Sudan University of Science and Technology

College Of Graduate Studies

Evaluation of Computerized Based Health Care Facilities Management System in Khartoum Dialysis Centers

تقويم الانظمة المحوسبة لادارة مرافق الرعاية الصحية في مراكز الغسيل الكلوي بالخرطوم

A Thesis Submitted to Sudan University of Science & Technology for the Master Degree in Biomedical Engineering

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الايـــــــــة

قَالَ تَعَـالَىٰ:

﴿ ٱقۡرَأۡ بِٱسۡمِ رَبِّكَ ٱلَّذِى خَلَقَ ۝١ خَلَقَ ٱلۡإِنسَـٰنَ مِنۡ عَلَقٍ ۝٢ ٱقۡرَأۡ وَرَبُّكَ ٱلۡأَكۡرَمُ ۝٣ ٱلَّذِى عَلَّمَ بِٱلۡقَلَمِ ۝٤ عَلَّمَ ٱلۡإِنسَـٰنَ مَا لَمۡ يَعۡلَمۡ ۝٥ ﴾

صدق الله العظيم

سورة العلق الايات (1 -5)

Dedication

This work is nicely dedicated to my parents;
Mr. My Father Ishag Gadora Mohammed and

Mrs. Omaima Abdelwahid for their Care & Tension

to my dear husband, companion of the heart and path, Mr. Aladdin Muhammad

To my children, my condolences are the pulse of my heart / Momen and Areen

To my consolation and support in life my dear brothers And to my extended family who was and still supports me

To those who were loyal to me my friends.

To everyone who taught me a letter, to those who contributed to the completion of this modest work, I dedicate this research to you.

Abstract

The topic of this research focus on the effect of using computer based systems in managing healthcare facilities , and the extent to which they benefited from the advantages they avails. Standing of Sudanese hospitals and healthcare facilities on old-fashion tools and techniques for generating information about their various aspects considered as the main problem. Moreover research aims to aware the employee in these hospitals and healthcare facilities about the benefits of applying the computer-based management system and address the current techniques used for optimizing hospital performance. Descriptive and analytical methods were used to analyze the data collected from a sample of 50 respondents working different healthcare facilities in Khartoum (specially dialysis centers) was surveyed using questionnaire.

The research arrived many findings most important are: the healthcare facilities are – to some extent – apply computer-based systems in managing their general activities, however, less than half of the surveyed healthcare facilities have a computer-based database for their patients' records, based on hybrid databases models [DDM and CIPDM], as well as, centrally integrated physical database models [CIPDM] and distributed database models. Also, one thirds of the surveyed healthcare facilities apply database management systems – DBMS, and the type of architecture used in building these system are hierarchical DBMS, object-oriented DBMS, relational DBMS, and a text-oriented DBMS.

The research recommends more focus on exploiting and bring-about the benefits of applying computer-based management system in healthcare services, and the need for staffing more information and communication technologies[ICT] personnel in healthcare industry to professionally contribute in the application and use of these system, and lastly more research should be conducted to comprehensive to state the extent to which healthcare facilities can benefits from using computer-based systems.

الخلاصه

يركز موضوع هذا البحث على تأثير استخدام الأنظمة المحوسبه في إدارة مرافق الرعاية الصحية، ومدى استفادتها من المزايا التي توفرها. تعتبر وقوف المستشفيات والمنشآت الصحية السودانية على أدوات وتقنيات قديمة لتوليد المعلومات حول جوانبها المختلفة هي المشكلة الرئيسية. علاوة على ذلك ، يهدف البحث إلى توعية الموظف في هذه المستشفيات ومنشآت الرعاية الصحية بفوائد تطبيق نظام الإدارة المحوسب والوصول الي التقنيات الحالية المستخدمة لتحسين أداء المستشفى. تم استخدام الطرق الوصفية والتحليلية لتحليل البيانات التي تم جمعها من عينة من 50 مستجيبًا يعملون في مرافق رعاية صحية مختلفة في الخرطوم (خاصة مراكز غسيل الكلى) تم مسحها باستخدام الاستبيان.

توصل البحث إلى العديد من النتائج أهمها: أن مرافق الرعاية الصحية – إلى حد ما – تطبق أنظمة قائمة على الكمبيوتر في إدارة أنشطتها العامه، ومع ذلك ، فإن أقل من نصف مرافق الرعاية الصحية التي شملها الاستطلاع لديها قاعدة بيانات حاسوبية لسجلات المرضي ، استنادًا إلى نماذج قواعد البيانات الهجينة [DDM و CIPDM] ، بالإضافة إلى نماذج قواعد البيانات المادية المتكاملة مركزيًا [CIPDM] ونماذج قواعد البيانات الموزعة. أيضًا ، تطبق ثلث مرافق الرعاية الصحية التي شملتها الدراسة أنظمة إدارة قواعد البيانات – نظم إدارة قواعد البيانات ، ونوع البنية المستخدمة في بناء هذه الأنظمة هي نظم إدارة قواعد البيانات الهرمية ، ونظم إدارة قواعد البيانات الموجهة للكائنات ، ونظم إدارة قواعد البيانات العلائقية ، ونظام إدارة قواعد البيانات (DBMS) الموجه للنص.

يوصي البحث بمزيد من التركيز على استغلال وتحقيق فوائد تطبيق نظام الإدارة القائم على الكمبيوتر في خدمات الرعاية الصحية ، والحاجة إلى توظيف المزيد من موظفي تكنولوجيا المعلومات والاتصالات [ICT] في صناعة الرعاية الصحية للمساهمة المهنية في تطبيق واستخدام هذا النظام ، وأخيرًا يجب إجراء المزيد من الأبحاث بشكل شامل لتحديد إلى أي مدى يمكن أن تستفيد مرافق الرعاية الصحية من استخدام الأنظمة القائمة على الكمبيوتر.

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List of Abbreviations

(HMS) Hospital Management System

(ICT) information and communication technologies

(HIS) hospital Information system

(CMS) computerized management systems

(CPR) Computerized Patient Records

Chapter One

Introduction

1.1 General View

The running of hospitals involves many processes and procedures that can be tracked, recorded, predicted, planned and linked together, so that they are performed on a consistent manner, taking into consideration the huge effort and coordination needed to accomplish the day-to-day activities within such facilities (R.D.Lele, 2015).

Hospital Management is the process where healthcare providers effectively and efficiently administer everything from patient registration to appointment scheduling, document management, consultation management, lab management, drug safety, report generation, staff management, outpatient management, and so much more. Good Hospital Management starts by ensuring anytime availability, anytime accessibility and high-quality healthcare to the patients. Hospitals and clinics strive for excellent care but it can be difficult to achieve all of the above without the proper procedures and systems in place. Hospitals and clinics are complex and have different departments, specialties, schedules, teams, types of data, and so much to manage (Eddie Clinic, 2015). Throw in a growing desire for patients to want more control over their data, scheduling, and access to records, and you can quickly see how hospital management isn't as easy as it sounds! Some hospitals might be operating under outdated systems while others are still using a paper-heavy hospital management system. The problem with outdated systems and paper focused hospital management is that things can get physically lost, errors can occur and patients simply do not have a way to access their information anywhere, anytime (Nir Menachemi and Taleah H Collum, 2016). This is where the rapidly growing Hospital Management System (HMS) comes into play. The Hospital

Management System enables hospitals, healthcare centers and staff to function systematically and manage information effectively to offer better patient care. The system integrates all information and data related to doctors, patients, staff, and departments and provides a way to securely and seamlessly streamline processes and care (Memorial Care Health Systems, 2017).

1.2 Problem statement

Sudanese hospitals and health care facilities depends on old-fashion tools and techniques for generating information, which provide data about various aspects, but not sufficient for generating full information about the actual situations in the setting of the health care facility as a whole organizational entity, which gain a complex information integrity and data security, problem monitoring Recording and Tracking and problem in communication and information transfer. Moreover, problem searching records which increase west time.

1.3 Research objectives

1.3.1 General Objectives:

The main of objective of this research is to address the standing of Sudanese Hospitals, in specific and health care facilities in general, in using computer-based systems and applications in performing the activities.

1.3.2 Specific Objectives:

- Identify the extent to which the use of computer-based systems and applications can enhance the performance of hospitals and health care facilities.
- Aware the persons in these hospitals and health care facilities of benefits of applying the computer-based management system.
- Address the current technique used for optimizing the hospital performance.

1.4 Methodology

The methodology starts by study and analysis to the hospital management systems for various health care facilities, then choses the study area conducting hospitals and dialysis centers in Khartoum State, including Khartoum north, and Beharry. Then a data collection will be done through questionnaire. The collected data is analyzed using to provide the frequency distributions statistics and graphical displays for the variables and their description. The multiple response frequencies are extracted to present frequency tables for the multiple response sets.

1.5 Research Outline

This thesis includes six chapters, in Chapter one, an introductory chapter which provides an introduction, problem statement of the research, objectives and methodology, Research Outline while, Chapter two will be devoted for reviewing the **Theoretical Background** literature, besides sections related to SMART hospital management. And Chapter three for **Literature Review** .Chapter four deals with methodology of the Research Concerning the data Gathering and analysis, while chapter five discusses the **Results and Discussion, chapter six** deals with the conclusions and recommendations was included.

Chapter Two

Theoretical Background

This chapter is an overview to the hospital management system, types and structure, also the benefits from using computerized hospital management system.

2.1 Hospital Management:

By definition, running a hospital entails complex sets of functions and activities to be carried out so as to provide the services which it is devoted to, this include collective of utilizing various human, financial and physical resources to offer a satisfying services based on medical science. All these resources should be coordinated to achieve the common goal of restoring and maintaining the health of people in the community within which it operates (Healthit organization). As a specialized institution, where the patient care is the core around which all the activities and procedures in the hospital revolve, the hospital should be managed professionally, by applying a specific sets of principles, techniques, activities and procedures.

The concept of hospital management has changed many times as a direct result of the changing concept of hospitals themselves. However, four major stages of change can be addressed(Healthit organization). , which are: the trusteeship stage, whence the hospitals were run and managed by trustees mainly, and in this stage hospital's approach was devoted to humanitarian bases, aiming to heal the sick people. As the time passed, came the doctor stage, whence the hospital became a place of medical practices, and in this stage of hospital evolution, the laboratory medicine developed, and also the interventions of the political and economic factors became very influential in hospitals' running and activities. The third one is the administrative and team stage, whence the practices activities began to take a team work perspective, as a result

of the advancement in the technology, when the use of computer and its applications in patient's care and management became an integral tool in running and managing the hospitals. And the last one is the growth of corporate sector stage, as a result of globalization and liberalization policies adopted by governments worldwide, and as a consequence of the rapid advancements which took place in recent decades, many new concepts and medical practices has emerged, such as medical tourism, corporatization of hospitals and governance. This made the concept of hospital change from a sole service providing facility to a profit making one, where management thinking and principles of productivity (efficiency and effective) became popular terms in hospital management.

Despite the abovementioned evolutionary gradual stages of the concept of hospital and its management, the respective past decades have been "…, challenging for the healthcare administrators, whether they managing health systems, hospitals," …etc., added to the currently changing situations related to the medical domain influential factors [economic, political, socio-cultural, etc.], it inescapable to overlook the crucial importance of benefiting from the capabilities of computer-based healthcare information systems (Healthit organization).

2.1.1 Sudanese Hospitals Management Context:

As per the overall governmental adopted health policy and structure in Sudan that target to promote a comprehensive health care system based on primary health care services, primary health care institutions include – in an ascending manner - basic health unit (staffed by community health workers), dressing station (staffed by a nurse or a medical assistant, rural/urban health centers (staffed by a physician) and act as the primary referral level for the former levels in the structure of the Sudanese health care system, rural hospitals represents the second referral level for the preceding levels of health facilities (which are all

managed and financed by the State Ministry of Health). At the end of the system come tertiary hospitals (including teaching and specialized hospitals, which are located in the States' capital cities and operated by the relevant State's Ministry of Health (Software Engineering Ethics Research Institute (SEERI), 2015).

All these health care institutions provide different levels and variant types of care services, such as emergency, inpatients and outpatients, ICU, GI bleeding, neurology, nephrology cardiac, respiratory dentistry, ENT, ophthalmology, maternity and pediatrics, in addition to that they are equipped with some advanced diagnostic and therapeutic instruments. In addition to these institutions private and NGOs health care institution are distributed throughout the country, which has a significant role in the promoting health care services (Richard S Dick, Elaine B Steen and Don E Detmer, 2020).

Aligned to the above described health care system, a primary health care package is developed and implemented aiming to promote child health, school health and reproductive health, control of endemic diseases, promote environmental health and sanitation, and the treatment of injuries, diseases and mental illnesses ((Richard S Dick, Elaine B Steen and Don E Detmer, 2020). However, and due to many indigenous and exogenous factors, such a package is not fully implemented and lacks effectiveness and efficiency, among which is the managerial effectiveness and efficiency so as to succeed in providing health care services as envisaged in the adopted health care policy. For instance, all these care services were mostly to be delivered feeless to all citizens in Sudan. However, and due the structural economic reforms took place in Sudan in the beginning of the 1990s, the financing of the health system has changed by the introduction of user contributing fees mechanisms, which demanded a newly managerial and financial perspective to be applied (Mohan Bansal, 2020).

Additionally, a decentralized approach to health care providing was conducted at the same time which, and though its foreseen merits [effectiveness and more

integration and better utilization/allocation of services and resources within a manageable defined areas, was not able to make access for health care available for the majority of the citizens in the country (Richard S Dick, Elaine B Steen and Don E Detmer, 2020).

2.2 Computer-Based Hospital Management:

The change in the concept of hospital from a sole health care services provider to a for profit-making organization, drives its management to seek reducing expenditure on 'non-core' activities, and at the same time, stakeholders expectations and requirements has increased, which makes the management of the hospital in an ever-challenging and competing situations to meet these conflicting demands. (Richard S Dick, Elaine B Steen, 2018) shaded light on five core domains within healthcare facility management that should be considered to successfully manage the hospital which are: maintenance management, performance management, risk management, supply services management and development, and he emphasized that information and communication technologies (ICT) is an integrator among all of these five domains. On the other side, and as a result of the revolutionary advancements in information and communication technologies, a transformation in the management of information has emerged. As a result, health care facilities and their management activities have greatly influenced by this innovative transformation, which led the medical field and practices to take the advantage of this advancement to contribute in improving health care services (Elizabeth Mott, 2015). As well, they stated that an increased awareness among healthcare organizations for the necessity for benefiting from these technological advancements health information system to provide better services and care to patients (Vimla L Patel, Andre W Kushniruk, Seungmi Yang, Jean-Francois Yale, 2016.).

Another point is that, and due to the nature of healthcare data that it is varied in form, colossal in size and incongruous and changeable in characteristics and attributes, it is inevitable to not continue adopting conventional methods of managing, as the merits of utilizing the advancements technologies are spectacle everywhere in the medical domain(Hu et al., n.d.). From a Total Quality Management (TQM) perspective, practical use of computer-based technologies has many merits too in the medical domain, this includes among others – according to– speedy response to patients needs and services, and helping in anticipating many changes "customer's expectation, new opportunities, advanced diagnostic techniques, evolving patient care system and social expectation and achieving quality and healthcare service leadership. (Harold P Lehman, Patricia A Abott, Nancy C Roderer, 2020.)

Further, the use of computer-based data records [electronic medical data record] is became to be considered as the backbone of any health information system, where some professional in the field consider it as a full computerized health information system, as by definition it is a system "in which health practitioners record detailed medical information, such as patient demographics, encounter summaries, medical history, allergies, intolerances and lab test histories." (Gunter TD, Terry NP. 2017). Additionally, they assure that many of these electronic medical records can further perform administrative functions such as "place order entry, result management and decision support and can also cover features or be incorporated with program that may schedule appointments, execute billing tasks and produce reports".

According to (Harold P Lehman, Patricia A Abott, Nancy C Roderer, 2020.) a hospital Information system (HIS) "is a comprehensive, integrated information system designed to manage the administrative, financial and clinical aspects of a hospital", aiming to "provide the finest support to patient care and administration by electronic data processing".

2.2.1 Computer-Based Hospital Management in Sudan:

As it is the main objective of this study, the research exerted a huge effort to review the literature of computer-based hospital management systems in Sudan. Unfortunately, sufficient previous studies that are directly discuss the issue were not found. All was found, is the application computer-based technologies which are not bear to be considered a fully computer-based hospital management and/or healthcare system, for example (computer-based data records, financial records, staff records, and some computer based medical equipment and instruments) (Vimla L Patel, Andre W Kushniruk, Seungmi Yang, Jean-Francois Yale, 2016.).

2.3 Hospital Management System

Any hospital being a complex healthcare unit implies functioning of several departments in sync so that high quality patient care could be delivered timely. Hence, it excludes applying old and familiar management methods. Just like any large business organization, a hospital healthcare unit requires a complete management system to be flexible, data-based and innovative to function properly.

For instance, the traditional approach of maintaining paper-based medical records is not only bulky but burdensome in terms of time consumption. Moreover, it also potentially increases the risk of errors and inaccurate recording. Apart from inaccuracy, there adds a risk of losing time on searching for the record in need.

That is why almost all the hospital health care units are now welcoming the idea of implementing advanced management systems. A hospital management system is a great tool to solve all the problems in terms of recording and accessing the information. An information management system, regardless of being employed in an organization or a healthcare unit, has now become

increasingly advanced. This is because the computerized management systems (CMS) are designed to possess an ever-growing variety of capabilities. These capabilities have led to the widespread utilization of hospital management systems across all the healthcare industries globally. In fact, the utilization of a similar level of information management system has now become virtually universal and imperative among healthcare providers, health systems, and facilities (Wanless D, 2016).

2.3.1 CMS is important in healthcare

Computerized hospital management system in a healthcare unit has now significantly evolved into more digital healthcare infrastructure. Modern healthcare infrastructures are digitized and responsible for managing, collecting and integrating the huge volume of financial, clinical and operational information. This information is generated daily in today's healthcare system in order to enhance the effectiveness, safety, and efficiency of the system. For instance, clinical management is constantly being improved by electronic health records, also known as EHRs. This helps in placing the comprehensive and immediate patients' records at the fingertips of all the healthcare professionals (Wanless D, 2016).

2.3.2 The types of systems come as follows:

a) Patient administrative systems

Patient administrative systems assist in enhancing healthcare customer experience and improving patient engagement by providing online education to patients. By applying this system, patients are provided with reliable and efficient means of communication with medical professionals and have instant access to their personal health information. In particular, patient portals help users connect with doctors through the digital environment (Wanless D, 2016).

b) EHR Programs

EHR systems involve interactive assistance tools for clinical decision to alert providers on potential problems like medication interactions, critical lab values or allergies and send timely reminders on the clinical guidelines and preventive care (Wanless D, 2016).

c) Operational and Financial Management

This management system is aided by accounting software to support and facilitate healthcare billing systems, healthcare organizations, contract and healthcare policy management software, and intuitive and interactive inventory control systems, including several other software solutions (Wanless D, 2016).

d) Task-based systems

They imply that the same subject relates to multiple tasks: for example, the patient's ID is being duplicated across each task. Task-oriented functions introduced in cloud-based can help medical providers view and update the tasks and monitor the progress of each task up to completion (Wanless D, 2016).

2.4 CMS Hospital Management

To handle a multi-specialty hospital, medical professionals require effective management solutions to prevent excessive time and resource consumption. Advanced functionalities of CMS make them easily accessible for any authorized person (a patient, doctors, staff, etc.). Additionally, CMS can be used for storing information pertaining to activities of all the participants of medical care process. (Wanless D, 2016).

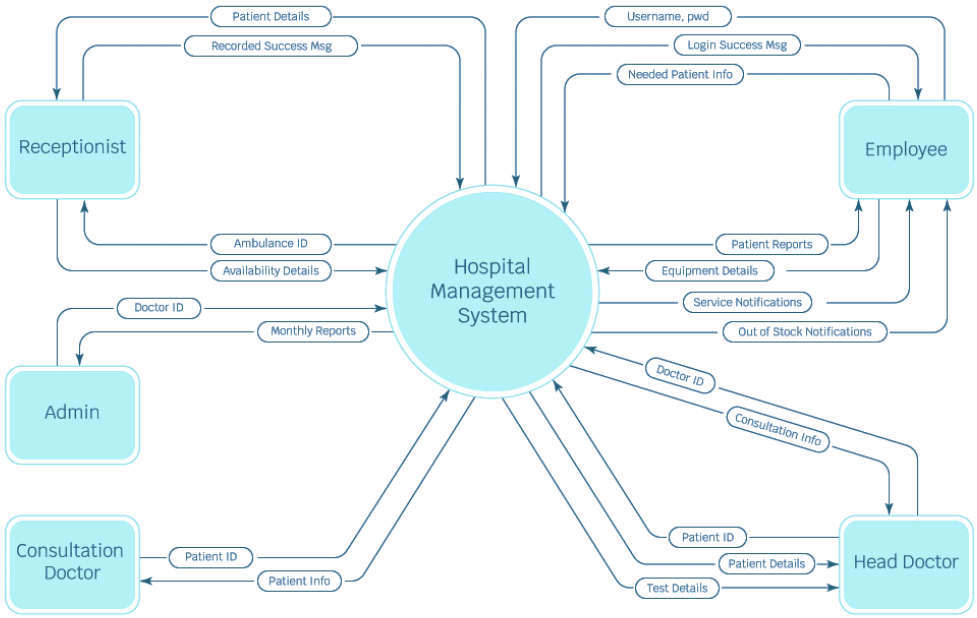

Figure 2.1: Structure of CMS Hospital Management

In particular, a single computerized and quality management system for hospitals serves the following purposes.

2.4.1 Patient Information

The system can be used to register new patients. When you employ an electronic management system, it stores all the relevant and basic medical details of the patient. You can also record the patient's contact information including photos as identity proof in case of facing any medical-legal case or fraud (Colledge A, Car J, Donelly A, Majeed A, 2015).

2.4.2 Statistical Reports

The complete data in a computerized information system is integrated. It can be analyzed whenever needed. This assists in keeping a statistical database so that it can be used internally in the hospital or can be submitted to the administration. The administration can use this data to summarize hospital

expenses while evaluating all the necessary and unnecessary expenditures (Colledge A, Car J, Donelly A, Majeed A, 2015).

2.4.3 Supplies Control

A quality hospital management system also helps to maintain inventory, the supplies stock in the hospital such as medication, surgical instrument, stationery, laboratory supplies, staff supplies and others. This inventory record ensures that the administration keeps a quick look in terms of usage and proper control of the wastage of available supplies (Colledge A, Car J, Donelly A, Majeed A, 2015).

2.4.4 Occupancy

When you employ an efficient computerized management system in your hospital, you can have a quick look to check the beds/rooms available so that patients can be accommodated and transfer from one place to another conveniently. By keeping this data regularly updated, you can easily keep a track of incoming patients, admitted or discharged patients. The patient data management system can also store information about the availability of the operation theaters along with their schedule, to help staff book and allow the vacant rooms or theaters accordingly (Colledge A, Car J, Donelly A, Majeed A, 2015).

2.4.5 Schedules

A hospital management system can also be used to list the available doctors and their relevant schedules. It contains the emergency numbers of the doctors. Even doctors can check the schedule and coordinate with other doctors. The record can also be kept in terms of available medicine for a particular disease so that every doctor can stay updated and use an alternative, whenever needed and avoid delay. Not to mention, a quality management system improves the coordination between the doctor and patient both hassle-free and easy (Colledge A, Car J, Donelly A, Majeed A, 2015).

Chapter Three

Literature Review

3.1 Related Works

3.1.1 Hospital Management System, Assist.Lec. Sura Abed Sarab, 2020

In [16] the author state that the Hospital Management System provides the benefits of streamlined operations, enhanced administration, control, superior patient care, strict cost control and improved profitability. HMS is powerful, flexible, and easy to use and is designed and developed to deliver real conceivable benefits to hospitals. More importantly it is backed by reliable and dependable support. The project 'Hospital Management System' is based on the database, object oriented and networking techniques. As there are many areas where we keep the records in data basefor which we are using MY SQL software which is one of the best and the easiest software to keep our information. This project uses JAVA as the front-end software which is an Object Oriented Programming and has connectivity with MY SQL. Hospital Management System is custom built to meet the specific requirement of the mid and large size hospitals across the globe. All the required modules and features have been particularly built to just fit in to your requirement. This package has been widely accepted by the clients in India and overseas. Not stopping only to this but they are highly satisfied and appreciating. Entire application is web based and built on 3 tier architecture using the latest technologies. The sound database of the application makes it more users friendly and expandable. The package is highly customizable and can be modified as per the needs and requirements of our clients. Prolonged study of the functionalities of the hospital and its specific requirement has given it a wonderful shape both technically and usability wise. It covers all the required modules right from Patient Registration, Medicine details, Doctor, Wards, , Admin, Store, Patient appointment, bill payment, record modification, discharge details etc.

Human Body is a very complex and sophisticated structure and comprises of millions of functions. All these complicated functions have been understood by man him, part-by-part their research and experiments. Asscience and technology progressed, medicine became an integral part of the research. Gradually, medical science became an entirely new branch of science. As of today, the Health Sector comprises of Medical institutions i.e. Hospitals, HOSPITALs etc. research and development institutions and medical colleges. Thus the Health sector aims at providing the best medical facilities to the common man

3.1.2 ONLINE HOSPITAL MANAGEMENT SYSTEM A PROJECT REPORT

In (Winkelman WJ, Leonard KJ, Rossos PG. 2018), the author state that the Hospital Management System is an organized computerized system designed and programmed to deal with day-to-day operations and management of the hospital activities. The program can look after inpatients, outpatients, records, database treatments, status illness, billings in the pharmacy and labs. It also maintains hospital information such as ward id, doctors in charge and department administering. The major problem for the patient nowadays to get report after consultation, many hospital managing reports in their system but it's not available to the patient when he / she is outside. In this project we are going to provide the extra facility to store the report in the database and make available from anywhere in the world.

3.1.3 Effects of Computerized Patient Records on Patients Beena Ullala Mata B N, 2015

In(Grol R, Wensing M, Mainz J, Jung PH, Ferreira P, Hearnshaw H, Hjortdahl P , Olesen FL, Reis S, Ribacke M, et al. 2021), the author in this paper define the Computerized Patient Records (CPR) are computer-based documentations of all the meetings between a patient and a physician that contain the data of the

various details about the patient, any clinical observations, investigations and diagnostic results, mode of treatment and the details about the follow-up of the patient by the physician. They are used in most of the hospitals to provide a quality patient care. It has both, positive and negative effects on the physicians as well as on the patients.

3.1.4 A systematic review of computer-based patient record systems and quality of care: more randomized clinical trials or a broader approach?

CYRILLE DELPIERRE, 2014

In (Barlas S, 2018), the author analyze the impact of computer-based patient record systems (CBPRS) on medical practice, quality of care, and user and patient satisfaction. Data sources. Manual and electronic search of the Medline, Cochrane, and Embase databases. Study selection. Selected articles were published from 2000 to March 2003. CBPRS was defined as computer software designed to be used by clinicians as a direct aid in clinical decision making. To be included, the systems should have recorded patient characteristics and offered online advice, or information or reminders specific to clinicians during the consultation. Data extraction. Keywords used for the search were: electronic record, informatic record, electronic medical record, electronic patient record, patient order entry, computer-based patient system, clinical decision support systems, and evaluation. Results. Twenty-six articles were selected. Use of a CBPRS was perceived favorably by physicians, with studies of satisfaction being mainly positive. A positive impact of CBPRS on preventive care was observed in all three studies where this criterion was examined. The 12 studies evaluating the impact on medical practice and guidelines compliance showed that positive experiences were as frequent as experiences showing no benefit. None of the six studies analyzing the impact of CBPRS on patient outcomes reported any benefit.

3.1.5 Measuring the operational impact of digitized hospital records: a mixed methods study, Philip J. Scott, 2016

in (Lye CT, Forman HP, Daniel JG, Krumholz HM, 2018), the author focus on the Digitized (scanned) medical records that have been seen as a means for hospitals to reduce costs and improve access to records. However, clinical usability of digitized records can potentially have negative effects on productivity. Methods: Data were collected during follow-up outpatient consultations in two NHS hospitals by non-clinical observers using a work sampling approach in which pre-defined categories of clinician time usage were specified. Quantitative data was analyzed using two-way ANOVA models and the Mann-Whitney U test. A focus group was held with clinicians to qualitatively explore their experiences using digitized medical records. The quantitative and qualitative results were synthesized.

Chapter Four

Methodology

4.1 Research Methods:

The research uses the descriptive and analytical methods to address the standing of dialysis centers and health care facilities within Khartoum- State in using computer-based systems and applications.

As well, the research benefits from the secondary sources such as previous studies, specialized journals, books etc., to review the literature and formulate the general and theoretical framework of the research.

Figure 4.1: Steps of Research Methodology

4.1.1 Population and the Sample Size:

The population of the research consists of 50 health care facilities in the centers of Khartoum State's main cities (Khartoum, Khartoum North – Bahri and omdrman), the targeting of this population gives the researcher many benefits to conduct the research provided the many factors which constraint to conduct a state-wide field study, which require a huge efforts and dealing with difficulties of accessing these facilities, the time frame of the study and other logistic and financial resources to conduct such a field study.

To make it as representative as possible, the researcher managed to draw a purposive sample of (50) respondents, who were selected on the basis of ease of reach and accessibility to targeted health care facilities (public and private hospitals, health centers and clinics, etc.).

4.1.2 Data Collections Tool:

A questionnaire was designed and distributed to the concerned persons in hospitals and facilities to collect the primary data and then analyzing it to answer the research questions.

The questionnaire includes four (4) sections; the first one provides the geographic and demographic information of the respondents and the health care facilities in which their work for. The second section deals with the use and nature of the use of computer in the health care facility activities, including managerial/administrative activities. The third provides information about the perceived and/or obtained benefits of using computer in the management of health care facility. And the last section provides information about the characteristics and properties of the computer-based systems and technologies used in building such these systems.

4.1.3 Data Analysis Criteria:

The collected data is analyzed using Excel spreadsheets to provide the frequency distributions statistics and graphical displays for the variables and their description. The multiple response frequencies are extracted to present frequency tables for the multiple response sets.

4.1.4 Evaluating data

Often, it is sufficient and best simply to calculate the proportions of all respondents answering in each category. (An Excel spreadsheet is much quicker than using a calculator!) It is clear that having a category for all respondents who either don’t know or didn’t answer is very important, as it provides useful information on the strength of feeling over a particular question. Questionnaire results are often used to compute mean scores for individual questions or groups of questions.

Chapter Five

Results and Discussion

5.1 Results:

5.1.1 Demographic Information:

Table 5.1: Distribution of the Respondent according to the Location					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Khartoum	17	34.0	34.0	34.0
	Khartoum North	22	44.0	44.0	78.0
	Bahari	11	22.0	22.0	100.0
	Total	50	100.0	100.0	

Table (5.1) shows the distribution of respondents according to the location, and it reveals that the majority of them with a percentage 44% are located in Khartoum North health care facilities, followed by those located in Khartoum 34%, and those located in Bahari 22%, as shown in the figure below.

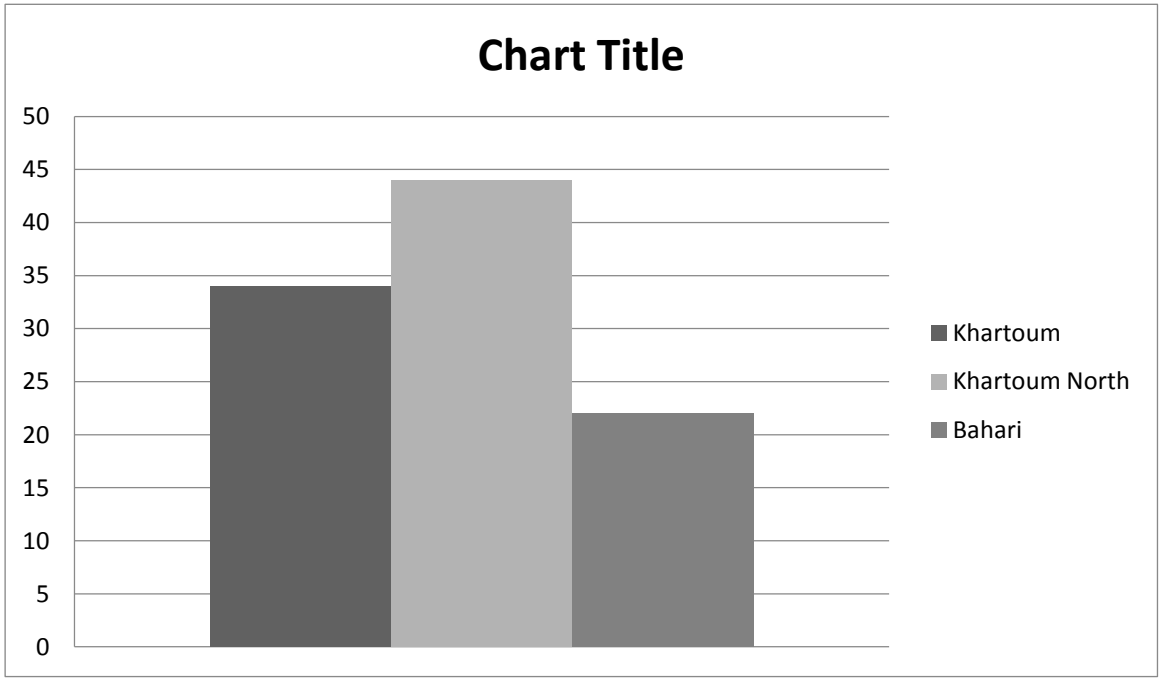

Figure 5.1: Distribution of the Respondent according to the Location

Table 5.2: Distribution of the Respondents according to the Type of Facility

	Frequency	Percent	Valid Percent	Cumulative Percent
Public Hospital	21	42.0	42.0	42.0
Private Hospital	17	34.0	34.0	76.0
Public Clinic	3	6.0	6.0	82.0
Private Clinic	6	12.0	12.0	94.0
University [Teaching] Hospital	3	6.0	6.0	100.0
Total	50	100.0	100.0	

Table 5.2 shows the distribution of the respondents according to the type of the health care facility they work for, and it reveals that the majority of them work for public hospitals representing 42%, followed by those who work for private hospitals 34%, and those who work for private clinics representing 12%, and lastly those who work for public clinics and university hospitals 6% for each, as shown in the figure below.

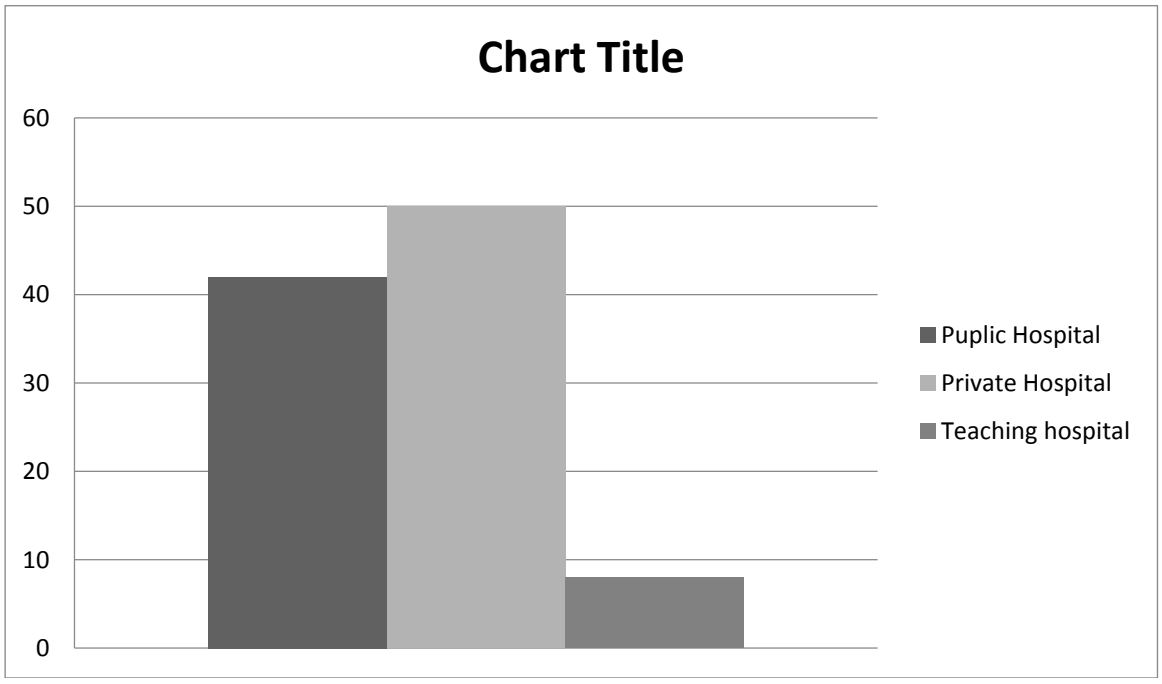

Figure 5.2: Distribution of the Respondents according to the Type of Facility

Table 5.3: Distribution of the Respondents according to Occupation

	Frequency	Percent	Valid Percent	Cumulative Percent
Medical Staff [Physician, Nurse, SMP]	30	60.0	60.0	60.0
Technical Staff	12	24.0	24.0	84.0
Managerial/Administrative Staff	8	16.0	16.0	100.0
Total	50	100.0	100.0	

Table 5.3 shows the distribution of the respondents according to their occupation in the health care facilities they work for, and it shows the majority of them are medical staff [physicians, Nurse, and supporting medical professionals], representing 60% of the total respondents, followed by those who work as technical staff with a percentage of 24%, and lastly those who work as managerial/administrative staff representing 16%, as shown in the figure below.

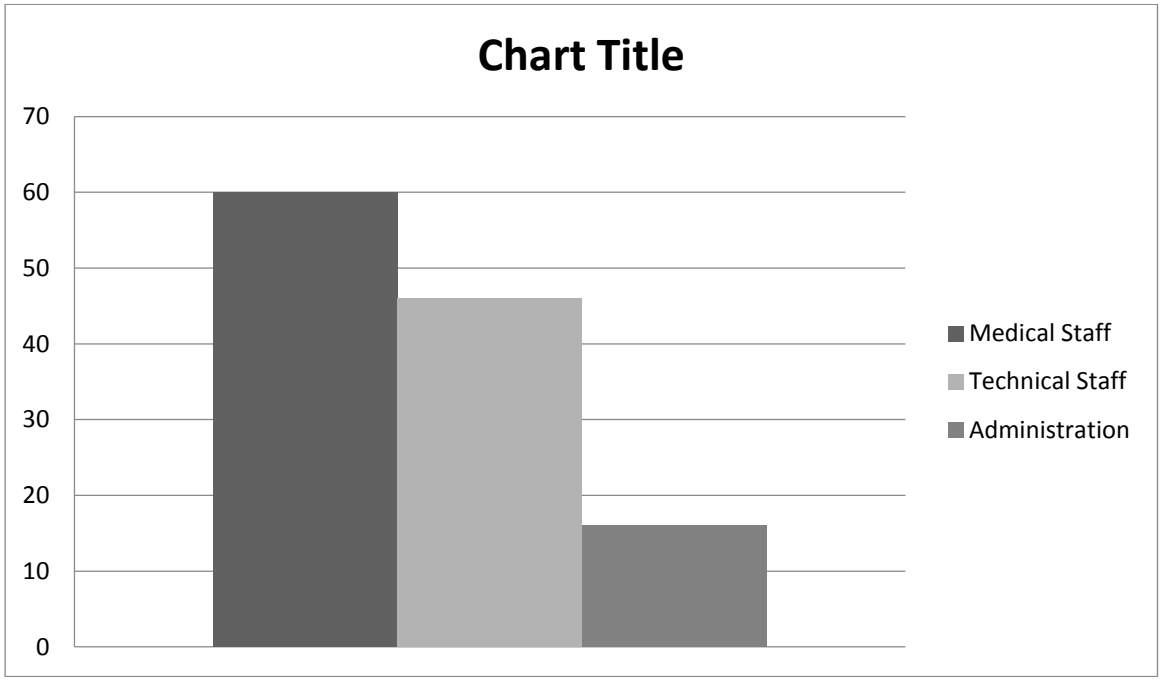

Figure 5.3: Distribution of the Respondents according to Occupation

Table 5.4: Distribution of the Respondents according to Years of Experience

	Frequency	Percent	Valid Percent	Cumulative Percent
1-5 Years	19	38.0	38.0	38.0
6-10 Years	23	46.0	46.0	84.0
11-15 Years	3	6.0	6.0	90.0
More than 20 Years	5	10.0	10.0	100.0
Total	50	100.0	100.0	

Table 5.4 shows the distribution of the respondents according to their years of experience, and reveals that the majority of them with a percentage of 46% have (6-10 years) of experience, followed by those who have (1-5 years) of experience 38%, then those who have more than 20 years of experience representing 10%, and lastly those whose years of experience range (11-15 years) representing 6%, as shown in the below figure.

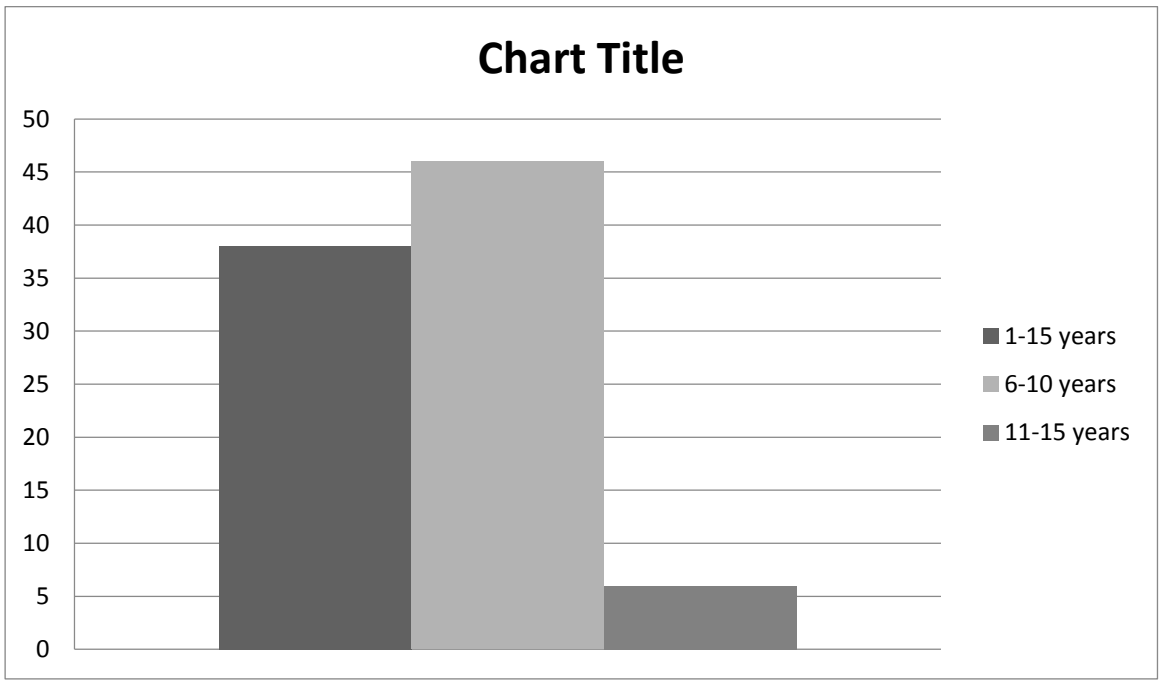

Figure 5.4: Distribution of the Respondents according to Years of Experience

5.1.2 Use of Computer in Managing Hospital Activities:

Table 5.5: Computer-Based General Hospital's Activities - Assessment

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	27	54.0	54.0	54.0
No	23	46.0	46.0	100.0
Total	50	100.0	100.0	

Table 4.5 presents the distribution of the respondents' reply to whether the management of assessment activities within the healthcare facility they work for is computerized or not. 54% of them responded 'Yes', while 46% responded 'No', as the figure below shows.

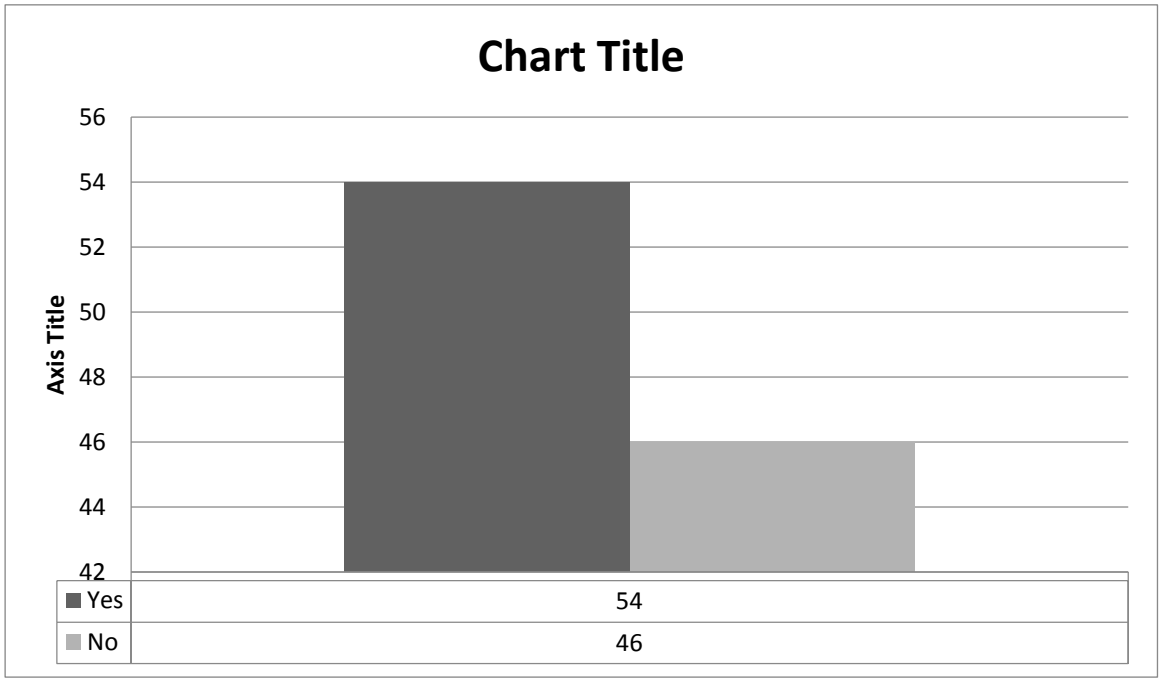

Figure 5.5: Computer-Based General Hospital's Activities – Assessment

Table 5.6: Computer-Based General Hospital's Activities - Patient Monitoring

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	25	50.0	50.0	50.0
No	25	50.0	50.0	100.0
Total	50	100.0	100.0	

Table 5.6 presents the distribution of the respondents' reply to whether the management of **patients monitoring** activities within the healthcare facility they work for is computerized or not. They evenly responded – 50% for each – by 'Yes' and 'No', as the figure below shows.

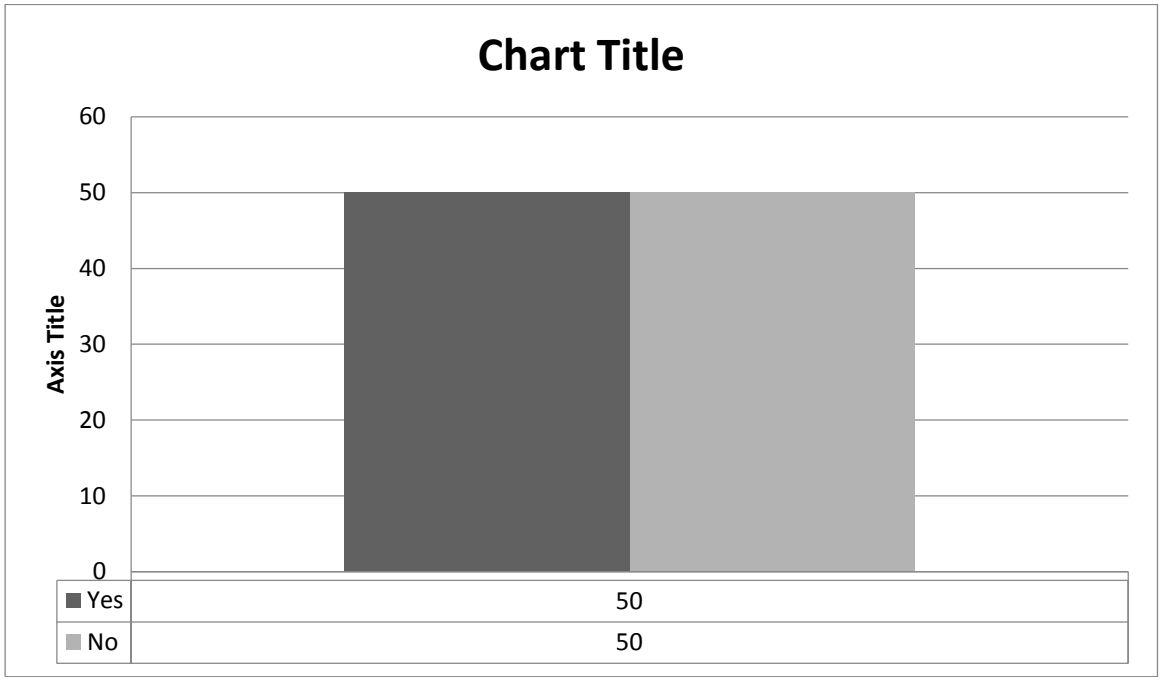

Figure 5.6: Computer-Based General Hospital's Activities - Patient Monitoring

Table 5.7: Computer-Based General Hospital's Activities - Documentation

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	7	14.0	14.0	14.0
No	43	86.0	86.0	100.0
Total	50	100.0	100.0	

Table 5.7 presents the distribution of the respondents' reply to whether the management of **documentation** activities within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 86%, and those who responded 'Yes' represent 14% only, as the figure below shows.

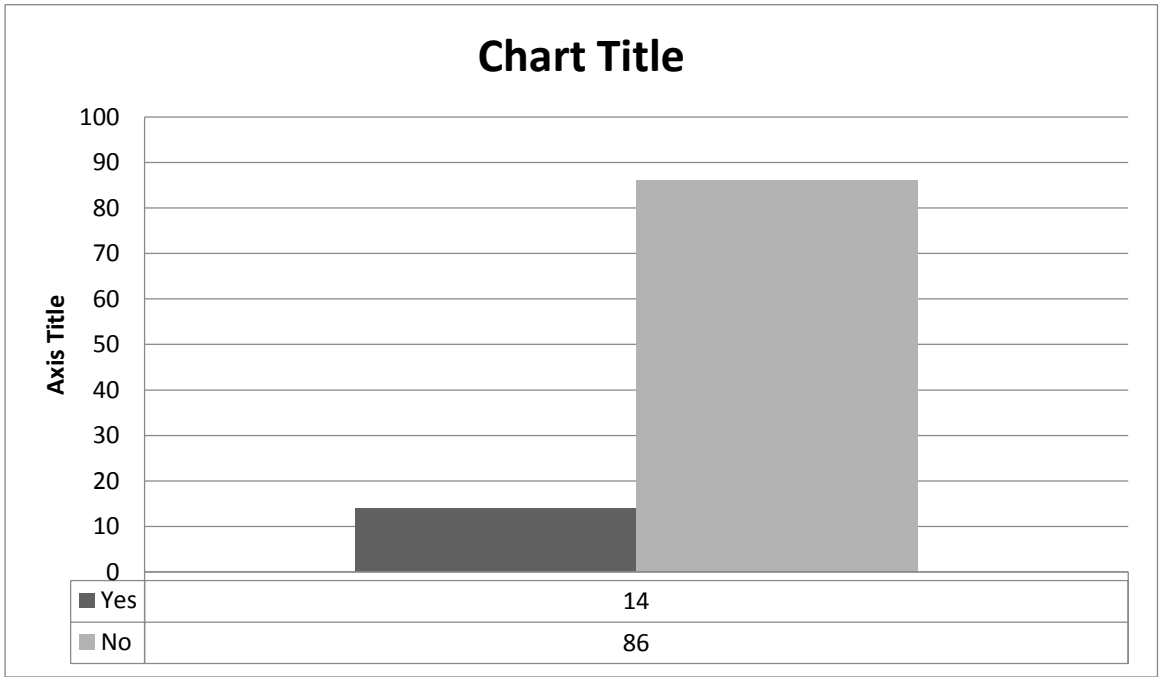

Figure 5.7: Computer-Based General Hospital's Activities – Documentation

Table 5.8: Computer-Based General Hospital's Activities - Telemedicine

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	3	6.0	6.0	6.0
No	47	94.0	94.0	100.0
Total	50	100.0	100.0	

Table 5.8 presents the distribution of the respondents' reply to whether the management of **telemedicine** activities within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 94%, and those who responded 'Yes' represent 6% only, as the figure below shows.

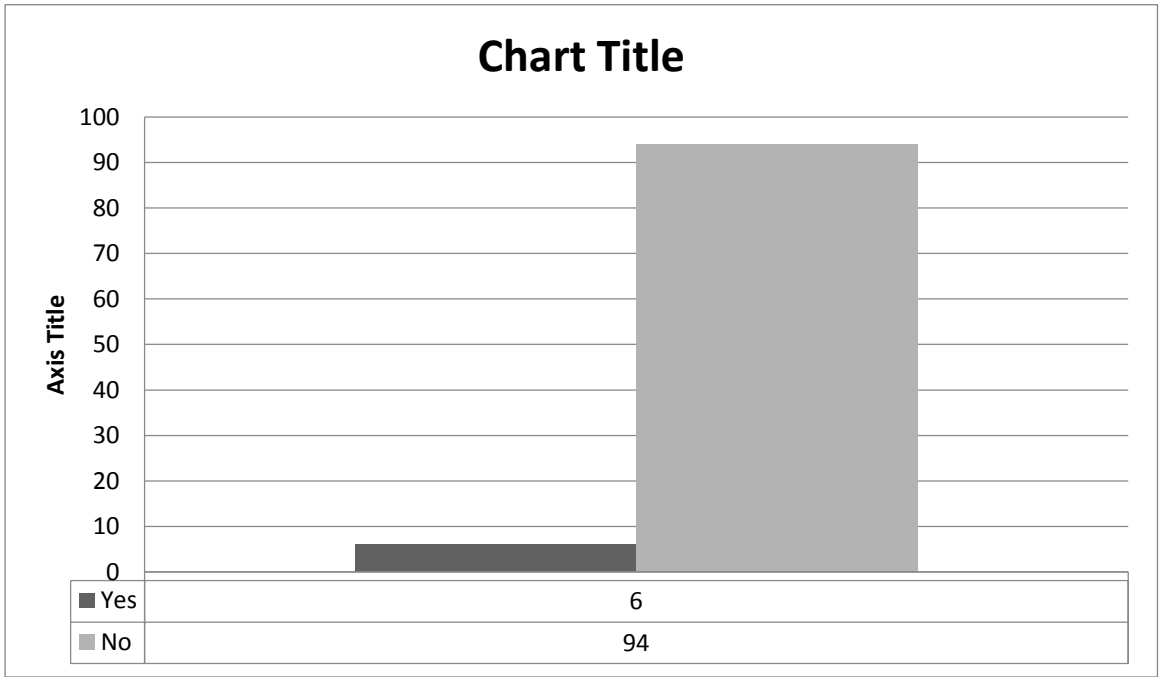

Figure 5.8: Computer-Based General Hospital's Activities – Telemedicine

Table 5.9: Computer-Based General Hospital's Activities – Electronic Medical Records [EMR]

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	5	10.0	10.0	10.0
No	45	90.0	90.0	100.0
Total	50	100.0	100.0	

Table 5.9 presents the distribution of the respondents' reply to whether the management of **medical records** activities within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 90%, and those who responded 'Yes' represent 10% only, as the figure below shows.

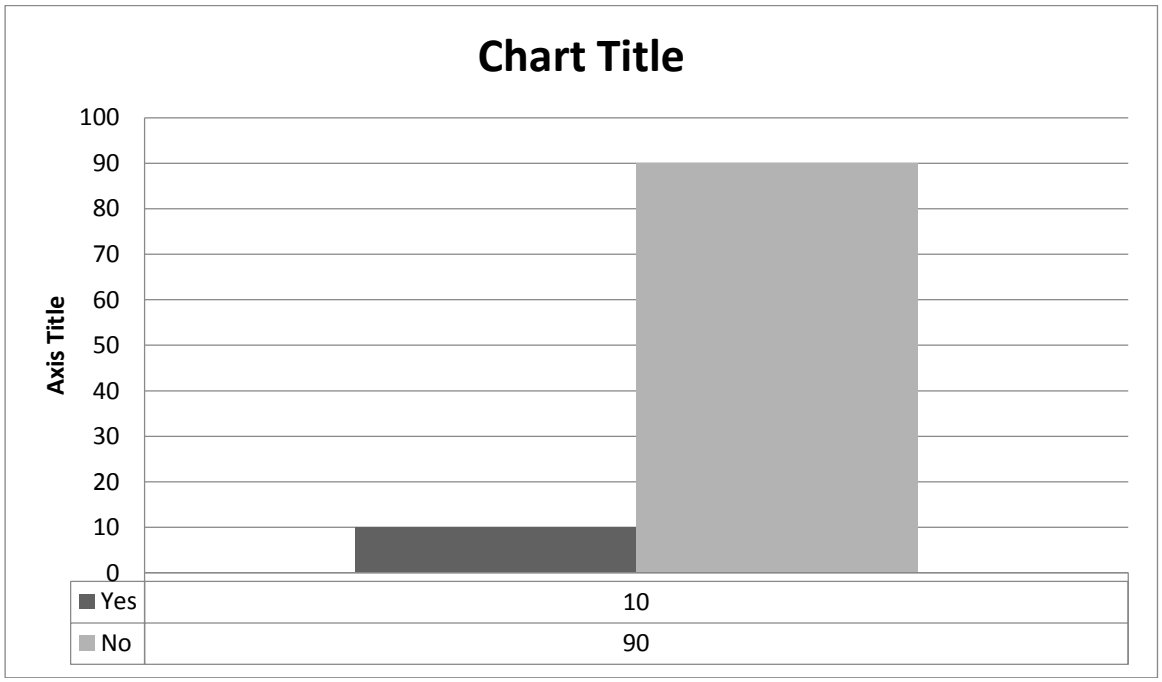

Figure 5.9: Computer-Based General Hospital's Activities – Electronic Medical Records [EMR]

Table 5.10: Computer-Based Hospital's Managerial/Administrative Activities – Nursing Services

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	21	42.0	42.0	42.0
No	29	58.0	58.0	100.0
Total	50	100.0	100.0	

Table 5.10 presents the distribution of the respondents' reply to whether the management of **nursing services** activities within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 58%, and those who responded 'Yes' represent 42%, as the figure below shows.

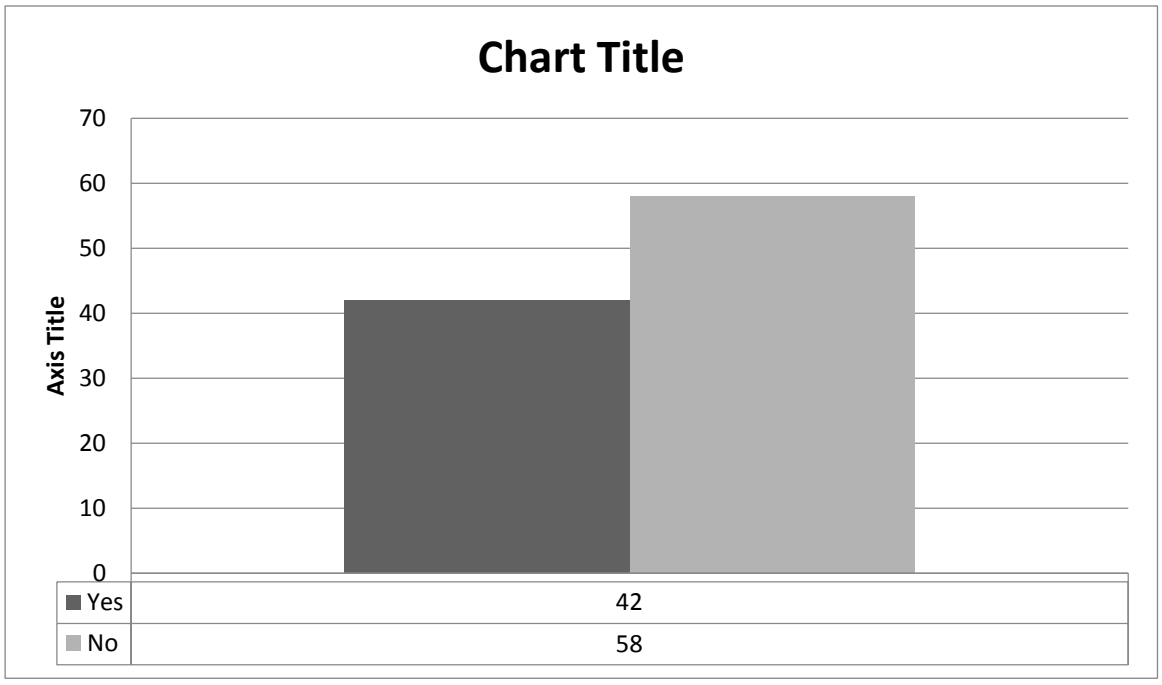

Figure 5.10: Computer-Based Hospital's Managerial/Administrative Activities – Nursing Services

Table 5.11: Computer-Based Hospital's Managerial/Administrative Activities - Functional Activities

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	14	28.0	28.0	28.0
No	36	72.0	72.0	100.0
Total	50	100.0	100.0	

Table 5.11 presents the distribution of the respondents' reply to whether the managerial/administrative activities – **functional activities** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 72%, and those who responded 'Yes' represent 28%, as the figure below shows.

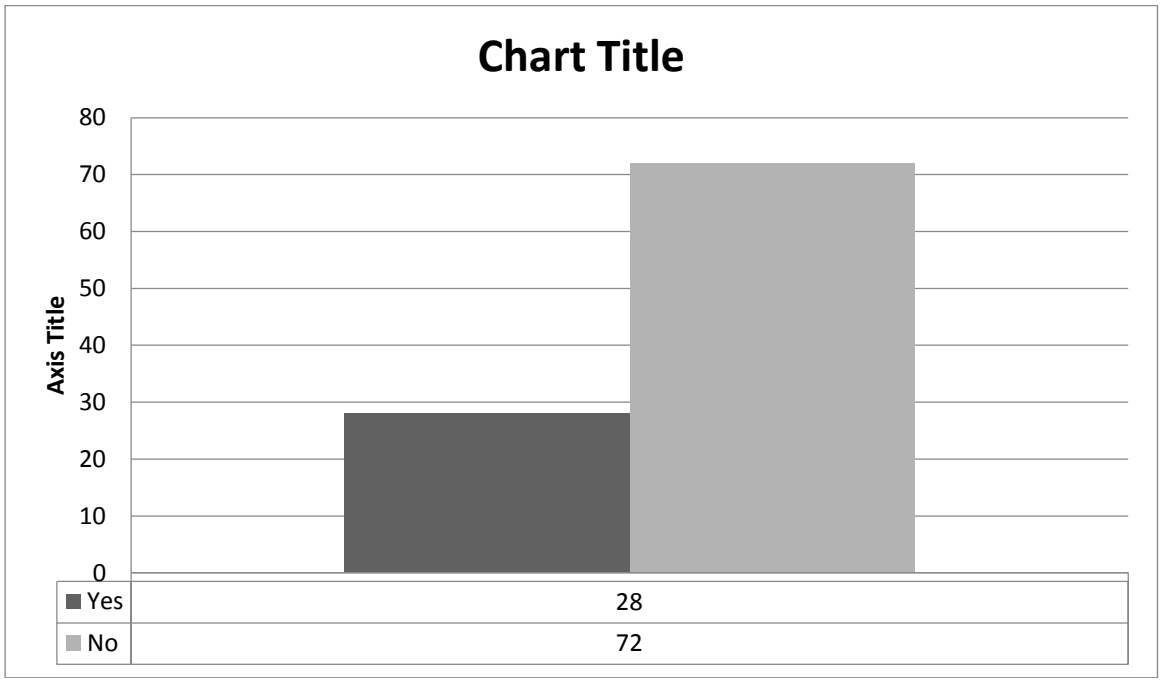

Figure 5.11: Computer-Based Hospital's Managerial/Administrative Activities - Functional Activities

Table 5.12: Computer-Based Hospital's Managerial/Administrative Activities – Accounting and Financial Activities

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	21	42.0	42.0	42.0
No	29	58.0	58.0	100.0
Total	50	100.0	100.0	

Table 5.12 presents the distribution of the respondents' reply to whether the managerial/administrative activities – **accounting and financial activities** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 58%, and those who responded 'Yes' represent 42%, as the figure below shows.

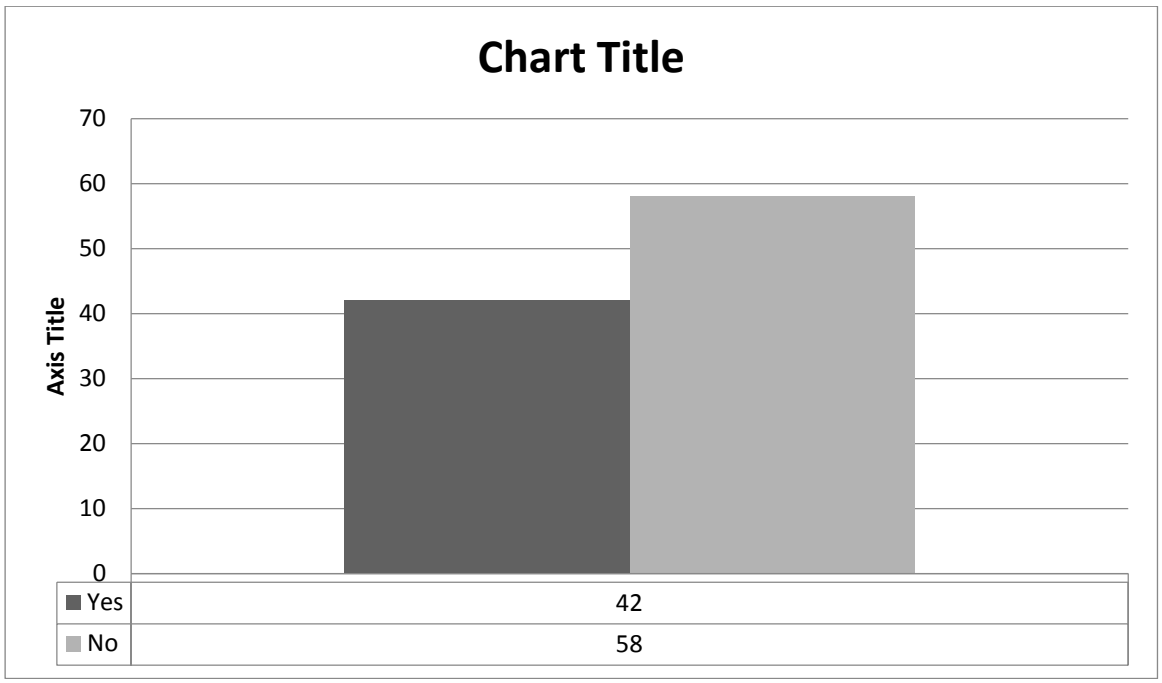

Figure 5.12: Computer-Based Hospital's Managerial/Administrative Activities – Accounting and Financial Activities

Table 5.13: Computer-Based Hospital's Managerial/Administrative Activities – Quality Assurance and Management

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	13	26.0	26.0	26.0
No	37	74.0	74.0	100.0
Total	50	100.0	100.0	

Table 5.13 presents the distribution of the respondents' reply to whether the managerial/administrative activities – **quality assurance and management** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 74%, and those who responded 'Yes' represent 26%, as the figure below shows.

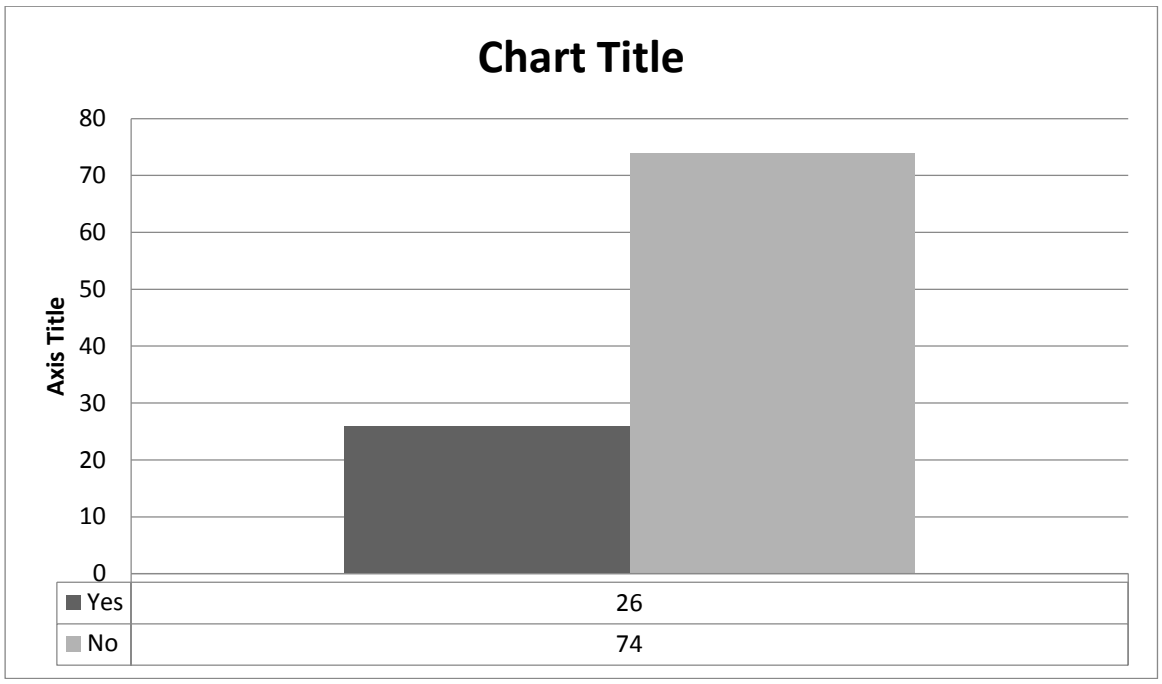

Figure 5.13: Computer-Based Hospital's Managerial/Administrative Activities – Quality Assurance and Management

Table 5.14: Computer-Based Hospital's Research Activities – Preparation of Research Documents

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	18	36.0	36.0	36.0
No	32	64.0	64.0	100.0
Total	50	100.0	100.0	

Table 5.14 presents the distribution of the respondents' reply to whether the research activities – **preparation of research documents** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 64%, and those who responded 'Yes' represent 36%, as the figure below shows.

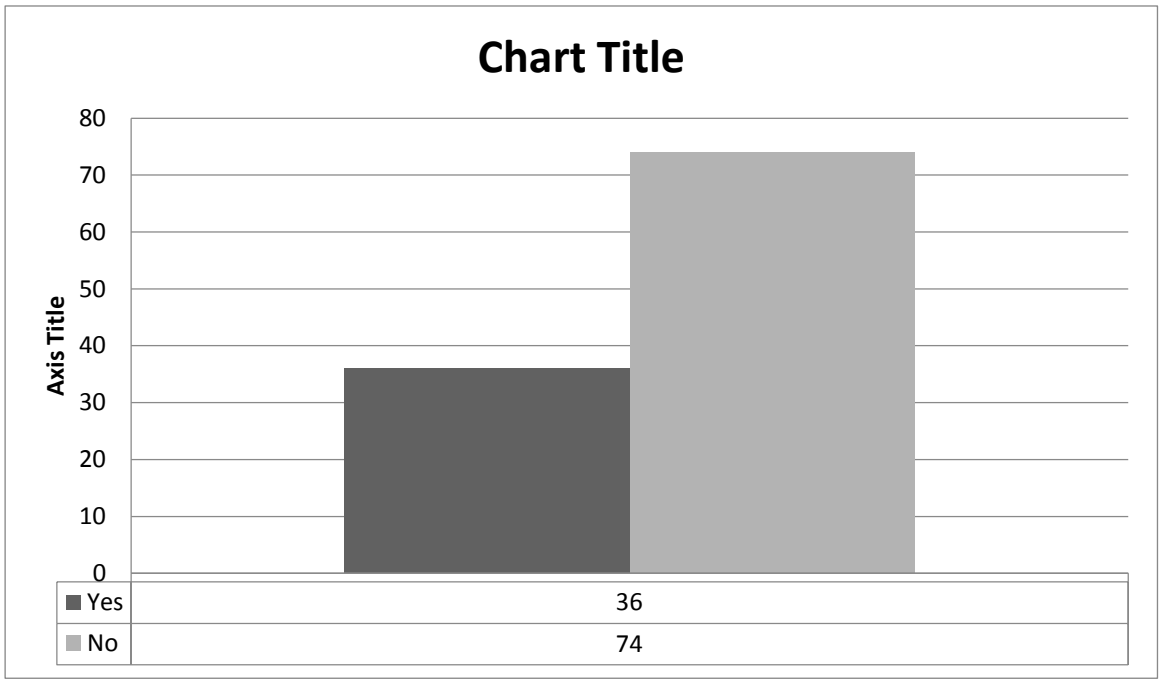

Figure 5.14: Computer-Based Hospital's Research Activities – Preparation of Research Documents

Table 5.15: Computer-Based Hospital's Research Activities – Data Gathering and Analysis

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	23	46.0	46.0	46.0
No	27	54.0	54.0	100.0
Total	50	100.0	100.0	

Table 5.15 presents the distribution of the respondents' reply to whether the research activities – **data gathering and analysis** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 54%, and those who responded 'Yes' represent 46%, as the figure below shows.

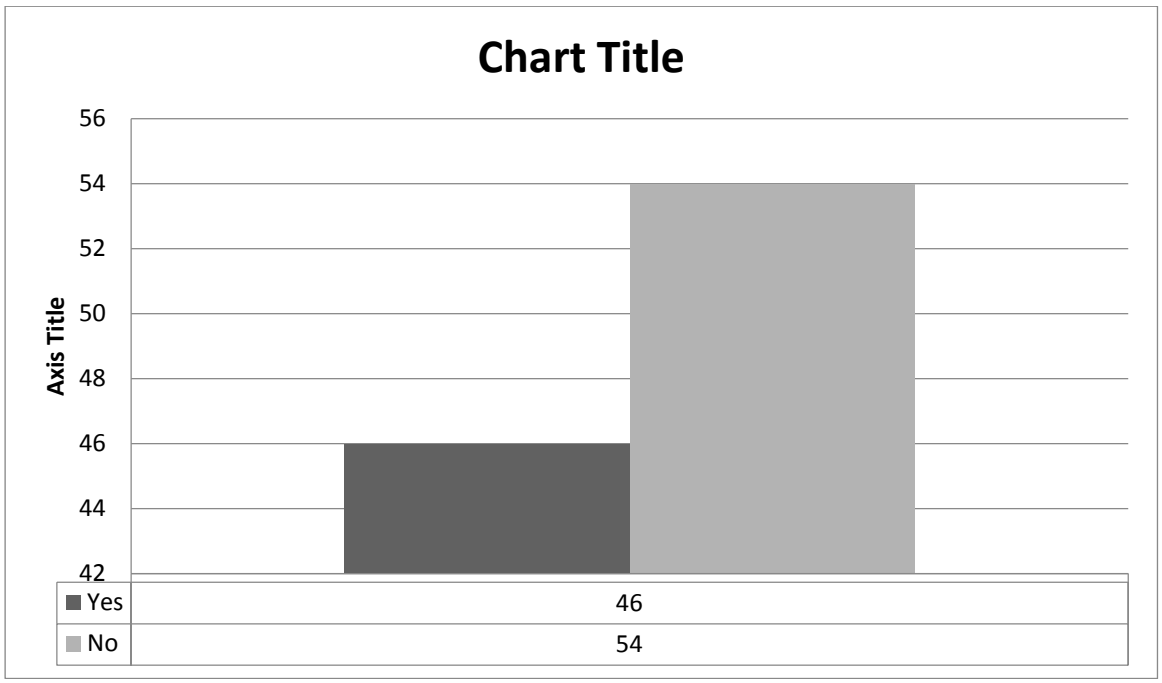

Figure 5.15: Computer-Based Hospital's Research Activities – Data Gathering and Analysis

Table 5.16: Computer-Based Hospital's Research Activities - Computer Assisted Instruction

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	20	40.0	40.0	40.0
No	30	60.0	60.0	100.0
Total	50	100.0	100.0	

Table 5.16 presents the distribution of the respondents' reply to whether the research activities – **assisted instructions** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 60%, and those who responded 'Yes' represent 40%, as the figure below shows.

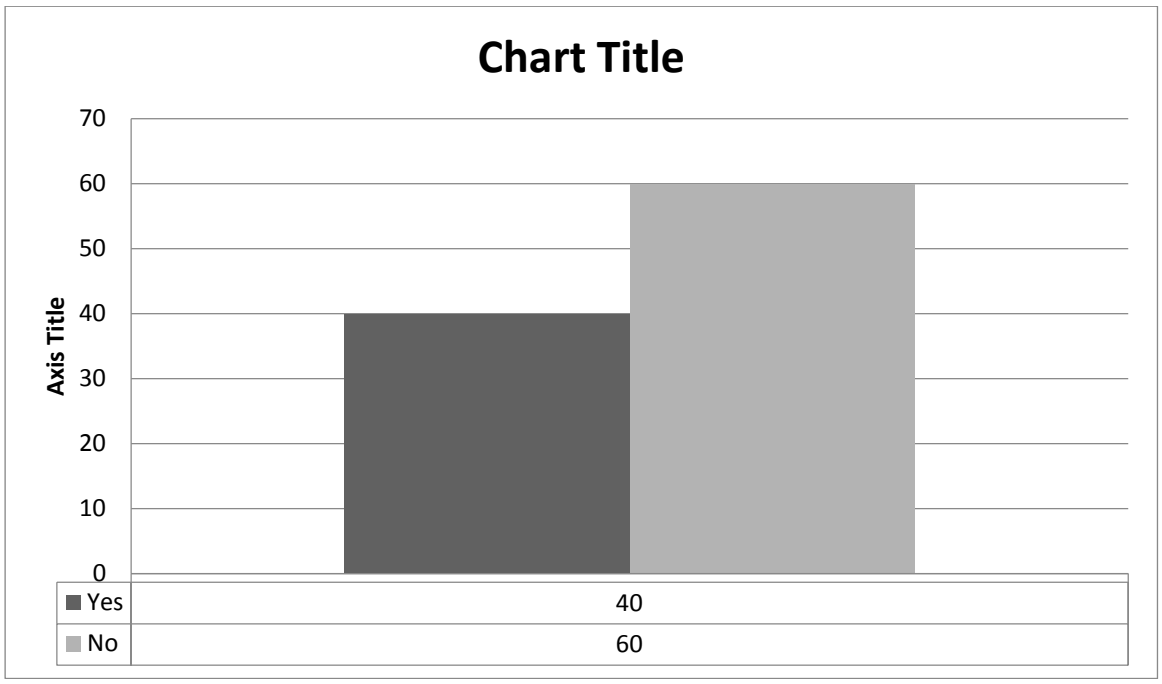

Figure 5.16: Computer-Based Hospital's Research Activities – Computer Assisted Instruction

Table 5.17: Computer-Based Hospital's Research Activities – Simulation

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	20	40.0	40.0	40.0
No	30	60.0	60.0	100.0
Total	50	100.0	100.0	

Table 5.17 presents the distribution of the respondents' reply to whether the research activities – **simulation** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 60%, and those who responded 'Yes' represent 40%, as the figure below shows.

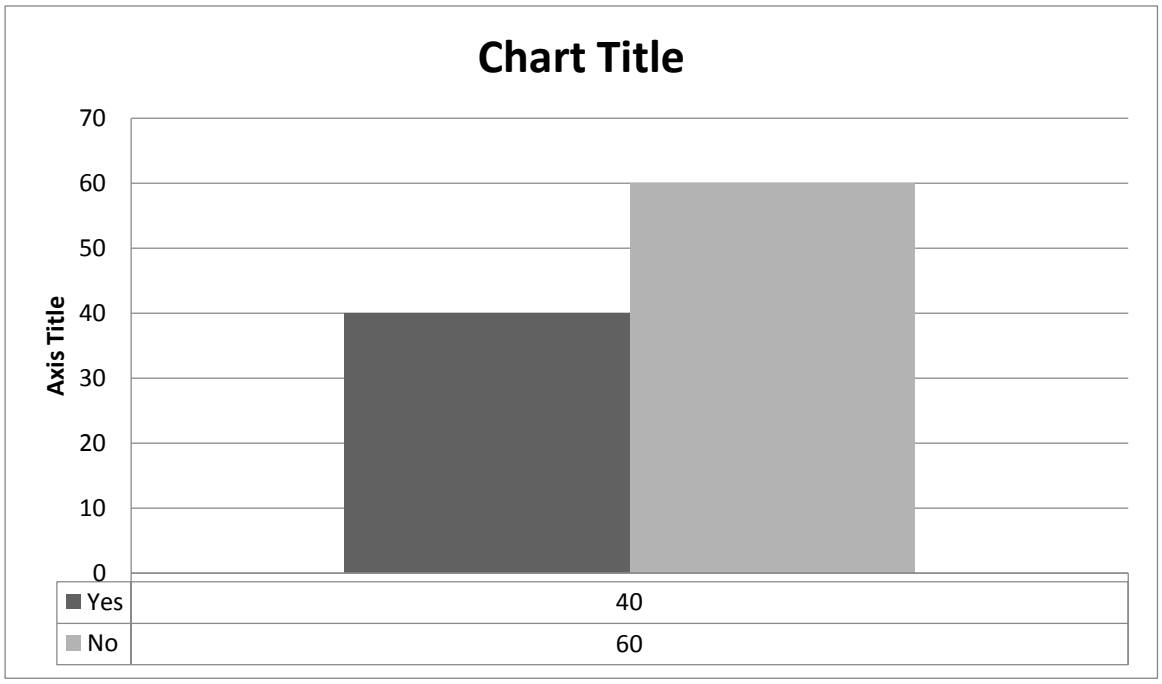

Figure 5.17: Computer-Based Hospital's Research Activities – Simulation

Table 5.18: Computer-Based Hospital's Research Activities - Tutorials

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	17	34.0	34.0	34.0
No	33	66.0	66.0	100.0
Total	50	100.0	100.0	

Table 5.18 presents the distribution of the respondents' reply to whether the research activities – **tutorials** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 66%, and those who responded 'Yes' represent 34%, as the figure below shows.

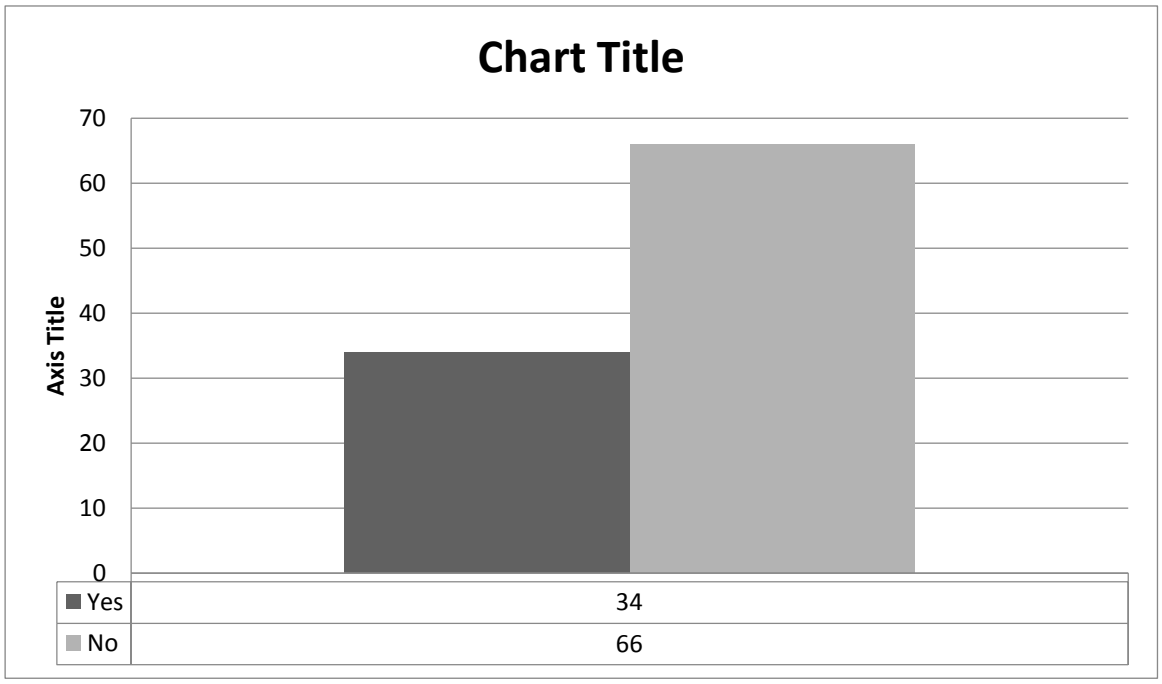

Figure 5.18: Computer-Based Hospital's Research Activities – Tutorials

Table 5.19: Computer-based Hospital's Community Activities - Gathering Statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	11	22.0	22.0	22.0
No	39	78.0	78.0	100.0
Total	50	100.0	100.0	

Table 5.19 presents the distribution of the respondents' reply to whether the community activities – **gathering statistics** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 78%, and those who responded 'Yes' represent 22%, as the figure below shows.

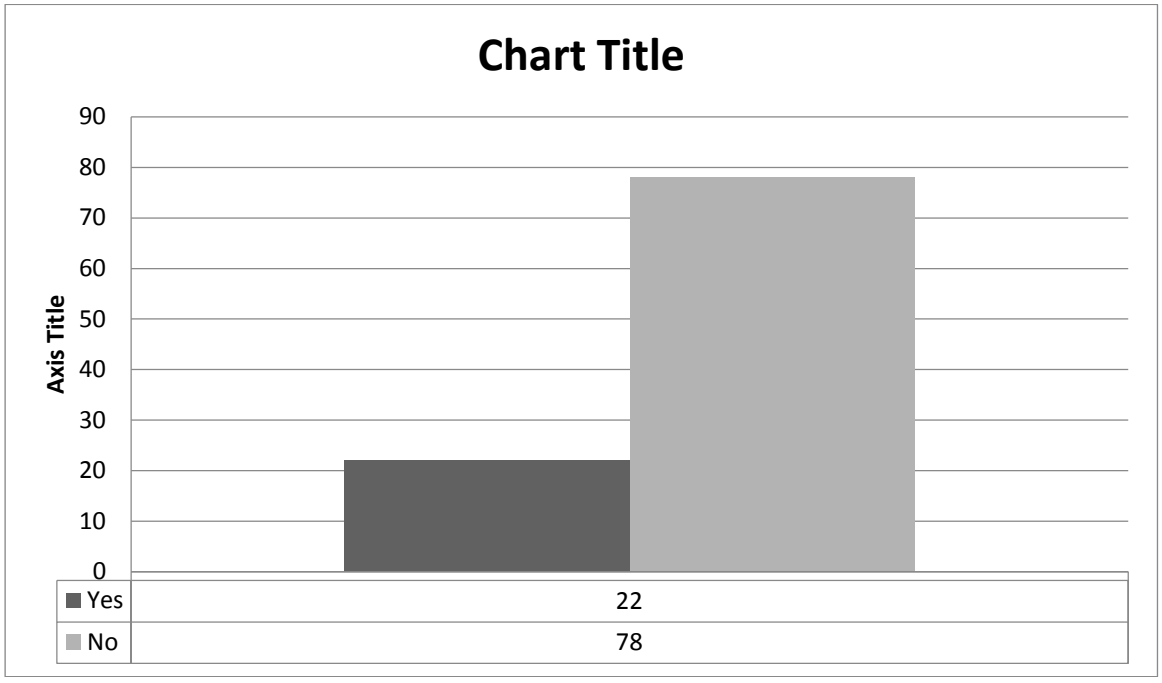

Figure 5.19: Computer-based Hospital's Community Activities - Gathering Statistics

Table 5.20: Computer-based Hospital's Community Activities – Patients Appointment/Identification

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	16	32.0	32.0	32.0
No	34	68.0	68.0	100.0
Total	50	100.0	100.0	

Table 5.20 presents the distribution of the respondents' reply to whether the community activities – **patients appointment/identification** within the healthcare facility they work for is computerized or not. The majority of them responded 'No' representing 68%, and those who responded 'Yes' represent 32%, as the figure below shows.

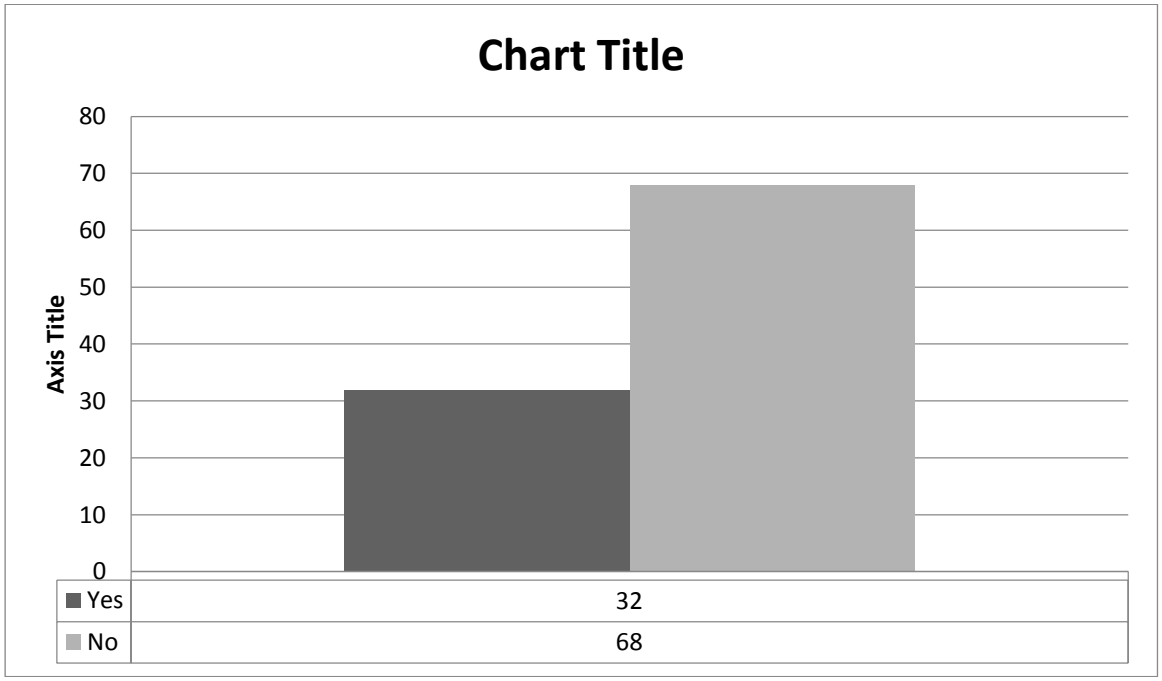

Figure 5.20: Computer-based Hospital's Community Activities – Patients Appointment/Identification

Table 5.21: Computer-based Hospital's Community Activities – Home Care Management

	Frequency	Percent	Valid Percent	Cumulative Percent
No	50	100.0	100.0	100.0

Table 5.21 presents the distribution of the respondents' reply to whether the community activities – **home care management** within the healthcare facility they work for is computerized or not. The all of the respondents replied 'No' representing 100%.

Table 5.22: Computer-based Hospital's Community Activities - Others

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	2	4.0	4.0	4.0
No	48	96.0	96.0	100.0
Total	50	100.0	100.0	

Table 5.22 presents the distribution of the respondents' reply to whether the community activities – **other activities** within the healthcare facility they work for is computerized or not. Most of them responded 'No' representing 96%, and those who responded 'Yes' represent 4% only, as the figure below shows.

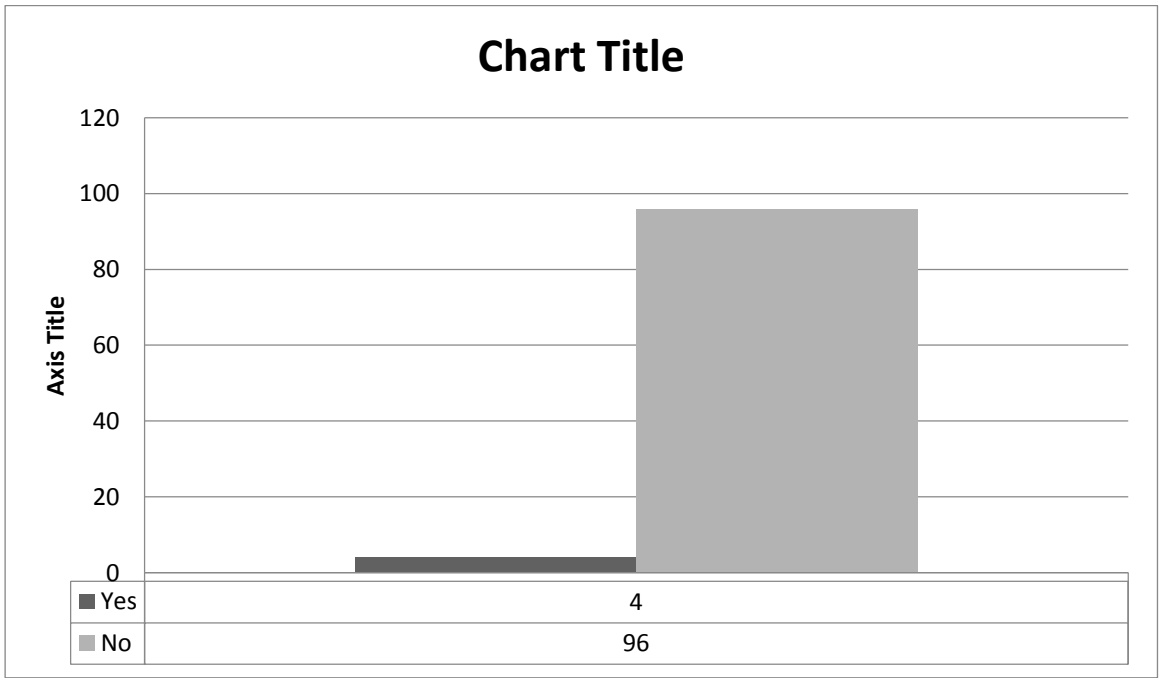

Figure 5.21: Computer-based Hospital's Community Activities – Others

5.1.3 Perceived/Obtained Benefits of Using Computer-Based Hospital Management System - CBHMS:

Table 5.23: Perceived/Obtained Benefits of Using Computer-Based Management Systems – Improved Quality of Care

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	36	72.0	72.0	72.0
No	14	28.0	28.0	100.0
Total	50	100.0	100.0	

Table 5.23 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit of using computer-based management system – **improved quality of care** – within the healthcare facility they work for or not. The majority of them responded 'Yes' representing 72%, and those who responded 'No' represent 28%, as depicted in the below figure.

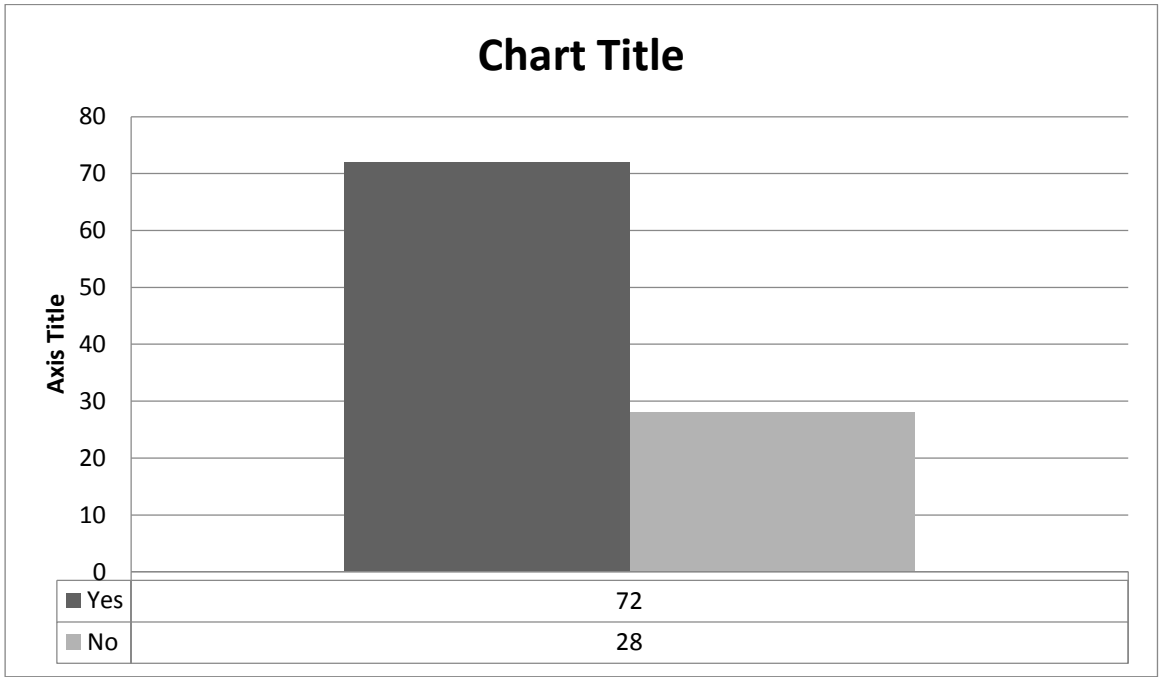

Figure 5.22: Perceived/Obtained Benefits of Using Computer-Based Management Systems – Improved Quality of Care

Table 5.24: Perceived/Obtained Benefit of Using Computer-Based Management Systems – Decreased Cost

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	15	30.0	30.0	30.0
No	35	70.0	70.0	100.0
Total	50	100.0	100.0	

Table 5.24 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit of using computer-based management system – **decreased cost** – within the healthcare facility they work for or not. The majority of them responded 'No' representing 70%, and those who responded 'Yes' represent 30%, as depicted in the below figure.

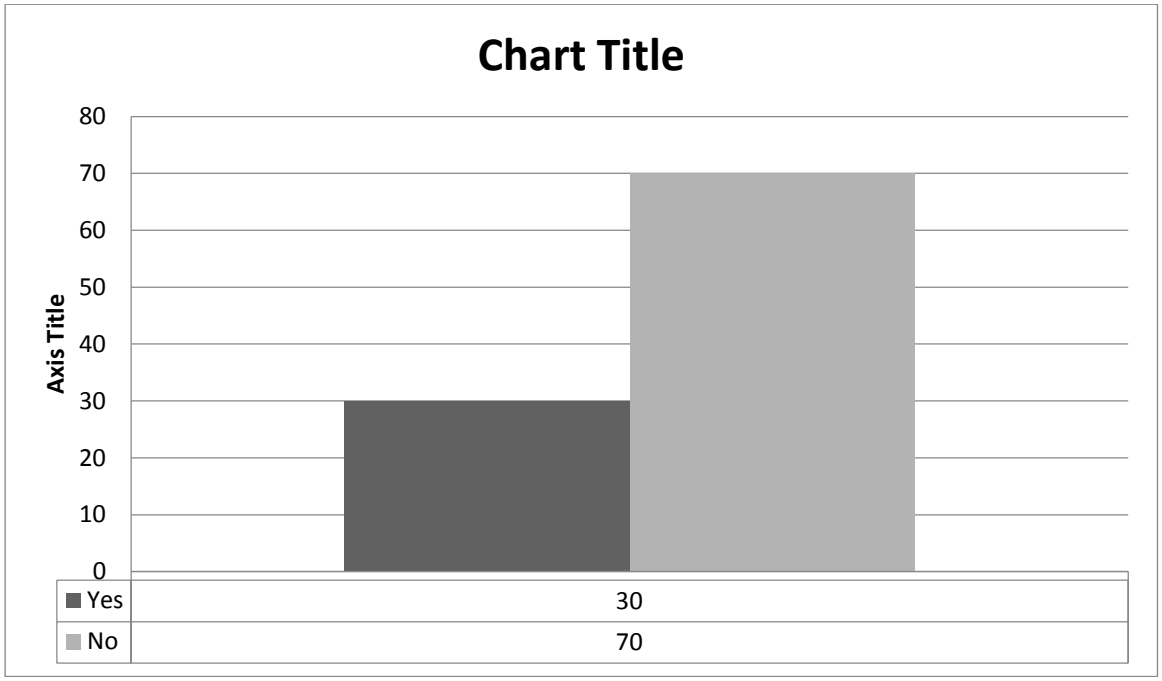

Figure 5.23: Perceived/Obtained Benefit of Using Computer-Based Management Systems – Decreased Cost

Table 5.25: Perceived/Obtained Benefit of Using Computer-Based Management Systems - Uniformity with Future Uses

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	6	12.0	12.0	12.0
No	44	88.0	88.0	100.0
Total	50	100.0	100.0	

Table 5.25 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit of using computer-based management system – **uniformity with future uses** – within the healthcare facility they work for or not. The majority of them responded 'No' representing 70%, and those who responded 'Yes' represent 30%, as depicted in the below figure.

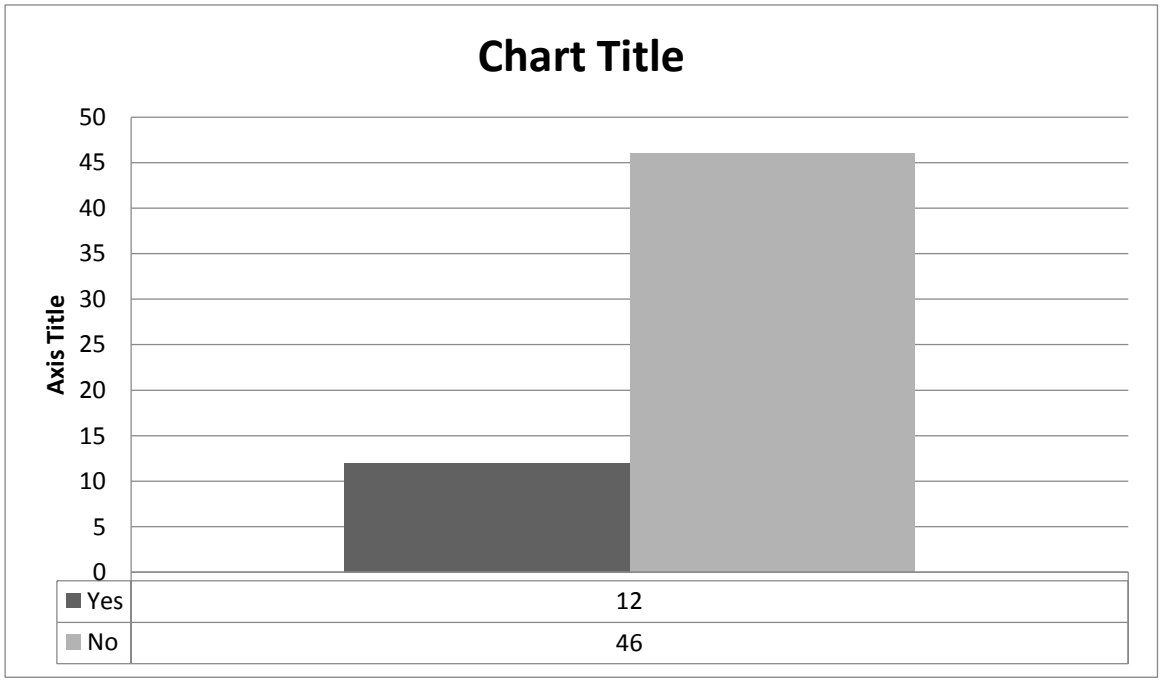

Figure 5.24: Perceived/Obtained Benefit of Using Computer-Based Management Systems - Uniformity with Future Uses

Table 5.26: Perceived/Obtained Benefit of Using Computer-Based Management Systems - Sufficient Patients Knowledge

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	3	6.0	6.0	6.0
No	47	94.0	94.0	100.0
Total	50	100.0	100.0	

Table 5.26 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit of using computer-based management system – **sufficient patients knowledge** – within the healthcare facility they work for or not. Most of them responded 'No' representing 94%, and those who responded 'Yes' represent 6% only, as depicted in the below figure.

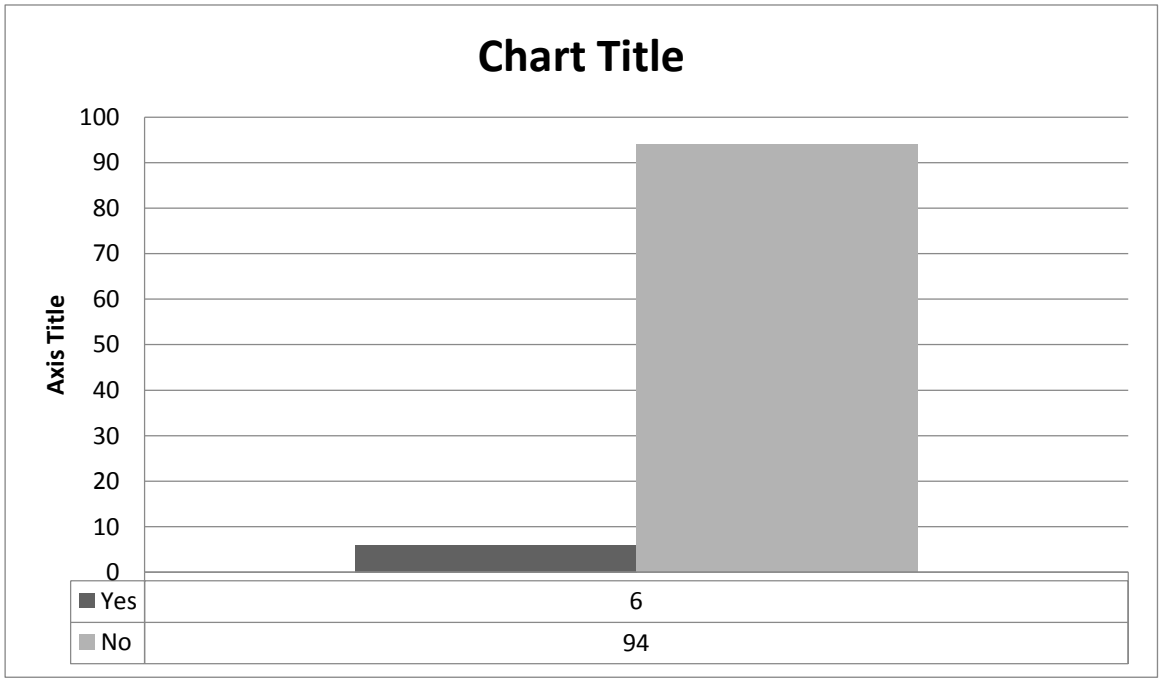

Figure 5.25: Perceived/Obtained Benefit of Using Computer-Based Management Systems - Sufficient Patients Knowledge

Table 5.27: Perceived/Obtained Benefit of Using Computer-Based Management Systems - Achieving Patients Accessibility

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	3	6.0	6.0	6.0
No	47	94.0	94.0	100.0
Total	50	100.0	100.0	

Table 5.27 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit of using computer-based management system – **achieving patients accessibility** – within the healthcare facility they work for or not. Most of them responded 'No' representing 94%, and those who responded 'Yes' represent 6% only, as depicted in the below figure.

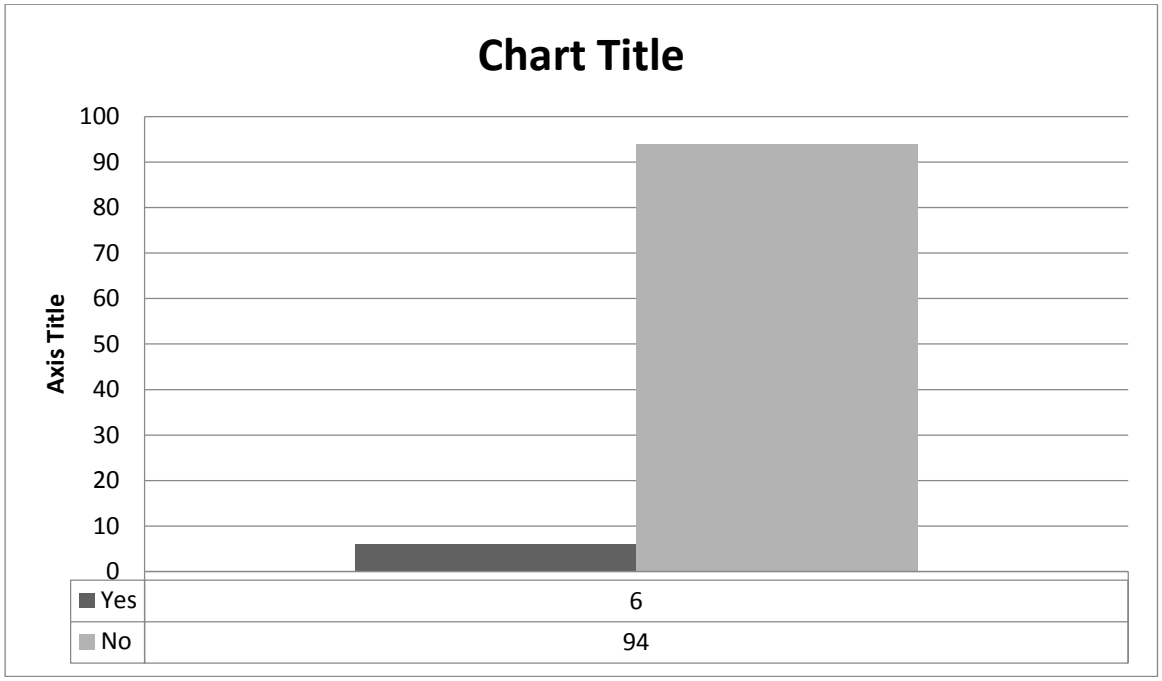

Figure 5.26: Perceived/Obtained Benefit of Using Computer-Based Management Systems - Achieving Patients Accessibility

Table 5.28: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Hospital Statistics

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	23	46.0	46.0	46.0
No	27	54.0	54.0	100.0
Total	50	100.0	100.0	

Table 5.28 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **healthcare facility statistics**, or not. The majority of them responded 'No' representing 54%, and those who responded 'Yes' represent 46%, as depicted in the below figure.

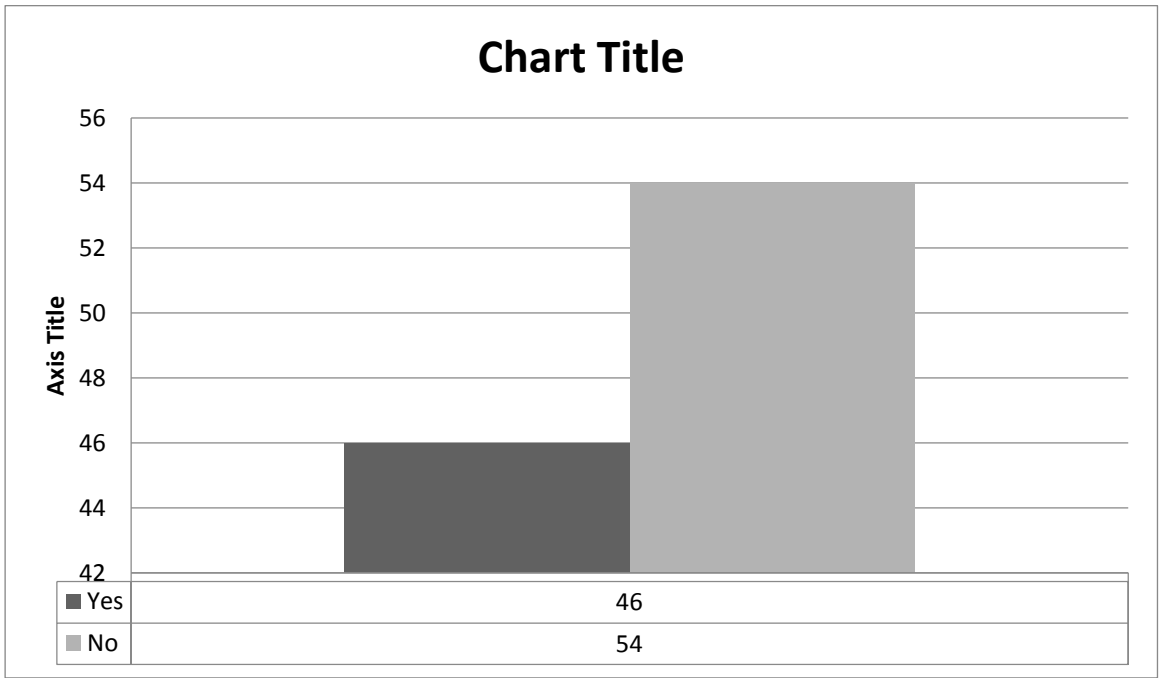

Figure 5.27: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems – Hospital Statistics

Table 5.29: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Medical Records

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	9	18.0	18.0	18.0
No	41	82.0	82.0	100.0
Total	50	100.0	100.0	

Table 5.29 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **medical records**, or not. The majority of them responded 'No' representing 82%, and those who responded 'Yes' represent 18% only, as depicted in the below figure.

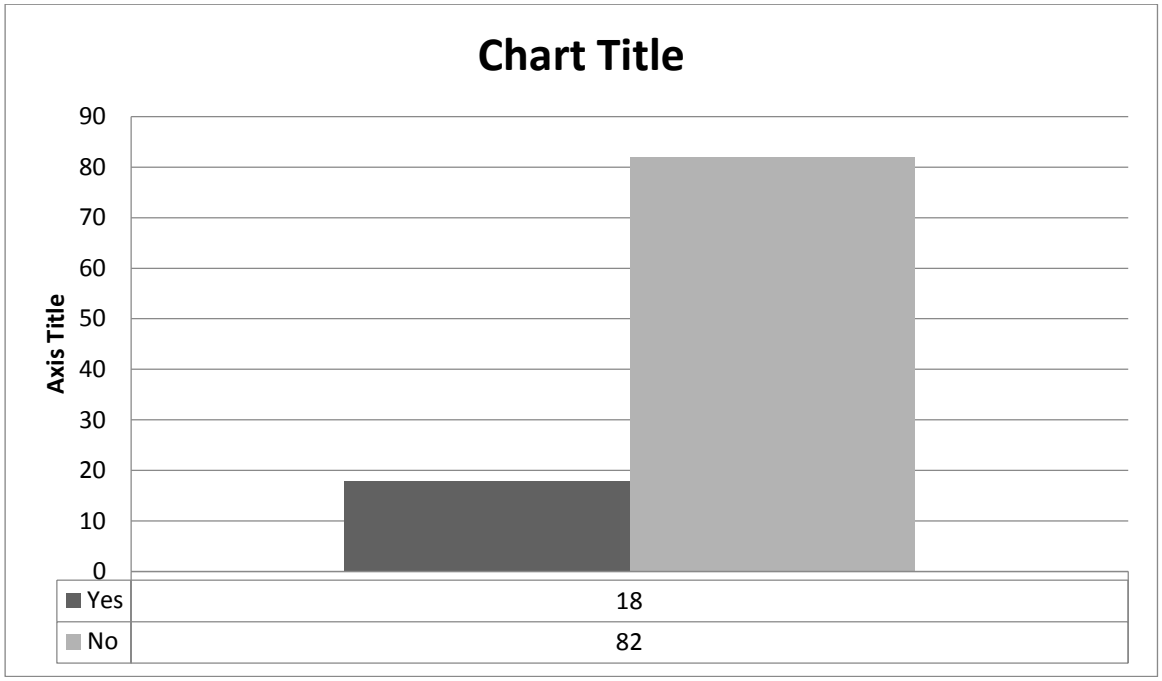

Figure 5.28: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems – Medical Records

Table 5.30: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Physiological Monitoring

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	4	8.0	8.0	8.0
No	46	92.0	92.0	100.0
Total	50	100.0	100.0	

Table 5.30 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **physiological monitoring**, or not. Most of them responded 'No' representing 92%, and those who responded 'Yes' represent 8% only, as depicted in the below figure.

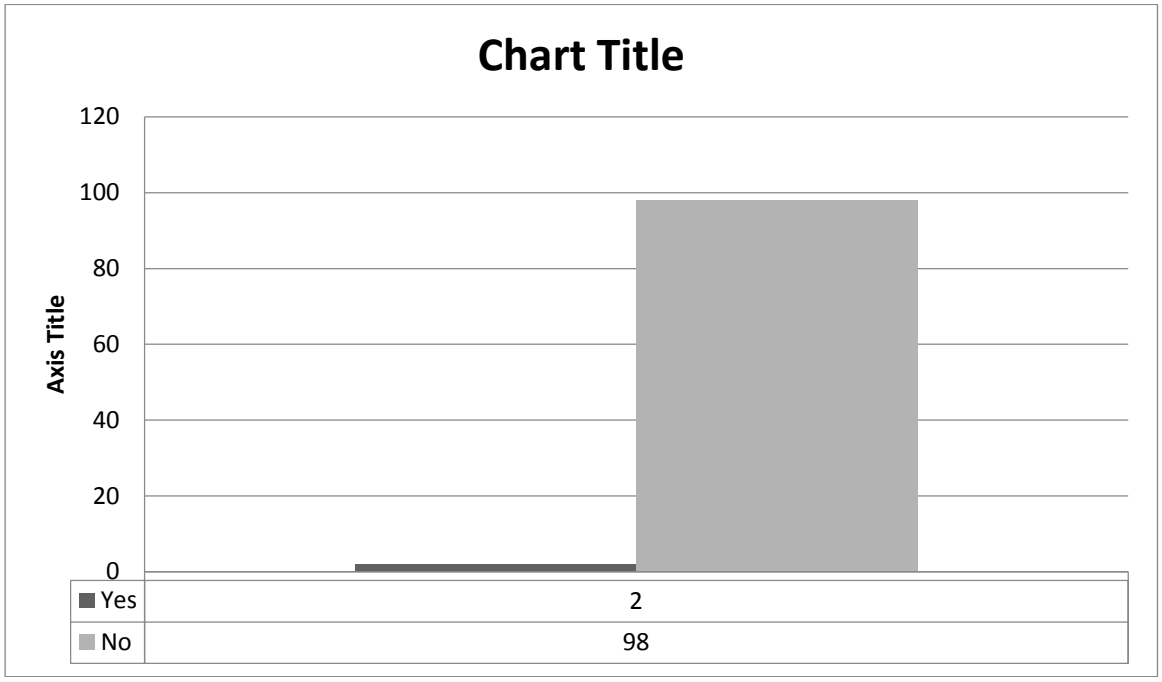

Figure 5.29: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems – Physiological Monitoring

Table 5.31: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Medical Management

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	19	38.0	38.0	38.0
No	31	62.0	62.0	100.0
Total	50	100.0	100.0	

Table 5.31 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **medical management**, or not. The majority of them responded 'No' representing 62%, and those who responded 'Yes' represent 38%, as depicted in the below figure.

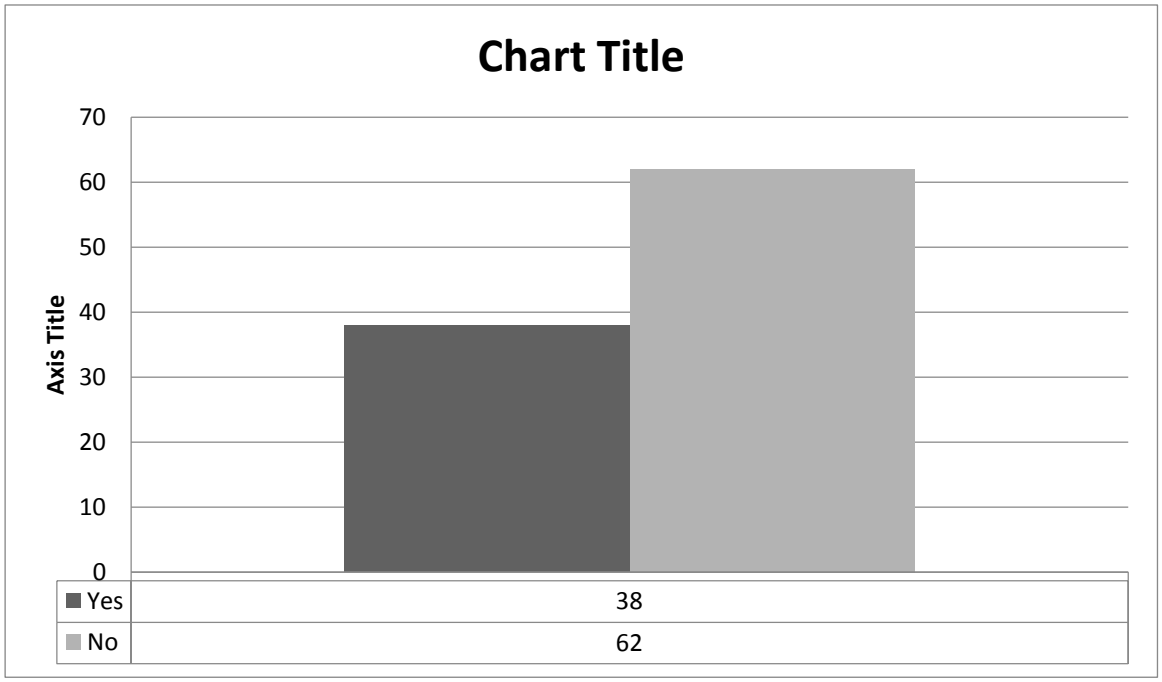

Figure 5.30: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Medical Management

Table 5.32: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Laboratory & Functional Testing

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	6	12.0	12.0	12.0
No	44	88.0	88.0	100.0
Total	50	100.0	100.0	

Table 5.32 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **laboratory and functional testing**, or not. The majority of them responded 'No' representing 88%, and those who responded 'Yes' represent 12% only, as depicted in the below figure.

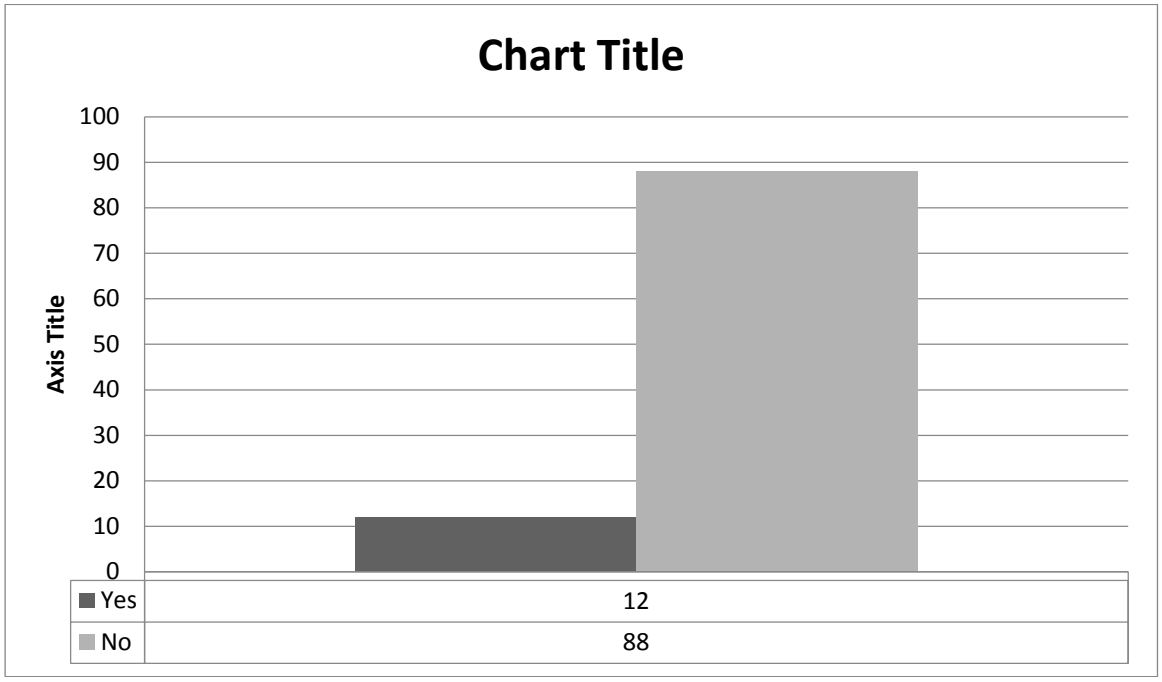

Figure 5.31: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Laboratory & Functional Testing

Table 5.33: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Hospital Communications

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	6	12.0	12.0	12.0
No	44	88.0	88.0	100.0
Total	50	100.0	100.0	

Table 5.33 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **healthcare communications**, or not. The majority of them responded 'No' representing 88%, and those who responded 'Yes' represent 12% only, as depicted in the below figure.

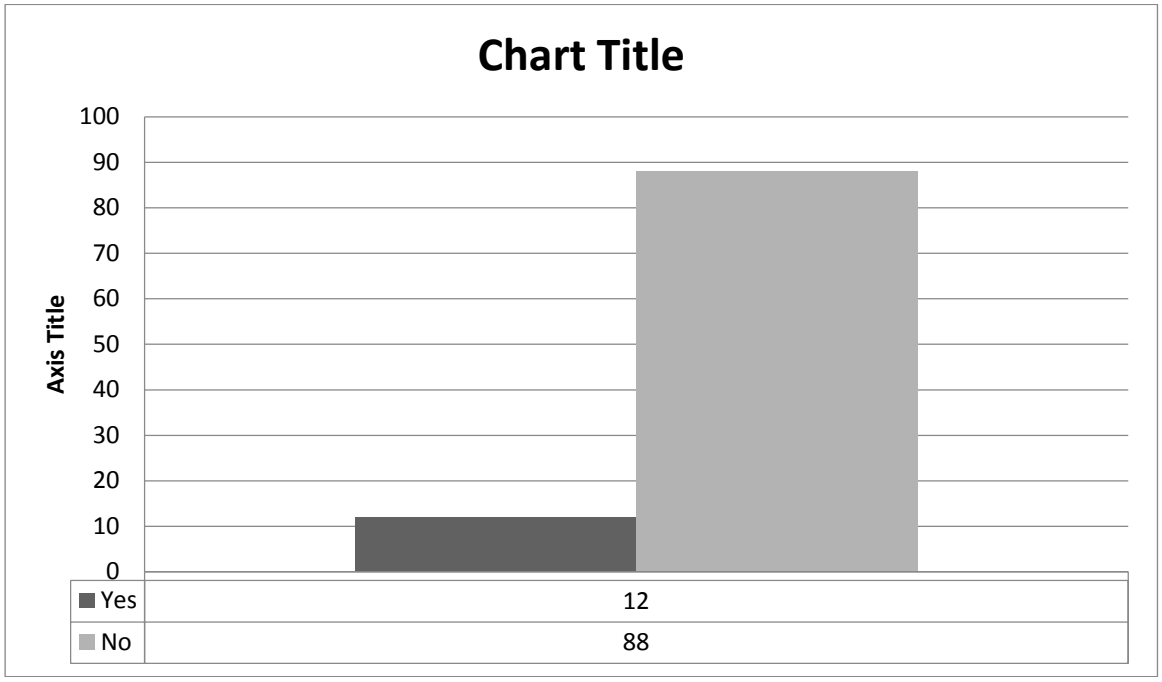

Figure 5.32: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Hospital Communications

Table 5.34: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Distribution of Services & Facilities

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	7	14.0	14.0	14.0
No	43	86.0	86.0	100.0
Total	50	100.0	100.0	

Table 5.34 presents the distribution of the respondents' reply to whether there is a perceived and/or obtained benefit in the functions/operations of the healthcare facility they work for by using computer-based management system – **distribution of services and facilities**, or not. The majority of them responded 'No' representing 86%, and those who responded 'Yes' represent 14% only, as depicted in the below figure.

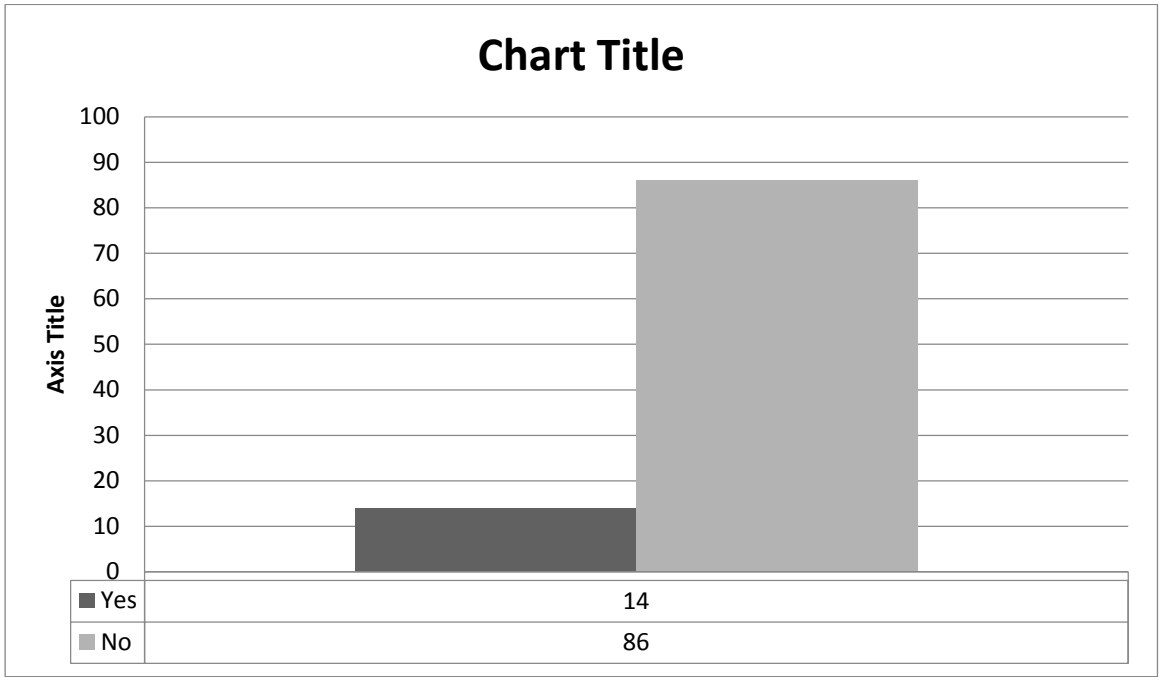

Figure 5.33: Perceived/Obtained Benefit in Hospital's Functions/Operations of Using Computer-Based Management Systems - Distribution of Services & Facilities

5.1.4 Characteristics and Properties of Computer-Based Hospital Management System – CBHMS:

Table 5.35: Existence of a Database for Collecting Patients' Record [Computer-Based Patients Record]

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	16	32.0	32.0	32.0
No	34	68.0	68.0	100.0
Total	50	100.0	100.0	

Table 5.35 illustrates the distribution of the respondents' reply to whether there is a computer-based database for collecting patients' records within the healthcare facility they work for, or not. The majority of them, representing 68% responded 'No', while those who confirmed the existence of such a database represents 32%, as depicted in the below figure.

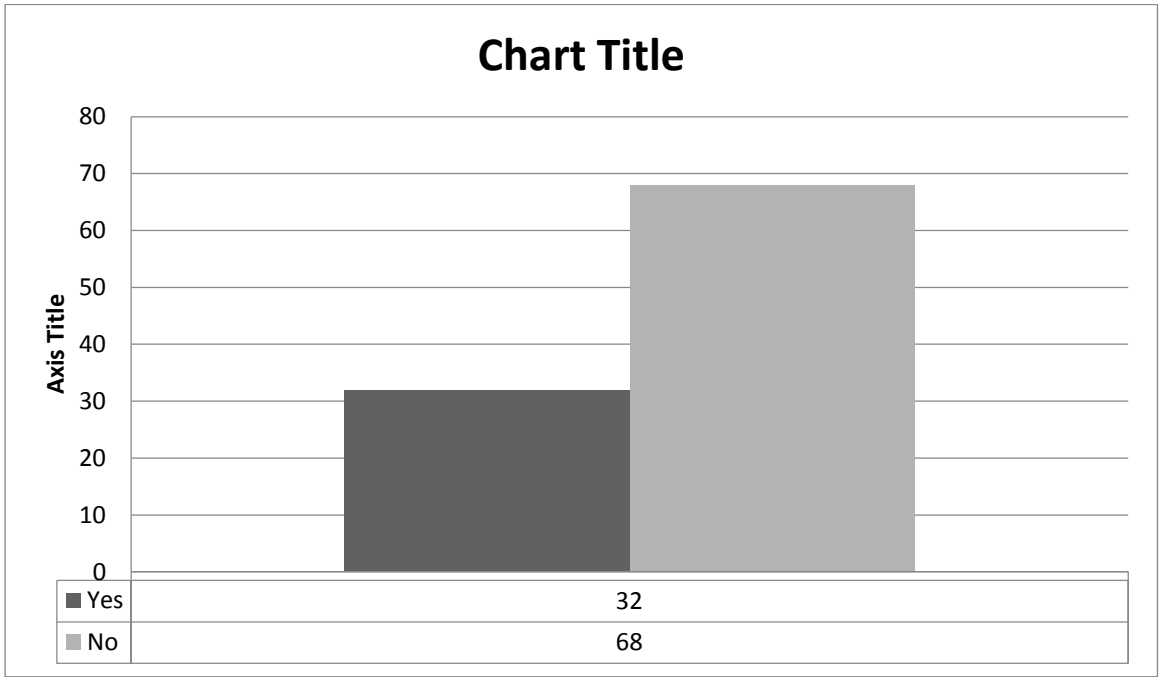

Figure 5.34: Existence of a Database for Collecting Patients' Record [Computer-Based Patients Record

Table 5.36: Properties of Computer-Based Patients' Record System – Reliability [Reliable/Not Reliable]

	Frequency	Percent	Valid Percent	Cumulative Percent
Reliable	12	24.0	24.0	24.0
Not Reliable	9	18.0	18.0	42.0
Not Specified	29	58.0	58.0	100.0
Total	50	100.0	100.0	

Table 5.36 illustrates the distribution of the respondents' reply to whether the computer-based patients' records system in the healthcare facility they work for is reliable or not reliable. The majority of them, representing 58% did not specify the reliability of the patient' record system, while 24% believe that it is reliable, and those who think it is not reliable represent 18% only, as depicted in the below figure.

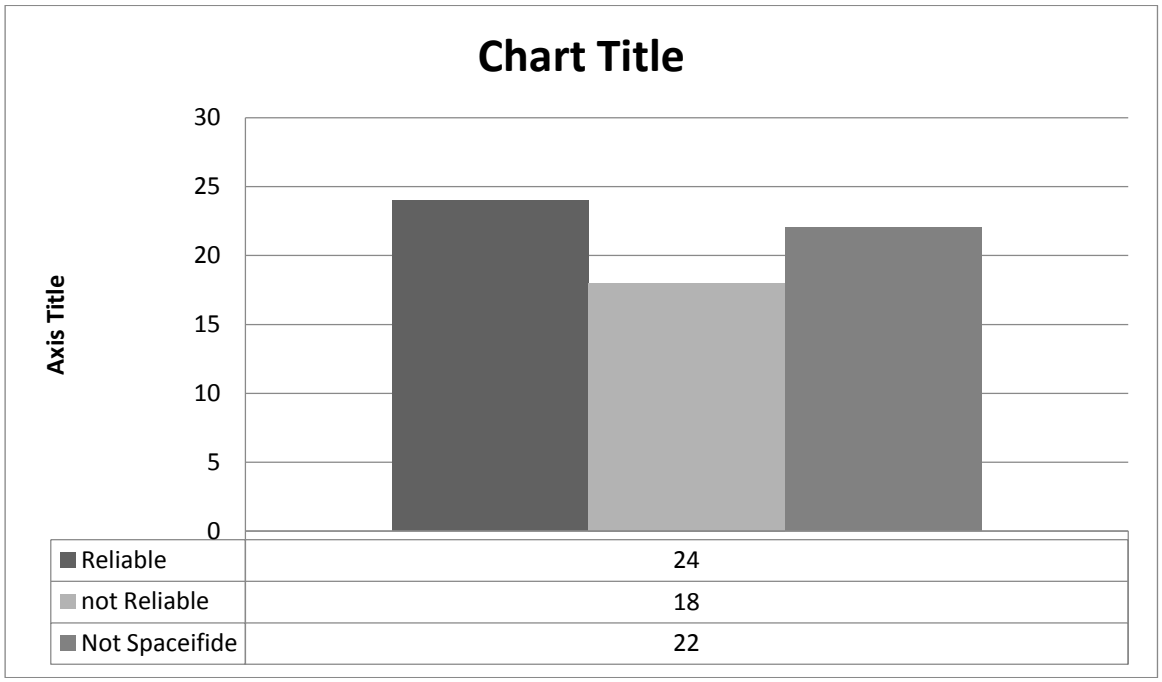

Figure 5.35: Properties of Computer-Based Patients' Record System – Reliability [Reliable/Not Reliable]

Table 5.37: Properties of Computer-Based Patients' Record System – Security [Secure/Not Secure]

	Frequency	Percent	Valid Percent	Cumulative Percent
Secure	6	12.0	12.0	12.0
Not Secure	15	30.0	30.0	42.0
Not Specified	29	58.0	58.0	100.0
Total	50	100.0	100.0	

Table 5.37 illustrates the distribution of the respondents' reply to whether the computer-based patients' records system in the healthcare facility they work for is secure or not secure. The majority of them, representing 58% did not specify that it is secure, while 30% believe that it is reliable, and those who think it is not secure represent 18% only, as depicted in the below figure.

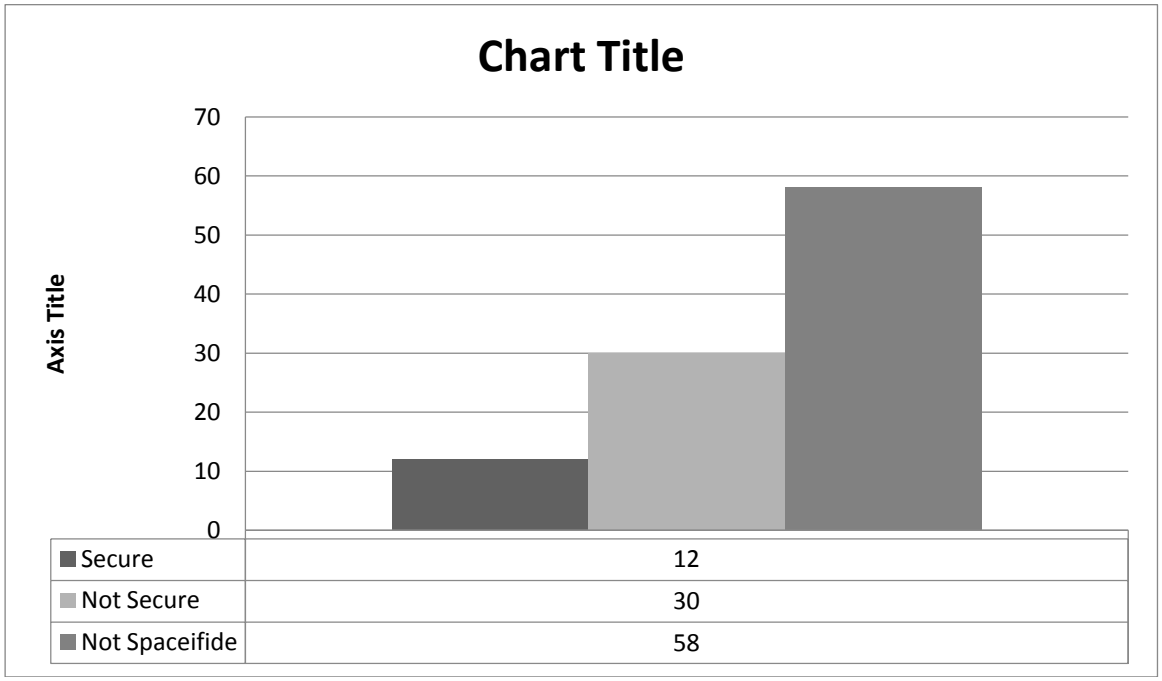

Figure 5.36: Properties of Computer-Based Patients' Record System – Security [Secure/Not Secure]

Table 5.38: Type of Database Model Used in the Hospital

	Frequency	Percent	Valid Percent	Cumulative Percent
Distributed Database Model	7	14.0	14.0	14.0
Centrally Integrated Physical Database Model	6	12.0	12.0	26.0
Hybrid Database Model	11	22.0	22.0	48.0
Not Specified	26	52.0	52.0	100.0
Total	50	100.0	100.0	

Table 5.38 illustrates the distribution of the respondents' according to the type of database model used in the healthcare facility they work for. The majority of them did not specify the type of the database model, while 22% of specified that a hybrid database model is used [DDM and CIPDM], 14% specified that it is a centrally integrated physical database model, and only 12% specified the distributed database model as the used database model in the healthcare facility they work for, as depicted in the below figure.

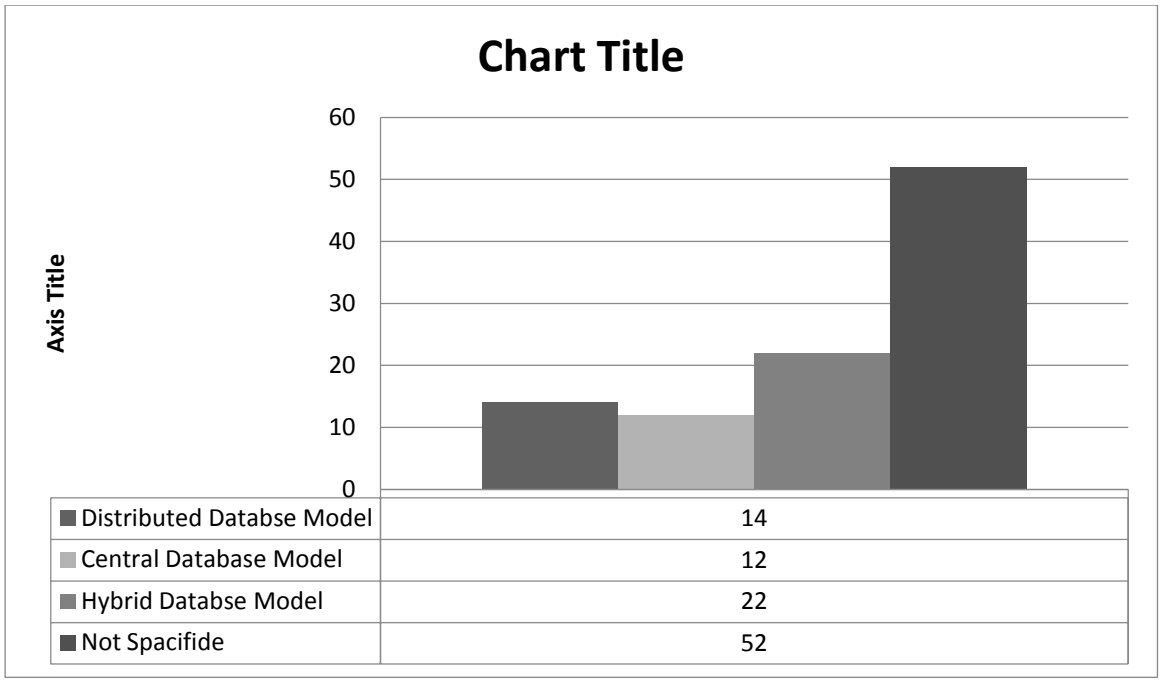

Figure 5.37: Type of Database Model Used in the Hospital

Table 5.39: Existence a Database Management System - DBMS

	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	14	28.0	28.0	28.0
No	36	72.0	72.0	100.0
Total	50	100.0	100.0	

Table 5.39 illustrates the distribution of the respondents' reply to whether there is a database management system within the healthcare facility they work for. The majority of them responded that there is no DBMS within their facilities, representing 72%, while 28% responded that their facilities have a DBMS, as depicted in the below figure.

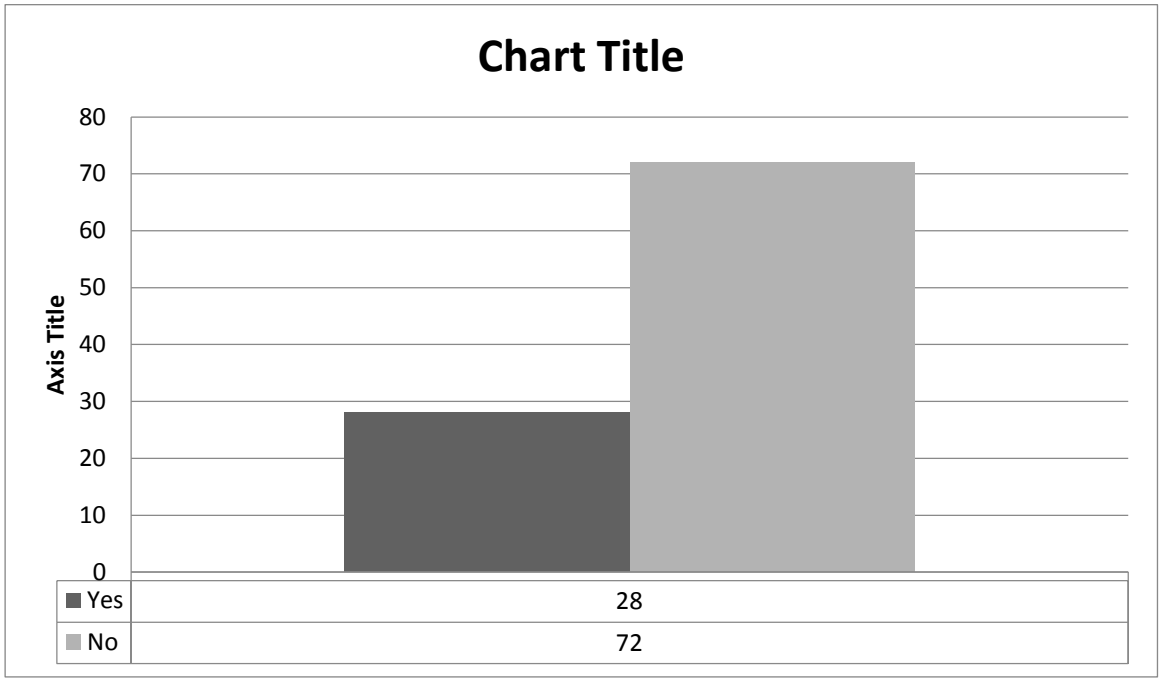

Figure 5.38: Existence of a Database Management System – DBMS

Table 5.40: Architecture of Database Management System - DBMS Archit.

	Frequency	Percent	Valid Percent	Cumulative Percent
Hierarchical DBMS	7	14.0	14.0	14.0
Relational DBMS	4	8.0	8.0	22.0
Text-Oriented DBMS	2	4.0	4.0	26.0
Object-Oriented DBMS	5	10.0	10.0	36.0
Not Specified	32	64.0	64.0	100.0
Total	50	100.0	100.0	

Table 5.40 illustrates the distribution of the respondents according to the architecture of the database management system used in the healthcare facility they work for. The majority of them, representing 64%, did not specify the architecture of the system used for managing database, while 14% identified the hierarchical DBMS, 10% the object-oriented DBMS, 8% the relational DBMS, and only 4% identified the text-oriented DBMS, as depicted in the below figure.

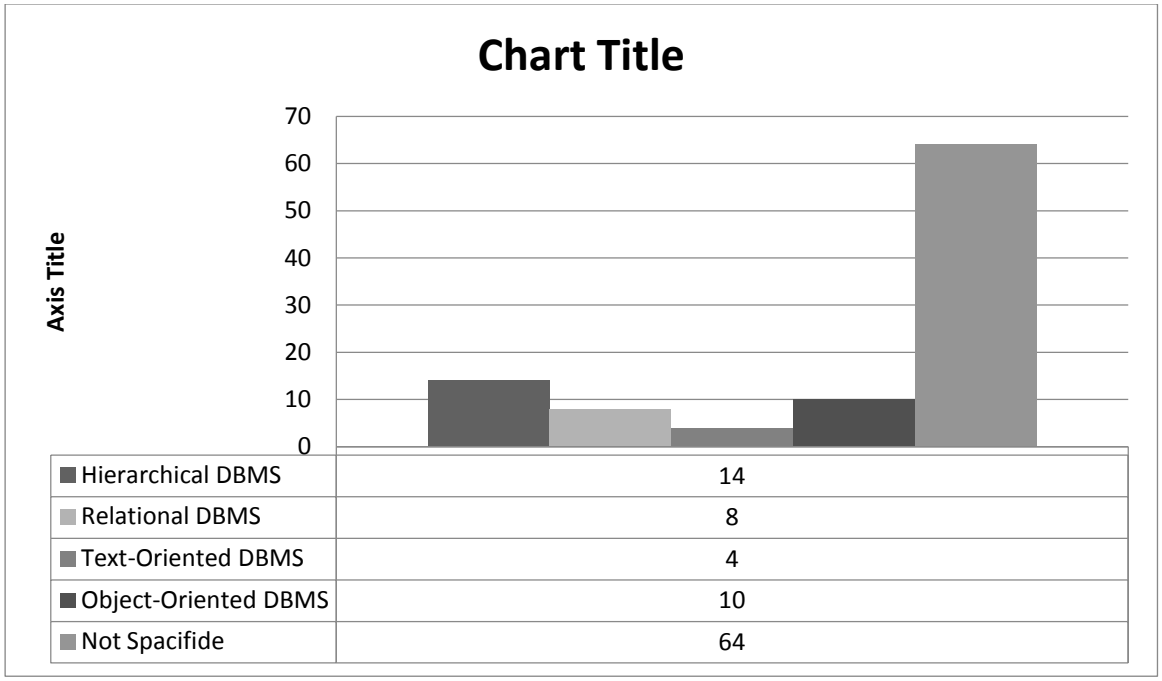

Figure 5.39: Architecture of Database Management System - DBMS

5.2 Discussion:

- The surveyed healthcare facilities are not distributed equally within the targeted population, which reflects the fact that the researcher was not able to access all the facility due to many difficulties faced the research in pursuing this research, given the limited time frame and other resources, in addition the complex requirements within healthcare facilities, especially private healthcare facilities.

- The majority of the respondents are closely related to and concerned with the subject issue of the study, as they represent the individuals whose performance is directly affected by the instruments and tool, as well as the managerial/administrative processes and techniques adopted in the healthcare services.

- The use of computer in the managing the general activities of the healthcare facilities can be ranked – as per the surveyed respondents – in the following manner: patients monitoring 50%, assessment 46%, documentation 14%, medical records 10%, and telemedicine 6%.

- The use of computer systems in the managerial/administrative activities of the healthcare facilities can be ranked – as per the surveyed respondents – in the following manner: nursing services and accounting and financial activities 42% for each, functional activities 28%, and quality assurance and management 26%.

- The use of computer systems in the research activities of the healthcare facilities can be ranked – as per the surveyed respondents – in the following manner: data gathering and analysis 46%, computer assisted instructions and simulation 40% for each, preparation of research documents 36%, and tutorials 34%.

- The use of computer systems in the community activities of the healthcare facilities can be ranked – as per the surveyed respondents – in the following manner: patient appointment/identification 32%, gathering statistics 22% and other activities 4%.

- The perceived/obtained benefits of using computer system in management of the healthcare facilities can be ranked – as per the respondents – as follows: improved quality of care 72%, decreased cost 30%, uniformity with future uses 30%, sufficient patients knowledge and achieving patients accessibility 6% for each.

- The obtained benefits of using computer systems in functions/operations in the healthcare facilities can be ranked – as per the respondents – as follows: healthcare facility statistics 46%, medical management 38%, medical records 18%, distribution of services and facilities 14%, laboratory and functional testing 12% and healthcare communications, 12% for each, and physiological monitoring 8%.

- Less than half of the surveyed healthcare facilities have a computer-based database for their patients' records, 32%. Among them 24% are reliable databases and 30% are considered to be secure. Also, 14% of these database are hybrid databases models [DDM and CIPDM], as well as, centrally integrated physical database models [CIPDM], and only 12% are distributed database models.

- Less than 30% of the surveyed healthcare facilities apply database management systems – DBMS. 14% of these systems are architected on the basis of a hierarchical DBMS, 10% an object-oriented DBMS, 8% as a relational DBMS, and only 4% as a text-oriented DBMS.

Chapter Six

Conclusion and Recommendations

6.1 Conclusion

Sudanese hospitals and health care facilities depends on old-fashion tools and techniques for generating information, which provide data about various aspects, but not sufficient for generating full information about the actual situations in the setting of the health care facility as a whole organizational entity, which gain a complex information integrity and data security, problem monitoring Recording and Tracking and problem in communication and information transfer. Moreover, problem searching records which increase west time. The main of objective of this research is to address the standing of Sudanese Hospitals, in specific and health care facilities in general, in using computer-based systems and applications in performing the activities. The methodology starts by study and analysis to the hospital management systems for various health care facilities, then choses the study area conducting hospitals and dialysis centers in Khartoum State, including Khartoum, Beharry and Bahari. Then a data collection will be done through questionnaire. The collected data is analyzed using to provide the frequency distributions statistics and graphical displays for the variables and their description. The multiple response frequencies are extracted to present frequency tables for the multiple response sets. It was conclude that the obtained benefits of using computer systems in functions/operations in the healthcare facilities can be ranked – as per the respondents – as follows: healthcare facility statistics 46%, medical management 38%, medical records 18%, distribution of services and facilities 14%, laboratory and functional testing 12% and healthcare communications, 12% for each, and physiological monitoring 8%.

6.2: Recommendations:

- Further research should be conducted to comprehensive illustrate the standing of healthcare facilities on applying and benefiting from computer-based systems and technologies in the management of their activities in the Sudanese context.
- developing smart phone applications supporting many types of operating systems such as android, IOS and other systems.
- The ministry of health is the recommended location for storing database.
- The development of the application must be authorized by the ministry, including specific data storing and encryption techniques, unique protocols, multilanguage support, online help chat and hot lines. Moreover, its recommended to broadcast records online, patient can view historical background and results.
- Link national ID number with the patient records. Help hospitals to find patient records in case of accidents.

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Appendix

جامعة السودان للعلوم والتكنولوجيا

كلية الهندسة (قسم الهندسة الطبية الحيوية)

استبيان حول تقبل العاملين في القطاع الصحي لاستخدام نظام السجلات الطبية الإلكترونية

/ مجال الدراسة مراكز الغسيل الكلوي بولاية الخرطوم،

هذا الاستبيان يستهدف العاملين بالقطاع الصحي في ولاية الخرطوم، وتحديداً مراكز الغسيل الكلوي بالولاية،

يشار إلى أنظمة أو برامج السجلات الطبية الإلكترونية في الصفحات القادمة بكلمتي النظام أو البرنامج المعلومات عن الأفراد الذين يستجيبون لهذه الدراسة

سيتم التعامل معها بسرية تامة،

وسيتم فقط الإشارة إلى بيانات المجموعة كنتيجة لهذا البحث.

التالي

القسم الأول :

النوع *

ذكر

انثى

الفئة العمرية *

اقل من 25

25 ل 34

35 ل 44

45 ل 54

55 وأكثر

الوظيفة *

- طبيب
- تقني تمريض
- مهندس طبي
- أخرى

سنوات الخبرة *

- 1 ل 5 سنوات
- 6 ل 10 سنوات
- 11 ل 15 سنة
- 16 ل 20 سنة
- اكثر من 20

موقع المؤسسة الصحية

- الخرطوم
- بحري شمال
- أمدرمان

نوع المؤسسة الصحية التي عملت أو تعمل بها حاليا *

- مستشفى عام
- مستشفى خاص
- عيادة عامة
- عيادة خاصة
- تعليمي جامعي

رجوع التالي محو النموذج

القسم الثاني :

تصورك الشخصي عن سهولة استخدام نظام السجلات الطبية الالكترونية

هل النظام الالكتروني مواكب في الإدارة العامة للأنشطة بالمؤسسة الصحية ؟ *

- نعم
- لا

أتوقع ان يستخدم النظام في تقييم مختلف الأنشطة بالمؤسسة الصحية *

- نعم
- لا

النظام الإلكتروني مستخدم في مراقبة المرضى و التوثيق لهم *

- نعم
- لا

هل النظام مستخدم في إدارة سجلات المرضى ؟ *

- نعم
- لا

يدعم النظام برنامج التطبيب عن بعد *

- نعم
- لا

رجوع التالي محو النموذج

القسم الثالث

تصورك الشخصي عند استخدام النظام في إدارة انشطة محددة

هل النظام مطبق في إدارة خدمات التمريض ؟ *

- نعم
- لا

هل النظام مطبق في التحضير للأنشطة البحثية ؟ *

- نعم
- لا

هل النظام مستخدم في إدارة الأنشطة الوظيفية المخزنة ؟ *

- نعم
- لا

هل النظام نستخدم في الإدارة المالية و الحسابات للمستخدمين ؟ *

- نعم
- لا

هل النظام مستخدم في الإدارة وظبط الجودة بالمؤسسة الصحية ؟ *

- نعم
- لا

هل النظام مستخدم في جمع المعلومات وتحليلها ؟ *

- نعم
- لا

هل النظام يدعم خاصية المحاكاة في إدارة الأنشطة البحثية ؟ *

- نعم
- لا

هل النظام يدعم دروس تدريبية في إدارة الأنشطة المختلفة ؟ *

- نعم
- لا

رجوع التالي محو النموذج

القسم الرابع

تصورك الشخصي عن الفائدة من إستخدام نظام السجلات الطبية الإلكترونية

سيتمكن هذا النظام من إتخاذ المهام وزيادة جودة الرعاية *

- نعم
- لا

سيتمكن النظام من تقليل التكلفة *

- نعم
- لا

سيؤدي النظام الى تسهيل الإتحاد مع الإستخدامات المستقبلية للأنظمة المماثلة *

- نعم
- لا

سيمكن النظام المرضى من سهولة الوصول الى بياناتهم *

- نعم
- لا

رجوع | التالي | محو النموذج

القسم الخامس

تصورك الشخصي عن ملائمة نظام السجلات الطبية لطبيعة عملك في اعمال

سيكون هناك تأثير للنظام في إدارة الضمان لجمع الأخطاء *

- نعم
- لا

هل النظام مستخدم في تعديل بيانات تعريف هوية المرضى و المواعيد ؟ *

- نعم
- لا

هل النظام مستخدم في تعديل بيانات تعريف هوية المرضى و المواعيد ؟ *

- نعم
- لا

هل سيكون هناك تأثير النظام عن استخدامه في الرعاية المنزلية ؟ *

- نعم
- لا

رجوع | التالي | محو النموذج

القسم السادس

العوامل التس تسهل استخدام نظام السجلات الطبية الإلكترونية

لدى الموارد اللازمة لإستخدام نظام السجلات الطبية الإلكترونية *

- نعم
- لا

المؤسسة الصحية توفر التدريب لإكتساب المعرفة اللازمة للتعامل مع النظام *

- نعم
- لا

المؤسسة الصحية لديها البنية التحتية اللازمة لتطبيق النظام (الكهرباء - اجهزة الكمبيوتر - انترنت ++ أخرى) *

- نعم
- لا

تمتلك المستشفى الموارد المالية اللازمة لشراء و تشغيل وصيانة النظام *

- نعم
- لا

رجوع التالي محو النموذج

تصورك الشخصي عن سهولة استخدام السجلات الطبية الالكترونية

*

	نعم	لا
هل الإلكتروني مطبق في المؤسسة الصحية ؟	☐	☐
هل النظام الإلكتروني مطبق في إدارة نشاطات المؤسسة الصحية ؟	☐	☐
هل النظام مستخدم في توثيق الأنشطة في المؤسسة الصحية ؟	☐	☐
هل النظام مستخدم في نظام التطبيب عن بعد ؟	☐	☐

هل النظام مطبق في إدارة سجلات المرضى ؟	☐	☐
هل النظام مستخدم في إدارة خدمات التمريض ؟	☐	☐
هل النظام مستخدم في الأنشطة الإدارية والمالية بالمؤسسة الصحية ؟	☐	☐
هل النظام مستخدم في الإدارة وضبط الجودة بالمؤسسة الصحية ؟	☐	☐
هل النظام مستخدم في جمع وتحليل البيانات بالمؤسسة ؟	☐	☐
هل النظام		

هل النظام مستخدم في المساعدة في الأغراض البحثية والمحاكاة ؟	☐	☐
هل النظام مطبق في بقسم الإحصاء الحيوي بالمؤسسة الصحية ؟	☐	☐
هل النظام مطبق بقسم المختبرات الطبية بالمؤسسة الصحية ؟	☐	☐
هل النظام مستخدم في توزيع وتنسيق الخدمات المختلفة ؟	☐	☐
هل النظام مستخدم كقاعدة بيانات لجمع السجلات الطبية بالمؤسسة ؟	☐	☐

هل النظام المطبق واقعي ومحدد ؟	☐	☐
هل النظام المطبق آمن أم لا ؟	☐	☐

نوع نموذج قاعدة البيانات المستخدمة في المستشفى *

- ◯ نموذج قاعدة البيانات الموزعة
- ◯ نموذج قاعدة بيانات مادية متكاملة مركزيا
- ◯ نموذج قاعدة البيانات الهجين
- ◯ نموذج غير محدد

هل نظام إدارة قواعة البيانات موجود بالمستشفى ؟ *

- نعم
- لا

أنواع نظام إدارة البيانات المستخدمة بالمؤسسة *

- قواعد بيانات هرمية
- قواعد بيانات علائقية
- قاعدة بيانات الكائن
- قاعدة بيانات أخرى

هل النظام مستخدم في تنظيم عمليات الصيانة بأنواعها ؟ *

- نعم
- لا

هل النظام مستخدم في تنظيم عمليات الصيانة بأنواعها ؟ *

- نعم
- لا

هل النظام مطبق في طلب وتوزيع قطع الغيار إلكترونياً ؟ *

- نعم
- لا

رجوع التالي محو النموذج

القسم الأخير : البيانات الشخصية : (اختياري)

يهدف هذا الجزء من الاستبيان إلى الحصول على بعض المعلومات عن الأفراد الذين يستجيبون لهذه الدراسة، سيتم التعامل مع المعلومات التي يتم جمعها حول المشاركين بسرية تامة، وسيتم فقط الإشارة إلى بيانات المجموعة كنتيجة لهذا البحث.

الإسم

إجابتك

المدينة

إجابتك

الدولة

إجابتك

عنوان البريد الإلكتروني

إجابتك

رقم الهاتف

إجابتك

العمر

إجابتك

أعلى مراحل تعليمية

- دبلوم
- ثانوي
- معهد

أعلى مراحل تعليمية

- دبلوم
- ثانوي
- معهد
- جامعة
- ماجستير
- دكتوراه

إجادة اللغة الإنجليزية

- ممتاز
- جيد
- محدود
- لا يوجد

المعرفة بتكنولوجيا المعلومات – المهارات الأساسية (على سبيل المثال: مهارات استخدام لوحة المفاتيح)

- لا مهارات
- مهارات محدودة
- مهارات عالية

- لدي مهام وظيفية ومسؤوليات واضحة *

- اتفق تماما
- اتفق
- محايد
- لا اتفق
- لا اتفق ابدا

لدي وقت فراغ للأنشطة الاجتماعية والرياضية والهوايات

- اتفق تماما
- اتفق
- محايد
- لا اتفق
- لا اتفق ابدا

رجوع التالي محو النموذج

شكرا لك على وقتك

رجوع إرسال محو النموذج