source: Primary data (2023)

management policy, procedures, and standards; right to information law; copyright and intellectual properties law; security risks to electronic records management; open access to information and digital records management tools and strategies. The study also reviewed models and theories pertaining to the management of electronic or digital records.

FINDINGS OF THE STUDY

Findings of the study were discussed in line with the objectives of the study.

Response Rate

The study determined the response rate for the study was determined as illustrated in Table 3.

The overall response rate of 96% was deemed sufficient for the study, as it enabled the researcher to obtain sufficient information to inform the study.

Biographic Information of the Study Participants

Selected biographic information of the study participants was obtained, and it is presented in Table 4.

The above biographic information shows that the study participants were young (youthful) and educated with a reasonable work experience of 1-5 years at Rocket Health, and thus were familiar with EHR management within Rocket Health. This implied that they could provide credible information to inform the study.

Table 3. Response rate

Data Collection Method	Issued/Expected	Returned/Held	Percentage
Questionnaires	21	21	100%
Interviews	4	3	75%
Total	**25**	**24**	**96%**

Source: Primary data (2023)

Table 4. Biographic information of the study participants

Biographic feature	Category	Total number	Percentage
Gender	Male	9	37.5%
	Female	15	62.5%
Age bracket	20-29 years	15	62.5%
	30-39 years	9	37.5%
Highest level of education	Diploma	9	37.5%
	Bachelors	12	50%
	Masters	3	12.5%
Work experience at Rocket Health	Less than one year	1	4.2%
	1-5 years	20	83.3%
	6-10 years	3	12.5%

Source: Primary data (2023)

Healthcare Services Provided at Rocket Health

Table 5 shows the healthcare services provided at Rocket Health as provided for in the questionnaires. SA stands for Strongly Agree; A stands for Agree; NS stands for Not Sure; D stands for Disagree and SD stands for Strongly Disagree.

In the interviews, it was deduced that apart from the above healthcare services (telehealth, last mile, consultations, E-shop, and pharmaceutical services), Rocket Health also provided vaccination services, immunization services, laboratory services, and healthcare and wallet plans. Rocket Health also ran a clinic which would be accessed physically. However, the interviewees shared that its focus was on telemedicine or telehealth services. The researchers further asked the interviewees about the protocol followed in accessing the services of Rocket Health. It was confirmed that different protocols existed for different services. One interviewee shared that:

Clients can access some of our services using their mobile phones by dialing *280#. This generates a list of different services. For example, a client could choose to have a consultation with a doctor. Based on the client's request, the system asks for a payment of Ugx 10,000 and once it is made, a meeting with the required doctor is scheduled.

Additionally, our mobile-based services extend beyond consultations. Clients can use the same platform to access laboratory results, schedule follow-up appointments, or receive health tips and information. Each service is designed to enhance the overall healthcare experience for our clients.

Table 5. Healthcare services provided at rocket health

Healthcare service	SA	Rate	A	Rate	NS	Rate	D	SD
Telehealth services	18	85.7%	2	9.5%	1	4.8%	0%	0%
Last mile services	7	33.3%	8	38.1%	6	28.6%	0%	0%
Consultations	18	85.7%	3	14.3%	0%	0%	0%	0%
E-shop	15	71.4%	5	23.8%	1	4.8%	0%	0%
Pharmaceutical services	17	81%	3	14.3%	1	4.8%	0%	0%

Source: Primary data (2023)

Table 6. Records management practices adhered to at rocket health

Records management practices	SA	Rate	A	Rate	NS	Rate	D	Rate	SD	Rate
Records creation	19	90.5%	1	4.8%	1	4.8%	0	0	0	0
Records maintenance	16	76.2%	3	14.3%	2	9.5%	0	0	0	0
Records retrieval	19	90.5%	1	4.8%	0	0	1	4.8%	0	0
Records preservation	17	81.0%	3	14.3%	1	4.8%	0	0	0	0
Records conservation	16	76.2%	3	14.3%	2	9.5%	0	0	0	0
Records disposal	4	19.0%	2	9.5%	10	47.6%	1	4.8%	4	19.0%

Source: Primary data (2023)

However, it is crucial to note that while this mobile-based system offers seamless access to various services, there may be areas where its effectiveness is contrasted. For example, some clients may face challenges with digital literacy or may prefer traditional modes of communication, such as in-person consultations. Understanding and addressing such contrasts are essential for providing inclusive and comprehensive healthcare services.

On the other hand, clients also have the privilege of being served by calling directly, using WhatsApp, or visiting Rocket Health's premises. Other services like the E-shop, laboratory, and pharmaceutical are available for request on Rocket Health's website. A client places an order, makes the payment of an order and, based on the nature of the order, a delivery person or laboratory staff is sent to fulfill the order.

Records Management Practices Adhered to at Rocket Health

Table 6 shows the records management practices adhered to at Rocket Health as provided for in the questionnaires. SA stands for Strongly Agree; A stands for Agree; NS stands for Not Sure; D stands for Disagree; and SD stands for Strongly Disagree.

The researchers also asked the interviewees how EHRs were generated at Rocket Health. One study participant narrated that:

EHRs are generated through the USSD code, website and WhatsApp which are used by clients to request for a desired service. For example, a client requests for a checkup and the request are recorded. They are then contacted and a schedule is made. A service provider is after sent to pick the sample and the results are returned. The client's diagnosis is then provided online and all this information is saved in the system.

This narrative showed that EHRs were created from the different avenues through which clients requested services. Furthermore, the interviewees revealed that the digital health records generated and stored at Rocket Health included medical forms, laboratory reports, prescriptions, surgical history, clinical notes, correspondences, registration forms, medical orders, administrative records, progress notes, and admission and discharge notes. The interviewees also shared that EHRs were managed by a cloud-based system which was Google protected. This system managed the processes of records creation, records maintenance, records retrieval, records preservation, and records creation. Rocket Health did not dispose of its EHRs and therefore, they were permanently stored in the cloud. It was further disclosed that the IT practitioners operated and maintained the system, monitored records access, and ensured that unauthorized users could not access electronic health records. From a document reviewed by Health Sector Cyber Security Coordination Center, it was disclosed that cloud-based EHR systems were managed by third party cloud vendor service providers. These managed multiple user access and provided external backup. They were also in charge of ensuring that supply chain threats were minimal. ISO 1306-4 (2019) notes that records security in the health sector is more extensive than in other industries. The factors that make it more extensive include: i) the presence of

Table 7. Inhibitors to effective EHR management at rocket health

Inhibitors	SA	Rate	A	Rate	NS	Rate	D	Rate	SD	Rate
Shortage of records staff	0	0	5	23.8%	1	4.8%	6	28.6%	9	42.9%
Lack of records management training	4	19%	6	28.6%	2	9.5%	6	28.6%	3	14.3%
Lack of records management policies	2	9.5%	5	23.8%	4	19%	5	23.8%	5	23.8%
Low levels of awareness of records management	3	14.3%	4	19%	4	19%	6	28.6%	4	19%
Lack of records management systems	3	14.3%	3	14.3%	1	4.8%	7	33.3%	7	33.3%
Low compliance levels among staff	4	19%	5	23.8%	3	14.3%	3	14.3%	6	28.6%
Lack of e-learning initiatives	1	4.8%	7	33.3%	4	19%	4	19%	5	23.8%

Source: Primary data (2023)

many health record entries made on patients daily; ii) the possibility of specific healthcare personnel who may come into contact with a given patient more than once; iii) the difficulty of understanding how sensitive a record entry might be and its impact on the future care of a given patient; iv) the growing number of patients with consent on disclosure; and v) low rates of concern among the majority of patients. This leaves most of the duty of EHR management, including security, to healthcare service providers irrespective of the involvement of third-party service providers.

The Health Sector Cybersecurity Coordination Center (2020) lays down how EHRs are managed by cloud-based EHR systems. The first process is the capture of clinical data, which includes providing patients with their electronic copies of the heath information they provide. The second process involves the maintenance of EHR systems through continuous quality improvement during usage, point of care, clinical processes, and information exchange. Lastly, the final stage involves meeting reporting requirements and measuring performance based on health outcomes.

Inhibitors to Effective EHR Management at Rocket Health

Table 7 shows the inhibitors to effective EHR management at Rocket Health as provided for in the questionnaires. SA stands for Strongly Agree; A stands for Agree; NS stands for Not Sure; D stands for Disagree and SD stands for Strongly Disagree.

In the interviews, the interviewees revealed that some of the threats faced in the management of EHRs at Rocket Health included hacking and human errors. These had resulted in corruption of data and the production of wrong data. In some instances, they also exposed the company to the risk of litigation. However, efforts had been put in place, such as strengthening security controls by constantly updating the system and checking for errors. A stand-by technology team had also been put in place to monitor the cloud-based system. The Health Sector Cybersecurity Coordination Center (2020) notes that EHR systems are prone to many threats. Among these include phishing attacks, where attackers exploit emails to trick users into revealing their login credentials; malware and ransom ware, which are deployed on electronic health systems to steal EHRs or hold the information for ransom; cloud threats, where hackers are prone to attacking the entire cloud; insufficient encryption, which makes data in transit susceptible to third party attacks; and insider threats, where employees gain access to EHRs without authorization for different purposes. Therefore, the inhibitors to effective EHR management not only expose the EHRs to different threats but also threaten the digital health service provider.

DISCUSSION OF FINDINGS

This study sought to examine the management of EHRs in virtual environments using Rocket Health as a case study. The study investigated the healthcare services provided by Rocket Health, the records management practices adhered to at Rocket Health, and the inhibitors to effective EHR management

at Rocket Health. Like any other digital health service provider, it was revealed that Rocket Health mostly dealt with electronic health records. This was attributed to the nature of the services they offered. The EHRs emanated from its services which included: telehealth, last mile, consultations, E-shop, pharmacy, vaccination, immunization, laboratory, healthcare plans, and health wallet plans. From its setup, its services were mainly provided remotely, although it also ran a clinic where patients could visit. These findings were in line with what other similar studies have reported about digital health service providers.

Namatovu and Semwanga (2021) and Akwaowo et al. (2022) reported that most digital health service providers provide electronic health services. These services are normally provided with the aid of digital technologies, which result in the generation of electronic health records. These EHRs are used by the digital health service providers, such as Rocket Health, to provide healthcare services. Therefore, the way these EHRs are managed has an influence on the healthcare services provided by the digital health service provider. This is what necessitates the need to effectively manage electronic health records. When it came to the EHR management practices at Rocket Health, it was revealed that records were created from different service points. These included using the mobile USSD code, Rocket Health's website, and the call center, among others. A cloud-based system was also used to manage EHRs, and it automatically generated the electronic health records. These included clinical notes and correspondence. Furthermore, the cloud-based system captured the records which it organized and pluralized. This system was maintained by IT practitioners and it managed all EHRs processes. Kiberu et al. (2018) report that digital health by default requires ICT infrastructure. An EHR management system, such as the cloud-based system at Rocket Health, can facilitate the electronic capture, processing, storage, and exchange of EHRs (Ngusie et al., 2022; Namatovu & Semwanga, 2021). Seymour (2016) further notes how EHRs are created during the conduct of health service delivery. This presents them as one of the outputs of health service delivery. However, they can also be one of the inputs of health service delivery, for example, during consultations or prescriptions. This shows that the quality of EHRs affects effective EHR management. Lastly, the findings revealed that the major inhibitors to effective EHR management at Rocket Health were the lack of records management training, low compliance levels among staff, and the lack of e-learning initiatives.

EHRs were also exposed to threats such as hacking and human errors, which often resulted in data corruption and the production of wrong data, and in some instances exposed Rocket Health to litigation. These challenges are a big hindrance to EHR management and the delivery of digital healthcare services. This is because the delivery of digital healthcare services depends on the available information or records. If there are errors in records, then digital healthcare service delivery will be jeopardized. According to Attafuah et al. (2022), poor or inaccurate EHRs jeopardize patient safety, as they increase the likelihood of misdiagnosis and wrong treatment of patients. This results in poor patient outcomes. The same is true with security threats, which put EHRs at risk. Zulkipli et al. (2022) notes that inadequate security measures expose patient health information to unauthorized access and manipulation, which put patient safety at risk. Therefore, it is important to resolve these challenges at Rocket Health to improve EHR management.

CONCLUSION AND RECOMMENDATIONS

In conclusion, the health services provided at Rocket Health were mostly digital. These services were provided with the aid of ICTs, thus generating electronic health records. Considering the role of EHRs in facilitating healthcare service delivery at Rocket Health, it suggests the potential necessity for effective management. While the available information hints at the importance of managing EHRs, further exploration and evidence may be required to draw more definitive conclusions about the specific needs and strategies for their effective management. In addition, the records management practices adhered to at Rocket Health had an influence on the health services delivered. Therefore, there was a need to ensure that they were effective to minimize negative effects on health service

delivery resulting from having poor quality electronic health records. Lastly, it is necessary to resolve the inhibitors to effective EHR management at Rocket Health to improve the management of electronic health records. This would improve the delivery of healthcare services at Rocket Health. Based on the findings of the study, it is recommended that:

a) IT practitioners, system administrators, system managers, or any other staff that manage EHRs should work hand in hand with health practitioners to effectively manage electronic health records. This is because the health practitioners are more informed about health matters than IT staff who are left to manage electronic health records. By working together, knowledge can be shared which can be used to improve EHR management processes based on what is applicable for the health practitioners since they will be the main users of the health information.
b) There is a need to enforce security during the EHR management processes and during the health data/information flow stages. This is because these stages put health information at risk by exposing it to different threats both internally and externally. The management thus has to come up with strong security controls to ensure that health information is free from manipulation, unauthorized access, and loss. It is also important to ensure that there are information backups and that the cloud-based system is protected from threats which may affect all the existing patients' health information.
c) Given that EHRs are vital for efficient digital health service delivery, actions should be taken to ensure that captured information is always accurate, reliable, and complete. This will minimize the risk of giving wrong diagnoses and treatment, which may jeopardize patient safety and patient outcomes. Therefore, the way EHRs are captured should be monitored to ensure that the right meta data or information is recorded.
d) Lastly, quality checks are needed to ensure that EHRs and the EHR systems are reliable and functional. These quality checks should cover the system, information, users, and the entire company. The system has to be flexible and functional, the information has to be accurate and complete, users need to know how to use the system; and EHR management should benefit the entire company.

In conclusion, a collaborative approach between health practitioners and IT professionals, robust security measures, accurate data capture, and comprehensive quality checks are vital components for ensuring effective electronic health record management at Rocket Health. By integrating these strategies, the organization can enhance not only the security and reliability of health information but also the overall efficiency of digital health service delivery, ultimately contributing to improved patient safety and outcomes.

COMPETING INTERESTS

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

FUNDING STATEMENT

No funding was received for this work.
Received: December 28, 2023, Revision: January 15, 2024, Accepted: January 26, 2024
Correspondence should be addressed to Tlou Maggie Masenya; maggst124@gmail.com

REFERENCES

Abdullah, A. R. (2022). Adoption of EHRs in Saudi Arabia hospitals: Knowledge and usage. *Journal of King Saud University – Science.*. .10.1016/j.jksus.2022.102470

Adedeji, T., Fraser, H., & Scott, P. (2021). Implementing EHRs in primary care using the theory of change: A Nigerian case study (preprint). *JMIR Medical Informatics*, *10*(8). doi:10.2196/33491 PMID:35969461

Akwaowo, C. D., Sabi, H. M., Ekpenyong, N., Isiguzo, C. M., Andem, N. F., Maduka, O., Dan, E., Umoh, E., Ekpin, V., & Uzoka, F. M. (2022). Adoption of electronic medical records in developing countries-A multi-state study of the Nigerian healthcare system. *Frontiers in Digital Health*, *4*, 1017231. doi:10.3389/fdgth.2022.1017231 PMID:36479191

Al-Shorbaji, N. (2021). Improving healthcare access through digital health: The use of information and communication technologies. *IntechOpen*. https://www.intechopen.com/chapters/78328

Attafuah, P. Y. A., Abor, P. A., Abuosi, A. A., Nketiah-Amponsah, E., & Tenza, I. S. (2022). Satisfied or not satisfied? EHRs system implementation in Ghana: Health leaders' perspective. *BMC Medical Informatics and Decision Making*, *22*(1). doi:10.1186/s12911-022-01998-0 PMID:36138402

Cain, P. (2002). Model requirements for the management of electronic records (MoReq): A critical evaluation. *Records Management Journal*, *12*(1), 14–18. doi:10.1108/09565690210427752

Fresko, M., & Waldron, M. (2001). *Model requirements for the management of electronic records (MoReq)*. Europea. http://europa.eu.int/ISPO/dlm and <http://www.cornwell.co.uk/moreq

Frings-Hessami, V. (2021). Continuum, continuity, continuum actions: Reflection on the meaning of a continuum perspective and on its compatibility with a life cycle framework. *Archival Science* doi:10.1007/s10502-021-09371-2 PMID:34776769

Hermes, S., Riasanow, T., Clemons, E. K., Böhm, M., & Krcmar, H. (2020). The digital transformation of the healthcare industry: Exploring the rise of emerging platform ecosystems and their influence on the role of patients. *Business Research*, *13*(3), 1033–1069. doi:10.1007/s40685-020-00125-x

Hossain, M. S., Syeed, M. M. M., Fatema, K., & Uddin, M. F. (2022). The perception of health professionals in Bangladesh toward the digitalisation of the health sector. *International Journal of Environmental Research and Public Health*, *19*(20), 13695. doi:10.3390/ijerph192013695 PMID:36294274

Huvila, I., Eriksen, J., Häusner, E. M., & Jansson, I. M. (2014). Continuum thinking and the contexts of personal information management. *Journal Name*, *19*(1). https://files.eric.ed.gov/fulltext/EJ1020832.pdf

Kamulegeya, L. H., Bwanika, J. M., Musinguzi, D., & Bakibinga, P. (2020). Continuity of health service delivery during the COVID-19 pandemic: The role of digital health technologies In Uganda. *The Pan African Medical Journal*, *35*(2, Supp 2), 43. doi:10.11604/pamj.supp.2020.35.2.23115 PMID:33623568

Kegoro, O., & Njenga, P. (2021). Electronic records management in support of customer service delivery. Evidence from public universities in Kenya. [AIJBM]. *American International Journal of Business Management*, *4*(10), 42–50.

Kiberu, V. M., Scott, R. E., & Mars, M. (2018). Assessment of health provider readiness for telemedicine services in Uganda. *The HIM Journal*, *48*(1), 33–41. doi:10.1177/1833358317749369 PMID:29359588

Kling, R. (2007). What is social informatics and why does it matter? *The Information Society*, *23*(4), 205–220. doi:10.1080/01972240701441556

Lamb, R., & Kling, R. (2003). Reconceptualizing users as social actors in information systems research. *Management Information Systems Quarterly*, *27*(2), 197–235. doi:10.2307/30036529

Lamb, R., & Sawyer, S. (2005). Social informatics: Legacy and next steps. *Information Technology & People*, *18*(1), 9–20. doi:10.1108/09593840510584595

Le, K. H., La, T. X. P., & Tykkyläinen, M. (2022). Service quality and accessibility of healthcare facilities: Digital healthcare potential in Ho Chi Minh City. *BMC Health Services Research*, *22*(1), 1374. doi:10.1186/s12913-022-08758-w PMID:36403031

Maier, E., Reimer, U., & Wickramasinghe, N. (2021). Digital healthcare services. *Electronic Markets*, *31*(4), 743–746. doi:10.1007/s12525-021-00513-z PMID:35602115

Matlala, M. E., & Maphoto, A. R. (2020). Application of the records life-cycle and records continuum models in organisations in the 21st century. *ESARBICA Journal: Journal of the Eastern and Southern Africa Regional Branch of the International Council on Archives*, *39*(1), 79–98. doi:10.4314/esarjo.v39i1.6

Mukred, M., Yusof, Z. M., Al-Moallemi, W. A., Mokhtar, U. A., & Hawash, B. (2021). Electronic records management systems and the competency of educational institutions: Evidence from Yemen. *Information Development*. doi:10.1177/0266666920980829

Neves, A. L., & Burgers, J. (2022). Digital technologies in primary care: Implications for patient care and future research. *The European Journal of General Practice*, *28*(1), 203–208. doi:10.1080/13814788.2022.2052041 PMID:35815445

Ngusie, H. S., Kassie, S. Y., Chereka, A. A., & Enyew, E. B. (2022). Healthcare providers' readiness for electronic health record adoption: A cross-sectional study during pre-implementation phase. *BMC Health Services Research*, *22*(1), 282. doi:10.1186/s12913-022-07688-x PMID:35232436

Obotu, A. A. U., & Ogezi, I. (2018). Evaluative study of digital record management system in the hospitals in Minna metropolis (A case study of General Hospital Minna, Niger State, Nigeria). *Library Philosophy and Practice (E-Journal)*. https://digitalcommons.unl.edu/libphilprac/1699/

Romwald, J., Mwantimwa, K., & Newa, J. (2019). E-records management in Tanzania public service: Determinants, perceived importance and barriers. *Semantic Scholar.* https://www.semanticscholar.org/paper/E-records-management-in-Tanzania-public-service%3A-Newa-Mwantimwa/43e0aa42a0270d1d3ef6d82a346e067096d6ebea

Sabeh, H. N., Husin, M. H., Kee, D. M. H., Baharudin, A. S., & Abdullah, R. (2021). A systematic review of the DeLone and McLean model of information systems success in an e-learning context (2010–2020). *IEEE Access : Practical Innovations, Open Solutions*, *9*, 81210–81235. doi:10.1109/ACCESS.2021.3084815

Sawyer, S., & Rosenbaum, H. (2000). Social informatics in the information sciences: Current activities and emerging directions. *Informing Science*, *3*(2), 89–96. doi:10.28945/583

Seymour, J. (2016). The modern records management program: An overview of electronic records management standards. *Bulletin of the Association for Information Science and Technology*, *43*(2), 35–39. doi:10.1002/bul2.2017.1720430212

Shaikh, M., Vayani, A. H., Akram, S., & Qamar, N. (2022). Open-source electronic health record systems: A systematic review of most recent advances. *Health Informatics Journal*, *28*(2). doi:10.1177/14604582221099828 PMID:35588400

Sharma, R., & Kshetri, N. (2020). Digital healthcare: Historical development, applications, and future research directions. *International Journal of Information Management*, *53*, 102105. doi:10.1016/j.ijinfomgt.2020.102105

Upward, F. (2000). Modelling the continuum as paradigm shift in recordkeeping and archiving processes, and beyond – A personal reflection. *Records Management Journal*, *10*(3), 115–139. doi:10.1108/EUM0000000007259

Wanyonyi, E., Rodrigues, A., Abeka, S., & Ogara, S. (2017). Effectiveness of security controls on electronic health records. *International Journal Of Scientific & Technology Research, 6*. https://www.ijstr.org/final-print/dec2017/Effectiveness-Of-Security-Controls-On-Electronic-Health-Records-.pdf

Zulkipli, F.N., Hussin, N., Mat, F., Ismail, A., & Noor, first initial. (2022). Fundamental assumptions in narrative analysis: Mapping in mobile EHRs field. *International Journal of Business and Economy, 4*(1), 41–49. https://myjms.mohe.gov.my/index.php/ijbec/article/view/17011

Ssekitto Francis teaches in the Department of Records and Archives Management, East African School of Library and Information Science- College of Computing and Information Sciences- Makerere University. He holds a Bachelor's degree in Library and Information Science from Makerere University and a Masters in Information Technology with a strong bias in management of records and Information, strategy and Knowledge Management from University of Pretoria. He is currently the Coordinator for Distance, Open and E-learning for East African School of Library and Information Science, at Makerere University

Sarah B. Kaddu is a Senior Lecturer and Dean East African School of Library and Information Science, Makerere University in Uganda

Simati Sam holds a Bachelor's degree in Library and Information Science from Islamic University in Uganda. He serves with in the library of the Faculty of Agriculture and Animal Science at Busitema University, Uganda. He is currently pursuing a Master's Degree in Library Information Services from Uganda Christian University.