

# The Role of MIS in Enhancing the Decision-making Process in Hospitals and Health Care Sectors: Case Study of AL-HADA Military Hospital in AL Taif, KSA

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## Abstract

Decision-making processes become the heart of the management challenge and are the way to achieve the objectives of the organization during different stages such as planning, organizing, directing and monitoring throughout the entire structure of the organization. Health care is considered by many as one of the most important issues for humanity, both in terms of societal and life goals. The relationship between information technology and health care is a mutual relationship. The health care sector needs accurate information and accurate information cannot be achieved unless we have good health in our brains. In this article, the author seeks to help both administration and medical managers by explaining the impact of health Information system on decision making process as well as illustrating the importance of the information system in taking these of decisions.

**Keywords:** *Management Information System, Health Information Systems, Hospital, Decision Support Systems, Retrieval of health information, Electronic Health Record.*

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## 1. Introduction

The information flow process is insignificant for healthcare institution's activity. Medical decisions are facing many challenges and difficulties due to the volume of information and knowledge that should the doctors and decision makers in hospitals and health care centers to deal with on an ongoing basis [25]. Information about hospitals and health care centers has grown and expanded to the point where it has become difficult to handle in traditional ways, using supporting tools became necessary to raise the destiny analytical and predictive needed in the decision-making processes, thereby raising the efficiency and effectiveness of collection, storage, sorting and retrieval information. Raising the analytical capabilities needed to evaluate and process information and various alternatives helps to save time and effort required for the decision-makers [25].

Health care is considered by many as one of the most important issues for humanity, both in terms of societal and life goals. The relationship between information technology and health care is a mutual relationship. The health care sector needs accurate information and accurate information cannot be achieved unless we have good health in our brains, body and psychology [1]. Management information systems give managers quick access to information. This may include interaction with other decision support systems, information inquiries, cross-referencing of external information and potential data mining techniques. These systems can also compare strategic goals with practical decisions, giving managers a sense of how their decisions fit organizational strategy [19]. Therefore, the process of decision-making in any business is an inherently vital aspect not just for organizations but also for individuals who greatly rely on these decisions for their survival in the highly competitive arena of entrepreneurship [7].

In addition, most MIS programs are endowed with the capacity to give real-time updates of the occurrences in company or system. By real-time, scholars simply refer to immediate updates of occurrences in a system. These immediate updates help managers to take necessary actions as soon as is deemed appropriate especially during the discovery and management of crises. This augments progress and improvement in company operations through timely decision-making. This is important for companies in the modern-day generation where any slight lapse in decision making can lead to a huge loss [4].

Decision-making processes become the heart of the management challenge and are the way to achieve the objectives of the organization during different stages such as planning, organizing, directing and monitoring throughout the entire structure of the organization. The 21 century, considered as the knowledge age has shown that the effective management of information influences all aspects of life and is considered as the main source for assisting in decision-making processes which are complex. Information availability at a suitable time can reduce this complexity. Information system can be considered as a strategic tool which increases the productivity and effectiveness of organizations and can be used to enhance the competitiveness of organizations [1].

This study seeks to help both administration and medical managers by explaining the impact of health information system on decision making process. The decision-making in hospitals is mainly important in view of the position of those decisions and their impact on patients' lives and health [10]. Therefore, the researchers are trying to figure out the problem of the study based on the empirical evidence to prove that and make sure it is noticeable in the most of our hospital there are many of the important decisions has been taken without being dependent on an efficient information system to reach an efficient decision. So that, the researchers are trying to find out the cause of this phenomena and shed a light of the matter and the importance the information system in taking these of decisions. The decision-making process in hospitals and health care centers as an essential part to play in our social and economic and growth. The health information system can be one of the great importance of supporting decision making. Hence, the importance of current study stems from the following points:

- This study addresses a newly approach in information system and medical field both in theoretically and in practically.
- Despite the importance of the subject of health information system and its role in decision making, however, there is a shortage in the number of research and studies that address this topic.
- The fact that the success and efficiency of the decision-making process depend on to a large extent on the degree of availability of information and the existence of an efficient system of information has become the basic requirements for survival, not just as a means to improve performance.
- The study has practical importance through the outcome of the results that can benefit the officials and decision-makers in health facilities, which could lead to the activation of different health information systems and applications.
- It is hoped that this study leads to increased awareness among workers in the health institutions and motivate them to serve the hospitals and health care.

## 2. Related Works

This article provides a review of relevant literature in the field of health information system it consists of many parts and some related previous studies have been done in the field to see what has been achieved so far. The study done by Haux discuss: which were lines of development in health information systems from the past until today? What will be consequences for health information systems in the future? The study depends on theoretical frameworks and reaches Conclusions that: Health information systems have to be developed and explored that enhance opportunities for global access to health services and medical knowledge. Informatics methodology and technology is expected to facilitate continuous quality of care in aging societies. Ubiquitously available computing resources and networks, existing worldwide for the transmission of all varieties of data, will allow us to consider new types of information systems for health care, including new kinds of health monitoring and also new opportunities for the analysis of biomedical and health data. These trans-institutional information system architectures and infrastructures will, when appropriate designed and adequately strategically managed, provide new opportunities for the whole field of biomedical and health informatics as well as of biomedical statistics and epidemiology [11].

Al-Marri has conducted a field study entitled "The role of modern technology in raising the efficiency of the performance of employees in the public administration of medical services of the armed forces, Saudi Arabia." This study aimed to identify the role of modern technology in raising the efficiency of the performance of employees in the public administration of medical services. Follow-Marri in his study descriptive and analytical approach through a comprehensive inventory of the community study, based on a questionnaire as a tool to collect data, and constitute the study population consisted of officers and personnel of the General Directorate of Medical Services in Riyadh's area (1200) people. Marri connected to the results of the most important: modern technology available in the General Directorate of Medical Services Armed Forces moderately, though modern techniques used by workers in the public administration of medical services of the armed forces in the completion of their tasks are: the use of computers in the termination of transactions and recorded, and worked hard copies the task of transactions through the normal and color printers, and the very strong positive implications of the use of the General Directorate of Medical Services armed forces of modern technology on the performance of its employees are Facilitate the work procedures within the Directorate General of Medical Services, and the completion of a lot of transactions per day, and the accuracy in the completion of the transactions, although important obstacles that prevent the use of the General Directorate of Medical Services Armed Forces of modern technology with a high degree are: lack of training courses in the use of modern technologies, and the unavailability action plan contribute to emphasize the importance of modern technology, and lack of suitable training courses to enable the use of modern technologies. The study recommended providing workers in the public administration of medical services of the armed forces, the training courses needed to increase their ability to use new technologies, and develop a comprehensive and integrated action plan for the implementation and use of modern technologies in the administration work of the General Directorate of Medical Services of the Armed Forces gradually until access to the automated dealing absolute administration transactions design training programs for workers in the medical management of services according to their needs, and in the light of modern techniques that should be used to impart elements of speed, flexibility and accuracy of their business. [15].

The aim of the article by Barra et al is to suggest a strategy for developing flexible IS standards to improve the HIS in developing countries. Using complexity theories to interpret

the outcomes of the action research project, we propose a strategy whose two main components are to create an attractor that emerges as a new standard and which evolves into a system of standards, and second, to suggest that the individual standards must be crafted in a manner which allows the whole complex system of standards to be adaptive to the local context. Furthermore, the strategy is based on two principles, which we call the principle of flexible standards and the principle of integrated independence. With this strategy, we argue, while being rather general, is of particular importance when addressing the complexity caused by the uneven development of infrastructure in developing countries. We illustrate how this approach is supported by obtaining rich information from minimal data, how radical change can be achieved through taking small steps, and how gateways and a focus on data standards (as opposed to technical standards) are the important components when aiming at scaling national HIS in developing countries [9].

A health information system (HIS) is the intersection of between healthcare's business process, and information systems to deliver better healthcare services. The nature of healthcare industry, which is highly influenced by economic, social, politic, and technological factors, has changed over time. This paper will address some important concepts of healthcare and related terminologies to provide a holistic view for HIS. Related technological milestones and major events are briefly summarized. The trends and rapid development of health information technologies are also discussed [3]. The researchers aimed to examine the current status of computer information systems and its role in decision making in Jordan bank. Results showed that there was a strong relationship between information systems and the process of decision-making, in addition to that Jordan relies heavily on a number of technologies used by IS to implement their key activities. [2].

Al Zahrani 2010 examined and identified the importance role of management information systems in the decision-making process during crises at the Directorate General of Border Guard in Saud Arabia. His results showed that MIS was effectively used in decision-making during crises. In addition, he confirmed that the MIS should be used more heavily in the decision process during crises. Finally, the researchers recommended that the MIS units should be maintained to ensure a free flow of information and adequate use of MIS in decision-making. [7].

The aim of this paper has been to organize the knowledge gained in qualitative studies performed in association to HIS implementations and to use this knowledge to outline an updated structure for implementation planning. We found that the main action implication that could be drawn from the meta-analysis was that merely implementing a HIS will not automatically increase the organizational efficiency. We used a multi-disciplinary team for the analyses in order to cover as many aspects of the primary studies as possible. Nevertheless, our results should be interpreted as a high-order scheme, and not a predictive theory and the action recommendation need to be investigated in prospective studies. The results obtained shown that when implementing HISs in hospital and primary care environments, at a minimum, strategic, tactical, and operational actions have to be taken into consideration, through management involvement, integration in healthcare workflow and especially user involvement, education, and training and through establishing compatibility between software and hardware. The results show also that many of the most important failures seem still to emerge from the absence of feedback from end-users to developers during the development process. What it is needed is the use of an implementation methodology that minimizes the information asymmetry in the implementation process, and that allows the accumulation of the knowledge capital needed to prevent rejection of the final system [19].

Researchers investigated the role of information systems in introducing, reinforcing or reducing biases. Their results showed that information systems have the ability to introduce new biases and to reinforce biases, also found that Information systems can also reduce biases; but this requires innovative thinking on the way information is represented and the way human decision-making processes are supported. In addition, they found that in the real world, as opposed to the laboratories where biases are usually measured, other constraints on rational decision-making, such as politics or data errors, could overshadow the effects of biases [22].

### 3. Health Information System

The nature of healthcare industry which is highly influenced by economic, social, politic and technological factors has changed over time. Generally, health information systems in developing countries are paper-based and manually driven [17]. Health is information-intensive that producing enormous volumes of data every day which means that safe and reliable healthcare depends on access to and the use of information that is accurate, effective, reliable, timely, applicable, legible and complete. In addition, health information has the main role to play in healthcare planning decisions where to determine a new service whether or not to present a new national screening program and decisions on best value for money in health and social care provision [12]. The development of suitable integrated and scalable information systems in the health sector in developing countries has been difficult to achieve and is expected to remain elusive in the face of continued fragmented funding of health programs [8].

One of the initial keys of health systems is a good performance health information system that ensures the production, analysis, dissemination and use of reliable and timely information on health factors, health system, performance and health status [13]. Health information system (HIS) is the connection of between healthcare's business process and information systems to provide better healthcare services [5]. Health information systems should produce dependable and timely information on health critical factors, health status, and health system performance and be able to analyze this information to guide activities across all other health system building blocks [18].

Information systems have many benefits in the health sector, the benefits of information system not only reduce errors and increase the speed of care and accuracy, but they also can lower health costs by coordinating services and improving the quality of care [16].

It is not the value systems of health information unless the information element is the main goal and information systems are a tool to help manage it. Hence, health information management has become a key element in any national health care system. Smith believes that the progress or growth of any system for managing health information based on the following facts [21].

- i. The health care is increasing reliance on information growing steadily.
- ii. The main source of information crucial to the health of everyone, the health of the population in general and to the success of any organization.
- iii. Consideration should be given to health information systems as a single entity, beginning with data for patients (Clinical data), data (performance and use, etc.), data-oriented knowledge-based (planning and decision support), and the collected data (policy) [23].
  - i. Improve organizational efficiency by increasing the productivity of staff and management.
  - ii. Update professional experience and capabilities in accurately diagnosing patients.
  - iii. Improve the quality of health care.
  - iv. Reduction of expenditures in the health sector.

- v. The reduction in working time and provide medical services to a larger number of patients.
- vi. Improving the patient experience and the rest of society.
- vii. Create an electronic patient file.
- viii. Adoption of uniform systems in disease diagnosis.
- ix. Adjust the provision of health services.
- x. Information dissemination to broad audiences quickly and more effectively.
- xi. Administration and medical decision-making more validity and accuracy.
- xii. Assist researchers interested in health.

#### **4. Obstacles Faced Application Of The Health Information System**

Although the health information system of the main components of the national health system, this does not give sufficient importance of health system. In a study conducted by the World Health Organization to detect obstacles to the application of computerized health information systems in the Middle East shows that major obstacles lie in the following [6].

- i. The lack of long-term vision: most of the leaders of health care health professionals know about health care more than they know about systems health information. This has led to the absence of a holistic and long-term planning systems health information.
- ii. The lack of affordability: have left the economic situation and financial constraints imposed on the health-care sector many of the health care units and medical education institutions without adequate funding for basic health needs, let alone finance the cost of computing. Reliance has become external resources or funding from donors is the rule and not the exception in health information systems.
- iii. Lack of experience in the field of health information systems: because the Middle East countries lacked experience in this area with a lack of awareness of its value, will continue to suffer health care institutions. We must keep pace with technology, health information, medical education medical practice will soon be fully dependent on technology.
- iv. Weak information infrastructure: many countries of the region to background information, and to contact technology infrastructure. This has led to a lack of computing policies and national policies for information, culture, information and qualified personnel, the low level of adaptation of information in the healthcare sector as circumstances dictate.
- v. The absence of a legal framework, legislative, ethical and constitutional: because most countries in the region did not enter the laws and regulations to regulate information technology in General, and health information systems in particular. Will regulate the legal framework of EDI or allow to reach patient files, electronic publishing and the encoding systems, confidentiality and privacy.

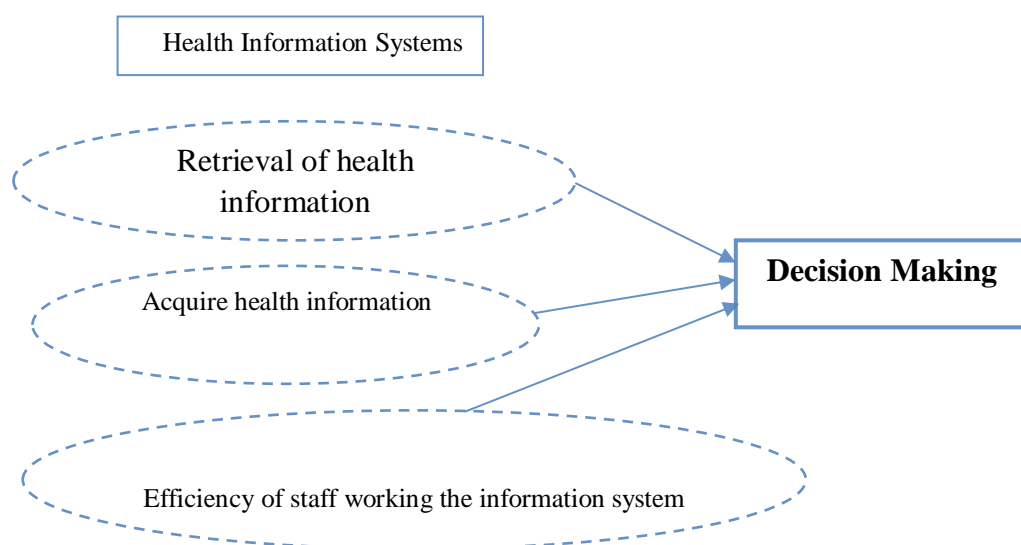
Every day we make an enormous number of decisions, some of these decisions are routinely and habitually that we made them without thinking and other decisions that need thinking and patience before we make such decisions because these decisions are critical, may change our life and there are decisions that we made them instantly and momentary according to the situation.

Decision Making is a process of making a choice from a number of alternatives to achieve the desired result, this definition revealed three main elements as the following: first, there are many options to choose from them. Second, according to the first element decision-making is a process that includes more than only a final choice from among substitutes. Finally, the

“desired result” contains a purpose resulting from the mental activity that the decision maker engages in to reach a final decision. In addition, decision-making is a way of life [14]. Decision Making is a process that selects the desired option or a development of actions from among a group of alternatives on the basis of given standards or strategies [12].

## 5. Research Method and Model

The article will use a descriptive and analytical approach to describe the impact of health information system on decision making of administration and medical. The descriptive approach of the most suitable methods and the most widely used in the study of the humanities and social phenomena, such as the study of managerial behavior, and obstacles to scientific research, and the phenomenon of faltering companies, the study of the child's behavior. Our designed model is shown in Figure 1.



**Figure 1. Health Information Model**

To achieve the underlined research objectives data needed to be collected through using a questionnaire method, and qualitative approach. Data collected are entered and treated by using the Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistics techniques such as frequencies, percentages, average means, and standard deviations have been used to analyze and interpret the sample perceptions, and demographic characteristics. The Statistical Package for Social Sciences (SPSS) version 20. will be used with the aim of analysis, including:

- 1 - Cronbach's alpha Test.
- 2 - Descriptive Statistics.
- 3- Chi-square

## 6. Numerical Results

This section presents an analysis of the data collected and the findings from this research. A total of 105 questionnaires were distributed 94 were collected 4 questionnaires have been neglected due to uncompleted answers, 90 questionnaires data were suitable to be tested, data were then prepared, examined, and screened for outliers and missing values. The hypotheses were then tested using regression analysis, at significant level (0.05). Cronbach's Alpha was

used to measure the reliability of instrument. The value of Cronbach's Alpha level was 78%, we consider this rate is excellent because they were higher than the accepted rate of 60%.

**Table 1: The Frequency Distribution of Participants' Age**

Age		Frequency	Percent
<b>Valid</b>	Less than 30years	29	32.2
	30-40 years	41	45.6
	41-50 years	16	17.8
	more than 50 years	4	4.4
	<b>Total</b>	<b>90</b>	<b>100.0</b>

Table 1 shows that %45.6 of the samples were 30-40 years, %32.2 were Less than 30years, %17.8 were 41-50 years old, and %4.4 were more than 50 years.

**Table (2): The Frequency Distribution of Participants' Gender**

Gender		Frequency	Percent
<b>Valid</b>	MALE	70	77.8
	FEMALE	20	22.2
	<b>Total</b>	<b>90</b>	<b>100.0</b>

Table 2 shows that %77.8 of the samples are males, %22.2 were females.

**Table 3: The Frequency Distribution of Participants' Education Level**

Education level		Frequency	Percent
<b>Valid</b>	High school	3	3.3
	Bachelors	54	60.0
	Diploma	19	21.1
	master/PHD	14	15.6
	<b>Total</b>	<b>90</b>	<b>100.0</b>

Table 3 shows that: %60.0 of the samples hold Bachelor's degree, %21.1 hold Diploma, %15.6 hold master/PHD degree, and %3.3 hold High school degree.



**Table 4: The Frequency Distribution of Participants' Experience**

Experience		Frequency	Percent
Valid	1-2 years	11	12.2
	3-5 years	34	37.8
	6-8 years	23	25.6
	more than 8years	22	24.4
	<b>Total</b>	<b>90</b>	<b>100.0</b>

Table 4 shows that:

- % 12.2 of the samples was 1-2 years of experience.
- % 37.8 of the samples was 3-5 years of experience.
- % 25.6 of the samples was 6-8 years of experience.
- % 24.4 of the samples was more than 8years of experience.

**Table (5): Means and Std. Deviation of Retrieval of health information**

Statement		Mean	Std. Deviation	Importance
<b>1</b>	Information system always provides all the necessary information	3.633	High	High
<b>2</b>	The information provided by the current information system has details required by the various hospital departments and administration levels and in all times that.	4.456	High	High
<b>3</b>	Used information system provides the importance and usefulness information needed for the Supreme Administration levels	4.222	High	High
<b>4</b>	The devices used provide appropriate information that addresses hospital objectives	4.144	High	High
<b>5</b>	Information system resulted statistical data and information requested by the various departments and sections of the hospital upon request.	3.432	Moderate	Moderate
<b>Average</b>		<b>3.977</b>	<b>0.855</b>	

Table 5 indicates the attitudes of the sample towards questionnaire statements of Retrieval of health information; the table indicates that Retrieval of health information Average was (3.977) that indicates that Retrieval of health information was in high estimation level. These results shows that statements means were between (3.432 - 4.456).With regards to Acquire health information: Means & Sd. were executed.

**Table 6: Means and Std. Deviation of Acquire health information**

No.	Statements	Mean	Std. Deviation
6	Information provided by information systems accurate	4.000	1.0600
7	Information provided by information systems reliable.	3.6000	.85853
8	Information provided by information systems are highly efficient.	3.2444	1.49389
9	Information provided by the information systems fit with various emergency and urgent circumstances.	4.3444	.47785
10	Information provided by the information systems are useful for each case.	3.9444	1.1549
<b>Average</b>		<b>3.8267</b>	<b>1.009</b>

Table 6 indicates the attitudes of the sample towards questionnaire statements of Acquire health information; the table indicates that Acquire health information Average was (3.8267) that indicates that Acquire health information was at high estimation level. These results shows that statements means were between (3.244- 4.344).

On other hand, with regards to the working staff efficiency: Means & Sd. were executed to the statements, table 7 shows the results.

**Table 7: Means and Std. Deviation of working staff efficiency**

No.	Statements	Mean	Std. Deviation
11	Individuals working in information systems have high efficiency in dealing with the available hardware.	3.322	1.188
12	The employees provided with the basic skills necessary to deal with the modern systems.	3.056	1.344
13	Employees subjecting to training sessions on a regular basis	4.011	1.117
14	The administration recruits individuals with high experience in information system.	3.689	0.979
15	Employees in every department have efficiency in dealing with information system.	4.444	1.029
<b>Average</b>		<b>3.704</b>	<b>1.131</b>

Table 7 indicates the attitudes of the sample towards questionnaire statements of working staff efficiency; the table indicates that working staff efficiency Average was (3.704) that

indicates that working staff efficiency was at high estimation level. These results shows that statements means were between (3.056- 4.444).

Concerning the Decision Making (Dependent variable): Means & Sd. were executed to the statements, table 8 shows the results

**Table 8: Means and Std. Deviation of Decision Making**

No.	Statements	Mean	Std. Deviation
16	The administration determined the problem is to make a decision.	4.222	0.957
17	The administration identify the problem elements for decision.	4.300	0.800
18	The administration collect sufficient information about the problem for decision.	4.178	1.023
19	The hospital analyzed the alternatives to make its decision.	3.489	1.229
20	The administration analyze alternatives to make decision.	4.611	0.631
21	The administration usually make the most efficient decisions.	3.978	0.960
<b>Average</b>		<b>4.130</b>	<b>0.933</b>

Table 8 indicates the attitudes of the sample towards questionnaire statements of Decision Making, These results shows that statements means were between (3.489- 4.611): Decision Making Average was (4.130) that indicates that Decision Making was at high estimation level.

## 7. Conclusion and Recommendations

Based on the achieved results in section five, the author reaches the following results:

- The work reached that retrieval of health information was in high estimation level, the results indicates that the information provided by the current information system has details required by the various hospital departments, administration levels and in all times. Used information system provides the importance and usefulness information needed for the Supreme Administration levels. The devices used provide appropriate information that addresses hospital objectives, Information system always provides all the necessary information. The results shows that Information system do not resulted statistical data and information requested by the various departments and sections of the hospital upon request.
- The article reached that acquire health information was at high estimation level, that results shows that Information provided by the information systems fit with various emergency and urgent circumstances. Information provided by information systems accurate, Information provided by the information systems are useful for each case. The results shows that Information provided by information systems are not highly efficient.
- The article reached that working staff efficiency was at high estimation level, employees subjecting to training sessions on a regular basis. Employees in every department have

efficiency in dealing with information system. The administration recruits individuals with high experience in information system, the results shows that Individuals working in information systems have high efficiency in dealing with the available hardware, the employees provided with the basic skills necessary to deal with the modern systems.

- The article reached that decision making was at high estimation level, the administration collect sufficient information about the problem for decision and they determined the problem to make a decision and they identify the problem elements for decision. The hospital analyzed the alternatives to make its decision. The administration usually make the most efficient decisions.
- There is a statistically significant relationship between retrieval of health information and decision making of administration and medical.
- There is a statistically significant relationship between acquire health information and decision making of administration and medical.
- There is a statistically significant relationship between efficiency of staff working the information system and decision making.

According to results the researchers reached the following recommendations:

- Hospital in formation system must developed to result statistical data and information requested by the various departments and sections of the hospital upon request.
- Implementation of awareness campaigns aimed at workers in the areas of health about the importance of health information systems.
- Strengthen strategic vision about the need for comprehensive planning and long-term e-health applications.
- Information provided by information systems should be more efficient.
- Holding training courses in the use of health information systems for all staff in Alhada Military Hospital and focus on the perpetuation of these courses, and raise their levels in line with the ongoing developments and technological changes.
- Individuals working in information systems should have higher efficiency in dealing with the available hardware.
- Providing computers for all the sections that are deficient or non-availability of these devices and the numbers and specifications of good. Because of its impact on raising the efficiency of decisions by reducing the effort and time spent.
- The allocation of financial and human resources required to provide and update health information system.
- Health information should be accurate in retrieval of information, to support decision making of administration and medical.
- Health information should be accurate in Acquire of information, to support decision making of administration and medical.
- The study results should be disseminating due to its important effect on administration and medical managers in decision making.
- The provision of efficient supervision and prevention on the health information system.

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