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Original Article

Factors Influencing the Adoption and Implementation of the EMR among Health Care Providers at Homabay County Teaching and Referral Hospital

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ABSTRACT

In Kenya, many public hospitals continue to use paper-based health records (PBHR), associated with several challenges. Adoption and implementation of the EMR are necessary for the advancement of the quality of patient care. Despite the efforts by the government to provide subsidies, there has been low uptake of the EMR by public facilities. Thus, the need to study the factors influencing the adoption and implementation of EMR among healthcare providers in HCTRH. The study focused on identifying the different EMRs available at HCTRH, identifying the areas of application of the EMR at HCTRH, determining the challenges associated with EMR compared to the PBHR, and determining the benefits of EMR at HCTRH. A cross-sectional study design was employed, with a sample of 38 healthcare providers using EMR. A structured questionnaire was the tool for data collection while analysis was done using Excel. There were 5 EMR systems available at HCTRH, Elephant, Funsoft, Kenya EMR, and Laboratory Information and Management Systems (LIMS). Areas of application included Clinical, ordering tests, imaging, drugs, and Health information exchange to 89%. Billing and administrative had 15.79% and 26.31% in use. Both technological and organizational factors contribute to challenges affecting the adoption and implementation of EMR. Regarding the lack of general infrastructure, 78.95% agreed with funding, and 57.89% of the respondents agreed. Other factors, power interference was reported at 63.16%. However, on the positive side, 60.53% of the respondents reported that the hardware and software available are compatible. 57.89% agreed that HCTRH lacks the technical personnel to install and maintain the EMR system. It was apparent that the factors affecting the adoption and implementation of EMR are mainly insufficient funds and a lack of general infrastructure. There is a need to increase the supply of infrastructure and budget allocation to address the technological and organizational factors at HCTRH.

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INTRODUCTION

Electronic Medical Records (EMRs) are an outstanding innovation in the delivery of healthcare since they shift patient records from paper-based systems in healthcare facilities. In their current state, EMRs offer the clinician instant access to a patient's information, thus enhancing the quality, continuity and coordination of care throughout healthcare facility departments (Aguirre et al., 2022). Due to the improved, rapid accessibility of health records as well as the organization of histories that assist in mitigating medical risks while doing away with or cutting health care complexities, EMRs improve health care and clinical choices for patients while maintaining operational health care efficiency (McGinn et al., 2020). EMRs have been increasingly implemented in the past few decades around the world, especially in countries with high incomes where policies promote the implementation of EMRs in the national health system (Birk et al., 2021). For instance, EMR adoption in the United States is encouraged through the Health Information Technology for Economic and Clinical Health (HITECH) Act which seeks to improve the quality of healthcare through technological advancement (Miller & Tucker, 2022). Nevertheless, the adoption of EMR systems has its difficulties, primarily concerning implementation costs, technological issues, and inadequate integration between systems which ultimately may restrain the functioning of EMR in various networks of healthcare organizations even in developed countries (Wang & Khurshid, 2021). EHR interoperability standards can either be national or regional in order to support the local EMR; this observation has been made by Guenter et al. (2023) who affirm that if ORU local EMR concepts are to improve patient care, then it will be of utmost importance to have harmonized local EMR frameworks to support data sharing.

The shift to adopt EMR systems is somewhat slow in low- and middle-income LMICs largely because of system infrastructure, high implementation costs, and lack of skilled human resources (Luna et al., 2021). Current paper-based systems used in many developing regions' healthcare organizations remain inefficient, error-prone, and vulnerable to data security breaches (Ochieng and Gauld, 2022). It is observed in African settings that fewer hospitals implement wide-ranging EMR systems, many of which encounter operational problems because of insufficient technical support and inadequate funding (Omary et al., 2023). However, these challenges require policy solutions, and especially, enhanced infrastructure as well as training for healthcare staff in order to accomplish EMR adoption efficiently (Bedeley & Palvia, 2022). In Kenya as a developing nation, EMR has not fully

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caught up despite various hospitals and healthcare facilities incorporating its implementation in order to enhance their patients' care as well as management data. However, limitations that include lack of funding, technical problems and resistance from the users are still persistent factors (Musau et al., 2022). The paper recognises this resistance as a call to duty to policy for three converging policies that target both technology and culture to increase the usage and sustainability of EMR systems in Kenyan healthcare facilities. The purpose of this study is to examine EMR systems in use at HCTRH, to fill existing gaps in the knowledge through a description of EMRs used, the purpose served by EMRs, and the comparison of EMR and paper-based patient record systems details the opportunities and challenges of the EMR implementation at HCTRH.

MATERIALS AND METHODS

This research was conducted at Homa Bay County Teaching and Referral Hospital (HCTRH), a level 4 government health facility in Homa Bay County, Kenya. The hospital has a bed capacity of 350 and employs approximately 400 staff members. It offers a wide range of services, including outpatient and inpatient care, surgical procedures, renal care, radiology, and eye care, among others. A cross-sectional study design utilizing qualitative methods was employed, targeting healthcare workers involved in patient care and using Electronic Medical Records (EMRs) during the study period. The healthcare workers came from departments such as casualty, pharmacy, laboratory, and the Comprehensive Care Clinic (CCC). Healthcare providers who consented to participate and complete the questionnaires were included, while those who declined were excluded from the study.

The sampling process involved two stages. First, purposive sampling was used to identify the healthcare providers to participate in the study based on their involvement with EMR systems. Second, convenient sampling was employed to select healthcare workers who were available during the study period. The casualty department had 12 healthcare providers, the pharmacy had 2, the CCC had 8, and the laboratory had 16, making a total of 42 healthcare workers in the target population. To calculate the appropriate sample size, Slovin's formula was applied, which is given as:

Sample size calculation was done using Sloven's formula:

$n= N/ (1+ N (e)^2)$

Where n is the sample size

N is the study population

The study population was 42

e is the margin of error of 5% (Kothari et al., 2005)

$n=42/ (1+42 (0.05)^2)$

n= 38

Data were collected using a structured questionnaire divided into four sections. The first section captured the demographic information of the participants, while the second section explored the extent of EMR utilization among healthcare workers. The third section assessed the perceived benefits of EMR use in patient care, and the final section examined the technological and institutional factors influencing EMR adoption. The questionnaires were designed to gain a comprehensive understanding of EMR usage, and the challenges associated with its implementation. Microsoft Excel 2013 was utilized for data analysis. The data were presented in the form of charts, summary notes, tables, and bar graphs, allowing for clear visualization of the findings.

Ethical considerations were central to the study's conduct. Confidentiality, anonymity, informed consent, and voluntary participation were all ensured throughout the research process. Each participant received a consent letter and was informed of their right to withdraw from the study at any time or refuse to answer specific questions. These measures were in line with ethical research

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practices and aimed to protect the rights and dignity of the participants (Hall & Earle, 2021; Nyatanga et al., 2022). This study provided valuable insights into EMR adoption at HCTRH, offering a foundation for further research in this area, particularly within similar health facilities in Kenya.

RESULTS

The study involved 38 respondents and there was a 100% response rate.

Demographics

The majority of the study respondents were male 68.4% (26), mostly aged 30-40 years 47.4% (18), most of the respondents 55.3% (21) had a diploma education and the majority 47.37% (18) had 2-5years of working experiences as shown in the figure below.

Table 1: Distribution of Gender, age, level of education, and work experience

Demographics	Items	Frequency	Percentage
Gender	Male	26	68.42%
	Female	12	31.58%
Age	<30	13	34.12%
	30-40	18	47.37%
	40-50	7	18.42%
	>50	0	0%
Education level	Certificate	0	0%
	Diploma	21	55.26%
	Undergraduate	15	3.47%
	Postgraduate	2	5.26%
Years of work experience	<1year	1	2.63%
	2-5years	18	47.37%
	6-10years	11	28.95%
	>10years	8	21.05%

Extent of use of EMR

Table 2: Extent of Use of EMR and Computer Systems at HBCTRH

Category	N=38	No. of Cases (%)
Systems Used for Medical Records		
Both paper and electronic records	25	65.79
Electronics only	8	21.05
Paper-based medical records	5	13.16
Frequency of Computer Use		
Daily	35	92.11
Once a week	2	5.26
Once a month	1	2.63
Never	0	0.00
Areas of Application of EMR		
Clinical (patient history, examination, diagnosis, management)	30	78.89
Order tests, imaging, drugs	30	78.89
Administrative	10	26.31
Billing	6	15.79
Health information exchange	30	78.89
Reports	28	73.69
Others	3	7.89

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The data collected from 38 respondents at HBCTRH indicate a diverse application and usage of EMR systems. A majority (65.79%) use both paper and electronic records, while only 21.05% have transitioned exclusively to electronic records. A small proportion (13.16%) rely solely on paper-based records, showing a mixed adoption of EMR systems across the facility.

Daily computer use is high, with 92.11% of respondents using computers every day, suggesting that healthcare staff have adapted to frequent digital engagement. A minority (5.26%) use computers weekly, and 2.63% use them monthly, indicating sporadic computer use among a few staff members.

Regarding EMR application areas, the highest reported usage is in clinical tasks (78.89%), including patient history, diagnosis, and management, as well as ordering tests, imaging, and medications. Health information exchange is also commonly utilized (78.89%), showing a significant role for EMR in facilitating data sharing within the facility. Billing (15.79%) and administrative functions (26.31%) are less frequently managed using EMRs, which could indicate limited involvement by healthcare providers in these areas. Additionally, report generation (73.69%) and other tasks (7.89%) reflect further usage of EMR systems for streamlined healthcare operations.

Institutional and Technological factors hindering EMR Adoption

Table 3: Institutional and Technological Factors Hindering EMR Adoption

Category	N=38	Agree No. of Cases (%)	Disagree No. of Cases (%)
Technological Factors Hindering EMR Adoption			
Lack of general infrastructure for the use of EMR		30 (78.95)	8 (21.05)
Hardware and software compatibility		23 (60.53)	15 (39.47)
Power interference as a challenge		24 (63.16)	14 (36.84)
Time Taken to Procure IT Hardware and Software			
3 months		14 (36.84)	-
6 months		5 (13.16)	-
1 year		3 (7.89)	-
Indefinite		16 (42.11)	-
Speed of Internet Connectivity			
Slow		14 (36.84)	-
Moderate		16 (42.11)	-
Okay		3 (7.89)	-
Fast		5 (13.16)	-

The findings highlight several institutional and technological factors that hinder the adoption of EMR at HBCTRH. A significant proportion (78.95%) of respondents reported inadequate infrastructure as a barrier to effective EMR use, indicating that the institution may lack essential facilities or resources needed to support EMR. Compatibility of IT hardware and software is another key factor, with 60.53% of respondents affirming compatibility issues, which may disrupt EMR functionality and integration with existing systems. Power stability was identified as another challenge; 63.16% of respondents indicated that power interference is a frequent issue, impacting

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EMR access and reliability. This suggests the need for consistent power solutions to sustain EMR operations.

Regarding the procurement of IT hardware and software, 42.11% of respondents noted an indefinite timeline, while 36.84% reported that procurement takes three months. This prolonged acquisition period may contribute to delays in the implementation and maintenance of EMR systems.

Internet speed also affects EMR functionality. Although 42.11% of respondents rated internet speed as moderate, a notable proportion (36.84%) found it slow, which could impact data entry, retrieval, and overall efficiency in accessing EMR systems.

Organizational factors affecting the adoption of EMR

Table 4: Organizational Factors Affecting the Adoption of EMR

Category	N=38	No. of Cases (%)
Supply of IT Consumables		
Problematic		33 (86.84)
Immediate		5 (13.16)
Never supplied		0 (0.00)
Funding as a Challenge		
Agree		22 (57.89)
Disagree		16 (42.11)
EMR Training Offered by Institution		
Agree		24 (63.16)
Disagree		14 (36.84)
Legal Concepts Limiting EMR Use		
Agree		28 (73.69)
Disagree		10 (26.32)
Adequate Technical Personnel Availability		
Agree		22 (57.89)
Disagree		16 (42.11)

The data illustrates key organizational factors that impact EMR adoption at HBCTRH. A major constraint appears to be the supply of IT consumables, with 86.84% of respondents indicating that access to necessary consumables is problematic, which may impede consistent EMR system maintenance and use. Funding is another significant issue; 57.89% of respondents cited funding as a challenge, which could hinder the institution's ability to procure and maintain EMR-related technology and infrastructure. Training on EMR, while available, is inconsistent, with only 63.16% of respondents affirming that training is offered. This indicates a need for improved training programs to ensure staff are proficient in using EMR systems.

Legal restrictions also pose a barrier to EMR adoption, as 73.69% of respondents agreed that legal issues limit EMR use. This may include concerns over data privacy, compliance, or regulatory frameworks that could constrain full implementation. Finally, the availability of technical personnel is a concern. Only 57.89% of respondents agreed that the institution has sufficient technical staff, suggesting that a lack of specialized personnel may impact the effectiveness of EMR support and troubleshooting. Addressing these organizational factors could facilitate a smoother transition and improve the long-term sustainability of EMR adoption at HBCTRH.

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DISCUSSION

The study revealed that the majority of respondents (65.79%) used both paper and electronic medical record (EMR) systems, while 21.05% used electronic systems exclusively, and 13.16% relied on paper-based records. This finding is consistent with studies conducted in other low-resource settings, where hybrid systems (combining paper and electronic records) were commonly used due to the slow pace of EMR adoption (Aguirre, 2022). However, this contrasts with findings from studies in developed countries, where the exclusive use of electronic systems is more prevalent, owing to stronger infrastructural and technological support (Chepkwony, 2015). The use of both systems highlights the ongoing transition from paper to digital systems in developing settings, but it also suggests inefficiencies, as healthcare providers may face challenges in managing dual record-keeping processes.

Regarding the frequency of computer use, the study found that 92.11% of respondents used computers daily, while 5.26% used them once a week, and 2.63% only once a month. This high frequency of daily use indicates a strong reliance on technology in daily healthcare operations, consistent with findings from studies in urban hospitals in Kenya, where healthcare workers reported frequent use of computers for clinical tasks (Wang and Khurshid, 2021). However, this contrasts with studies from rural healthcare settings in sub-Saharan Africa, where access to computers and digital literacy were identified as major barriers to daily use (Waithera, Muhia, & Songole, 2017). The high daily use observed in this study could reflect the relatively urban location of HBCTRH, where access to basic digital infrastructure is more feasible.

The findings also showed that EMR systems were primarily used for clinical tasks (78.89%), including patient history, diagnosis, and management, as well as for ordering tests and medications. This is in line with previous studies that found EMR use to be most beneficial in clinical processes that require real-time access to patient information (Waithera et al., 2017). However, administrative tasks and billing were less frequently performed using EMR systems, with only 26.31% and 15.79% of respondents, respectively, using EMRs for these purposes. This suggests a gap in the full integration of EMR into hospital-wide operations, as was also noted in a study by Vishwanath and Scamurra (2007), where financial and administrative tasks were less digitized due to resource limitations.

The study highlighted several benefits of EMR, with 92.11% of respondents agreeing that EMR improved the quality of work life and allowed for better decision-making. This is consistent with findings from similar studies, where EMR was shown to enhance clinical efficiency, reduce medical errors, and facilitate better patient outcomes (Boonstra & Broekhuis, 2010). Moreover, the majority (84.21%) also agreed that EMR increased productivity and reduced workload, aligning with previous research that identified time savings and streamlined workflows as key advantages of EMR systems (Waithera et al., 2017). However, a minority (15.79%) disagreed with this view, reflecting findings from studies that highlighted the challenges of adjusting to EMR systems, especially among older or less digitally literate staff (Amatayakul, 2017).

The study identified several technological factors hindering EMR adoption at HBCTRH. A lack of general infrastructure for EMR use was reported by 78.95% of respondents, which is consistent with research by Vishwanath and Scamurra (2007) that identified insufficient infrastructure as a major barrier to EMR implementation. Power supply challenges were also cited by 63.16% of respondents, which is a recurring issue in low-resource settings, where unstable electricity hampers the continuous use of electronic systems (Miller, A., & Tucker, 2022). Additionally, 42.11% of respondents reported moderate internet connectivity, while 36.84% reported slow speeds, underscoring the importance of reliable internet for

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effective EMR use. These findings align with previous studies that highlight the need for stable internet connectivity as a critical component of successful EMR implementation (Ochieng and Gauld, 2022) The study also revealed organizational barriers, with 57.89% of respondents citing inadequate funding as a major challenge to EMR adoption. This finding is consistent with previous research that emphasized the need for substantial financial investment to support EMR infrastructure, training, and system maintenance (Amekuedee, 2005). Inadequate technical personnel was another key challenge, with 57.89% of respondents agreeing that there were insufficient IT staff to support EMR systems. This aligns with the study by Alexandria et al. (2011), which identified a shortage of skilled technical staff as a common issue in healthcare facilities attempting to adopt EMR. The study also highlighted legal concerns, with 76.69% of respondents agreeing that legal concepts limited EMR use. This is in line with Boonstra and Broekhuis (2010), who found that unclear legal frameworks around data privacy and security can create apprehension among healthcare providers regarding the use of EMRs.

CONCLUSION

In conclusion, the study revealed that while healthcare providers at HBCTRH recognized the benefits of EMR systems in improving clinical decision-making, productivity, and patient care, several technological and organizational barriers hindered their full adoption and implementation. The lack of adequate infrastructure, unstable power supply, slow internet connectivity, and insufficient funding were major challenges that limited the effective use of EMR systems. Furthermore, the shortage of technical personnel and concerns over legal frameworks contributed to the slow adoption process. Despite these challenges, the study underscored the importance of EMR in enhancing healthcare delivery, particularly in clinical tasks. However, to maximize the potential of EMR, these barriers must be addressed through targeted interventions.

RECOMMENDATIONS

Infrastructure Development

The hospital should prioritize the improvement of its technological infrastructure by ensuring reliable power supply and stable internet connectivity. This can be achieved through collaboration with the county government to provide alternative power sources, such as generators or solar energy, and improve internet service quality at the facility.

Financial Investment

Adequate funding should be allocated to support the continuous upgrade of EMR systems and ensure the procurement of the necessary hardware and software. Government agencies and international donors should be engaged to provide financial assistance to cover the costs of system upgrades and maintenance.

Training and Capacity Building

Regular training programs should be implemented to enhance the digital literacy of healthcare providers and increase their proficiency in using EMR systems. Additionally, the hospital should hire more technical personnel with specialized skills in managing and maintaining EMR systems.

Legal and Policy Frameworks

The government should develop clear legal policies and regulations concerning the use of EMR systems, addressing issues of data privacy, security, and liability. This will help reduce healthcare providers' apprehension and encourage the broader adoption of EMR systems.

System Integration

Efforts should be made to fully integrate EMR systems into all hospital departments, including administrative and billing sections. This will ensure that the entire hospital operates on a unified

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electronic system, leading to better coordination, efficiency, and overall healthcare delivery.

REFERENCES

Aguirre, R. R., et al. (2022). "Electronic Health Records: Their Role in Quality and Safety Improvement." Journal of Patient Safety.

Amekuedee, J. O. (2005). An Evaluation of Library Automation in Some Ghanaian University Libraries. The Electronic Library, 23, 442-452. https://doi.org/10.1108/02640470510611508

Bedeley, R., & Palvia, P. (2022). "Health Information Systems in Developing Countries: A Critical Review." Journal of Global Information Management.

Birk, S., et al. (2021). "Global Trends in EMR Adoption and Policy Impact." Healthcare Policy Journal.

Boonstra, A., & Broekhuis, M. (2010). Barriers to the Acceptance of Electronic Medical Records by Physicians from Systematic Review to Taxonomy and Interventions. BMC Health Services Research, 10, 231. https://doi.org/10.1186/1472-6963-10-231

Chepkwony, M. C. (2015, January 1). Factors influencing the adoption of electronic medical records technology in public health institutions in Kenya: A case of Hospitals in Nairobi County.

Hall, B.H and Khan, B. (2002). Adoption of New Technology. In New Economy Handbook. Berkeley University, Berkeley, 1-38. https://doi.org/10.3386/w9730

Kothari, S. P., Leone, A. J., & Wasley, C. E. (2005). Performance matched discretionary accrual measures. Journal of Accounting and Economics, 39(1), 163–197. https://doi.org/10.1016/j.jacceco.2004.11.002

Luna, D., et al. (2021). "Barriers to EMR Adoption in Low-Resource Settings." International Journal of Medical Informatics.

McGinn, T., et al. (2020). "Adoption of EMR Systems in the US: What are the Key Drivers?" Health Affairs.

Miller, A., & Tucker, C. (2022). "Economic Incentives and EMR Adoption in the US Healthcare System." Health Economics.

Musau, P., et al. (2022). "Challenges to EMR Adoption in Kenya's Healthcare System." Journal of Global Health Reports.

Ochieng, D., & Gauld, R. (2022). "EMR Implementation in Sub-Saharan Africa: Challenges and Opportunities." BMC Health Services Research.

Omary, Z., et al. (2023). "An Evaluation of EMR System Effectiveness in East African Hospitals." African Health Sciences.

Vishwanath, A., & Scamurra, S. D. (2007). Barriers to adoption of electronic health records: using concept mapping to develop a comprehensive empirical model. Health Informatics Journal, 13, 119-134.

Waithera, L., Muhia, J., & Songole, R. (2017). Impact of electronic medical records on healthcare delivery in Kisii Teaching and Referral Hospital. Medical & Clinical Reviews, 03(04). https://doi.org/10.21767/2471-299x.1000062

Wang, H., & Khurshid, A. (2021). "Interoperability Challenges in EMR Systems: A Review." Journal of Healthcare Informatics Research.

