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شئون البحث العلمي والدراسات العليا

كليـــة التجارة

قسم ادارة اعمال

The Impact of Hospital Information System Quality on the Health Care Quality (A Case Study on European Gaza Hospital)

أثر جودة نظام المعلومات الصحي المحوسب على جودة الرعاية الصحية

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of the requirements for the degree of
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I

الجامعة الإسلامية ـ غزة

The Islamic University of Gaza

نتيجة الحكم على أطروحة ماجستير

بناءً على موافقة شئون البحث العلمي والدراسات العليا بالجامعة الإسلامية بغزة على تشكيل لجنة الحكم على أطروحة الباحثة/ **فلسطين معين محمود نجم** لنيل درجة الماجستير في كلية *التجارة/* قسم إدارة الأعمال وموضوعها:

أثر جودة نظام المعلومات الصحي المحوسب على جودة الرعاية الصحية

دراسة حالة على مستشفى غزة الأوروبي

The Impact of (HIS) Hospital Information System Quality on the Health Care Quality

A case study on European Gaza Hospital

وبعد المناقشة العلنية التي تمت اليوم الثلاثاء 30 محرم 1438هـ، الموافق 2016/11/01م الساعة الواحدة ظهراً بمبنى اللحيدان، اجتمعت لجنة الحكم على الأطروحة والمكونة من:

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وبعد المداولة أوصت اللجنة بمنح الباحثة درجة الماجستير في كلية *التجارة/*قسم إدارة الأعمال.

واللجنة إذ تمنحها هذه الدرجة فإنها توصيها بتقوى الله ولزوم طاعته وأن تسخر علمها في خدمة دينها ووطنها.

والله ولي التوفيق،،،

نائب الرئيس لشئون البحث العلمي والدراسات العليا

أ.د. عبدالرؤوف علي المناعمة

بسم الله الرحمن الرحيم

قَالَ تَعَالَى: ﴿ وَأَنزَلَ ٱللَّهُ عَلَيْكَ ٱلْكِتَٰبَ وَٱلْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ وَكَانَ فَضْلُ ٱللَّهِ عَلَيْكَ عَظِيمًا ﴾

Dedication

Every challenging effort needs self-confidence , faith, courage to get rid of fear as well as guidance of expertise especially those who were very close to our heart.

I dedicate my humble thesis to Palestine, the homeland and the identity, to the martyrs of freedom, to the soul of my grandfather, to my peacemakers (my father and my mother), to my sweetheart kids (Ghada and Abood), to my sisters and my brothers, to my uncles and aunts, and finally to my guardian angel (my brave heart soldier).

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At first , I am grateful to Allah for granting me the patience, determination, power and courage to achieve my goals through completing this humble work.

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Abstract

Many organizations started to adopt a new technology to simulate developing countries. Hospital Information System (HIS) was introduced to Palestinian organizations to overcome life difficulties. However, many organizations still face challenges to implement such a system .From this perspective the researcher intends to discover the quality of using (HIS).

This study investigated the importance of hospital information systems usage in Gaza strip inside one of Gaza hospitals namely, (European Gaza Hospital) .It examined the effect of safety quality, service quality, performance quality, system quality and information quality on health care quality .The research followed the descriptive analytic approach and employed survey method. Accordingly, questionnaire was designed especially to measure the research variables . The research was employed on a sample of (258) employees in different departments at European Gaza Hospital. (270) questionnaires were distributed to the research population and (258) questionnaires were received.

The study found that there was a significant relationship between the independent variables (performance quality, information quality and service quality) and the dependent variable. It also found a positive correlation statistically significant at the 0.05 level between the hospital information system quality and patients healthcare quality at level of 0.5.through the perspective of hospital employees in European Gaza Hospital in Gaza. The findings showed that ,(HIS) quality had a positive significant impact on healthcare quality at level of 0.5.However, there was no significant difference among the respondents toward each field due to gender. There were also no significant statistical differences at level (α = 0.05) among the respondents in their opinions about the study fields attributed to gender, education level, age, current job and qualification years in using system.

The findings of this study showed that there is a need to increase the awareness about the benefits of information system, to enhance training in fields of hospital information system, and to develop HIS selection multidisciplinary team.

ملخص الدراسة

توجهت العديد من المنظمات في الآونة الأخيرة إلى تبني تقنية جديدة من اجل محاكاة الدول المتطورة. لقد تم إدخال نظام المعلومات الصحي المحوسب إلى المنظمات الفلسطينية من اجل التغلب على صعوبات الحياة المستمرة ،ولكن لايزال هناك العديد من المنظمات التي لازالت تواجه تحديا لتنفيذ هذا النظام. من هذا المنظور عزم الباحث على اكتشاف مدى جودة نظام المعلومات الصحي المحوسب المستخدم.

كان الهدف من هذه الدراسة هو البحث عن أهمية نظام المعلومات الصحي المحوسب المستخدم في احد مستشفيات قطاع غزة (مستشفى غزة الأوروبي). أيضا عن تأثير كلا من جودة الأمان، جودة المعلومات، جودة النظام، جودة الأداء، وجودة الخدمة على جودة الرعاية الطبية. استخدمت الباحثة منهج التحليل الوصفي من خلال إعداد استبيان مصمم خصيصا للتعامل مع متغيرات البحث. وزعت الباحثة الاستبيان على (258) عامل في مستشفى غزة الأوروبي من أقسام مختلفة تم توزيع (270) استبيان واسترداد (258) استبيان.

وجدت الدراسة أن هناك علاقة ذات دلالة إحصائية عند مستوى (0,05) بين المتغيرات المستقلة (جودة الأداء، جودة المعلومات، جودة الخدمات) وبين المتغيرات التابعة . أيضا كشفت الدراسة عن وجود علاقة طردية ذات دلالة إحصائية عن مستوى (0,05) بين جودة نظام المعلومات الصحي المحوسب وجودة الرعاية الطبية من خلال وجهة نظر العاملين في مستشفى غزة الأوروبي. كما أثبتت النتائج أن جودة نظام المعلومات الصحي المحوسب له تأثير كبير على جودة الرعاية الطبية. من جهة أخرى أثبتت الدراسة بعدم وجود فرو ذات دلالة إحصائية تعزى إلى كلا من الجنس، العمر، المؤهلات، التعليم، الوظيفة الحالية أيضا سنوات الخبرة باستخدام النظام.

وأخيرا بينت نتائج الدراسة على أنه يتوجب زيادة الوعي حول فوائد استخدام نظام المعلومات الصحي المحوسب ، تعزيز التدريب في مجال نظام المعلومات الصحي المحوسب ، اختيار فريق متكامل متعدد التخصصات في مجال نظم المعلومات الصحية المحوسبة .

Table of Contents

List of Tables

X

List of Figures

List of Abbreviations

HIS (Hospital Information System)

MIS (Management Information System)

IS (Information System)

HMR (Hospital Medical Record)

M. surgical ward, M. medical ward(men surgical ward)

W .surgical ward, W. medical ward (Women)

Chapter 1
Background Context

Chapter 1
Background Context

1.1 Introduction:

Palestine as, an occupied country, is vulnerable to continuous attacks from the Zionist occupation especially after facing three barbaric wars .This country suffers from homelessness, suffers from killing their children and women and huge numbers of wounded. All these issues have an effect on emergency departments in Gaza hospitals. Therefore, the need for speed and accuracy in work achievement has become very critical by adopted manual system. Thus, it was necessary to find out a new technology that has the ability to improve employees achievements with a high quality in performance by reducing doctors' workloads through presenting services for large numbers patients .

Hospital Information Systems (HIS) are considered an important part of healthcare system in hospitals and different types of healthcare organizations. There are some hospitals in Gaza strip which started to adopt (HIS) such as private doctors' clinics and UNRWA healthcare Clinics inside Gaza strip, where this adoption still face challenges and difficulties from different aspects. One of them is the way to implement (HIS) as well as the training of healthcare professionals on using such a system. The second aspect is how to integrate(HIS) between governmental hospitals and private healthcare clinics.

The importance of these systems appeared from the main role in managing all patients data and information, which include a personal data about the patient and a comprehensive medical data (Khalifa, 2014).Health Information System (HIS) is a comprehensive software for patient's information integration for sending and exchange comprehensive patient's information between wards and other medical centers in order to expedite the process of patient care, improve quality, increase satisfaction and reduce costs (Aghazadeh, Aliyev, et al., 2013). Use of Hospital Information Systems is one concern in the health sector because of their increasing needs of the growing complexity of health management processes and also due to the significant diversity and innovation in the supply system (Ahmadi et al., 2014).

Meanwhile ,these systems are very important in diagnosis especially, if the patient suffers from allergy to a special kind of medicine such as allergy to the anesthetic, or has other kinds of diseases ;therefore, documented data in (HIS) are very important to protect patients safety from crucial flutes during diagnosis and surgery.

It cannot be ignored that using (HIS), the nurses and doctors do not spend more time per patient for diagnosis because spending long time in diagnosis needs a lot of efforts which will need longer work times and fewer patients seen. This will increase workload and it may decrease productivity and slow performance .The main objective of (HIS) is to increase the improvement effectiveness by reducing time and increasing service healthcare quality in Gaza hospitals and developing plans to overcome implementation problems in addition to improve healthcare quality. The aim of (HMIS) is to streamline the complex processes in a hospital so that the hospital could provide a better healthcare services for its patients (Herdiyanti et al., 2015). Electronic Health Record (EHR) systems enable hospitals to store and retrieve detailed patient information to be used by health care providers, and sometimes patients, during a patient's hospitalization, over time, and across care settings, EHRs can help hospitals monitor, improve, and report data on health care quality and safety (Edwards et al., 2012).

(HIS) in Gaza hospitals still need technical support from the different hardware, software, networking and service provider when technical problems emerge, such as slow networks or complex data entry when the hardware is old. This is the reason for training plans of healthcare experts are needed to support positive attitude toward hospital information system, to enhance confidence in the benefits of such system and to increase patients satisfaction on healthcare service quality .

The researcher choses European Gaza hospital because it was the pioneer in using completely hospital information system in Gaza .

In 2002, the Palestinian Ministry of Health adopted a completely hospitals system (Integrated Health Care Management Information System) as a donation from The European Union.(HIS) was ready for working in 2004 .

1.2 Problem Statement and Research Question:

The world is considered in advanced stages for adopting different techniques to facilitate life matters. (HIS) was adopted in different developing countries for a long time ago ,and they developed it to solve most problem implementations.

In Gaza strip, (HIS) is still like a newly born baby, it needs a lot of time for training, working ,developing to lead such techniques and to put it in correct approach . The researcher is interested to find out the quality criteria of (HIS) in Gaza hospitals especially in European Gaza Hospital. After the establishment of the European Gaza Hospital, this system was implemented and was called (Health Care System). Although this system was implemented in the early stage of the establishment, there is little research about the system and the critical factors which affected on its implementation.

According to (Dwak, 2010), there is a significant effect of utilized health information system in Gaza European Hospital on the medical and administrative areas such as the preparation of statistical reports related to the work, the transfer of laboratory results between different wards, the facilitation of access to medical record, and returning it at any time. This is in addition to facilitating communication and coordination processes among the internal wards of the hospital. However, based on the researcher observations and notes she got from different workers in the hospital, there were some problems with HIS. Therefore, this study is meant to find the gap and find an answer to the question (Is there any impact of HIS on Healthcare in European Gaza Hospital?).

Health Information System (HIS) saves the documented data and patient information electronically by archiving with the possibility to get them back any time. In contrast, the computerized health system, which is currently used, does not give medical orders electronically. (HIS) also doesn't provide all patient information digitally integrated as the results of the previous researches have shown that this system is not yet able to depend on (HIS) medical records without using manual system .

The research of (Grbawy, 2014) aimed at identifying the relationship between computerized health information systems and job performance of UNRWA primary health care centers in Gaza strip. Such a study recommended providing modern and fast networks, establish specialized technical department of health information systems, providing training courses in the use of health information systems, increase senior management support for users by encouraging them to use health information systems.

There are few dimensions that the researcher thought of when identifying the research problem. First, the population in the Palestinian areas are increasing. Second, there is an increasing pressures on hospitals especially during wars on Gaza and crises times. Third, there is an accelerating growth and progress of medical world development, which needs such an electronic system. Fourth, there is an urgent need to keep up the technical progress and simulating the developing country of using new systems. Finally, there is an increase in the large numbers of wards within hospitals which need using HIS system to control the large number of patients services. Hence, this study aims at **examining the impact of hospital information system quality on healthcare quality.** In order to achieve this objective, this work aims to answer the following research questions:

1. Has Health Information System, which is used in European Gaza hospital, has integrated a mutual regular information system between different wards (laboratory, radiology, etc.) and outpatients healthcare clinics?
2. Does Health Information System, used in European Gaza hospital, have documented data for every patient in different wards ?
3. Does Health Information System , used in European Gaza Hospital, have the ability to reduce employees workload and time?
4. Can Hospital Information System help improve the safety quality for patients?
5. Is Health Information System, used in European Gaza hospital , able to protect patients information confidently ?
6. Does Health Information System help improve patients service quality?

7. Does Health Information System, used in European Gaza hospital, support re-designing patients care pathway to monitor patients during their stay in hospital?

8. Is Health Information System, used in European Gaza hospital, able to decrease prescribing errors ?

Answering the above-mentioned questions, this study aims to explain the impact of Health Information System quality on healthcare quality**.**

1.3 Hypotheses:

To study the impact of (HIS) quality on healthcare quality , the following hypotheses were constructed:

H1. There is a statistical significant relationship between (HIS) quality (system quality, information quality ,safety quality ,performance quality ,service quality) and healthcare quality .

    H1a) There is a statistical significant relationship between system quality and healthcare quality .

    H1b) There is a statistical significant relationship between information quality and healthcare quality .

    H1c) There is a statistical significant relationship between safety quality and healthcare quality .

    H1d) There is a statistical significant relationship between performance quality and healthcare quality .

    H1e) There is a statistical significant relationship between service quality and healthcare quality .

H2. (HIS) quality components (system quality, information quality ,safety quality, performance quality, service quality) impact positively and significantly healthcare quality .

H3. There are no statistical significant differences between respondents regarding their perceptions of (HIS) quality &healthcare quality in European Gaza Hospital in Gaza strip due to demographics which are: gender, education level, age, current job and qualification years in using system.

1.4 Variables and Conceptual Framework:

Figure 1.1 shows the variables of the study. There are five independent variables, which are namely: (safety quality, information quality ,system quality ,service quality, and performance quality) and the three different dimensions that measure the dependent variable (healthcare quality), which are namely : (reduction of prescribin – error, improvement health outcomes for patients, and redesigning patients care pathway). Section 1.4.1 below highlights these variables.

1.4.1 Research Variables:

Depending on Cohen,(2016),Safdari, Ghazisaeidi et (2014), (Abdool 2014),Peikari, Zakaria(2013), the researcher concluded the theoretical framework of the study. This theoretical framework highlights the variables and dimensions of the study.

1.4.2 Theoretical Framework:

The following is the framework for the study:

Health Information System
Safety Quality
System Quality
Information Quality
Service Quality
Performance Quality

Healthcare Quality
Reduction of prescribing errors
Healthcare Outcomes Improvement
Redesigning patients care pathway

Control Variables
Gender
Educational Level
Age
Current Job
Years of Experience using HIS
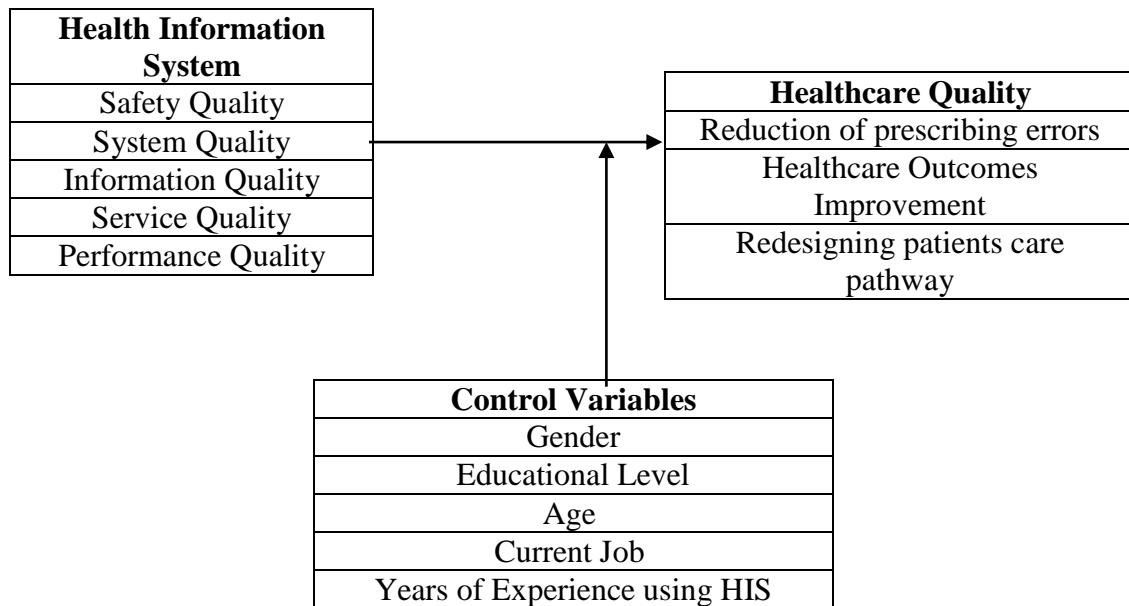
Figure (1.1): conceptual map developed by the researcher based on (Cohen, Coleman, et al., 2016), (Safdari, Ghazisaeidi, et al., 2014), (Abdool, 2014), (Hayajneh, Hayajneh, et al. 2006) and (Peikari, Zakaria, et al., 2013).

1.4.3 Definition of Key Terms:

a. **Healthcare quality** is defined as the quality of services presented in the hospital and which make patients feel of satisfaction to the presented service.

b. **Reduction of prescribing – errors** is defined as how to use (HIS) to reduce and prevent medical errors through presented correct medicine according to correct diagnosis .

c. **Improvement health outcomes for patients** is defined as the best use of (HIS) to follow patients improvement through communication with doctors, accurate diagnosis, alerts and integration data within the system .

d. **Redesigning patients care pathway** is defined as how to monitor patients during their stay in the hospital.

e. **Safety quality** is defined as how to build the confidence with patients through safety for patients, safety to presented services, safety in the values and common beliefs which regard to the presented efforts.

f. **System quality** is defined as the quality which regarding to ease of use, system confidence, responded time and reducing work mental load**.**

g. **Information quality** is defined as presented accurate, detailed data for every patient which helping for decision making and presented right medicine.

h. **Service quality** is defined as how to present completely service for both patients and for system users through training, supporting for system users and quick respondent for patients.

i. **Performance quality** is defined as improvement of production activity levels through reducing time, reducing work load for doctors and achieving more works by seeing more patients.

1.5 Research Objectives:

The study's main objective is to investigate the impact of (HIS) quality on healthcare quality at European Gaza Hospital. Specifically, the study aims at achieving the following objectives:

1. Examining the relationship between (HIS) quality (system quality, information quality ,safety quality ,performance quality , service quality) and healthcare quality.

2. Examining the impact of (HIS) quality (system quality, information quality, safety quality, performance quality , service quality) on healthcare quality.

1.6 The Importance of Research:

The Importance of the research emerges from answering the questions that are raised from the problem, which is how to improve healthcare quality through using hospital information system quality in the European Gaza hospital without consuming time and efforts. This study is important from both the theoretical and practical perspectives.

1.6.1 Theoretical Importance of Study:

This research arises from the lack of such researches in Palestinian hospitals (as far as the researcher knows). Thus, it could serve as a reference for future researchers concerned in this topic. The research results may also encourage researchers to do more studies in this area. Finally, the results of this study would contribute to the body of knowledge in Healthcare literature.

1.6.2 Practical Importance of Study:

This study would be important to academicians, researchers, and practitioners in the healthcare field. It would be useful to healthcare sector in Gaza in general and to European Gaza Hospital in particular.

For the healthcare sector, the implementation of information system in the Palestinian society especially in the hospitals can improves the presented service to the patients , and save the efforts for system users by decreasing waiting time .

As for European Gaza Hospital in Gaza, this importance can be shown in the points below:

- The results of this study may help information system quality, service quality in this hospital for each of system users and for patients .

- Also the results may encourage them to develop plans to overcome system errors and difficulties implementation .

- Also the results may encourage them to hold training courses to system users to increase awareness about the benefits of hospital information system ,also to encourage them of using system effectively .

Since this study is meant mainly to investigate healthcare in European Hospital in Gaza, it is important to shed some light on such an important hospital. Section 1.7 below shows a background of the hospital.

1.7 European Gaza Hospital:

According to the website of Palestinian Ministry of Health, the hospital began as a project of the European Union donation to the Palestinian at the end of the first Intifada in 1989. In this period, there was no foundation to any legitimate authority. Therefore, (UNRWA) was assigned to work on the establishment of the hospital by European fund. Establishing the hospital began in 1993 and allocated funding ended in 1996.And since the arrival of the Palestinian Authority as the legitimate authority in the country, the negotiation began with the UNRWA and the European Union for the transfer of ownership of the hospital to the Ministry of Health. This negotiation led to signing a document of agreement in October 1997, which states for the transfer of the hospital ownership to the Health Ministry in October 2000.(Ministry of Health, 2016).

The Ministry of Health developed a general chart for the hospital, which was as follows:

- Emergency Hospital: Special cases were transformed to it from the southern region and from all areas of Gaza.

- A training hospital: Which adopted the clinical department of medical education programs of the Faculty of Medicine.

- A leading hospital: If this system succeeds in the administrative systems, it will be applied in other hospitals

It is worth mentioning that the hospital faced great crises because of the delay in the arrival of the hardware and some experts in Intifada. Despite these crises, the hospital began to implement the scheme as planned on the medical, administrative and educational level.

1.8 Structure of the Thesis:

This thesis consists of six chapters. In Chapter one, a brief description of European Gaza Hospital in Gaza strip is presented. This chapter also includes a statement of the problem, research hypotheses, objectives, and importance of the study and structure of the thesis.

The second chapter includes a brief discussion about information system , hospital information system definitions ,components and advantages of hospital information system in addition to research model which often includes (HIS) quality components (system quality, information quality ,safety ,performance quality, service quality) and healthcare quality .

The third chapter presents relevant studies and research papers in the fields of (HIS) system and healthcare quality.

Chapter four includes research design, study population and sample, the instrument questionnaire, pilot, data collection, data entry and analysis.

Chapter five includes percentages, significance and correlation tables relating to questionnaire's data, study constructs and hypotheses.

Finally, the last chapter is chapter 6; it includes the conclusion and the recommendations of the study.

1.9 Summary of Chapter One:

This chapter included introduction about hospital information system, problem statement and research questions, hypothesis, variables, and conceptual framework. It also included definition of each independent and dependent variables, research objectives, the importance of research and finally ,a brief description of European Gaza Hospital in Gaza strip.

Chapter 2

Literature Review &

Research Model

Chapter 2

Literature Review& Research Model

2.1 Introduction:

Management information systems (MIS),or information systems (ISS),become a serious field of study largely through the development of computers and related technologies.

The use of information systems (ISs) has increased in the last 10 years not only by firms, but also by individuals and even governments. The use of ISs was encouraged by the technological breakthroughs; the advancements in telecommunications such as the internet, the globalization that created a global unlimited marketplace, the strong growing for information economy, and the rise of competitive digital firms. All of these factors transformed the ISs from data processing systems to decision support systems and became the foundation of the new business environment (Munirat, Sanni, and Kazeem, 2012).

Management Information Systems in this golden era can support the activities of employees, owners, customers and other key people in the organizations environment ,either by efficiently processing data to assist with the transaction work load by effectively supplying information to authorized people in a timely manner.(Parker and Case, 1993).

2.2 Section one: Information System

2.2.1 Definition of System:

System is defined as an asset of related events that collectively from a unified whole (Parker and Case, 1993), While (Steven, 2000) defined system, as a set of interrelated parts that interacts with one another, brought to gather for purpose. every system contain on inputs and process then into outputs. also system is defined as a set of integration components that operate together to accomplish a purpose .(Kozar, 1988; Steven, 2000)

From the previous definitions the researcher adopts this definition. The system is a collection of an integrated, systematic components that work together to a accomplish one purpose which has limited rules.

2.2.1.1 Elements of System:

Any system has elements. The elements of Management Information System are the inputs/outputs, control, storage and process.

- **Input:** This includes the keyboard, the data users, punch cards, computer operation and programs.
- **Processing:** Processing refers to the task performed before the input is generated into output.
- **Output:** This is the result generated after processing the input [data].
- **Storage:** Storage refers to the main and auxiliary memory. The storing of data is the basis of the information system.
- **Control:** This refers to the various measures taken to ensure timelines, accuracy, and cost effectiveness . (Munirat, Mohammed, et al., 2012)
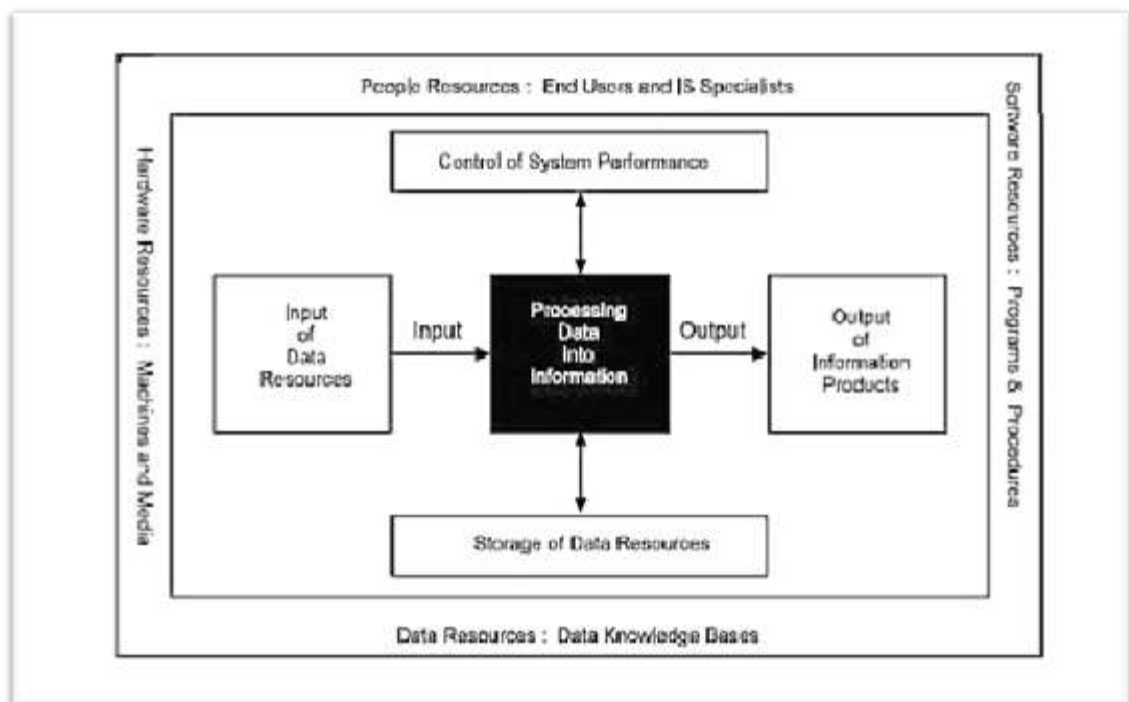
Figure (2.1): Elements of Management Information System (Munirat, Mohammed et al., 2012)

14

2.2.2 Information:

Information is defined as a sub - set of data that measures something to the person receiving it which they judge to be useful, significant, urgent and soon. It comes from data that has been processed by people or with the aid of technology so that it has meaning and value for the recipient. This means that information is subjective since what one person sees as valuable information , another may see as data with no particular significance. (Boonstra and Kennedy, 2005).

While (Steven, 2000) started its definitions from date to information and, he clarified the relationship between these definitions.

- **Data:** are facts, images, or sounds that may or may not pertinent or useful for a particular task.
- **Information :** is data whose form and content are appropriate for a particular use converting data into information by formatting, filtering, and summarizing.
- **Knowledge** : is a combination of instincts , ideas ,rules ,and procedure that guide action and decisions .

Also Steven showed the relationship between these terms converting data into information by formatting ,filtering ,and summarizing is a key role of information system. (Boonstra and Kennedy 2005) defined information system as apart wider organization context up the elements.
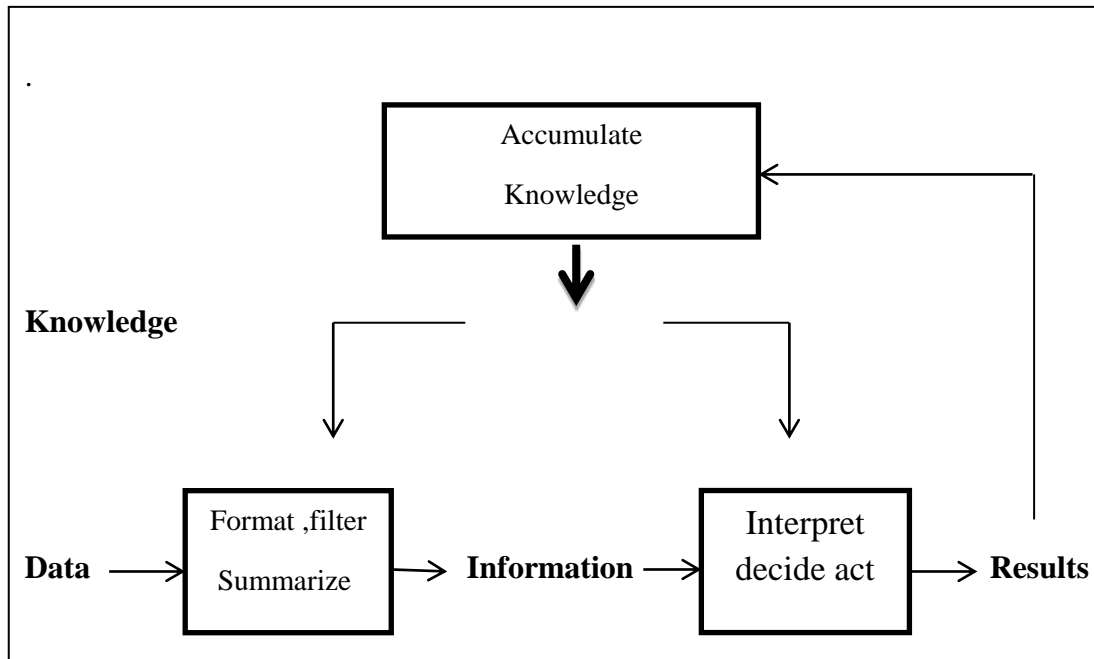
Figure (2.2): Relationship between data, information knowledge (Steven 2000)

The researcher adopted the following definition for data. Data are all facts, images, which needs processing to have a meaning. While information, a collection of data that has a meaning and it may help to get best choices.

2.2.3 Information Systems:

Information system is defined as an asset of people, procedures and resources that collects data which transforms and disseminates. (Boonstra and Kennedy, 2005).

While (Parker and Case, 1993) defined information system (Is) as, any system that provides people either with data or information relating to an organization operation. Also information system is defined as apart wider organization context up the elements (Boonstra and Kennedy, 2005) . (Steven, 2000) defined Information System as a system that uses information technology to capture, transmit, store, retrieve, manipulate, or display information used in one or more business process. (Munirat, et al., 2012) defined management information system as a critical component of the institution's overall risk management strategy; it supports management's ability to perform such reviews. MIS should be used to recognize, monitor measure, limit, and manage risks. Risk Management involves four main elements, which include:

- Policies or practices.
- Operational processes.

- Staff and management.

- Feedback devices. (Munirat, Mohammed, et al. 2012).

While Information technology is defined as , that hardware and software that make information system possible (Steven, 2000).

From previous detentions of information system, the researcher adopted the following definition: " IT is a system which may consist of people ,data, resources, that exists in a small society which works together to collect, manipulate, store data to achieve the goal of organization".

2.2.3.1   Components of Information Systems

There are different components of Information Systems. These components include resources of people, hardware, data, and networks. Below is an explanation to these components.

1. **Resources of people**: (end users and IS specialists, system analyst programmers, data administrators etc.). End users: (also called users or clients) are people who use an information system or the information it produces. They can be accountants, salespersons, engineers, clerks, customers, or managers. Most of us are information system end users. IS Specialists: people who actually develop and operate information systems.

2. Hardware: (Physical computer equipment and associate device machines and media).

- Machines: as computers and other equipment along with all data media, objects on which data is recorded and saved.
- Computer systems: consist of variety of interconnected peripheral devices.

Examples are microcomputer systems, midrange computer systems, and large computer systems.

3. **Software**: (programs and procedures).

Software Resources includes:

• System software, such as an operating system

• Application software, which are programs that direct processing for a particular use of computers by end users.

• Procedures, which are operating instructions for the people, who will usean information system. Examples are instructions for filling out a paper form or using a particular software package.

4. Data: (data and knowledge bases),

Data resources must meet the following criteria:

• Comprehensiveness: means that all the data about the subject are actually present in the database.

• Non-redundancy: means that each individual piece of data exists only once in the database.

• Appropriate structure: means that the data are stored in such a way as to minimize the cost of expected processing and storage.

5. Networks: (communications media and network support).

Network resources include:

• Communications media: such as twisted pair wire, coaxial cable, fiber-optic cable, microwave systems, and communication satellite systems.

• Network support: This generic category includes all of the people, hardware, software, and data resources that directly support the operation and use of a communications network. Examples include communications control software such as network operating systems and Internet packages (Sharma and Khanna, 2012).

2.2.3.2 The Benefits of Information System :

1. An information system can save cost directly by an automating process .

2. An information system is more accurate and it can decrease waiting time operation which lead to efficacy passed cost reduction.

3. An information system can avoid an organization from a future cost increases

4. An information system improves quality by reducing errors when it replaces a manual system .

5. An information system can provide a personal and flexible service.(Boonstra and Kennedy, 2005)

2.2.3.3 Categories of Information System:

There are different types of Information System. These categories are as follows;

1. Operational support system

2. Decision support system

3. Communication support system is an important because it helps organization members keep in touch with other person.

4. Supporting activities which take so much of manager's time .

5. This type help managers to use time more efficiently using technologic aids.(Kozar 1988)

Thus, DeLone and McLean identified six factors for the success of information systems, namely system quality, information quality, system use, user satisfaction, individual impact and organizational impact. (DeLone and McLean, 1992)

2.2.3.4 Challenges of Planning and Managing Information System

There are different difficulties and challenges to manage Information System. These difficulties can be seen in the following points.

1. Difficulty foreseeing and assessing opportunities

2. Difficulty assuring consistency with organizational objectives.

3. Difficultly building system.

4. Difficulty maintaining system performance.

5. Difficulty collaborating with system builders.(Steven, 2000)

2.2.4   Summary for Previous Section:

In the previous section, the researcher focused on different points of information system such as other researchers definitions, information and information system as one definition in addition to researcher procedural definition. Also the researcher mentioned the elements of Management Information System, Components of Information Systems, types of information system. The benefits of information system in addition to categories of information systems and challenges which face planning and managing information system from different points of view.

2.3 Hospital Information System

2.3.1   Introduction:

As the world's population increases, and as a significant proportion of making human beings live longer than ever in history, health issues are becoming more prominent in politics and economies. It is, therefore, no surprise that the world of information technology (IT) has linked up with the medical world and the field of health information systems (HISs) and has grown into a special focus area in the circles of Information and Knowledge Management (Serobatse, 2013).

Hospital Information Systems (HIS) are increasingly becoming an emerging tool in health care arena to efficient delivery of high quality health services. HIS is a necessary component of modern hospital infrastructure. HIS is considered a prerequisite for the efficient delivery of high quality health care in hospitals. The use of information technology in hospitals to improve quality and reduce costs dates back to the early1960s.(Hayajneh, Hayajneh, et al., 2006).

Most health centers nowadays use new information management systems like hospital information systems (HIS) in order to integrate the patients' information and modify communication patterns among different hospital wards and the professional staff. HIS can play a significant role in providing the patients' safety. In fact, it can be said that hospital information systems are big and organized data bases that are utilized to integrate patients' information for the purpose conducting official and administrative undertakings. In hospital information systems, computers and communication devices are used to collect, store, process, and retrieve patients' data

and contact between patient care and official information in all hospital activities and also to meet the system users' needs. Hospital information systems should not only support the hospital activities in practical, technical, and strategic perspectives but also protect medical and organizational processes of the patients in separate and integrated way in order to provide them with better service, decrease medical costs, reduce service provision time, minimize medical faults, and document the patients' documents. Now a high quality information system is required to support the medical process and meet the service receivers' needs (Aghazadeh, et al. 2013).

2.3.1.1 Health Information-Related Concepts:

There are a lots of terms which are related to hospital information system through procedures, management and technology according to **The American Health Information Management Association** (Ahima, 2016).

1. **Health Information (HI)** is a science that shows how health information is technically captured, transmitted, and utilized. Health information focuses on information systems, information principles, and information technology as it is applied to the continuum of healthcare delivery. It is an integrated discipline with specialty domains that include management science, management engineering principles, healthcare delivery and public health, patient safety, information science and computer technology. Health information programs demonstrate uniqueness by offering varied options for practice or research focus.

2. **Health information** is the data which is related to a person's medical history, including symptoms, diagnoses, procedures, and outcomes. while health information records include patient histories, lab results, x-rays, clinical information, and notes. A patient's health information can be viewed individually, to see how a patient's health has changed; it can also be viewed as a part of a larger data set to understand how a population's health has changed, and how medical interventions can change health outcomes.

3. **Health Information Technology (HIT)** refers to the framework used to manage health information, and the exchange of health information in a digital format. Professionals who work in HIT are focused on the technical

side of managing health information, working with software and hardware used to manage and store patient data. HIT professionals are usually from information technology backgrounds, and provide support for EHRs and other systems HIM professionals use to secure health information. As technology advances, HIT professionals are necessary to ensure the electronic data HIM professionals manage is maintained and exchanged accurately and efficiently.

4. **Health Information Management (HIM)** professionals work in a variety of different settings and job titles. They often serve in bridge roles, connecting clinical, operational, and administrative functions. These professionals affect the quality of patient information and patient care at every touch pointin the healthcare delivery cycle. HIM professionals work on the classification of diseases and treatments to ensure they are standardized for clinical, financial, and legal uses in healthcare. Health information professionals care for patients by caring for their medical data .

5. **Managed care** is an organized effort by health insurance plans and providers to use financial incentives and organizational arrangements to alter provider and patient behavior so that services are delivered in a more efficient and cost-effective manner Managed care concentrates on reducing delivery costs and improving healthcare financing through strict utilization management, financial incentives to physicians and limited access to providers.(Hurst and Guo, 2008).

In this study, the definition of the American Health Information Management Association will be adopted. According to the American association, **Health Information** is considered as a science that show the way for this system can work through registration ,transmission patients information. **Health Information** returns to patients medical historical records by following the improvement of patients outcomes while **Health Information Technology** , refers to base of knowledge which concerns of digital format for patients health records. **Health Information Management (HIM)** collects all previous terms by how the system can manage, rearrange data to serve patient efficiently and effectively .

2.3.1.2   Hospital Information System (HIS):

(Ismail, et al., 2010) defined Hospital Information System (HIS) is a comprehensive, integrated information system designed to manage the administrative, financial and clinical aspects of a hospital. (HIS) is also defined as a comprehensive software for patients' information integration for sending and exchanging comprehensive patients' information between wards and other medical centers in order to expedite the process of patient care, improve quality, increase satisfaction and reduce costs (Aghazadeh, et al., 2012). (Khalifa, 2014) considered (HIS) as a major part of the healthcare system, on which the processes of care delivery. While (Farzandipour, et al. 2011) defined Hospital Information System as one of the most common computer systems that have been designed to support health care services. These systems are large computerized data bases intended primarily for communication and store health and administrative information. They also believe that HIS implementation is an organizational process conducted toward information technology within user community. User community in health care arena consists of many different user groups (physicians, nurses, administrators, managers, researchers, etc.).

From previous definitions of Hospital Information System, this study adopted the following definition: "HIS is a complete designed system which concerns of patients clinical data it can register, document accurate information and process it to increase quality of patient healthcare."

Hospital Information Systems is one concern in the health sector because of their increasing needs of the growing complexity of health management processes and also due to the significant diversity and innovation in the supply system. They integrate health data collecting, processing, analyzing and reporting and providing us with appropriate indicators for checking and assessing the health system performance.

In this study, Hospital Information System HIS defined it as kind of computer system which is used in hospitals to help each of doctors, nurses to save their efforts, time for serving patients to give the best diagnosis.

2.3.1.3 The Importance of Healthcare Information

The importance of (HIS) systems emerges from the importance of their role in managing all patient data and information including key personal data about the patient and other comprehensive medical data. The importance is also shown in documenting all medical services that have been provided to the patient such as investigations, diagnoses, treatments, follow up reports and important medical decisions. In addition, it helps improving quality, safety and reduce costs; implementation of hospital information systems.

2.3.1.4 Reasons for the Importance of Using Such System

There are many reasons why it is very important to use Health Information System. These reasons are highlighted below:

- Generation of alert and Reminds: HIS systems help with the creation of wake series warning messages to remind doctor in diagnosis.
- Critical Pathway of Decisions: HIS systems help a doctor in serious cases. In very serious cases, that there isn't the opportunity for doctor to decide, these systems help the doctor and bring his response quickly in emergency cases.
- Automatic reporting: one of advantages and performances of HIS systems is that can be provided report of patient's diagnostic - care information automatically by them .
- Reducing cost: HIS systems effect very significantly in reducing the costs.
- Access to diagnostic information care of patient with a PC: using of the appropriate Work station, physician can access patients and hospitals easily from your location or where he/she is present.
- Suitable Administration: One of the benefits of HIS systems is that it allows the patient to call the hospital network from home and reserve time to meet with the doctor. Thus making an Appointment is much easier.
- Reducing errors: because all data have been collected in one place, fewer mistakes occur.
- Better managing &following : patient management and follow patient can be done better in these systems .Therefore, accessing to previous information of patient will be better.

Data Presentation T-standardization, better communication of information and decrease the time (Aghazadeh, et al., 2012).

Moreover, there are certain reasons why it is necessary to establish Hospital Information System (HIS). These reasons can be as follows:

- Inefficiency of manual procedures,
- the growth of medical research in the world, insurance industrial development and changing reimbursement techniques to the centers of contracts,
- new methods of medical education, medical facilities great achievement, and increasing professional in Employees and development how hospital catering and management, growing health costs,
- increased patient expectations, the associated need for medical centers and medical professionals together and etc.

Also a good management information system is necessary to evaluate the quality of care for patients.(Aghazadeh, Aliyev et al., 2012)

In order to have a successful management of hospital information systems, it was stated in the literature that it is crucial to engage physicians and other healthcare professionals and providing strong organizational support to them before and during the implementation activities. These two factors could eliminate major resistance and negative attitudes frequently reported and in the same time increase level of acceptance of hospital information systems by physicians and healthcare professionals.(Khalifa, 2014)

2.3.1.5 The Goal of Health Care Information Systems:

Including hospital information systems is management of information, which health care staffs need for their efficiency and effectiveness of tasks and activities. Hospital information systems must be capable to support the high-quality health care services and meet the needs of its people.(Mehraeen, Ahmadi et al., 2014).

2.3.1.6 The Aims of Hospital Information System Are:

- Achieving the best possible support of patient care and administration by electronic data processing.

- Providing the required information to each level of the management at the right time, in the right form, and in the right place, so that the decisions to be made effectively and efficiently.
- Playing a vital role in planning, initiating, organizing and controlling the operations of the subsystems of the hospital and thus provides a synergistic organization in the process.
- Improving patients' care by accessing data and making recommendations for care and enabling a hospital to move from retrospective to a concurrent review quality and appropriateness of care. (Ismail, Jamil, et al., 2010).

2.3.1.7 The Objectives of The HIS Are Included:
- Standardization of work processes in the hospital.
- Improving the patient care.
- Savings in hospital costs.
- Information preparation for performance evaluation.
- Monitoring of health and medical care.
- Generating relevant and high-quality information to support decisions (Rodrigues, 2010).

An information system is effective when it is able to respond to users' information needs. Otherwise, it would step into the vanity and in order to be prevented from entering the early stage of information systems futility, it is required to assess the effectiveness of the system periodically to realize the possible failures in order to improve system .

2.3.1.8 Functions of (HIS):
- This system is a comprehensive software which integrates the patient's related data to be exchanged among different departments and medical centers in a way that it can speed up the care and treatment process.
- It enhances the satisfaction, improves the services quality and decreases the costs.
- It automatically manages the data related to the clinical, financial, nursing, laboratory, pharmacy as well as radiology and pathology departments.

- The HIS includes 8 sub-systems (clinical information system, financial information system, laboratory information system, nursing information system, pharmacy information system, the picture archiving and communication system and radiology information system). (Saghaeiannejad-Isfahani, Jahanbakhsh, et al., 2014)**.**

While HIS's Primary Function:

- Development of patient data mechanized service which leads to the better efficient retrieval of the data required for treatment, statistics, teaching and research purposes.
- HISs are designed for the integrated collection of data, their processing, reporting as well as using essential data for improving the efficacy and effectiveness of health services through a better management across all the levels.(Saghaeiannejad-Isfahani, Jahanbakhsh et al. 2014)

Another Four Primary Functions to (HIS) :

1. Memory aid: It reduces the need to rely on memory alone for information required to complete a task.
2. Decision support aid: It enhances the ability to integrate information from multiple sources to make evidence-based decisions.
3. Collaboration aid: It enhances the ability to communicate information and findings to other providers and patients.(Serobatse 2013)

2.3.1.9   Properties and Characteristics of Hospital Information System (HIS):
- It acts based on standard.
- It doesn't make any mandatory in existing manual system, but it matches itself with these systems.
- It acts based on "medical events" and is independent of the cycle of moving patients.
- Using this system, the previous manual and the current trend does not change much.
- It keeps the old computer systems and promotes and improves their futures.

- It offers the best solution for coordination between different lines of work and different units in the hospital .
- It coordinates all wards and hospital system.
- It increases the quality of decision making and managerial. (Aghazadeh, Aliyev et al. 2012)

2.3.1.10 System Models:

There are two basic models for clinical information systems.

- The first is for hospitals, where the assumption is that there will be a limited number of patients, each treated for a relatively long period of time and each requiring a great deal of clinical information related to the current admission. This model facility is large, has a number of separate departments and requires a large staff. In addition to the functions of health care delivery, there are also hotel functions, business- functions, personnel functions and the like.
- The second system model is for ambulatory care settings, such as health maintenance organizations and office practices. In these settings there are more patients, a need for long-term follow-up, relatively short-term episodes of illness with limited clinical data for each episode and few functions not directly associated with the provision of health care. (Saghaeiannejad-Isfahani, Saeedbakhsh et al., 2015).

2.3.2 Types Hospital Information System:

- Clinical information system:
  Clinical Information systems are based on technology and applied at the point of care. The system is designed, based on the requirement and need for support and processing of information. The CIS systems provide storage with processing capabilities. (Abubakar, 2015)
- Community based on health information system:
  Community health Information network (CHIN) may be conceived as a network that links health care stakeholders throughout a community, region or district. It also facilitates an efficient flow of funds information among various

providers, employers and other stakeholders within a specified area. (Rodrigues J, 2010. Health Information systems, concepts, systems, tools)

2.3.2.1 Advantages of Medical Records:

- It integrates diverse patient information.
- It provides a mechanism for communication.
- It serves as a legal document of a patient's experiences during hospitalization.
- rapid access to pertinent information, simultaneous access by multiple users, improved legibility, and, when the data is stored in a structured manner, assistance in searching for pertinent information.
- Timely and accurate data capture is also facilitated by direct interfaces with patient monitors and other medical instruments.
- Finally, the researcher defined(HIS)as Systems that use the stored information can be developed to monitor patients and issue alerts, make diagnostic suggestions, recommend patient-specific drug dosing regimens, and provide limited therapy advice.

Hospital Information System implementation (HIS): In this method, using the computer, all therapeutic, and management and financial actions of patient is done by comprehensive software that is made up of different parts All therapeutic actions, medication orders and diagnostic services are sent to clinical and Para clinical and administrative centers such as accounting, pharmacy, warehouses, and other units through the system and submitted their response is received .(Aghazadeh, Aliyev et al. 2012)

2.3.3 Summary for Previous Section:

In the previous section the researcher focused on different points of hospital information system such as others researchers definitions ,terms which related to hospital information system information in addition to researcher procedural definition . Also the researcher mentioned the goals, aims , objectives, advantages of hospital Information System, functions of Hospital Information Systems, types of hospital information system, The benefits of hospital information system in addition to Hospital Information System implementation from different points of view.

2.4 Section Three :Research Model & Research Hypothesis:

2.4.1 Introduction:

This section will include on the researcher model and researcher hypothesis. The researcher will defined each of dependent and independent variable in addition to variables details .

This study is designed to examine the effect of healthcare quality on five independent variables, to assess the quality degree in each variable on healthcare quality . Quality is the most important criterion for the success of information system which refers to desirable features of information system such as : Ease of access, flexibility, system integration, system response time, system reliability, ease of learning and use, and so on. Quality in these systems is mainly related to the costumer's satisfaction. (Salahuddin and Ismail, 2015). Hospital information system (HIS) could improve the personnel's work process, decrease the chances of fault, and increase the quality of healthcare, all through improving communication in the nurses' work and increasing their preciseness in daily tasks.(Aghazadeh, Aliyev, et al.)

2.4.2 Health Care Quality:

Quality in these systems is mainly related to the costumer's satisfaction. Costumers inside the hospital information system who are typically called users are more than simple users.(Aghazadeh, Aliyev et al., 2012)

Also The reduction in total lead time reduces costs of treatment patients and the country's health system and will increase health care quality and patient satisfaction.(Aghazadeh, Aliyev et al., 2012)

quality of care is :"the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.(Hurst and Guo, 2008)

From previous detentions quality of care, the researcher adopted the following definition: "quality of care is the quality of services which presented in the hospital and which make patients feel of satisfaction to the presented service , quality may emerge from different points of view such as how to present service in an effective way by reducing time and facilitating presented services for patients" .

30

2.4.2.1   Divisions of Quality :

Technical quality and Functional quality.

- **Technical quality** refers to the basis of technical accuracy and procedures. In health care context, it is defined on the basis of the technical accuracy of the medical diagnoses and procedures or the compliance of professional specifications.

- **While functional quality** refers to the manner in which service is delivered to the customer.

In health care setting, patients usually rely on functional aspects (facilities, cleanliness, quality of hospital food, hospital personnel's attitudes) rather than technical aspects when evaluating service quality.(Edura Wan Rashid and Kamaruzaman Jusoff, 2009)

2.4.2.2   Dimensionality of health care quality:

- Tangible: physical facilities, equipment and appearance of personnel.

- Reliability: ability to perform the promised service reliable and accurately.

- Responsiveness: willingness to help customers and provide prompt service.

- Assurance: knowledge and courtesy of employees and their ability to inspire trust and confidence.

- Empathy: caring, individualized attention provided to customers.(Edura Wan Rashid and Kamaruzaman Jusoff, 2009)

2.4.2.3   Related Scales to Quality Were Included as Follows:

- Ease of access.

- Flexibility of the system (Flexibility of an information system is the ability to be adapted to changes.

- System integration Response time (response time was defined in this study as the period that an information system responds to a specific request demand)

- System reliability

- Benefits derived from the information system.

- Usefulness of decision support system features system usefulness functions.

- Utilization of resources.

- The use of new technologies.

- Error recorded.

- Easy to learn and use.(Saghaeiannejad-Isfahani, Saeedbakhsh et al., 2015)

2.4.3 Reduction of Prescribing Errors:

Reduction of prescribing errors definitions &terms :

1- Errors: A physician error is largely due to decision making with an incomplete case history. A comprehensive root-cause analysis identified knowledge deficiencies about drugs, checking errors, and inadequate availability of patient information as the leading types of errors. Many errors arose from sources such as ''dependence on diagnoses made by inexperienced clinicians, poor records, poor communication.'' and other causes related to lack of complete knowledge.(Feied, Handler, et al., 2004)

2- Prescribing errors: All errors including many minor errors which are unlikely to result in patient harm), or an outcome (which focuses on those errors that lead to patient harm).(Reckmann, Westbrook et al. 2009)

3- Prescribing another kind of errors: Result from prescribing decision or prescription writing process, where there is an unintentional, significant: reduction in probability of treatment being timely and effective or increase in the risk of harm when compared with generally accepted practice. (Dean, Schachter, et al., 2002).

While medication errors differ from prescribing, medication errors is an error which can occur at any of the steps of medication use process, which include prescribing, dispensing ,administration and monitoring. A medication error may or may not cause harm the patients, but it is considered to be preventable .(Reckmann, Westbrook, et al., 2009)
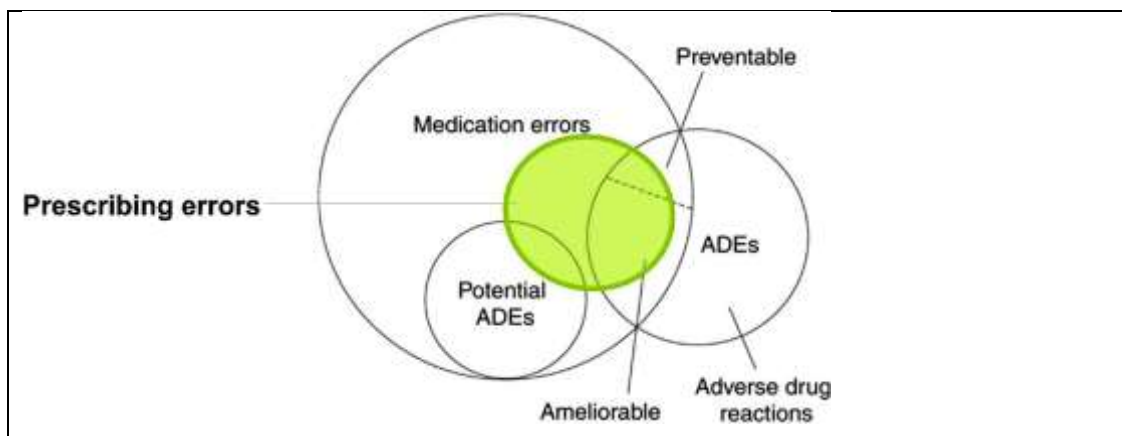
Figure (2.3): Relationship between adverse drug events(ADEs), potential ADEs, medication errors and prescribing errors.(Reckmann, Westbrook et al., 2009)

While there is clarification about prescribing errors through the system and he compared between manual and computerized system, Electronic prescribing (e-prescribing) systems as the means of communicating medicine choice and therapy of patients between doctors and pharmacists often lead to significant improvements in the delivery of care. (Peikari, Shah, et al., 2015)

From previous detentions of prescribing error , the researcher adopted the following definition: "prescribing error is a different kind of medical errors which cause serious problems for patients, it may emerges from hospital information system fault , decision making, undocumented date for every patients, less training and experts human recourses" .

The researcher interested in how to use (HIS) to reduce, prevent medical errors through presented correct medicine according to correct diagnosis.

4- Kinds of Errors:

- Uncompleted patient information (e.g., not knowing about patients' allergies, other medicines they are taking, previous diagnoses, and laboratory results)
- Unavailable drug information (such as lack of up-to-date warnings).
- Miscommunication of drug orders, which can involve poor handwriting, confusion between drugs with similar names, misuse of zeroes and decimal points, confusion of metric and other dosing units, and inappropriate

abbreviations Lack of appropriate labeling as a drug is prepared and repackaged into smaller units

- Environmental factors such as lighting, heat, noise, and interruptions that can distract health professionals from their medical tasks.(Feied, Handler et al., 2004).

5- Tactics for Reducing Errors and Adverse Events:

Many tactics are available to make system changes to reduce errors and adverse events; they fall into five categories:

- Reduce complexity.
- Optimize information processing.
- Automate wisely.
- Use constraints.
- Mitigate the unwanted side effects of change.(Nolan, 2000).

2.4.4   Improvement health outcomes for patients:

Definition and terms:

(Peikari, Shah et al., 2015), defined **system outcomes** as the system outcomes which Refers to the extent to which a system improves communication, facilitation providing care, medical error reduction and workload among the users.

While (Abdool 2014), added different criteria for how (HIS) can improve patients outcomes through gathering a full documented information about patients' lab results and radiology reports) that help in making therapeutic decisions ,how the system helps in to track patients' care progress, help patients of drug duration ,reminders which (HIS) send it for doctors to follow patients improvement outcomes.

From previous detentions of improvement health outcomes, the researcher adopted the following definition: "improvement health outcomes is the best use of (HIS) to follow patients improvement through communication with doctors, accurate diagnosis, alerts and integration data within the system ".

2.4.4.1 The Concept of Improvement Health Outcomes for Patients :

There are no enough previous studies about this concept so, the researcher tried to use her efforts to explain this variable. Improvement health patients outcomes by using (HIS)may allow having a comprehensive picture about a patient that, helps in diagnosing problems sooner which prevent future diseases.

2.4.4.2 How Can (HIS) Improve Health Outcomes for Patients :

1. The system allows gathering all information related to a patient in one place (e.g. lab results and radiology reports) that helps in making therapeutic decisions).
2. The system allows viewing drug formulary information.
3. HIS allows to access and view patients' assessments easily and quickly.
4. The system has the option to send reminders to healthcare providers (e.g. surgeries appointments and nurses to give medications to inpatients).

2.4.5 Redesigning Patients Care Pathway

Redesigning patients care pathway presented a lot of information about patients care pathway, he defined it as journey in the hospital; since the patient enters the facility till leaving it.

(Abdool, 2014), explained a lot of matters which are related to redesigning patients care pathway such as reviewing patients' progress notes, facilitating documenting patients' care, acquiring and analyzing all needed results.

There are two figures that could illustrate redesigning patients care pathway. The first figure is an old process which used a manual system showing a patient's journey suffering from poisoning. The patient arrives to the hospital at 1.30 p.m. He has to go the reception disk first to register. He has to fill in a form, verify his insurance statues ,wait his turn, pay the doctor's fee in advance.

After receiving a consultation slip from the reception disk, he has to go to the internal medicine department on second floor. At the second floor reception, the patient gives his form to a nurse and waits for his turn. A consultation may take a

long time, the doctor prescribes some medicine. The patient takes the perception to the cashier's disk in the reception. He pays the bill and goes down to the pharmacy in the basement. As we noticed, that the process was very long and took a lot of time. The patient already leaves from the hospital at 4.00 pm. These complex procedures may harm the patient if he suffers from a serious disease.
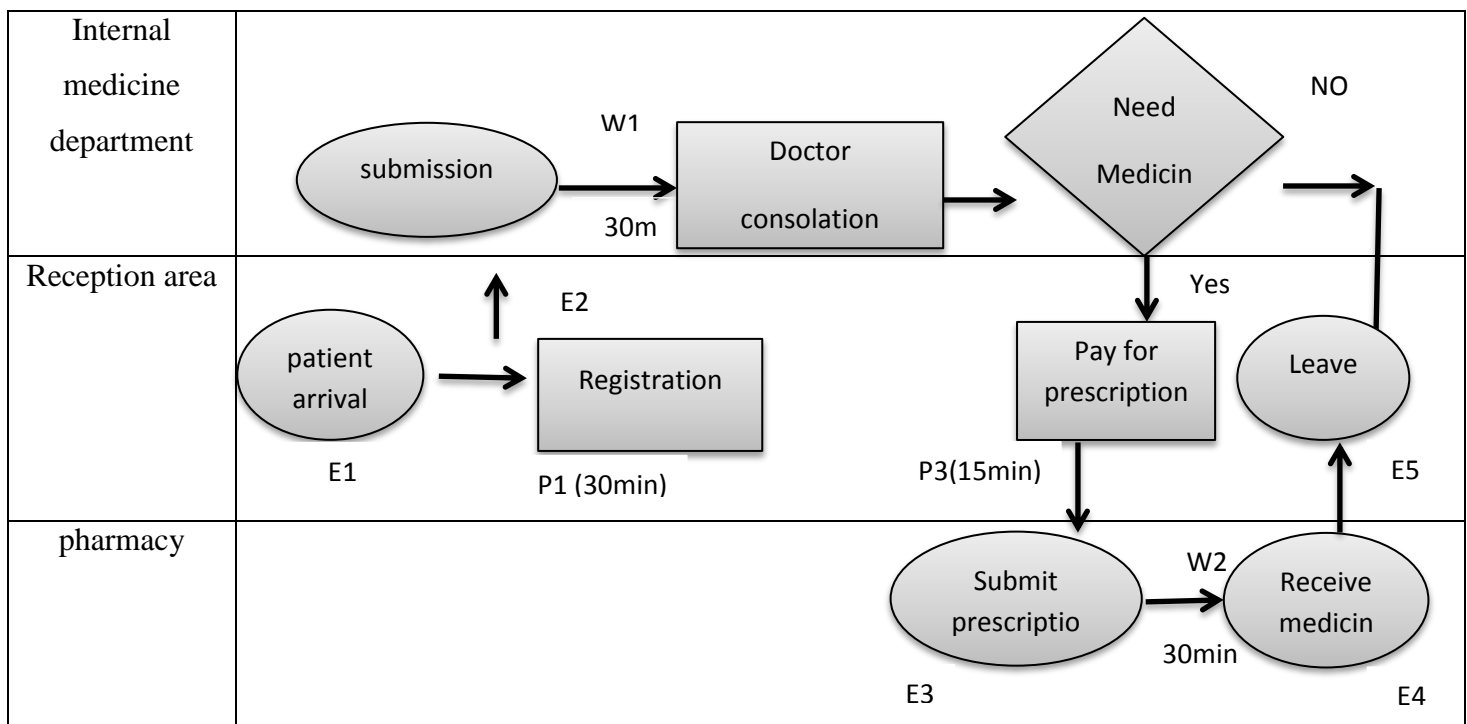
Figure (2.4): A patient's journey with an old process at hospital(Boonstra and Kennedy, 2005)

2.4.5.1 A patient's Journey With an Old Process at Hospital:

- **While a new process** by using hospital information system differs from the old process .A patient's journey becomes shorter than the previous process and also there is no waiting time.
1. Change the registration process (old P1) into an event (newE2)
2. Remove the wait (old W2) into an event (new E3);
3. Remove the payment process (old P3) by integration in the recipe event (newE3).

This illustrates how computers based on information systems open many opportunities to rethink a process and bring a significant reduction in the process steps and waiting.
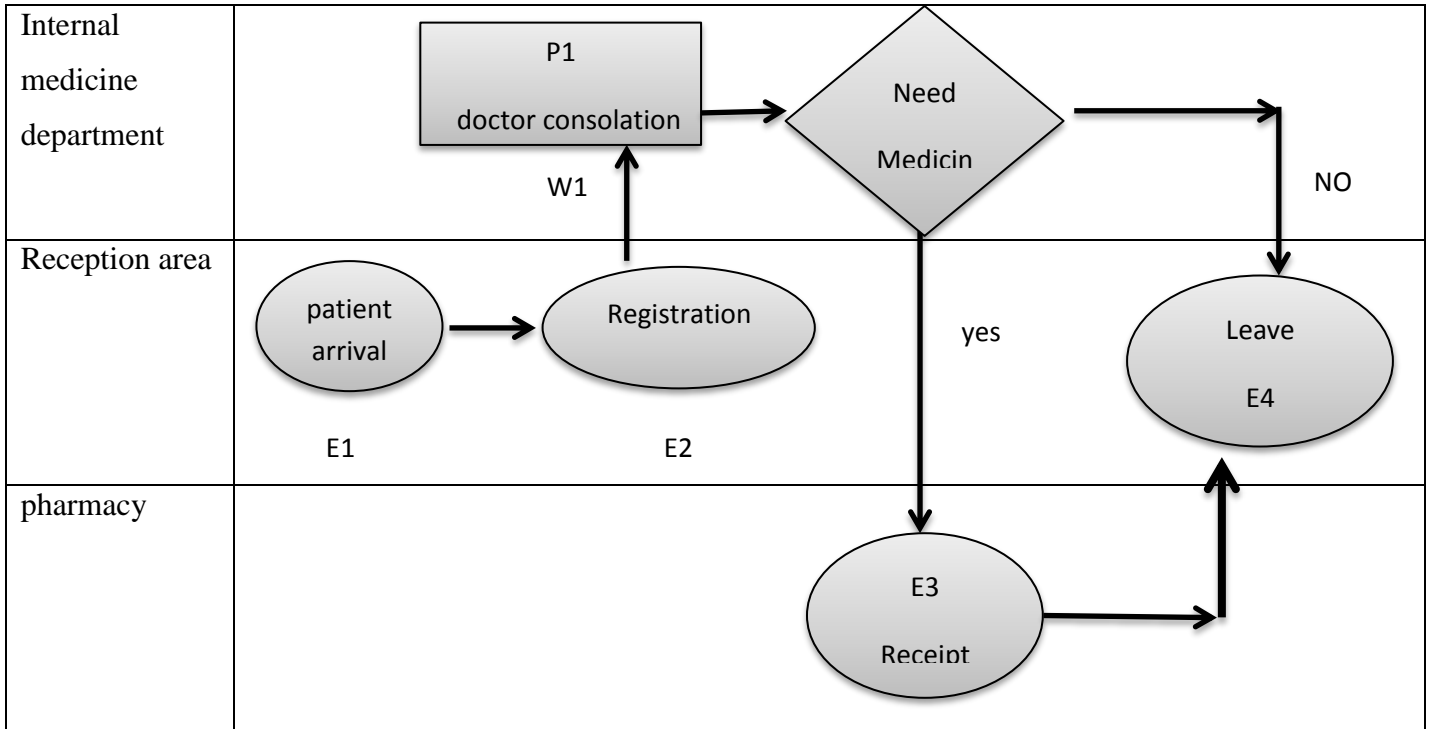
Figure (2.5): a patient's journey with the new process (HIS) at hospital(Boonstra and Kennedy, 2005)

2.4.5.2 A patient's Journey With New Process at Hospital:

The new process advantages are as follows:

1. The New process by using (HIS) shortened patient's journey through reducing events since arrival time into departure.
2. Reducing waiting time by reducing the number of unnecessary process steps.
3. The new process integrates documented data for every patient with all departments such as (radiology, laboratory and pharmacy) with doctors .
4. By using (HIS), it presents a good services for patients and for doctors .
5. The New process gives time for doctors to see patients more than previous with old process.
6. Patient's registration or scheduling appointment process may take time shorter than previous with old system.

7. The new process with (HIS) helps in simplifying supporting process ,such as billing ,medicine cost and make it easier than before.

2.5 Independent Variables

The sections below highlight all the independent variables of the study.

2.5.1 Safety Quality:

Safety culture in healthcare is an important aspect of the broader organizational culture that emphasizes the importance of safety for both patients and providers. Safety climate as the shared values and beliefs regarding safety efforts.

As for the definition, (Salahuddin and Ismail, 2015) mentioned that The Institute of Medicine (IOM) defined patient safety as *"the prevention of harm to patients. It is often concerned with medical errors, adverse events, and preventable injuries"*.

(Vincent, 2006) defined patient as "prevention of errors and improvement of adverse effects, or injuries to patients associated with the process of care".

Patient safety was also defined as a discipline in the health care sector that applies safety science methods toward the goal of achieving a trustworthy system of health care delivery. Patient safety is also an attribute of health care systems; it minimizes the incidence and maximizes recovery from, adverse events. (Emanuel, Berwick, et al., 2008). Moreover, safety was defined by the IOM as "the prevention of harm to patients. However, Hughes added another point which is, how they can achieve patients' safety. Emphasis is placed on the system of care delivery that (1) prevents errors; (2) learns from the errors that do occur; and(3) is built on a culture of safety that involves health care professionals, organizations, and patients (Hughes, 2008). Precisely, Hughes defined safety practices as "those that reduce the risk of adverse events related to exposure to medical care across a range of diagnoses or conditions" (Hughes, 2008).

From the previous and different definitions of the patients' safety , the researcher adopted this definition. Safety is how to build confidence between patients and

hospital groups through protecting patients documented data secretly, preventing errors ,make patients feeling of safety toward the hospital services and its responsibility .

2.5.2 System Quality

System quality is a user's experience of the system from a technical, design and operational perspective .This is reflected in a user's evaluation of system attributes such as ease of use, reliability and response time. These attributes have been found important to healthcare IT acceptance in a number of contexts. Slow response time and difficulties in HIS use can result in severe dissatisfaction and eventually lead to the shutdown of an HIS system.(Cohen, Coleman, et al., 2016)

System quality was defined in another way. It is concerned with the system features of health IT. System quality that is potentially contributed to patient safety incidents is denoted in terms of usability, compatibility, reliability, and response time (Salahuddin and Ismail, 2015).

(Safdari, Ghazisaeidi, et al., 2014) explained the importance of the quality of the system which evaluates the data-processing system and measures such as user-friendly, responsibility time, system reliability, completeness, system flexibility, and usability are offered.

In addition, it was defined by (Haux, 2006) as a system which is associated with system performance. System quality in a healthcare setting measures the inherent features of HIS including system performance and user interface.

(Aghazadeh, Aliyev et al., 2013),defined system quality but they added another feature to it ,Quality in these systems is mainly related to the costumer's satisfaction. Costumers inside the hospital information system who are typically called users are more than simple users.

System quality also refers to the extent to which a system improves communication, facilitation of providing care, medical error reduction and workload among the users (Peikari, et al., 2015).

From previous and different definitions of the **System quality,** the researcher adopts the following definition: " system quality is a coordination and integration of data inside the computerized system through ease of use, speed responses to the patients requests, reliability and finally patients satisfaction on the services which presented by the system."

2.5.2.1   Constructs for System Quality:

There are different constructs for system quality. The section below sheds some light on these constructs, namely (system processing speed, user interface, user training, user documentation, and in sourcing support)

1. System processing speed: The system speed is the time that elapses from the time an activity starts until the results are displayed on the screen or on the printer.
2. User interface: The working environment which is offered to the user for the importing processing and exporting of the information
3. User training: User's notion concerning the training provided before and during system's usage
4. User documentation: User documentation consists of written or visual explanations (e.g., manuals, procedures, films, tutorials, online help instructions, operating instructions, etc.) concerning what the application software does, how it works, and how to use it.
5. Insourcing support: The quality of the support provided to the end-user concerning the system department of the organization.
   Outsourcing support: The quality of the support provided to the end-user concerning the system usage from the staff of the external vendor.(Aggelidis and Chatzoglou, 2012)

The following characteristics were compiled based on established design heuristics:

1. **Ease of data entry:** When a patient presents for an acute episode, vitals and basic patient information must be quickly entered into the HIS to allow for effective coordination and subsequent decision making.

2. **Effective use of default information:** Ensuring that commonly needed information and functions exist on a single screen improves provider efficiency and software usability. Functions or information that is repeatedly used in sequence should be reflected in the display.

3. **Consistency in the system's terminology, structures, look and feel :**
   Consistency across screens and between the providers' views enhances system navigation and team coordination (Serobatse, 2013)

   While , (Salahuddin and Ismail, 2015)added different system quality characteristics **System usability associated with system quality:**
   usability is the extent to which a system can be used by specific users to achieve specified goals with effectiveness, efficiency, and satisfaction in a specified context of use.

4. **System response time associated with system quality:**
   (Salahuddin and Ismail, 2015),considered the System responses time one of the important features to system quality which concerns with the duration taken by the health IT to response accordingly. Quick response time is crucial in healthcare environment to avoid safety incidents. Healthcare practitioners denoted that using health IT were too time-consuming due to the slow speed of the computer or network delays, and the slow process for the healthcare practitioners to interact with the systems. Speed of ordering became worse with health IT compared to paper-based because the health IT required many mouse clicks and steps to complete ordering. Slow health IT caused work increase due to new or additional work emerged in order to deal with the limitations.

5. **System compatibility associated with system quality:**
   refers to the fit, alignment or balance that needs to be in place to achieve one or more goals . Compatibility issues were related to compatibility between health IT and healthcare practitioners' tasks, and compatibility between health IT and other systems.

6. **System reliability associated with system quality:**
   System reliability referring to health IT ability to continuously functioning correctly . In other words, it is the extent to which health IT functions

without failure under given normal conditions during a given time period . Frequent system down or malfunction is associated to poor reliability. Poor system reliability resulted in data being entered in the health IT were missing, delayed information accessed, and disrupted the functioning of the entire clinical department. (Salahuddin and Ismail 2015)

2.5.2.2 DeLone McLean Information Systems Success Model indicators for system quality :

1- Accessibility : Users are easy to access the system
2- Ease of Use: The system is easily to be learned and used.
3- Response time the system provides a quick response to any given input.
4- Security the system ensures restriction to any unauthorized access.(DeLone and McLean, 1992)

2.5.3 Information Quality:

Information quality refers to the content and format of the system's outputs so as to ensure they are usable, sufficiently detailed, meaningful, easy to read and understand, and therefore helpful for task completion and decision making (Cohen, et al., 2016).

Also information quality defined as a concerned with the information provided by health IT. Information quality related to the safety issue is denoted by: completeness, relevancy, and timeliness. Information completeness serves as a measure of the prevalence of missing information . (Salahuddin and Ismail, 2015)

(Peikari, et al., 2015) defined information quality, which refers to the accuracy, relevance and timeliness of the information generated by a system.

(Safdari, et al., 2014) considered the quality of information as evaluation to the output of the information system and also criteria such as adequacy, granularity, currency and timeliness of data, validity and reliability, association with decision are measured.

Information quality defined as the determinant of output data process which will be communicate to the user or can be considered as an input for another process.

Information quality determined by seven things which is Accessibility, Completeness, Accuracy, Exactly, Timely, Clearly, and Flexibility.(Ratnaningtyas and Surendro, 2013)

While (Trice and Treacy, 1988) defined an information system as a system usage, which reflects the degree to which users are confident about the effectiveness of the information systems they use

From the previous and different definitions of the information quality the researcher adopts the following definition: "information quality is the completeness of system which present a documented data for patients ,these documented data should be accurate ,easy to access and clearly to gain best service for patient and best decision making for doctors ".

2.5.3.1 The Importance of Information Quality in Hospitals :

According to (Ratananingtyas and Surendro, 2013), the importance of information quality in hospitals can be seen through the following points:

- To promote accountability between health provider.
- To inform the focus policy development.
- To possibly the provider and functionary to learn about quality improvement between them.

2.5.3.2 Parameters for Information Quality :

Below are the parameters of information quality

- Accuracy: Information should be free from error/defect and not ambiguous.

- Accessibility: Information should be easy to get by interested and needed parties, so that the health care process should be easier to implement.

- Completeness: Information should be complete without nothing left.

- Timely: The delivery time of information. If information delivered late, it will occur to the importance level of information.

- Clearly: It will be better if information has been packaged with the easy-to-read format.

- Relevance: Information should be useful and related to user requirement. It is the same with the effective level of information. Information should be used to meet the right things.

- Safely: Information should be secure and has its own security system to protect the confidentiality of the information.

- Efficient: Information is not overused and should meet the right things to get the maximum results.(Ratnaningtyas and Surendro, 2013)

However, DeLone McLean Information Systems Success Model indicators for information quality added other parameters, which are:

- Content the system provides a complete information/content.
- Currency the system does provide up-to-date information.(DeLone and McLean, 1992)

Other relevant concepts are information completeness, information relevancy, and information timeliness. Below is a brief explanation about these concepts.

Information completeness serves as a measure of the prevalence of missing information. reported that omitted information contribute to most of the errors related to e-prescribing systems.

Information relevancy is ability of the health IT generated information or features that satisfy the healthcare practitioners' needs. Alert fatigue and information overloaded were the typical issues associated with information relevancy. Alerts were perceived as not useful because they did not display all the clinically-relevant information required for healthcare practitioners decision-making . Additionally, medication information were not displayed according to the healthcare practitioners' needs and information overload created difficulties to find necessary information.

Information timeliness refers to information that was accessible in time in the health IT to be useful. Information did not generate periodically according to appropriate schedule prevented healthcare practitioners from receiving accurate medication overview. Moreover, timely exchange of relevant patient information between transition units, and emergency care is crucial to ensure continuity and facilitate

coordination during transitions. Primary care practitioners are criticized for not consistently receiving hospital admission or discharge summaries beforehand that were necessary for follow up at the point of care (Salahuddin and Ismail 2015).

2.5.4 Service Quality:

Service quality refers to the availability and responsiveness of support provided to users of the system as well as training opportunities .systematic review identified user support as highly important for the success of clinical IS implementations, while others show user support as reducing user resistance. A longitudinal study found that training and user support are among the most important factors contributing to nurses' acceptance of an IS in both early and later stages of implementation(Cohen, Coleman et al. 2016) While (Mikic Little and Dean 2006) defined Service quality as measures how well the service level received by customers matches their expectations. Also Service quality has been considered as concerns with the support delivered by health IT service providers. The service providers include employees from internal department such as IT department or external providers such as health IT vendors or internet providers. Service quality related to the safety issue is denoted by: tangibles, responsiveness, and assurance. (Salahuddin and Ismail 2015)**.** Service quality was defined as , the degree that the support of a system meets its customer needs. (DeLone and McLean 1992).

(Edura Wan Rashid and Kamaruzaman Jusoff 2009) defined service quality as the difference between predicted, or expected, service (customer expectations) and perceived serviced (customer perceptions).

From previous and different definitions of the service quality, the researcher adopts the following definition: "service quality is how to present completely service for both patients and for system users through training, supporting for system users and quick respondent for patients."

2.5.4.1 The Differences between Each of System Quality Information Quality:

System quality measures the characteristics of health IT whereas information quality and service quality measure the content of health IT and the support provided by service providers, respectively . The service providers can be the IT department,

system vendors or third party service providers(Salahuddin and Ismail 2015) , information quality refers to the semantic level and information use, user satisfaction, individual impact and organizational Impact to the effectiveness level (Häyrinen, et al. 2008) .

2.5.4.2 A Conceptual Model Of Service Quality

The service quality model indicates that consumers' quality perceptions are influenced by a series of four distinctive gaps occurring in organizations. These gaps on the service providers' side, which impede delivery of services that consumers perceive to be of high quality, are:

- Differences between patient expectations and management perceptions of patients expectations.
- Differences between management perceptions of patient expectations and service quality specifications.
- Differences between service quality specifications and service actually delivered.
- Differences between service delivery and what is communicated about the service to patients (Rashid and Jusoff, 2009).

2.5.4.3 Parameters For Service Quality :

presented indicators for service quality:

- **Tangible**: is associated with physical facilities and equipment. Technical support facilitated healthcare practitioners to catch up with periodic systems upgrades . lack of technical support to perform maintenance or update the health IT caused imprecise, incomplete, or out-of-date information .
- **Responsiveness** : refers to IT service providers' willingness to help users and provide prompt service .Slow response of technical support staff to act upon the reported technical problem, and inability to make rapid modification on health IT due to the requisite of approval prior to the proposed changes created problems among healthcare practitioners to effectively used the systems .
- **Assurance**: is related to the knowledge of IT service providers. Inadequate knowledge of the health IT by technical support staff can potentially develop safety risks [89]. For an example, a technical support staff failed to immediately

recognize inadvertent change to a configuration file or configuration error during a system update because the installation and configuration were done before the enrolment of the technical support staff (Salahuddin and Ismail, 2015)

DeLone McLean Information Systems Success Model ,added in his model another indicators differ from previous one .

- **Reliability:** The system provider reliable services to its users
- **Empathy:** The system/staffs show willingness to help/care to its users(DeLone and McLean 1992)

2.5.4.4   The Advantages of SERVQUAL:.
- It is accepted as a standard for accessing different dimension of service quality;.
- It has been shown to be valid for a number of service situations;.
- It has been known to be reliable;.
- the instrument is parsimonious because it has a limited number of items. This means that customers and employers can fill it out quickly.
- It has a standardized analysis procedure to aid interpretation and results.(Edura Wan Rashid and Kamaruzaman Jusoff, 2009)

2.5.5   Performance Quality:

Performance quality was defined as a primary a quantitative technique for making diagnostic observations of user experiences by assessing individual satisfaction along a set of attributes, performance of HIS attributes as well as the relative importance of these attributes to user satisfaction and productivity outcomes (Cohen, et al., 2016).

While (Chang, et al., 2012) defined performance as ,refers to the yield and results generated by individual employees at work performance as the speed by which an organization reaches its goal.

Health System Performance was also defined as a system, which has a number of aspects including population health, health outcomes from treatment, clinical quality and the appropriateness of care, responsiveness, equity and productivity and progress is varied in the development of performance measures and data collection techniques for these different aspects. Considerable progress has been made. (Smith, 2009)

From the previous and different definitions of the performance quality, the researcher adopts this definition: " performance quality is defined as improvement of activity levels through reducing time, reducing work load for doctors and achieve more works by seeing more patients".

The personal factors that affect work performance include knowledge, skills, capabilities, motivation and attitudes (Chang, et al., 2012).

2.5.5.1 Performance Measurement:

Performance can be measured by different dimensions. Below are some of these dimensions.

- Service Improvement: purchasers and providers can compare performance within and among hospitals to stimulate and measure change.
- Referee and patient choice: patients and their referrers can use information such as waiting times, outcomes and patient experiences in choosing a provider.
- Resource management: purchasers and provider managers need data on performance, costs and volume of activity in order to decide on the best use of resources.
- Accountability: politicians and the public increasingly demand transparency, protection and accountability for performance. (l'Europe and Shaw, 2003)

2.5.6 Summary for Previous Section:

In the previous section, the researcher focused on the research model and researcher hypothesis. Firstly, the researcher introduced dependent variables healthcare quality(reduction of prescribing errors, redesigning patients care pathway and improvement patients health outcome) others definitions, researcher definitions ,function and types each of terms .Also the researcher introduced Independent variables of hospital information system (safety quality ,information quality , system quality ,service quality and performance quality) others' definitions, researcher definitions ,function and types of each of term .

Chapter Three:
Previous Studies

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Chapter Three

Previous Studies

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3.1 Introduction

In this chapter, the researcher aimed to provide an overview of the literature that studied hospital information system and its effects on healthcare quality, also who (HIS) impact on system quality, information quality, safety quality, service quality and performance quality .

3.2 Previous Studies:

Twenty three studies were chosen to summarize which covered the subjects of hospital information system ,criteria of quality such as system quality ,information quality, service quality, safety quality, performance quality in addition to healthcare quality which consists of reduction of prescribing errors, redesigning patients care pathway and finally improvement patients health outcomes .

These studies were arranged in descending order from 2016 to 1999.

1-(Cohen, et al., 2016)

" An importance-performance analysis of hospital information system attribute nurse perspective"

The Objective :was to identify priorities for managerial intervention based on user evaluations of the performance of the HIS attributes as well as the relative importance of these attributes to user satisfaction and productivity outcomes.

Research variables :HIS attributes, System quality, Information quality, Service quality and data quality.

Research methodology: the researcher collected data along a set of attributes representing system quality, data quality, information quality, and service quality from 154 nurse users. Their quantitative responses were analyzed using the partial least squares approach followed by an importance of performance analysis.

Finding & conclusion: the main findings were two system quality attributes (responsiveness and ease of learning), one information quality attribute (detail), one service quality attribute (sufficient support), and three data quality attributes (records complete, accurate and never missing) were identified as high priorities for intervention. The research conclusions were that application of importance-performance analysis is unique in HIS evaluation and we have illustrated its utility for identifying those system attributes for which underperformance is not acceptable to users and therefore should be high priorities for intervention.

2-(Jin, et al., 2016)

"How users adopt healthcare information: An empirical study of an online Q&A community"

The Objective :was to explore patients' healthcare information seeking behavior in online communities.

Research methodology :research method was based on dual-process theory and the knowledge adoption model. The model highlights that information quality, emotional support, and source credibility are antecedent variables of adoption likelihood of healthcare information, and competition among repliers and involvement of recipients moderate the relationship between the antecedent variables and adoption likelihood.

Finding & conclusion :research results were Information quality, emotional support, and source credibility have significant and positive impact on healthcare information adoption likelihood, and among these factors, information quality has the biggest impact on a patient's adoption decision. In addition, competition among repliers and involvement of recipients were tested as moderating effects between these antecedent factors and the adoption likelihood. Results indicated competition among repliers positively moderates the relationship between source credibility and adoption likelihood, and recipients' involvement positively moderates the relationship between information quality, source credibility, and adoption decision. In addition to information quality and source credibility, emotional support has significant positive impact on individuals' healthcare information adoption decisions. Moreover, the

relationships between information quality, source credibility, emotional support, and adoption decision are moderated by competition among repliers and involvement of recipients.

3-(Ross and Venkatesh, 2016)

"Role of Hospital Information Systems in Improving Healthcare Quality in Hospitals."

The Objective : was to offer analytical research that explores the role of hospital information systems in delivery of healthcare in its diverse organizational and regulatory settings. Also it aimed to examine the role of hospital information systems in improving health care quality in hospital.

Research variables : Information system quality is categorized into six major dimensions that include system quality, information quality, use, user satisfaction, individual impact and organizational impact.

Research methodology : primary data was collected through distributing questionnaire to patient. A total of 214 samples were collected from major corporate hospitals in the capital city of Tamil Nadu, i.e., Chennai and used for research paper.

Methods and Analysis: Friedman test was implied to find the effect of implementing hospital information systems in hospitals to improve healthcare quality.

Finding &conclusion : Implementing hospital information system in hospitals has a greater effect on improving healthcare quality among hospitals and this increase patients' satisfaction.

4-(Shah and Peikari, 2016)

"Electronic Prescribing Usability: Reduction of Mental Workload and Prescribing Errors among Community Physicians."

The Objective : was to address three gaps in this field. First, the factors leading to the reduction of mental workload and its relationship with the reduction of prescribing errors by improving electronic prescribing (e-prescribing) usability have

not been empirically examined before. Second, the past research in the field of e-prescribing usability lacks robust theoretical models. Third, there are no existing studies to examine the direct influences of user interface consistency and error prevention with the reduction of mental workload and prescribing errors.

Research variables : Information Quality, Ease of Use, Error Prevention, Consistency, Reduction of Mental Workload and Reduction of Errors.

Research methodology :a quantitative survey method was used to collect data from 188 community physicians. The partial least squares path modeling technique was applied to analyze the data.

Finding &conclusion : Prescribing errors were reduced by improving the information quality, user interface consistency, system ease of use, and mental workload reduction. Mental workload is reduced by ease of use, error prevention, and consistency. No significant relationships between prescribing error reduction with error prevention and also between information quality with mental workload reduction were found.

5-(Peikari, et al., 2015)

"The impacts of second generation e-prescribing usability on community pharmacists outcomes."

The Objective :was to investigate the extent to which second generation e-prescribing usability leads to positive outcomes for community pharmacists.

Research variables :the research intends to employ a robust and rigorous quantitative research method and multivariate data analysis to examine the extent to which second generation e-prescribing usability improves the positive outcomes (including the improvement of communication, facilitation of providing care, reduction of medical errors and workload) amongst community pharmacists.

Research methodology :a quantitative survey research method was used and the data was collected from the community pharmacists, who use an e-prescribing system. Data from 152 questionnaires collected in a national survey were used to for

the study. Partial Least Squares (PLS) path modeling was used to examine scale reliability, validity and hypotheses.

Finding &conclusion :the result showed that, the scale was found to test well for reliability and validity. Examining the hypotheses illustrated that ease of use (P < 0.01, t = 5.79) and information quality (P < 0.01, t = 6.24) of an e-prescribing system improved pharmacists' outcomes (including communication, facilitation of care, reduction of workload and medical errors) while ease of use of the system was influenced by user interface consistency (P < 0.01, t = 7.35) and system error prevention (P < 0.01, t = 5.29). Conclusion: To improve community pharmacists' outcomes and practices, the ease of use, information quality, consistency and error prevention features of e-prescribing systems should be improved. It was

6-(Saeedbakhsh et al. 2015)

"Analysis of the quality of hospital information systems in Isfahan teaching hospitals based on the DeLone and McLean model."

The Objective: was the analysis system quality for hospital information system (HIS)in teaching hospital of Isfahan based on DeLone's model.

Research variables: system quality components (system quality ,information quality and users' satisfaction.

Research methodology: the study which was applied and descriptive-analytical in nature was carried out in the medical-teaching hospitals of Isfahan city in 2009.

Research population consisted of the system users from which a sample was selected using random sampling method. The size of the sample was 228. Data collection instrument was a self-developed questionnaire produced based on the satisfaction criterion in the DeLone and McLean's model. Its content validity was assessed based on the opinions given by the computer sciences professionals with its estimated Cronbach's alpha found to be 92.2%.

Finding &conclusion :the differences among the mean scores obtained for the satisfaction with different kinds of HISs in use in the hospitals were statistically significant (p value≤0.05). The overall mean score for the satisfaction was 54.6% for different types of systems and 55.6% among the hospitals. Conclusion: Given the

findings of the study, it can be argued that based on the used model, the level of users' satisfaction with the systems in question was relatively good. However, to achieve the total optimum condition, when designing the system, the factors affecting the enhancement of the users' satisfaction and the type of hospital activity and specialty must be given special consideration.

7-(Salahuddin and Ismail, 2015)

"Classification of antecedents towards safety use of health information technology: A systematic review."

The Objective :were to identify the antecedents towards safety use of health IT by conducting systematic literature review (SLR). The second objective was to classify the identified antecedents based on the work system in Systems Engineering Initiative for Patient Safety (SEIPS) model and an extension of DeLone and McLean (D&M) information system (IS) success model.

Research variables : Information quality, System quality ,Service quality ,Intention to use and User satisfaction

Research methodology :a systematic literature review (SLR) was conducted from peer-reviewed scholarly publications between January 2000 and July 2014. Data extracted from the resultant studies included are to be analyzed based on the work system in Systems Engineering Initiative for Patient Safety (SEIPS) model, and also from the extended DeLone and McLean (D&M) information system (IS) success model. Results: 55 articles delineated to be antecedents that influenced the safety use of health IT were included for review

Finding & conclusion : This review provides evidence that the antecedents for safety use of health IT originated from both social and technical aspects. However, inappropriate health IT usage potentially increases the incidence of errors and produces new safety risks. The review cautions future implementation and adoption of health IT to carefully consider the complex interactions between social and technical elements propound in healthcare settings.

8-(Abdool, 2014)

"A Cross-Sectional Study about a Health Information System (HIS) in the United Arab Emirates Federal Healthcare Organization (UAE FHO)."

The Objective : were to identify the current status of the health information system (HIS) in the UAE Federal Health Organization (UAE FHO) and how health information system (HIS) can help in re-designing patients' care pathway as well as improving health outcomes. Another aim of this research was to identify the challenges faced in this system with possible solutions to overcome these challenges.

Research variables: Re-designing patients' care pathway, Improving health outcomes for patients.

Research methodology: mainly ‹quantitative method was utilized to conduct the study. The study met its aims and covered the targeted research questions related to HIS. Two hypotheses were tested related to patients' care pathway and health outcomes. Abdool used a mixed study design between descriptive and analytical design was conducted. The study was conducted to cover 6 hospitals and the project management office. The researcher used a questionnaire to collect data for its questions.

Finding &conclusion : results showed that he implemented HIS helped in re-designing patients' care pathway. Based on the results obtained, the null hypothesis is not rejected as the overall p-value obtained = 2.71 is greater than 0.05. This means that there is no statistical significance at the level of 5%. The implemented HIS helped in improving patients' health outcomes based on the results obtained, the null hypothesis is not rejected as the overall p-value obtained = 1.80 is greater than 0.05. This means that there is no statistics significance at the level of 5%.

Recommendations: the researcher recommended to make adjustments to the implemented systems, but with caution in order to not cause overwhelming costs and workloads. As part of HIS improvements, "patient portal" would be a positive tool for patients to access their own electronic health records which is useful for communication, completing tasks, viewing their medical conditions…etc. rather than visiting healthcare facilitates when it is not critical that save time, resources and efforts for both healthcare professionals and patients themselves.

9-(Mehraeen, et al., 2014)

"Evaluation Of Hospital Information Systems In Selected Hospitals Of Iran"

The Objective :were to avoid duplication, to help improve care quality and reduce cost. The study was performed using evaluation indices of hospital Information systems (HIS) in selected hospitals of Iran. The article organizational and server components of hospital information systems in selected hospitals are being assessed.

Research methodology :the research was a descriptive cross – sectional study. The study population consisted of the information system of ShohadayTajrish, Khatamolanbiya, Imam Khomeini and Milad Hospital. Data collecting tools were checklist of hospital information system Evaluation Index, which completed with direct observation and interviews with users.

Research method: the studied sample includes information system of ShohadayeTajrish, RasooleAkram, KhatamAlanbiya, EmamKhomeyni (5 hospitals and 100 information systems).

Finding & conclusion :the result was that there is not currently in designed software and will be implemented in future versions of the software" more than other features. Due to the widespread adoption of hospital information systems in healthcare organizations, significant impact on patient treatment .

Recommendations : The researcher recommended to emphasize on characteristics that required for the implementation of HIS software; evaluation of HIS in healthcare organizations; more focus on organizational and server components of HIS.

10-(Safdari, et al., 2014)

"Hospital information systems success: A study based on the model adjusted DeLone and McLean in UMSU hospitals."

The Objective :was to assess HIS success in hospitals of Urmia university of medical sciences is based on the model Adjusted DeLone - McLean. This is a descriptive - cross sectional study which was inducted in 2014.

Research variables :system quality, information quality and service quality.

Research methodology :the study population consisted of 180 HIS users from Teaching Hospitals Affiliated to Urmia University of Medical Sciences. Data were collected using a self-structured questionnaire which was estimated as both reliable and valid. HIS highest success rate was based on three criteria related to the quality of system (3.11) and the lowest information quality (2.78).

Finding & conclusion :the result showed that none of the three criteria (system quality, information quality and service quality) were not satisfactory success rate HIS ($P < 0.05$). According to the survey results, it seems necessary to improve the system quality: user friendly, speed data entry, integration and exchange of information, usability and flexibility HIS pointed out. Improve the comprehensiveness, accuracy, and appropriateness to date reports could lead to increased information quality of HIS. Using hardware and advanced equipment, such as portable computers, smart sensors, useful applications optimized to reduce medical errors and support services, which will allow users to have complete satisfaction from the service quality of HIS.

11-(Aghazadeh, et al., 2013)

"Study the effect of Hospital Information Systems (HIS) on Communication Improvement and Service Quality among Nursing Staff "

The Objective :was to investigate the HIS's effect on nursing stuff communications in different wards and finally on healthcare quality.

Research variables : service quality ,communication improvement .

Research methodology :questionnaire was designed to investigate the nurse users' view about the HIS. It was distributed among 150 nurses working in the admission wards of the hospital. From among the questions of the questionnaire, 6 questions were aimed at measuring the major and minor effects of the system on the nurses' important work communications and the major effect of the system on the accuracy of their routine tasks was assessed through one question. A 5-point Likert scale was considered in all of the questions. The study was an analytic descriptive research.

Finding & conclusion :a significant enhancement has been reported by nurses in total index of communication between different parts of hospital (60%) and basic indexes, including ease of accessing to patients' Furthermore, in 60 percent of cases a positive effect on enhancing accuracy in doing routine tasks has been reported (p<0.05).Conclusion: the study showed that hospital information system enhancing communication between nurses and increasing accuracy in their routine tasks causes development in nurses' work flow, decreasing probability of mistake, and rising in patient healthcare quality.

12-(Drach-Zahavy and Somech, 2013)

"Linking task and goal interdependence to quality service: The role of the service climate."
The objective : the purpose of the paper was to focus on the service climate, including its antecedents, consequences, and a moderator. First, it examined whether task and goal interdependent configuration facilitates the level of service climate; second, it tested the strength of the moderating role of service climate between service climate levels and service behavior.

Research methodology: among 54 nursing units at six hospitals, the data were collected using multiple methods (surveys, observations, administrative data). Research findings, mixed-linear model analyses indicated that the joint effects of task and goal interdependence related significantly to service climate level. Assimilating a service climate in units is not enough. To promote high quality service behaviors, managers must direct their efforts toward finding agreement among team members with regard with the importance of service in their unit.

Finding &conclusion :the paper's findings were offer empirical support to the persistent social interaction explanation of climate formation and point to the important role of interdependence for creating and maintaining service climate levels and promoting service behaviors in unit information industry in the country, the role of government and infrastructure.

13-(Peikari, et al., 2013)

"Role of computerized physician order entry usability in the reduction of prescribing errors."

The Objective :was to rigorously and quantitatively examine the influence of the use of CPOE on reduction of the prescribing errors.

Research variables :Information quality, Ease of use, Ease of use, Error prevention and Error reduction.

Research methodology: the research employed a quantitative method using a self-administered survey, the target population included doctors who had at least 3 months of experience with CPOE systems. a questionnaire was developed; one hundred and sixty-six questionnaires were used for quantitative data analyses. Since the data was not normally distributed, partial least square path modeling−as the second generation of multivariate data analyses−was applied to analyze data.

Finding &conclusion :the results showed that t was found that the ease of use of the system and information quality can significantly reduce prescribing errors. Moreover, the user interface consistency and system error prevention have a significant positive impact on the perceived ease of use. More than 50% of the respondents believed that CPOE reduces the likelihood of drug allergy, drug

interaction, and drug dosing errors thus improving patient safety. Conclusions: Prescribing errors in terms of drug allergy, drug interaction, and drug dosing errors are reduced if the CPOE is not error-prone and easy to use, if the user interface is consistent, and if it provides quality information to doctors.

14-(Acharyulu, 2012)

"Assessment of Hospital Information System Quality in Multi-Specialty Hospitals."

The Objective :was to identify the requirements for HIS to assist in providing quality healthcare service.

Research Methodology: questionnaires were designed to assess the level of satisfaction of different HIS users, the questionnaires were distributed to 180 HIS users from three different hospitals 60 from each hospital that uses the same HIS system. These respondents were selected through purposive sampling the assessment of variables. In addition, the research introduced the concept of loss function and relates it to repercussions of HIS customer dissatisfaction. The research's design is qualitative and consists of three leading multispecialty corporate hospitals (above 500 bedded) in Hyderabad.

Finding & Conclusion :results showed that there is statistically significant difference in 'The Information System has ability to communicate and exchange data among departments' score across three groups as the sig-value was 0.018 and less than alpha level 0.05, and an inspection the mean ranks of Administrative and 'others' had the highest agreement followed with Nurses, and Doctors. There is statistically significant difference in 'The Information System can reduce waiting time' score across three groups as the sig-value was 0.049 and less than alpha level 0.05, and an inspection the mean ranks of Administrative and 'others' had the highest agreement followed with Nurses and Doctors. There is statistically significant difference in 'Present information system needs modification or improvement for efficient and effective patient care.' score across three groups as the sig-value was 0.022 and less than alpha level 0.05, and an inspection the mean ranks of Nurses had the highest agreement followed with Administrative and 'others' and Doctors .

15-(Aggelidis and Chatzoglou, 2012)

Hospital information systems: Measuring end user computing satisfaction (EUCS)."

The Objective :was to (a) determine whether an IS instrument that is commonly used as a surrogate measure for success, the end-user computing satisfaction model, can be applied in hospital information systems and (b) extend the generalizability of the end-user computing satisfaction (EUCS) instrument by assessing the psychometric properties of a Greek translation of the EUCS survey.

Research Variables : Information Quality, System Quality and Overall Satisfaction

Research Methodology: research method based on the literature, items for each construct were developed to test the hypothetical models. All items were measured using a five-point Likert scale. These items were incorporated into a preliminary structured questionnaire which was sent out for review to 30 HIS users and three experts who had practical and academic experience with IS research.

Finding &Conclusion : The findings indicated that the new EUCS model proposed is a valid and reliable instrument that can be used confidently by researchers in Greece and elsewhere. These results enable the generalizability of the EUCS instrument and enhance its robustness as a valid measure of computing satisfaction and a surrogate for system success in a variety of cultural and linguistic settings.

16-(Gardner ,2012)

"Improving Hospital Quality and Patient Safety. An Examination of Organizational Culture and Information Systems"

The Objective was to examine the application of operations management principles and practices in a hospital setting for the purpose of improving healthcare quality and safety. Specifically, the study research the effects of safety culture, including operational climate and practices, as well as the adoption and use of information systems for delivering high quality healthcare and improved patient experience.

Research Variables :most existing research examines safety culture from a general organizational perspective and often fails to explicitly examine moderating effects of

two key organizational variables: 1) hospital capacity as represented by the number of beds, and 2) the influence of information technologies.

Research Methodology: Secondary data on the levels of HIT adoption as reported by HIMSS and the Dorenfest Institute is combined with primary survey data from 2009 on the use and analysis of data in 272 U.S. hospitals; the dissertation combines multiple sources of secondary data on hospital performance with primary survey data from hospitals throughout the U.S. Performance outcomes examined include process of care quality, patient satisfaction, and patient experience of care.

Finding &Conclusion :the findings addressed gaps in the literature regarding how organizational culture and information systems influence hospital quality performance. The results indicate that general safety climate and quality practices establish an environment in which outcome-specific efforts enable process quality improvement.

17- (Ammenwerth, et al., 2011)

"Effect of a nursing information system on the quality of information processing in nursing: An evaluation study using the HIS-monitor instrument."

The Objective :was to assess the changes in the quality of information processing in nursing after the introduction of a computer-based nursing information system.

Research Variables : Quality of information, System details and Participants.

Research methodology: 94 nurses filled out the HIS-monitor survey, comprising 41 questions and focusing on the quality of the information processing, shortly before and again one year after the introduction of a computer-based nursing information system.

Finding & Conclusion :the results show improved support during patient anamnesis and care planning, higher availability and completeness of nursing documentation, better overview on the patient, better readability of nursing documentation, reduction of duplicate documentation, better work flow support with task lists and checklists, and better fulfillment of the legal regulations.

The results with regard to time efforts for nursing documentation and the related impact on patient care were mixed, however. Most of the expectations of the nurses that were stated before IT introduction seem to have been realized. Conclusions: The HIS-monitor was found to be a useful instrument, in turn showing that the quality of the information processing in nursing strongly increased after the introduction of a nursing information system.

18-(Wan Rashid and Jusoff, 2009)

"Service quality in health care setting"

The Objective was to explore the concept of service quality in a health care setting. Research methodology, the paper probed the definition of service quality from technical and functional aspects for a better understanding on how consumers evaluate the quality of health care.

Research methodology: The researcher adopted the conceptual model of service quality frequently used by the most researchers in the health care sector. The paper also discussed several service quality dimensions and service quality problems in order to provide a more holistic conception of hospital service quality.

Finding &Conclusion :the paper was found that service quality in health care is very complex as compared to other services because this sector highly involves risk, service quality becomes the most critical consumer issue in health care setting. From various studies, SERVQUAL appears to be a consistent and reliable scale to measure heath care service quality. The importance of functional aspects of care, the SERVQUAL instrument has a useful diagnostic role to play in assessing and monitoring service quality in health care, enabling the organization to identify where improvements are needed from the patient's viewpoint.

19-(Gurses, et al., 2009)

"Impact of performance obstacles on intensive care nurses' workload, perceived quality and safety of care, and quality of working life."

The Objective was to study the impact of performance obstacles on intensive care nurses' workload, quality and safety of care, and quality of working life (QWL).

Performance obstacles are factors that hinder nurses' capacity to perform their job and that are closely associated with their immediate work system.

Research Variables : Workload, Perceived quality and safety of care.

Research methodology: data were collected from 265 nurses in 17 intensive care units (ICUs) between February and August 2004 via a structured questionnaire, yielding a response rate of 80 percent.

Finding &Conclusion :the researcher resulted that, a Performance obstacles were found to affect perceived quality and safety of care and QWL of ICU nurses. Workload mediated the impact of performance obstacles with the exception of equipment-related issues on perceived quality and safety of care as well as QWL. Performance obstacles in ICUs are a major determinant of nursing workload, perceived quality and safety of care, and QWL. The research concluded that the performance obstacles increase nursing work load, which in turn negatively affect perceived quality and safety of care and QWL. Redesigning the ICU work system to reduce performance obstacles may improve nurses' work.

20-(Hurst and Guo, 2008)
"Quality of health care in the US managed care system: comparing and highlighting successful states."
The Objective :was to examine the issue of quality of care in the US managed care system and to compare state-level policies and programs. Specifically, also it aimed to describe five states which are making the most quality of care improvements.

Research Methodology: Methodology approach study, examined the literature to identify states' care quality rankings. Additionally, five state case studies are presented to illustrate various programs approach to quality.

Finding &Conclusion :the paper was found that some states are better than others in their strategies to enhance quality of care. California, Florida, Maryland, Minnesota and Rhode Island are considered among the best. Thus, their programs are described. As states devise strategies to improve quality, their methods and outcomes vary. A

systematic investigation of these techniques is useful for managers and practitioners striving to improve care quality under US managed.

21-(Chaudhry, et al., 2006)

"Systematic review: impact of health information technology on quality, efficiency, and costs of medical care."

The Objective was to study the effect of health information technology on quality, efficiency, and costs of health care.

Research Methodology: the researchers used Descriptive and comparative studies and systematic reviews of health information technology. Two reviewers independently extracted information on system capabilities, design, effects on quality, system acquisition, implementation context, and costs. Three major benefits on quality were demonstrated: increased adherence to guideline-based care, enhanced surveillance and monitoring, and decreased medication errors. The primary domain of improvement was preventive health. The major efficiency benefit shown was decreased utilization of care. Data on another efficiency measure, time utilization, were mixed. Empirical cost data were limited.

Finding &Conclusion : Four benchmark institutions have demonstrated the efficacy of health information technologies in improving quality and efficiency. Whether and how other institutions can achieve similar benefits, and at what costs are unclear.

22-(Hayajneh, et al., 2006)

"Extent of Use, Perceptions, and Knowledge of a Hospital Information System by Staff Physician".

The Objective was to study the effect of computerized hospital information system (HIS) used to support clinical and administrative processes which was implemented in a large Jordanian teaching hospital in 2003,also the another aim of the study was to describe physicians' use, perceptions, and knowledge regarding the implemented HIS.

Research Variables :access to Information, security and privacy of Information, communication effectiveness, efficiency and quality of services

Research methodology: the researcher used a descriptive survey in a large teaching hospital. The researcher developed questionnaire comprising 38 questions was distributed to a convenient sample of 29 staff physicians who practiced in the hospital in the periods before and after implementation of the system. The population was consisted of all staff physicians employed by the hospital at the time of data collection and who were employed by the hospital during the period before and after its implementation.

Finding & Conclusion :the research results indicated that staff physicians use the system and that access to information was improved as a result of the HIS. Study findings indicated that the HIS was in general effective in improving access to information. Still there seems to be a problem in protecting information confidentiality and security. The study was recommended to implement such application for enhancing communication between all involved providers of care.

23-(Bates, et al., 1999)

"The impact of computerized physician order entry on medication error prevention."

The Objective was to evaluate the impact of computerized physician order entry (POE) with decision support in reducing the number of medication errors. All patients admitted to three medical units were studied for seven to ten-week periods in four different years. The baseline period was before implementation of POE, and the remaining three were after. Sophistication of POE increased with each successive period. Physician order entry with decision support features such as drug allergy and drug–drug interaction warnings.

Research Methodology: During the study, the non-missed-dose medication error rate fell 81 percent, from 142 per 1,000 patient-days in the baseline period to 26.6 per 1,000 patient-days in the final period (P< 0.0001). Non-intercepted serious medication errors (those with the potential to cause injury) fell86 percent from baseline to period 3, the final period (P = 0.0003). Large differences were seen for all

main types of medication errors: dose errors, frequency errors, route errors, substitution errors, and allergies.

For example, in the baseline period there were ten allergy errors, but only two in the following three periods combined ($P < 0.0001$).

Finding & Conclusion : Computerized POE substantially decreased the rate of non-missed-dose medication errors. A major reduction in errors was achieved with the initial version of the system, and further reductions were found with addition of decision support features.

3.3 Comment on Previous Studies and Conclusion:

The researcher used the previous studies to acquire a wide understanding to the context of the study literature and identify hospital information system implementation, which was necessary in selecting the variables, developing hypothesis and the environment of the research. These previous studies were also important in the analysis process as well as the interpreting to the results of the study by comparing the findings with those of the previous studies As shown, many researchers studied hospital information system by using different variables affected (HIS) and on the healthcare quality .The researcher found that most of previous studies proved that hospital information system variables effect on healthcare quality. This study contains on different independent variables which differ from DeLone and McLean's model. DeLone and McLean's model contained only on system quality, service quality and information quality, the researcher addressed another two criteria for quality which is safety quality and performance quality in addition to DeLone and McLean's model also another three variables of healthcare quality added which are reduction of prescribing error, redesigning patients care pathway and improvement patients outcome. The researcher tried to take in consideration all aspects and theories to detect the impact of hospital information system on healthcare quality. Most of previous studies tried to research the impact of hospital information system on limited variables while, the researcher collected variation of variables which able to measure healthcare quality. The researcher found that most of previous studies population samples differed from the researcher sample, it may targeted a specific category such as nursing staff only or radiology technicians only …etc.

The researcher used a wide range of population which included nine categories, nurses in 21 different hospital departments, administrators, radiology technicians, pharmacy, laboratory technicians, (patients' healthcare) reception staff, medical record, emergency staff and out patients clinics who are working on the European Gaza Hospital.

Having shed light on the previous studies, the researcher finds it important to shed some light on what distinguishes the current study from previous ones. Below are few points that make this study different from the previous ones.

- It is modern study that examined the relationship and the impact of (HIS) quality components on healthcare quality "as the researcher found".
- Previous studies examined the parts of the title of this study separately so these studies similar with it in some theoretical frameworks, but different in some things such as the dependent and associated independent variables, Society study, as well as the spatial domain and temporal.
- The current study used a multi regression model to show the impact of (HIS) on healthcare quality, whereas most of previous research didn't use this model.
- This research contains on a variety of independent variables (system quality , safety quality, information quality ,performance quality and service quality) in addition to another three dependent variables(re-designing patients care pathways, reduction of prescribing error and improvement patients outcome).

3.4 Summary of Some Previous Studies

Table (3.1): Kolmogorov-Smirnov test

Study	Variables	Main findings
1-(Cohen, et al. 2016)	HIS attributes System quality Information quality Service quality data quality	The main findings were Two system quality attributes (responsiveness and ease of learning), one information quality attribute (detail), one service quality attribute (sufficient support), and three data quality attributes (records complete, accurate and never missing) were identified as high priorities for intervention.
2-(Jin, et al. 2016)	Information quality Emotional support Source credibility Replier competition Recipient involvement	1-Research results were Information quality, emotional support, and source credibility have significant and positive impact on healthcare information adoption likelihood, and among these factors, information quality has the biggest impact on a patient's adoption decision. 2- Results indicated competition among repliers positively moderates the relationship between source credibility and adoption likelihood, and recipients' involvement

		positively moderates the relationship between information quality, source credibility, and adoption decision. 3-Information quality and source credibility, emotional support has significant positive impact on individuals' healthcare information adoption decisions.
3-(Ross and Venkatesh,2016)	Healthcare quality Process, Waiting time, Adequacy, Speed and ease of admission and Staff skills.	1-There is significance difference between mean ranks on the dimensions of health care quality effect for implementation of hospital information systems. 2- Thus it is observed that implementing hospital information systems has positive effects on the dimensions of healthcare quality and so it improves healthcare quality in hospitals.
4-(Shah and Peikari, 2016)	Information Quality Ease of Use Error Prevention Consistency Reduction of Mental Workload Reduction of Errors	1-Prescribing errors were reduced by improving the information quality, user interface consistency, system ease of use, and mental workload reduction. Mental workload is reduced by ease of use, error prevention, and consistency.

		2- No significant relationships between prescribing error reduction with error prevention and also between information quality with mental workload reduction were found.
5-(Peikari, et al. 2015)	Consistency Error prevention Ease of use Information quality System outcomes	The scale was found to test well for reliability and validity. Examining the hypotheses illustrated that ease of use (P < 0.01, t = 5.79) and information quality (P < 0.01, t = 6.24) of an e-prescribing system improved pharmacists' outcomes (including communication, facilitation of care, reduction of workload and medical errors) while ease of use of the system was influenced by user interface consistency (P < 0.01, t = 7.35) and system error prevention (P < 0.01, t = 5.29).
6-(Isfahani, et al. 2015)	System quality components	Findings showed that the mean of system quality score in a variety of HIS and among different hospitals was significantly different and not the same (P value ≥ 0.05). In general, Kosar (new version) system and Rahavard Rayaneh system have dedicated the highest and the lowest mean

		scores to themselves. The system quality criterion overall mean was 59.6% for different HIS and 57.5% among different hospitals respectively.
7-(Salahuddin and Ismail,2015)	Information quality System quality Service quality Intention to use User satisfaction	System quality, information quality, and service quality influenced the health IT usage. System quality measured by usability, compatibility, reliability, and response time is essential to ensure the safe use of health IT. System quality is important for the ease of use as well to avoid workflow disruption, workaround strategies, and missing data. The quality of information generated by health IT in terms of completeness, relevancy, and timeliness is crucial for the healthcare practitioners to act appropriately. Service quality aids healthcare practitioners with health IT problems particularly technical aspect and maintenance.
8-(Abdool, 2014)	Re-designing patients' care pathway. Improving health outcomes for patients.	Results showed that he implemented HIS helped in re-designing patients' care pathway. Based on the results obtained, the null hypothesis is

	74	not rejected as the overall p-value obtained = 2.71 is greater than 0.05. This means that there is no statistical significance at the level of 5%. The implemented HIS helped in improving patients' health outcomes. Based on the results obtained, the null hypothesis is not rejected as the overall p-value obtained = 1.80 is greater than 0.05. This means that there is no statistics significance at the level of 5%.
9-(Safdari, et al. 2014)	System quality Information quality Service quality	HIS highest success rate based on three criteria related to the quality of system (3.11) and the lowest information quality (2.78) is. The tests' result showed that none of the three criteria (system quality, information quality and service quality) were not satisfactory success rate HIS (P < 0.05). According to the survey results, it seems necessary to improve the system quality: user friendly, speed data entry, integration and exchange of information, usability and flexibility HIS pointed out.

10-(Aliyev et al. 2013)	Communication Improvement. Service Quality among Nursing Staff.	A significant enhancement has been reported by nurses in total index of communication between different parts of hospital (60%) and basic indexes, including ease of accessing to patients' Furthermore, in 60 percent of cases a positive effect on enhancing accuracy in doing routine tasks has been reported (p<0.05).
11-(Drach-Zahavy and Somech, 2013)	Service climate level. Quality service behavior.	Research findings, Mixed-linear model analyses indicated that the joint effects of task and goal interdependence related significantly to service climate level. Service climate strength moderated the relationship of service climate level to quality service behavior.
12-(Zakaria et al. 2013)	Information quality Ease of use Ease of use Error prevention Error reduction	The results showed that t was found that the ease of use of the system and information quality can significantly reduce prescribing errors. Moreover, the user interface consistency and system error prevention have a significant positive impact on the perceived ease of use. More than 50% of the respondents believed that CPOE

		reduces the likelihood of drug allergy, drug interaction, and drug dosing errors thus improving patient safety.
13-(Acharyulu, 2012)	Information System quality	1-There is a statistically significant difference in 'The Information System has ability to communicate and exchange data among departments' score across three groups as the sig-value was 0.018 and less than alpha level 0.05, and an inspection the mean ranks of Administrative and 'others' had the highest agreement followed with Nurses, and Doctors. 2-There is statistically significant difference in 'The Information System can reduce waiting time' score across three groups as the sig-value was 0.049 and less than alpha level 0.05, and an inspection the mean ranks of Administrative and 'others' had the highest agreement followed with Nurses and Doctors. 3-There is statistically a significant difference in 'Present information system needs modification or improvement for efficient and effective patient

		care.' score across three groups as the sig-value was 0.022 and less than alpha level 0.05, and an inspection the mean ranks of Nurses had the highest agreement followed with Administrative and 'others' and Doctors .
14-(Aggelidis and Chatzoglou,2012)	Information Quality System Quality Overall Satisfaction	The findings indicated that the new EUCS model proposed is a valid and reliable instrument that can be used confidently by researchers in Greece and elsewhere. These results enable the generalizability of the EUCS instrument and enhance its robustness as a valid measure of computing satisfaction and a surrogate for system success in a variety of cultural and linguistic settings. The two derived factors, System Quality and Information Quality, are statistically significant and have a positive relationship with the Overall End-user Satisfaction.
15-(Gardner, 2012)	Quality practices Safety climate	The results indicate that general safety climate and quality practices establish an environment in which outcome-specific efforts enable process quality improvement.

16-(Ammenwerth, Rauchegger et al. 2011)	Quality of information System details Participants	we found there is a significant improvement of information processing in many areas. Hardware and software problems as well as the feeling of increased documentation load were reported by many respondents, but seem to not affect the overall feeling of better IT support for nursing care. The used HIS-monitor instrument seems applicable to measure changes in quality of information processing.
17-(Wan Rashid and Jusoff, 2009)	Service quality	The paper was find that service quality in health care is very complex as compared to other services because this sector highly involves risk, service quality becomes the most critical consumer issue in health care setting. SERVQUAL appears to be a consistent and reliable scale to measure heath care service quality.
18-(Gurses,et al. 2009)	Workload. Perceived quality and safety of care. Quality working life.	a Performance obstacles were found to affect perceived quality and safety of care and QWL of ICU nurses. Workload mediated the impact of performance obstacles with the exception of equipment-related issues on perceived

		quality and safety of care as well as QWL. Performance obstacles in ICUs are a major determinant of nursing workload, perceived quality and safety of care, and QWL**.**
19-(Hughes ,2008)	Care quality	The paper was find that some states are better than others in their strategies to enhance quality of care. California, Florida, Maryland, Minnesota and Rhode Island are considered among the best.
20-(Wang et al. 2006)	Effects on Quality Effects on Efficiency	Four benchmark institutions have demonstrated the efficacy of health information technologies in improving quality and efficiency. Whether and how other institutions can achieve similar benefits, and at what costs, are unclear.
21-(Hayajneh, et al. 2006)	Physicians' Knowledge about the System. Information. Security and Privacy of Information. Communication Effectiveness. Quality of Services Efficiency. Human Resource Performance	The research results indicated that staff physicians use the system and that access to information was improved as a result of the HIS. study findings indicated that the HIS was in general effective in improving access to information. Still there seems to be a problem in protecting information confidentiality and security.

22-(Bates, et al. 1999)	Medication Error Prevention dose error Route error. Frequency error.	Computerized POE substantially decreased the rate of non-missed-dose medication errors. A major reduction in errors was achieved with the initial version of the system, and further reductions were found with addition of decision support features.

Chapter Four

Methodology

Chapter Four
Methodology

4.1 Introduction

This chapter describes the methodology that was used in this research. The adopted methodology to accomplish this study uses the following techniques: the information about the research design, research population, questionnaire design, statistical data analysis, content validity and pilot study.

4.2 Research Design

This study used a quantitative research design where a questionnaire was designed, distributed, and primary data was collected and analyzed to find answers to the research questions. However, this research was conducted through various phases. Below is an explanation of these phases.

The first phase was to develop the research thesis proposal which included identifying and defining the research problem, establishing the study objective and developing the research plan.

The second of this research included a summary of a comprehensive literature review. Literatures on strategic planning and information security were reviewed.

The third phase included designing the study questionnaire to be used in examining the impact of (HIS) quality on healthcare quality in European Gaza Hospital .

The fourth phase of the research focused on the modification of the questionnaire design, through distributing the questionnaire to pilot study, The purpose of the pilot study was to test and prove that the questionnaire questions are clear to be answered in a way that help to achieve the target of the study. The questionnaire was modified based on the results of the pilot study.

The fifth phase of the research focused on distributing questionnaire. This questionnaire was used to collect the required data in order to achieve the research objective.

The sixth phase of the research was data analysis and discussion. Statistical Package for the Social Sciences, (SPSS) was used to perform the required analysis.

The final phase includes the conclusions and recommendations.

270 questionnaires were distributed to the research population and **258** questionnaires are received

Figure (4.1) shows the methodology flowchart, which leads to achieve the research objective.
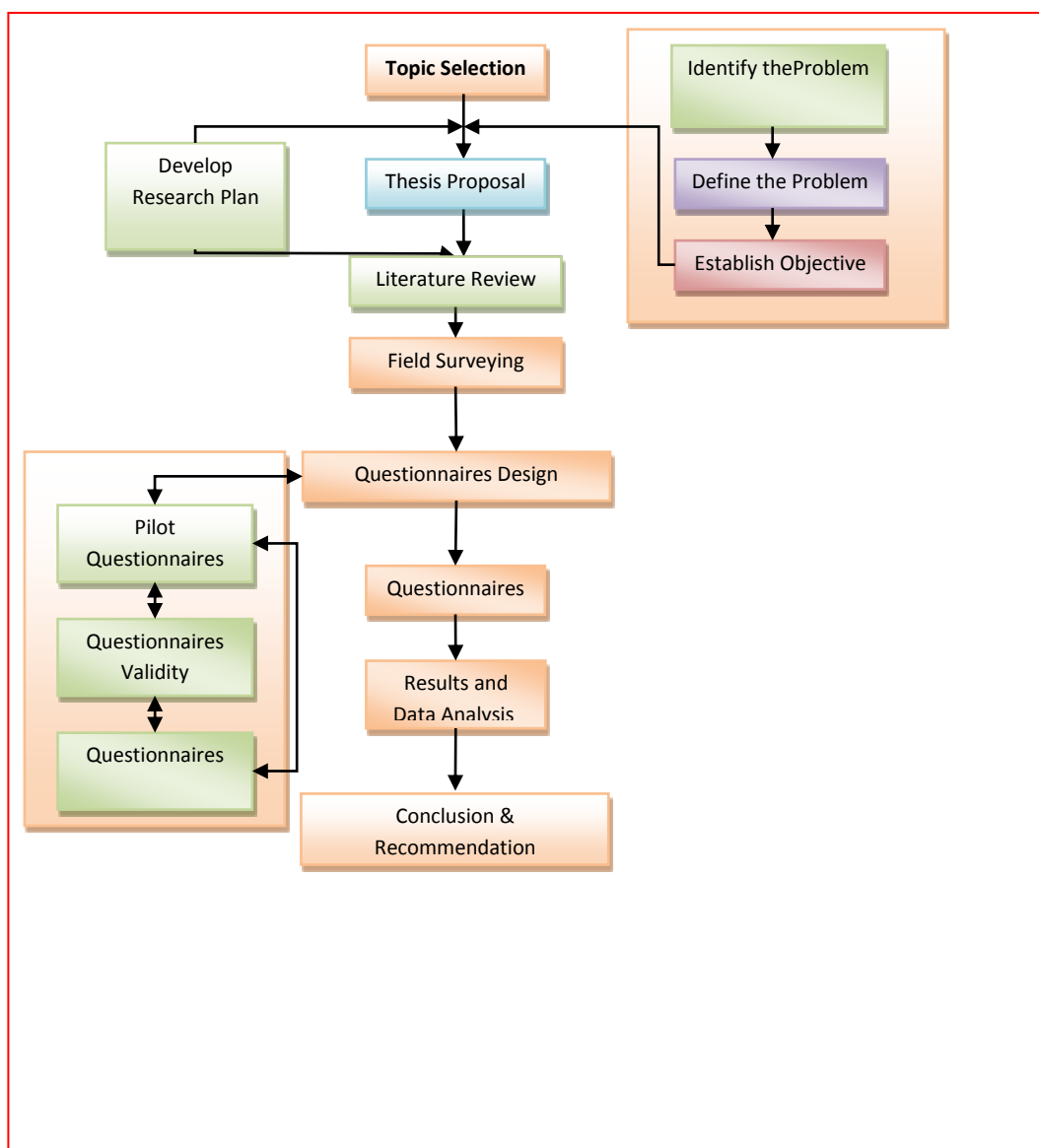
Figure (4.1): The Study Flow Chart

4.3 Data Collection Methodology:

In order to achieve the research objectives, two essential data collection resources were used, which are:

1. **Primary Resources**: in order to address the analytical aspects of the research theme, the research resorted to collect the primary data through the questionnaire as a main tool, which is designed especially to meet the research objectives. This questionnaire was distributed among the study population, (270) employees working at European Gaza Hospital, in Gaza in order to get their opinions about examining the impact of (HIS) quality on healthcare quality from employees point of View . It is worth mentioning here that the researcher has conducted an comprehensive literature review from different sources such as journal articles, books, papers, essays, research studies and reports that have handled the research theme and finally by surfing the internet to the related websites.

4.4 Population and Sample Size:
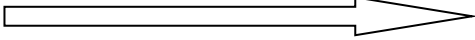
The study' population is European Gaza Hospital, in Gaza .The population includes nine categories, nurses in 21 different departments, administrators ,radiology technicians, pharmacy ,laboratory technicians, (patients' healthcare) reception staff ,medical record, emergency staff and out patients clinics who are working on European Gaza Hospital. This population consists of (548) employees.

4.5 Pilot Study:

To conduct the pilot study, (50) questionnaires were distributed to an exploratory sample during July 2016 in order to examine the questionnaire validity and reliability. It provides a trial run for the questionnaire, which involves testing the wordings of question, identifying ambiguous questions, testing the techniques that used to collect data, and measuring the effectiveness of standard invitation to respondents .After ensuring the questionnaire validity and reliability, the researcher had distributed the questionnaire to the residual employees of the population .Thus, the total number of questionnaires subjected to the study and the statistical analysis in the next chapter is (270) questionnaires representing of the study population.

4.6 Data Measurement:

In order to be able to select the appropriate method of analysis, the level of measurement must be understood. For each type of measurement, there is/are an appropriate method/s that can be applied and not others. In this research, ordinal scales were used. Ordinal scale is a ranking or a rating data that normally uses integers in ascending or descending order. The numbers assigned to the important (1,2,3,4,5,6,7) do not indicate that the interval between scales are equal, nor do they indicate absolute quantities. They are merely numerical labels. Based on Likert scale we have the following:

Item	*Strongly Disagree*						*Strongly agree*
Scale	1	2	3	4	5	6	7

4.7 Test of Normality:

The One-Sample Kolmogorov-Smirnov test procedure compares the observed cumulative distribution function for a variable with a specified theoretical distribution, which may be normal, uniform, Poisson, or exponential. The Kolmogorov-Smirnov Z is computed from the largest difference (in absolute value) between the observed and theoretical cumulative distribution functions. This goodness-of-fit test tests whether the observations could reasonably have come from the specified distribution. Many parametric tests require normally distributed variables. The one-sample Kolmogorov-Smirnov test can be used to test that a variable of interest is normally distributed (Henry, C. and Thode, Jr., 2002).

Table (4.1) shows the results for Kolmogorov-Smirnov test of normality, the p-value for each variable is greater than 0.05 level of significance, then the distributions for these variables are normally distributed. Consequently, parametric tests should be used to perform the statistical data analysis.

Table (4.1): Kolmogorov-Smirnov Test

Field	Kolmogorov-Smirnov	
	Statistic	**P-value**
System quality	0.673	0.756
Safety quality	0.785	0.569
Information quality	0.821	0.511
Service quality	0.618	0.839
Performance quality	0.919	0.367
Hospital Information System Quality	0.835	0.488
Reduction of prescribing - error	0.596	0.869
Redesigning patients care pathway	0.688	0.730
Improvement health outcomes for patients	0.792	0.557
Healthcare quality	0.767	0.599
All items of the questionnaire	0.462	0.983

4.8 Statistical Analysis Tools:

The researcher used data analysis both qualitative and quantitative data analysis methods. The Data analysis made utilizing (SPSS 23). The researcher utilized the following statistical tools:

1) Kolmogorov-Smirnov test of normality.
2) Pearson correlation coefficient for Validity.
3) Cronbach's Alpha for Reliability Statistics.
4) Frequency and Descriptive analysis.
5) Stepwise regression analysis.
6) Parametric Tests (One-sample T test, Independent Samples T-test and Analysis of Variance (ANOVA)).

T-testis was used to determine if the mean of an item is significantly different from a hypothesized value 4 (Middle value of Likert scale). If the P-value (Sig.) is smaller than or equal to the level of significance, $\alpha = 0.05$, then the mean of a item is significantly different from a hypothesized value 4. The sign of the Test

value indicates whether the mean is significantly greater or smaller than hypothesized value 4. On the other hand, if the P-value (Sig.) is greater than the level of significance $\alpha = 0.05$, then the mean a item is insignificantly different from a hypothesized value 4.

The Independent Samples T-test was used to examine if there is a statistical significant difference between two means among the respondents toward The Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to (gender).

The One- Way Analysis of Variance (ANOVA) is used to examine if there is a statistical significant difference between several means among the respondents toward The impact of (HIS) Hospital Information System Quality on the Health Care Quality due to (Education level, age, Current job and qualification years in using system).

4.9 Validity of Questionnaire:

Validity refers to the degree to which an instrument measures what it is supposed to be measuring. Validity has a number of different aspects and assessment approaches. Statistical validity is used to evaluate instrument validity, which include internal validity and structure validity.

4.9.1 Arbitrators Validity:

This group contains of ten of experts actually were of the academic staff of the Faculty of Commerce, the Faculty of Engineering and Computer Science, the Scientific Research Deanship, from the Islamic University and Al_Azhar university in Gaza , These arbitrators had issued their suggestions around the questionnaire and its appropriateness to achieve the study objective. In addition, an expert in statistics was requested to evaluate that the used questionnaire is statistically valid and was designed well enough to provide the relations and tests between the study variables. The names and some information about the arbitrators are explained in Appendix (A). The experts did agree that the questionnaire was valid and suitable enough to be used with some amendments. The arbitrators 'suggestions and amendments were taken into consideration in order to set the appropriate questionnaire as shown in Appendix (B)

4.9.2 Internal Validity:

Internal validity of the questionnaire is the first statistical test that used to test the validity of the questionnaire. It is measured by a scouting sample, which consisted of 50 questionnaires through measuring the correlation coefficients between each item in one field and the whole field.

4.9.3 Internal Validity for Hospital Information System Quality:

Table (4.2) clarifies the correlation coefficient for each item of the "System quality" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.2): Correlation coefficient of each item of "System quality" and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The system is easy to use and flexible.	.765	0.000*
2.	The system is respond quickly enough.	.808	0.000*
3.	The system is always up and running.	.512	0.000*
4.	The system includes almost all the services provided to patients within the facility (e.g. laboratory, radiology, surgery and billing).	.637	0.000*
5.	The system acquires radiology results	.620	0.000*
6.	The system analyze patients laboratory results and improved the speed of access to results.	.610	0.000*
7.	The system ease of medical reporting.	.737	0.000*
8.	The system has improved my communication with other health.	.842	0.000*
9.	Overall, the(HIS) is satisfactory.	.851	0.000*

* Correlation is significant at the 0.05 level

Table (4.3) clarifies the correlation coefficient for each item of the "Safety quality″ and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.3): Correlation coefficient of each item of " Safety quality ″and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Patients' records in [the system] are always complete.	.848	0.000*
2.	Patient's records in [the system] are never missing.	.817	0.000*
3.	Patients' records in [the system] are always correct and accurate.	.879	0.000*
4.	The system help in protecting the confidentiality of private patient information.	.857	0.000*
5.	Overall (HIS) meeting of security and privacy requirement.	.902	0.000*

* Correlation is significant at the 0.05 level

Table (4.4) clarifies the correlation coefficient for each item of the " Information quality ″and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

89

Table (4.4): Correlation coefficient of each item of " Information quality " and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The system had improved access to patients' medical information.	.907	0.000*
2.	Information output from [the system] is detailed enough.	.734	0.000*
3.	Information in (HIS) is currency and up to dating.	.801	0.000*
4.	Information output from [the system] is suitable for use.	.848	0.000*
5.	The system had improved the timeliness of access to patient in formation.	.756	0.000*
6.	The system had made accessing patient demographic information easier than before.	.790	0.000*
7.	The system had improved the speed of access to radiology results.	.607	0.000*
8.	Information in computerized health information system] helps correct diagnosis of patients and follow-up process.	.636	0.000*

* Correlation is significant at the 0.05 level

Table (4.5) clarifies the correlation coefficient for each item of the "Service quality" and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at $\alpha = 0.05$, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.5): Correlation coefficient of each item of " Service quality " and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Support provided to users of [the system] has been sufficient.	.712	0.000*
2.	Training on the use of [the system] has been sufficient.	.621	0.000*
3.	There is always someone to turn to if we need help with.	.658	0.000*
4.	The system had helped in improving the quality of services.	.831	0.000*
5.	The system had improved the accuracy of laboratory results and patient information.	.791	0.000*
6.	(The system had made medical decision making more based on information.	.775	0.000*
7.	Overall, (HIS) Increase satisfaction and quality of healthcare.	.749	0.000*

* Correlation is significant at the 0.05 level

Table (4.6) clarifies the correlation coefficient for each item of the "performance quality "and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.6): Correlation coefficient of each item of " performance quality " and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The system influence or alter their productivity levels.	.817	0.000*
2.	The HIS helped in reducing the consumption of material resources or the cost.	.773	0.000*
3.	The system had improved job performance of hospital employees.	.913	0.000*
4.	The system helped in clarifying employees' responsibilities.	.771	0.000*
5.	Hospital information system helped in increasing effectiveness dealing with the patient.	.810	0.000*
6.	Overall, With (HIS), I believe I can work more efficiently.	.821	0.000*

* Correlation is significant at the 0.05 level

4.9.4 Internal Validity for healthcare quality:

Table (4.7) clarifies the correlation coefficient for each item of the " reduction of prescribing - errors "and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.7): Correlation coefficient of each item of " reduction of prescribing - errors " and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	Hospital information system helps to reduce errors through reminders and alerts.	.756	0.000*
2.	The error messages informs me of error severity, suggest cause of problem.	.859	0.000*
3.	Hospital information system helps to overcome errors.	.841	0.000*
4.	Hospital information system helps to decrease medical reports errors.	.813	0.000*
5.	The system makes it possible for me to reduce drug allergy.	.815	0.000*
6.	The system has reduced drug dosing errors.	.809	0.000*

* Correlation is significant at the 0.05 level

Table (4.8) clarifies the correlation coefficient for each item of the "redesigning patients care pathway "and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.8): Correlation coefficient of each item of "redesigning patients care pathway" and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	This HIS facilitates a patient's journey in the hospital; since the patient enters the facility till leaving it.	.678	0.000*
2.	Patients' registration or scheduling appointment processes take maximum from 5 to10 minutes per patient.	.765	0.000*
3.	This HIS Allows reviewing patients' progress notes.	.762	0.000*
4.	Hospital information system has the option to send notices for patients reservation and checking appointments.	.785	0.000*
5.	This HIS helps in simplifying supporting processes, such as billing, therapy cost) and make it easier than before.	.630	0.000*
6.	Hospital information system help to decrease patients time to complete hospital management procedures.	.845	0.000*
7.	Hospital information system facilitates documenting patients' care activities.	.733	0.000*
8.	Overall, the system helped in redesigning patients' care Pathway.	.856	0.000*

* Correlation is significant at the 0.05 level

Table (4.9) clarifies the correlation coefficient for each item of the "Improvement health outcomes for patients "and the total of the field. The p-values (Sig.) are less than 0.05, so the correlation coefficients of this field are significant at α = 0.05, so it can be said that the items of this field are consistent and valid to be measure what it was set for.

Table (4.9): Correlation coefficient of each item of "Improvement health outcomes for patients" and the total of this field

No.	Item	Pearson Correlation Coefficient	P-Value (Sig.)
1.	The system allows having a comprehensive picture about a patient that helps in diagnosing problems sooner.	.780	0.000*
2.	The implementation of such systems helped in diagnosing medical conditions at earlier stage.	.810	0.000*
3.	The system allows gathering all information related to a patient in one place (e.g. lab results and radiology reports) that helps in making therapeutic decisions).	.823	0.000*
4.	The system allows viewing drug formulary information.	.824	0.000*
5.	This HIS allows to access and view patients' assessments easily and quickly.	.810	0.000*
6.	The system has the option to send reminders to healthcare providers (e.g. surgeries appointments and nurses to give medications to inpatients).	.784	0.000*
7.	Overall, the system helped to improve follow up patients' health outcomes.	.830	0.000*

* Correlation is significant at the 0.05 level

4.9.5 Structure Validity of the Questionnaire:

Structure validity is the second statistical test that used to test the validity of the questionnaire structure by testing the validity of each field and the validity of the whole questionnaire. It measures the correlation coefficient between one field and all the fields of the questionnaire that have the same level of liker scale.

Table (4.10) clarifies the correlation coefficient for each field and the whole questionnaire. The p-values (Sig.) are less than 0.05, so the correlation coefficients of all the fields are significant at $\alpha = 0.05$, so it can be said that the fields are valid to be measured what it was set for to achieve the main aim of the study.

Table (4.10): Correlation coefficient of each field and the whole of questionnaire

No.	Field	Pearson Correlation Coefficient	P-Value (Sig.)
1.	System quality	.908	0.000*
2.	Safety quality	.871	0.000*
3.	Information quality	.942	0.000*
4.	Service quality	.924	0.000*
5.	Performance quality	.859	0.000*
	Hospital Information System Quality	.979	0.000*
1.	Reduction of prescribing - error	.903	0.000*
2.	Redesigning patients care pathway	.952	0.000*
3.	Improvement health outcomes for patients	.915	0.000*
	Healthcare quality	.950	0.000*

* Correlation is significant at the 0.05 level

4.10 Reliability of the Research:

The reliability of an instrument is the degree of consistency which measures the attribute; it is supposed to be measuring (George and Mallery, 2006). The less variation an instrument produces in repeated measurements of an attribute, the higher its reliability. Reliability can be equated with the stability, consistency, or dependability of a measuring tool. The test is repeated to the same sample of people on two occasions and then compares the scores obtained by computing a reliability coefficient (George and Mallery, 2006). To insure the reliability of the questionnaire, Cronbach's Coefficient Alpha should be applied.

Cronbach's Coefficient Alpha

Cronbach's alpha (George D. &Mallery P, 2006) is designed as a measure of internal consistency, that is, do all items within the instrument measure the same thing? The normal range of Cronbach's coefficient alpha value between 0.0 and + 1.0, and the higher values reflects a higher degree of internal consistency. The Cronbach's coefficient alpha was calculated for each field of the questionnaire.

Table (4.11) shows the values of Cronbach's Alpha for each field of the questionnaire and the entire questionnaire. For the fields, values of Cronbach's Alpha were in the range from 0.852 and 0.966. This range is considered high; the result ensures the reliability of each field of the questionnaire. Cronbach's Alpha equals 0.975 for the entire questionnaire which indicates an excellent reliability of the entire questionnaire.

Table (4.11): Cronbach's Alpha for each field of the questionnaire

No.	Field	Cronbach's Alpha
1.	System quality	0.875
2.	Safety quality	0.912
3.	Information quality	0.907
4.	Service quality	0.852
5.	Performance quality	0.901
	Hospital Information System Quality	0.966
1.	Reduction of prescribing - error	0.898
2.	Redesigning patients care pathway	0.888
3.	Improvement health outcomes for patients	0.905
	Healthcare quality	0.954
	All items of the questionnaire	0.975

The Thereby, it can be said that the researcher proved that the questionnaire was valid, reliable, and ready for distribution for the population sample.

4.11   Conclusion:

This chapter presents a description of the research methodology that is followed in the implementation of the field study through identifying different ways and tools used in the completion of this study. It also contains a description of the study population and sampling that is considered a comprehensive survey of the all population.

Finally, the chapter addresses the questionnaire preparation and testing its validity besides; it presents the statistical methods used in the analysis of results. All this is to examine hospital information system impact on healthcare quality.

Chapter Five

Data Analysis and Discussion

Chapter Five

Data Analysis and Discussion

5.1 Introduction:

This chapter includes detailed description of the findings resulted from applying the statistical tests on the collected data from the questionnaires and discussion of the results with explanations for the meaning of these results. Also, it provides a clear idea about the respondents' general information , and provides the variance explained with SPSS tools. The collected data of the respondents are presented and the findings are described and discussed in three main parts:

- The first part tackles the analysis of the general information of the questionnaire respondents.
- The second applies the statistical tests indicated in section 4.8:
  (Statistical Analysis on the collected data from questionnaire respondents). The overall results will be compared with the previous studies results.
- The third part handles the study hypothesis. The findings of this test will be discussed and compared with previous studies results.

5.2 Part I: Respondents Characteristics:

In this section, the researcher describes and analyzes the respondent's personal characteristics (gender, education level, age, current job, current position, qualification years in using system, the ratio of using hospital information system , years of experience in current position and persons how benefit of the services). Each one of them is described and analyzed separately. The frequency and percentage for each variable is listed according to the survey categories. The following table describes three results:

Section A: General Information

Table (5.1): General information

General Information		Frequency	Percent
Gender	Male	161	62.4
	Female	97	37.6
Education level	PhD o higher	5	1.9
	master's degree	27	10.5
	Bachelor degree	171	66.3
	diploma	53	20.5
	high school or less	2	0.8
Age	Less than 25 years	43	16.7
	25 - less than 35 Year	118	45.7
	35- less than 45 Year	63	24.4
	45 years and over	34	13.2

Table (5.1) shows that, the percentage of gender group from male which is equal to 161(62.4%) while the gender group of Females is equal to 97(37.6%) .the result indicates that the number of males who work in the hospital is more than the number of females. This returns to the ability of males to work long period especially at night shift.

The percentage of Education group from PhD or above which is equal to 5 (1.9%), by the Education group from Master degree is equal to 27 (10.5%), by the Education group from Bachelor Degree is equal to 171 (66.3%), by the Education group from Diploma is equal to 53 (20.5%) ,by the Education group from high school or below is equal to 2 (0.8%). The bachelor degree has the most requests in education.

The percentage of age group less than 25 years old which is equal to 43 (16.7%), while the age group from 25 - less than 35 years which is equal to 118 (45.7%). By the age group from 35 to 45 years is 63 (24.4%). By the age group who are above 45 years old is 34 (13.2%) . The highest group between previous groups were age group from less than 25 years old and 25 - less than 35 years which are equal to 161(61.14%) Palestinian society is a young population.

Table (5.2): General information

General Information		Frequency	Percent
Current job	Administrativee	44	17.1
	Nurse	168	65.1
	Pharmacy	12	4.7
	radiology technician	19	7.4
	Technical analysis	15	5.8
Qualification years in using system	less than year	26	10.1
	From one year to less than five years	60	23.3
	From five to less than ten years	70	27.1
	Ten years and over	102	39.5
The ratio to which your work depends using of hospital information system?	50% and Less	69	26.7
	51% - 80%	106	41.1
	More than 80%	83	32.2
Persons who benefit from your services	Ppatients	94	36.4
	Colleagues at work	9	3.5
	Multiple categories	155	60.1

As shown in table (5.2), the results show that the percentage of Current Job group from hospital Administrators which is equal to 44 (17.1%) ,while Nurse Job group from nursing departments which is equal to 168 (65.1%). by the Current Job group from Technicians, Pharmacy is equal to 12(4.7%), radiology technician 19 (7.4%), by the Current Job group for Secretary is 15 (6.4%), by the Current Job group Technical analysis 15(5.8%). The highest current job group is nurses in nursing departments which is equal to 168 (65.1%).

The results show that the percentage of qualification years in using system group less than a year which is 26 (10.1%) while the other group of qualification years in using system group from one year to less than five years which is equal to 60 (23.3%), by the qualification years in using system group from five to less than ten years is

70(27.1%), by the qualification years in using system group who are ten years and over is 102 (36.5%). This indicates that the most group of workers in hospital has an experience in using information system which is equal to 102 (36.5%) .

The results show that the percentage of workers which their work depends on using hospital information system group 50% and Less which is equal to 69 (26.7%),while the percentage of workers which their work depends on using hospital information system group from 51% - 80% which is equal to106(41.1%). Finally, the percentage of workers which their work depends on using hospital information system group is equal to 83 (32.2%). There is a medium percentage of workers which their work depends on using hospital information system.

The results show that the percentage of persons who benefit from (HIS) services, patients group which is equal to 94(63.4%)**.** While the percentage of persons who benefit from (HIS) services colleagues at work group which is equal to 9(3.5%) **.** Finally, the percentage of persons who benefit from (HIS) services multiple categories group which is equal to 155(60.1%) **.**This indicates that, hospital information system presents services for multiple different categories .

5.2.1 Hospital Departments :

Table (5.3): Hospital Departments

Hospital Departments	Frequency	Percent
1. Patients' healthcare department (reception staff , medical record, emergency staff and out patients clinic).	30	11.6
2. Technicians department(laboratory, radiology).	35	13.6
3. Pharmacy department.	12	4.7
4. Pediatric department (surgical ward ,medical ward ,Incubation ward).	17	6.6
5. Men department (M. surgical ward, M. medical ward).	26	10.1
6. Women department (Surgical ward, W. medical ward).	18	7.0
7. Intensive care units department (adult ward, children ward).	22	8.5
8. Surgical department(surgical ward , Neurosurgery ward ,*Cardiac* catheterization ward ,cardio surgery ward .	49	19.0
9. Tumors department (M. Tumors , W. Tumors , outpatient Tumors, daily care Tumors clinics).	21	8.1
10. Outpatient clinics department (outpatient clinics , daily care clinics ,emergency stuff for adults and children).	28	10.9
Total	258	100.0

As shown in Table (5.3), the results show that the percentage of persons who work in patients' healthcare department is equal to 30(11.6%), by the persons who work in technicians department(laboratory, radiology) is equal to 35(13.6%). by the persons who work in pharmacy department is equal to 12 (4.7%). by the persons who work in pediatric department (surgical ward ,medical ward ,Incubation ward) is equal to 17(6.6%). by the persons who work in men department (M. surgical ward, M. medical ward)is equal to 26(10.1%) . by the persons who work in women department (Surgical ward, W. medical ward) is equal to 18(7.0%). by the persons who work in intensive care units department (adult ward, children ward) is equal to 22(8.5%). by the persons who work in surgical department(surgical ward , Neurosurgery ward ,cardiac catheterization ward ,cardio surgery ward) is equal to 49(19.0%) . by the persons who work in tumors department (M. Tumors, W. Tumors, outpatient Tumors, daily care Tumors clinics) is equal to 21(8.1%).

by the persons who are work in outpatient clinics department(outpatient clinics, daily care clinics ,emergency stuff for adults and children) is equal to 28(10.9%).

This indicates that the highest percentage of Persons who work in hospital department is nursing stuff in different departments groups which is equal to 168(65.1%).While the lowest percentage of persons who work in hospital department is pharmacy department group which is equal to 12 (4.7%). the most of hospital employees are in nursing stuff this return to large number of wards within the hospital .

5.3 Part II: Statistical Analysis for the Questionnaire Fields:

In this section, the researcher describes the collected data from the second part of questionnaire. These findings will be discussed and interpreted to provide an overview of responses and increase our understanding of study variables. Moreover, the findings will be compared to the previous studies findings identifying the differences and similarities and explain the reasons for each field's.

- **Testing the Hypothesis :**

To analyze the fields, sign test can be used. The following statistical hypotheses were tested:

-The null hypothesis: test if the resulted average degree equal to 4.

-The alternative hypothesis: test if the resulted average degree is not equal to 4. If Sig. (P-value) is greater than the significance level $\alpha = 0.05$ (according to the results of the program SPSS), we don't reject the null hypothesis and in this case the average views of respondents about the phenomenon under study does not differ significantly from the degree of neutrality of 4. On the other hand, if the Sig. (P-value) is less than the significance level $\alpha = 0.05$, we rejected the null hypothesis and accept the alternative hypothesis that means the average views of the sample is significantly different from the degree of neutrality. Through the value of the test ,If the reference is positive it means that the arithmetic average of the response over the degree of neutrality and vice versa.

Section B: Hospital Information System Quality:

5.3.1   System Quality

Table (5.4): Means and Test values for "System quality"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The system is easy to use and flexible.	5.09	1.64	72.77	10.64	0.000*	2
2.	The system is respond quickly enough.	5.01	1.70	71.60	9.56	0.000*	3
3.	The system is always up and running.	4.54	1.66	64.79	5.16	0.000*	8
4.	The system includes almost all the services provided to patients within the facility (e.g. laboratory, radiology, surgery and billing).	4.74	1.83	67.76	6.53	0.000*	6
5.	The system acquires radiology results.	3.77	2.12	53.89	-1.72	0.044*	9
6.	The system analyze patients laboratory results and improved the speed of access to results.	5.30	1.78	75.67	11.63	0.000*	1
7.	The system ease of medical reporting.	4.95	1.84	70.70	8.27	0.000*	5
8.	The system has improved my communication with other health.	4.74	1.73	67.66	6.85	0.000*	7
9.	Overall, the(HIS) is satisfactory.	4.97	1.60	71.03	9.69	0.000*	4
	All items of the field	4.79	1.26	68.38	10.01	0.000*	

* The mean is significantly different from 4

Table (5.4) shows the following results:

The mean of item #6 "the system analyze patients laboratory results and improved the speed of access to results" equals 5.30 (75.67%), Test-value = 11.63, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4. We conclude that (75.67%)of the respondents agreed that the system helps them in laboratory results and improved the speed of access to results. this result indicates that hospital information system sending documenting data for every patient to the laboratory and receiving the results of the examinations were much easier than before because requests were documented on the computer and at the same time they were available in the laboratory ward; that is the results were available as soon as they were documented on the computer in the laboratory, so this system may improve the speed of access to the documented data , and decreases the efforts for all persons who benefit from the system.

The mean of item #5 "The system acquires radiology results" equals 3.77 (53.89%), Test-value = -1.72, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is negative, so the mean of this item is significantly smaller than the hypothesized value 4. We conclude that the respondents disagreed to this item. This indicates that, the persons who are agreed with this item they may belong to technicians' ward only; while the others may belong to nursing stuff or other departments so they haven't enough information about this item.

The mean of the field "System quality" equals 4.79 (68.38%), Test-value = 10.01, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "System quality ".

This result agreed with what Cohen(2016) found in his research that, system quality has the largest effect on satisfaction with the attributes of responsiveness and ease of learning requiring immediate intervention .system quality attributes are salient to user satisfaction and important to ensuring a successful implementation; also the result consistent with what Salahuddin and Ismail (2015). They proved in their research that System quality is important for the ease of use as well to avoid work flow disruption, workaround strategies, and missing data; also the results agreed with what , Aggelidis and Chatzoglou (2012). They found in their research that, system quality has a significant direct effect on information quality, system quality is the most important factor for explaining and, thus, predicting the variance of end-user satisfaction.

Actually, it has both the highest direct and total impact on satisfaction system quality significantly and positively affects, to a large extent, the variance of the quality of the information provided from the system to its users; also the result agreed with what Peikari (2015) he found in his research about system quality that , the system is capable of producing quality information, users can more effectively communicate with each other. This result consistent with what, Hayajneh (2006)), he found in his research about system quality that , (90%) reported that the system had improved the speed of access to patients' laboratory results.

All these studies agreed with the researcher result which is , system quality is an important element of hospital information system , system flexibility ,system quick responses , system updating, system facilitate patients services to get feedback may increases of system quality and its impact on hospital information system.

Table (5.5): Means and Test Values for "Safety quality"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Patients records in [the system] are always complete.	4.66	1.67	66.52	6.29	0.000*	5
2.	Patients records in [the system] are never missing.	5.03	1.59	71.88	10.32	0.000*	1
3.	Patients records in [the system] are always correct and accurate.	4.82	1.48	68.91	8.91	0.000*	2
4.	The system help in protecting the confidentiality of private patient information.	4.77	1.68	68.19	7.36	0.000*	3
5.	Overall (HIS)Meeting of security and privacy requirement.	4.71	1.65	67.30	6.90	0.000*	4
	All items of the field	4.80	1.36	68.51	9.38	0.000*	

* The mean is significantly different from 4

5.3.1 Safety Quality:

Table (5.5) shows the following results:

The mean of item #2 "Patients records in [the system] are never missing " equals 5.03 (71.88%), Test-value = 10.32 and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that the highest agreed respondent is equal to (71.88%) of the respondents to this item "Patients records in [the system] are never missing ". this indicates that patients record is the most essential element of the hospital information system. Each patient in the hospital medical record should has a documented data about his name , detailed information about diseases and the last visiting diagnosis , all these matters depend on how to maintain patient records and never missing it .

The mean of item #1 "Patients records in [the system] are always complete" equals 4.66 (66.52%), Test-value = 6.29, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that , the lowest agreed respondent is equal to (66.52%) of the respondents to this item "Patients' records in [the system] are always complete". This indicates that , the persons who work on the hospital information system haven't experiences about this item, so the workers on the system still need for practices and training courses about medical record to learn how they may complete the documented data for every patients.

The mean of the field "Safety quality" equals 4.80 (68.51%), Test-value = 9.38, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "Safety quality ".

This result agreed with what, Vincent(2006) ,found in his book that , Patient safety is the cornerstone of high-quality health care; while Hayajneh (2006) disagreed with the searcher result he proved that , larger percentages (48% vs. 41%) of the physicians believe that the system did not help in protecting the confidentiality of private patient information. Additionally, fifty one percent (51%) of the physicians believe that the system allows for easy access to patient information to unauthorized individuals.

There isn't enough studies to cover this variable .Hayajneh (2006) disagreed with what the researcher concludes about safety quality . today hospital information systems improved than previous ages . there are a lot of programs which protect patients records from unauthorized persons .

Table (5.6): Means and Test values for "Information quality"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The system had improved access to patients' medical information.	5.13	1.65	73.24	10.89	0.000*	2
2.	Information output from [the system] is detailed enough.	4.79	1.54	68.45	8.18	0.000*	7
3.	Information in (HIS) is accuracy and up to dating.	4.75	1.52	67.83	7.80	0.000*	8
4.	Information output from [the system] is suitable for use.	4.95	1.51	70.74	9.97	0.000*	6
5.	The system had improved the timeliness of access to patient information.	5.22	1.49	74.63	12.98	0.000*	1
6.	The system had made accessing patient demographic information easier than before.	4.98	1.54	71.15	10.17	0.000*	5
7.	The system had improved the speed of access to radiology results.	5.00	1.62	71.48	9.85	0.000*	4
8.	Information in computerized health information system] helps correct diagnosis of patients and follow-up process.	5.04	1.55	71.93	10.62	0.000*	3
	All items of the field	4.99	1.23	71.25	12.88	0.000*	

* The mean is significantly different from 4

5.3.2 Information Quality:

Table (5.6) shows the following results:

The mean of item #5 "the system had improved the timeliness of access to patient information" equals 5.22 (74.63%), Test-value = 12.98 and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that the highest agreed respondent is equal to(74.63%) of the respondents to this item, the system had improved the timeliness of access to patient information" this indicates that ,the system decreases the time to access patient records more than manual system and this saves time and efforts for each of patients and system's users.

The mean of item #3 "Information in (HIS) is currency and up to dating" equals 4.75 (67.83%), Test-value = 7.80, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that , the lowest agreed respondent is equal to (67.83%) of the respondents to this item, this indicates that, information accuracy is difficult to assess during using hospital information system but it should be constantly updating and this needs for more training and practicing to overcome implementation difficulties .

The mean of the field "Information quality" equals 4.99 (71.25%), Test-value = 12.88, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "Information quality ".

This result agreed with what, Hayajneh (2006) found in his research that , (76%) reported that the system had improved access to patients' medical information; ninety eighty three percent (83 %) reported that the system had improved the timeliness of access to patient information; fifty nine percent (59%) reported that the system had made accessing patient demographic information easier than before. Salahuddin and Ismail(2015) they proved in their research that, The quality of information generated by health IT in terms of completeness, relevancy, and timeliness is crucial for the healthcare practitioners to act appropriately. Also this result agreed with what Peikari(2015) he found in his research about information quality ,the findings indicated that quality information had a positive significant influence on the facilitation of care; also Likewise, this result consistent with what Ammenwerth et all (2011) improved in his study about information quality ,he illustrated that the quality of the information can influence patient anamnesis and care planning activities, the availability, completeness and readability of the documentations, reduction of duplicate documentation and fulfillment of the regulations. Also the result consistent with what Astuti, H. M., A. Herdiyanti, et al. (2015)founded in their research that , information quality perceived to influence the degree of the benefits of HMIS for individual and organization.

All these studies consistent with the researcher result which is , information quality is an important element of hospital information system . detailed information output , information accuracy , updated information and information which may improve accurate diagnosis. All these matters improve information quality which presented through information system .

Table (5.7): Means and Test Values for "Service Quality"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Support provided to users of [the system] has been sufficient.	4.38	1.63	62.62	3.74	0.000*	7
2.	Training on the use of [the system] has been sufficient.	4.42	1.64	63.21	4.12	0.000*	6
3.	There is always someone to turn to if we need help with.	5.03	1.56	71.88	10.53	0.000*	5
4.	The system had helped in improving the quality of services.	5.15	1.48	73.59	12.32	0.000*	1
5.	The system had improved the accuracy of laboratory results and patient information.	5.09	1.53	72.78	11.39	0.000*	3
6.	The system had made medical decision making more based on information.	5.04	1.62	71.99	10.21	0.000*	4
7.	Overall,(HIS)Increase satisfaction and quality of healthcare.	5.15	1.52	73.52	11.96	0.000*	2
	All items of the field	4.89	1.21	69.90	11.77	0.000*	

* The mean is significantly different from 4

5.3.3 Service Quality:

Table (5.7) shows the following results:

The mean of item #4 "the system had helped in improving the quality of services" equals 5.15 (73.59%), Test-value = 12.32 and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that the highest agreed respondent is equal to(73. 59%) of the respondents to this item, "the system had helped in improving the quality of services". This indicates that , the system improves services not for patients only also for system users. Service quality should be connected with patient's satisfaction and user's satisfaction . There are services presented for patients through different areas such as (examination results, radiology, system reminders about appointments, etc.); while the service which presented for system users such as (sending feedback to the laboratory by using the system, easy access to data for patients, saving time and efforts , presenting completed services and improving communication between different wards such as pharmacy, radiology, ICU, etc.).

The mean of item #1 "Support provided to users of [the system] has been sufficient" equals 4.38 (62.62%), Test-value = 3.74, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that , the lowest agreed respondent is equal to (62.62%) of the respondents to this item. Support provided to users of [the system] has been sufficient" this indicates that, the system may still need for more improvement to present supporting for patients and system users and to overcome difficulties implementation .

The mean of the field "Service quality" equals 4.89 (69.90%), Test-value = 11.77, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "Service quality ".

This result agreed with what, Cohen (2016) found in his research that, service quality attributes are important to satisfaction, supporting and to user productivity . Also this result agreed with what Salahuddin and Ismail(2015) they proved in their research that, the service quality influenced the health IT usage, Service quality aids healthcare practitioners with health IT problems particularly technical aspect and maintenance. This result consistent with what Sakineh Aghazadeh (2013) he proved in his study that , using HIS can improve service quality through ,communication between wards and decrease the personnel's commuting. 58.6% of the nurses claimed that discharging information collection had highly facilitated. Data analysis proved a positive effect of the system on improving task accomplishment preciseness in 60% of cases.

All these studies agreed with the researcher's result which is , service quality is an important element of hospital information system . The services which the system presented them for patient and for system users may facilitates communication within hospital wards , shorten distances inside the hospital , decrease the waiting time and efforts for patients and system users .

Table (5.8): Means and Test values for "Performance Quality"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The system influence or alter their productivity levels.	4.83	1.69	68.99	7.79	0.000*	6
2.	The HIS helped in reducing the consumption of material resources or the cost.	5.07	1.59	72.40	10.61	0.000*	4
3.	The system had improved job performance of hospital employees.	5.20	1.55	74.32	12.34	0.000*	2
4.	The system help in clarifying employees' responsibilities.	4.89	1.57	69.80	8.85	0.000*	5
5.	Hospital information system help in increasing effectiveness dealing with the patient.	5.15	1.56	73.63	11.75	0.000*	3
6.	Overall, with (HIS), I believe I can work more efficiently.	5.28	1.45	75.49	14.07	0.000*	1
	All items of the field	5.07	1.33	72.43	12.75	0.000*	

* The mean is significantly different from 4

5.3.4   Performance Quality:

Table (5.8) shows the following results:

The mean of item #6 "Overall, With (HIS), I believe I can work more efficiently" equals 5.28 (75.49%), Test-value = 14.07 and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4. We conclude that the highest agreed respondent is equal to(75. 59%) of the respondents to this item, "Overall, With (HIS), I believe I can work more efficiently". This indicates that , this item collects all previous characteristics for other items to this variable . So system influence on productivity levels, system had improved job performance of hospital employees, the system help in clarifying employees' responsibilities and system help in increasing effectiveness dealing with the patient.

The mean of item #1 "the system influence or alter their productivity levels" equals 4.83 (68.99%), Test-value = 7.79, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that , the lowest agreed respondent is equal to (68.99%) of the respondents to this item, "the system influence or alter their productivity levels" . The system increases performance levels by decreases waiting time ,so the system users still need for courses about how they can exploit the system to increase performance levels .

The mean of the field "performance quality" equals 5.07 (72.43%), Test-value = 12.75, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "performance quality ".

This result agreed with what ,Chiu Chang (2015) found in his research that, the influence of performance impact on continued use intention was significantly positive, also that utilization impact had a significantly positive influence on performance impact. Regarding the positive influence of satisfaction on performance impact and continued use intentions. While Hayajneh (2006) disagreed with researcher result he proved in his research that, (41%) of the physicians reported that the system had improved job performance of hospital employees. On the other hand, an equal number did not agree with this finding. (55%) of the physician did not agree with statement indicating that the system had helped in improving their job performance. Additionally, (59%) of the physicians reported that the system did not help in clarifying employees' responsibilities. This indicates that the different environment between these studies ,Hayajneh research was in 2006 , so there are a lot of hospitals in this period were still preferred manual system more than technological system .

The world develops every day and this needs to adopt these changes so hospital information system didn't cancel human resources but it will support human efforts to overcome problems in practical ways . Gaza is vulnerable to wars so our hospitals need to developing this system to improve performance for doctors ,nurses and etc.,

Table (5.9): Means and Test Values for " Hospital Information System Quality "

Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
System quality	4.79	1.26	68.38	10.01	0.000*	5
Safety quality	4.80	1.36	68.51	9.38	0.000*	4
Information quality	4.99	1.23	71.25	12.88	0.000*	2
Service quality	4.89	1.21	69.90	11.77	0.000*	3
Performance quality	5.07	1.33	72.43	12.75	0.000*	1
All Items of hospital information system quality	4.90	1.13	69.96	12.74	0.000*	

*The mean is significantly different from 4

5.3.5 In General " Hospital Information System Quality"

Table **(5.9)** shows the mean of all items equals 4.90 (69.96%), Test-value = 12.74 and P-value =0.000 which is smaller than the level of significance $\alpha = 0.05$. The mean of all items is significantly different from the hypothesized value 4. We conclude that the respondents agreed to all items of the hospital information system quality.

The largest percentage of respondents is "performance quality" which is equal to (72.43%), while the smallest percentage of respondents is "System quality" which is equal to (68.38) . Information quality which is equal to (71.25) , service quality is equal to(69.90) and Safety quality is equal to (68.51). This indicates that the importance of hospital information system on five variables .

This result agreed with each of Chiu Chang (2015) , Hayajneh (2006) , Salahuddin and Ismail(2015), SakinehAghazadeh(2013), Ammenwerth at all (2011) that ,each of service quality ,performance quality ,system quality ,safety quality and information

quality are important elements to success of hospital information system . There is no doubt that , system information quality differs in developed countries hospital more than Palestinian hospitals, this returns to the lateness using of such system . The criteria of quality in Palestinian hospitals are less than other developed countries through , services which are presented to patients and to system users .

5.4 Section C: Healthcare Quality

Table (5.10): Means and Test values for "reduction of prescribing - errors"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	Hospital information system help to reduce errors through reminders and alerts.	4.86	1.68	69.40	8.13	0.000*	2
2.	The error messages inform me of error severity, suggest cause of problem.	4.61	1.66	65.84	5.85	0.000*	4
3.	Hospital information system help to overcome errors.	4.89	1.61	69.79	8.77	0.000*	1
4.	Hospital information system help to decrease medical reports errors.	4.86	1.58	69.38	8.61	0.000*	3
5.	The system makes it possible for me to reduce drug allergy.	4.41	1.82	63.02	3.59	0.000*	5
6.	The system has reduced drug dosing errors.	4.29	1.94	61.26	2.36	0.009*	6
	All items of the field	4.65	1.36	66.47	7.62	0.000*	

* The mean is significantly different from 4

5.4.1 Reduction of Prescribing – errors:

Table (5.10) shows the following results:

The mean of item #3 "Hospital information system help to overcome errors" equals 4.89 (69.79%), Test-value = 8.77, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that the highest agreed respondent is equal to(69.79%)of the respondents to this item, "Hospital information system help to overcome errors". This indicates that , the system can overcome different errors such as diagnosis errors , medicine errors and etc.

The mean of item #6 "The system has reduced drug dosing errors" equals 4.29 (61.26%), Test-value = 2.36, and P-value = 0.009 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that , the lowest agreed respondent is equal to (61.26%) of the respondents to this item, "The system has reduced drug dosing errors" . This indicates that , drug dosing errors may only return to the doctors or to the nurses responsibility who supervise on patients not on to the system shortcoming. "it was reported that when users had difficulty in working with a CPOE system and needed to spend more time and effort to work with the system, they were more likely to make more medication errors".(Peute and Jaspers, 2007)

The mean of the field "reduction of prescribing - errors" equals 4.65 (66.47%), Test-value = 7.62, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "reduction of prescribing - errors ".

This result agreed with what Peikari, Shah et al. (2015) they found in their research there was a positive significant relationship between e-prescribing ease of use and its positive impacts on pharmacists' outcomes (including facilitation of care, communication, workload and error reduction). Also the result agreed with what ,Bates, Teich et al.(1999) that, Computerized POE substantially decreased the rate of non-missed-dose medication errors. . A major reduction in errors was achieved with the initial version of the system, and further reductions were found with addition of decision support features. More than 80 percent of non-missed-dose medication errors were eliminated by computerized POE. Three quarters of this reduction was achieved with a relatively simple system, which structured the entry of orders and included rudimentary order checking.

This result disagreed with what Reckmann, Westbrook et al.(2009) they found in their research that, the effectiveness of CPOE to reduce prescribing errors is not compelling and is limited by modest study sample sizes and designs. Error size differs from one ward to another according to (the number of daily patients which entered to the system) . also Peikari,(2013) consistent with Reckmann, Westbrook et al.(2009) that , prescribing errors in terms of drug allergy, drug interaction, and drug dosing errors are reduced if the CPOE is not error-prone and easy to use, if the user interface is consistent, and if it provides quality information to doctors. This result also agreed with what, Abdool,(2014) in his research that , more than the half agreed that the number of errors is decreased compared to the manual system and the system generates reports for planning and research.

There are three studies consistent with researcher result that ,using hospital information system helps to reduce the number of prescribing errors such as (drug allergy, drug interaction, and drug dosing errors ,diagnosis errors and etc..,. while there are another two studies disagreed with this result, they proved that , hospital information system cannot decrease the errors if the system don't effective or if the system users not qualified to use like this system . so they proved that the system is effective but the users of the system need for more practices more training to increase the effectiveness of the system and the quality of information by decreasing of prescribing errors .

Table (5.11): Means and Test Values for "Redesigning Patients Care Pathway"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	This HIS facilitates a patient's journey in the hospital; since the patient enters the facility till leaving it.	5.11	1.67	72.95	10.58	0.000*	1
2.	Patients' registration or scheduling appointment processes take maximum from 5 to10 minutes per patient.	5.09	1.69	72.67	10.26	0.000*	2
3.	This HIS Allows reviewing patients' progress notes.	4.80	1.72	68.63	7.39	0.000*	4
4.	Hospital information system has the option to send notices for patients reservation and checking appointments.	4.64	1.79	66.31	5.71	0.000*	7
5.	This HIS helps in simplifying supporting processes, such as billing, therapy cost) and make it easier than before.	4.41	1.79	62.95	3.59	0.000*	8
6.	Hospital information system help to decrease patients time to complete hospital management procedures.	4.92	1.59	70.23	9.15	0.000*	3
7.	Hospital information system facilitates documenting patients' care activities.	4.75	1.56	67.86	7.64	0.000*	6
8.	Overall, the system helped in redesigning patients' care pathway.	4.78	1.53	68.27	8.07	0.000*	5
	All items of the field	4.81	1.29	68.71	9.97	0.000*	

* The mean is significantly different from 4

5.4.2 Redesigning Patients Care Pathway:

Table (5.11) shows the following results:

The mean of item #1 "This HIS facilitates a patient's journey in the hospital; since the patient enters the facility till leaving it" equals 5.11 (72.95%), Test-value = 10.58, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 . We conclude that the highest agreed respondent is equal to (72.95%) of the respondents to this item, "This HIS facilitates a patient's journey in the hospital; since the patient enters the facility till leaving it" .This indicates that , hospital information system decrease the time spent of patient journey since patient entering till leaving it through the integration of documented data for every patients with hospital's ward such as (laboratory , radiology ,pharmacy with all hospital ward) this procedure helps patients to complete his visiting to hospital without difficulties (short time with effective service quality)

The mean of item #5 "This HIS helps in simplifying supporting processes, such as billing, therapy cost) and make it easier than before" equals 4.41 (62.95%), Test-value = 3.59, and P-value = 0.009 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4. We conclude that, the lowest agreed respondent is equal to (62.95%) of the respondents to this item. "This HIS helps in simplifying supporting processes, such as billing, therapy cost) and make it easier than before". This indicates that , may the system didn't support such this procedure for billing cost and therapy cost such as other procedures which the system supporting it .

The mean of the field "redesigning patients care pathway" equals 4.81 (68.71%), Test-value = 9.97, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "redesigning patients care pathway ".

This result agreed with what, Abdool,(2014) in his research that , more than half of participants agreed that the implemented HIS facilitates a patient's journey in the hospital; once the patient enters the facility till leaving it with 5 disagreeing .Also The number of participants who agreed about patients' registration and scheduling appointments processes that take maximum 5 minutes per patient was about 83 with 42 disagreed. So this result indicates that using hospital information system facilitates a patient's journey in the hospital; patient's registration and appointment processes, all these matters can help in decreasing patient's time to complete hospital management procedures.

Table (5.12): Means and Test values for "Improvement health outcomes for patients"

	Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
1.	The system allows having a comprehensive picture about a patient that helps in diagnosing problems sooner.	4.61	1.76	65.87	5.52	0.000*	4
2.	The implementation of such systems helped in diagnosing medical conditions at earlier stage.	4.51	1.68	64.43	4.82	0.000*	5
3.	The system allows gathering all information related to a patient in one place (e.g. lab results and radiology reports) that helps in making therapeutic decisions).	4.77	1.65	68.14	7.42	0.000*	3
4.	The system allows viewing drug formulary information.	4.47	1.83	63.92	4.11	0.000*	6
5.	This HIS allows to access and view patients' assessments easily and quickly.	4.81	1.62	68.77	8.00	0.000*	2
6.	The system has the option to send reminders to healthcare providers (e.g. surgeries appointments and nurses to give medications to inpatients)	4.27	1.85	60.98	2.31	0.011*	7
7.	Overall, the system helped to improve follow up patients' health outcomes.	5.04	1.54	72.00	10.70	0.000*	1
	All items of the field	4.64	1.36	66.31	7.54	0.000*	

* The mean is significantly different from 4

5.4.3 Improvement Health Outcomes for Patients:

Table (5.12) shows the following results:

The mean of item #7 "Overall, the system helped to improve follow up patients' health outcomes" equals 5.04 (72.00%), Test-value = 10.70, and P-value = 0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 .We conclude that the highest agreed respondent is equal to(72.00%)of the respondents to this item, "Overall, the system helped to improve follow up patients' health outcomes" .This indicates that , this item collects all previous characteristics for other items to this variable ,that means that the system allows having a comprehensive picture about a patient that helps in diagnosing problems sooner. The implementation of such systems helped in diagnosing medical conditions at earlier stage. The system allows gathering all information related to a patient in one place; the system allows viewing drug formulary information and etc.

The mean of item #6 "The system has the option to send reminders to healthcare providers (e.g. surgeries appointments and nurses to give medications to inpatients)" equals 4.27 (60.98%), Test-value = 2.31, and P-value = 0.011 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this item is significantly greater than the hypothesized value 4 the lowest agreed respondent is equal to (60.98%) of the respondents to this item, "The system has the option to send reminders to healthcare providers (e.g. surgeries appointments and nurses to give medications to inpatients)". This indicates that , there are some wards depend on this procedure more than other wards such as (ICU, operation ward ,surgical wards ,and etc.) the lowest average respondents was in these wards which is equal to (8.00%) , this return to the pressure inside work previous wards . This result agreed with what, Abdool, (2014) in his research that there were a number of participants who disagreed that the system improves documentation process and coding system as well as patients waiting time is reduced and the ability of the system to send reminders to patients about their appointments.

The mean of the field "Improvement health outcomes for patients" equals 4.64 (66.31%), Test-value = 7.54, and P-value=0.000 which is smaller than the level of significance $\alpha = 0.05$. The sign of the test is positive, so the mean of this field is significantly greater than the hypothesized value 4. We conclude that the respondents agreed to field of "Improvement health outcomes for patients ".

This result agreed with what , Abdool,(2014) in his research that , more than half of the participants agreed by 93% and only 3% disagreed. that he implementation of such systems helped in diagnosing medical conditions at earlier stage . Also Abdool , agreed with the result , that most the participants agreed and strongly agreed about the following: patients' registration and scheduling appointments processes take maximum 5 minutes per patient for overall item. Abdool result consistent with the researcher result that , 59% of the participants agreed on that Overall, the system helped in improving patients' health outcomes.

Table (5.13): Means and Test values for " healthcare quality"

Item	Mean	S.D	Proportional mean (%)	Test value	P-value (Sig.)	Rank
Reduction of prescribing - error	4.65	1.36	66.47	7.62	0.000*	2
Redesigning patients care pathway	4.81	1.29	68.71	9.97	0.000*	1
Improvement health outcomes	4.64	1.36	66.31	7.54	0.000*	3
All Items of healthcare quality	**4.71**	**1.22**	**67.25**	**9.25**	**0.000***	

*The mean is significantly different from 4

5.4.4 In General " Healthcare Quality ":

Table (5.13) shows the mean of all items equals 4.71 (67.25%), Test-value = 9.25 and P-value =0.000 which is smaller than the level of significance $\alpha = 0.05$. The mean of all items is significantly different from the hypothesized value 4. We conclude that the respondents agreed to all items of the healthcare quality. The highest percentage between the previous variables is Redesigning patients care pathway which is equal to(68.71%)of the respondents to this item, redesigning patients care pathway ,while reduction of prescribing – error percentage is equal to (66.47%) finally , the lowest percentage between the previous variables is Improvement health outcomes for which is equal to (66.31%).

The percentages of three variables are close to each other but there are simple differences according to the importance .These three variables are important to evaluate healthcare quality , redesigning patients care pathway, helps to decrease the time for patient and save the effort for system users ; Reduction of prescribing – error gives the alerts to system users for developing controlled system to overcome implementation problems . Improvement health outcomes. The system may develop applications to follow patients outcome improvement through following patients progress after each visiting and updating it by the system . This result consistent

with, Abdool (2014) , Peikari, Shah et al (2015) , Teich at all.(1999), Peikari,(2013) that , the redesigning patients care pathway; reduction of prescribing – error and Improvement health outcomes are help to increase healthcare quality .

5.5 Research Hypotheses:

The Pearson Correlation Coefficient test was used to examine the correlation significance in testing the main hypothesis via its subsidiary ones as the following: To clarify the impact, the researcher used linear regression model between the dependent variable and the independent variable.

Table (5.14): Correlation coefficient between hospital information system quality and patients healthcare quality

	Pearson Correlation Coefficient	P-Value (Sig.)
Relationship between system quality and patients healthcare quality	.623	0.000*
Relationship between safety quality and patients healthcare quality	.606	0.000*
Relationship between information quality and patients healthcare quality	.737	0.000*
Relationship between service quality and patients healthcare quality	.748	0.000*
Relationship between performance quality and patients healthcare quality	.779	0.000*
Relationship between hospital information system quality and patients healthcare quality	**.782**	**0.000***

* Correlation is statistically significant at 0.05 level

5.5.1   First Hypothesis:

H1. There is a significant relationship between hospital information system quality and patients healthcare quality at level of 0.5.

> H1a.There is a statistical significant relationship between system quality and healthcare quality .
>
> H1b.There is a statistical significant relationship between s information quality and healthcare quality .
>
> H1c.There is a statistical significant relationship between s safety quality and healthcare quality .
>
> H1d.There is a statistical significant relationship between s performance quality and healthcare quality .

H1e) There is a statistical significant relationship between service quality and healthcare quality

Table (5.14) shows that the correlation coefficient between hospital information system quality and patients healthcare quality equals 0.782 and the p-value (Sig.) equals 0.000. The p-value (Sig.) is less than 0.05, so the correlation coefficient is statistically significant at $\alpha = 0.05$. We conclude there exists There is a statistical significant relationship between (HIS) quality (system quality, information quality, safety quality, performance quality ,performance quality)and healthcare quality .

The highest correlation coefficient was the relationship between performance quality and patients healthcare quality which is equal to 0.779 ; while the lowest correlation coefficient was the relationship between safety quality and patients healthcare quality.

This result consistent with Ross and R. Venkatesh (2016) that , there is an effect on implementing hospital information systems in hospitals to improve dimensions of healthcare quality . also this result agreed with ,(Silow-Carroll, Edwards, et al., 2012) that ,the electronic health record system is living up to their expectations by helping them improve health care quality and safety. This result consistent with Abdool(2014) that , Health information systems can be considered as possible improvement approaches that assist health care providers, clinicians and non-clinical staff to provide better services in order to add more values to healthcare field in terms of productivity, security, management…etc. also the result consistent with

Salahuddin and Ismail (2015), that system quality, information quality, and service quality influenced the healthcare IT usage.

According to previous studies the research concludes that, there is a strong relationship between each of system quality, performance quality ,information quality ,service quality , safety quality and healthcare quality.

Table (5.15): Result of Stepwise regression analysis

Variable	B	T	Sig.	R	R-Square	F	Sig.
(Constant)	0.459	2.297	0.022*				
Performance quality	0.411	7.096	0.000*	.815	0.665	163.107	0.000**
Information quality	0.214	2.940	0.004*				
Service quality	0.223	2.909	0.004*				

* The variable is statistically significant at 0.05 level

* * The relationship is statistically significant at 0.05 level

5.5.2 Second Hypothesis:

H2. There is a significant impact of hospital information system quality on patients healthcare quality at level of 0.5.

We use Stepwise regression, and obtain the following results:

1- Table (5.15) shows the Multiple correlation coefficient R =0.815 and R-Square = 0.665. This means 66.5% of the patients healthcare quality is explained by performance quality, information quality and service quality.

2- Table (5.15) shows the Analysis of Variance for the regression model. F=163.107, Sig. = 0.000, so there is a significant relationship between the dependent variable patients healthcare quality and the independent variables " performance quality, information quality and service quality ".

3- Based on Stepwise regression method, the variables " system quality, safety quality " have insignificant effect on patients healthcare quality.

The estimated regression equation is:

Patients healthcare quality = 0.459+ 0.411* (Performance quality)

+ 0.214* (Information quality) + 0.223* (Service quality)

The estimated regression equation is used to predict the value of patients healthcare quality for any give values (responses) to the independent variables " performance quality, information quality and service quality ".

This result consistent with Salahuddin and Ismail (2015), Hayajneh (2006) Peikari(2015) Ammenwerth at all (2011) Astuti, H. M., A. Herdiyanti, et al. (2015) , Cohen(2016) Sakineh Aghazadeh (2013) Chiu Chang (2015) the influence of performance impact on continued use intention was significantly positive that there is a significant impact between performance quality ,information quality ,service quality and healthcare quality .

This indicate that if performance quality ,service quality and information quality improved healthcare will be improve also .

Table (5.16): Independent Samples T-test of the fields and their p-values for gender

No.	Field	Means		Test Value	Sig.
		Male	**Female**		
1.	System quality	4.81	4.75	0.346	0.730
2.	Safety quality	4.81	4.77	0.216	0.829
3.	Information quality	5.05	4.89	1.022	0.308
4.	Service quality	4.90	4.88	0.184	0.854
5.	Performance quality	5.09	5.03	0.332	0.740
	Hospital Information System Quality	4.93	4.85	0.527	0.599
1.	Reduction of prescribing - error	4.56	4.80	-1.369	0.172
2.	Redesigning patients care pathway	4.79	4.85	-0.338	0.736
3.	Improvement health outcomes for patients	4.64	4.65	-0.084	0.933
	Healthcare quality	4.67	4.77	-0.620	0.536
	All items of the questionnaire	4.83	4.80	0.182	0.855

5.5.3 Third Hypothesis:

H3. There are no significant differences among respondents at level α = 0.05 toward the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to general information, which are gender, Education level, age, Current job and qualification years in using system.

This hypothesis can be divided into the following sub-hypotheses:

1- There are no significant differences among respondents at level α = 0.05 toward the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to gender.

Table (5.16) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is no significant difference among the respondents toward each field due to gender. We conclude that the personal characteristics' gender has no effect on each field. This result indicates that there are no differences among the respondents in their opinions about the impact of (HIS) Hospital Information System Quality on the Health Care Quality in European Gaza Hospital in Gaza strip" due to the general information attributed to gender. According to this result the sub-hypothesis" There are significant statistical differences at level (α = 0.05) among the respondents in their opinions about the impact of (HIS) Hospital Information System Quality on the Health Care Quality due to general information attributed their gender" was rejected.

This result indicates that, all system users (males or females) have the same a good experience about hospital information system. All the managers directed to information system in governmental jobs, they held a lot of training courses to cultivate and to increase awareness about the benefits of using such system . Each of genders have the same training courses, the same experience about hospital information system using ,so there are no significant differences between their respondent to the hospital information system due to the gender .

Table (5.17): ANOVA test of the fields and their p-values for education level

No.	Field	Means			Test Value	Sig.
		Diploma and less	**Bachelor degree**	**master's degree and more**		
1.	System quality	4.72	4.86	4.61	0.843	0.432
2.	Safety quality	4.83	4.88	4.52	1.466	0.233
3.	Information quality	5.16	5.06	4.66	2.641	0.073
4.	Service quality	4.87	4.97	4.67	1.202	0.302
5.	Performance quality	5.25	5.11	4.85	1.051	0.351
	Hospital Information System Quality	4.95	4.96	4.66	1.530	0.218
1.	Reduction of prescribing - error	4.87	4.60	4.68	0.508	0.602
2.	Redesigning patients care pathway	4.97	4.79	4.76	0.287	0.751
3.	Improvement health outcomes for patients	5.11	4.56	4.62	2.143	0.119
	Healthcare quality	4.99	4.66	4.69	0.933	0.395
	All items of the questionnaire	4.96	4.84	4.68	0.734	0.481

2- There are no significant differences among respondents at level α = 0.05 toward the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to education level.

Table (5.17) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is no significant difference among the respondents toward each field due to education level. We conclude that the personal characteristics' education level has no effect on each field. This result indicates that there are no differences among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality in European Gaza Hospital in Gaza strip" due to education level. " There are significant statistical differences at level (α = 0.05) among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to education level". Was rejected.

This result indicates that , there are significant differences among persons in education level but not in the experience of using such system , the experience is the same for all persons with some individual differences . Information systems don't vary according to the education level but the variation according to the experiment , this returns to the technological revolution which raising awareness to use hospital information system for all educational levels .

Table (5.18): ANOVA test of the fields and their p-values for age

No.	Field	Means				Test Value	Sig.
		Less than 25 years	From 25 to 35	From 35 to 45	45 years and above		
1.	System quality	4.67	4.71	4.95	4.89	0.673	0.569
2.	Safety quality	4.75	4.82	4.86	4.65	0.201	0.895
3.	Information quality	4.86	4.93	5.16	5.04	0.674	0.569
4.	Service quality	4.76	4.96	4.88	4.86	0.274	0.844
5.	Performance quality	4.80	5.11	5.19	5.06	0.774	0.510
	Hospital Information System Quality	4.77	4.88	5.01	4.91	0.418	0.740
1.	Reduction of prescribing - error	4.62	4.60	4.93	4.33	1.516	0.211
2.	Redesigning patients care pathway	4.92	4.81	4.75	4.78	0.146	0.932
3.	Improvement health outcomes for patients	4.46	4.58	4.96	4.47	1.620	0.185
4.	**Healthcare quality**	4.68	4.67	4.87	4.55	0.589	0.623
	All items of the questionnaire	4.71	4.80	4.96	4.78	0.502	0.681

3- There are no significant differences among respondents at level α = 0.05 toward the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to age.

Table (5.18) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is no significant difference among the respondents toward each field due to age. We conclude that the personal characteristics' age has no effect on each field. This result indicates that there are no differences among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality in European Gaza Hospital in Gaza strip" due to age . " There are significant statistical differences at level (α = 0.05) among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to due to age". Was rejected.

This result indicates that , the fear of direction to information system disappeared especially to elderly category . The circumstances were changed to the best after adopting information system, so the famous saying that ," most of system users are from Youth category" is also changed . There are a lot of organizations become depend on technological system more than previous. There are managers imposed all of age categories (Youth and elders) to use this system. This commitment of using system improves the worker's awareness of the whole benefits of hospital information system .

It can improves the service quality through decreasing waiting time and saving efforts .

Table (5.19): ANOVA test of the fields and their p-values for current job

No.	Field	Means					Test Value	Sig.
		Administrative	Nurse	Pharmacy	radiology technician	Technical analysis		
1.	System quality	4.85	4.75	4.69	4.66	5.25	0.646	0.630
2.	Safety quality	4.85	4.75	4.38	4.89	5.36	0.973	0.423
3.	Information quality	4.86	4.99	4.95	4.98	5.43	0.596	0.666
4.	Service quality	4.83	4.90	4.69	4.68	5.45	1.058	0.378
5.	Performance quality	5.02	5.04	5.00	5.15	5.54	0.537	0.708
	Hospital Information System Quality	4.88	4.87	4.76	4.85	5.40	0.808	0.521
1.	Reduction of prescribing - error	4.91	4.52	4.82	4.94	4.84	1.092	0.361
2.	Redesigning patients care pathway	4.91	4.80	4.34	4.73	5.06	0.609	0.657
3.	Improvement health outcomes for patients	4.75	4.55	4.63	4.88	5.02	0.682	0.605
4.	**Healthcare quality**	4.86	4.64	4.58	4.83	4.98	0.578	0.679
	All items of the questionnaire	4.87	4.77	4.69	4.85	5.24	0.684	0.604

4- There are no significant differences among respondents at level α = 0.05 toward the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to current job.

Table (5.19) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is no significant difference among the respondents toward each field due to current job. We conclude that the personal characteristics' current job has no effect on each field. This result indicates that there are no differences among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality in European Gaza Hospital in Gaza strip" due to current job . " There are significant statistical differences at level (α = 0.05) among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to due to current job ". Was rejected.

This result indicates that, information system not limited to a specified job in the hospital but it becomes useful for all kinds of (governmental or NGOS) jobs . Information system was entered to the whole society and it became as a part of our life not only to the job positions but to the whole life. Information system facilitates implantation difficulties, shortened the distances between persons with different jobs, different ages ,and different places inside and outside the geographical barriers.

Table (5.20): ANOVA test of the fields and their p-values for qualification years in using system

No.	Field	Means				Test Value	Sig.
		less than year	From one year to less than five years	From five to less than ten years	Ten years and over		
1.	System quality	5.04	4.52	4.69	4.94	1.937	0.124
2.	Safety quality	5.00	4.66	4.91	4.74	0.593	0.620
3.	Information quality	4.98	4.92	4.85	5.12	0.737	0.531
4.	Service quality	4.98	4.91	4.85	4.89	0.076	0.973
5.	Performance quality	4.99	5.04	5.05	5.12	0.092	0.964
	Hospital Information System Quality	5.00	4.79	4.84	4.97	0.464	0.707
1.	Reduction of prescribing - error	4.94	4.55	4.67	4.63	0.493	0.687
2.	Redesigning patients care pathway	5.14	4.84	4.79	4.72	0.692	0.558
3.	Improvement health outcomes for patients	4.95	4.51	4.58	4.68	0.684	0.562
4.	**Healthcare quality**	5.02	4.64	4.69	4.68	0.618	0.604
	All items of the questionnaire	4.96	4.74	4.77	4.87	0.354	0.786

5- There are no significant differences among respondents at level α = 0.05 toward the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to qualification years in using system.

Table (5.20) shows that the p-value (Sig.) is greater than the level of significance α = 0.05 for each field, then there is no significant difference among the respondents toward each field due to qualification years in using system. We conclude that the personal characteristics' qualification years in using system has no effect on each field. This result indicates that there are no differences among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality in European Gaza Hospital in Gaza strip" due to qualification years in using system. " There are significant statistical differences at level (α = 0.05) among the respondents in their opinions about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality due to due to qualification years in using system". Was rejected.

This result indicates that, there is no doubt that the years of experience play an active role in using of the system, but the practice has a greater impact than years of experience. Many of the system users don't have Engineering degree in information technology, but they practice this function in his daily life in his experience that he gained from continuing the practice of the system. After technological development and the introduction of the computerized information system , managers directed to held training courses which may increase experiences ,practices to improve new systems which helps to facilitate services .

Chapter 6
Conclusion and
Recommendations

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Conclusions and Recommendation

6.1 Introduction:

This chapter includes the most important conclusions which have addressed the Impact of (HIS) Hospital Information System Quality on the Health Care Quality at the governmental hospital (European Gaza Hospital) in Gaza through the perspective of hospital workers. In addition, this chapter shows the proposed most important recommendations which may enhance information healthcare quality in the Palestinian hospitals.

6.2 Conclusion:

This research investigated the criteria that affecting on healthcare quality which are five criteria ,information quality, system quality, service quality ,safety quality and performance quality, hospital information system quality was approximately equal to (69.96%)The ratio is low but it's acceptable ,on the other hand, healthcare quality was equal to (67.25%) also the ratio is low but it's acceptable. there is a significant relationship between the dependent variable patients healthcare quality and the independent variables" performance quality, information quality and service quality".

The regression Model between dependent variable and independent variables was
Patients healthcare quality = 0.459+ 0.411* (Performance quality)

+ 0.214* (Information quality) + 0.223* (Service quality)

The model was fit but it is weak because the dependence between independent variables

In light of the findings that presented in the previous chapter, the Correlations between the study fields:

1- **The finding confirmed that, there is a relationship between hospital information system** (system quality, information quality, safety quality, performance quality and service quality) **and healthcare quality equals to 0.782**The highest correlation coefficient was the relationship between performance quality and patients healthcare quality which is equal to 0.779; while the lowest correlation coefficient was the relationship between safety quality and patients healthcare quality.

- **First domain:**

    There is a relationship significant between system quality and patients healthcare quality at level of 0.5.

    There is a positive correlation statistically significant at the 0.05 level between the system quality and patient's healthcare quality at level of 0.5.through the perspective of hospital employees in European Gaza Hospital in Gaza.

    That means that the system quality can improve healthcare quality at the level of statistical significance at $\alpha = 0.05$ (0. .623) through hospital employees in European Gaza Hospital in Gaza.

- **Second domain**

There is a relationship significant between safety quality and patient's healthcare quality at level of 0.5.

There is a positive correlation statistically significant at the 0.05 level between safety quality and patient's healthcare quality at level of 0.5. (.606) through the perspective of hospital employees in European Gaza Hospital in Gaza. This means that safety quality can improve healthcare quality for patients and system users at the level of statistical significance at $\alpha = 0.05$ through hospital employees in European Gaza Hospital in Gaza.

- **Third domain**:

There is a relationship significant between information quality and patients healthcare quality at level of 0.5.

There is a positive correlation statistically significant at the 0.05 level between information quality and patients healthcare quality at level of 0.5.through the perspective of hospital employees in European Gaza Hospital in Gaza**.** This means that information quality can improve healthcare quality at the level of statistical significance at $\alpha = 0.05(.737)$ through hospital employees in European Gaza Hospital in Gaza.

- **Fourth Domain:**

There is a relationship significant between service quality and patients healthcare quality at level of 0.5.

There is a positive correlation statistically significant at the 0.05 level between service quality and patients healthcare quality at level of 0.5.through the perspective of hospital employees in European Gaza Hospital in Gaza**.** This means that service quality can improve healthcare quality for patients and system users at the level of statistical significance at $\alpha = 0.05$ through hospital employees in European Gaza Hospital in Gaza.

- **Fifth domain:**

There is a relationship significant between performance quality and patients healthcare quality at level of 0.5.

There is a positive correlation statistically significant at the 0.05 level between performance quality and patients healthcare quality at level of 0.5.through the perspective of hospital employees in European Gaza Hospital in Gaza**.** This means that implementation of performance quality affects positively on healthcare quality for patients and system users at the level of statistical significance at $\alpha = 0.05(.779)$ through hospital employees in European Gaza Hospital in Gaza.

- **In general,** *there is a significant relationship between hospital information system quality and patients healthcare quality at level of 0.5.*

There is a positive correlation statistically significant at the 0.05 level between the hospital information system quality and patients healthcare quality at level of 0.5.through the perspective of hospital employees in European Gaza Hospital in Gaza. This means that the importance of the hospital information system to improve healthcare quality at the level of statistical significance at α = 0.05(**.782**) through hospital employees in European Gaza Hospital in Gaza.

2- **Hospital information system quality is directly affected on patient healthcare quality 66.5% of the patients healthcare quality is explained by performance quality, information quality and service quality.**

There is a significant impact of hospital information system quality on patients healthcare quality at level of 0.5.

there is a significant relationship between the dependent variable patients healthcare quality and the independent variables " performance quality, information quality and service quality " at the 0.05 level. through the perspective of hospital employees in European Gaza Hospital in Gaza.

This means that Hospital Formation System is intrinsic factor to improve each of" performance quality, information quality and service quality " for patients and system users at the level of statistical significance at α = 0.05 through the perspective of hospital employees in European Gaza Hospital in Gaza.

3-This study also finds that, (HIS) improved the usage of healthcare system, and the employees achievements with using such systems to improve services for patients .

1- **Differences among the Study Respondents' Opinions**

There is no significant difference among the respondents toward each field in European Gaza Hospital in Gaza strip in Palestine" due to gender.

There are no significant statistical differences at level (α = 0.05) among the respondents in their opinions about the study fields attributed to gender, education level, age, current job and qualification years in using system.

6.3 Recommendation:

Palestinian hospitals are advised to exert more efforts towards implementations of hospital information system .

- Palestinian hospitals are recommended to increase the awareness about the benefits of information system .

- Palestinian hospitals are recommended to enhance training in fields of hospital information system .

- Palestinian hospitals are recommended to develop HIS selection multidisciplinary team.

- Palestinian hospitals are recommended for assessing user needs, identifying key workflows and improving processes via process improvement mechanisms.

- Palestinian hospitals are recommended to develop a databases to collect factors affecting the HIS failures; evaluating HIS and present organizations with best practices

- Palestinian hospitals are recommended to improve communication between expertise via information system.

- Palestinian hospitals are recommended to Provide continuous training courses and to be accredited.

- Palestinian hospitals are recommended to implement such application for enhancing communication between all involved providers of care.

- Test existing systems to ensure that they actually catch errors that injure patients

6.3.1   Benefits and Implications of This Study

In order to cover the topic of this study, the researcher in this section tried to conclude some of the benefits and implications of this study results. So, this section

will focus on both theoretical and practical implications which may be useful for European Gaza hospital and another hospitals in Gaza.

6.3.2 Theoretical Implications

Researcher findings indicate that (HIS) quality components have a positive and a significant effect on healthcare quality, which can improve healthcare quality through improving redesigning patients care pathway, improving t health patients outcomes and decreasing prescribing errors for example,(Ross and Venkatesh, 2016), proved that implementing hospital information system in hospitals has a greater effect on improving healthcare quality among hospitals and this increase patients satisfaction .(Ammenwerth, Rauchegger, et al., 2011),The HIS-monitor was found to be a useful instrument, in turn showing that the quality of the information processing in nursing strongly increased after the introduction of a nursing information system. Finally, this study found that, implementing (HIS) can improve healthcare quality through improving safety quality ,performance quality , system quality ,information quality and service quality in addition to monitor patients health outcomes ,re-designs patients care pathway and finally decreasing prescribing errors.

6.3.3 Practical Implications:

There are several limitations that should be mentioned.

- This study focused on (HIS) using from the perspective of European Gaza hospital employees only, future researches should focus on patients perspective about using such system .

- There are other variables which should be focused such as patients satisfaction, preventing system' errors, communication, decreasing waiting time and decreasing workload. Additionally, future research can capture more variables from other domains to further enhance our understanding of (HIS) implementation.

6.4 Further Research:

- The factors that impact on healthcare quality .

- The impact of using hospital information system on re-designing patients care pathway.

- The impact of using hospital information system on the improvement of patients' outcomes through the perspective of patients.

- The role of hospital information system on decreasing prescribing errors through the perspective of system users.

- The impact of hospital information system on the integration of information between governmental hospitals and healthcare clinics.

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Appendices

استبيان حول أثر نظام المعلومات الصحي المحوسب على تحسين جودة الخدمات المقدمة للمرضى

(دراسة حالة مستشفى غزة الأوربي)

عزيزي الموظف

تقوم الباحثة بإجراء دراسة حول أثر نظم المعلومات الصحي المحوسب من خلال العوامل (جودة الأمان، جودة المعلومات، جودة الخدمة، جودة النظام، جودة الأداء) على تحسين جودة الخدمات المقدمة للمرضى من حيث: مدى القدرة على تحسين النتائج الصحية للمرضى، تصميم مسار الرعاية الطبية للمرضى، الحد من الأخطاء الطبية العائدة للنظام في **مستشفى غزة الأوربي،** لإكمال الأطروحة العلمية لنيل درجة الماجستير في إدارة الأعمال من الجامعة الإسلامية في غزة.

حصلت على الأذن من السيد، **كمال موسى،** لتوزيع الاستبيان على الموظفين العاملين في مؤسستكم الموقرة. سأكون ممتنة لكم إن وافقتم على تعبئة الاستبيان، ولكم مطلق الإرادة والحرية في عدم الإجابة عن أي سؤال لا ترغبون بالإجابة عنه. كما وإنني أقدر جهودكم عاليا في الإجابة على أسئلة الاستبانة؛ حيث يستغرق تعبئتها 15-20 دقيقة. كما وأؤكد على أنه لا توجد إجابات صحيحة وإجابات خاطئة وأن تبقى معلوماتكم الشخصية سرية ولا تستخدم إلا لأغراض البحث العلمي. لذا أرجو التكرم بالإجابة عليها بصدق وموضوعية ولكم مني جزيل الشكر. أشكر لكم حسن تعاونكم، وأقدر لكم جهدكم ووقتكم الثمين لتعبئة الاستبيان.

<div align="center">

الباحثة: فلسطين معين محمود نجم

برنامج الماجستير في إدارة الأعمال –كلية التجارة

الجامعة الإسلامية – غزة

جوال: 0599540510

شكرا لتعاونكم المخلص

</div>

القسم الأول:

1.	**الجنس**	☐ ذكر	☐ أنثى	

2.	**المستوى التعليمي**	☐ دكتوراه أو أعلى	☐ ماجستير	☐ بكالوريوس
		☐ دبلوم	☐ ثانوية عامة فأقل	

3.	**العمر**	☐ أقل من 25 عام	☐ من 25 إلى أقل من 35 عام
		☐ من 35 إلى أقل من 45 عام	☐ 45 عام فأكثر

4.	**الوظيفة الحالية**	☐ إداري	☐ممرض	☐ الصيدلة
		☐فني اشعة	☐فني تحاليل	القسم ،..............

5.	**سنوات الخبرة في استخدام النظام**	☐ أقل من سنة	☐ من سنة إلى أقل من خمس سنوات
		☐ من خمس إلى أقل من عشر سنوات	☐ عشر سنوات فأكثر

6.	**إلى اي درجة يعتمد عملك على استخدام النظام الصحي المحوسب؟**	%	

7.	**المستفيدون من خدماتك**	☐المرضى	☐الزملاء في العمل	☐ فئات متعددة

القسم الثاني:

المحور الأول: جودة نظام المعلومات الصحي المحوسب

إلى أي مدى توافق على الفقرات التالية والخاصة بجودة نظام المعلومات الصحي المحوسب؟

7	←					1	**(1 – غير موافق بشدة، 7- موافق بشدة)**	#
7	6	5	4	3	2	1	نظام المعلومات الصحي المحوسب مرن وسهل الاستخدام.	1.
7	6	5	4	3	2	1	نظام المعلومات الصحي المحوسب سريع الاستجابة ويوفر المعلومات المطلوبة عند الحاجة.	2.
7	6	5	4	3	2	1	يعمل نظام المعلومات الصحي المحوسب دون انقطاع ومحدث باستمرار.	3.
7	6	5	4	3	2	1	يشمل نظام المعلومات الصحي المحوسب على جميع الخدمات المقدمة للمرضى داخل المستشفى (على سبيل المثال المختبر والأشعة والجراحة والفواتير).	4.
7	6	5	4	3	2	1	يسجل نظام المعلومات الصحي النتائج الخاصة بالأشعة.	5.
7	6	5	4	3	2	1	يحلل نظام المعلومات الصحي المحوسب نتائج الفحوصات المخبرية ويسهل الوصول اليها.	6.

164

7						1	(1 – غير موافق بشدة، 7- موافق بشدة)	#
7	6	5	4	3	2	1	يسهل نظام المعلومات الصحية المحوسب إعداد التقارير الطبية.	.7
7	6	5	4	3	2	1	يساعد نظام المعلومات الصحي المحوسب في تحسين التواصل مع خبراء الصحة الآخرين في الأقسام الأخرى.	.8
7	6	5	4	3	2	1	بشكل عام يعتبر أداء نظام المعلومات الصحي المحوسب مرضي.	.9

المحور الثاني: جودة الأمان

الى أي مدى توافق على الفقرات التالية والخاصة بجودة الأمان ضمن نظام المعلومات الصحي المحوسب؟

7	6	5	4	3	2	1	تعتبر سجلات المريض في نظام المعلومات الصحية المحوسب هي دائما كاملة.	.1
7	6	5	4	3	2	1	سجلات المريض في نظام المعلومات الصحية المحوسب محمية ولا يمكن فقدانها.	.2
7	6	5	4	3	2	1	سجلات المريض في نظام المعلومات الصحية المحوسب دائما دقيقة وصحيحة.	.3
7	6	5	4	3	2	1	يعمل نظام المعلومات الصحية المحوسب على حماية سرية المعلومات المتعلقة بخصوصية المرضى.	.4
7	6	5	4	3	2	1	بشكل عام، النظام المستخدم في نظم المعلومات الصحية المحوسبة لديه القدرة على توفير متطلبات الأمان والخصوصية.	.5

المحور الثالث: جودة المعلومات

الى أي مدى توافق على الفقرات التالية والخاصة بجودة المعلومات ضمن نظام المعلومات الصحي المحوسب؟

7	6	5	4	3	2	1	يحسن نظام المعلومات الصحية المحوسب فرص الحصول على المعلومات الطبية للمرضى.	.1
7	6	5	4	3	2	1	المعلومات الصادرة عن نظام المعلومات الصحية المحوسب مفصله بما فيه الكفاية.	.2
7	6	5	4	3	2	1	المعلومات في نظام المعلومات الصحية المحوسب دقيقة ومحدثه باستمرار.	.3
7	6	5	4	3	2	1	شكل المعلومات الصادرة عن نظام المعلومات الصحية المحوسب مناسب للاستخدام.	.4
7	6	5	4	3	2	1	يساهم نظام المعلومات الصحية المحوسب في تحسين توقيت الوصول لمعلومات المرضى.	.5
7	6	5	4	3	2	1	يساهم نظام المعلومات الصحية المحوسب في تسهيل الحصول على المعلومات الديموغرافية للمريض بشكل أفضل من ذي قبل.	.6
7	6	5	4	3	2	1	يساهم نظام المعلومات الصحية المحوسب في تسريع الوصول إلى نتائج التحاليل والأشعة للمرضى.	.7
7	6	5	4	3	2	1	يمكن الاعتماد على المعلومات الصادرة عن نظام المعلومات الصحية المحوسب في عملية التشخيص الصحيح للمرضى ومتابعتهم.	.8

إلى أي مدى توافق على الفقرات التالية والخاصة بجودة الخدمة؟

7						1	البند	(1 – غير موافق بشدة، 7- موافق بشدة)
7	6	5	4	3	2	1	.1	يعتبر الدعم المقدم لمستخدمي نظام المعلومات الصحية المحوسب كافي.
7	6	5	4	3	2	1	.2	يعتبر التدريب على استخدام نظام المعلومات الصحية المحوسب كافي.
7	6	5	4	3	2	1	.3	يوجد هناك شخص ما نلجأ اليه عندما نحتاج المساعدة باستمرار.
7	6	5	4	3	2	1	.4	يساعد نظام المعلومات الصحية المحوسب في تحسين جودة ونوعية الخدمات المقدمة.
7	6	5	4	3	2	1	.5	يساعد نظام المعلومات الصحية المحوسب في تحسين دقة النتائج المخبرية والمعلومات المتعلقة بالمرضى.
7	6	5	4	3	2	1	.6	يمكن الاعتماد على نتائج الاختبارات التي يجمعها نظام المعلومات الصحي المحوسب في اتخاذ القرارات الطبية.
7	6	5	4	3	2	1	.7	بشكل عام، يساعد نظام المعلومات الصحية المحوسب على زيادة جودة الخدمات الطبية وزيادة الرضا عنها.

إلى أي مدى توافق على الفقرات التالية والخاصة بجودة الأداء؟

7						1	البند	(1 – غير موافق بشدة، 7- موافق بشدة)
7	6	5	4	3	2	1	.1	يؤثر نظام المعلومات الصحية المحوسب على مستويات الإنتاجية للعاملين.
7	6	5	4	3	2	1	.2	يساعد نظام المعلومات الصحية المحوسب على الحد من استهلاك الموارد وتقليل تكلفة تقديم الخدمات الصحية.
7	6	5	4	3	2	1	.3	يساهم نظام المعلومات الصحية المحوسب على تحسين الأداء الوظيفي للعاملين.
7	6	5	4	3	2	1	.4	يساعد نظام المعلومات الصحية المحوسب في توضيح مسؤوليات العاملين.
7	6	5	4	3	2	1	.5	يساعد نظام المعلومات الصحي المحوسب على زيادة فعالية التعامل مع المرضى من خلال (السرعة وزمن الاستجابة للمرضى).
7	6	5	4	3	2	1	.6	بشكل عام، أستطيع مع نظام المعلومات الصحي المحوسب العمل بفعالية اعلى.

القسم الثالث: جودة الرعاية الطبية

المحور السادس: الحد من الأخطاء الطبية وأخطاء الوصفات الطبية

إلى أي مدى توافق على الفقرات التالية والخاصة بمدى قدرة نظام المعلومات الصحي المحوسب على الحد من الأخطاء الطبية؟

7						1	(1 – غير موافق بشدة، 7- موافق بشدة)	#
7	6	5	4	3	2	1	يساعد نظام المعلومات الصحية المحوسب على الحد من الأخطاء من خلال التذكير والتنبيهات.	1.
7	6	5	4	3	2	1	تنبهني رسائل الخطأ في نظام المعلومات الصحي المحوسب بخطورة الأخطاء.	2.
7	6	5	4	3	2	1	يساعدني نظام المعلومات الصحي المحوسب على التغلب على الأخطاء.	3.
7	6	5	4	3	2	1	يقلل نظام المعلومات الصحي المحوسب من معدل الأخطاء بالتقارير الطبية.	4.
7	6	5	4	3	2	1	يساهم نظام المعلومات الصحي المحوسب في تقليل الأخطاء المرتبطة بالحساسية تجاه بعض الأدوية.	5.
7	6	5	4	3	2	1	يقلل النظام الصحي المحوسب من أخطاء الجرعات الزائدة.	6.

المحور السابع: إعادة تصميم مسار الرعاية الطبية للمرضى

إلى أي مدى توافق على الفقرات التالية والخاصة بمدى قدرة نظام المعلومات الصحي المحوسب على المساعدة في إعادة تصميم مسار الرعاية الطبية؟

7						1	(1 – غير موافق بشدة، 7- موافق بشدة)	#
7	6	5	4	3	2	1	يسهل نظام المعلومات الصحي المحوسب رحلة المريض منذ دخوله للمستشفى حتى موعد المغادرة.	1.
7	6	5	4	3	2	1	تستغرق عملية التسجيل للمرضى أو اخذ المواعيد من 5 إلى 10 دقائق كحد أقصى.	2.
7	6	5	4	3	2	1	يسمح نظام المعلومات الصحي المحوسب بمراجعة الملاحظات عن مدى تقدم المرضى.	3.
7	6	5	4	3	2	1	يمتلك نظام المعلومات الصحي المحوسب الخيار من اجل إرسال إشعارات للمرضى بمواعيد الحجوزات ومواعيد المراجعة.	4.
7	6	5	4	3	2	1	يساعد نظام المعلومات الصحي المحوسب على تبسيط الإجراءات الإدارية الداعمة (مثلا الفواتير وتكلفة العلاج) وجعلها أكثر سهولة.	5.
7	6	5	4	3	2	1	يساعد نظام المعلومات الصحية المحوسب على تقليل الوقت الذي يستغرقه المرضى لاستكمال الإجراءات الإدارية المتبعة في المستشفى.	6.
7	6	5	4	3	2	1	يساعد نظام المعلومات الصحي المحوسب في توثيق أنشطة الرعاية الصحية والتمييز بينها.	7.
7	6	5	4	3	2	1	بشكل عام، يساعد نظام المعلومات الصحي المحوسب في إعادة تصميم مسارات الرعاية الطبية للمرضى.	8.

إلى أي مدى توافق على الفقرات التالية والخاصة بمدى قدرة نظام المعلومات الصحي المحوسب على المساعدة في تحسين النتائج الصحية للمرضى؟

البند	(1 – غير موافق بشدة، 7- موافق بشدة)	1						7
1.	يسمح نظام المعلومات الصحي المحوسب بتكوين صورة شاملة عن المريض والذي يساعد في تشخيص المشاكل بشكل أسرع.	1	2	3	4	5	6	7
2.	يساعد نظام المعلومات الصحي المحوسب في تشخيص الحالات المرضية في مرحلة مبكرة.	1	2	3	4	5	6	7
3.	يسمح نظام المعلومات الصحي المحوسب بجمع كافة المعلومات ذات الصلة بالمريض في مكان واحد (مثل نتائج المختبر وتقارير الأشعة) والتي تساعد في اتخاذ القرارات العلاجية.	1	2	3	4	5	6	7
4.	يسمح نظام المعلومات الصحي المحوسب في عرض معلومات الأدوية التي يتم وصفها للمرضى.	1	2	3	4	5	6	7
5.	يسمح نظام المعلومات الصحي المحوسب بالوصول إلى المعلومات السابقة عن المرضى وعرض تقييمات حالتهم المرضية بسهولة وبسرعة.	1	2	3	4	5	6	7
6.	لدى نظام المعلومات الصحي المحوسب الخيار لإرسال رسائل تذكيرية إلى مقدمي الرعاية الصحية (مثل العمليات الجراحية التعيينات والممرضات لإعطاء الأدوية للمريض).	1	2	3	4	5	6	7
7.	بشكل عام، يساعد النظام في تحسين متابعة النتائج الصحية للمرضى.	1	2	3	4	5	6	7

تقبلوا فائق احترامي

A questionnaire about the Impact of (HIS) Hospital Information System Quality on the Health Care Quality.

Dear employee ,

The researcher collecting information about (HIS) effect through quality criterion (information quality ,system quality ,service quality ,performance quality and safety quality) on the improvement of healthcare quality through (re-designing patients care pathway ,improving health outcomes and decreasing prescribing errors) at European Gaza Hospital in Gaza strip to complete a MPA thesis in business administration at the Islamic University of Gaza.

I have been given permission by (Mr. Kamal Mosa) to distribute a questionnaire to staff in your organization.

I'll be grateful to you if you would answer questions this questionnaire, with reserving your right not to answer any question do not want to answer. The researcher shall use these data only for the purpose of scientific research.

Please , read the instruction associated with each section and each question carefully. Your responses to the items asked in this questionnaire will be treated with total and absolute confidentiality. Your responses will not be known to anyone outside the research team, and will not be disclosed to anyone within your organization.

Thank you for your cooperation and for taking the time and effort to fill out this

questionnaire.

Ms. Falsteen Najem

Faculty of Commerce

Business Administration Department

Islamic University of Gaza

Mob.0599540510

Thank you for your sincere cooperation.

Section A: Personal Information

First division

1-Gender	☐female	☐male
2- Education level ☐Bachelor degree	☐master's degree ☐high school or less	☐Doctor or higher ☐ diploma
3- age ☐From 25 to less than 35. ☐45 years and over	☐ Less than 25 years ☐From 35 to less than 45 years	
4-Current job	☐Nurse ☐pharmacy ☐Technical analysis	☐Administrative ☐radiology technician department..............'
5-qualification years in using **system** ☐From one year to less than five years ☐Ten years and over	☐less than year ☐From five to less than ten years	
6-The ratio to which your work depends using of hospital information system?		**%**
Persons who benefit from your services	☐Colleagues at work ☐patients	☐Multiple categories

Second division:

First domain :System Quality

Please indicate the extent to which you agree or disagree with each of the statements and circle.

the appropriate number based on the scale: 7–strongly agree, 1–strongly disagree.

#	7–strongly agree, 1–strongly disagree.	1	→					7
1-	The system is easy to use and flexible.	1	2	3	4	5	6	7
2-	The system is respond quickly enough.	1	2	3	4	5	6	7
3-	The system is always up and running .	1	2	3	4	5	6	7
4-	The system includes almost all the services provided to patients within the facility (e.g. laboratory, radiology, surgery and billing).	1	2	3	4	5	6	7
5-	The system acquires radiology results.	1	2	3	4	5	6	7
6-	The system analyze patients laboratory results and improved the speed of access to results .'	1	2	3	4	5	6	7
7-	The system ease of medical reporting.	1	2	3	4	5	6	7
8-	The system has improved my communication with other health.	1	2	3	4	5	6	7
9-	Overall, the(HIS) is satisfactory.	1	2	3	4	5	6	7
Second domain : Safety Quality								
1-	Patients records in [the system] are always complete .	1	2	3	4	5	6	7
2-	Patients records in [the system] are never missing .	1	2	3	4	5	6	7
3-	Patients records in [the system] are always correct and accurate .	1	2	3	4	5	6	7
4-	The system help in protecting the confidentiality of private patient information.	1	2	3	4	5	6	7
5-	Overall, (HIS)Meeting of security and privacy requirement.	1	2	3	4	5	6	7

#	7–strongly agree, 1–strongly disagree.	1	⟶					7
Third domain : Information Quality								
1-	The system had improved access to patients' medical information.	1	2	3	4	5	6	7
2-	Information output from [the system] is detailed enough.	1	2	3	4	5	6	7
3-	Information in (HIS) is currency and up to dating .	1	2	3	4	5	6	7
4-	Information output from [the system] is suitable for use .	1	2	3	4	5	6	7
5-	The system had improved the timeliness of access to patient information**.**	1	2	3	4	5	6	7
6-	The system had made accessing patient demographic information easier than before.	1	2	3	4	5	6	7
7-	The system had improved the speed of access to radiology results.	1	2	3	4	5	6	7
8-	Information in computerized health information system] helps correct diagnosis of patients and follow-up process.	1	2	3	4	5	6	7
Forth domain :Service Quality								
1-	Support provided to users of [the system] has been sufficient	1	2	3	4	5	6	7
2-	Training on the use of [the system] has been sufficient.	1	2	3	4	5	6	7
3-	There is always someone to turn to if we need help with**.**	1	2	3	4	5	6	7
4-	The system had helped in improving the quality of services.	1	2	3	4	5	6	7
5-	The system had improved the accuracy of laboratory results and patient information**.**	1	2	3	4	5	6	7
6-	The system had made medical decision making more based on information.	1	2	3	4	5	6	7
7-	Overall,(HIS)Increase satisfaction and quality of healthcare.	1	2	3	4	5	6	7
Fifth domain : Performance Quality								
1-	The system influence or alter their productivity levels.	1	2	3	4	5	6	7
2-	The HIS helped in reducing the consumption of material resources or the cost.	1	2	3	4	5	6	7
3-	The system had improved job performance of hospital employees.	1	2	3	4	5	6	7
4-	The system help in clarifying employees' responsibilities.	1	2	3	4	5	6	7
5-	Hospital information system help in increasing effectiveness	1	2	3	4	5	6	7

#	7–strongly agree, 1–strongly disagree.	1	→					7
	dealing with the patient.							
6-	Overall, With (HIS), I believe I can work more efficiently .	1	2	3	4	5	6	7

Third division :Healthcare Quality

Sixth domain : Reduction of Prescribing - Errors

1-	Hospital information system help to reduce errors through reminders and alerts .	1	2	3	4	5	6	7
2-	The error messages inform me of error severity, suggest cause of problem.	1	2	3	4	5	6	7
3-	Hospital information system help to overcome errors.	1	2	3	4	5	6	7
4-	Hospital information system help to decrease medical reports errors .	1	2	3	4	5	6	7
5-	The system makes it possible for me to reduce drug allergy.	1	2	3	4	5	6	7
6-	The system has reduced drug dosing errors.	1	2	3	4	5	6	7

Seventh domain :Redesigning Patients Care Pathway

1-	This HIS facilitates a patient's journey in the hospital; since the patient enters the facility till leaving it**.**	1	2	3	4	5	6	7
2-	Patients' registration or scheduling appointment processes take maximum from 5 to10 minutes per patient.	1	2	3	4	5	6	7
3-	This HIS Allows reviewing patients' progress notes.	1	2	3	4	5	6	7
4-	Hospital information system has the option to send notices for patients reservation and checking appointments .	1	2	3	4	5	6	7
5-	This HIS helps in simplifying supporting processes, such as billing, therapy cost) and make it easier than before.	1	2	3	4	5	6	7
6-	Hospital information system help to decrease patients time to complete hospital management procedures .	1	2	3	4	5	6	7
7-	Hospital information system facilitates documenting patients' care activities .	1	2	3	4	5	6	7
8-	Overall, the system helped in redesigning patients' care Pathway.	1	2	3	4	5	6	7

#	7–strongly agree, 1–strongly disagree.	1						7
Eighth domain : Improvement Health Outcomes for Patients								
1-	The system allows having a comprehensive picture about a Patient that helps in diagnosing problems sooner.	1	2	3	4	5	6	7
2-	The implementation of such systems helped in diagnosing medical conditions at earlier stage.	1	2	3	4	5	6	7
3-	The system allows gathering all information related to a patient in one place (e.g. lab results and radiology reports) that helps in making therapeutic decisions).	1	2	3	4	5	6	7
4-	The system allows viewing drug formulary information.	1	2	3	4	5	6	7
5-	This HIS allows to access and view patients' assessments easily and quickly.	1	2	3	4	5	6	7
6-	The system has the option to send reminders to healthcare providers (e.g. surgeries appointments and nurses to give medications to inpatients).	1	2	3	4	5	6	7
7-	Overall, the system helped to improve follow up patients' health outcomes .	1	2	3	4	5	6	7

Thanks a lot

Appendix C

List of Experts who Reviewed the Questionnaire

Name	Place of work
Dr. Waseem Elhabeel	**Commerce faculty**
Dr. Akram Samoor	**Commerce faculty**
Dr. hatem Elaydy	**Engineering faculty**
Dr.Wael Thabt	**AL azharCommerce faculty**
Dr. Ramez Bdeir	**AL azharCommerce faculty**
Dr. Hesham Mady	**Islamic university**
Dr. Wael AL daya	**Commerce faculty**
Dr. Kaleil Mady	**Plantain university**
Dr. Nabeul Al loh	**Employees office**
Dr. Mansor AL auoby	**Technician Deir AL balh university**