

MONITORING AND EVALUATING ELECTRONIC HEALTH RECORDS SYSTEMS IN PUBLIC AND PRIVATE HOSPITALS IN THE ETHEKWINI AREA, KWAZULU NATAL, SOUTH AFRICA

MONITORAMENTO E AVALIAÇÃO DE SISTEMAS DE PRONTUÁRIO ELETRÔNICO EM HOSPITAIS PÚBLICOS E PRIVADOS DA REGIÃO DE ETHEKWINI, KWAZULU NATAL

MONITOREO Y EVALUACIÓN DE SISTEMAS DE REGISTROS ELECTRÓNICOS DE SALUD EN HOSPITALES PÚBLICOS Y PRIVADOS EN EL ÁREA DE ETHEKWINI, KWAZULU NATAL

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e2445

<https://doi.org/10.47820/jht.v2i4.45>

RECEIVED: 08/31/2023

APPROVED: 10/01/2023

PUBLISHED: 10/16/2023

ABSTRACT

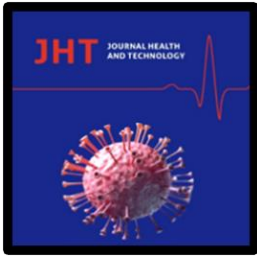
Monitoring and evaluating the electronic health records system is one of the most essential aspects of assessing the impact of utilizing technology in the health sector. The study examined how hospitals monitored and evaluated EHR systems implementation and operation in KwaZulu Natal, South Africa. According to the National Digital Strategy for South Africa (2019-2024:26), there is no defined process detailing the monitoring and evaluation plan in public and private health; the monitoring and evaluation are still being developed, concentrating on actions required to meet strategic intervention milestones. The study adopted the Leading Change Model (LCM) in integration with the Technology Acceptance Model (TAM). The models were adopted in the study to assess monitoring and evaluation in the implementation and operation of electronic health records systems in the public and private hospitals in the eThekweni Area. The study utilized both the cross-sectional survey and the qualitative case study designs to compare public and private hospitals monitoring and evaluation of the implementation of electronic health records systems. The population for this study consists of three groups, or strata. The first group consists of record management personnel, patient administrators, and filing or ward clerks who deal mainly with hospital administration. The study sought to establish the control plans used to measure the success or failure of the EHR system. In terms of monitoring productivity, both hospitals monitored the efficiency of users in the utilization of the system, but there was no proper strategy documented. Hospitals monitored the EHR systems based on what worked for them.

KEYWORDS: Monitoring. Evaluation. Change management. Electronic health records. Public hospital and private hospital.

RESUMO

O monitoramento e a avaliação do sistema de registros eletrônicos de saúde é um dos aspectos mais essenciais para avaliar o impacto da utilização da tecnologia no setor da saúde. O estudo examinou como os hospitais monitoraram e avaliaram a implementação e operação de sistemas de EHR em KwaZulu Natal, África do Sul. De acordo com a Estratégia Digital Nacional para a África do Sul (2019-2024:26), não há um processo definido detalhando o plano de monitoramento e avaliação em saúde pública e privada; O monitoramento e a avaliação ainda estão sendo desenvolvidos, concentrando-se nas ações necessárias para o cumprimento dos marcos estratégicos de intervenção. O estudo adotou o Leading Change Model (LCM) em integração com o Technology Acceptance Model (TAM). Os modelos foram adotados no estudo para avaliar o monitoramento e a avaliação na implantação e operação de sistemas de prontuário eletrônico nos hospitais públicos e privados da Área eThekweni. Utilizou-se o estudo transversal e o desenho qualitativo de estudo de caso para comparar o monitoramento e a avaliação da implantação de sistemas de prontuário eletrônico em hospitais públicos e privados. A população deste estudo é composta por três grupos, ou estratos. O primeiro grupo é composto por pessoal de gerenciamento de registros, administradores de pacientes e funcionários de arquivamento ou de enfermagem que lidam principalmente com a administração hospitalar. Em termos

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de monitoramento da produtividade, ambos os hospitais monitoraram a eficiência dos usuários na utilização do sistema, mas não houve uma estratégia adequada documentada.

PALAVRAS-CHAVE: Monitoramento. Avaliação. Gestão da Mudança. RES. Hospital público. Hospital privado.

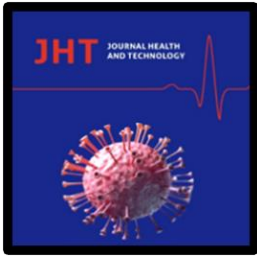
RESUMEN

El seguimiento y la evaluación del sistema de historiales médicos electrónicos es uno de los aspectos más esenciales de la evaluación del impacto de la utilización de la tecnología en el sector sanitario. El estudio examinó cómo los hospitales monitorearon y evaluaron la implementación y operación de sistemas EHR en KwaZulu Natal, Sudáfrica. Según la Estrategia Digital Nacional para Sudáfrica (2019-2024:26), no existe un proceso definido que detalle el plan de monitoreo y evaluación en salud pública y privada; El seguimiento y la evaluación aún se están desarrollando, concentrándose en las acciones necesarias para cumplir con los hitos estratégicos de intervención. El estudio adoptó el Leading Change Model (LCM) en integración con el Technology Acceptance Model (TAM). Los modelos fueron adoptados en el estudio para evaluar el monitoreo y la evaluación en la implementación y operación de sistemas de registros electrónicos de salud en los hospitales públicos y privados en el área de eThekweni. El estudio utilizó tanto la encuesta transversal como los diseños cualitativos de estudios de casos para comparar el monitoreo y la evaluación de la implementación de sistemas de registros electrónicos de salud en hospitales públicos y privados. La población para este estudio consiste en tres grupos, o estratos. El primer grupo consiste en personal de administración de registros, administradores de pacientes y empleados de archivo o sala que se ocupan principalmente de la administración del hospital.

PALABRAS CLAVE: Monitoreo. Evaluación. Gestión del cambio. HCE. hospital público. hospital privado.

INTRODUCTION

Monitoring and evaluating electronic health records systems is one of the most important components of analyzing the impact of using technology in the health sector. The study examined how hospitals monitor and assess the adoption and implementation of EHR systems. According to the Centers for Medicare and Medicaid Services (2012), electronic health records are an electronic version of a patient's medical history that the provider keeps over time and may include all key administrative clinical data relevant to that person's treatment with a specific provider. EHR may standardized and reorganize the clinician's workflow in addition to providing a thorough record of a clinical interaction (Zheng; Ratwani; Adler-Milstein 2020). Existing records management models serve as the foundation for the proper administration of records in any organization, including the healthcare industry. The World Health Organisation (2018) defined monitoring as process of collecting data envisioned to measure progress of organizational performance or project executed. Monitoring and evaluating ensures project plan implementation to attain positive results with the aim to improve efficiency and provide useful basis for evaluating which consist of systematic methods or tools used for assessing whether the project implemented is operative or not (World Health Organisation, 2018). Therefore, evaluation helps health organizations understand why certain results are not attainable and restructure if needed, to achieve

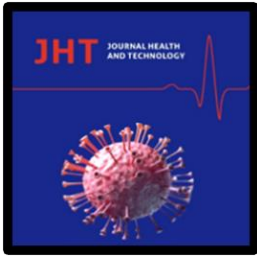


desired outcomes (Gabbay; Le May 2010). One of the principles of the National eHealth Strategy of South Africa (2012-2017, p.28) was to "...constantly evaluate eHealth initiatives and measure improvements in health outcomes in order to build an evidence base that demonstrates the benefit over time of eHealth and guides line planning and decision making". Meanwhile, this derives from numerous past eHealth initiatives including the EHR system in different provinces that have been unproductive and ineffective due to inadequate planning or lack of reliability sponsorship or funding and management structures.

This study sought to examine monitoring and evaluation of the impact of EHR system implementation in public and private hospital in eThekweni area, South Africa. In terms of social and economic standing, the eThekweni Municipality is one of the wealthiest districts in South Africa (eThekweni Municipality Independent Development Plan, 2023-2027), and it acts as a centre of wealth for the region. The eThekweni region (Durban), which has a population of over 3.5 million and is located on the east coast of South Africa in the Province of KwaZulu-Natal (KZN), is considerably bigger than other South African cities. According to eThekweni Municipality Independent Development Plan (2023-2027) the city is made up of a varied (cosmopolitan) community that deals with a range of social, economic, environmental, and governance issues. The study focused on two main types of hospitals in the eThekweni region (private and public), both of which had contemporary infrastructure and provided medical care using the element of EHR systems. According to Rensburg (2021) the Department of Health oversees South Africa's healthcare system. South Africa's healthcare system is two-tiered and grossly unequal. The author further elaborate that the public sector is government-funded and services the great majority of the population (71%) and the private sector, which serves around 27% of the population, is primarily financed by individual contributions to medical aid schemes or health insurance. The Department of Health is responsible for ensuring that the public healthcare system is adequately resourced and that all South Africans have access to quality healthcare. They also administer the private healthcare sector, ensuring that all medical practitioners and facilities meet the necessary standards.

2. PROBLEM STATEMENT

According to a 2013 report by the National Department of Health (NDoH) and Council for Scientific and Industrial Research (CSIR), only seven (7) of the forty-two (42) different HIS systems that support patient administration and healthcare in South Africa were operational in five or more provinces. Of these seven, five were for monitoring and evaluation, while the other two dealt with healthcare. Given the large number of disparate systems' lack of interoperability and communication linkages, this is one of the issues addressed by National eHealth Strategy for South Africa (2012-2017). This indicates that data are not shared between systems and are not accessible to other healthcare practitioners. As a result, it has become more difficult to deliver high-quality medical treatment and there is a higher chance of data duplication and inaccuracy.



The lack of a fully integrated healthcare system in South Africa has led to increased expenses, inefficiency, and decreased patient satisfaction due to a lack of continuity of service (Maphumulo; Bhengu 2019). Healthcare practitioners are exploring solutions to address these issues, but there is no defined process for monitoring and evaluation in public and private health (National Digital Strategy for South Africa (2019-2024:26). This lack of monitoring and evaluation mechanisms can lead to an erosion in care quality and a drop in patient satisfaction, especially in public hospitals. Furthermore, the lack of a defined process has hindered the development of a strategy to address the existing issues (Malakoane *et al.* 2022; Maphumulo; Bhengu 2019). The study aims to establish guidelines for monitoring and evaluating the effectiveness of electronic health record management in improving healthcare service delivery. It will provide insights to healthcare professionals, hospital management, ICT specialists, and records management staff, enhancing ICT integration efficiency. The study will assess the current state of EHR control measures and offer evidence-based recommendations for monitoring and evaluation best practices, aiming to improve patient outcomes and healthcare quality. The study assessed the current state of EHR control measures and offer evidence-based recommendations for monitoring and evaluation best practices, aiming to improve patient outcomes and healthcare quality in public and private hospitals in eThekweni area, KwaZulu Natal, South Africa.

3. PURPOSE & OBJECTIVES OF THE STUDY

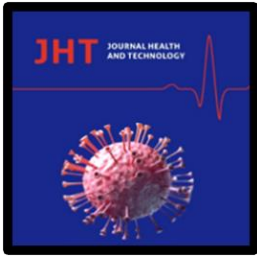
The primary purpose of the study was to examine monitoring and evaluating of the impact of EHR system implementation in public and private hospital, to establish the standing of monitoring and evaluation at public and private hospitals.

Objectives

- To find out control plans to measure success or failure of EHR systems in public and private hospitals.
- To examine how public and private hospital monitoring staff productivity in the use of EHR systems.
- To explore effectiveness of using EHR systems in public and private hospitals

4. LITERATURE REVIEW

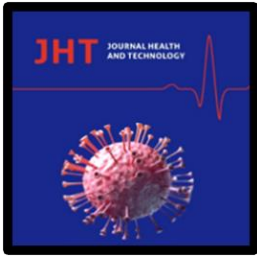
In the context of the health organization, monitoring is often utilised as an indicator to track and measure changes overtime, to manage project implementation (Gabbay; LeMay, 2010). Similarly, monitoring focuses on the on-going implementation, hence, evaluation provides an opportunity for continuous learning from experience and opportunity to improve if necessary. The Health Design Authority (2012) highlighted EHR monitoring and evaluation tools with a purpose to provide clear understanding on the tools available to assess EHR system capability within the health organisation. The tools include the following:



- **Peer review:** Fundamental exchange of interrelated information between health organizations entails benchmarking capabilities. These tools are limited to the knowledge associated with chosen health organization.
- **External audit:** It involves assigning a well-established with strong health professionals with proven records of offering EMR evaluating or auditing services. Although this evaluation tool is associated with high cost, it can tailor the organization to the right strategic direction with results of improvements presented.
- **Self-Assessment:** Consist of the health organization creating impact study survey and assigning internal project team to assess the current state of the organization and forecast the future vision state, set goals and plan to achieve them.
- **Literature review:** It provides published work relating to the experiences or trending topic of the EMR system in different health organizations national and international.

Currently, there is limited literature on EHR system monitoring and evaluation; no strategy or tools officialised in South Africa to guide health organizations in assessing electronic health records systems. Katsande (2014, p.73) specified "...healthcare impacts were measured in terms of the effects of EMR documentation, patient's privacy, communication healthcare delivery and patient care". Additionally, an efficacious health strategy necessitates monitoring technology use and the behaviour of users and making improvements based on the results obtained (Falchok *et al.*, 2015). According to Salleh, Abdullah, and Zakaria (2021), assessing the performance of an EHR system is crucial yet complex. Recent literature also indicates that there is no standard method for correlating an effective EHR system, as different healthcare institutions have unique organizational structures, workflow processes, and employee expectations that substantially affect how the EHR system is used within the organisation.

Importantly, EHR system implementation is a long constant process, which needs on going evaluation and commitment of users to measure favourable or unfavourable EHR impact, this therefore will assist in identifying the gaps or challenges hindering the adoption progress. Thomas (2016) indicated that post implementation is a phase of assessing and modifying the system is necessary. The author further stated that frequent monitoring and reporting allows implementers to know if any adjustments on the system are necessary. Another study in South Africa by Erasmus and Van Der Walt (2015) established that patient waiting time could be used as success indicator when evaluating the EHR system. Falchok *et al.*, (2015) reviewing EHR system includes it is usage and identification of time spent by personnel when searching for information, information load printed and replication of physical information. Furthermore, Su *et al.* (2006) asserted that advancing accuracy of patient documentation and efficiency in communiqué among health workers should be merged in any EHR



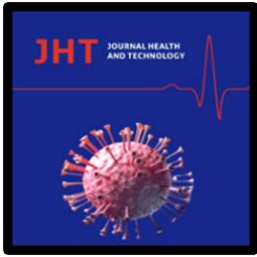
system evaluation. The author elaborated that health information technology evaluation contemplate interaction among people, technology, and environment.

The study by Cherry and Carpenter (2011) evaluated effectiveness of electronic medical records system in a long-term healthcare facility by means of work process analysed through direct observation, and recording of steps followed by nurses when they carried their daily tasks. The study employed detailed flow chart with every step to capture work observed performed by nurses. The flow chart provided exceptional and precise technique of assessing the effect EMR system have on the workflow. Similarly, Tubaishat (2017) evaluated the success of EHR system based on nurse's perceptions on the quality of the system, assessing the way they use the records in the system, and the general level of satisfaction with EHR system. The study discovered that nurses positively support the operation of the system and perceive it with high quality and contentment; consequently, the findings reassure success of the EHR implementation. Berhe *et al.* (2017) also evaluated electronic medical records in Ethiopia, Ayeder Referral Hospital based on users' viewpoint with the aim to obtain results on the effectiveness of system executions. The study used four sub-dimensions of users' satisfaction: context, usefulness, ease to learn, and ease to learn to evaluate the utility of the system. The study concluded that effectiveness rate shown to be very high, and more than half of the participants were satisfied with using the system, therefore the implementation was perceived successful. Although it is indicated that there should be more computers in all hospital sites and strong support for users, and continuous training to advance success usage of the system.

Martha-Acquah (2015, p. 109) mentioned the following outcomes in Effia Nkwata Regional Hospital Ghana, as measure to ensure sustainability of the EHR system:

- The hospital needs to add more staff to strengthen the IT department as the number is sternly insufficient.
- The need to increase power supply to improve long-term sustainability of the system as it is the challenge for many developing countries.
- The primary healthcare givers, doctors and nurses must be involved in the usage of the system as measure to address encounters arising from unreadable of their handwriting as it increases workload for other workers.

Literature indicates that different hospitals monitor and evaluate the impact of EHR systems using compatible evaluation tools based on the health services they offer, there is no notable existing standard method; therefore, Boonstra and Broekhuis (2010) indicated that rapidity and in-depth impact of the system may be enriched by the way it is executed. The motive driving the implementation, user satisfaction and time spent retrieving on the system is used as variables to measure the effect of EHR systems in hospitals.



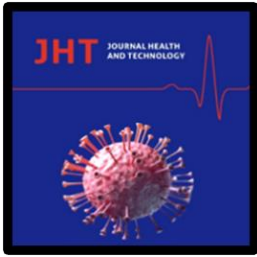
5. THEORETICAL FRAMEWORK

The study adopted Leading Change Model (LCM) in integration with Technology Acceptance Model (TAM). The two models were adopted in the study to assess monitoring and evaluation in the implementation and operation of electronic health records systems in the public and private hospitals in the eThekweni Municipality. The models were chosen based on the earlier studies by Martin and Voynov (2014) that utilised the LCM with TAM to assess the implementation and operation of EHR in physician practices. TAM has a sturdy element to assume that when an individual forms an intention to act, do it freely without any constraint (Kalusopa, 2011, p. 56). Martin and Voynov (2014) also opined that TAM model is a suitable complement to Kotter's Leading Change Model (LCM) that focuses on the perception of the group (healthcare providers) experiencing change in relation to specific variables such as perceived usefulness and ease of use due to EHR system implementation. Crucially, both models allow the researcher to get an insight of the pre or post implementation and acceptance of the EHR system, even if the EHR implementation was done years back. The study involved participants from hospital top management to healthcare workers in their respective disciplines.

The LCM model and TAM model evaluate changing behaviour of hospital employees towards tactical processes on their daily duties in using the electronic health records management systems. Martin and Voynov (2014, p. 629) indicated that Kotter's change management model serves as a foundation for understanding complex setting. In the current study, both public and private hospitals are complex in part because of different health professionals within the organization, which include top management, physicians, nurses, and administrators working directly or indirectly with EHR system (Antwi; Kale, 2014, p. 2).

6. METHODOLOGY

The primary purpose of the study was to examine monitoring and evaluation of the impact of EHR system implementation in public and private hospitals and establish the status of monitoring and evaluation at public and private hospitals. Both quantitative and qualitative approaches were used concurrently to achieve the objectives of the study. Therefore, the study deployed mixed method approaches that were suitable to examine the monitoring and evaluation measures of the implementation and operation of the EHR system. The mixed-methods approach was also appropriate to uncover and assess change management effects in the implementation and use of electronic health records in public and private hospitals. The study comparatively examined a dissimilar group of hospital employees (health providers, hospital management, and administration) concerning change management in the implementation and operation of electronic health record systems in two hospitals, a public and a private. The abductive approach was employed in the current study as it provided in-depth validation of the two sets of quantitative and qualitative data.



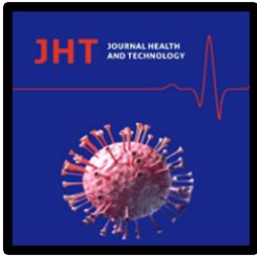
The study utilised both the cross-sectional survey and the qualitative case study designs to compare public and private hospitals monitoring and evaluation in the implementation of electronic health records systems. The population for this study consists of three groups, or strata. The first group consists of record management personnel, patient administrators, and filing or ward clerks who deal mainly with hospital administration. The second group comprises doctors and nurses, who render healthcare services to patients. The first and second groups were referred to as users of the electronic health record system. The third group involves managers who are responsible for the hospital's tactical processes, managing change, and decision-making. For each department, 2 nurses and 2 doctors were conveniently selected out of 24 departments in public and private hospitals, resulting in a total of 48 nurses and 48 doctors in the public hospital in each category, while for each of the 14 departments, 3 nurses and 2 doctors were conveniently selected, totalling 42 nurses and 28 doctors. In the public hospital, 10 patient administrators, 10 ward clerks, 1 records management personnel, and 8 managers were interviewed based on their availability; therefore, the sample size for the public hospital was 121. In the private hospital, six management staff were interviewed: 24 doctors, 42 nurses, 10 patient administrators, 3 receptionists, 8 file or ward managers, and 1 records management personnel, for a total sample of 94 members. Descriptive analysis was used for quantitative data. The data from interviews was thematically categorized and presented in narrative form.

7. FINDING AND DISCUSSION

The main objective of the study was to examine how public and private hospitals monitor and evaluate the impact of EHR system execution. Monitoring and evaluation are significant in measuring the effectiveness, usefulness, and level of acceptance in the health institutions (WHO, 2017). Evaluating the value of impact of electronic health records systems is the crucial part of understanding the use of the system and its users. According to the WHO (2017), it is crucial to acknowledge and consider monitoring and evaluation in the initial stage of the implementation process. WHO (2017) specifies that, the evaluation process be done on the regular basis and make use of correct indicators, in order to measure the impact of the system in the hospital and on its users. One of the objectives of the study was to examine how public and private hospitals monitor and evaluate the impact of EHR implementation. The findings are based on the following themes:

- Control plans to measure success or failure of EHR systems.
- Monitoring staff productivity in the use of EHR systems
- Feedback on the effect of using EHR systems in public and private hospitals.

Personnel from public hospital management interviewed specified that, the system is controlled based on the penalty regime used against the private partners. They explained that there is a certain amount paid by the EHR system service providers called *penalty fee*. They elaborated that, when the



service provider does not respond to queries on time, they compensate the hospital. In that sense, the hospital controls and reinforces the service provider to deliver as expected. Respondent (8) elaborated that:

“Monthly based penalty reports are always drawn from footprint, which is the number of queries logged by system users and speedily attended by the service provider, based on the time set by the hospital to avoid penalty fee. Therefore, penalty fee is a certain amount paid by the EHR system service provider if they did not respond to queries in time”.

Respondent (2), from IT division mentioned that:

“From the IT section, they can see if the records have been maintained properly, and people are being admitted correctly. As the hospital we often have meetings with the IT private company, where statistics and indiscretions are discussed, and they pick from there if the staff struggling with the system, if there are staff doing mistakes or if there is a trend of not understanding something”.

It was indicated by the management of public hospital management during interview that they regularly have Hlanganani meetings quarterly with the private partners to address issues on progress, and changes on the EHR system. In addition, reports and meetings assist the hospital to measure progress and to know the status of EHR system operation in the hospital. Respondent (7) emphasized that:

“The system gets to be audited by the private firm of external auditors, internal auditors from the hospital, and auditor general (government) evaluating whether the system still meets needs of the hospital and make sure it operates well”.

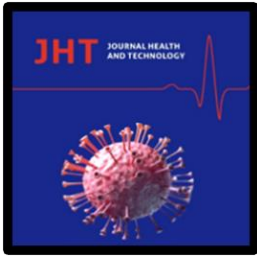
Respondent (1) explained thus:

“The volume of patient information stored in the EHR system indicates success or failure of the system in terms of storage capacity, service rendered to patients indicates if new modules in the system need to be modified or introduced after the system was already implemented or upgraded”.

On the other hand, the private hospital operates differently compared to the public hospital. The private hospital management revealed that control plans and measures are conducted at the head office. One personnel, respondent (3) elaborated that:

“The hospital head office got a team that is responsible for the system from initiation phase, piloting and implementation including maintenance and system upgrade. The head office also assesses the effectiveness of the system”.

The private hospital management confirmed that control plans are based on the objectives as to why the system was initiated in the first place, looking at the manner in which health employees do their work using the system. They mentioned that control plans in their hospital are based on the time variance



spent by health employees with patients versus on the system. This therefore gives them an indication whether the employees are productive or not using the system.

In terms of control plans in the private hospital, one of the personnel respondents (6) revealed that:

“Control plans are done through incident reports communicated by the hospital head office and the whole group receives it. The reports indicate specific hospitals and services impacted particularly system down time”.

Respondent (4) added that:

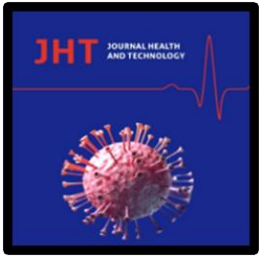
“The records management, scanning and storage is outsourced. So, when the files are retrieved from the electronic system, checklist is used for evaluation and verification on patient’s electronic files. At times, I find that certain files are scanned incorrectly, and returned to the external service provider. As someone responsible for accurate record keeping for our hospital, I do random visits to the external provider’s site to assess their work, to measure their work and progress”.

Respondent (5) further said:

“There are no formal officialised procedures measuring the effectiveness of the system. However, I do suggest that the hospital head group have continuous evaluation processes in place to assess the effectiveness of the system, especially when it comes to billing system. In that way, they will know what challenges users in different hospitals are facing operating the system. This will also help to identify gaps in the system and improve productivity of our employees”.

Results presented from public and private hospital revealed that both hospitals operate differently, as they have their own processes of control plans measuring the use of EHR system. The public hospital uses penalty regime to reinforce the IT company to deliver as expected, meetings and reports are other tools they utilise including internal and external auditors. While the private hospital uses the time variance of time spent by employees to measure effectiveness and incidents reports. This shows that both hospitals decide on what works for them in controlling the EHR system and sustaining results.

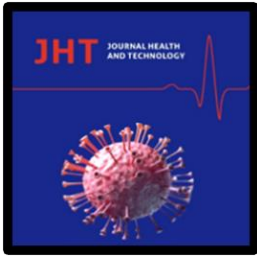
The electronic system is intermittently controlled and assessed to determine how it can be made more efficient and effective (IRMT, 2009). Control plans are methods utilised to promote and ensure quality standards in the use of the EHR system to achieve anticipated outcome. The current study revealed that the public hospital control effectiveness of EHR system using penalty regime set for EHR system providers. The penalty regime emboldens agreement and compliance on EHR system providers to promptly respond on challenges (calls logged) encountered by users while utilising the system. The public hospital further revealed that when the IT company does not respond to queries logged by users on time the IT company forfeits certain amount of money to be remunerated to them. The study further



revealed that monthly-based penalty reports are drawn from footprint to analyse the performance of the EHR service providers in the public hospital. The study established that, penalty regime seems to work in the public hospital's favour as the EHR system service provider promptly attends to all EHR system-related matters in time and not willing to make any financial loss. IRMT (2009, p. 26) posited that performance of any contractor responsible for the electronic system needs to be controlled and continuously reviewed on a regular basis, and contract agreements are updated to reflect changes in requirements.

Furthermore, the public hospital further revealed that regular meetings are held with the IT private company discussing indiscretion brought by the system. Similarly, the private hospital conducts regular meetings where transgression and statistic reports are discussed, including common challenging trends and report back to the head office. This result clearly showed that the public hospital has a voice in success or failure of the EHR system. The public hospital directly engages with the EHR service providers as compared to the private hospital where they liaise with hospital head group. The study settled that the private hospital operates differently to the public hospital. Furthermore, the private hospital revealed that, control plans are based on the objectives of the system set by the hospital head group. However, the hospital uses time variance spent on the system including time spent with patients as an indicator to measure success or failure of the system. Erasmus and Van Der Walt (2015) reported patient waiting time as an indicator when evaluating the EHR system. Starvers (2015) also concurred that time spent retrieving patient information form part of evaluating EHR system effectiveness. IRMT (2009, p. 80) suggested developing performance indicators as another way of measuring and evaluating change. The study established that the private hospital does not have standalone formal measures in place to monitor the system as all their processes are head office driven.

The private hospital also revealed that incident reports communicated by the hospital head office assist to monitor and track effectiveness of the system. The incident reports specify hospital site and services affected at that particular time. The study established that the private hospital does not have any contribution in control plans to measure effectiveness in the use EHR system, as all detailed information concerning the electronic systems derive from the hospital head office. The study indicated that that private hospital is not fully electronic in managing patient records, however, evaluates scanned files against physically stored offsite files using checklist. Hazazi & Wilson (2021) also emphasized that accuracy in patient documentation merged with an EHR system must be utilised as form of control plans. The private hospital further revealed that random visit to the offsite storage forms part of monitoring and evaluation plan to measure work progress. Marutha (2012) accentuated that it is vital to develop recurrent formal procedures for monitoring and auditing of electronic records systems. The author, however, did not describe the metrics that will guide the evaluation and tracking process. Erasmus and Van Der Walt (2015) also proposed that change necessitates constant monitoring and assessment.



The current study established that the public hospital has monitoring and evaluation processes in place, however, depends on the IT company as hospital does not have the hospital standalone formal monitoring and evaluation plan. Similarly, the private hospital evaluation processes are done at the hospital head office. IRMT (2009, p. 79) emphasized that it is important for hospitals to conduct frequent monitoring, evaluation, and performance measurements in order to identify success or failure of initiatives implemented as to when and how advancement needs to be made to attain anticipated outcome. Thomas (2016) opined that continuous monitoring enables the implementers to assess if there is any necessity for adjustment.

7.1 Monitoring productivity with the use of EHR systems

Respondents from both hospitals were asked if they had performance evaluation conducted whenever there are changes in the electronic health records system. The majority 92(92.92%) of respondents from the public hospital indicated that they normally evaluated after training they receive on the system based on their individual duties. Users said they also write a test after each training provided by the IT company, assessing their level of competency to determine if they fit to use the system. They further elaborated that number of trending cases or issues reported are counted over a period and used to monitor their performance on the system. Majority of the respondents from the hospital management validated what their users at the public hospital said during the interviews as they were also asked if they monitor the effect of EHR system in staff productivity.

Furthermore, the public hospital management also confirmed that they have electronic measures used, within the system designed to measure productivity, accuracy and completeness of different users' duties. The hospital management revealed that EHR system generates errors report in monitoring users' productivity and each manager gets his or her staff to rectify and fill missing information. Respondent (1) from admission department during the interview revealed that:

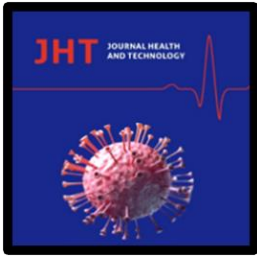
"The EHR system in place do allow the admission department to monitor the registration process for each counter while staff are busy with their duties, from the number of patients in the waiting area to patients attended, discharged, and admitted. The department can see people who are doing their daily task and who are not".

Respondent (3) from information systems elaborated that:

"Staff productivity is also monitored based on the number of patients who received medical attention, that an indicator to us if certain processes in the system need to be amended".

Respondent (2) from technology department said:

"Data quality captured on the system is used to monitor staff productivity based on data coding. This is used to verify if users are following the right procedures capturing patient information. Verifying data captured by different users on the system also assists the hospital to easily determine users who need more training, more especially if there are lot of discrepancies".



Furthermore, hospital management in the public hospital revealed that case studies and user studies are utilised to measure effectiveness of EHR system. The public hospital mentioned that it certainly effective and they are satisfied with the outcome of using EHR system in their hospital, as other health institutions are bench marking with them.

On the other hand, the private hospital does things differently as compared to the public hospital. The management from the private hospital indicated that the hospital has no standalone valid measurements focusing on their hospital as most processes are head office driven and affect all hospital under their head office. However, they indicated that calls logged by users are indicators for measuring and monitoring challenges encountered by users on the system. As in the public hospital, the private hospital management indicated that discrepancies on the information captured signifies them if users are struggling with the system. Time variance spent on patients is also used as a tool to monitor productivity.

Respondent (5) from the private hospital management during interview said:

“The hospital conduct monitoring of staff productivity through statistics reports, number of patients admitted and medication stock control”.

Respondent (3), other personnel stated that:

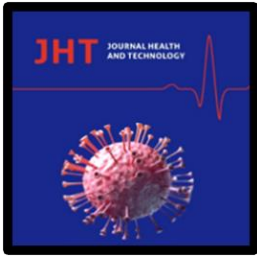
“Auditing trial assist the hospital to know if the system is defaulting or when employees are struggling with the system leading them to be unproductive”.

From hospital CEO office, respondent (6) further explained that:

“Certainly, there is a way of measuring the effect of the system and staff productivity including all hospitals as we under one hospital head group. This is validated by incident reports they send through emails from time to time, indicating which hospital experiencing problems at a particular time”.

In addition, the management indicated that each department have their way of doing things. At times, the units monitor their staff productivity on the system based on their duties, therefore no standardised method in the hospital to measure the effect of the system as long as users can access the system and perform their duties; the monitoring is conducted as they continue using the system. All the above-presented results imply that both hospitals have no officialised monitoring method; they simple do what is working for them at that particular time.

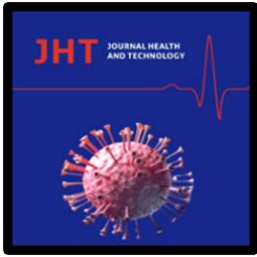
Monitoring offers a means to track progress and ensure users are productive in the utilization of EHR system, and it forms essential part of change management. According to Kamadjeu (2005), monitoring the use of EHR system ensures immediate response to challenges facing users in utilization of the system. The study revealed that both public and private hospitals use discrepancies found son data captured in the EHR system to monitor staff productivity, compliance and track users struggling with the system. The study further revealed that number of trending cases reported, or issues logged by



users are also utilised to monitor productivity in the utilization of the EHR system. Furthermore, the study revealed that EHR system used in the public hospital generates error reports for the hospital management to monitor users' productivity. In the private hospital, the EHR systems is monitored through detailed incident reports sent via email by head office. Unlike in the public hospital, the private hospital head office only focuses on the EHR system infrastructure and efficiency not on users' productivity in the use of the system. Moreover, the reports produced also support hospital management into decision making in improving the system. Thomas (2016, p. 55) found the use of health information technology in primary healthcare offering multiple operational services including producing reports that can be utilised to analyse cost centres and shortage of resources. IRMT (2009, p. 82) concluded that the use of the electronic records system is essential in ensuring successful training.

The public hospital additionally revealed that the number of patients who received medical attention is used to measure staff productivity and it used as an indicator for processes that need amendment. Furthermore, the system allows the hospital to monitor the workflow from number of patients in the waiting area to patients attended, discharged and admitted, each department is able to track people performing their task and those who not. In the current study, time variances spent by health care practitioners assisted hospitals to assess users' productivity. Thomas (2016, p. 55) found that a Pretoria clinic monitored productivity based on patients in the waiting area. The public hospital management revealed that case and user studies are utilised to measure effectiveness of EHR system. The public hospital revealed that due to effective monitoring in the use of EHR system, different hospital around the country benchmarks the system in place. Berhe *et al.* (2017) monitored the effectiveness of EHR systems utilizing users' studies in Ethiopia referral hospital and found that usage of the system was highly favourable to the hospital and users were satisfied with system in place. Health Design Authority (2012) underlined benchmarking as one of the fundamental tools to assess capabilities of EHR system in hospitals including impact studies in the use of the system. The study established that the public hospital monitors EHR system efficiency and users' productivity, while the private hospital only monitors the system.

The private hospital indicated that through audit trail, the hospital is informed if the system is failing, or users are strolling with the system. It is necessary to conduct audit and measure performance to help the organization achieve its objectives (IRMT, 2009, p. 18). Meanwhile, involving external and internal auditors with strong basis of health profession and EHR system is another best form of evaluating system effectiveness (Health Design Authority, 2012). Studies by Luthuli (2017), Marutha (2011), Pyrene (2015) and Katuu (2015), Thomas (2016) and Weeks (2013) focused on medical records management and the use of ICT and supported the evaluation of health records, however, there is currently limited literature supporting the monitoring and evaluation of EHR system. Noticeably, the eHealth Strategy of South Africa (2012-2017) highlighted the importance of monitoring and evaluation as a priority, without notable supporting national framework and processes guiding the implementation



of electronic health records systems. According to Health Design Authority (2012), literature review offers healthcare organizations with published work of knowledge, trending topics relating to EHR system national and international supporting the monitoring and evaluation of the system. In a similar vein, initial evaluations are based on a solid change management strategy (Msomi, 2020); however, neither hospital has an official monitoring system; instead, they just follow whatever strategies are effective for them at a particular moment.

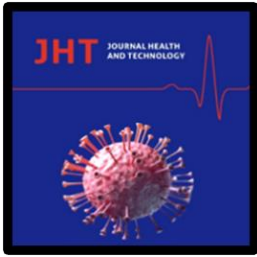
7.2 The use of EHR system in improving users’ work

Using the multi-purposes response users from both hospitals were asked in which manner they think electronic health records system improve their work. Majority of the respondents 90 (90.9%) in the public hospital indicated that EHR keeps *information up-to date*, followed by those who stated that the system provides *accurate health information* 70(70.7%). They confirmed that EHR system results to complete patient information at a point of care 69(69.7%) which allows easy interaction and communication between health personnel 59(59.5%). In the private hospital, respondents indicated the system provides them with *highly accurate* health information 44(59.5%); *keeping information up to date* 43(58.1%); and *easy interaction and communication* between health personnel 41(55.4%). The survey revealed that both public and private hospital benefit in the use EHR system. The study established that the private hospital only benefits from the portion that already implemented, as the EHR system is not fully utilised for all health activities. This is confirmed by the minority of 32(43.2%) response regarding complete *patient information at a point of care*. Table: 4.23 below illustrates the findings.

Table 1: Response on the manner EHR system improve users’ work (selecting more than one response) (n=173)

The manner EHR system to improve users’ work	Type of Hospital		
	Public	Private	Total
(a) Provide accurate health information.	70(70.7%)	44(59.5%)	114(65.9%)
(b) Keep information up to date.	90(90.9%)	43(58.1%)	133(76.9%)
(c) Complete patient’s information at a point of care.	69(69.7%)	32(43.2%)	101(58.4%)
(d) Easy interaction and communication between health personnel.	59(59.6%)	41(55.4%)	100(57.8%)

The implementation of electronic health record systems in hospitals is industrialised to improve employee’s (users) workflow simultaneously encourage and promote health service delivery. The study sought to find out the manner in which the use of EHR system improves users’ daily tasks. In terms of the rankings scored, findings indicated that the system keeps information up to date in the public hospital with high score of 90 (90.9%), and similar results obtained in the private hospital stood at 43 (58.1%).



Furthermore, both hospitals established that the EHR system provides hospitals with accurate health information with the score of 70(70%); from which public hospital has 44(59.5%); and private hospital with 44(59.5%). Only the public hospital has 69(69.7%), thus confirmed that the EHR system provides complete information at a point of care. Both public and private hospitals revealed that EHR system promotes easy communication among health personnel. The study established that the EHR system is effective in the public hospital, while the private hospital only benefits from the portion of implementation already active, as the EHR system is not implemented. Luthuli (2017, p. 140), Marutha (2011, p. 173), Moomba (2017), and Pyrene (2015, p. 131) also found that hospitals do not use all the modules in the electronic records management system and the implementation is incomplete.

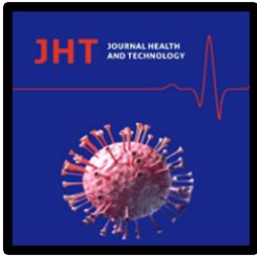
7.3 The hospital on the effect of using EHR system

The respondents were asked to indicate how often the feedback is given to them on the effect of using EHR system. The finding revealed that in both hospitals, the respondents disclosed they *never receive feedback* from the hospital. In the public hospital, 27 (27.3%) respondents said *sometimes they do get feedback*; while in the private hospital, the majority of the respondents 25 (33.8%) said they *rarely receive it*, and 23(31.1%) said *they never*. Low response from both public and private hospitals implies that both hospitals hardly give feedback to the users on the effect of the EHR system as illustrated below in Table 24

Table 2: Feedback given by the hospital on the effect of using EHR system.

Feedback on EHR system	Type of Hospital		
	Public	Private	Total
Often	10(10.1%)	10(13.5%)	20(11.6%)
Sometimes	27(27.3%)	14(18.9%)	41(23.7%)
Rarely	14(14.1%)	25(33.8%)	39(22.5%)
Never	45(45.5%)	23(31.1%)	68(39.3%)
Total	96(97.0%)	72(97.3%)	168(97.1%)

The purpose of monitoring and evaluating is to assess and track outcome anticipated, with the aim to improve impact and future output. It is for this reason change management must emphasize giving feedback more often to users utilizing the EHR system. The study revealed that users do not receive feedback on the effect of utilizing the system, as confirmed by 59 (59.6%) of the users in the public hospital, and 48 (66.9%) in the private hospital. The study established that both public and private hospitals overlook giving feedback to users. These results showed an imbalance in the change management practice as the hospital could miss preventable challenges in the use of EHR systems.



Kotter (1995) posited that it is essential to break down small wins during the implementation phase and give feedback on the short wins accomplished; therefore, this involuntarily allows the hospital to know the challenges in the implementation. Pryor & Crossouard (2008, p. 11) encourage leaders to regularly look for short wins and give feedback to the organisation to encourage additional change and more constructive progress in the system implementation.

8. SUMMARY OF FINDINGS

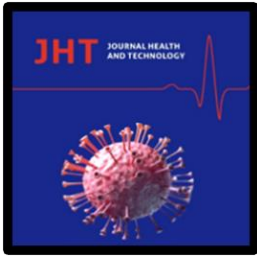
The study established that:

- (a) The study established that the public hospital had control plans to measure system effectiveness but mostly dependent on the IT company to lead the monitoring and evaluation of the EHR system. The private hospital on the other hand did not have standalone control plans as all their processes are head office driven.
- (b) In terms of monitoring the productivity, both hospitals monitored the efficiency of users in the utilisation of the system but there was no proper strategy documented. Hospitals monitored the systems based on what works for them.
- (c) Concerning feedback being given to users on the system effectiveness, the study affirmed that both public and private hospital do not provide feedback to users on the utilization of the system. Therefore, this is not good as users form essential part of the implementation process and form greater part of change management process.

9. RECOMMENDATION

In terms of monitoring and evaluating the impact of EHR system implementation, the study recommends that:

- Concerning control plans utilised to measure EHR system effectiveness, the public hospital should have a proper documented monitoring and evaluation strategy in place to assess the success or failure of EHR systems. Similarly, the private hospital should also have internal monitoring and evaluation processes for electronic systems and report feedback to the hospital head office for improvements.
- Both the public and private sectors should consider conducting regular evaluations for each department in the hospital to understand the challenges facing different users in their respective duties in the use of EHR systems.
- The Department of Health, working together with hospitals, should develop an official change management framework for the implementation of EHR systems.
- Standardised formal monitoring and evaluation processes with tools need to be developed by the Department of Health, including indicators to measure effectiveness and level of user acceptance from *pre-* to *post-*implementation of the EHR system.



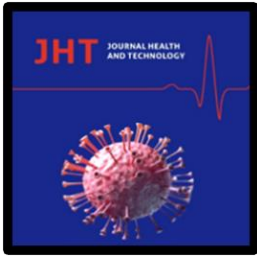
- Concerning providing feedback to users on EHR system effectiveness, both hospitals need to use formal and informal communication channels to disseminate information concerning the utilization of the system to reach users in different structures and encourage the use of the system.

10. CONSIDERATION

In conclusion, the study looked at the monitoring and evaluation of the EHR systems. Each hospital monitored the systems based on what was relevant to them at the time. Moreover, the public hospital is reliant on the IT company regarding monitoring and evaluation processes, while in the private hospital all processes derive from the hospital head group. Both hospitals have operational procedures for the use of the EHR system, but there is no policy or procedure guiding the monitoring and evaluation process in the implementation and operation of EHR systems. Both public and private hospitals should implement documented monitoring and evaluation strategies to assess the effectiveness of the EHR system. Regular evaluations should be conducted to understand user challenges. It is necessary to have a formal framework for change management as well as uniform monitoring and assessment procedures and tools.

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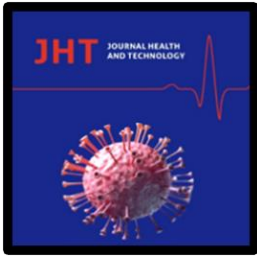
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