

Review the Role of Hospital Information Systems in Medical Services Development

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Abstract—Growing communications industry, telecommunications and Informatics, the world will face new revolution every day. Information and communication technologies Revolution have significant effects in all parts of economic, social, political and national security. One of the most important areas of application of information technology, health care field is in this research using library methods and especially using of databases Plumed, Cochrane, Embase and the Search engines, this article is perused. The paper introduces information systems; some of the required standards for systems implementation and deployment solutions are presented for electronic health network in the country.

Index Terms—Hospital information systems, telemedicine, medical development.

I. INTRODUCTION

In 1990's Very profound and important changes were happened in medical devices and equipment. technology development in the field of data processing, rising levels of hospitals staff expertise, patient expectations, changes in how the service and its models and the different methods of insurance repayment, has been caused huge change in hospital workflow. In health care organizations, trial and error work are wrong and irreversible because of its role in determining and promoting the health of human society. Therefore, management based on correct, accurate and timely information and enjoyment of an information management system has a special importance. The only way to collect, store, communicate, and offer large amounts of information is using the computer in such a manner that obviate the needs of consumers.

Importance of computer and information on global development process is well known. General principle is that a computer and information technology is pervasive that effects on the practical aspects of social life. Nowadays, a computer has become key tool for development [1]. A great goals of national health care system, is not possible without using of the computer and using new technology for ease and accuracy in collection, classification, archiving, retrieval and processing of data. Overall the computer in health centers (hospitals) can be used the following methods.

A. First Method

Preparation of software that performs functions separately. In this method, each person or department administer feels commensurate with the appropriate knowledge, understanding and the need for computer and entrepreneurial it, and regardless of issues such as specialized information State any impact on clinical findings on treatment process and the need for integration of patient information in hospitals, uses a Stand Alone Software. For example, in various duties in hospital units are done by different people during patient treatment, such as admission and discharge patients that is done in admission, is done transfer of patients between wards, visit and determining the therapeutic actions and orders are issued by physicians and are run by Nursing services, performing diagnostic procedures and matters such as settlement and others. As you can see, all of these actions is performed separately for each patient and is similar in all patients.

If for these actions is used separate software's, in fact any duty may be done faster and better, but on different actions of treatment and their impact on patient's entire treatment process, will create less accelerate probably because the different systems have no relationship to each other, and if the relationship between dispersed systems is not done rapidly, the desired goals in the hospital information management will not do.

In this way, in every part, Suit the needs of them, software is provided with capabilities and its features. The format of the software, operating system and programming language will be completely different and incompatible with each other, most likely the software have been designed and prepared by different people in different intervals without regard to the necessary connection between them, and even in terms of used hardware will be incompatible completely.

Thus the use of computer software for doing hospital measures, possibility of create networks and exchange patients information, there isn't even in the future, and since being dispersed information in different systems cannot help to solve hospitals problems, therefore evolution with time and new systems development, management will be forced to change the existing systems, and this means loss of data, costs, and time is a dynamic management system.

B. The Second Method

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,

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warehouses, and other units through the system and submitted their response is received .

Therefore the start time and end all actions will be identified and followed in the system. in this method will not be delayed between communication of systems like the first method, ultimately therapeutic patient will be exchanged faster and with broader communication between workstations of different treatment patient and therapeutic factors, and will be taken to avoid a patient data entry form overlapping .The system efficiency is, reducing patient treatment time through the introduction of blind spots in its treatment process.

This 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 .Also in this system, that any act is done in treatment patient field by a person will be identified and investigated exactly, so the control issue in medical environments is possible to management easily.

Generally we can define hospital information system: Hospital information system (HIS) is 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 [2].

II. GOALS OF HOSPITAL INFORMATION SYSTEM (HIS)

Goal of Hospital Information System (HIS) is supporting hospital activities in the levels of practical, Tactical, and strategic .In other words, goal of hospital information system (HIS) is using of computers and communications equipment for collecting, storing, processing, readout, and communication between patients cares with administrative data on all hospital activities and comply needs of all consumers system .In academic hospitals, also research and training support is one of the hospital information system (HIS) goals. Generally the main goals hospital information system (HIS) can be summarized in the following:

- Improving staff efficiency
- To remove duplication and unnecessary procedures
- Using computers as work tools
- Statistics and data mining techniques faster and more accurate
- Improving quality of health care status of
- To create a modern working methods and systems and standardized hospital
- Data communication systems, medical engineering
- Data communication between hospitals and medical centers in
- The country reaching a distributed database in the country and make its relationship with the World Health Networks
- Promote community health

A. History of Hospital Information System (HIS)

Reports relating to the use of computers returns to support clinical data management activities in 1950, Although most early systems were created to provide financial and repayment goals, but they was the founder of modern

electronic records.Until 1960, hospital information system (HIS) emerged and probably the first hospital information system, data systems was Technician that was created in the system of nursing stations. The first time it was created in a hospital Kamynv, Mountain in December 1971 (El Camino, Mountain (Created [3])).

Many countries including European countries have moved toward automation hospital information system since the early 1980 .This system developed significantly until now, and it has been an integrated system and with the inner core that called electronic medical records (EMR) from one inconsistent system [1]. Using hospital information system (HIS)was introduced in Iran in 1378 and was launched in the hospital anymore, Mashhad, Yazd, and Zanjan be as a pilot project for the first time. Thus, in 1380 the country's first e-hospital, carried out in the 313-bed hospital Imam Hussein of Shahrood, to the national pilot with the cost of 800 million Rials .One of the positive results of the implementation of electronic information system was 12 percent reduction of medication in this hospital [4].

B. The Importance and Necessity of Establishing Hospital Information System (HIS)

Due to extensive changes in medical technology and increased expectations of patients, in the twenty-first century hospitals that lacks hospital information system (HIS), they have nothing to say and will not have the ability to compete with other hospitals [2].

The most important necessity and reasons for hospital information system automation are Inefficiency 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. [5]-[6]. Also a good management information system is necessary to evaluate the quality of care for patients [7]. So the reasons for using these systems can be summarized as follows:

- Generation of alert and Reminds: HIS systems help with the creation of Wake series warning messages to remind doctor in diagnosis. For example, patient has an abdominal pain that is may be 45 diseases that have the same symptoms but doctor remembers only 10 of them.
- 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.
- Reduce cost: HIS systems effect very significant in reducing the costs. So if you have detection algorithms in the system, you won't need to review Problem Oriented of patient. In this case you won't require performing additional tests and etc.

- 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 allow the patient to call the hospital network from home and reserve time to meet with the doctor. Thus make 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. [15]

III. PROPERTIES AND CHARACTERISTICS OF HOSPITAL INFORMATION SYSTEM (HIS)

Properties and characteristics of hospital information system (HIS) as follows:

- 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 [12].
- 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.
- It includes rich knowledge-based medicine databases such as SNOMED and ICD-10 [13].
- The data entry are required to type in only 2 %of cases and in 98 %cases, for data entry, clicking method is used by the help of the mouse.
- Operation is very simple and completely visual and user-friendly.
- Smart cards are used for identification and control of hospital staff access to patient records (to enhance security) .
- It is equipped with video conferencing system between health care professionals.[11]
- It is equipped with knowledge-based intelligent system for diagnosis and treatment.
- It provides Access to information via the Internet to communicate with the mobile phone.
- Filing and retrieval of medical information dense is possible to easy access to the complex and stratified set of data.
- It is equipped with open standards for the implementation of local language.
- It allows to people's common use of medical information recorded and Protocol Guide electronically.
- Using multimedia technology, audio and video recording various Information is possible in it [8].

A. Standard HL7 (Health-Care Level 7)

Standard HL7 is accepted standard (protocol) in the world that provides the common language for information exchange and electronic patient records in both domestic and abroad .This world standard is recognized by the Common Market of Europe in 1992and Central Office in 1994 by ANSI and the WHO [1].

B. Mission of HL7

HL7 is an international forum with health care that its goal is working with professionals and health scientists to create standards for information exchange, management, and integration of electronic health information .HL7 strives that we use of such standards within and between health care organizations to increase efficiency and effectiveness of health care activities such a manner that is in favor of all[5].In other words goal of HL7 is facilitating communication in configuration Health Care [9]. The features of a hospital information system (HIS) software such as HL7 must to have till act successfully ,include following:

- The software should be able to make a separate computerized record (EMR / CPR) for every admitted patient [10].
- System has accepted standard for transferring medical information between different medical centers.
- Software is designed Based on Object Oriented Technology, it means that different layers (different tasks) can be run separately from each other and be implemented, so it can implement in various center of health systems.
- System could support Interface (hardware interfaces) of advanced devices such as radiography; MRI, CT scan, etc.
- The Software has capabilities of Tele Communication & Tele Medicine.
- The software must be able to support multimedia capabilities (Multimedia).
- Level of computer user's access to file system is classified based on each individual task in patient treatment and position.
- Software persuades users to use it or is User Friendly.
- Standard Numbering and archive systems are predicted in it.
- System works in the network and covers all clinical and Para clinical units.
- Data confidentiality is guaranteed by certain methods [8].

HL7 Standard has a lot of flexibility information exchange in the types of the hardware and software infrastructure. Also it has a closely coordination with other accepted standards of medical informatics, and can be used in all health care environments.

IV. HOW TO USE HIS IN COUNTRY'S ELECTRONIC HEALTH NETWORK

We require planning based on opportunities and threats of the way and self-strengths and weaknesses to develop this industry within the country. A group of major and noticeable obstacles are considered in the way of development, have the effect of possible factors that are related to space management outside the country and their management is not

easy. Some of these obstacles and challenges we expressed in:

- Large investment and intense competition among developed countries reduce technology life in the arena and the competition has been heavier.
- Due to requests from the local market using the most advanced products in the world to provide medical services, offering products in this arena requires standards in manufacturing products of the world.

In addition to the above, Informatics Technology has features generally that encourages the countries in the world to investment in this sector. Medical informatics industry includes three areas: software, hardware and medical services. The areas of medical informatics as artificial intelligence applications in medicine, remote medical services, will be a good background for planning and investment in its product offering in the sector due to the research stage.

V. INFRASTRUCTURE

Considering the role of governments in order to developing, two Applicable and production parts in the informatics field should create infrastructure items. Thus, a comprehensive understanding of infrastructure planning of the form is very necessary in the beginning of this section. [14]

A. Security Infrastructure

Privacy and protection of digital information is infrastructure Developing member of Medical Informatics that prevent abuse and invasion of people privacy. Collection of items that should be considered include: network's equipment security, secure operating system, electronic signature, identification center and etc.

B. Business Infrastructure

Weakness and lack of proper systems for financial interaction under the network will prevent interest in the public for providing services through the network. Therefore, other cases of infrastructure of application development and the industry growing of medical informatics are an infrastructure business including: electronic banking, electronic money and etc.

C. Legal Infrastructure

Laws and regulations relating to activities in the information age are necessary to medical informatics in developing countries. Because of without clear and determinant rules, chaos will hinder development. For example: the court network, cyber laws and etc.

D. Social and Cultural Infrastructure

The main audience of information technology is human resources and if it resists changes in the development, we cannot achieve the desired results. Therefore, training and culture building is continued needs for promotion of scientific and intellectual development of the population information technology. Increased knowledge and skills of medical specialists in the field and against the increased awareness and create social acceptance for the productivity of services at national and regional levels is necessary and

irrefutable [3].

E. Technical Infrastructure

Medical equipment in addition to communication and information tools will provide technical infrastructure of medical informatics in this age. Appearance of electronic tools with the ability of the individual records from birth to death will provide Admitted for the use of powerful and intelligent processing tools that these tools be made responsible for everyday works with a non-creative nature. Among these tools we can Point to consulting physician Technology as a medical help in the diagnosis and treatment is known. Another group of tools, a powerful database is that will be very significant role in speeding up service delivery and cost reduction, including technologies, strong database of medical information is. That can be part of them took advantage of the following:

- Hospital management information systems: these systems are a kind of management information systems (MIS) those issues in the covers information such as administrative and financial information for financial management and information systems, reimbursement and other administrative.
- clinical information systems and medical care: These systems have databases that apply the types of patient information To multimedia including several individuals critical parameters (EMG, ECG, EEG) medical images (CT, MRT), medical sounds and system has the ability to collect and registration, search and retrieve this information and provides power to the diagnosis and treatment by a physician despite a powerful tool to process and improves.
- Health information systems: Main features of these systems will be their vast in collecting, recording and retrieving information that will provide monitoring the underlying health of the community and timely and appropriate response to natural factors and abnormal impaired health community.
- Virtual reality: Another new and important debate is the concept of virtual reality in the process of getting information in human societies. The talk covers all materialist concepts around us and it has the capability that simulate many part of the physical world interactions. Also A virtual reality in medicine has widespread application for example simulating anatomy and physiology human body as a laboratory sample, will provide the ability to do any tests and medical research. Simulating Types of laboratories and educational and training environment, will provide the rapid growth of knowledge to in the future world, workers do the knowledge-based works.

Telemedicine: in the information age, Experts and facilities distribution and services from all over the world will not require spending a lot of time and then place will lose its importance. In this age of new areas such Telemedicine will find significance that will be the medical care field and will provide services should be close to medical standards. Otherwise the status of service will have problems. In the subset of Telemedicine topics, we can offer remote consultation, remote surgery, remote capture and other remote services [15].

F. Standardization Infrastructure

With Complexity and structure expanded medical services, increasingly, need to develop automated information systems and create communication flow within and between organizations increases. Create an efficient communication is possible in the context of standardization and coordination and development in the standardization will be necessary. Standards provide effective Infrastructure in order to compete effectively if between producers and consumers will result to agree common standards; in the technology propagation process occurs acceleration.

Also standardization in facilitate and funding research and innovation have a key role and because of clarify, provides investment environment that provide needs of financial .in other hand, it facilitates the participation of sector investment and provides infrastructure of development finance by medical informatics industry.

VI. CONCLUSION

According to the aim of efficient developing the Medical Informatics industry, in this article were addressed definition of the concepts, information systems, standards, development ,medical informatics industry in the country, the role of government and infrastructure. So we hope that the administrators of medical services take an effective step towards the development of medical services with playing a role in development of the informatics industry and presenting standardization.

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