Challenges and Opportunities in the Utilization of Electronic Medical Record Systems in Selected Hospitals in Meru County

***Mary Mumbi Ng'ang'a*[1*]**

[1]*Kenya Methodist University, P.O. Box 45240-00100, Nairobi, Kenya*

[*]*Corresponding author's Email: mary.nganga@kemu.ac.ke*

Abstract

The deployment of Electronic Medical Record Systems (EMRs) has been on the rise in Kenya. Although there has been an increasing adoption of these systems in the country, quite a few studies have been conducted in Kenya to investigate utilization of Electronic Medical Record Systems (EMRs) among healthcare workers in facilities that have deployed such systems. The present study sought to address the challenge of inadequate knowledge regarding healthcare workers' EMR utilization rates and the challenges that they face when utilizing these systems in facilities where they have been adopted in Meru County, Kenya. The study adopted a mixed-methods approach and three hospitals in Meru County were selected for study. Thirty respondents, comprising nurses, clinical officers and doctors from the three selected hospitals, were interviewed to provide data. Quantitative data was analyzed using frequency statistics, while qualitative data was analyzed using thematic analysis and NVivo qualitative data analysis software. The findings revealed high rate of utilization of EMRs due to the mandatory requirements, improvement in patient outcomes and increased efficiency. However, network failure and system breakdown were reported to be key challenges in utilization of EMRs. The study recommends proper training of healthcare workers on use of EMRs and incorporation of enhanced EMRs security systems. The systems should also be upgraded frequently.

Keywords: *Electronic Medical Record Systems, utilization, opportunities, challenges, threats*

IJPP 12(2); 99-108

1.0 Introduction

Electronic Medical Record systems (EMRs) are computer systems used by healthcare workers to collect, store, analyze, and share relevant patients' medical information, such as patient's medical history, diagnosis, consultation notes, medicine, and allergies (Raymond et al., 2015). Advanced technology in the world today has facilitated easier exchange of clinical information among health-care personnel and improved the quality of health-care services. The efficacy of medical interventions and other healthcare services highly depends on a trustworthy and integrated history of individual health and medical status (Abdu et al., 2021). The use of information technology (IT) in health has revolutionized and improved the delivery of healthcare services around the globe. IT has been used in hospitals for admission and management of clients, management of human resources, acquisition of resources, and emergency fleet management among others. In the past, all such tasks were managed using paper-based record-keeping systems, which proved to be inefficient in terms of information retrieval, security, data quality as well as facilitating concurrent data access (Mkalira et al., 2019). Paper-based records are still being utilized by healthcare professionals, for the reason that many healthcare professionals are more familiar with paper-based records after using them for a long time.

Benedictis et al. (2020) observe that EMRs help enhance care quality and safety, minimize healthcare cost, enhance clinical processes, and improve clinical research. Paper-based records, however, have their limitations such as illegible handwriting, which makes it difficult to read, thereby causing medical errors. Bloom et al. (2021) carried out a national study of RCEM members and fellows working in the NHS in the UK, to demonstrate usability of EMR systems. The median usability score across all the EMR systems in Bloom et al (2021) study with about 20 responses were 53 (IQR 35–68), with a range of 65–35. Only three EMRs had a median that included the standard of the industry of 68 within the upper bounds of the 95% CIs. Individual responses indicated that significant determinants of usability included having simple systems with functions that are well-integrated. Once adjusted for EHR system, usability was also associated with healthcare organization; that is, there was an association between usability and individual NHS Trusts or Health Boards (Bloom et al., 2021).

Ngugi et al. (2021a) state that EMR adoption has grown in developed and developing nations. Mkalira et al. (2019), in their study in Malawi, revealed that differences in age, gender, and previous experience in computer usage had no association with EMR usage. However, education and levels of employment were found to have a positive association with EMR utilization. Hardware and connectivity problems, as well as lack of training and support from the management, negatively influenced the utilization of EMRs. EMRs were found to improve the quality of data, as well as its efficiency in patient management.

In a study carried out in Ethiopia, majority of respondents were aware of the potential functions of EMR in dealing with patient

data, reduction of errors, and improving the quality of care. More than three-quarters of respondents agreed that EMR improves timely patient care decisions, reduces medical errors, and can be readily acceptable by users (Abdu et al., 2021). Kenya is among the countries where EMR deployment is rising (Muinga et al., 2018; Ngugi et al., 2021a). Despite the increasing deployment of EMRs in Kenya, few studies have been conducted to evaluate EMR utilization by healthcare workers (Ngugi et al., 2021a; Ngugi et al., 2021b). Therefore, little is known regarding usage rates of EMR in the country and the factors that enhance and hinder EMR use in healthcare facilities. According to Ngugi et al. (2021b), few studies focus on EMR utilization by healthcare workers following their implementation in different healthcare facilities in Kenya. Nandikove et al. (2018) also observe that few studies focus on EMR usage in Kenya. Ngugi et al. (2021b) conducted a study on EMR utilization in Kenya. However, their study focused on the number of EMR users, data exchange, data completeness, and patient identification. However, the research did not focus on user-related factors influencing healthcare professionals to use EMRs in their tasks and the challenges they face when utilizing EMRs. Ngugi et al. (2021a) a study on user-related factors influencing EMR usage in the country, understand, factors and challenges that affect EMR utilization in healthcare facilities in different parts of Kenya. Results indicated inadequate utilization of EMRs in Kenyan hospitals.

Inadequate research on the systems' use in Kenyan hospitals limits understanding of some barriers hindering effective EMR utilization. Understanding EMRs utilization barriers and facilitators is crucial to enhancing EMR use in hospitals in Kenya. In Kenya, public and private healthcare facilities are increasingly implementing EMRs (Muinga et al., 2018; Nandikove et al., 2018; Ngugi et al., 2021a; Ngugi et al., 2021b). According to Muinga et al. (2018), the adoption of EMRs in Kenya, especially in the public sector, is driven by donor-funded projects. The adoption of EMRs to fight diseases and conditions like HIV aims to enhance record-keeping and the use of data to enhance patient care (Haskew et al., 2015). Fighting specific diseases drives adoption of EMR in Kenya. Other contributing factors to EMR adoption among healthcare facilities in Kenya include reducing paperwork, improving productivity, better healthcare decision-making, and enhancing collaboration in healthcare delivery (Kang'a et al., 2017; Waithera et al., 2017; Muinga et al., 2018).

"Factors such as level of education, employment status, connectivity problems, training and support from the management influence the utilization of EMRs."

Examples of EMRs systems in use in healthcare facilities in Kenya include KeEMRs, IQCare, OpenMRS, Care 2000, Funsoft and Comprehensive Patient Application Database (CPAD) (Waithera et al., 2017; Ngugi et al., 2021a). Public facilities adopt the national-level EMR systems supported by the Kenyan Ministry of Health (MOH) (Muinga et al., 2020). However, private facilities are free to adopt systems that suit their needs.

Implementing EMRs in public healthcare facilities in Kenya gained momentum in 2012, thanks to partnerships between the MOH and local and international donors (Ngugi et al., 2021a). The partnerships led to adoption of five EMRs. Much money and time have been invested in developing, implementing, and maintaining EMRs in different healthcare facilities in Kenya (Muinga et al., 2018; Ngugi et al., 2021a). The aims of EMR investment in Kenya include improving patient care quality and safety, improving healthcare data share-ability, and minimizing paperwork (Kang'a et al., 2017; Waithera et al., 2017).

It is impossible to achieve these objectives if healthcare professionals fail to effectively utilize implemented EMRs. The objectives of this study objectives were to; (i) determine the EMRs utilization rate among healthcare workers (ii) determine factors that facilitate EMRs utilization among healthcare workers (iii) determine the challenges that healthcare workers face when utilizing EMRs and (iv) explore opportunities that can help enhance EMRs usage in selected hospitals within Meru County. The current study investigated utilization rate of EMRs in selected facilities to help evaluate whether the systems are being utilized to achieve their intended goals. The information was relevant to decide if interventions to promote usage of EMRs are needed, and to inform the most effective strategies. The study also sought to understand the challenges that prevent healthcare workers from effectively utilizing EMRs. This will help to effectively deal with EMR implementation challenges, thus improving EMRs utilization in Kenya. Data on opportunities that can help enhance utilization of EMR was also collected and analyzed. The findings regarding opportunities that can help enhance usage of EMR also is anticipated to enhance the systems' utilization in the country for quality patient care.

Jean Watson's theory of human caring was applied in this study is the. According to this theory, health professionals are concerned with health promotion, prevention of illnesses, caring for the sick and restoring health (Watson, 2006). The theory is appropriate for this study since documentation is key when it comes to continuity of patient care and restoration of health. Use of EMR can enhance documentation since there will be minimal loss of data if any, and retrieval is also easy especially in emergency situations, thus saving lives.

2.0 Materials and Methods

The study adopted mixed-methods approach. Three hospitals in Meru County were selected for this study. Thirty participants, ten from each hospital, comprising of nurses, clinical officers and doctors were selected.

Selection of the sample size was informed by the funding available for this study. Multi-stage sampling, then purposive sampling method, were used to select hospitals for case study. Purposive sampling was informed by the fact that not all the selected hospitals within the county were fully utilizing the EMRs. The first stage involved recruiting all the level 5 hospitals. The second stage involved selection of hospitals that were utilizing the EMRs. The third and final stage involved selecting hospitals that were fully utilizing EMRs in both the in and out-patient records. Purposive sampling was also used to select informants, who included the nurses in-charge and the doctors and clinical officers. There were similar questions in the interview guide for all the cadres of respondents. In each hospital, stratified sampling was used to get the number of participants in each cadre, since the lead persons and nurses' in-charge were more than the required sample size. Simple random sampling technique was then used to select the participants in each strata. Data was collected using prior-prepared interview guide. The interview guide contained socio-demographic data and data on rate of utilization of EMRs. Microsoft (MS) Excel software was used to analyze data and develop frequency statistics. Thematic analysis and NVivo qualitative data analysis software were used to analyze the qualitative data regarding factors that facilitate EMR usage, the challenges healthcare workers face when utilizing EMRs, and the opportunities for enhancing usage of EMRs.

Authorization to conduct the study was sought form the Kenya Methodist University Ethics and Review Committee, and research permit obtained from the National Commission for Science, Technology and Innovation (NACOSTI). The permission to collect data was also obtained from the administration of the sampled hospitals. As outlined by Traianou and Hammersley (2021), participants were fully informed about the study's purpose and participation before they consented to participate in the study. Personally identifiable information (PFI) was kept confidential to protect participants from negative effects that could arise from taking part in the study.

3.0 Results and Discussion

The research found that 87% of healthcare professionals understand EMR and its application in the current healthcare processes. All the agreed to receiving training on the use of EMR. Sanitas Health Management Information System and MED 360 were used in one of the sampled healthcare facilities. The difference in the systems did not have much significance in the findings since the data that is input is basically related.

According to Obwocha et al. (2016), healthcare professionals in Kenya require training on data tools and ICT systems. However, without proper and adequate training, the healthcare professionals' use of information is compromised. Table 1 shows the utilization rate of EMRs among the participants.

Table 1

EMR Utilization

Dimension	Factor	Proportion (%)
Understand EMR	Fully Understand	87
	Partially understand	13
	Does not understand	0
Period of Use of EMR	< 6 months	10
	6-11 months	10
	1-2 years	53
	Over two years	27
Instances Not Used	Yes	37
	No	63
Mandatory requirement to use EMR	Yes	83
	No	17
Trained to use EMR	Yes	100
	No	0

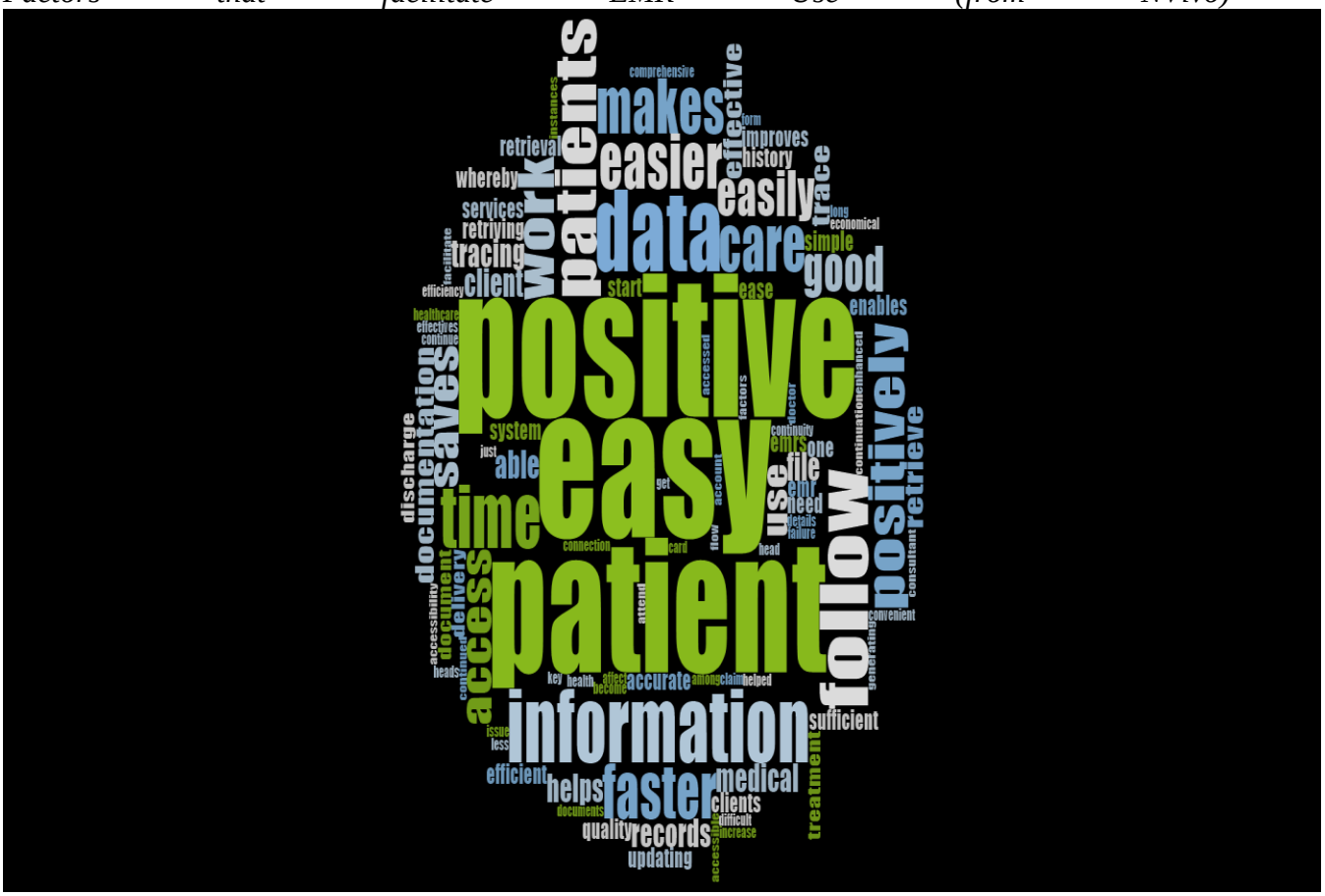
Results in Table 1 indicate that most participants (60%) are 20-29 years and the rest (40%) are 30-39, and job training within hospitals in Meru County is least likely. Most of the participants in the aforementioned age groups receive training in the use of EMR during their study. Most participants (53%) have utilized EMR for 1-2 years, 27% for over two years, while the rest for less than a year (20%). 83% of respondents highlighted it is a mandatory requirement for them to use EMR; 17% stated that EMR was not a requirement and thus they utilized it to reinforce other data systems.

Obwocha et al. (2016) study conducted in Gucha Sub-County, Kisii County, Kenya, identified an EMR healthcare policy within the hospital as a major factor in increasing utilization. Healthcare workers require information at individual and community levels for effective clinical management to increase efficiency and effectiveness.

This study also found that 37% of the participants have have not utilized the EMR substantially. According to Muinga et al. (2020), the adoption of digital health systems in Kenyan public hospitals is influenced by network issues. Most hospitals have not completely transitioned to electronic health records, and they rely on manual files to store patient records (Muinga et al., 2020). However, Kithinji (2018) identified progress in implementing information technology in Meru county public hospitals. Therefore the end users' expectations of the EMR for exceed the availability of these technological solutions.

Figure 1

Factors that facilitate EMR Use (from NVivo)

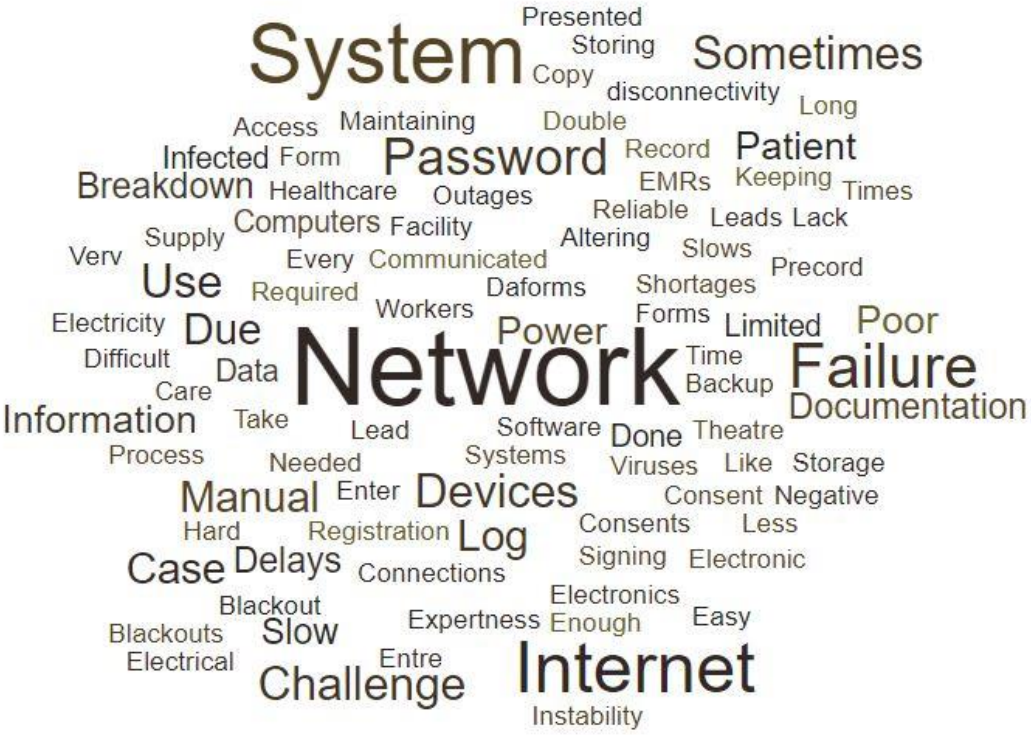


Beyond the mandatory requirement for hospitals to use EMR, there is a significant perception that EMRs yield positive benefits on the quality of healthcare services. Since healthcare workers know the benefits of care coordination, they utilize EMR to improve patient outcomes (Waithera et al., 2017). EMR enables healthcare professionals to follow the patient from the start until discharge. However, some respondents felt that using EMR poses critical challenges in healthcare quality since *much time is spent updating medical records*. However, in most instances, *health care has improved.*

The second key theme was factors which facilitate utilization of EMR. At the operational level, *using EMR saves time since there is less paperwork, and it is simple and convenient.* Most respondents are committed to using EMR since it saves time required to retrieve information. According to Kimani (2021), using EMR is faster and more efficient than paperwork. The easier tracing of patient information makes it easy to deliver healthcare services quickly.

Figure 2

Challenges in the Use of EMRs (from NVivo)



As shown in Figure 2, challenges faced by the respondents while using EMR included *power and network failure, internet instability, long patient keeping times, poor system maintenance as well as use of passwords*. With the passwords, most felt that if anyone gets to know another's password, they may use it to add malicious information to their records. Bloom et al. (2021) in their study on the NHS in the UK, demonstrated usability in EMR systems that was not up to standards. Individual responses indicated that determinants of usability included having simple systems with functions that are well-integrated. According to Muinga et al. (2020), the adoption of digital health systems in Kenyan public hospitals is influenced by network issues.

Qualitative analysis of the respondents' thoughts, perceptions and experiences highlight technical issues as key factors that influence the use of EMR. *Network failure, system breakdown, and slow internet* delay the level of utilization of the EMR. Respondents suggested upgrading the network infrastructure as a solution to ineffectiveness of EMR. The qualitative analysis highlights *proper training and better security protocols as effective strategies to increase utilization of EMR.* Like other technological solutions, data security and privacy are major concerns, and both human factors and technical aspects must be improved.

Kithinji (2018) explained the significance of addressing organizational factors so as to leverage the value of EMR in public hospitals. Employees who manage healthcare unit should receive advanced training in using EMR and the strategic opportunities that ensue from its use. This is important to ensure all healthcare workers understand the trouble shooting options available to them. With advanced training, all healthcare professionals have the skills to protect the system from fraud. To achieve this, all hospitals in Meru County should have a comprehensive EMR policy to increase commitment to resolving the technical and human factors which affect utilization of EMR.

4.0 Conclusion

The study concluded that there is increased utilization of EMRs in healthcare facilities in Meru County., Healthcare and management impact of EMRs has motivated healthcare professionals to use EMRs. Further, the study noted that various challenges, including breakdown of the system and network failure, are key threats to the utilization of Electronic Medical Reports systems. Hence, proper training and better security protocols are effective strategies for increasing utilization of EMRs. Like other technological solutions, data security and privacy are major concerns, and both human factors and technical aspects need to be improved.

5.0 Recommendations

The study recommends that the lead persons in records department, together with the Information and Communication technology personnel be incorporated into the EMRs to prevent fraud. The systems should also be upgraded frequently and regular on-job training be conducted for healthcare workers every time the system is upgraded or whenever new staff are recruited. This study focused on mission/private hospitals since they are the only ones that met the criteria of full utilization of the EMRs. The researcher therefore recommends to the director of health services in Meru County, to facilitate and embrace full utilization of EMRs.

References

Bloom, B. M., Pott, J., Thomas, S., Gaunt, D. R., & Hughes, T. C. (2021). Usability of Electronic Health Record Systems in UK EDS. *Emergency Medicine Journal*, *38*(6), 410–415. https://doi.org/10.1136/emermed-2020-210401

Haskew, J., Ro, G., Turner, K., Kimanga, D., Sirengo, M., & Sharif, S. (2015). Implementation of a cloud-based electronic medical record to reduce gaps in the HIV treatment continuum in rural Kenya. *PLOS ONE*, *10*(8), e0135361. https://doi.org/10.1371/journal.pone.0135361

Kang'a, S., Puttkammer, N., Wanyee, S., Kimanga, D., Madrano, J., Muthee, V., Odawo, P., Sharma, A., Oluoch, T., Robinson, K., Kwach, J., & Lober, W. B. (2017). A national standards-based assessment on functionality of electronic medical records systems used in Kenyan public-sector health facilities. *International Journal of Medical Informatics*, *97*, 68-75. https://doi.org/10.1016/j.ijmedinf.2016.09.013

Kiilu, E. M., Okero, D. C., Muiruri, L., & Owuondo, P. A. (2015). Human resource capacity for information management in selected public healthcare facilities in Meru County, Kenya. *Pan African Medical Journal*, *20*, 334-343. https://doi.org/10.11604/pamj.2015.20.334.6052

Kimani, J. (2021). Influence of information technology on patient care. *Journal of Technology and Systems*, *3*(1), 22-35. https://carijournals.org/journals/index.php/JTS/article/view/550

Kithinji, A. K. (2018). *Factors Influencing Implementing Health Management Information System in Public Hospitals: a Case of Meru Teaching and Referral Hospital, Meru County, Kenya* [Doctoral dissertation, University of Nairobi]. Kenya. http://hdl.handle.net/11295/105246

Msiska, K. E. M., Kumitawa, A., & Kumwenda, B. (2017). Factors affecting the utilisation of electronic medical records system in Malawian central hospitals. *Malawi Medical Journal*, *29*(3), 247-253. https://doi.org/10.4314/mmj.v29i3.4

Muinga, N., Magare, S., Monda, J., English, M., Fraser, H., Powell, J., & Paton, C. (2020). Digital Health Systems in Kenyan Public Hospitals: A mixed-methods survey. *BMC Medical Informatics and Decision Making*, *20*(1), 1-14. https://doi.org/10.1186/s12911-019-1005-7

Nandikove, P., Wanja M. T., & Njuguna, S. (2018). Technical Factors Affecting Electronic Medical Record System Information Use: A Case of Kakamega County Referral Hospital Outpatient Department. *Journal of Nursing and Health Science*, *7*(2), 31-19. https://doi.org/10.9790/1959-0702073139

Ngugi, P., Babic, A., & Were, M. C. (2021). A multivariate statistical evaluation of actual use of electronic health record systems implementations in Kenya. *PLoS One*, *16*(9), e0256799. https://doi.org/10.1371/journal.pone.0256799

Obwocha, W., Ayodo, G., Nyangura, A., & Thomas, O. (2016a). Utilization of healthcare information among healthcare workers in Gucha subcounty, Kisii County, Kenya. *Journal of Health Education Research & Development*, *4*(4), 1-10. https://doi.org/10.4172/2380-5439.1000192

Waithera, L., Muhia, J., & Songole, R. (2017). Impact of electronic medical records on healthcare delivery in Kisii teaching and Referral Hospital. *Medical & Clinical Reviews*, *3*(4), 21-28. https://doi.org/10.21767/2471-299x.1000062

Watson, J. (2006). From carative factors to clinical caritas processes. Retrieved July 18, 2023, from https://www2.uchsc.edu/son/caring/content/evolution.asp. In Berman, A., Snyder, S. J., Frandsen, G., & Kozier, B. (2022). *Kozier & Erb's fundamentals of nursing: Concepts, process, and Practice*. Pearson Education Limited.