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Assessing Implementation of electronic health records in hospitals: A Systematic Literature Review.

A Research project submitted in partial fulfillment of the requirement for the Award of Master's Degree in Health Informatics; Submitted to College of Medicine and Health Sciences School of public health.

Presented by:

MUTUYIMANA Ildephonse

No: 218014274

Supervisor: Dr. Nasiru Sani

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Declaration

I **Mutuyimana Ildephonse,** declare that this research is my original work and has not been presented to any institution, the sources or information utilized in this research have been cited and acknowledged within the text.

Signature: ………………………….

Date: ………………………………………

Certification

The undersigned certify that I have read and hereby recommend for acceptance by the university of Rwanda college of Medicine and Health Sciences department of Health Informatics the thesis entitled "Assessing Implementation of electronic health records in hospitals: a systematic literature review". In fulfillment of the requirement for the degree of Masters in Health Informatics.

Signature**: …………………………………**

Dr.Nasiru Sani

(Supervisor)

Date**: ………………………………**

Dedication

 To Almighty God,

To my dear wife Uwimana Vestine thank you for all, my beloved sons Uhiriwe Bernardin and Isingizwe Berardin, my dear mother, my dear sisters and brothers to Mujawamariya Dancilla. I take your encouragement and your support into account.

Acknowledgement

Abstract

Background

Literatures on electronic health record implementation in hospitals are very different. Purpose of the research is to produce a short description on already exist Literatures to the implementation of Electronic Medical record (EHR) in hospital and to determine the results and lessons generally applicable to facilitator (1).

Methodology

Analysis systematically of experimental literature to the implementation of Electronic Health Record was undertaken. Tools utilized are web based knowledge, EBSCO and Cochrane Library. References related to the articles chosen were also examined. The study terms encompassed Electronic Health record, implementation as well as hospital. The article should have the next requirements: to be written in English, basic empirical information emphasized to hospital EHR implementation and fulfill formulated criteria.

Result

Three hundred sixty four journal articles originally identified, this study examines the twenty one journal articles which having necessary requirements. To these journal articles nineteen actions that are applicable in general, are identified and put in system, having these interactional extents: context of Electronic Health Record, EHR content and EHR implementation process.

Conclusions: While Electronic Health Record (EHR) systems are thought to have positive result on performance of hospital, implementation is a complicated work. This systematically review discovers the causes of the complexity and it show nineteen frameworks of innervations that can aid to resolve the EHR implementation problem.

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ABBREVIATIONS AND ACRONYMES

EHR: Electronic Health Record

EMR: Electronic Medical Record

IT: Information Technology

ISO: International Organization for Standardization

CPOE: Computerized Physician Order Entry

CPR: Computerized Patient Record

EHCR: Electronic Healthcare Record

ECR: Electronic Client Record

PHR: Personal Health Record

CIS: Clinical Information System

DMR: Digital Medical Record

PHR: Personal Health Record

HIT: Health Information Technology

USA: United state of America

IS: Information systems

HIS: Health information system

SVR: Sample fundamental registration

WHO: World Health Organization

UN: United Nations

UNESCO: United Nations Educational Scientific and Cultural Organization

KVA: Kilo-volt-amperes

HMIS: Health Management Information System

IMIS: Institute for the Management of Information Systems

UNEP: United Nations Environment Programme.

DOS: Disk Operating System

ICT: Information and Communication Technology

GIS: Geographic Information System

CHAPTER ONE: GENERAL INTRODUCTION

1.0 Study Background

In the current years EHR have been implemented by increasing number of hospital worldwide. Ambition to implement Electronic Health Record tend to be driven by the guarantee to improvement integration and existence of patient data by the need to enhance performance and inexpensive, modifying connection among physician and patient through care shared by a group of health care professionals(1).

With many advances in Information Technology over the last 20years, especially in health care, a number of different forms of EHR data have been discussed, developed, and implemented(2).

Electronic health record (EHR) can be utilized in single organizations, like system ability to share data in associated healthcare units, to level of region or across country. Unit of health care that utilize Electronic Health Record encompass hospitals to all levels, pharmacies, general medical doctor surgeries as well as other healthcare providers. Implementation of Electronic Health Record wide-hospital is a complicated issue including a number of institutional and Technical factors encompassing skilled human, institutional structure, civil, technical basic technical equipments, financial resources as well as organization(1).

Although there are crucial benefits of Electronic Health Record, Health care givers were at the beginning stage slow to accept it.

Application of information system to hospitals is very complicated than other area because of the complex character of medical data, data entry problem, problem of security and confidentiality as well as general inadequate of knowledge on IT benefits

There are three ideas why hospital is dissimilar compare to other industries and such distinction can impact Electronic Health record applications. The 1st idea is that hospitals have multiple goals, like curing and treating patients and education of new nurses and doctors. 2nd hospital have more and diverse infrastructure and process.3rd hospital comprise various workers that encompass doctor specialists with high levels of expertise, power and freedom. These difference

properties show a study that focus on identify and examining the results of previous research to Electronic Health Record implementation in hospital(1).

EHRs include higher important advantages and topmost chances in social improvement patient and resident health result, medication errors reduction, enhance care quality," institutional result financial and running advantages; and community result" enhance capability to carry out study, Health of population improvement as well as reduction of cost that are common
coming down to a higher level of risk that lasts longer is as long a life as EHR as it is for other software packages(3).

1.1 PROBLEM STATEMENT

There are no reviews of existing literature related to EHR implementation to hospital

1.2 Objectives

1.2.0 Main objective

This research have objective to perform a systematic review to determine, classify and examine available results on implementation of EHR in hospitals

1.2.1 Specific objectives

i.   To identify the current result in literature on Electronic Health Record implementation in Hospitals.
ii. To categorize findings related to Electronic Health Record implementation in hospitals.
iii. To examine the results relevant to the implementation of Electronic Health Record in hospitals.
iv. To discover in the literatures the interventions aid to resolve EHR implementation problems.

1.3 Research questions

1. What are the findings of EHR implementation in hospital?
2. What are instruments show categorization steps of Electronic Medical Record implementation in hospitals?
3. What are possible ways of solving EHR implementation problems?

1.4 Theoretical framework

The systematic review focus on wide-hospital, individual hospital electronic Health Record Implementation and found realistic studies (that encompass primary data collected by the main authors or researchers) that indicate this situation. The classification of the results from chosen articles shown on Framework of Pettigrew in order to comprehend change strategy [13].

1.4.1 Terminology

EHR is defined as electronic health record nationally relevant information about the individual recognized interoperability standards that can be created, managed and consulted by authorized clinicians and staff across the board more than one health organization(3).

Assessing Execution of EHR in hospitals: a systematical review of literature.
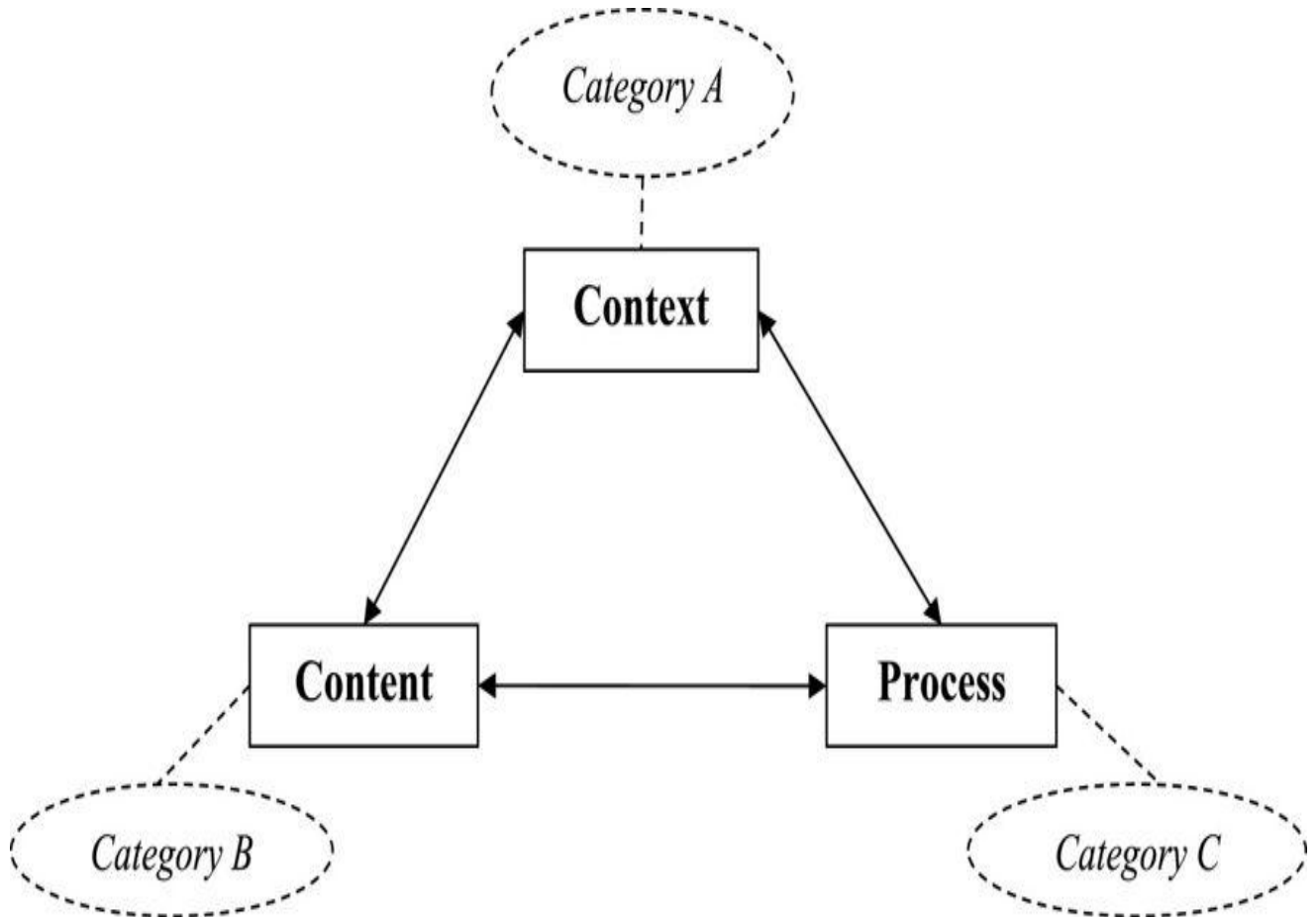
Figure 1: Pettigrew's framework [13] and the corresponding categories.

Source from(1): http://www.biomedcentral.com/1472-6963/14/370

ISO: International Organization for Standardization examines EHR to be a wide term for storage of health status information of person of care in computer process able form. International Organization for Standardization (ISO) utilizes various expressions to explain different types of

EHRs these encompass EMR, which is like EHR but limited to domain of medical. The word EPR and CPR are identified also(1).

1.5 Significance of the Study

Recently, the transition needs of electronic health record (EHR) show the need of standard practice in health services. Awareness of most excellent performance and actions for patient statistics management is to solution effectual health utilization and diverse health provision scheme in each environment. Such study is extremely needed to link the breach of the limited awareness on implementation of EHR in hospital. This study contributes to development of knowledge on implementation of Electronic health record in hospital. The result of this study will help Pharmacists, laboratory technicians, physician, nurses healthcare professionals and hospital manager to find the requirements for implanting EHR this will help to improve hospital quality and efficiency.

1.6 Study limitation and Scope

The study was delimited to due to the use of secondary data related to EHR implementation. However, the data used comprised of a research across the globe provided fulfilled our criteria of searching literatures. Similarly, Connectivity of internet has limited our finding.

Moreover, time factor has been one of the major limitation to this our studies because of the limited time considering other academic activities.

CHAPTER TWO: LITERATURE REVIEW

2.0 Introduction

The articles related to review of literature are based on the Pettigrew framework, which categorized the findings into three content, context, and process. In the first (Content) it reviews articles related to what needs to be linked or included before implementing the electronic health record. Second, (Context) what is the context that is the size to cover and the resources needed for such coverage has also been reviewed and finally (the process) the procedures to be covered are in accordance with international standard, there is the process of implemented in the literature review.

2.1 Determining whether or Not Patient's Information Supported Effective Health Care Service Delivery in Hospitals.

Task aid to help an individual health management level using approach of information. The important element of modern literature research relevant to management of health information in countries which are developing has been shown realistic research for helping special information in various levels of health management. Finally, an attempt has been made to evaluate the current landscape of experimental research regarding the informational support of relevant literature for the effective delivery of health care services.

2.2 Disease Surveillance System

As Described by Hiyawalyer some interesting work on the subject, including the increase the system for disease surveillance, Established and implemented on level of the entire country.
The research have proved that with the enhancement in quality" efficiency, and effectiveness, many medical errors, which are the most common cause of preventable injuries in hospitals can be prevented by such EHR system"(1)

2.3 Large Linked Databases: An Example

Case study of using connected database to monitor vaccine-related adverse events in Khanh Hoa as described by Mohammad [47]. In this rare report, it was demonstrated that it is possible for creating sub-health information system like a wide connected database that can offer worthy, specific and in appropriate information in a developing country for utilize.

EHR is sophisticated effort but EMR show record of health-related information on person by single institution." EHR is a highly complex multi-organizational collaborative process of health-related information of an individual (Figure 2). The complexity of EHR varies depending on architectural style, for example, a platform-based EHR tend to be more homogeneous and simpler compared to a provider based or a patient-based EHR(1).

Complexity of EHR, multiple providers
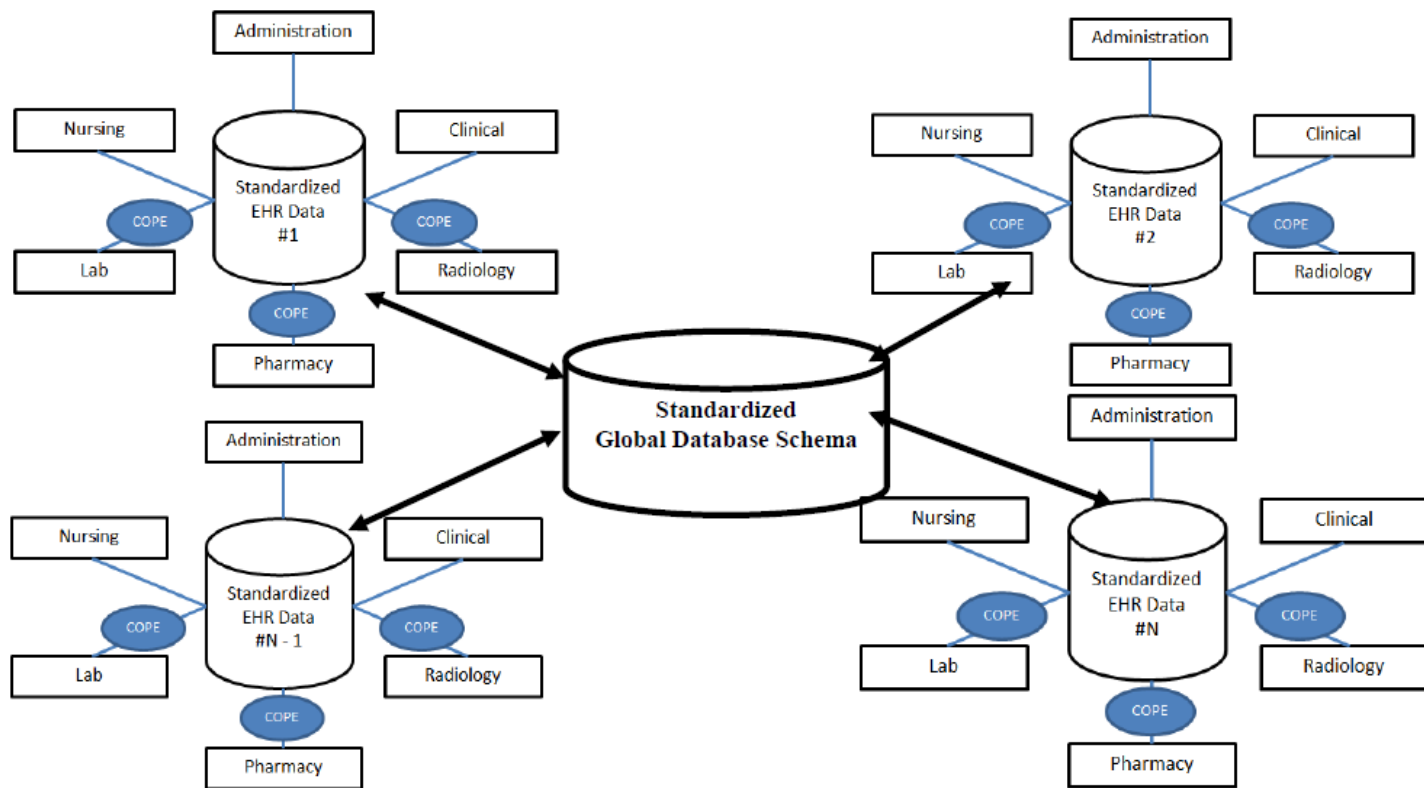
Figure 2: Complexity of HER, multiple providers

Source: from(4) https://www.google.com/search?q=Ondo+and+Hess%2C+2005&rlz

According to (4) like any complicated incorporated system, certain parts are normal and other change by facility. Next is the list of standard parts of EHR.

1. Administrative part: patient, admission, release, and forward information.
2. Laboratory segment: tests orders, result, and information regarding billing.
3. Radiology element: order images, results and information related to billing.
4. Pharmacy: self-acting entry of prescription drugs is highly needed and would remove manual entry errors
5. Computerized Physician order Entry or CPOE enable combination of two, three and four elements. CPOE is a must and also should be harmonious with other elements.
6. Repository of document: Electronic Health Record enables Health providers to take notes, assessments and make reports anytime wanted.
7. Compliance Checker: This element has E-consent system and compliance system. This part can possibly be done by a third party checker for simplicity and cost effectiveness

2.4 Use of Health Information in Addressing Inequalities

Short area relevant development was explained by Nolen and Braveman [47] who continued further regarding in special area, describes a small area related development, leading to a reduction further (HIS) in a country specific, namely health disparities between social and economic groups, gender, race, geographic area and others. Measures related to social benefits, it examines basic requirement information and capable databases.

2.5 An Injury Surveillance System

Crucial medium of public health is impacted by the mismanagement of information related to health in an article by Rahman, Anderson, and Svanstrom [46]. It reports on a research in Bangladesh about the adequacy of the current wound monitoring system. They say injury prevention, a major public health problem in many developing countries, including Bangladesh.

2.6 Registrations of vital Civil

Researchers [48] describe a completely diverse health information management point of view in emergency sites, confirmed that birth enrollment, timely death registration, sex and cause, and counting mortality and different levels are necessary for health policies evidence-based. Monitoring and evaluation. However, only a small fraction of the nation's most needy for such data have effective production systems, although legislation provides for the creation and protection of a basic record. They indicate that the living model of registration in the countries mentioned must be advanced or improved as a remedy for this stalemate. The challenge that travels, when used in combination with verifiable verbal verification ways and applied to nationwide population model, provides a reasonable, beneficial, and preserved outcome in a small, intermediate problem term. This is an additional case where researchers are trying to promote the growth of the small aspect of health system reform in order to achieve their goals.

Expert in health information who believes that some consistency is needed in expanding organized data and evidence will not see this as a success story. In contrast, health service administrators in decentralized health systems will agree with many emergency sites for similar reasons. Therefore, this dialogue and debate will continue as to whether full action needs to be appropriated into the system or that the fundamental and unique elements of the different health process in different nations are developed in terms of health information systems reforms.

2.7 Defining public health priorities and interventions: An example

The impressive study of pneumonia epidemics in rural areas of western Kenya Report by Tornheim et al. [50], their result illustrates that hospital-based data are likely to provide useful information on public health concentration and interventions. They suggested that deaths from this issue could be prevented by the introduction of new vaccines to prevent early-day pneumonia, and that antiretroviral medications could be reinforced in relation to hospital records. These intermediaries require accurate, consistent and reliable data; this situation is common in almost all health systems in emergency locations. Monitoring common infectious diseases through the hospital information system can not only prevent the burden of epidemics, but also prevent unnecessary deaths due to the reasons for the availability of definitive therapies. The same authors are Tornheim et al. A similar study was published three years after [50] with the same objectives. Her study consisted of an analysis of diarrhea in Kenya over three years.

Again, if health service managers make good use of existing hospital data, many beneficial health interventions can be implemented for the benefit of the target population.

In conclusion, the nine publications analyzed above were used in this report to highlight the truth some researchers are trying to promote a certain level of health service passing through information access. Table 1 gives a complete summary of these publications. The author of the year and country is studying the field of health information system concluding their remarks.

Extensive summary of these publications

Author, year and the country	Area of the Health	Concluding remarks
Hiawalyer, G., *(Papuaa New Guinea)*	Disease surveillanc e	Diseases surveillance information sub- system could perform a major function in deciding health
Mohammad, Ali Canh Gia, Do *(Viet*	Large linked databases related to essential services	Establishing large linked databases of this nature is a cost efficient measure in emergent
Noleen, LP Braveman, K Dachs, JNW	Addressing health inequities	Systems of information in health care can be made use of to support a culture of equity guide resolution making and policy development
Rahman, F. Andersson, R.	Health information and measuring disease burden	Existing data sources could be improved to establish an accurate injury information system
Setel, PD Sankoch, O Reao, C *(Developin*	Registration of vital events	Sample fundamental registration (SVR) is an reasonable, gainful, and sustainable short- and medium-term answer to the
Shaw, V *(South Africa)* 2005	Essential data sets for regional health information systems	The growth of an indispensable data position help to intensification health services

Thieren, M *(Developing countries)* 2005	Health information in caring quickly	Health information systems need incorporation and contribution in caring emergencies
Tornheim, Jeoffrey Magya, Ayub S. Oyando, Norbert *(Kenya)* 2007	Surveillance statistics from admitted health facilities	Surveillance statistics from admitted health services can be helpful for emphasizing of public health creativity, however not gathered or analyzed in emergent countries
Tornkeim, Jeoffrey Mangya, Ajub S. Oyando, Norbert *(Kenya)*	Child and death statistics from admitted health hospitals	Hospitals give functional data for community health main concern situation and preparation, and also preventive guidance and assistance

Table 1: Attempts to assist a particular level of health management through information

2.8 Access: Some representative publications.

Determining factors that hinder the adoption of digital registries in hospitals. The importance of patient registries is related to different needs and objectives. They represent a permanent documentation of the patient's health and allow the physician to evaluate symptoms and signs in a longer time perspective, thereby contributing to the development of true diagnosis and medication. The value of the patient record is also understood in different areas of life, such as its legal scope, because it can be tested, which can clarify suspicions and identify behaviors that can protect patients and medical professionals around. And the other person affected. In accumulating medical and legal considerations, the data provide research motivation as they contain information that helps to shape the context of patient development and evaluate measures and outcomes.

In hospitals which is large there is a huge request for baggage sharing of traditional records (printed records), which can hinder maintenance or access to information. In addition, it often happens that these documents are faulty or have difficulty reading. The authors identified frequent problems such as poor information quality, illegible descriptive records, record-related controls (making it difficult to verify patient reports for long hospital stays), extreme manuscript usage, and inadequate behavior. These complications complicate the correction of these documents, which has a detrimental effect on patient care.

The effects of bad quality of available registers, storage problem and approach to immense number of registers include scientific research and delay demonstration progress and epidemiological analysis. In summary, Santooz, Pula and Leema (2013, p. 86) stated that a useful information system "is a limited means of communication that surpasses modern digital technology."

With the development of information systems (often called information technologies), you can quickly and quickly develop electronic and digital solutions for storing these documents to facilitate the progress of their processing. Although political translators and legislators are considering and considering the possibility of including information technology in healthcare, this has not happened at the same pace as in other areas. Currently, few hospitals use electronic recordings, as Cirqueira and Mac Allister [51] showed promising trends. The authors found that the number of doctors using electronic data sets is somewhat mobile, but the use of these data sets is increasing every year.

This increase reflects the impact of hospital initiatives on expanding IT implementation to improve the value of patient services, monitor the consumption of clinical medical materials, and reduce costs. Although the literature contains various reports on the integration of electronic records into HIS, remuneration is not the only reported problem associated with the use of such a process [52]. Analysis of the implementation of the integrated management system in a large hospital has shown that it provides significant benefits beyond potential difficulties, facilitates implementation and improves the integrity of Camper services [53]. Two cases showed the impact of the selected system provider (especially in terms of care, training and adaptability) and how to manage the implementation project, which results in different results for both projects [54].

2.9 Implementation Barriers of Electronic Health Record in the United States:

Strategy implementation in general industry and healthcare more than ten years ago emphasize on continuous enhancement of goods and services quality through the use of innovative technologies. Limiting the increase in costs is associated with technological implementation in the field of health care. Australia and England are close to widespread implementation of electronic healthcare systems, but there are significant barriers to the slow hospital information systems implementation in all hospitals and health care organizations in the United States as Opined [55].

In a research conducted in the USA. [56] Reports that America ranks sixty-sixth within hundred countries with first-class healthcare systems. Past research have shown 4-6% of hospitals in the United States and health care institution have reached complete implementation of hospital information systems, and fourteen to sixteen percent have incomplete implementation of some hospital systems (Moorie, 2009; Silmoon et al., 2008; Ward et al. ., 2006;).The increased cost of implementing electronic healthcare systems is often to criticize for their lowest reception. A survey of hospitals in Iowa [56] indicated that eighty percent adoption rate in city hospitals and a thirty to forty percent rate in countryside hospitals, mentioning the solid financial capacity of city municipal hospitals as a cause of differences. The description of discrepancies in the implementation indicators of EHR systems revealed that larger hospitals with beyond two hundred beds, didactic hospitals, non-profit hospitals and many hospital systems have a biger implementation rate than independent non-pedagogical hospitals. Private non-profit institution have doubling the adoption rate than institution acquired because of the reinvestment of organizational profit in healthcare technologies and hospital information systems as a way to preserve nonprofit status [57] but argue that geographical location does not significantly affect adoption rate.

In the plan, to give more insight into the adoption structure of HIS has shown that hospital features have an impact on the point of interest in information technology of hospital [58]. These scribes revealed that poor implementation is found within smaller hospitals, more hospitals in rural areas, no health care organization related systems, and hospitals in areas where there is greater environmental indecision. The lower implementation rate among rural hospitals more correlates with their inadequate coverage and resources than geographical location.

Other obstacles have hindered the delivery of electronic healthcare systems in previous years. These include insufficient awareness of available technologies; poor delivery of service by some product sellers; afraid of disruptions at work leading to resistance of doctors; ambiguities regarding the return investment visit; difficult system of approving large expenses, especially in order to acquire an organization; database incompatibility resulting in poor inter-operability of different systems; training difficulties to cover high staffing needs; legal and legal considerations; and various in information technology preferences among physicians and administrators [57],[58], [59]. At the meeting on health data management in 2010, a research of the main Information officers who attended explains that 74% of medical staffs are interested in introducing digital recording systems in their various hospitals as the main problem. Officials are concerned about the problems of effective administration changes and obstacles in resolving end-user confrontations [60], arguing that employees are more opposed to transformation that openly impact their existing situation.

Looking at users' resistance capabilities, we need official leadership to accept a process that trusts employees, and were not convinced of the necessary technological change, recommends organizations needs to undertake hospital information technologies to plan strategically to prevent accidental effects of technology in the information field. Information breaches among administrators and staff have contributed to the fight against antagonism with the implementation of EMR. Most time managers who do not perform daily documentation tasks make decisions about system components without personnel to find out that some changes need to be made.

A pilot investigation in Cyprus regarding the launch of electronic medical registration systems [63] found that the main obstacle to implementation was the doctor's assessment of the importance of the system for its functioning, legal problems, temporary problems and ignorance of electronic devices. On the other hand, Smutis et al. It was revealed that the computer system increased performance and improved proper patient service. As return is increasingly related to the efficiency of service results, it is mandatory to build the correct system and its components.
In a pilot study in Cyprus regarding the introduction of electronic medical registration systems [61], it was found that the obstacle to implementation was the physician's assessment of system control in terms of its functioning, legal problems, temporary problems and ignorance of electronic devices. On the optimistic side, Smutis et al. determine that the computer system has

increased performance and increased the importance of patient care. As return is increasingly linked to an emphasis on results of concerns, it is mandatory to build the right system and its components

In a Cyprus study [63], it was noted that the Cypriot environmental management of local areas mentioned that doctors' perceptions of the impact of procurement systems on their functioning and their insufficient knowledge of electronic devices were an obstacle to their implementation. These problems may be exacerbated in Nigeria because medical personnel are already at risk. Dishonesty in Nigeria is a major concern for the nation's social and economic existence and adversely exaggerates progress in healthcare provision and service requirements.

In a Cyprus pilot study on the implementation of digital medical information systems, it was found that the doctor's perception of the system's impact on their workflow, legal uncertainties, transition issues and lack of knowledge of electronic equipment were obstacles to implementation. Positively, Samoutis et al. determine that the computer system has increased efficiency and improved the quality of services provided to patients. As the reimbursement becomes more and more related to the value of the results of services, it becomes necessary to implement the right system with the right components. Based on research carried out by many scholars in various environments [55], a significant step in the procedure for implementing hospital information systems is for the medical director to seek the input of collaborating physicians and advanced nurses in the organization during the assessment phase, because recommendations from the main group of entities regarding the process of providing care are crucial for success. The challenge associated with the installation of computer networks is the civilization of the institute and the composition of each department that will use the system. Nurses and doctors are less interested in the use of computer systems, which maintain that in a study in 2008 in the US, this is likely to affect patient care [58], it stems from the fact that often technological advances and predictable expenses for system modernization can determine manager decisions regarding installation. Insufficient knowledge, poor understanding and pessimistic experiences of managers with information technologies are challenges that may discourage achieving EHR.

Related research again in the same country (Cyprus) [62] found that the adoption of EMR in Cyprus showed that doctors' perception of the importance of the EMR process in their workflow and the lack of knowledge of electronic equipment was an obstacle to completion. These challenges are similar to those in Nigeria, as the health care population has already been threatened. Dishonesty in Nigeria is the main dispute that has shaped the socio-economic life of the nation and negatively affected the development of health care and the provision of services.

2.8.0 Barriers to achieving e-health in Africa

Obstacles to the introduction of a health information system in Africa; has tidal relations with the US because, implementing policy, general industry and health services, they have been paying attention to the continuous development of excellence in goods and services through the use of innovative technologies for over a decade. And curbing the rising spending on health services that technologically attribute the dissemination of health information [55], argued that Australia and England are almost universal recognition of the eHealth process, but there are significant obstacles to the slow implementation of hospital information systems. And an additional health department in the US.

For example, the investigation is carried out in the US [56], reports that America ranked 66 out of 100 countries with world-class infrastructure and healthcare systems. A recent investigation has shown that 4-6% of healthcare facilities and organizations in the US have achieved full implementation of the hospital information system and 14-16% have partially accepted the adoption of many forms of HIS (Moore, 2009; Simeon et al., 2008; 2016;

Expenses related to updating e-Health systems are usually blamed for their poor acceptance. 53 Research conducted at Iowa State Hospitals found 80 percent of city hospitals and 30-40 percent of the adoption rates of city hospitals, citing the strong financial capabilities of city hospitals as a cause of inequality. Analyzing the inequality in the acceptance of electronic medical records, he found that large hospitals with over 200 beds, educational hospitals, in profitable hospitals and many hospitals have higher implementation rates than independent hospitals. Private non-profit health organizations are twice as high as the adoption of profit-oriented organizations because the organization's revenues are reinvested in medical technologies and HIS for non-profit status. These features influence the beginning of the information process in the area of e-health, but indicate that geographical location has no significant impact on the acceptance rate. In order to

gain additional knowledge of the guide on the implementation of the health information system [58], it was found that hospital characteristics affect the rate of admission of hospital information technologies. These writers revealed that improper executions take place in small hospitals, hospitals in informal health care facilities in villages, and in hospitals in places with increased environmental uncertainty.

The low implementation rate in local hospitals tends to be associated with their small size and limited resources compared to their geographical location. Another obstacle was delaying the start of the electronic process in ancient times. Insufficient knowledge of available technologies; poor quality of services provided by some product suppliers; fear of a break from work that causes clinical resistance. Uncertainty about a return visit to savings; and difficult approval processes for high investment outlays, especially in organizations that have a database mismatch that causes the interoperability of various systems; training difficulties to cover the requirements of large personnel; organizational and legal considerations; differences in information technology preferences among physicians and administrators [57], [58], [59] At a meeting on health data management in 2005, a study by current senior information officers showed that 74% of participants showed readiness to prioritize clinical information systems in hospital practice. Leaders asked about the challenges associated with effective adaptation management and the problem in resolving end-user confrontation [60], saying that employees were more reluctant to transform, which directly affected their current situation. To counter end-user resistance, officials demand an extension of employee empowerment strategies while convincing the workforce to accept and apply the required change.

Many scholars show that organizations wishing to use hospital information technologies strategically plan to stay away from the unplanned results of implementing data technologies. Information breaches among management and staff make it difficult to implement environmental management plans. Managers who do not perform daily documentation tasks often make decisions about system components without the involvement of staff and only need to make adjustments.

A WHO (2008) statement states that Nigeria has been adopting policies in the healthcare sector for several years after more than 30 years since the opening of the Almaa-Ata Health for All statement in 1978. Successive Nigerian governments have not adopted guidelines for the

implementation of a digital information system in hospitals as part of the national healthcare system. The policy has failed for many reasons, such as poor health outcomes in the country, as revealed in an investigation conducted in 2003 by the Nigerian Ministry of Health. The statement sets the infant mortality rate at 110 per 1,000 births and maternal mortality at 1,100 per 100,000 live births

The report (USA) places Nigeria as the highest maternal mortality in the world. [53] In Africa, loss of health means that the poor live in poverty and extreme poverty is exposed to people [64]. The Millennium Announcement. He sacrificed the freedom of all categories of people, including older men and young people, all groups of women, the negative effects of poverty, but in sub-Saharan Africa there are concerns about the predictable outcome of the current millennium development [64].

The particular situation in Nigeria, the Nigerian healthcare system, is still suffering from many years of neglect by subsequent governments, and thus poor infrastructure in both public and private healthcare facilities. This trend is the same in almost every subset of national life. At the UNESCO conference in 2009 on the assessment and evaluation of the development efforts of associated countries ten years later, Nigeria's record of performance failed in all areas. Other nations in West Africa, such as Senegal and Ghana, have been proud of their achievements for over 10 years. The revised health document showed that government spending on health was less than USD 8 per person compared to USD 34 recommended internationally. The situation level of bribery and corruption in this country is hindering low government funding for health in Nigeria. [60], Excessive procurement and non-execution of projects exist in an economic system that does not translate into technological breakthroughs and economic failures. Poverty seems to be a frequent excuse for modest infrastructure investments in Nigeria.

 Nigeria Suvora (in the press) said she was blessed with abundant natural resources, although the country is in a lower position (ninth among the poorest in the world) because it has not used its natural wealth wisely. World Bank (2007) statistics show that poverty levels increased from 27 percent in 1980 to 70 percent in 1990, and indicators still show no economic improvement.

Similarly, the result also showed a lack of basic social services (Sufofura, in the press). Statistics show that energy supplies are always unavailable or are at the lowest levels, statistics show that less than 50 percent of the country is connected to electricity. In places with electrical conductivity, the display is less than 12 hours a day. Lack of consistent power led to poor

production throughout the country. In a related investigation scenario of depriving inventive knowledge of inventiveness in the Nigerian banking sector, a World Bank study 57 showed that low KVA electricity efficiency was a major obstacle. Unpredictable energy supplies have become a challenge for continuous growth in the entire aspect of Nigeria's economy.

Many factors influence health care policy in this country. Nigeria is struggling with social, economic and political issues, and in addition, the civil war creates an opportunity to corrupt and strengthen deprived macroeconomic governance, some of which are causing serious county failures. After years of military despotism and a lack of government responsibility, the collapse of infrastructure required a great deal of concentration. The Obama Administration in the Health Improvement Act 2010 sought to expand the use of hospital information systems [65] because the decision to facilitate the enforcement of e-health policy introduced by the Bush administration as part of the new healthcare strategy highlighted in the Obama administration's debate $ 19 billion In Nigeria and other African countries, a strong government policy on health technologies is needed to enable e-Health initiatives to be implemented (WHO Newsletter, 2008).

Differences in the health information system and demographic differences between neighborhoods and cities are a challenge for formulating a policy on international IT support in health care. This fear goes beyond sub-Saharan Africa, where around 80% of people live in rural communities without social facilities and infrastructure. [64]

A study on the management and use of HMIS in the province of Busia, Uganda in 2001. It showed that there is also clear evidence that advanced databases are not fully used and that many managers are unable or reluctant to control data in order to take As a decision, the main obstacle to implementing these systems was inadequate effective central routine health data systems and the use of individual patient tests for screening. The result was non-standard data / information in which clinics reported significantly fewer data items. As expected. To manage the information system, a permanent recruitment assistant has been appointed who does not have sufficient training in information management. They considered it necessary to establish a minimum set of data, develop a realistic set of indicators and train all employees in information management and use. The main problems in the management of public health services were accelerating them (HIS). Although this area still did not have a large amount of data on the computer, the goal was

to obtain enough data for simple analysis and interpretation that could be used for decision making, research, planning and allocation of supplies. The region has MIS financial plans in its plans, and some new creativity has been dropped.

The Busia zone, in which there was no power, influenced the energy production process, thus ending the development of the computerized database. High recognition for reporting systems in relation to report processing has proved problematic due to a lack of funds and equipment. In recent years, efforts to strengthen the healthcare sector have been exceptional and total expenditure on IMIS has remained low. In response to a question that in three months back or a year mentioned exactly how the data was used with HMIS, he stated that most care units. Health has actually used Health Management System data, but it doesn't have much potential. Some respondents did not really know that they would make a decision based on the results of statistics until they asked questions such as "How do you know the amount of medicine needed for a healthcare unit?" The addition of points and the use of the financial management information system are due to various restrictions.

General problems related to the functioning of the health service (MHIS) at the medical unit level included general deficiencies in stationery, inadequate and unskilled employees, lack of transport, lack of motivation and lack of retention and lack of documentation. Bad recordings are usually stored in a small package, so most healthcare units need to store lockers. There are not enough deposit shields, so it is difficult to compile different materials into one file, given the limited resources. There were no counterfeit books or monthly summary forms. No healthcare unit had a center for rooms or resources to properly maintain records, leading to documentation errors and loss of documentation

According to the person responsible for Lumino, "most employees are not trained and do not have data management skills in the healthcare department, such as graphics and graphic interpretation." All health care units, including the health zone, do not have a computerized data management and storage system and do not need training in sound documentation management and data analysis. Manual analysis, which they did not even do so often, is described as very tedious and only in the DOS office, where the computer database of the Financial Management

Information System (HMIS) was poor motivation of staff, also hindered proper document management, which caused information delay and omission data, so it was inaccurate.

Circumstances worsened due to the cancellation of common costs during the presidential campaign. Another problem that IMIS has outlined is poor coordination, lack of staff participation and absenteeism (WHO, 2011). Much of the information collected by healthcare professionals is not relevant to the tasks they perform. The data collected will probably emphasize the reporting of diseases and relate only partially to the function of healthcare at the level of the health unit or patient / client. Data collection or reporting requirements are often taken without taking into account the technical capabilities of the personnel or diagnostic equipment concerned with minimal health delivery. In addition, healthcare professionals receive little or no training in data compilation techniques.

Duplication and waste occur in many parallel systems (HIS) instead of comprehensively dealing with management functions. There are UNEP forms and family planning forms, all of which must be completed at health unit level. As a result, healthcare professionals are regularly by the necessity of making overlapping reports every month. Much time is spent collecting unnecessary information because data is not shared between different systems (WHO, 2011). The procedure for sending, compiling, analyzing and presenting data is so long that it is often outdated. After submitting the feedback report and making a decision without the media. In strong vertical programs, data transmission is not carried out in accordance with the hierarchical continuation of communication, which means that reports do not reach the management, especially to the level of the department (WHO, 2011).

2.9 Use of ICT in Enhancing Health Information Management in Developing countries
2.9.0 Countries: Some Empirical Studies

Many developing countries are currently looking for community, regional or national health infrastructure or strategies to ensure secure and comprehensive access to comprehensive health information and to improve healthcare by quality, completeness and reporting of health data provided by healthcare. Settings [66], an extensive literature search was carried out on 4 electronic databases. These databases were Medellin (2000-2010), Census Direct (2000-2010)

and IBSCO (2000-2010). Keyword databases reflecting HIS in developing countries and Information and Communication Technology applications were research strategies. Search utilizing the next words: HIT, HIS reforms, HIS failure, health information management, medical data systems, digital medical records, integrated medical records, health information management systems, health care information technology, a total of 521 studies were selected based on preliminary research. After reviewing the abstracts and reviewing 51 full texts, 28 studies meeting the inclusion criteria were identified. The main features of the study are summarized in Table 2 below.

A review systematically includes experimental research Journal articles on all types of changes in HIS or reforms in underdeveloped countries. The next integration criteria were utilized: First, the search was restricted to Journal articles published in English. 2nd, just experimental research materials are contained in health information systems or networks. Research with a technologically and architectural approach was excluded.

Credentials collected and processed using the following methodology. First, the article titles were read and addresses from searches and keywords were downloaded. English text entries published in magazines chosen for further evaluation. Opening, characters, ideal pages and dual copies are rejected. Secondly, the summaries were compared with the integration conditions for HIS in developing countries and results.

For this reason, the abstracts of the study problem were recovered, without regarding to the project. Summaries of all documents discovered in the search strategy have been read and evaluated. The use of health information technology has been explored in implementing health information exchange and reform in regional or national health information systems or organizations in a variety of ways and for various research projects. The most common study design was 'construction assessment' and the other 'case study'. There were difference kinds of Information Technology interventions in the selected series of experimental studies. Nearly all of them were small subsystems of regulatory IS. No studies have been conducted to fully or partially assess regional or national HIS using Information Technology. The results of most studies were successful except one. However, the results of the study should be explained with attention for 2 reasons. 1st, design evaluation, the most common test method, cannot be considered a real product evaluation. Independent practical appraisal of the application,

preferably by a third party, can lead to completely different conclusions. According to Hicks [66], there may be a negative preference for the spread of errors in IT applications in health information systems.

The main characteristics of the study

Author, year and the country or region	Study design	Type of IT intervention	Outcome
Blaya et al [79] , 2010 Developing countries	Systematic Review	Personal digital assistants and mobile devices in data collection procedures	Such devices can be very effective in improving data collection time and Quality
Borzekowski et al [80], 2006, Ghana	Survey	Use of the internet as a source of health Information	Internet has high potential to deliver health information to in developing Countries
Boyom et al [81], 1997, Sub-Saharan Africa	Constructive Evaluation	An information-oriented tool for acquiring, processing and disseminating medical knowledge, data and decisions	The system is successful in daily micro-management of various components of the health system
Bulgiba, A. M. [71], 2004, Malaysia	Case study	A tailor made hospital information system in a tertiary care hospital	Problems and challenges in Implementation Identified
Chan et al [82], 2010, Developing countries in General	Constructive Evaluation	A framework for selecting patient-oriented Information Technologies in developing countries	The framework can be applied to health interventions across all health domains
Diero et al [83] , Kenya	Constructive evaluation and Survey	Electronic Medical Records (EMR) and (personal Data Assistant) PDA in rural health Information Management	EMRs and PDA are useful tools for performing health Information Management
Dongmo et al [84] , 2006, Cameroon	Case study	Obstetric health information system	Obstetric health information systems can provide a relatively accurate assessment of the maternal health Situation
Douglas et al [85],	Constructive	Computer-based	Such systems can be

23

2003, Malawi	Evaluation	order entry system	successfully deployed and adopted in resource-poor settings
El Hattab, O. R. E. [86], 2015, Egypt	Constructive Evaluation	An integrated hospital information System	Benefits, cultural issues and other technology related issues identified
Fraser et al [87], Africa and Latin America	Systematic Review	HIS in tracking patients with specific Diseases	HIS need to play an increasing role in disease tracking
Fraser et al [88], Peru	Constructive Evaluation	Web based medical record system	Successful implementation in resource poor
Geissbuhler et al 2007, Mali	Constructive Evaluation	E health network and a telemedicine tool	Improvement in clinical data access Improvement in clinical data exch
Hannan et al 2000, Kenya	Constructive Evaluation	Electronic Medical Record System	Decisions, trade-offs and the process involved in introducing
Idowu et al [91], 2006, Nigeria	Survey	IT infusion model	Proposal for development of a model
Jayasuriya [73], 1999,	Case study	Computerised regional HIS	Factors that led to the failure of the
Kijsanayotin et [92]	Survey	IT system of a health	Factors related to IT are identified
Kohli et al [93], Kenya	Constructive Evaluation	Radiology information System	Identified as a low-cost system
Lim et al [94], Kenya	Constructive Evaluation	Nutritional System	Collaboration between engineering and medical
Ma et al [95], 2008, Developing countries in general	Constructive Evaluation	An application framework for programming practices	SAFE and Epi Info are both cost-free and have low system requirements
Massimo [96],	Constructive	Common architecture	Effectiveness and

Developing countries Mohammad et 2005, Viet Nam	Evaluation in Case study	for	an organisational HIS A large linked	validity of a common Feasibility to
		for the monitoring of vaccine-related Events		establish health information systems such as a large linked database
Ndira et al [97], 2008, Uganda	Case study Survey	Electronic Health Record		Only some aspects Information management was improved with the System
Noor et al [61] , Kenya	Case study	Framework resource allocation based on a Information System I(GIS)		Success of GIS application in health Information Management Demonstrated
Scott et al [98], 2002, South Africa	Case study	Application of GIS to improve an existing HIS		Potential of GIS to improve His Demonstrated
Shih et al, 2009[99], Taiwan	Case study	An integrated HIS of specific health Programme		Success of a fully integrated electronic HIS demonstrated
Syed-Mohamad et al [100], 2010, Malaysia	Constructive Evaluation	An open-source web-based electronic record system (EPR)		Improved coordination and Integrity Demonstrated
Ali et al [101], 2005, Viet Nam	Case study Survey	large linked database for the monitoring of vaccine-related Events		Feasibility to establish health information systems such as a large Database demonstr.

Table 2: The main characteristics of the study

CHAPTER THREE: RESEARCH METHODOLOGY

3.0 Search strategies

In order for the systematic review of the literature to be exhaustive, it is necessary to include in the search all terms related to the purpose of the study. In addition, we must include relevant synonyms and related terms, both for electronic medical information systems and hospitals. By adding * at the end of the term, search engines select other forms and by adding "" around the words, one guarantees that only the entire term will be searched. In addition, including? as a wildcard, every possible combination is included in the search. Three categories of keywords were used in the search. The first category included the following terms as approximate synonyms of the hospital: "hospital *", "healthcare" and "clinic *". The second category concerned implementation and included the term 'implementation *'. For the third category, electronic medical information systems, the following search terms were used: "Electronic medical records *", "Electronic patient records *", "Electronic medical records *", "Computerized patient records *", "Electronic healthcare record *", "Computers? Ed Physician Order Entry. ".

This relatively large set of keywords was necessary to ensure that articles were not left to search and required a large number of search strategies to cover all those keywords. As we searched for papers regarding the implementation of electronic medical information systems in hospitals, the search strategies included the terms shown in Table 3.

Overview of the search strategies

From: Assessing implementation of Electronic health records in hospitals: a systematic literature review

Search strategy	Terms used**
[1]	"Electronic Health Record*" + implement* + hospital*
[2]	"Electronic Health Record*" + implement* + "health care"
[3]	"Electronic Health Record*" + implement* + clinic*
[4]	"Electronic Patient Record*" + implement* + hospital*
[5]	"Electronic Patient Record*" + implement* + "health care"
[6]	"Electronic Patient Record*" + implement* + clinic*
[7]	"Electronic Medical Record*" + implement* + hospital*
[8]	"Electronic Medical Record*" + implement* + "health care"
[9]	"Electronic Medical Record*" + implement* + clinic*
[10]	"Computeri?ed Patient Record*" + implement* + hospital*
[11]	"Computeri?ed Patient Record*" + implement* + "health care"
[12]	"Computeri?ed Patient Record*" + implement* + clinic*
[13]	"Electronic Health Care Record*" + implement* + hospital*

Search strategy	Terms used**
[14]	"Electronic Health Care Record*" + implement* + "health care"
[15]	"Electronic Health Care Record*" + implement* + clinic*
[16]	"Computeri?ed Physician Order Entry" + implement* + hospital*
[17]	"Computeri?ed Physician Order Entry" + implement* + "health care"
[18]	"Computeri?ed Physician Order Entry" + implement* + clinic*

Table 3: Overview of the search strategies

1. ***As suggested by the referees of this paper, we also used the terms "introduc*" (instead of "implement*") and "provider" (instead of physician, as part of CPOE). Each of these two searches yielded one additional article.***

The three types of searches were selected based on their relevance to the field and their accessibility by the researcher: Web of information, EBSCO, and the Cochrane library. Most search engines use a lot of data but not all of them are suitable for this research as they serve a wide range of fields. Appendix A provides a summary of the data used. The reference list is included in articles that meet the selection criteria and looked at other relevant studies that were not identified in the data search.

Identified articles from different search methods should have been peer review articles if they were included in our review. Furthermore, they were tested and they had to satisfy the following criteria that would include: (1) written in English, (2) a full text available online, (3) based on empirical baseline data, (4) focused on EHR hospital implementation in general, and (5) a

meeting established for sound principles. A long list of symptoms of misconduct was made, and all were independently considered by the two authors. They have independently studied the occult, removed duplicate copies and shortlisted for detailed study. Where opinions are different, the final decision to engage is made after discussion between researchers.

CHAPTER FOUR: RESULT AND DATA ANALYSIS

4.0 Data analysis

The quality of the articles that survived the cleaning was evaluated by the first two authors using the Quality Assessment Standard for Basic Research papers [18]. In other words, the score quality was evaluated jointly by assessing whether specific policies had been prepared, the outcome measure by 2 (full reference), 1 (partially addressed), or 0 (not mentioned) in each criterion. The papers are included to obtain at least half of all possible marks; it is acknowledged that the cut-off area is given a comment on the Standard Assessment Standards for the Preliminary Research Papers [20].

The next step was to obtain the results of the revised articles and to analyze them for the purpose of achieving the implementation of the hospital's EHR programs. The categorization of these findings in general can increase clarity. A pre-informed conceptual model, based on Pettigrew's framework for understanding strategic change, includes three categories: content (A), content (B), and process (C). As our study focuses specifically on identifying the outcomes associated with the implementation process, the potential reasons for introducing such a system and its inputs and outputs, are out of bounds. The authors hold regular discussions among themselves to discuss the meaning and categorization of results.

4.1 Results

4.1.0 Paper selection

The use of the 18 search strategies listed in Table 1 with the various search engines led to the identification of 364 articles. The search results were conducted on 18 August 2019 with search techniques 1-15 and August 21, 2019 with search strategies 16-16. The last three strategies were added after an initial analysis of preliminary results that highlighted some of the principles and explanations of information technology in health care. Not surprisingly, many duplicates were included in the 364 articles, both inside and among search engines. Using Revenues functions to identify multiplication and proximity, 160 responses were received. However, the program did not identify all existing duplicates and the second author conducted a 23 additional identified book check. When removing a duplicate, we kept a link to the original search engine that

identified the article, and, as the Web site being the first search engine used, many articles seemed to come from this search engine. This left a total of 181 different articles that were examined in the article and not needed to see if they met the criteria. When this was uncertain, the headings on the page were further investigated. This survey resulted in 13 articles that met all the criteria. Then we have looked at two for perfectionism. First of all, a look at the directions of these articles identified the other nine points. Secondly, as suggested by the referee of this paper, we also use the word "informant" "instead of" implement it ", as well as the first two categories, and the word" provider "instead of" doctor ", is part of the CPOE. One additional point (see Table 1). The 24 articles resulted, two points being the same and the same score one was removed, leading to 23 articles in the final standard test results can be found in Appendix B. The results show that the two points failed to meet the quality barrier and therefore The 21 articles are left in the in-depth analysis Figure 2 shows the steps taken in this identification process.

Assessing implementation of Electronic health records in hospitals: a systematic literature review
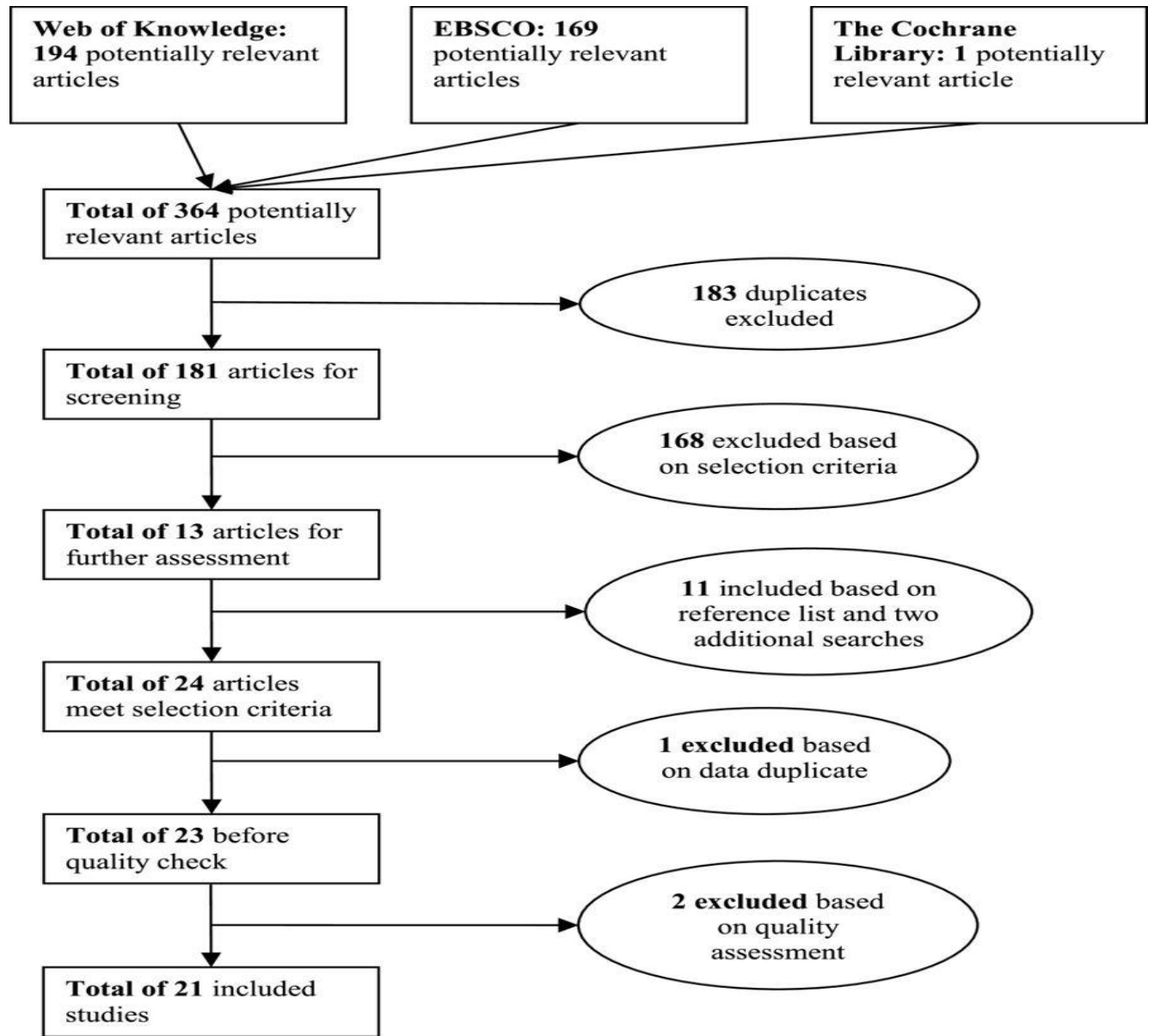
Figure 3: A systematic literature review

Source from(1): http://www.biomedcentral.com/1472-6963/14/370

4.1.1 Selection procedure.

To give a great idea of the situation and the nature of the remaining twenty one articles, a general provision is given in Table 2. All studies except one book were published after 2000. This represents an increase in the effort to use more comprehensive information systems, such as EHR systems, and to increase the ability to encourage governments to use EHR systems in hospitals. Of the twenty one subjects, fourteen can be classified as competent, six as level, and one as an integrated subject. Most studies are done in the United States, and eight in different countries including Africa. Educational and non-teaching hospitals are almost the same as the question of inquiry, and some researchers focus on specific types of hospitals such as outpatients, critical outreach, or psychiatric hospitals. There is a huge difference in the number of texts but one should never forget that the smaller subjects are less likely to be quoted.

Overview of studies included in the systematic literature review

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
Aarts et al. [21]	The Netherlands	To examine the three theoretical aspects (social process, emergent change, socially negotiated judgments) to understand the implementation	Qualitative	Semi-structured interviews, observations, document analysis	10 members of the project team from different disciplines	Teaching hospital	4.329	194

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		process.						
Aarts & Berg [22]	The Netherlands	To understand the outcomes of CPOE implementation using a heuristic model and to identify factors that determine successful implementation.	Qualitative	Open interviews, observations, document analysis	25 interviews with project team members, physicians, nurses, technical and clerical personnel	Teaching hospital & regional hospital	1.090	47
Ash et al. [23]	USA/Virginia, Washington, California	To find out how some hospitals had successfully implemented POE.	Quantitative and Qualitative	Survey, semi-structured interviews, focus groups, observations	Quantitative: 1000 hospitals (37% response rate) Qualitative: 32 interviews with physicians, nurses, pharmacists, IT-staff, administrators	quantitative : 1000 hospitals qualitative: 2 teaching hospitals, 2 community hospitals	-	37

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
Ash et al. [24]	USA/Virginia, Washington, California	To describe perceptions of POE held by diverse professionals at both teaching and nonteaching sites where POE has been successfully implemented.	Qualitative	Semi-structured interviews, focus groups, observations	Physicians, administrators, and information technology personnel	2 teaching hospitals, 2 community hospitals	4.329	160
Boyer et al. [25]	France	To examine health care professionals' opinions on the critical events (opportunities and barriers) surrounding EMR implementation	Qualitative	Semi-structured interviews	115 psychiatrists, nurses, psychologists and social assistants, secretaries and administrative professionals	Psychiatric teaching hospital	0.420	0
Cresswell et al. [26]	United Kingdom	To explore how EHR has shaped	Qualitative	Semi-structured interview	66 users and other hospital staff,	3 hospitals, 1 acute	-	13

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		professional practice and what consequences these changes had for organizational functioning, record keeping and patient care.		s, observations, documents		setting, 1 community and mental health.		
Ford et al. [27]	USA	To assess complete versus incomplete HIT implementation levels among U.S. hospitals in light of the various technology adoption strategies employed and to discuss the	Quantitative	Survey	1,814 hospitals	All kinds of hospitals	-	13

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		implications with respect to meaningful use for hospitals that have adopted the different HIT strategies.						
Gastaldi et al. [28]	Italy	To examine how hospital performance can be improved by enhancing and balancing knowledge exploration and exploitation capabilities through the development of an EMR.	Qualitative	Interviews, archival data	27 interviews in three hospitals	3 hospitals, 2 teaching and 1 non-teaching	-	2
Houser & Johnson	South Africa	1. To determine the status of implementation	Quantitative	Survey	131 directors in health information	Members of the Teaching	-	19

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
[29]		of EHRs in hospitals in the state of Alabama; 2. To assess the factors that are driving the decision making for implementation of EHRs; and 3. To assess the perceptions of HIM professionals of the benefits, barriers, and risks that are associated with implementation of EHRs.			management, 69% response rate	Hospital Association		
Jaana et al. [30]	USA/Iowa	To present an overview of clinical information	Quantitative	Survey	116 CEOs or CIOs, 84% response rate	Nonfederal hospitals	-	3

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		systems (IS) in hospitals and to analyze the level of electronic medical records (EMR) implementation in relation to clinical IS capabilities and organizational characteristics.						
Katsma et al. [31]	The Netherlands	To contribute to the developments in method engineering, which promises a better participation of the user.	Qualitative	Interviews	12 people, being supported sponsor, process owner or key-user	4 hospitals	-	4
Ovretveit et al. [32]	Sweden	To describe and assess an implementation	Qualitative	Interviews	30 persons, project leaders,	Teaching hospital	2.480	86

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		in one hospital and analyze this in relation to factors suggested by previous research to be important for successful implementation as well as in relation to a published USA case study, which used similar methods.			supervisors, heads of division and clinics, instructor, nurses, physicians, and doctor secretary			
Poon et al. [33]	Nigeria	To provide more insight into the challenges to CPOE implementation.	Qualitative	Interviews	52 CIOs/CFOs/CMOs and senior managers from 26 hospitals (46 hospitals were	Both teaching and non-teaching hospitals	3.748	269

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
					contacted: 57% response rate			
Rivard et al. [34]	Canada	To propose a substantive theory – a theory developed for a particular area of inquiry (Gregor, 2006) – to provide an organizational culture-based explanation of the level of difficulty of a CIS implementation and of the implementation practices that can help reduce the level of difficulty of	Qualitative	Interviews	43 people, physicians, nurses, and administrators	3 hospitals, 2 teaching and 1 community hospital	2.654	9

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		this process.						
Scott et al. [35]	USA/Hawaii	To examine users' attitudes to implementation of an electronic medical record system in Kaiser Permanente Hawaii.	Qualitative	Interviews	26 senior physicians, managers and project team members	One hospital, 4 clinics	13.511	174
Simon et al. [36]	USA/Massachusetts	To identify attitudes, behaviors and experiences that would constitute useful lessons for other hospitals embarking on CPOE implementation	Qualitative	Interviews, observations	24 physicians, nurses and pharmacists	5 community hospitals	-	2
Takian et	England	To report on a	Qualitative	Interview	48 interviews	Mental	2.254	0

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
al. [37]		case study of the implementation of an EHR (RiO) into a mental health setting delivered though the NPfIT and analyzed using our adapted 'socio technical changing framework'.		s, observations, document analysis	with senior managers, implementation team members, healthcare practitioners	health hospital		
Ward et al. [38]	USA	To examine the impact of clinical information system implementation on nurses' perceptions of workflow and patient care	Quantitative	Survey	705 nurses	Rural hospital	-	3

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		throughout the implementation process.						
Ward et al. [39]	USA	To examine staff perceptions of patient care quality and the processes before and after implementation of a comprehensive clinical information system (CIS) in critical access hospitals (CAHs).	Quantitative	Survey	840 nurses, providers, and other clinical staff	Critical access hospitals	2.540	0
Weir et al. [19]	USA/Utah	To identify factors that discriminate successful from non-successful implementation	Quantitative	Survey	52 medical administration staff, administrators, support staff, users (ward	6 hospitals	-	29

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		of OE/RR 2.5 in order to prepare for the next version.			clerks, physicians, and nurses), and physician opinion leaders (92 received survey, thus 57% response rate)			
Yoon-Flannery et al. [40]	USA/New York	To determine pre-implementation perspectives of institutional, practice and vendor leadership regarding best practice for implementation of two ambulatory electronic health records	Qualitative	Interviews	31 interviews with institutional leaders, practice leaders and vendor leaders.	Teaching hospital	-	25

Author	Country/region	Main objective of study	Type of research	Data collection	Participants (sample size, response rate)	Hospital type	Impact factor*	Citations**
		(EHRs) at an academic institution.						

Table 4: Overview of studies included in the systematic literature review

From: Assessing implementation of Electronic health records in hospitals: a systematic literature review

1. *The 5-year impact factor based on the Journal Citation Reports 2018 is used in this table.*
2. **The number of citations is identified using scholar.google.nl*.

Theoretical perspectives of the revised articles

In research, it is common practice to apply the principles of theory when designing an educational subject [41]. Theoretical frameworks provide a way of thinking about looking at the content and explaining what is thought under the type of thing [42]. Building on existing theories, research has focused on enriching and expanding existing knowledge in the area [42]. To provide a deeper understanding of the selected articles, their policies, if any, are detailed in Table 5.

Overview of the theoretical frameworks used in the included studies

From: Assessing implementation of Electronic health records in hospitals: a systematic literature
review

Author	Theoretical framework
Aarts et al. [21]	Three theoretical aspects: 1) sociotechnical approach, 2) emergent change with an unpredictable outcome, and 3) "success" and "failure" are socially negotiated judgments and is determined by the fit between work processes and information technology.
Aarts & Berg [22]	A model on success or failure of information systems with four variables: (1) information system, (2) support base, (3) medical work practices, and (4) hospital organization. Successful implementation of an information system (1) is defined as the capability to create a support base (2) for the change of (medical) work practices (3) induced by the system (4).
Ash et al. [23]	None
Ash et al. [24]	None
Boyer et al. [25]	None
Cress-well et al. [26]	Study draws on Actor-Network Theory, which helps to investigate how the centrally procured EHR has plays an active role in shaping social relationships.
Ford et al. [27]	HIT adoption strategies: (1) Single-vendor strategy, (2) Best of Breed strategy, and (3) Best of Suite strategy.

Author	Theoretical framework
Gastaldi et al. [28]	The notion that the capability of any organization to create sustainable organizational value not only resides in the ownership of knowledge assets guaranteeing the present competitive advantage (knowledge exploitation), but also in the ability to understand and govern the continuous development of knowledge assets necessary to renew its organizational capabilities (knowledge exploitation).
Houser & Johnson [29]	None
Jaana et al. [30]	None
Katsma et al. [31]	IT implementation success is determined by quality (relevance) times acceptation (participation). Relevance is defined as the degree to which the user expects that the IT system will solve his problems or help to realize his actually relevant goals. Participation of employees is perceived to increase their acceptation of the IT system. Effectiveness of participation is moderated by organizational receptiveness, individual ego development, and knowledge availability.
Ovretveit et al. [32]	None
Poon et al. [33]	None
Rivard et al. [34]	A culture-based explanation of the level of difficulty of a CIS implementation, using an integration perspective (basic assumptions are shared among the members of the collective), a differentiation

Author	Theoretical framework
	perspective (subgroups within a collective have inconsistent interpretations), and a fragmentation perspective (members within a collective sometimes manifest multiple interpretations, irrespective their subgroup).
Scott et al. [35]	None
Simon et al. [36]	None
Takian et al. [37]	A sociotechnical framework as identified by Aarts et al. (2004), underscoring the emerging nature of change.
Ward et al. [38]	None
Ward et al. [39]	None
Weir et al. [19]	None
Yoon-Flannery et al. [40]	None

Table 5: Overview of the theoretical frameworks used in the included studies

It is striking that no specific theoretical frameworks have been used in the research leading to 13 of the 21. Most articles simply state their objectives as information on specific aspects of the implementation of the EHR (as shown in Table 1) and do not use a specific method to identify and report results. In addition, these articles add information to the EHR implementation section but do not attempt to extend existing Theories.

Aarts et al. [21] introduced the concept of a social phenomenon: emphasizing the importance of focusing on the levels of well-being in the implementation of the EHR and in the areas of program expertise. Using the logic of change, they say that the implementation process is too far

away and predictable due to the complexity of organization that is influencing the process. Societal approach and emerging change theory are included in the theoretical framework of Takian et al. [37]. Iarar et al. [21] describe the social functioning approach when explaining the fit between work processes and information technology that describes the success of implementation. Arts and Berg [22] introduce a model of success or failure in the implementation of an information system. They see the creation of a relationship between the practice of the medical profession, the information system, and the hospital organization as it should be fulfilled, and they argue that this will only happen if enough people accept the change in practice. A study by Cresswell et al. [26] we are also impressed by the principles of sociology and drawing in Actor-Network Theory. Gastaldi et al. [28] identify Electronic Health Records as information management systems and ask how these systems can be used to develop information assets. Katsma et al. [31] focus on the achievement of achievement and articulates the view that the success of the implementation is determined by the quality of the process and the acceptance of participation.

As a result, they adopt a more holistic view of the implementation of the implementation than the social approach. Rivard et al. [34] look at the difficulties in implementing the EHR from a traditional perspective. They look at culture not only as a set of ideas shared by the whole group (the notion of integration) but expect specific themes to be shared (a view of differentiation), and predictions not shared by a particular group (subgroup). Ford et al. [27] focus on a different topic and investigate the IT adoption process using a three-pronged framework. This is a single-vendor plan (for all IT purchases from a single vendor), the best integration strategy (integrating IT to multiple vendors), and a practical suite plan (a hybrid approach uses the focus on one vendor as a base and other applications from to other vendors).

To summarize, articles by Arts et al. [21], Aarts and Berg [22], Cresswell et al. [26], and Takian et al. [37] use a social guide to focus their research. Gastaldi et al. [28] see EHRs as a mechanism for renewal of organizational strength. Katsma et al. [31] Use the social framework with a focus on the importance of the IT system as perceived by the user and the participation of users in the implementation process. Rivard et al. [34] analyze how organizational cultures might respond to the implementation of the EHR. Ford et al. [27] refer to the pediatric technique, leading them to

focus on the electronic health record selection process. Another 13 studies did not use clear theoretical lenses in their research.

4.2 Implementation-related findings

The categorization process began by assessing whether the items identified in the study should be categorized as Category A, B, or C. Thirty outcomes were categorized into Category A (contextual), 31 Class B (contextual), and 66 Class C (contextual). Comparisons and combinations obtained lead to numerous intermediate results for each component. The results are generally assigned to each code (character type and number) and the related code is shown next to each item found in Appendix C. Results that appear only in one article, and because of a lack of support, are discarded.

4.2.0 Part A – context

The content category of the EHR implementation process encompasses internal variables and external variables. Six findings were identified, all but relevant to internal variables. A summary of the findings and related articles can be found in Table 6. The general lack of results related to external variables reflects our decision to select fewer reasons to use the EHR system in this review. As such, the internal consequences related to such things as financial resources or improved quality of care, are outside our scope.

Part A - Context findings

From: Implementing electronic health records in hospitals: a systematic literature review

General finding	Finding code	Article numbers
Large (or system-affiliated), urban, not-for-profit, and teaching hospitals are more likely to have implemented an EHR system due to having greater financial capabilities, a greater change readiness, and less focus on profit.	A1	27/29/30/32
EHR implementation requires the selection of a mature vendor who is committed to providing a system that fits the hospital's specific needs.	A2	28/32/33
The presence of hospital staff with previous experience of Health Information Technology increases the likelihood of EHR implementation as less uncertainty is experienced by the end-users.	A3	19/29/32/37/38
An organizational culture that supports collaboration and teamwork fosters EHR implementation success because trust between employees is higher.	A4	23/24/25/35
EHR implementation is most likely in an organization with little bureaucracy and considerable flexibility as changes can be rapidly made.	A5	19/25
EHR system implementation is difficult because cure and care activities must be ensured at all times.	A6	28/34/39

Table 6: Part A - Context findings

A1: Large (or system-integrated), urban, nonprofit, and educational hospitals are at greater risk of implementing the EHR program because of greater financial capacity, greater readiness for change, and less profit perception.

Observational research suggests that large or system-related hospitals are more likely to implement the EHR system, and that this can be explained by their easier access to the necessary financial resources. Large hospitals have more funding than smaller hospitals [30] and system-related hospitals can share costs [27]. Hospitals in urban areas often have an EHR system than rural hospitals, defined as limited knowledge of EHR programs and little support from medical staff in rural hospitals [29]. The fact that most nonprofit hospitals have an EHR program is fully implemented and that teaching hospitals a little bit more than private hospitals is described as a wait-and-see approach and better transition to the community and teaching hospitals [27, 32](5).

A2: Implementation of the EHR requires the selection of a mature supplier committed to providing a program that is tailored to the specific needs of the hospital.

Although finding this is not a big surprise, it's worth discussing more about it. The hospital that selects its supplier can ensure that the program complies with the specific needs of the hospital [32]. Furthermore, it is important to deal with a vendor that has proven in the EHR market with mature and successful products. The supplier should be able to monitor the delivery of the hospital operation and adjust its product accordingly, and be committed to a long-term trust relationship with the hospital [33]. With this in mind, the initial costs of the process need not be over-emphasized: the organization must be willing to avoid costly vendors [28], as costs will increase as soon as problems arise(5).

A3: The presence of hospital staff with prior experience with Health information technology increases the availability of EHRs as less uncertainty can occur with end users.

In order to be able to work with the EHR system, users need to be able to use information technology like computers and have good writing skills [19, 32]. Knowing and previous

experience with EHR systems or other treatment programs reduces uncertainty and inconvenience to users, and this leads to a positive attitude toward the process [29, 32, 37, 38].

A4: An organizational culture that supports teamwork and teamwork promotes the implementation of the EHR because trust among employees is high.

The impact of the culture of the organization on the success of organizational change is addressed in almost all popular management change processes, as well as in several articles in this literature review. Ash et al. [23, 24] and Scott et al. [35] highlight that a strong culture with a history of collaboration, teamwork, and trust between different stakeholder groups reduces resistance to change. Boyer et al. [25] proposes to create a culture of interest that is more relevant to the implementation of the EHR. However, creating a positive culture is not always easy: a broad approach involving motivation, resource allocation, and a responsible team was used in the example of Boyer et al. [25].

A5: Implementation of the EHR is most feasible for organizations with small government and transparent flexibility as changes can be made quickly.

The most corrupt branch structure prevents change: it slows down the process and often leads to conflict between departments [19]. In particular, appointing a multidisciplinary team to address EHR-related issues can prevent conflict and foster cooperation [25].

A6: Implementation of the EHR system is difficult because treatment and care services must be guaranteed at all times.

During the EHR implementation process, it is very important that all relevant information is always available [28, 34, and 39]. Ensuring the continuity of quality care while implementing the EHR process is difficult and important in many other aspects of IT implementation.

4.2.1 Part B - Content

The content of the EHR implementation process have the EHR process and its associated goals, concepts, and support services. Table 5 lists the five general findings. This focuses on both

computer hardware and software for the EHR system, as well as its association with work methods and privacy.

Part B – Content findings

From: Assessing implementation of Electronic health records in hospitals: a systematic literature review

General finding	Finding code	Article numbers
Creating a fit by adapting both the technology and work practices is a key factor in the Implementation of EHR.	B1	19/21/26/28/31/37
Hardware availability and system reliability in terms of speed, availability, safety, and a lack of Failures are necessary to ensure EHR use.	B2	19/24/25/29/30/35/37/40
To ensure EHR implementation, the software needs to be user-friendly with regard to ease of use, Efficiency in use, and functionality.	B3	19/24/32
An EHR implementation should contain adequate Safeguards for patient privacy and confidentiality.	B4	25/29/37/40
EHR implementations require a vendor who is willing to adapt its product to hospital work processes.	B5	32/33

Table 7: Part B – Content findings

B1: Creating equity by changing both technology and work methods is key to the implementation of HER.

This finding extends the sociological approaches identified in the previous section to the theory adopted in the articles. Several authors [21, 26, 31, and 37] suggest that creating a correlation between the EHR system and existing work methods requires the initial acknowledgment that the implementation of the EHR is not a technical project and that existing work methods will change as a result of the new system. By customizing and customizing the system to meet specific needs, users will be more open to use [19, 26, and 28].

B2: Hardware availability and system reliability, in terms of speed, availability, and deficiencies, are important to ensure the effectiveness of the EHR.

In several articles, the authors emphasize the importance of having enough computer equipment. The system can only be used if it is accessible to users, and the system will only be used if it is running without problems. Ash et al. [24], Scott et al. [35], and Weir et al. [19] refer to the speed of the process and the availability of a sufficient number of terminals, see [40] at various locations. Procedures should be systematically organized [29], reliable [32], and provide secure access to information [37]. Boyer et al. [25] also mention the importance of technical features but in addition that these are not sufficient for the implementation of the EHR(5).

B3: To ensure the implementation of the EHR, the software needs to be simple in terms of ease of use, efficiency, and functionality.

Some authors distinguish between technical availability and reliability, as well as the user experience of the software [19, 24, 32]. They emphasize that it is not enough for the system to be available and reliable, it should be simple and convenient to use, and to provide the functionality needed for medical staff to take proper care. If the system fails to do this, workers will not use the system and will stick to their old ways of working.

B4: The implementation of the EHR should have reasonable protections on patient privacy and confidentiality

Concerns regarding privacy and confidentiality are known by Boyer et al. [25] and Housing and Johnson [29] and are considered a barrier to the implementation of the EHR. Yoon-Flannery et al. [40] and Takian et al. [37] acknowledged the importance of patient privacy and the need to address this issue by providing training and practicing effective preventive measures(5).

B5: Implementation of the EHR requires a vendor who is willing to adapt its product to the hospital's operating systems

The supplier must be accountable and enable the hospital to develop its products to ensure a fair and effective EHR system [32, 33]. In doing so, the dependency on the supplier is reduced and the emerging concerns within the hospital can be addressed [32]. This finding is consistent with A2 in the sense that an experienced, collaborative and transformative marketer is needed to address the range of interest groups found in hospitals.

4.2.2 Part C – process

This stage refers to the EHR implementation process. The features considered are time, change method, and change management. In our study, this level produced the largest number of findings (see Table 6), as would be expected given our attention in the implementation process. Implementation of the EHR often leads to stress, uncertainty, and concerns about the potential negative impact of the EHR on performance and quality systems. The outcomes of the process, including leadership, resource availability, communication and participation are clear to overcome resistance to implementing the EHR. These interventions helped create an environment for goal-directed, collaborative, and collaborative purposes(5).

Part C - Process findings

From: Assessing implementation of Electronic health records in hospitals: a systematic literature review

General finding	Finding code	Article numbers
Due to their influential position, management's active involvement and support is positively associated with EHR implementation, and also counterbalances the physicians' medical dominance.	C1	19/24/25/32/33/34/35
Participation of clinical staff in the implementation process increases support for and acceptance of the EHR implementation.	C2	19/25/26/28/32/35/36
Training end-users and providing real-time support is important for EHR implementation success.	C3	19/29/32/36
A comprehensive implementation strategy, offering both clear guidance and room for emergent change, is needed for implementing an EHR system.	C4	19/21/25/26/28/31/37/40/36
Establishing an interdisciplinary implementation group consisting of developers, members of the IT department, and end-users fosters EHR implementation success.	C5	19/32/36
Resistance of clinical staff, in particular of physicians, is a major barrier to EHR implementation, but can be reduced by addressing their concerns.	C6	22/24/26/28/29/33/36
C7: Identifying champions among clinical staff reduces resistance.	C7	32/33/36

General finding	Finding code	Article numbers
Assigning a sufficient number of staff and other resources to the EHR implementation process is important in adequately implementing the system.	C8	19/26/32/33/36

Table 8: Part C - Process findings

C1: Due to their influential position, effective management involvement and support positively correlates with the implementation of the EHR, and its opposition to the medical authority.

Many authors note the important role that management plays in the implementation of the EHR. While some authors refer to supportive leadership [19, 24], others emphasize that involvement of strong and effective governance is needed [25, 32–35]. Strong leadership is appropriate as it successfully opposes physician disclosure. For example, Rivard et al. [34] note that physicians' clinical capabilities and the level of autonomy of some health professionals affect collaboration and teamwork, and this in turn influences the implementation of the EHR. Poon et al. [33] accept this article and argue for strong leadership to deal with powerful doctors. They also claim that leaders need to set an example and apply the process themselves. At the same time, it is encouraging that implementation be managed by leaders who are accepted by the medical staff, for example chief nurses and physicians or former physicians and nurses [25, 33]. Ovretveit et al. [32] argue that it is useful for implementation if senior management repeatedly declares the implementation of the EHR a priority and supports this with sufficient funding and people. Poon et al. [33] added to this by highlighting that, especially in times of uncertainty and inadequacy, a common vision leading to the implementation of the EHR should be provided to hospital staff. Adequate resources include the selection of competent and experienced project leaders who normally implement the EHR. Scot et al. [35] identify the leadership styles of the various phases: participatory leadership is most important in electoral decisions, while leadership in senior leadership prefers implementation.

C2: **The participation of medical staff in the implementation process increases the support and acceptance of the implementation of the EHR.**

The participation of end users (medical staff) generates commitment and enables problems to be resolved quickly [25, 26, 36]. Especially since it is not expected that this system is perfect for all, it is important that medical staff be the owners, rather than the customers, of the system. Clinical staff should be involved at all levels and at all stages [19, 28, 32, 36] from the first system selection [35]. Ovretveit et al. [32] suggested that this involvement should have an extended period, starting from the initial stage of implementation, when the initial marketing requirements were implemented ('consultation before implementation'), to the extent of implementation. Creating a variety of work groups that demonstrate that the content of the EHR and the rules in relation to information sharing contributes to the adoption of the EHR [25] and establishes acceptable practices that are acceptable to the medical profession [36].

C3: **End-user training and providing timely support are critical to the success of the EHR implementation.**

Often, end users of a new EHR system have no experience with a specific EHR system or with EHR systems in general. Although it will be increasingly difficult to visualize a community or workplace without IT, a large program, such as the EHR, still requires extensive training on how to use it effectively. The importance of training remains to be considered, and inadequate training will create a barrier to EHR implementation [19, 29]. Hence proper training, of good quality and quality, must be provided at the right time and place [19, 32, 36]. Simon et al. [36] added to this the importance of real-time support, especially provided by peers and key users.

*C4: A***strong implementation plan, which provides clear guidance and room for rapid change, is required for the implementation of the EHR process.**

Several articles highlight aspects of the EHR implementation plan. It is a good strategic plan for implementing the EHR [19, 25] and consists of careful planning and preparation [36], sustainable business plan, effective communication [28, 40] and compulsory implementation [19]. Rapid changes are considered to be a key indicator of the implementation of the EHR in complex organizations such as hospitals [21], and this suggests an approach based on the

development paradigm [31], which may involve the involvement of the same paper [26]. The idea of the change that is to come is presented in a variety of ways, including the technical nature of Aarts et al. [21] and Katsma et al. [31]. This study recognizes that the implementation of the EHR cannot be explained as a result of unforeseen emergencies that one cannot plan. With their emphasis on germinal change with unintended consequences, Aarts et al. [21] make the case for acknowledging that unforeseen and unplanned situations will influence the process of realization. They argue that the changes caused by these problems are always manifesting unexpectedly and should be addressed. In addition, Takian et al. [37] point out that it is important that the content of the EHR implementation is better prepared for unexpected changes.

C5: **The establishment of a team of implementation teams including developers, IT department members, and end users promotes the success of the EHR implementation.**

In line with discussions of management support and participation of medical staff, Ovretveit et al. [32], Simon et al. [36] and Weir et al. [19] developed a case for using a method implementation group. By enabling all direct stakeholders to work together, a better EHR system can be delivered faster with fewer problems.

C6: **Opposition to medical staff, especially physicians, is a major impediment to the implementation of the EHR, but can be reduced by addressing their concerns.**

As shown by (1)The attitude of medical staff is an important factor in the implementation of the EHR [36]. In particular, doctors make an important part of hospitals. As a result, their potential resistance to the implementation of the EHR will create a significant barrier [29, 33] and may lead to a workaround [26]. Whether physicians accept or reject the implementation of the EHR depends on their acceptance of their modified practices [22]. Approval of admissions will be increased if the practitioners address the concerns of physicians [24, 28, 32, 33], but also with other members of the medical staff [36].

C7: **Identifying champions among medical staff reduces resistance.**

Preliminary results have already been described in opposing medical staff and suggest reducing this by fixing their problems. One way to reduce their resistance is related to the use process and involves identifying veterans, well-respected physicians for their knowledge and contacts [32, 33]. Simon et al. [36] emphasize the importance of identifying champions for each team involved. These champions can provide assurance to their peers.

C8: **Allocating an adequate number of personnel and other resources to the EHR implementation process is essential to operating the system.**

The implementation of the larger EHR program requires resources, including human resources. Providing the right people, such as key users [36] and a sufficient number of them in the process will increase the chances of success [19, 32, 33, 36]. Moreover, it is important to have sufficient time and financial resources [26, 32]. This finding is also important in relation to acquiring an A6 (to ensure proper care during organizational change).

These ninety general findings were identified from further findings within the twenty reviewed articles. These findings all relate to one of the three main and most effective aspects of communication: six to context, five to content, and eight to continuity. This identification and interpretation of the findings concludes the section on the results of the literature review process and are the basis of the discussion below.

CHAPTER FIVE: DISCUSSION, CONCLUSSION AND RECOMMENDATIONS

5.0 Discussion

This literature review is available that shed light on current information on the implementation of the EHR. The 21 selected articles from the United States, Europe and other African countries, probably represent the largest government observation in the implementation of the EHR in these areas and, yes, our articles are written in English only. Two articles were rejected for ethical reasons [43, 44], see Appendix B. All but other selected articles were published from 2000 to 2018, reflecting the growing interest in implementing hospital EHR programs. Eight articles build their research into a theoretical framework, four using the same lenses of the socitechnical approach [21, 22, 26, 37]. Katsma et al. [31] and Rivard et al. [34] focus primarily on the culture and culture of EHR implementation, the former in terms of value, and user participation, the latter in three different cultural contexts. Ford et al. [27] investigated the adoption capabilities of EHR systems and Gastaldi et al. [26] consider them as a way to stimulate the organization's energy. It is noteworthy that some of the articles considered did not use the EHR analysis framework and did not attempt to clarify existing theories(1).

A total of 127 findings were extracted from the articles, and these findings were classified according to Pettigrew's systematic change process [13] as a comprehensive model including three dimensions of content, content, and process. To ensure a strong focus, the limits of attention were clearly limited to the outcomes associated with the EHR implementation, thus excluding the causes, barriers, and consequences of the implementation of the EHR.

Some of the research results require further interpretation. The acquisition of content A1 is related to the importance of the hospital. One of the most certain is that private hospitals are no less than public hospitals in the EHR. The EHR costs are currently clearly reflected in the cost of implementing the benefits. This seems strange as it is widely believed that information technology increases efficiency and reduces costs, more than compensating for higher capital investment. However it is important to note that the literature on the EHR is perishable when it comes to implementation; several authors record a decrease in job performance [25, 33, 35, 38], while others report an increase [29, 31]. Acquiring A2 is a reminder of the importance of choosing the right supplier, taking into account the experience and sales of the EHR and the maturity of their products rather than, for example, focusing on the total cost of the system. Due

to high investment costs, EHR pricing tends to have a significant impact on vendor selection, which is further enhanced by existing European tender regulations that authorize (semin) public institutions, like many hospitals, to choose the lowest bidder, or the most competitive bidder. is very important [45]. The finding that implementation of the EHR system is difficult because medical care must be guaranteed at all times (A6) also deserves mention. In fact, much of the hospitalization process is different from the use of IT in some cases because people's lives are at stake in hospitals. This is not enough to make the process feasible because clinical operations have to continue, and require the system to be reliable from the date of its launch.

The results obtained with regard to the content of the EHR program (Part B) indicate the importance of proper software products. The well-defined identification process of the software package and its associated vendor (discussed in A2) is considered to be the most important (B5). Selection should be based on careful demand analysis and analysis of the supplier's experience and quality. The important thing is enough distance to change so that you can change and adjust the software to suit the needs of the users and the hospital system (getting B1). At the same time the software product must challenge the hospital to review and improve its systems. An important aspect of acceptance by different groups of hospital users is the robustness of the EHR system in terms of availability, speed, reliability and flexibility (B2). This requires adequate equipment for access to computers, as well as mobile devices to make it available to all areas of the hospital. The ease of use of the system (B4) and the private safety of patients (B4) are other factors that can make or break the implementation of EHR in hospitals.

The results of the implementation process, our section C, emphasize the four aspects mentioned in change management as key elements of success in organizational change. Active engagement and support in management (C1), clinical staff participation (C2), implementation strategy (C4), and implementation team implementation (C5) are in line with the three guidelines provided by Kanter et al. [46]. These three guidelines are: (1) Support the role of strong leader; (2) communicate, engage with people, and be honest; and (3) implementation strategy. As the implementation of the EHR system is an organizational change process it is not surprising that these common factors have been identified in many revised articles. The three Class C findings (C2, C6, and C7) address the medical staff given their strong and resilient positions. Physicians are the most influential medical providers, and their resistance can delay the implementation of

the EHR [23], leading to a small amount of it being missed [21, 22, 34], or not being implemented at all [33]. Therefore, there is sufficient evidence that physicians are accredited by the EHR by physicians. This means that clinics and other key personnel need to be more involved and motivated to contribute to the EHR. Report promptly on requests and high-quality support during implementation and an EHR that clearly supports clinical work is key issues affecting the medical staff being promoted.

Analyzing and comparing their findings makes us categorize them by content points (see Table 7). By dividing the results by subject, and by the total number of articles relevant to each subject, one can determine how much attention has been given to the literature on different topics. This review highlights that physicians' involvement in the process of implementation, quality of the process, and a comprehensive action plan are considered to be important factors in the implementation of the EHR.

Findings sorted by subject

From: Assessing implementation of Electronic health records in hospitals: a systematic literature review

Subject	Related findings	Number of articles
Leadership and involvement in the process	C1, C2, C5, C8	10
Vendor	A2, B5	3
Implementation strategy	C4, C5,	10
Role of clinical staff (in particular the physicians)	C6, C7,	8
Users' skills/experience	A3, C3	6
EHR system	B2, B3	8
Patient issues	A6, B4,	7

Subject	Related findings	Number of articles
Hospital demographics	A1	4
Organizational culture	A4	4
Organizational structure	A5	2
Fit between work processes and EHR system	B1	6

Table 9: Findings sorted by subject

In addition to obtaining useful results, these analyzes and analyzes have some limitations. Although we have carefully developed and implemented a search strategy, we cannot be certain that we have found all the relevant articles. Because we focused specifically on the keywords, and these should be part of the content of the article, we would not exclude relevant articles that use a different vocabulary for their titles. Although looking at the index of identified articles leads to additional articles, other relevant articles may not have been missed. Another obstacle is the downloading of publications in languages other than English. Furthermore, the selection and classification of the findings, and subsequent findings of the results in general, are possible and subject to the interpretation of the authors, and some researchers may have made different choices. The last limitation relates to literature review because the authors of the included studies may have different aims and objectives, and use different approaches and approaches to interpretation, in reaching their conclusions.

5.1 Competing interests

The authors declare that they have no competing interests.

5.1.0 Authors' Contributions

The researcher and his supervisor design and made significant contributions to the interpretation of the results. He supervised   the study, and participated in writing the final version of this

paper. Internet as well as other search engine drastically contributed substantially to the selection and analysis of included papers as summarized below.

Analysis of included papers

Author	Findings	Category
Ash et al. [23]	Trust between administrators and physicians seems to be a necessary ingredient to successful implementation.	A4
Ash et al. [24]	Organizational issue fostering implementation: a strong culture	A4
Ash et al. [24]	Organizational issue fostering implementation: a history of collaboration and teamwork	A4
Boyer et al. [25]	A favorable strategic factor is creating a favorable organizational culture.	A4
Boyer et al. [25]	The establishment of a multidisciplinary team to deal with her related issues prevents conflict and stimulates collaboration.	A5
Ford et al. [27]	For-profit hospitals are half as likely to have fully implemented an EHR as their nonprofit counterparts.	A1
Ford et al. [27]	System-affiliated hospitals were 31 percent more likely than were unaffiliated facilities to have successfully implemented an EHR.	A1
Gastaldi et al. [28]	Willingness to avoid pure cost-oriented vendors.	A2
Gastaldi et al. [28]	Diffused pressures to realize the EMR as soon as possible, because physicians' data sharing is needed.	A6
Houser & Johnson [29]	Rural hospitals are less likely to have completed implementation of an EHR system compared to urban and suburban hospitals.	A1
Houser & Johnson [29]	Government-owned or not-for-profit hospitals more often implemented a complete EHR system compared to for-profit hospitals.	A1
Houser &	A perceived barrier of implementing an EHR system is the lack of	A3

Author	Findings	Category
Johnson [29]	knowledge of EHR systems.	
Jaana et al. [30]	Critical Access Hospitals (CAH) in Iowa have significantly lower EMR levels compared to non-CAHs.	A1
Jaana et al. [30]	A higher number of staffed beds and available slack resources is positively associated with higher clinical IS scores and EMR levels.	A1
Ovretveit et al. [32]	A facilitating factor in implementing an EMR system is the local hospital control of selection of the system.	A2
Ovretveit et al. [32]	A facilitating factor in implementing an EMR system is previous computer or EMR experience.	A3
Ovretveit et al. [32]	A facilitating factor in implementing an EMR system is the academic medical centre being more change ready.	A1
Poon et al. [33]	A barrier to implementing CPOE is product and vendor immaturity.	A2
Poon et al. [33]	Product and vendor immaturity can be overcome by selecting a vendor who is committed to the CPOE market.	A2
Poon et al. [33]	Product and vendor immaturity can be overcome by ensuring a long-term trusting relationship of the vendor with the hospital.	A2
Rivard et al. [34]	The difficulty of a CIS implementation is explained by quality of care.	A6
Scott et al. [35]	The organizational culture of cooperative values minimized resistance to change early on.	A4
Takian et al. [37]	In order to successfully implement an EHR stakeholders, and their computer literacy and ability to access the technology, need to be identified prior to planning to procure and implement EHR software.	A3
Ward et al. [38]	Nurses who had previous experience with EHRs at other hospitals expressed more positive views towards an EHR.	A3

Author	Findings	Category
Ward et al. [38]	Nurses with more years of health care experience had less favorable perceptions towards an EHR compared to nurses with less years of experience.	A3
Ward et al. [39]	The staff perceived the EHR/CPOE implementation not to have disrupted the existing care processes.	A6
Weir et al. [19]	A barrier to successful implementation of a CPOE is an uncooperative or computer phobic attitude of physicians.	A3
Weir et al. [19]	A barrier to successful implementation of a CPOE is bureaucracy preventing change and interdepartmental conflict.	A5
Weir et al. [19]	A barrier to successful implementation of a CPOE is health care providers that don't know how to type.	A3
Weir et al. [19]	Support staff identify the barrier bureaucracy significantly more often than physicians.	A5
Aarts et al. [21]	Implementation of a CPOE is both a social process and contains technical issues, which increases complexity.	B1
Aarts et al. [21]	Creating fit between technology and work practices is a key factor for successful implementation of information systems.	B1
Ash et al. [24]	Technical/implementation issue fostering implementation: speed of the system	B2
Ash et al. [24]	Technical/implementation issue fostering implementation: the ability to group orders into order sets	B3
Ash et al. [24]	Technical/implementation issue fostering implementation: the possibility to make clinical pathways available to health care teams,	B3
Ash et al. [24]	Technical/implementation issue fostering implementation: the possibility to enter orders from remote locations.	B2

Author	Findings	Category
Ash et al. [24]	Organization of information issue fostering implementation: the information must be organized in a manner designed to mimic the way in which people use the information, which is generally not in a structured, hierarchical manner.	B3
Boyer et al. [25]	The technical aspects of an EMR have an important place but do not necessarily guarantee a successful implementation of EMR.	B2
Boyer et al. [25]	A barrier in implementing an EMR is less confidentiality in information sharing between patient and professional.	B4
Cresswell et al. [26]	A barrier in implementing an EHR is limited ability to customize the software.	B1
Gastaldi et al. [28]	Being able to deal with technical problems related to the customization of the system.	B1
Houser & Johnson [29]	A perceived barrier of implementing an EHR system is the lack of structured technology.	B2
Houser & Johnson [29]	Perceived barriers of implementing an EHR system are privacy and confidentiality issues.	B4
Katsma et al. [31]	Compatibility of the EPR with working processes can also be reached by changing the work processes.	B1
Ovretveit et al. [32]	A factor in implementing an EMR system is the ease of navigation, efficiency in use and accessibility of the system.	B3
Ovretveit et al. [32]	A factor in implementing an EMR system is the absence of failures	B2
Ovretveit et al. [32]	A factor in implementing an EMR system is physicians' acceptance and implementer's responsiveness to concerns.	B5
Poon et al. [33]	Product and vendor immaturity can be overcome by having the vendor	B5

Author	Findings	Category
	willing to adapt its product to hospital workflow issues.	
Scott et al. [35]	Software design and development problems increased local resistance.	B2
Takian et al. [37]	EHR needs to be seen as a sociotechnical entity by stakeholders, ensuring a user-centered design of EHR.	B1
Takian et al. [37]	Because of the huge cultural shift an EHR brings to heavily text-based notes, healthcare practitioners must be educated and protected with regards to transparency and observing confidentiality of patient notes.	B4
Takian et al. [37]	The safety of information access to EHR systems needs to be ensured prior to and during the implementation.	B2
Weir et al. [19]	A facilitating factor associated with implementation of a CPOE is sufficient functionality of the system.	B3
Weir et al. [19]	A facilitating factor associated with l implementation of a CPOE is the ability to customize software to meet physician needs.	B1
Weir et al. [19]	A facilitating factor associated with implementation of a CPOE is adequate hardware, terminals, etc.	B2
Weir et al. [19]	A barrier to implementation of a CPOE is insufficient functionality of the software.	B3
Weir et al. [19]	A barrier to implementation of a CPOE is having an insufficient number of terminals, a too slow system, and non-portable screens.	B2
Weir et al. [19]	A barrier to implementation of a CPOE is a user-unfriendly system.	B3
Weir et al. [19]	A barrier to implementation of a CPOE is a too labor intensive program.	B3
Yoon-Flannery et al. [40]	EHR implementation best practice contains sufficient hardware, technical equipment, support and training.	B2
Yoon-Flannery et	EHR implementation best practice contains adequate safeguards for patient	B4

Author	Findings	Category
al. [40]	privacy.	
Aarts et al. [21]	Emergent change is a key characteristic of implementing information systems in complex organizations.	C4
Ash et al. [24]	Organizational issue fostering implementation: supportive leadership	C1
Boyer et al. [25]	The strategy used for EMR implementation is particularly important	C4
Boyer et al. [25]	A favorable strategic factor is active involvement of the manager.	C1
Boyer et al. [25]	A favorable strategic factor is regularly assessing the views of professionals to identify problems and develop support for corrective action.	C2
Cresswell et al. [26]	Allowing intensive user involvement in software design is favorable for embedding the system of time (particularly in smaller scale implementations).	C2
Cresswell et al. [26]	Acceptance of initially parallel use of paper during the implementation.	C4
Cresswell et al. [26]	Resistance of powerful users can lead to 'workarounds'	C6
Cresswell et al. [26]	There is time and resources available to let the users familiarize with the system.	C8
Gastaldi et al. [28]	Engagement of the whole organization in the process is crucial (both the creation as well as the maintenance).	C2
Gastaldi et al. [28]	Management of the change is crucial, particularly its initial communication.	C4
Gastaldi et al. [28]	Initial technological resistance of the physicians is a problem.	C6
Gastaldi et al.	Understanding of the physicians' necessities is important.	C6

Author	Findings	Category
[28]		
Houser & Johnson [29]	A perceived barrier of implementing an EHR system is the lack of employee training.	C3
Katsma et al. [31]	Development paradigm implementation approaches go hand in hand with high levels of implementation.	C4
Ovretveit et al. [32]	A helping factor in implementing an EMR system is employee involvement in many different ways.	C2
Ovretveit et al. [32]	A helping factor in implementing an EMR system is leadership and support by a competent on site information technology department.	C5
Ovretveit et al. [32]	A helping factor in implementing an EMR system is decisive and full leadership backing.	C1
Ovretveit et al. [32]	A factor in implementing an EMR system is user involvement in selection and development.	C5
Ovretveit et al. [32]	A factor in implementing an EMR system is providing education at the right times, amount and quality.	C3
Ovretveit et al. [32]	A factor in implementing an EMR system is strong management support.	C1
Simon et al. [36]	The entity that manages the implementation of CPOE needs to have representation from among the staff members (front line representation).	C2
Simon et al. [36]	Training end-users is important; providing real-time support is even more important.	C3
Simon et al. [36]	CPOE implementation requires a great deal of planning and preparation in advance.	C4
Simon et al. [36]	Multi-disciplinary representation of front line users and collaboration is important for the implementation of CPOE.	C5

Author	Findings	Category
Simon et al. [36]	Awareness of attitudes of anxiety and fear is important in the planning of the implementation of CPOE.	C6
Simon et al. [36]	The identification and support of a champion among each user group.	C7
Simon et al. [36]	The ample presence of live, in-person support (super-users) is helpful in facilitating the CPOE implementation.	C8
Scott et al. [35]	The initial selection of the CIS was perceived to be detached from the local environment resulting in conflicting priorities between the organization and individual physicians.	C2
Scott et al. [35]	Participatory leadership was valued for selection decisions.	C1
Scott et al. [35]	Hierarchical leadership was valued for implementation.	C1
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is knowledgeable, cheerful support from the Information Resource Management department.	C5
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is supportive administration and chiefs of staff.	C1
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is direct involvement of physicians.	C2
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is a good working relationship with developers.	C5
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is an interdisciplinary, effective implementation group.	C5
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is a good implementation strategy.	C4
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is support by medical administration and other allied fields.	C2

Author	Findings	Category
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is mandatory implementation.	C4
Weir et al. [19]	A facilitating factor associated with the implementation of a CPOE is good training and instruction.	C3
Weir et al. [19]	A barrier to the implementation of a CPOE is inadequate training, insufficient material, and residents rotation.	C3
Weir et al. [19]	A barrier to the implementation of a CPOE is the lack of effective, cheerful Information Resource Management support.	C5
Weir et al. [19]	A barrier to the implementation of a CPOE is non-supportive section chiefs of staff.	C1
Weir et al. [19]	Support staff identifies the facilitating factor organized, interdisciplinary implementation group significantly more often than physicians.	C5
Weir et al. [19]	Physicians identify the facilitating factor support of chiefs of staff and medical administration significantly more often than support staff.	C1
Weir et al. [19]	Physicians identify the facilitating factor mandatory implementation significantly more often than support staff.	C4
Weir et al. [19]	A facilitating factor associated with successful implementation of a CPOE is having a sufficient number of people for implementation and user training.	C8
Weir et al. [19]	A barrier to successful implementation of a CPOE is insufficient personnel to adequately implement the system and train people.	C8
Weir et al. [19]	Support staff identifies the facilitating factor sufficient personnel for implementation significantly more often than physicians.	C8
Yoon-Flannery et al. [40]	EHR implementation best practice contains effective, clear communication.	C4

Author	Findings	Category
Yoon-Flannery et al. [40]	EHR implementation best practice contains careful planning for system migration.	C4
Yoon-Flannery et al. [40]	EHR implementation best practice contains a sustainable business plan.	C4
Aarts & Berg [22]	Accepting or rejecting an information system will depend on whether those involved in the medical work practices will accept a transformation of these practices.	C6
Ash et al. [24]	Clinical/Professional issue fostering implementation: customization and the ability to adapt POE at the local level, creating acceptance among physicians.	C6
Houser & Johnson [29]	A perceived barrier of implementing an EHR system is the lack of support from medical staff.	C6
Ovretveit et al. [32]	A facilitating factor in implementing an EMR system is having adequate people and financial resources.	C8
Poon et al. [33]	A barrier to implementing CPOE is physician and organizational resistance.	C6
Poon et al. [33]	Physician and organizational resistance can be overcome by addressing workflow concerns.	C6
Aarts et al. [21]	The implementation process of a CPOE is highly unpredictable, influenced by contingencies that were not expected nor planned for.	C4
Ovretveit et al. [32]	A factor in implementing an EMR system is having a physician champion.	C7
Poon et al. [33]	Physician and organizational resistance can be overcome by strong leadership.	C1
Poon et al. [33]	Physician and organizational resistance can be overcome by identifying physician champions(6).	C7

Author	Findings	Category
Poon et al. [33]	Physician and organizational resistance can be overcome by leveraging house staff or hospitalists.	C8
Rivard et al. [34]	The difficulty of a CIS implementation is explained by physicians' medical dominance.	C1
Rivard et al. [34]	The difficulty of a CIS implementation is explained by other health professionals' professional status and autonomy.	C1
Takian et al. [37]	Contextualization and taking heterogeneity across mental health settings is crucial to implement EHR initiatives, it might help identify areas in need of additional support.	C4
Boonstra A, Versluis A, Vos JFJ [67]	Findings categories A,B and C of EHR	A,B and C

Table 10: Analysis of included papers

5.2 Conclusions

The current literature fails to provide evidence that there is a broad approach to implementing EHR programs in hospitals that include issues relevant to the 'EHR' transition process. The literature is inconsistent, and articles do not always build on the former to extend theoretical knowledge to the implementation of the EHR, without exception (Boonstra, Versluis and Vos, 2014). Previous discussion on the various outcomes summarizes the available information and reveals gaps in information related to the implementation of the EHR. The number of EHR implementations in hospitals is growing, as well as the body of literature on this issue. This systematic review of the literature yielded 19 overall results from the implementation of the EHR, each grouped into a single category. Many of these findings are generally related to the general literature of change management, and some are related to some form of implementation of EHRs in hospitals.

The results presented in this article can be viewed as just an overview of the important interventions that should help to resolve EHR system implementation problems. It is clear that EHR systems have some difficulties and must be implemented with great care, with due regard to the context, content, and process issues and interactions between these issues. As a result, we achieved our research objective by conducting a systematic literature review on the implementation of the EHR. This paper is the contribution of studies in providing an overview of the existing literature on key aspects of EHR use in hospitals. The regulatory impact lies in the general results that can serve as a guide when dealing with EHRs in hospitals. We do not intend to offer a single EHR implementation process, but instead provide guidelines and highlight points that need attention. Understanding and addressing these issues can increase the likelihood of a successful EHR program(1).

5.3 Recommendations

In light of the above findings, the following recommendations are made: To improve access to resources at public health facilities, there is a need for government to provide additional funding and staff support. This will ensure that funds are available to purchase the necessary resources and the most skilled staff available to ensure that the EMR system is fully utilized. To improve access to the network, there is a need for public health institutions to compete with businesses that ensure the delivery of a harmless network during the procurement process. This will ensure that one can easily access or lock on any medical information without delay.

To address the skills of employees in the use of EMR technology, the researcher suggests that there is a need for government to support health workers to undergo EMR training. This should improve their abilities and thus reduce the situations where other people act on their behalf and may compromise health information data in a particular case. Training programs should be developed for nurses to make good use of the EHR.

Hospitals and nurses need to realize that the best benefits are after the implementation of the EHR and that they have a tendency to overcome the fear of failure. To develop operational capacity, there is a need for EMR technology sponsors to constantly prevent health workers about the change and the operating system. This ensures that the majority of medical staff work with small challenge. Hospital needs a competent employee in charge of function of EHR to help

healthcare providers to implement rightly EHR in order to enhance quality, efficiency and service as well as increase hospital productivity.

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Appendix

Appendix A - List of databases

This appendix provides an overview of all databases included in the used search engines. The databases in italic were excluded for the research as these databases focus on fields not relevant for the subject of EHR implementations.

Web of Knowledge
1. 1)
   Web of Science
2. 2)
   Biological Abstracts
3. 3)
   Inspec
4. 4)
   MEDLINE
5. 5)
   Journal Citation Reports

EBSCO
1. 1)
   Academic Search Premier
2. 2)
   AMED - The Allied and Complementary Medicine Database
3. 3)
   America: *History & Life*
4. 4)
   American Bibliography of Slavic and East European Studies
5. 5)
   Arctic & Antarctic Regions
6. 6)
   Art Full Text (*H.W. Wilson*)

7. 7)

   Art Index Retrospective (*H.W. Wilson*)

8. 8)

   ATLA Religion Database with ATLASerials

9. 9)

   Business Source Premier

10. 10)

    CINAHL

11. 11)

    Communication & Mass Media Complete

12. 12)

    eBook Collection (*EBSCOhost*)

13. 13)

    EconLit

14. 14)

    ERIC

15. 15)

    Funk & Wagnalls New World Encyclopedia

16. 16)

    GreenFILE

17. 17)

    Historical Abstracts

18. 18)

    L'Annéephilologique

19. 19)

    Library, Information Science & Technology Abstracts

20. 20)

    MAS Ultra - School Edition

21. 21)

    MEDLINE

22. 22)

Military & Government Collection

23. 23)

    MLA Directory of Periodicals

24. 24)

    MLA International Bibliography

25. 25)

    New Testament Abstracts

26. 26)

    Old Testament Abstracts

27. 27)

    Philosopher's Index

28. 28)

    Primary Search

29. 29)

    PsycARTICLES

30. 30)

    PsycBOOKS

31. 31)

    PsycCRITIQUES

32. 32)

    Psychology and Behavioral Sciences Collection

33. 33)

    PsycINFO

34. 34)

    Regional Business News

35. 35)

    Research Starters - Business

36. 36)

    RILM Abstracts of Music Literature

37. 37)

    SocINDEX

The Cochrane Library

1. 1)

   Cochrane Database of Systematic Reviews

2. 2)

   Cochrane Central Register of Controlled Trials

3. 3)

   Cochrane Methodology Register

4. 4)

   Database of Abstracts of Reviews of Effects

5. 5)

   Health Technology Assessment Database

6. 6)

   NHS Economic Evaluation Database

7. 7)

   About The Cochrane Collaboration

Appendix B - Quality assessment

The quality of the articles was assessed with the Standard Quality Assessment Criteria for Evaluating Primary Research Papers [18]. Assessment was done by questioning whether particular criteria had been addressed, resulting in a rating of 2 (completely addressed), 1 (partly addressed), or 0 (not addressed) points. Table 8 provides the overview of the scores of the articles, (per question) for qualitative studies; Table 9 for quantitative studies; and Table 10 for mixed methods studies. Articles were included if they scored 50% or higher of the total amount of points possible. Based on this assessment, two articles were excluded from the search.

Quality assessment results of qualitative studies

From: Assessing implementation of Electronic health records in hospitals: a systematic literature review

Criteria qualitative studies	[21]	[22]	[24]	[25]	[26]	[28]	[31]	[32]	[33]	[34]	[35]	[36]	[37]	[40]
Question/objective sufficiently described?	2	2	2	2	2	2	2	2	1	2	1	2	1	2
Study design evident and appropriate?	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Context for the study clear?	2	2	2	2	2	2	1	2	1	2	1	2	2	1
Connection to a theoretical framework/ wider body of knowledge?	2	1	0	2	1	0	2	2	0	2	1	0	2	1
Sampling strategy described, relevant and	0	0	2	2	2	2	1	0	1	2	1	2	2	2

Criteria qualitative studies	[21]	[22]	[24]	[25]	[26]	[28]	[31]	[32]	[33]	[34]	[35]	[36]	[37]	[40]
justified?														
Data collection methods clearly described and systematic?	1	1	2	2	2	2	1	2	2	1	1	2	1	2
Data analysis clearly described and systematic?	0	0	1	1	1	2	0	1	1	2	1	2	1	2
Use of verification procedure(s) to establish credibility?	0	2	2	0	1	1	0	0	0	0	0	1	2	0
Conclusions supported by the results?	1	2	2	2	2	0	1	2	2	2	2	2	1	2

Criteria qualitative studies	[21]	[22]	[24]	[25]	[26]	[28]	[31]	[32]	[33]	[34]	[35]	[36]	[37]	[40]
Reflexivity of the account?	0	0	0	0	0	0	0	0	1	0	0	2	2	2
Total score/possible maximum score	**10/20**	**12/20**	**15/20**	**15/20**	**15/20**	**13/20**	**10/20**	**13/20**	**11/20**	**15/20**	**10/20**	**17/20**	**16/20**	**16/20**

Table 11: Quality assessment results of qualitative studies