A Survey on IT Applications in Healthcare Systems

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Abstract – The advancements in the Information Technology field is an advantage to the healthcare industry. It has improved the health of the individuals. It has led to keep up the person's health information and survey on it. The unintentionally made errors effect on the person's safety. So, to overcome these problems, health care systems are used. The technologies used in the health information technology, helps to make a sound decision for treatment and diagnosis.

Index Terms – Information Technology, Healthcare.

1. INTRODUCTION

With the recent improvements in technology, IT has revolutionized the healthcare systems. The information technology helps to maintain and manage the health information. It is saved in the format of electronic records to enable the doctors and health care professionals to access the patient's health information [1]. With the help of information technology, the doctors can have a clear idea of the patient's health records. And it also provides an easy way to the patients to go through their medical history [2].

IT is an application of computers and telecommunications equipment's for storing, retrieving, transmiting and manipulating the data [3]. Now a days the information technology is widely employed in a large variety of fields and one of the emerging fields of Medical Science is known as Health Information Technology (HIT).

Health information technology (HIT) is the employment of computer system to process the information for storing, retrieving,sharing and using the data in the health care systems. It also invloves the wisdom to make a decision [3]. HIT, technology includes the computers and attributes of the communications which can be merged to form the systems for health information.

HIT improves the health of the patients holding the improved quality, less cost. The technologies include health record systems and the personal health tools like smart devices and apps. It provides a good care for patients and helps to achieve health equity. It also helps to record the patient details and analyses the information [5]. This data can be accustomed to implement the policies for better treatment and to avoid the spread of diseases.

The rest of the paper is organized as follows: Section 2 presents the related work. Section 3 discusses the benefits of Information technology in Health care systems. Section 4 presents the Technological advancements in Health care systems. Finally Section 5 concludes the paper.

2. RELATED WORK

The emerging innovations in the technology is changing the industries as they are evolving. In the health care system, the technology is playing a vital role in all the processes. For example, from the registration of patient details to the data monitoring and from lab test to the self-care tools.

The conventional monitoring and recording systems are replaced by the smartphones and tablets. The technological advancements has taken out the confinement of medical services in the hospitals itself. Instead, the patients has an option to undergo a full consultation with the doctor at their homes itself [4].

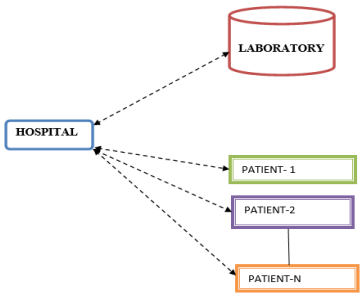

Fig 1: Health Information Exchange

The health information system (HIS) is a blend of information science, computer science and health care. It deals with resources, devices and the methods used to minimize the acquring, storing and retrieval from the health records[3]. The information exchange among Patients, Hospital and Laboratory are shown in Fig 1. The tools used in the HIS consist of the computers, clinical guidelines, medical

terminologies and the information and communication systems. These tools are applied in health and medical systems to provide an easy access.

The emergence of the information technology in the IT applications has led to a lot of advancements. It assists the medical education in various ways such as computer assisted learning(CAL), Virtual reality(VR), Human patient simulators. Various medical journals, textbooks and the trending information on latest improvements in medicine encourages the students to learn.

HIT improves the quality of healthcare by providing accurate patient information and allowing the doctors to understand the patient's health details in a better way. The HIT can be of much use as[1]:

- It provides an ease of access of the information for the doctors in the remote locations.
- It enables an effective and error-free care in an effective way.
- It is easy to track the cautions of the unforeseen drug interactions with that of the connected healthcare systems.

The information technology is very useful in the healthcare sector. One of the major advancements in the healthcare is that of the electronic medical records. These provide an easy way to access the patient information.

3. BENIFITS OF INFORMATION TECHNOLOGY IN HEALTH CARE SYSTEMS

From EMR to advancements in the biomedical engineering, the health care systems are changing rapidly. The following are some of the benefits of using IT in health care systems[6].

- It improves the prevention and treatments outcome by focusing on patient health records.
- It creates the benchmarks that monitors the patients health progress and status.
- It helps to track the referral process.
- It enhances the continuity of care for the patients.
- It improves the information exchange within and across the organizations.
- It can improve the administrative processes.
- It provides timely and improved access to the information required before and after a point of care.
- It lowers the cases of malpractice claims.
- It gives faster lab results, turn around and save the time
- It eases the diagnostics and gives accurate results.

4. TECHNOLOGICAL ADVANCEMENTS IN THE HEALTH CARE SYSTEMS

Healthcare IT is emerging rapidly as an important tool. Using this beneficial tool, patient can communicate in a better way with doctor and improve the quality of life. The following are some of the technological advancements in health care systems[7]:

(i) **Electronic Health Record:**

An Electronic Health Record(EHR) is a collection of patient health information which is stored in digital format. These records helps to share the patients information across health care systems. Electronic Health Records may contain patients laboratory test results, medical history, radiology images and personal information like age, weight and billing information. Fig 2 shows the information in the Electronic Health Record.

Main advantages of this type of records are:

- It helps to track the patients previous medical records and assure that the data is accurate.
- There is no data replication as there is only one modifiable file.
- These records are more effective when extracting medical data for examination purpose because the information of patient contains in a single digital file
- These records helps to access any reports based on the patient details saved in the record.

Fig 2: Electronic Health Record Information

(ii) **Real-Time Location System:**

In Health Care Systems, Real-Time Location System is a kind of system which helps to track and manage the medical-equipment, staff and patients within all types of patient care environments. The system is a thought of as a type of indoor GPS for hospitals.

Main advantages of this system are:

- It has an ability to keep a watchful eye on hygiene compliance
- It helps to keep track of staff members details who have come into contact with an infected person or asset in hospital
- This system gives quick alert for nurses and staff to call for help in an emergency.
- It helps to calculate how long the patient stays in hospital based on health records.
- Real-Time Location system tags can be used to locate at entry or exit points and also in Room level or sub room level location

(iii) **mHealth:**

mHealth is also called as mobile Health which is used for the practice of medicine and public health supported by mobile devices. In this generation mobile phones are widely used for information exchange based on that concept mHealth helps to exchange information between patient and doctors. Not only the connectivity but this mHealth also helps to check the patients health checkup based on tools. Patient can check blood pressure or any other test using tools available in the mobile market.

Main advantages of mHealth is:

- It has the potential to improve health monitoring of patients
- It takes less time to know the test results as compared to general checkup
- Using this technology, patients can have a ability to check their blood pressure or any other test at any time and any place.
- It helps to increase the access to healthcare and health-related information where patients cant reach hospitals on daily basis.
- It helps to improve the ability to diagnose and track diseases.

(iv) **Remote Monitoring Tools:**

Remote monitoring tools helps to monitor patients health at home and reduce costs and unnecessary visits to a doctors office. The technological components that are used for this system are: a)Sensors- which helps to enable wireless communication to measure physiological parameters. b) Local data storage- Which is under patient's site to set the interface between sensors ans other centralized data repository. c) Centralized repository- contains stored data sent from sensors, local data storage and other applications. d) Diagnostic application software- this helps to develop treatment recommendations and give alert based on analysis of collected data.

Main advantages of this system are:

- It provides a better access to health care
- The quality of care is improved because of its comfortable and familiar nature towards patients
- It provides a kind of assurance that someone is watching out patient health and well-being.
- It also expand the levels of support based on patients feedback.

(v) **Pharmacogenomics sequencing:**

Pharmacogenomics is an analysis of how genetics of individuals affects patients response to drugs. It helps to know whether patient is ready to take a particular drug based on genetics. It helps to enhance the treatment plans in an accurate manner. It particularly helps to reduce billions of dollars in excess healthcare spending due to various drug diagnosis.

Main advantages of this system are:

- It helps to trace whether the particular drug is suitable for particular person.
- It assures that the right drug to the right patient based on patient genetics.
- It helps doctors to know how the drug will react if drug is not suitable for the patient before using it.
- It ensures maximum efficiency of choosing drug and minimize side effects.
- It examines patients single gene interactions with drugs.

5. CONCLUSION

Health Information Technology improves the communication and the coordination. The emerging technologies in the IT field helps alot to maintain and track the individual's health care. It assures accurate information and contact to the doctors about the patients's health record. Thus, these technologies are a boon to the healthcare field.

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