African Journal of Public Administration and Environmental Studies (AJOPAES)

ISSN 2753-3174 (Print) ISSN 2753-3182 (Online)
indexed by IBSS, EBSCO and SABINET. It is accredited by DHET (the South African regulator of Higher Education)

Volume 4, Number 1, March 2025

Pp 25-43

Electronic Medical Records Adoption Readiness in Selected Public Hospitals in Gauteng Province of South Africa

DOI: https://doi.org/10.31920/2753-3182/2025/v4n1a2

Mulatu Fekadu Zerihun
Department of Economics, Tshwane University of Technology
ORCID ID: https://orcid.org/0000-0003-4797-928X
Email: Zerihunmf@tut.ac.za

&

Kenneth Boitshepo Magodielo
Department of Finance and Investment, Tshwane University of Technology
ORCID ID: https://orcid.org/0000-0002-4545-1097
Email: boitshepokenneth2@gmail.com

Abstract

The objective of this study is to assess the electronic medical records adoption readiness in the selected public hospitals in South Africa. The study used descriptive analysis with a set of interview questions and closed-ended questionnaires to assess the electronic medical records (EMR) adoption readiness among 200 health administrators/workers in public hospitals in Gauteng province. To turn around on going massive losses of medical records owing to the absence of an adequate file management system, the authors pursue to understand the EMR adoption readiness among healthcare workers in public hospitals. This study finds that health workers are increasingly becoming more interested and embracing the use of electronic medical records systems irrespective of the current challenges that are in place. The ingenuity of this study is because this study used open-ended interview questions to conduct research amongst health

administrators. Adopting Electronic Medical Records (EMRs) in South African hospitals faces several challenges, which can be broadly categorised into soft and hard infrastructure, technical, financial, organisational, and societal issues. Addressing these challenges often requires a concerted effort from government bodies, healthcare institutions, and technology providers to create a supportive environment for EMR adoption.

Keywords: *Electronic Medical Records; File management system; Health Administrators; Public hospitals.*

Introduction

Adoption of the electronic medical records (EMR) systems in the African continent continues to be a challenge (Kiri and Ojule 2020). According to Ohuabunwa *et al.* (2016), EMR benefits outweigh the benefits of using a paper-based file management system, which attributes to the fact that an EMR system can generate better patients' historic health information. EMR system can gather patient demographics, medical problems, vital signs, past medical conditions, immunisations, radiology information, laboratory data and improve safety (Crispin *et al.* 2022).

EMR systems have been praised and encouraged in high-income countries such as the United States of America and the Netherland because there is scientific understanding that EMR can affect clinical outcomes by bettering the quality of care and decreasing medical faults (Davis and Khansa 2016). In South Africa, the National Department of Health (NDoH) is promulgated by the National Health Act 61 of 2003 to develop and maintain information systems from national, provincial, and local spheres to create a robust national information system. To develop this national information system using manual files is a challenge and makes reporting to the current National Health Information System (HIS) difficult. To address this challenge, the NDoH has developed the National Digital Health Strategy that is being used to aid with the roll-out of the new Health Patient Registration System (HPRS) at Primary Health Care (PHC) facilities (National Department of Health 2019).

The use of manual paper-based files has created enormous problems for medical practitioners, as they often need to perform the same tests multiple times because patients' files are being lost, or they are removed from the hospital. It has been discovered that chronic patients often take the medical files home to skip the long queues next time they visit the

hospital. Meanwhile, the adoption of Electronic Medical Records (EMRs) among South African hospitals faces several challenges, which can be broadly categorised into soft and hard infrastructure, technical, financial, organisational, and societal issues (Department of National Health, 2019; Maphumulo & Bhengu, 2019; Zenda, Voster, and Da Viega, 2020; Matsheta and Sefoka, 2023). Addressing these challenges often requires a concerted effort from all the government structures, healthcare institutions, and technology providers to create a supportive environment for EMR adoption (Thulare, Herselman, & Botha, 2020).

The objective of this study is to assess the EMR adoption readiness among health administrators at three hospitals (Dr. George Mukhari Academic Hospital, Mamelodi Regional Hospital, and Thelle Mogoerane Regional Hospital) in Gauteng province in South Africa. Existing research on EMR adoption in South Africa is primarily concentrated on reasons why the EMR cannot be adopted, citing challenges such as loadshedding, financial backlog, and fragmented infrastructure (Rios and Kavuluru 2018; Dzinamarira *et al.* 2020; Dube and Moyo 2022). This study affirmed that health workers are increasingly becoming more interested and embracing the use of electronic medical records systems irrespective of the current challenges that are in place. To successfully enroll in the electronic medical records system, one should belong to a global community that has an advanced knowledge hub on health informatics and invest in eHealth research. The rest of this study is organised as follows. Section two presents the literature review, section three presents methodology, and section four presents results analysis and discussions. The last section presents the conclusion of the study and deduces policy implications.

Literature Review

A review of EMR adoption readiness is very important, as it will aid with understanding the level of EMR usage readiness amongst healthcare workers. The EMR has proved numerous times to be beneficial in servicing a high volume of patients; not only is electronic filing important in the health sector, but it also plays a crucial role in creating a database that is accurate and in providing prompt access to information when it is needed. The main purpose of electronic filing is to store information in a central server for unified management using information technology (He *et al.* 2021).

Figure 1 below indicates how several countries have shown a great interest in implementing national EHR initiatives, especially in primary

healthcare. In 2021, there were 39 countries where EMR systems were established, primarily in North America and Europe. According to the Organisation for Economic Cooperation (OECD) survey, countries in North America, Europe, Australia, and Eastern Asia are using multi-disciplinary approaches to implement national EMR systems. They are all driven by a common goal: to achieve "better health care".

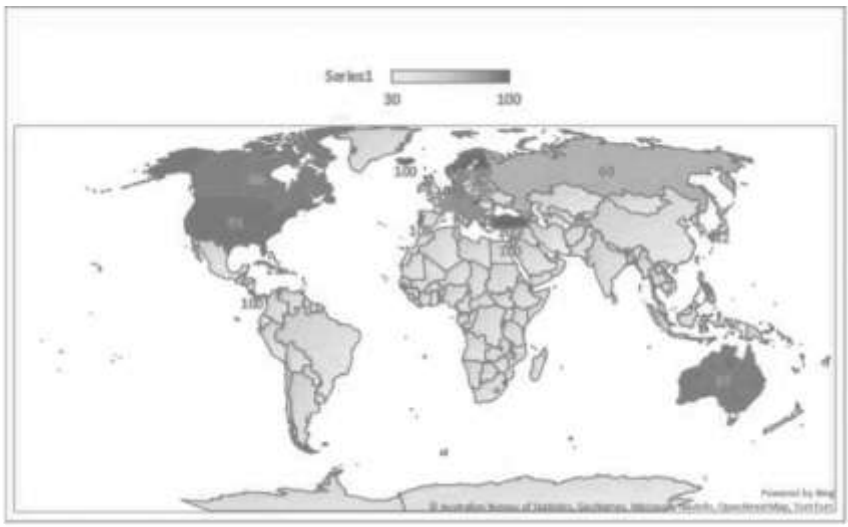

FIGURE 1: Proportion of primary care physician offices using EMR
Source: OECD (2021)

Lander *et al.* (2020) assessed EMR readiness amongst medical students at two institutions in the United States of America, using descriptive statistics, and performing cross-institutional comparisons. A total of 147 medical students participated, and over 50% were females. They found out that medical students are confident in using EMR to look for information, and genders irrespective of age, are more willing to use EMR to perform tasks. The study concluded that EMR must be included as part of curricular development, as this will assist medical students to be introduced to EMR at an early stage of their career to avoid resistance later. Kuo *et al.* (2013) investigated the effect of nurses' technology readiness on the acceptance of EMR and their perception towards using EMR in Taiwanese hospitals. The study used the Technology Acceptance Model (TAM), which incorporates the use of the Technology Readiness (TR) index. TR is currently the most robust measure of technology; it combines theoretical and comprehensive aspects for behavioural investigations (Parasuraman and Colby 2015). 878 questionnaires were

administered to full-time registered nurses; 213 questionnaires were spoilt, and only 665 were useful; 99% of the respondents were female. The study used Partial Least Square software to make the analysis. Results indicated that most of the nurses are concerned about security issues with EMR. Nurses who are optimistic about EMR indicated that they are ready to adopt the use of this system, those who are pessimistic want the hospitals to provide an easy-to-use EMR system and provide continuous education on the usage of EMR. In general, the nurses have been ready to use the EMR system if it is easy to use, has strong security features, and has continuous training for the hospital staff.

Mollart et al. (2020) conducted a peer-review of 23 articles on the use of EMR teaching and learning as part of nursing students' curricular development. These articles were assessed using a Critical Appraisal Skills Program (CASP) checklist. All the 23 articles analysed indicated that there is a need for higher education curriculum to include EMR teaching and practice in the undergraduate nursing syllabus. The study performed by Borycki *et al.* (2013) indicated that EMR is an important prerequisite for information technology inclusivity for professional competencies and the state board requirements. Biruk *et al.* (2014) disclosed that the adoption of EMR will increase if awareness, knowledge, and expertise of health professionals on EMR systems can be accelerated before any implementation of these systems.

The disadvantage of SmartCare Software is that it is only used in the file department, whereas the clinical departments use different systems. This remains a global problem; most EMR systems are not in full use and not integrated into other departments within hospitals. Yehualashet *et al.*, (2021) refer to this phenomenon as a lack of EMR knowledge; many technicians do not understand that the EMR system is not a file management system. According to Lokmic-Tomkins *et al.* (2023), EMR records health information that can be used by authorised clinicians and health workers within the institution. This means that the EMR system is not the sole responsibility of administrators in the file department but a responsibility of everyone who engages and uses the EMR system.

In addition, EMR systems are being introduced to better healthcare institutions' data management, communication, and decision-making process (Awol *et al.* 2020). Accurate patient information can be a matter of life and death, and if it is readily accessible, it can save lives (Walle *et al.* 2023). A study to assess EMR readiness among health professionals in Ethiopia was conducted by Walle *et al.* (2023); the results indicated that the level of readiness to adopt EMR in Ethiopia is low. However, health professionals in Ethiopia are ready to utilise EMR systems. The study

cited that slow technology development in Ethiopia is the core reason the EMR system cannot be fully adopted. Health professionals who are knowledgeable about EMR and who are optimistic are more likely to be ready to use the EMR system; attitude towards technology plays an essential role in determining if the health professionals are more willing to adopt the usage of the EMR system (Melas *et al.* 2014; Awol *et al.* 2020; Walle *et al.* 2023).

Scientific understanding of EMR systems and their benefits is not only limited to high-income countries; low- and middle-income countries have reconfigured EMR systems to fit their needs with known resource constraints. According to the World Health Organisation (WHO) survey, a total of 114 nations are working on national EMR systems (Webster 2011). This information may need to be updated since the survey was conducted a decade ago. In Africa, South Africa, Kenya, Rwanda, Lesotho, Ghana, Zimbabwe, Mozambique, Sierra Leone, Uganda, and Tanzania are some of the leading countries that are working on national EMR systems. According to Nordling (2020) the impulsion of EMR adoption in African countries is driven by the increase in infectious diseases as the leading cause of death, with human immunodeficiency virus (HIV) and multi-drug-resistant tuberculosis (TB) being the major contributors.

According to Adetoyi & Raji (2020), manual paper-based medical records still have a role to play in developing countries. These types of medical records are easy to use but impose many challenges that contribute to health services not being efficient and effective. On the other hand, the EMR has proven many times to be a success in ensuring quality and efficient healthcare services (Galnares*et al.* 2021; Sayed 2021). Moreover, there is empirical evidence that *eHealth* initiatives are becoming essential for improved and quality healthcare. However, according to Shiferaw & Mehari (2019), developing countries still rely on manual, paper-based filing, which has proved to be inefficient, resulting in problems such as duplication of efforts, missing patients' medical records, and time wastage. Sub-Saharan countries indicate slow progress in adopting the use of technology, mainly because of their socioeconomic status. There are fewer studies conducted on EMR acceptance in this region (Shiferaw & Mehari, 2019).

Research Methodology

This study employed descriptive analysis and graphical illustrations to assess health workers' readiness for adopting eHealth initiatives to fulfill

their duties. Interview questions and closed-ended questionnaires were administered to a sample of 200 public hospital staff members. The interviews concentrated on obtaining information on how the administrative staff operates, the challenges they face, and assessing their readiness to adopt eHealth initiatives such as EMRs. One of the senior administration personnel requested to remain anonymous and did not sign the consent form but was more than happy to participate. Although the interviews were recorded, the circumstances under which the interviews were held were not entirely conducive. Many of the administrative staff were on duty and were permitted to participate as long as their participation did not disrupt their duties. Due to this constraint, the turnout for participation was not as anticipated. Twelve administrative officers agreed to participate, with senior patient administration officers participating based on anonymity. The interview was conducted in English; however, most participants were comfortable responding in their native language (mostly Setswana and Sepedi). Questions were translated into Setswana to accommodate research participants and elaborated on to ensure that the participants understood what was asked.

The questions were directed towards the senior administration personnel and administrative officers of Dr George Mukhari Academic Hospital, Mamelodi Regional Hospital, and Thelle Mogoerane Academic Hospital. All interviews were recorded, and notes were taken to ensure the researcher recalled the events and details of the interviews. Open-ended interviews were conducted, and no formal structured responses were expected from the participants as participants' responses reflected their day-to-day work and experience. Open-ended interviews allowed the participants to be free and to speak their minds. Stakeholder theory and unified technology adoption and usage theory have been used as theoretical foundations of EHR acceptance/adoption contexts.

Results and Discussions

The results of this study are divided into two parts; the first part highlights the common challenges that are faced across these three hospitals from the open-ended interviews conducted, and the second part makes use of descriptive analysis to interpret the results of the close-ended questionnaires.

Common challenges across Dr George Mukhari Academic Hospital, Mamelodi Regional Hospital, and Thelle Mogoerane Regional Hospital

There is a high level of dissatisfaction among patients about the healthcare service provided at these public hospitals. Patients queue for long hours to receive service, and some arrive early in the morning at the hospital to ensure they are first in the queue. The appointment system at Dr George Mukhari Academic Hospital is defaulting and makes it hard for administrators to perform their functions. Each day, the hospital has the maximum number of patients it is prepared to serve (except in case of emergencies). This gets complicated when patients do not honour their appointments and visit the hospital on random days to receive treatment. The high number of unplanned patient visits further contributes to the hospital not being efficient and effective in attending to patients on time. Dr George Mukhari Academic Hospital has no plans for patient influx but to attend to patients on a first–come and first-serve basis. The patients who were scheduled on that day might not be attended to if they do not arrive very early in the morning because of these unplanned visits.

Thelle Mogoerane Regional Hospital managed to tackle the issue of appointments. At this facility, appointments are made through the electronic health information system, which can only book a limited number of patients per day. For example, 25 patients can be booked for surgery per day, 50 for urology, and 35 for eye care. If a patient misses an appointment date, a new date will be generated for that patient.

All three hospitals are running out of storage to keep patient files, and this has affected file management; as a result, many patient files are lost, and patients end up with multiple files. The record management policy of public hospitals states that if a patient does not visit the hospital for five years. The files will be discarded to make space for new files. If a patient returns after five years, they will receive a new file and re-perform all the necessary tests.

It is the hospital's responsibility to safeguard patients' medical records. However, chronic patients are removing the medical files to skip queues the next time they visit the hospital. The long waiting times and inadequate security measures for medical files are cited as the main problem for patients leaving with their medical records. Patients are expressing their frustrations about the current system, and often these frustrations are directed towards healthcare workers. Administrative staff

indicated that they do not feel safe as some of the patients are very violent.

Another major challenge is confidentiality and stigma; patients are travelling to health facilities where they are not scheduled to receive treatment for chronic illnesses. Administrators believe that patients do not trust them with their medical records, and they fear being stigmatised in their communities.

The storage facility that has been used to store medical files at Thelle Mogoerane regional hospital was not built to use manual filing, as the HIS was procured and healthcare workers were bought devices to access medical records for patients; however, resistance from medical practitioners made the hospital abort the full use of HIS procured. The storage facility that has been in use at Thelle Mogoerane Regional Hospital, facility was not configured to store paper files. Boxes of loose paper can be seen scattered in this room. This suggests that if an administrator cannot find a patient file, a new file will be opened for a patient. The storage facility was managed by two trainees during this study who had no experience in file management. This hospital is running out of space to store the increasing number of patients' files; more medical files can be seen being piled up in corridors, with no security personnel available to guard this area.

Descriptive Analysis

A set of closed-ended questions about qualifications and work experience was administered to collect descriptive data. Most participants were more than willing to give this information. However, a few participants opted not to answer the question about qualifications; this was mainly old administrative personnel.

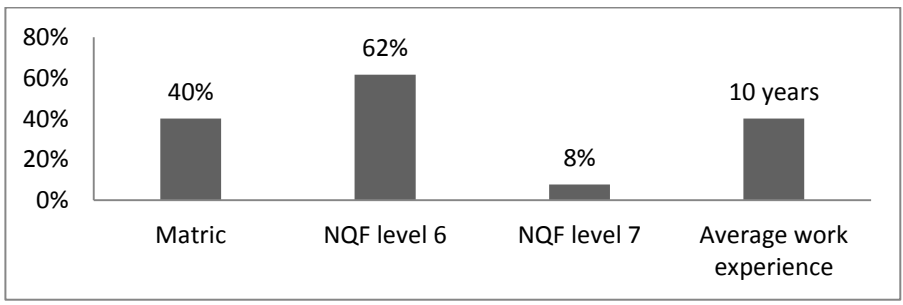

Figure 2: Summary of the national qualification framework for health administrators

Figure 2 indicates the level of education among the administrative personnel responsible for working with patient medical records. In the selected public hospitals, 62% of administrative personnel have credentials in administration, and 8% are qualified enough to become supervisors or lead team members. Although these are adequate numbers, 40% of staff only studied until matric (grade 12). In South Africa, Matric, also referred to as grade 12, is the highest secondary education grade that a learner can obtain before advancing to tertiary education. Upon successful completion of Matric, a National Senior Certificate is granted, which is acknowledged by Umalusi, the council for quality assurance in general and further education and training. This suggests that should the NDoH opt to implement an electronic filing system, staff may need to be upskilled to ensure they know how to operate the EMR system.

The average time working in administration was relatively high at ten years. Staff members know precisely what is expected of them regarding work duties and how they should treat patients. However, the stagnation of employees in the same position is demotivating. Research has shown that employees become discouraged if there is no organisational growth.

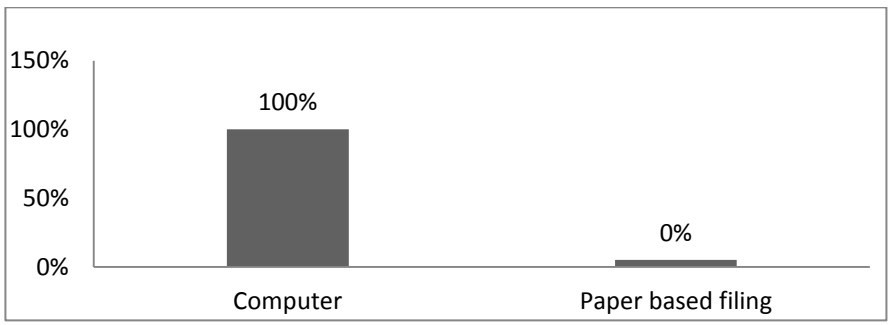

Figure 3: Usage of paper-based file visa vs the usage of eHealth computer systems

Figure 3 shows the staff's willingness to use computers to perform their tasks. The figure indicates the support for using EMRs, and the need for public hospitals to digitise the patient filing systems is evident. The research participants, who are administrative personnel, believe that hospital management can play a vital role in ensuring that medical records are fully digitised and that no one is left behind. The National Department of Health developed the Health Normative Standards and the National Digital Health Strategy to direct the roll-out of the HPRS, which is presently taking place at PHC facilities, also referred to as

clinics. The Gauteng government is working together to make the use of EMR a reality. But their efforts are still in vain and yield no returns on investment; the Dr. George Mukhari Academic Hospital serves as an illustration of this. The foundational policy document that the South African government uses to encourage the use of information and communication technology (ICT) in the public health sector is the e-Health strategy, which was developed in 2012. One of the ICT initiatives that resulted from this approach is the HPRS, which is being used at PHC facilities currently.

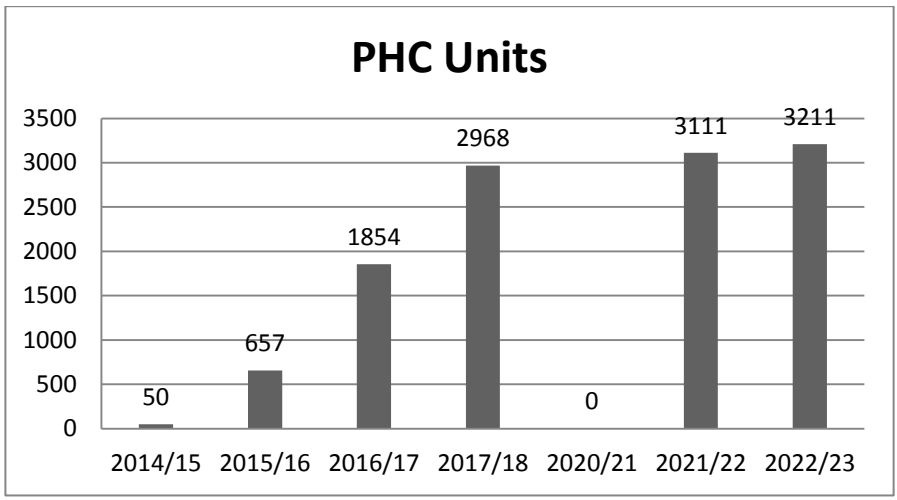

Figure 4: The implementation of the HPRS system in PHC facilities
Source: National Department of Health Annual Reports

With over 3400 PHC facilities in South Africa, Figure 4 shows the number of PHC facilities that are currently implementing the use of HPRS. This means that over 94% of PHC facilities have started using the HPRS. The South African Auditor General was unable to verify the 2020–21 figures, stating a lack of credible data reporting; hence, no information is given. Between the financial years of 2017–18 and 2020–21, the HPRS installation remained sluggish. Nevertheless, the COVID-19 outbreak on March 5, 2020, accelerated the implementation of HPRS, which is now linked to the Electronic Vaccination Data System (EDS). Data and cases related to COVID-19 vaccinations are recorded using EDS. With the upcoming integration of the recently approved NHI programme into law by parliament, the HPRS has gained significant prominence and importance within the South African health system.

The Electronic Data Management System (EDMS) deployment at Dr George Mukhari Academic Hospital collapsed only six months after its implementation. The EDMS was not a live system but only functioned as a backup. The administrative personnel were responsible for scanning patients' files and making backups on the EDMS. Staff were not trained on how to use the system. As a result, a service provider was outsourced to operate EDMS. The service provider discontinued operations due to lack of payments, and the whole system came to a standstill. The use of EDMS was aborted, and the hospital returned to fully using the manual filing.

The administrative staff proposed that electronic filing should be integrated fully within the hospitals. Many staff members alluded to what Thelle Mogoerane Academic Hospital and Charlotte Maxeke Academic Hospital were trying to do. The Thelle Mogoerane Academic Hospital is the leading public health facility to implement an electronic filing system. The use of EMRs at Thelle Mogoerane Academic Hospital was a step in the right direction, although hospital management is not monitoring and promoting its usage. Therefore, no impact can be recognised from using EMRs at this facility.

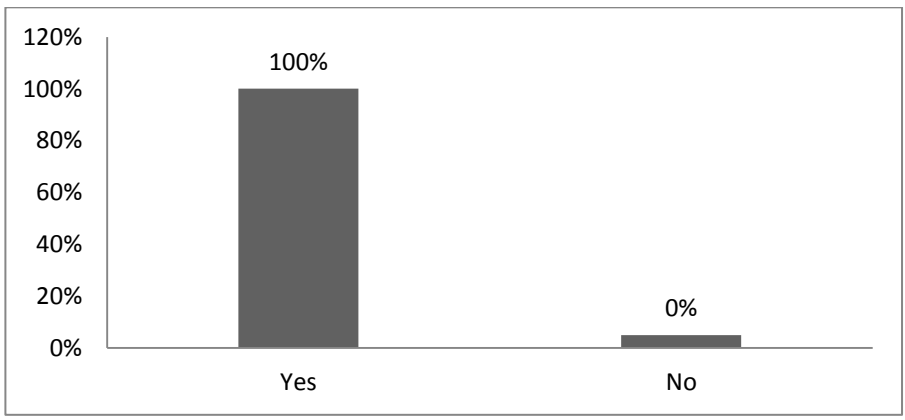

Figure 5: Willingness to learn a new set of skills

Figure 5 indicates participants' desire to learn a new set of skills that will enable them to operate the electronic filing system and use a computer. Participants acknowledged that they are living in the 4th Industrial Revolution, and that technology is necessary to make an impact. Literature indicates that it can be difficult to convince staff members to adopt new systems, as many can become resistant to change with the administrative personnel. In contrast to this assertion, the participants in

this survey were fully cooperative. There is a common understanding among the participants that the use of electronic filing will not only assist with the challenges the patients are facing, but it will also simplify the administrative task for staff and make them more efficient and effective. However, the resistance by physicians still proves that much work needs to be done to educate health professionals in terms of simplifying their work through eHealth systems.

Further Discussions

Many of the research participants have the minimum requirement for an administrator position. These employees are doing one of the critical jobs in the hospitals, which is to maintain and safeguard patients' files. The staff welcomes the idea of having a complete EMR system in place. Administrative staff across from the hospitals that participated possess work experience. Although experienced, they fail to maintain good housekeeping in the file archive rooms. When files are returned after patient consultation, they are not filed correctly, and some are left on the floor next to the shelves. In the past, this practice has resulted in patients' files being lost and patients filing litigation lawsuits against hospitals. What is also concerning is the lack of confidentiality of patients' medical records; administrative staff has full access to patients' medical records. i.e., patients with chronic illnesses in Mamelodi prefer to receive health treatment outside the region to avoid being seen at Mamelodi Regional Hospital.

All administrative personnel have indicated that they prefer using computers to facilitate their work. They are informed that computers can save time and allow them to retrieve files swiftly and timeously. Allowing computers to open a file and store it can increase productivity, eliminate theft of files, and save hospitals money on litigation. This research study was only limited to administrative personnel. As a result, health practitioners were not considered. Administrative staff members are already using computers to perform essential administrative functions.

The administrative staff has shown great interest in learning a new set of skills that will enable them to use computers and eHealth initiatives to provide their service. These employees acknowledge that to efficiently and effectively service patients, they need to use technology to simplify their work and avoid complications. It is commonly understood that EMRs might improve how swiftly the staff can perform their functions. However, health practitioners resist adopting eHealth initiatives, contributing to hospital defaulting and system fragmentations. i.e., in

Thelle Mogoerane hospital, doctors bought tablets to access patients' medical files. However, the doctors are not using them; papers and school exercise books are used as patient files.

The administrative staff faces common challenges; one highlighted challenge is that the employees now fear for their lives. Patients tend to be frustrated when standing in queues to collect their files, and there is no fast way of retrieving patients' files. The administrative staff must review the file room's manual archives to locate these files. A new file must be opened if a patient's file is not retrieved. Opening new files can take 10 to 15 minutes, which adds to patients' frustrations. Patients are taking these files home in a quest to avoid long queues. The security measures at the hospital entrances are not robust enough to detect if patients are leaving with their files. Health physicians are also making it difficult for administrative staff to do their work.

Conclusions and Policy Implications

This study recommends that electronic medical records be implemented in stages to ensure that no hospital in the province is left behind. ICT infrastructure should be regarded as a priority in the implementation of EMRs. Unstable internet connections in hospitals must be prioritised. There is a need for awareness workshops on how ICT can assist health officials in efficiently and effectively carrying out their work. Public hospitals that have already implemented EMRs and ICT infrastructure must be monitored regularly to assess how the infrastructure is being used and be able to address the shortcomings of these systems. The government, private sector, and all related stakeholders must collaborate to develop a national eHealth system for hospitals in South Africa. This will cement the integration of information across different health institutions. In closing, the study puts an emphasis on the importance of private-public partnership, involvement of relevant stakeholders, eHealth policy assurance and for guidelines to be made available in the EMR implementation process. The current load shedding will put immense pressure on internet connectivity. When developing the EMR system, developers must establish the EMR system with power backup in mind and offline functionality. Adopting Electronic Medical Records (EMRs) in South African hospitals faces several challenges, which can be broadly categorised into inadequate soft and hard infrastructure, low technical know-how, financial constraints, weak organisational environment, and low societal awareness about the EMR system. Addressing these challenges often requires a concerted effort from government bodies,

healthcare institutions, and technology providers to create a supportive environment for EMR adoption.

Acknowledgements

The authors would like to express sincere gratitude to all the health workers who participated in this study. We also appreciate the insightful comments from the two anonymous reviewers and the Editorial Team of the African Journal of Public Administration and Environmental Studies (AJOPAES).

Declarations

Ethical Approval

This study was conducted according to Tshwane University of Technology Research Ethics policy, and the authors obtained an ethical clearance letter to conduct this study.

Competing Interests

The author declares that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' Contributions

The corresponding author suggested the topic, initiated and supervised the research, and wrote the abstract, introduction, and part of the literature review. In addition, he reviewed all the subsequent versions of the manuscript. The design, implementation, write-up, data analysis, and interpretations of the results of the manuscript are done by the second author.

Funding information

The author thanks Tshwane University of Technology for the payments of page/publication fees.

Data availability

The data that support the findings of this study are available on special request from the corresponding author. The data are not publicly available because they contain information that could compromise the privacy of research participants.

Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the author.

References

Adetoyi OE and Raji OA (2020) 'Electronic health record design for inclusion in sub-Saharan Africa medical record informatics', *Scientific African*, 7, doi:10.1016/j.sciaf.2020.e00304.

Awol SM, Birhanu AY, Mekonnen ZA, Gashu KD, Shiferaw AM, Endehabtu BF, Kalayou MH, Guadie HA and Tilahun B (2020) 'Health professionals' readiness and its associated factors to implement electronic medical record system in four selected primary hospitals in Ethiopia', *Advances in Medical Education and Practice*, 11, doi:10.2147/AMEP.S233368.

Biruk S, Yilma T, Andualem M and Tilahun B (2014) 'Health Professionals' readiness to implement electronic medical record system at three hospitals in Ethiopia: A cross sectional study', *BMC Medical Informatics and Decision Making*, 14(1), doi:10.1186/s12911-014-0115-5.

Borycki EM, Newsham D and Bates DW (2013) 'eHealth in North America', *Yearbook of medical informatics*, 8:103–106, doi:10.1055/s-0038-1638839.

Crispin P, Akers C, Brown K, Delaforce A, Keegan A, King F, Ormerod A and Verrall T (2022) 'A review of electronic medical records and safe transfusion practice for guideline development', *Vox Sanguinis*, 117(6), doi:10.1111/vox.13254.

Davis Z and Khansa L (2016) 'Evaluating the epic electronic medical record system: A dichotomy in perspectives and solution recommendations', *Health Policy and Technology*, 5(1), doi:10.1016/j.hlpt.2015.10.004.

Department of National Health: South Africa. (2019). NDOH, "National Digital Health Strategy for South Africa 2019 - 2024", In: Better

health for all South Africans enabled by person centered Digital Health.

Dube F and Moyo CG (2022) 'The Right to Electricity in South Africa', *Potchefstroom Electronic Law Journal*, 25, doi:10.17159/1727-3781/2022/v25ia11839.

Dzinamarira T, Dzobo M and Chitungo I (2020) 'COVID-19: A perspective on Africa's capacity and response', *Journal of Medical Virology*, 92(11), doi:10.1002/jmv.26159.

Galnares M, Nesmachnow S and Simini F (2021) 'Instance-Based Learning Following Physician Reasoning for Assistance during Medical Consultation', *Applied Sciences*, 11(13), doi:10.3390/app11135886.

He X, Cai L, Huang S, Ma X and Zhou X (2021) 'The design of electronic medical records for patients of continuous care', *Journal of Infection and Public Health*, 14(1):117–122, doi:10.1016/j.jiph.2019.07.013.

Kiri VA and Ojule AC (2020) 'Electronic medical record systems: A pathway to sustainable public health insurance schemes in sub-Saharan Africa', *The Nigerian postgraduate medical journal*, 27(1), doi:10.4103/npmj.npmj_141_19.

Kuo KM, Liu CF and Ma CC (2013) 'An investigation of the effect of nurses' technology readiness on the acceptance of mobile electronic medical record systems', *BMC Medical Informatics and Decision Making*, 13(1), doi:10.1186/1472-6947-13-88.

Lander L, Baxter SL, Cochran GL, Gali HE, Cook K, Hatch T, Taylor R and Awdishu L (2020) 'Self-perceptions of readiness to use electronic health records among medical students: Survey study', *JMIR Medical Education*, 6(1), doi:10.2196/17585.

Lokmic-Tomkins Z, Gray K, Cheshire L, Parolini A, Sharp M, Tarrant B, Hill N, Rose D, Webster M, Virtue D, Brignell A, Waring R, Broussard F, Tsirgialos A and Meng Cham K (2023) 'Integrating interprofessional electronic medical record teaching in preregistration healthcare degrees: A case study', *International Journal of Medical Informatics*, 169, doi:10.1016/j.ijmedinf.2022.104910.

Maphumulo WT and Bhengu BR (2019) 'Challenges of quality improvement in the healthcare of South Africa post-apartheid: A critical review', *Curationis*, 42(1), doi:10.4102/curationis.v42i1.1901.

Matsheta,R.M and Sefoka, I.M (2023). Load-Shedding in South Africa: An Immediate Threat to the Right to Education, "Section 29 Inquiry"., *Journal of Educational and Social Research*, *13*(1), 216. https://doi.org/10.36941/jesr-2023-0020

Melas CD, Zampetakis LA, Dimopoulou A and Moustakis VS (2014) 'An empirical investigation of Technology Readiness among medical staff based in Greek hospitals', *European Journal of Information Systems*, 23(6), doi:10.1057/ejis.2013.23.

Mollart L, Newell R, Geale SK, Noble D, Norton C and O'Brien AP (2020) 'Introduction of patient electronic medical records (EMR) into undergraduate nursing education: An integrated literature review', *Nurse Education Today*, 94, doi:10.1016/j.nedt.2020.104517.

National Department of Health (2019) *National Digital Health Strategy for South Africa 2019 - 2024*, http://www.health.gov.za/wp-content/uploads/2020/11/national-digital-strategy-for-south-africa-2019-2024-b.pdf.

Nordling L (2020) 'Tested by HIV and TB, South Africa confronts new pandemic', *Science*, 368(6487), doi:10.1126/science.368.6487.117.

OECD. (2021). Survey of Electronic Health Record System Development, Data Use and Governance.

Ohuabunwa EC, Sun J, Jean Jubanyik K and Wallis LA (1 March 2016) 'Electronic Medical Records in low to middle income countries: The case of Khayelitsha Hospital, South Africa', in *African Journal of Emergency Medicine*, African Federation for Emergency Medicine, doi:10.1016/j.afjem.2015.06.003.

Parasuraman A and Colby CL (2015) 'An Updated and Streamlined Technology Readiness Index: TRI 2.0', *Journal of Service Research*, 18(1), doi:10.1177/1094670514539730.

Rios A and Kavuluru R (2018) 'EMR coding with semi-parametric multi-head matching networks', in *NAACL HLT 2018 - 2018 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies - Proceedings of the Conference*, doi:10.18653/v1/n18-1189.

Sayed ME (2021) 'Knowledge, attitude and behaviour of dental health care providers towards health electronic record systems in Saudi Arabia', *Health Information and Libraries Journal*, 38(3), doi:10.1111/hir.12290.

Shiferaw KB and Mehari EA (2019) 'Modeling predictors of acceptance and use of electronic medical record system in a resource limited setting: Using modified UTAUT model', *Informatics in Medicine Unlocked*, 17, doi:10.1016/j.imu.2019.100182.

Snyder H (2019) 'Literature review as a research methodology: An overview and guidelines', *Journal of Business Research*, 104:333–339, doi:10.1016/j.jbusres.2019.07.039.

Statistics South Africa (2022) *Mid-year population estimates 2022*, www.statssa.gov.za,info@statssa.gov.za,Tel+27123108911.

Thulare,T., Herselman, M., and Botha, A. (2020). Data Integrity: Challenges in Health Information Systems in South Africa, World *Academy of Science, Engineering and Technology International Journal of Computer and Information Engineering,* Vol:14, No:11.

Walle AD, Shibabaw AA, Tilahun kefyalew N, Atinafu WT, Adem JB, Demsash AW, Baykemagn ND, Kebede SD, Ferede TA, Tegegne MD and Wubante SM (2023) 'Readiness to use electronic medical record systems and its associated factors among health care professionals in Ethiopia: A systematic review and meta-analysis', *Informatics in Medicine Unlocked*, 36, doi:10.1016/j.imu.2022.101140.

Webster PC (2011) 'The rise of open-source electronic health records', *The Lancet*, 377(9778), doi:10.1016/S0140-6736(11)60659-4.

Yehualashet DE, Seboka BT, Tesfa GA, Demeke AD and Amede ES (2021) 'Barriers to the adoption of electronic medical record system in Ethiopia: A systematic review', *Journal of Multidisciplinary Healthcare*, 14:2597–2603, doi:10.2147/JMDH.S327539.

Zenda, J.B , Voster, R. and Da Viega,A. (2020). Protection of personal information: An experiment involving data value chains and the use of personal information for marketing purposes in South Africa, *South African Computer Journal*, 32(1): p. 113-132.