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EFFECT OF HEALTHCARE INFORMATION SYSTEMS ON SERVICE DELIVERY IN PRIVATE HOSPITALS IN NAIROBI COUNTY, KENYA

[1*]**Josephine Kwamboka Orang'i** *sabrnicol@gmail.com*
[2**] **Dr. James Ogalo (Ph D)** *jamesogalo@yahoo.com*
[3***] **Dr. Jotham Wasike (Ph D)** *jothamwasike@gmail.com*

[1*, 2**] *School of Information Science and Technology, Kisii University, Kenya*
[3***] *Kirinyaga University, Kenya*

Abstract: *The study explores various types of healthcare information system integration that are designed to help hospital practitioners and professionals with better communications within and outside for better services delivery in private hospitals in Nairobi –County. A descriptive research design methods was adopted to reach out the objectives with the survey method being used on the targeted population of out of which a sample size was done to represent the respondents on the study. The use of self-administered questionnaire survey was conducted among healthcare professionals. The study uses the SPSS to describe the respondents from the questionnaire. The study's findings reveal out that health information systems is being used in the hospital and interoperability policies were being applied but still much is needed, the use of healthcare medical technology was widely applied and this has made the process faster with easily patient's monitoring well. The strengths and weaknesses of the health information system, interoperability policies and healthcare medical technologies were identified and strategic recommendations were formulated accordingly. It is anticipated that this research will make a significant contribution to the healthcare information management in private hospital in Nairobi county-Kenya. The study attempts to bridge the existing knowledge gap by presenting the findings of a comprehensive study on healthcare information system, interoperability policies and healthcare medical technologies in private hospitals in Nairobi County. The study enriches the literature by providing an assessment tool and a tool for the evaluation of regional health information systems. The study also give valuable guidelines for improving the interoperability policies in the healthcare information systems for easy and quick sharing of information both in Kenya and the whole world respectively.*

Keywords*: Healthcare Information Systems, Service Delivery, Private Hospital*

1. Introduction

Over the previous years the use of healthcare information systems (HIS) in the hospitals has increased, they are used to capture, process, store, retrieve, share and present data for better decision-making in the hospital. The healthcare providers are increasingly sharing clinical data with other providers all over the world caring for the same patient by using the systems **(**Rudin, Goldzweig & Shekelle, 2014). The use of healthcare information systems in the hospital is believed to increase legibility, reducing medical errors, cutting medical costs and boosting up the quality of the healthcare expected to increasing legibility, reducing medical errors and boosting the quality of healthcare (Blumenthal & Tavenner, 2010). With the integration of the healthcare information systems in the hospital is not just about databases communicating with each other but it involves them moving of information towards a worldwide

healthcare integrated systems (Gröne & Garcia-Barbero, 2002). There is also the need for continuity of the healthcare and information exchange within and outside the health sector and this has introduced an imperative call for successful adoption of health care information system WHO (2004). The Government of Kenya (GOK) in its Kenya Vision 2030 has but more efforts to achieve the equitable and affordable health care at the highest affordable standard for all its citizens Luoma (2010). The Kenya Vision 2030 is blueprint document that highlights key reform agenda which is aimed to transform Kenya into a middle income country by the year 2030.In the recent years, there has been an increasing demand for good quality, health information data in Kenya, similar to that one of other developing countries (Luoma, 2010).

According to **(**Bell, 2012) the big potential benefits of using health information systems over paper medical records it reduces costs, improve the quality of care and the reduction of medication errors. However this benefits can only be fully realized once the barriers such as the lack of proper information technology infrastructure, inadequate information skills of health care providers and challenges in health information exchange have been overcome(Akhlaq, Sheikh & Pagliari, 2015).Assessing interoperability between health information systems in the hospital can help to identify the strengths and weaknesses of the systems that are being assessed and also gives prioritize quality improvement in the health care organization Gudria (2013). There are limited studies addressing healthcare information systems integration and its influence on Service delivery in private hospitals Nairobi –County in Kenya, hence this study sought to fill the existing gap. Consequently, the following research question was tested, RQ: Identify various types of healthcare information systems and their effects on service delivery in private hospitals in Nairobi County.

2. Literature Review

According to Ismaili et al., (2012) hospital information systems (HIS) are comprehensively, integrated and specialized information systems that are designed to manage the administrative, financial and clinical aspects of hospitals. With the use of healthcare information systems around the hospitals has brought a round rapid transition, moving from the traditional, paper-based practices to computerized processes and the systems ensures the delivery of healthcare and improvement of the quality services **(**Weber-Jahnke, Peyton, & Topaloglou, 2012).

It has provided a composed environment of complex information systems, heterogeneous, distributed and ubiquitous speaking different languages, integrating medical equipment and customized by different entities, which are set by different people aiming at different goals. (Palazzo et al., 2013). Buntin, Burke, Hoaglin, & Blumenthal (2011) suggest the hospital information systems or the healthcare information systems to have a potential of improving the healthcare of the patient and the performance of healthcare providers for better quality and cost cutting effectively in the hospital. Ketikidis et al., (2012) with the response of most of the healthcare professionals to use the hospital information systems are at the position of explaining the success or failure of the hospital system, development and implementation within the hospital. Furthermore Almunawar and Anshari (2011) sees the main goal of healthcare information systems is to give efficient and high quality of healthcare and also to promote development, rationalization and improvement of the hospital management. As technology develops so as the electronic healthcare records become more common, patients and clinicians are working towards a safer, more personal form of health care delivery the Patients are the consumers of health care and are the witness to the paradigm shift of access to health information and changes in information *(Caligtan & Dykes, 2011).*

The ability to electronically record, integrate and analyze data and information in the private hospital has enables administrators, practitioners to quickly move to the synthesis of knowledge and the development of wisdom, which they can apply to patient care (Edwards, Chiweda, Oyinka, McKay, & Wiles, 2011).

With the use of the technology, the patient monitoring has been made easy and efficient as the hospital can monitor and manage the patient particular including those ones who are suffering from disease such as diabetic, the patients can be taken care by the nurse from whenever they are while communicating with the expert at the hospital Larsen (2006).

According to Malliarou (2007) the nursing information systems(NIS) in the hospital help with the maintenance of nursing record, where nurses uses the systems to assess patient acuity and condition, prepare plan of care or critical pathway, specify interventions, document care, track outcomes and control quality in the given patient care. The decision support systems in the hospital is used for the reminders prompts and alerts of the patient's ensuring the regular screenings and other preventive practices within the hospital accordingly Tang (2009).

According to Tang (2009) radiology information systems (RIS) in the hospital helps with in entering and storing of orders for prescriptions, tests, and other services in a computer-based systems, it also enhances the legibility, reduces duplication and improve the speed with which orders are executed. The pharmacy information system (PIS) in the hospital is designed to address the demands of a pharmacy department and helps the pharmacists to monitor on how medication is used in hospitals, help them to supervise drug allergies and other medication-related complications (Frisse et al., 2012).With the use of the patient's administration information systems in the hospital provides services through computers, servers, networks and is the widely deployed and popular applications such as, electronic medical records (EMRs), electronic health records (EHRs) and have 24/7 remote support which allows hospital staff to troubleshoot problems occurring during system usage Ismail *et al*., (2012). Ambient Intelligent in the healthcare relies on network of sensors to observe subject and learn or predict, to which the systems can send alerts to a supervisor for any abnormal situation detected Sahli, Jabeura and Badra (2015).

Accordingly to Kafalı, Bromuri, Sindlar, vanderWeide and Pelaez, (2013) the staff-centered applications provide particular service to patients, including applications that personalize the care given to patients. Most of the applications are designed as personal assistants, whose aim is to collect and provide the most appropriate medical data on the appropriate point of care Bouzguenda and Turki (2014). Decision support systems are analyzed medical images or they are used to check the patient's health records and recommend the next steps to be followed for his/her treatment Sokolova and Fernández-Caballero (2012).

According to Galapago (2013) the implementation of the administration information system within the healthcare domain it takes the responsibility of people and departments within the institution, as knowledge exchange is the product of collaboration for better results. With rapid growth of information technology (IT) it has offered the healthcare providers with the ways of storing and accessing of substantial amounts of health data without the use of physical storage equipment and offering of the access to health information simultaneously from different locations in any given time **(**Savage, 2012). The healthcare industry started computerizing health information over a decade ago. From 1984 to 1994, healthcare-related computer transactions increased from 5% to 36% (Diana, Kazley & Menachemi, 2011).

Its main purpose is to replace the paper-based medical records as the main source of information of

healthcare records and to meet the clinical, legal, and administrative practice requirements (Hope et al., 2014).With the Computer personal records (CPR) existing computer systems can now capture, store, process, communicate, secure and present information from multiple locations (Roshanov et al.,2012).The systems reduces cost and improves the quality of care through the informed healthcare patients and providers, they remove duplication and enhances the coordination of treatment by more than one healthcare provider (Sittig & Singh, 2012). According to **(**Roshanov et al., 2012) Computer patient's records system implementation represented a major change in the management of patient records.

3. Healthcare Information Systems

The main goal of healthcare information systems is to manage information of healthcare-related activities, including planning, monitoring, coordination, and decision making and to improve the availability of patient's records by making information accessible for patient care in order to decrease the wait time for diagnostic information, such as laboratory results; and to improve patient administration procedures.

The real-time access, exchange and receipt of clinical data provided by hospital information systems improve the clinical documentation, reduce the duplication of care services, and support better decision making related to patient care **(**Tiina, et al 2009). The following are some of the healthcare information systems that are widely used in most of the private hospitals in Nairobi –County Kenya.

4. Electronic Health Records Systems (EHRS)

According Latha, Murthy and Sunitha (2012) Electronic health record in the hospital is an electronic set of patient records which contains information on a patient's medical history, demographics, laboratory data, medication and other important medical information. According to Kierkegaard (2011) the Cross-border of interoperable electronic health record systems make confidential of data more easily and rapidly accessible and it increases the risk of personal data concerning to health to be exposed or easily distributed to unauthorized parties from different sources, and throughout a lifetime.

With the release of the Standards and Guidelines in Electronic Medical Records (EMR) (2010), Strategic Plan for Health Information Systems (HIS) (2009-2014), Kenya ICT policy (2006) and Kenya Communications Act (2009) the country has made important milestones creating an environment with legal and regulatory framework conducive to development and adoption (Kenya National Electronic Health Strategy 2011- 2017). International Organization for Standardization (ISO) 2004, electronic health records is a repository of patient data in digital form, stored and exchanged securely, and accessible by multiple authorized users.

According to Griskewicz (2002) electronic health records are the a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting which includes this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports.

With the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 that was signed into law as part of the stimulus package which represents the largest US initiative to date that is designed to encourage widespread use of electronic health records (EHRs) Blumenthal and Tavenner(2010).They further expressed out that the Obama administration provided the health care community with a transformational opportunity to break through the barriers to progress where by the Health Information Technology for Economic and Clinical Health Act (HITECH) authorized incentive payments through Medicare and Medicaid to clinicians and hospitals when they use EHRs

privately and securely to achieve specified improvements in care delivery. Most of the private hospitals in Kenya are paper-based health record systems but with use of computers they are now moving to computerization systems for better quality, flexibility and patient safety on electronic healthcare records which are now easily accessible and shared faster (Huang, Sharaf & Huang, 2013). In order for the hospital to achieve good goals for the improvement of patient's safety on the use of electronic, data must be implemented so as to help in detecting, managing and giving potential safety of the patient 'events in real-time.

5. Electronic Medical Record Systems (EMRS)

Electronic medical records is the managing of the patient's medical records electronically from a variety of sources that deals with the patient treatment, diagnosis, laboratory test, imaging, history, prescription and allergies and the protection of security and patient privacy. Electronic Medical Records (EMRs) are computerized medical information systems that collect, store and display patient information, create legible and organized recordings and used to access clinical information about individual patients Boonstra, and Broekhuis (2010). According to Carter (2015) the widespread adoption of electronic medical records (EMRs) has transformed the practice of medicine from paper-based cottage industry into integrated health care delivery system and most of the physicians and institutions view the widespread use of EMRs to be inevitable. According to Mandl, Szolovits and Kohane (2001) the problems associated with patient medical records fragmented across the multiple treatment sites, poses a great obstacles in healthcare domain, the electronic medical record systems needs to be designed in a way that it can exchange data according to standards and the patients should have control to view their records while ensuring their privacy.

6. Patient Administration Records Systems (PAIS)

Eastaugh (2012) describes that the healthcare information technology in the hospital has enhances the marginal value products on the nurses and the entire concerned staff on the patient care activities for better improvement of healthcare productivity.

Waneka and Spetz (2010) conducted a study to determine the impact of health information technologies (HITs) on nurses and nursing care and they concluded that healthcare information technology improves the quality of nursing documentation; reduce on the medication administration errors, nurses are satisfied with healthcare information technology and have positive attitudes about it and with the effective leadership throughout the processes, it has improved the healthcare information technology in the hospitals.

With rapid the rapid growth of information technology (IT) has offered the healthcare providers ways of storing and accessing of substantial amounts of health data without the use of physical storage equipment and offering access to health information simultaneously from different locations in any given time (Savage, 2012). The healthcare industry started computerizing health information over a decade ago, from 1984 to 1994, healthcare-related computer transactions has increased from 5% to 36% (Diana, Kazley & Menachemi, 2011).

In the early 1990s, the IOM and the National Committee on Quality Assurance (NCQA) recommended that the healthcare and health insurance providers adopt a computerized patient record (CPR) (Kannry et al., 2012). Computerized patient records is the database system which is electronically maintain information regarding the patient's healthcare lifetime status and care to which the data is stored so only authorized users can access to the patient health information from multiple locations whenever needed (Hope et al., 2014).

The main purpose of it is to replace that one of paper-based medical records as the main source of information of healthcare records and to meet the clinical, legal and administrative practice requirements in the hospital (Hope et al., 2014).With the Computer personal records (CPR) the existing computer systems can now capture, store, process, communicate, secure and present information from multiple locations at the same time (Roshanov et al., 2012).The systems reduces cost and improves the quality of care through the informed healthcare patients and providers, they remove duplication and enhances the coordination of treatment by more than one healthcare provider (Sittig & Singh, 2012)

7. Clinical Decision Support Systems (CDSS)

Clinical Decision-Support System (CDSS) in the hospital is the computer system programed and designed to help health professionals make clinical decision in the hospital Musen, Shahar and Shortliffe (2006). They further emphases that the systems ones used in the hospital, help in storing and managing of the clinical data, helps the clinicians in solving the problematic situation such as on the drugs interaction, decision making. Irrespective of the kind of decision support task, the CDSSs should be integrated into the computer tools that are routinely used in the hospital by the by clinicians, they should be able to operate without any manual entry of data that being entered using some other system Musen, Shahar and Shortliffe (2006).

It reduces medication errors, enhances service delivery of preventive care, improved adherence to the recommended care standards Kaushal, Shojania and Bates (2010). According to Caligtan and Dykes (2011) is the electronic device which is universally available for the lifelong resource of health information and is maintained by individuals (patient). He further suggests the systems to be interchangeable used but they are separate from the Electronic Medical Record (EMR). According to (Caligtan & Dykes, 2011) the power of the ownership is the patient and the provider or the healthcare hospital organization itself.

According to the AHIMA (2010) there are several key factors that are comprises on the personal health records, the healthcare information data must be complete, reliable and accurate, personal health records does not replace the patient's official medical record, but it remains as separate and can integrate information from the official medical record. The following table gives summary of some of the clinical health information systems that are being used in private hospitals.

Table 1.1: Types of Healthcare Information Systems: Source researcher (2017)

Electronic Health Record Systems (EHRS)	Has information conforms to nationally recognized interoperable and that can be created, managed and consulted by authorized clinicians and staff across more than one health care organization.
Electronic Medical Records systems (EMRS)general focus on medical care	Created, gathered, managed and consulted by authorized clinicians and staff within one health care organization, intended to replace existing (often paper based
Patient Administration Records Systems (PARS)	Keeps track of the patients, admissions and appointments. They are computerized patient records are elements of a database system of electronically maintained information regarding an individual's lifetime health status and care
Clinical Decision Support Systems (CDSS)	Analyzes healthcare data for clinical decisions making.

8. Service delivery

Access to good healthcare services in hospital encompasses of three components namely: coverage, services, and timeliness. The health insurance coverage helps patients to gain entry into the health care system. Lack of adequate of it makes difficult for patient to get the health care they need, uninsured patient have poor health status and are more likely to die prematurely Hadley (2007).

The primary care provider (PCP) in the hospital serves as the source of care it gives a meaningful and sustained relationships with patients and provide integrated services which is associated with: greater patient trust in the provider, better patient-provider communication and increases the likelihood of the patients to receive appropriate care Mainous (2001). Timeliness is the health care system's the ability to provide health care quickly after a need is recognized and measures of timeliness in the hospital is the availability of appointments and care for illness or injury when it is needed and the time spent waiting in doctors' offices and emergency departments (EDs) National Healthcare Quality Report, 2013.

According to Sahli, Jabeura and Badra (2015) the ambient intelligent concepts in healthcare relies on the various networks of the sensors that observe subject and learn or predict ones behavior such as that one of supervision of elder people in which the system sends alerts to practionaires if any abnormal situation is detected. The staff centered applications in the hospital is designed to support medical practitioners (basically doctors and nurses) with their daily care. Bouzguenda and Turki (2014) most of the applications in the hospitals are designed to collect and provide the most appropriate medical data in the appropriate point of care when needed.

9. Methodology

Technology is ever-evolving thus evolution comes with increasing of data. Since decades, paper based records have been used and stored to keep information about patients and track the history of patients. In Kenya, still almost even not all health care organizations rely on paper based record system; however the system seems not allowing proper patients' data sharing among doctors when needed as irregularities can still be observed in information about historical health of patients and availability of all clinical data. Its interaction with other available systems in the healthcare organizations like procurement or finances systems is difficult and its linkage with health insurance and pharmacy systems is impossible. To overcome all these issues surrounding the paper based health records system, an electronic health record (EHR) interoperability system may revolutionize the system and improve the service quality of treatment offered to the patients.

The target population of the study focused on four private hospitals that is; the Nairobi hospital, the mater hospital, Aga Khan and the M.P Shah Private hospital. The four hospitals was picked to present the rest of the other hospitals as they are the major private hospitals in the Nairobi County and for the last ten years have implemented the use of healthcare information systems and interoperability policies fully so they make a well unit of the study. The research seek to develop a research on healthcare information systems and interoperability policies on service delivery and its importance in the hospital. The target population of this study was therefore 1617 respondents from the four hospitals. The following tables illustrates the targeted population of the study

This study used a descriptive research design. Descriptive research was used to obtain information concerning the current status of the phenomena and to describe what exists with respect to variables or conditions in a situation. The methods to be used ranged from the survey that described the status quo and correlation study which investigated the relationship between variables. This was the most appropriate research design since it investigated the relationship between the dependent and independent

variables. In addition, the study used a qualitative and quantitative research designs.

Results

10. Aspect of Healthcare information System Integration and usage in Private hospitals

The respondents were asked to indicate whether they use healthcare information system in their respective hospital**.**

According to the findings 49 of the out of total population sampled 84.4% of them respondents agree that healthcare information system integration (HCIS) has influenced the service delivery on hospital who were being sample,49 of them also strongly agree that healthcare information system integration is being applied in the hospitals making 84.4% of the respondent being sampled ,out of the 116 population targeted number 5 of them strongly disagree with the statement with 4.3% of the respondent disagree that healthcare information system integration helps with service delivery in the hospital,9.5% of the respondent sample remained neutral, representing 11 respondents having contrary opinion on the influence of healthcare information system on service delivery in their hospital by disagreeing that the healthcare information systems integration has not influenced the service delivery in the hospital.

The respondents were also asked to indicate the extent to which they the hospital uses the electronic health records systems in the hospital. From the findings from table 1.2 below, the respondents indicated with a mean of 2.0086 and a standard deviation of 0.61142. This clearly shows that with the use of electronic health records had greatly help the hospital with quick service delivery. They were also requested to indicate the extent to which the hospital uses the electronic medical records in managing of the patent's information. From these findings we can deduce that with the mean of 2.3190 and the standard deviation of 0.779781 it clearly shows that electronic health record is being applied in the hospitals respectively.

From the findings, the respondents indicated the extent to which the hospital uses the patient administration systems in tracking of the patient's appointment with a mean of 2.8276 and a standard deviation of 0.53203. This clearly shows that the hospitals use patient administration system for tracking out the patient treatment and admitting services. The respondents were also requested to indicate the extent to which they agreed with the statement that patient's records in the hospital are being analyzed using the clinical decision support systems for better decision making in the hospital. According to the findings, the respondents indicated with a mean of 4.1638 and a standard deviation of 0.97752 this clearly indicates that, the patient's records in the hospital are being analyzed using the clinical decision support systems for better decision making in the hospital.

The findings agree with Müller, Ganslandt, Eich, Lang, Ohmann and Prokosch (2001) argument that the greatest barrier for the daily routine usage of health information decision support systems in the hospital is that the systems are designed for a single problem which arises infrequently and have not been integrated into the routine data management environment for the user.

Mantwill, Fiordelli, Ludolph and Schulz (2015) argues that with inclusion of electronic medical records (EMR) systems, in the hospital the patients can easily access their individual personal health records not only to improve the quality of health care given to individuals but also to reduce the cost of healthcare in the country. From these findings we can deduce that the healthcare information system has immense influence on service delivery in private hospital in Nairobi County.

Table 1.2 Healthcare information systems usage

	Mean	Std. Deviation
Electronic Health Records	2.0086	.61142
Electronic Medical Record	2.3190	.79781
Patient Administration Record system	2.8276	0.53203
Clinical Decision Support System	4.1638	.97752

11. Discusion

The findings revealed a positive significant relation between healthcare information systems integration on service delivery in private hospitals it was established that healthcare information systems integration is being used to a great extent. The integration of healthcare information systems in the hospitals under study is impacted by three factors the autonomy, heterogeneity and distribution. Sharing of data within and outside the hospitals is an issue for systems which tends to consist enormous silos of paper-based or electronic data which are of poor quality and do not meet the expected standards.

From the study it was revealed out that private hospitals domain healthcare information system integration facilitate good communication and good flow of information from one departmental /section to another so that the exchanged information is shared amongst various systems and even beyond the hospitals .This can be only done well if the intended hospitals are fully integrated well, and they have some of the integration models being implemented such as the information-oriented integration which helps with the support of information exchange from one system to another ,the databases and APIs process-oriented that manages the process of information flow, service-oriented that shares the common business logic or methods and finally the user-oriented integration which allows the user to gain a consistent view of a multitude on the systems for better service delivery in the four private hospitals which are under study.

From the study it was revealed out that both electronic health records and electronic medical record systems in the hospitals under study helps the medical consultants and practitioners with easy, quick, manage and retrieval of clinical information and transferring of the patients data much faster from one section /department to another for quick services delivery. The study also established that hospital administration in the four hospitals under study is being used to track out the patient's appointments, for booking reservations and even administration of the patients in hospitals.

Also it was establish that the four hospitals under study uses the clinical decision support systems for analyzing of the patient's records quickly and firster for better appropriate decisions-making regarding on the patient's sickness and further flow -ups making if necessary for better hospital services. It was found out that the healthcare information systems integration helps both the medical practitioners and the general practitioners to integrate well with other systems for easy decision making on treatment of the patients for better service delivery in the hospitals.

12. Conclusion

The healthcare information systems is being used widely in the private hospitals in Kenya, the electronic health records systems, the electronic medical records systems, patient administration systems and clinical decision support systems are being used in the hospital for better service delivery. The systems are used to manage the patient's medical records electronically from a variety of sources (EMRS), used to track the patients, admissions appointments the hospitals, it also helps to analyze

the healthcare data for better decision making We believe that the failures of modern healthcare information systems can be avoided by using trustworthy systems which are designed with security and privacy in mind and increase the awareness about the potential of the systems in the hospitals.

The confidentiality, security and privacy of the patients' data is the key factors that influences services and utilization of healthcare information system products and not only in Kenya but also in developed world, security in the protection of personal health information from unauthorized access, use or disclosure is a challenge. The privacy and security requires individuals to determine when, how, and to what extent information is communicated to others while confidentiality is non-disclosure of private information with which one is entrusted. Due to the shortage of healthcare workers, use of electronic Health and mobile Health technologies is critical issue for enhancing equitable access to healthcare in Kenya. To address this shortage, the Government in collaboration with private sector has promoted the use of healthcare information systems integration usage in the country as it supports quick and reliable desired quality of hospital delivery and access to healthcare services.

13. Recommendation

The study recommends that private hospitals should implements the healthcare information systems integration and participates in health data exchange, healthcare interoperability is another area which has gained excess of higher growth in the hospitals country wide and even outside the country. This is due to higher growing of networks that has increased the patient's data access with the use of the healthcare interoperability policies in the hospital systems which has greatly impacted both the providers and patients for better service delivery in the hospitals. Connectivity is difficult because hospitals often have to overcome with the variety of information technology systems, diverse levels of sophistication and varied interoperable policies capabilities.

References

Almunawar, M.N. & Anshari, M. (2011). Health Information Systems (HIS): Concept and Technology. In Proceedings of the International Conference on Informatics for Development.

Akhlaq, A., Sheikh, A., & Pagliari, C. (2015). Barriers and facilitators to health information exchange in low-and middleincome country settings: a systematic review protocol. Journal of Innovation in Health Informatics, 22(2), 284-292.

Bell, D.S., Cima, L., Seiden, D.S., Nakazono, T.T., Alcouloumre, M.S., & Cunningham, W.E. (2012). Effects of laboratory data exchange in the care of patients with HIV. Int. J Med Inform. Elsevier Ireland Ltd, 81(10), e7482.

Blumenthal, D., & Tavenner, M. (2010). The 'Meaningful Use' Regulation for electronic health records The New England Journal of Medicine, 363(6), 501–504. doi: 10.1056/NEJMp1006114

Boonstra, A., & Broekhuis, M. (2010). Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. BMC health services research, 10(1), 231.

Bouzguenda, L., & Turki, M., (2014). Designing an architectural style for dynamic medical cross-organizational workflow management system: an approach based on agents and web services. J Med Syst. 38(4), 1–32.

Buntin, M. B., Burke, M. F., Hoaglin, M. C., & Blumenthal, D. (2011). The benefits of health information technology: a review of the recent literature shows predominantly positive results. Health affairs, 30(3), 464-471.

Caligtan, C.A. & Dykes, P.C. (2011). Electronic Health Records and Personal Health Records. Seminars in Oncology Nursing, 27(3), 218-228.

Carter, J. T. (2015). Electronic medical records and quality improvement. Neurosurgery Clinics, 26(2), 245-251.

Diana, M.L., Kazley, A., & Menachemi, N. (2011). An assessment of health care information and management systems society and leapfrog data on computerized provider order entry. Health Services Research, 46, 1575-1591. doi:10.1111/j.1475-6773.2011.01259.x

Eastaugh, S. R. (2012). Health information technology impact on productivity. Journal of health care finance, 39(2), 64-81.

Edwards, K., Chiweda, D., Oyinka, A., McKay, C., & Wiles, D. (2011). Assessing the value of electronic records. Nursing times, 107(40), 12-14.

Frisse, M. E., Johnson, K. B., Nian, H., Davison, C. L., Gadd, C. S., Unertl, K. M., ... & Chen, Q. (2012). The financial impact of health information exchange on emergency department care. Journal of the American Medical Informatics Association, 19(3), 328-333.

Galapago, S, (2013). Transcript of administrative and clinical health information system administrative and clinical health information system, journal of medicine, 213.

Griskewicz, M. (2002). HIMSS SIG develops proposed e-health definition. HIMSS News, 13(7), 12.

Gröne, O & Garcia-Barbero, M. (2002). Trends in Integrated Care – Reflections on Conceptual Issues. World Health Organization, Copenhagen, EUR/02/5037864

Gudria, W., Naudet, Y., & Chen, D. (2013). Maturity model for enterprise interoperability. Enterp Inf. Syst. 9(1), 128. Retrieved from: http://www.tandfonline. Com /doi/abs/10.1080/17517575.2013.805246

Hadley J (2007). Insurance coverage, medical care use, and short-term health changes following an unintentional injury or the onset of a chronic condition. JAMA, 297(10), 1073-84.

Hope, C., Estrada, N., Weir, C., Chia-Chen, T., Damal, K., & Sauer, B. C. (2014). Documentation of delirium in the va electronic health record. BMC Research Notes, 7(1), 1-10. doi: 10.1186/1756-0500-7-208

Huang, J., Sharaf, M. & Huang, C.T. (2013). A hierarchical framework for secure and scalable EHR sharing and access control in multi-cloud. 41st International Conference on Parallel Processing Workshops, Pittsburgh, Pennsylvania, USA. Retrieved from: IEEE Xplore, http:// www.ieee.org

Ismail, A., Jamil, A. T., Fareed, A., Rahman, A., Madihah, J., Bakar, A. & Saadi, H. (2012). The implementation of Hospital Information System (HIS) in tertiary hospitals in Malaysia: a qualitative study.

Kafalı, Ö., Bromuri, S., Sindlar, M., vanderWeide, T., & Pelaez, E. A. (2013). Scha echtle, U. Stathis, K, "COMMODITY12: A smarte-health environment for diabetes management". Journal of Ambient Intelligence and Smart Environments, IOS Press (Toappear).

Kannry, J., Beuria, P., Wang, E., & Nissim, J. (2012). Personal health records: meaningful use, but for whom? Mount Sinai Journal of Medicine: A Journal of Translational and Personalized Medicine, 79(5), 593-602.

Kaushal, R., Kern, L., Barrón, Y., Quaresimo, J. &Abramson, E. (2010): Electronic Prescribing Improves Medication Safety in Community-Based Office Practices. Journal of General Internal Medicine. 25(6), 530-536, 10.1007/s11606-009-1238-8.

Ketikidis, P., Dimitrovski, T., Lazuras, L., & Bath, P., A. (2012). Acceptance of health information technology in health professionals: an application of the revised technology acceptance model. Health informatics journal, 30(3), 464-471.

Kierkegaard, P. (2011). Electronic health record: Wiring Europe's healthcare. Computer law & security review, 27(5), 503-515.

Larsen, B.S. (2006). Pervasive Home Care-Technological support for treatment of diabetic foot ulcers at home, Unpublished PhD. Dissertation, Aarhus C, Denmark: University of Aarhus.

Latha, N. A., Murthy, B. R., & Sunitha, U. (2012). Electronic health record. International Journal of Engineering, 1(10), 25-27

Luoma, M., Doherty, J., Muchiri, S., Barasa, T., Hofler, K., & Maniscalco, L., (2010). Kenya Health System Assessment 2010. Bethesda, MD: Health Systems 20/20 project, Abt Associates Inc.

Mainous, A. G., Baker, R., Love, M. M., Gray, D. P., & Gill, J. M. (2001). Continuity of care and trust in one's physician: evidence from primary care in the United States and the United Kingdom. Fam Med, 33(1), 22-27.

Malliarou, M., & Damigou, D. (2007). Information Systems in nursing practice. Health Review, Sciences Technology Policy, 18(108), 37-41.

Mandl, K. D., Szolovits, P., & Kohane, I. S. (2001). Public Standards and Patients' Control: How to Keep Electronic Medical Records accessible but Private. MJ (Clinical Research Ed.), 322(7281), 283–287. https://doi.org/10.1136/bmj.322.7281.283

Mantwill, S., Fiordelli, M., Ludolph, R., & Schulz, P. J. (2015). EMPOWER-support of patient empowerment by an intelligent self-management pathway for patients: study protocol. BMC medical informatics and decision making, 15(1), 18.

Müller, M. L., Ganslandt, T., Eich, H. P., Lang, K., Ohmann, C., & Prokosch, H. U. (2001). Towards integration of clinical decision support in commercial hospital information systems using distributed, reusable software and knowledge components. International journal of medical informatics, 64(2-3), 369-377. Musen, M.A Shahar, Y & Shortliffe, E.H, (2006). Biomedical informatics: computer applications in health care and biomedicine Health informatics, (3rd ed.), (pp. 698–736), New York: Springer

Palazzo, L., Sernani, P., Claudi, A., Dolcini, G., Biancucci, G., & Dragoni, A. F. (2013). A Multi-Agent Architecture for Health Information Systems.

Roshanov, P. S., Gerstein, H. C., Hunt, D. L., Sebaldt, R. J., & Haynes, R. (2012). Impact of a computerized system for evidence-based diabetes care on completeness of records: A before--after study. BMC Medical Informatics and Decision Making, 12, 63-72. doi:10.1186/1472-6947-12-63.

Rudin, R. S., Motala, A., Goldzweig, C. L., & Shekelle, P. G. (2014). Usage and effect of health information exchange. Annals of Internal Medicine, 161, 803-811. doi:10.7326/M14-0877.

Sahli, N., Jabeura, N. & Badra, M., (2015). Agent-based framework for sensor-to-sensor personalization. Journal of Computer and System Sciences. 81(3), 487–495.

Savage, N. (2012). Better Medicine through Machine Learning, Communications of the ACM, 55(1), 17-19.

Sittig, D. F., & Singh, H. (2012). Electronic health records and national patient-safety goals. New England Journal of Medicine, 367, 1854–1860. doi: 10.1056/nejmsb1205420.

Sokolova, M.V., & Fernández-Caballero, A., (2012). Evaluation of environmental impact upon human health with DeciMaS framework. Exp System Appl. 39(3), 3469–3483.

Tang, P.C. & Lee, T. H. (2009). Your doctor's office or the internet? Two paths to personal health records. New England Journal of Medicine, 360(13).

Tiina, M., Tarja, S., Paula, A., Marianne, M., & Ilmari, R. (2009). The outcomes of regional healthcare information systems in health care: A review of the research literature. International journal of medical informatics, 78(11), 757.

Waneka, R., & Spetz, J. (2010). Hospital information technology systems' impact on nurses and nursing care. Journal of Nursing Administration, 40(12), 509-514.

Weber-Jahnke, J., Peyton, L., & Topaloglou, T. (2012). eHealth system interoperability. Information Systems Frontiers, 14(1), 1–3. doi:10.1007/s10796-011-9319-8.

WHO (2004) Developing health management information systems: A practical guide for developing counries. Geneva: World Health Organization.