Short Communication

Medical informatics: A boon to the healthcare industry

Abstract

Newer healthcare technologies and treatment procedures are being developed rapidly, and clinicians are incorporating them into their daily practice. They are integrating the past and the present knowledge for better patient healthcare. Previously, it had been difficult to organize, store and retrieve medical and patient information. But, today, with the advent of computers and, moreover, information technology has led to the development of medical informatics that is helping physicians to overcome these challenges. Medical informatics deals with all aspects of understanding and promoting the effective organization analysis, management and use of information in healthcare, which are being highlighted in this review paper.

Key words:
EMR, healthcare, Hospital Information Management System, informatics

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Introduction

The computer revolution has unfolded in the past 50 years and, after four generations of computer hardware, computers in medical systems show widespread use. The computer is now a well-established tool in medicine and is employed for a variety of functions ranging from clerical tasks to complex clinical simulations. The medical research depends heavily on computers. They have influenced our habits and attitudes and the way we work. Computers have not only influenced individuals but have also have changed institutions. Companies now have on-line workers, digital libraries and dial-up researchers,[1] with the ability to perform data acquisition, signal processing, storage and analysis, pattern recognition, data reduction and transformation, real-time interpretive calculations, manipulations and detection of detrimental changes in physiological functions for production of appropriate warnings that distinguish it from simple data capture to computerized monitoring systems. They also provide data retention for long time periods along with graphics data displays. The development of computerized monitoring systems requires considerable skills in engineering and programming so as to make the mode of operation much simpler, with fewer complications, thereby aiding the physicians and healthcare professional in patient healthcare monitoring and care.[2]

The internet nowadays is a very useful tool in healthcare and plays a significant role in the advancement of biomedical instrumentation. For example, online searches of books and journals for latest medical research and clinical information from medical libraries can be easily made available through CARL and MEDLINE. This shared information through computers is creating a knowledge explosion around the world. Many hospitals are transferring their medical records (worldwide) via the internet. But, many do it through intranet using WAN or LAN due to security reasons.[2] The huge impact of internet has led to the development of internet telephone, which might be used to conduct voice conversations through the internet computer data link. This will allow higher signal quality without broken speech and enhance biomedical communication using voice, data and pictures. Many online consumer health information sites are available providing discussions on various subjects of the mind and body. These are helping in creating awareness about health-related issues to the society at large.[1,2]

The computers are involved in improving the quality of patient care and reducing the costs, thereby enhancing self-management of chronic diseases. Few such examples of clinical/hospital information systems are Computer Stored Ambulatory Record (COSTAR), Regenstrief Medical record system (RMRS), Health Evaluation through Logical Processing (HELP) etc., which have been widely accepted and employed worldwide for better patient care

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monitoring.[3] This has led to an emergent need for having a better and faster healthcare/clinical information system to meet the day to day needs of the growing ailing population, thereby aiding the physician in providing treatment to the ever-growing demand for healthcare facilities and the threat of emerging diseases arising every now and then.

Health Information System

A health information system is a system to facilitate the collection, processing, analysis and transmission of health information, which can help in organizing and operating health services and also can be made useful for research and training of health service personnel. The uses of the health information system are:

a. To ascertain the health status of the population, that can help in quantifying their health problems.
b. To ascertain the local, national and international health status.
c. To ascertain the effectiveness of the health service.
d. To ascertain the degree of satisfaction of the beneficiaries from the health service.
e. To initiate research incase of the outbreak of new disease or health problem.

The different sources of health information are:

a. Census.
b. Registration of death and birth.
c. Hospital records.
d. Sample registration system.
e. Morbidity registers.
f. Health manpower statistics.[4]

Growth of Medical Informatics

Medical informatics or, rather, information technology (IT) in healthcare, has globally revolutionized the growth of the healthcare industry. With the sole intention of implementing "paperless" working, along with optimal outcome and improved efficiency, the solutions provided by IT companies to the healthcare industry are immense and innovative. Many globally renowned organizations like G.E., Infosys, Tata Consultancy Services, Sobha Rennaisance Information Technology Pvt. Ltd. (S.R.I.T), etc. are working in this area. They provide many hospital and patient-centric solutions. The solutions include Hospital Information Management System (HIMS or HIS) with various modules and subsets aiding from patient entry till his discharge from the hospital. These include Electronic Medical record (EMR or CPR), laboratory, radiology, dietary, housekeeping, wards management, insurance and contracts management, administrative, inventory and financial management, patient relationship, clinical knowledge management, medical decision making (Expert systems), communication systems (PACS), etc.[5] All these play a vital role in hospital administration, better healthcare practices and in the day to day functioning (operations) of a hospital system.

The different solutions being offered by these organizations as apart of HIS include:

Hospital Information Management System

Hospital Information Management System (HIMS) is dedicated to managing the automation needs of virtually every segment of the healthcare environment. It computerizes operations pertaining to administrative, financial, clinical, specialty and support and maintenance business workflows. It supports various front office operations like wards, ICUs, OTs, laboratories, radiology, pharmacy, blood bank, medical records and billing. These are integrated with back office modules like materials management, financial management, engineering, housekeeping, food and dietary services, HRMS, payroll, hospital waste management, occupational health, illness and injury. It provides a total integrated solution for the hospitals to meet their day-to-day requirements.[6]

Health-care

It is one of the healthcare modules provided to the clientele as an end-to-end solution for their healthcare needs. It is widely used by the hospitals for better and improved patient care. This module is being widely accepted and employed by different hospitals worldwide for providing the benefit of better healthcare and patient monitoring. This module has several core modules comprising of different subfunctional modules that help consolidate patient's clinical information and also help assimilate financial and administrative information across the healthcare enterprise. It is a patient-centric solution, capable of coordinating the delivery of multiple healthcare services like revenue enhancement, cost containment and excellent patient care, assisting healthcare institutions to rapidly move their enterprise toward a better healthcare environment based on international standards.[6]

Patient Registration Module

It is complimentary to most HIMS and provides staff and employees with easy and convenient access to information for better patient service and care, as per his preferences and permissions. It also helps hospitals manage workflow and patient flow using patient module features.[7]

Radiological Information System

It addresses the requirements of radiological investigations. It provides information about the different radiographic diagnosis conducted in a given time frame. It manages the information into an easy-to-use format, integrating healthcare enterprise, delivering optimal operational efficiency, lowering costs and offering better patient care. The system may be integrated with a telemedicine system for electronic transmission of radiological images from one place to another for purposes of interpretation and/or consultation.

Dental Care

It is a comprehensive end-to-end solution for dental hospitals and dental clinics. It provides dental surgeons to have online information regarding the latest tools and techniques in dentistry providing better knowledge to the physicians and thereby improved healthcare facilities to patients.

Dicom Compatible

It is a high-end viewer with superlative features, designed to enhance and optimize radiologist workflow and is a hardware-accelerated multimodality diagnostic workstation, which facilitates faster and efficient image processing and manipulation techniques. It also analyzes, displays, stores and retrieves images from PACS and other modalities. The workstation communication is based on the DICOM 3.0 standard, which enables communication with any DICOM-compatible product, like scanners and workstations.[7] It is employed in different imaging modalities like CAT scan, MRI, PET, SPECT, digital X-ray machines, etc. for better image processing and visualization.

Role of it in Healthcare

The use of modern IT structures in medical practices and the hospital contribute much to the optimization of the processes involved in patient care and administration. The basic aim of these systems is to support the extremely complex reorganization of clinical and administrative processes and to improve cost management. Hospital management is being faced with dynamically varying conditions that require quick reflexes (responses). The need is for lower treatment costs and real-time processing along with handling emergency situations like doctor's strikes, which is so common in many countries nowadays, alongside handling huge patient inflow. The advent of management information systems (MIS) is enabling hospitals to react dynamically to such events and adapting to changes much better.[8]

The major factor leading to the development of these systems was cost issues involved in hospital medical and patient care duties and determining the cost a patient creates for the hospital. The challenges are therefore based on three factors, like remuneration for treatment, personnel and materials. All these factors vary, and adjusting one may affect the other considerably. Hence, an integrated database system or a data warehouse is needed that can perform accurate closed loop real-time monitoring and permitting multiple permutations and combinations being made available. The need for having a database management system for quick and easy retrieval, upgradation and editing of a large amount of patient data is of primary importance in hospitals. Now, a thrust is also being given to internal cost allocation within the hospital. Each department head is assigned the economic responsibility for his or her own department, becoming self-sufficient in budget allocation and management responsibilities.[7,8]

Telemedicine in India

The World Health Organization defines Telemedicine as, "The delivery of healthcare services, where distance is a critical factor, by all healthcare professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of healthcare providers, all in the interests of advancing the health of individuals and their communities."[8] Telemedicine is the use of electronic information and communications technologies to provide and support health care when distance separates the participants. Telemedicine primarily refers to the use of telecommunication for the diagnosis and treatment of disease, provides healthcare expertise where there is none and improves the healthcare where there is some.[9] A Telemedicine system includes hardware, software, medical equipment and communication link. It provides solutions or answers to patient's treatment in remote or inaccessible areas with fewer medical facilities. It is also possible nowadays to have a mobile telemedicine system using mobile and satellite communication.

Indian Scenario

In India, the telemedicine programs are actively supported by the following organizations:

- Department of Information Technology
- Indian Space Research Organization
- NEC Telemedicine program for North-Eastern states
- Apollo Hospitals
- Asia Heart Foundation
- Different State government-run healthcare centers

Telemedicine technology is finding vast use by private organizations like the Fortis group, Max Healthcare, Satyakiran, etc.

Need for Telemedicine in India

The heterogeneous geographical set-up of India (snow-covered mountains, hot deserts, islands, forests) effectively means that the population of India is spread out and not everyone has access to healthcare services round the clock.[9]

The huge population of India makes the government's job more difficult in planning healthcare delivery systems and making facilities available for everybody at any place.[9,10]

Currently, specialists are concentrated in towns or cities as it provides them more lucrative opportunities in these regions. This makes it difficult for people living in remote places to get access to specialized healthcare services.

Some studies have shown that in the case of rural population the risk of death is twice that of urban patients with similar injuries.[10]

Conclusion

Medical informatics is now considered as one of the important tools necessary to improve the quality of healthcare in many western countries. It has given physicians solutions to many problems they face in patient care. It covers a wide range of topics, including electronic medical record system, access to current information, clinical reminders, clinical decision support, electronic communication, patient education and self-management of chronic disease.[10,11] Both computers and information go hand in hand, and the role of computers will increase rapidly in further evolving the field of medical healthcare. Hence, an emphasis to supporting research of new and innovative technologies, information and knowledge management, improved communication between patients and providers, shared decision making, identifying and overcoming barriers to use of computers in healthcare and new challenges posed thereof must be focused upon. This will not only help the people directly involved with the healthcare industry but also those who aim to get associated and work to improve this area for the betterment of human health and society.[11] For providing cheap and better healthcare facilities to the masses, the country must use and upgrade its medical centers with such technological tools to deliver the desired goods to the population at large.

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