



E-HEALTH: CONCEPT, ISSUES AND CHALLENGES

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Abstract

The concept of E-Health is emerged during early in the 21st century with a view to introduce a sea change in the area of health care. E Health or e-health stands for electronic health. It indicates the use of technology and specifically electronic communication within healthcare environments. It deals with any electronic exchange of health-related data collected or analyzed through an electronic connectivity for improving efficiency and effectiveness of health care delivery. The main objective of this concept is to improve the functioning of the Health care system with the help of improved technologies.

In the present paper the authors have made an attempt to examine a theoretical framework of E - Health with the help of Secondary Data. The paper is descriptive in nature and covers the areas of different terminologies used, components of e-Health, its applications, benefits, and limitations.

Key Words: E-Health, Electronic Health Records, Telemedicine, E Prescribing, M Health, Health Informatics.

1. Introduction

E-Health is an all-encompassing term for the combined use of electronic information and communication technology in the Health sector. This term refers to that technology used for clinical, educational, research, and administrative purposes, both at the local site and across wide geographic regions. As such, the “e” in e-Health does not only stands for “electronic ” but implies a number of other “e ‘s” which together perhaps best characterize what e - health is all about (or what it should be). The use of e-Health has enhanced networking, facilitated global thinking and improved health care on local, regional, and national levels. E-health includes tools for health authorities and professionals as well as personalized health systems for patients and citizens.

E-health can therefore be said to cover the interaction between patients and health-service providers, provider-to-provider transmission of data, or peer-to-peer communications between patients and/or health professionals. It can also include Health information networks, Electronic Patient Records, Telemedicine services, and personal wearable and portable communicable systems for assisting prevention, diagnosis, treatment, health monitoring and lifestyle management. In a broader sense the term characterize refers not only a technical development but also a state of mind, a way of thinking, an attitude and a commitment for networked, global thinking, to improve Health care locally, regionally, and worldwide by using information and communication technology. This definition hopefully is broad enough to apply a dynamic environment such as the internet at the same time acknowledges that e- Health encompasses more than just “internet and medicine”.

2. Statement of the Problem

The main objective of e Health is that to improve the functioning of the Health care system with the help of improved technologies. Technological innovations are essential for the smooth conduct of every field of operation. To cope up with others it is necessary to adopt improve our activities especially in the field of health care. Technological support will make the system more efficient, automatic & time saving. It is possible to diagnose the disease as early as possible with the help of advanced technologies. At this juncture, the authors have made an attempt to examine the different aspects of the new concept of E – Health and its issues and challenges.

3. Objectives of the Paper and Methodology Adopted

The objective of the paper is to review the major aspects of the new concept e Health, and to generate an overall idea regarding the different terms, aspects, Positives, issues and challenges and stages of development e Health in the State of Kerala.

This is a descriptive study based on secondary data. The secondary sources include Published and Unpublished reports, official website of Department of Health & Family Welfare Government of Kerala, books and journals dealing the subject, articles and news papers.

4. ‘e’ Health - The Concept

E-health is the transfer of health resources and health care by electronic means. It includes three main areas:

- The delivery of health information, for health professionals and health consumers, through the Internet and telecommunications.

- Using the power of IT and e-commerce to improve public health services, e.g. through the education and training of health workers.
- The use of e-commerce and e-business practices in health systems management.
E-health provides a new method for using health resources - such as information, money, and medicines - and in time should help to improve efficient use of these resources. The Internet also provides a new medium for information dissemination, and for interaction and collaboration among institutions, health professionals, health providers and the public.

5. The Components of e-Health

The 10 components of e Health are briefly explained below :

- **Efficiency:** One of the promises of e-health is to increase efficiency in health care, thereby decreasing costs. One possible way of decreasing costs would be by avoiding duplicative or unnecessary diagnostic or therapeutic interventions, through enhanced communication possibilities between health care establishments, and through patient involvement.
- **Enhancing Quality** of care increasing efficiency involves not only reducing costs, but at the same time improving quality. E-health may enhance the quality of health care for example by allowing comparisons between different providers, involving consumers as additional power for quality assurance, and directing patient streams to the best quality providers.
- **Evidence Based:** e-health interventions is evidence-based in the sense that their effectiveness and efficiency should not be assumed but proven by rigorous scientific evaluation. Much work still has to be done in this area.
- **Empowerment** of consumers and patients - by making the knowledge bases of medicine and personal electronic records accessible to consumers over the Internet, e-health opens new avenues for patient-centered medicine, and enables evidence-based patient choice.
- **Encouragement** of a new relationship between the patient and health professional, towards a true partnership, where decisions are made in a shared manner.
- **Education** of physicians through online sources (continuing medical education) and consumers (health education, tailored preventive information for consumers)
- **Enabling** information exchange and communication in a standardized way between health care establishments.
- **Extending** the scope of health care beyond its conventional boundaries. This is meant in both a geographical sense as well as in a conceptual sense. E-health enables consumers to easily obtain health services online from global providers. These services can range from simple advice to more complex interventions or products such as pharmaceuticals.
- **Ethics:** e-health involves new forms of patient-physician interaction and poses new challenges and threats to ethical issues such as online professional practice, informed consent, privacy and equity issues.
- **Equity:** To make Health care more equitable is one of the promises of e-health. But at the same time there is a considerable threat that e-health may deepen the gap between the "haves" and "have-nots". People, who do not have the money, skills and access to computers and networks, cannot use computers effectively. As a result, these patient populations (which would actually benefit the most from health information) are those who are the least likely to benefit from advances in information technology, unless political measures ensure equitable access for all. The digital divide currently runs between rural vs. urban populations, rich vs. poor, young vs. old, male vs. female people, and between neglected/rare vs. common diseases.

6. Different Forms of 'e' – Health

The various forms of 'e'- Health are discussed below.

6.1. Electronic Health Records

An electronic health record (**EHR**) is a digital version of a patient's paper chart. EHRs are real-time, patient-centered records that make information available instantly and securely to authorized users. While an EHR does contain the medical and treatment histories of patients, an EHR system is built to go beyond standard clinical data collected in a provider's office and can be inclusive of a broader view of a patient's care.

EHRs Contain

- Patient's medical history, diagnoses, medications, treatment plans, immunization dates, allergies, radiology images, and laboratory and test results.
- Allow access to evidence-based tools that providers can use to make decisions about a patient's care.
- Automate and streamline provider workflow.

One of the key features of an EHR is that health information can be created and managed by authorized providers in a digital format capable of being shared with other providers across more than one Health care organization. EHRs are built to share information with other health care providers and organizations – such as laboratories, specialists, medical imaging facilities, pharmacies, emergency facilities, and school and workplace clinics – so they contain information from all clinicians involved in a patient’s care. The major benefits of ERS can be shown in the following diagram.



Fig.1 Benefits of EHRs

6.2 Computerized Physician Order Entry

Computerized Physician Order Entry (CPOE), sometimes referred as to Computerized Provider Order Entry or Computerized Provider Order Management (CPOM), is a process of electronic entry of medical practitioner instructions for the treatment of patients (particularly hospitalized patients) under his or her care.

6.3 E Prescribing

E-prescribing or electronic prescribing is a technology framework that allows physicians and other medical practitioners to write and send prescriptions to a participating pharmacy electronically instead of using handwritten or faxed notes or calling in prescriptions. Through E Prescribing it is possible to create and refill prescriptions for individual patients, manage medications and view patient history, connect to a pharmacy or other drug dispensing site, and integrate with an electronic medical record (EMR) system.

6.4 Clinical Decision Support

Clinical decision support (CDS) provides clinicians, staff, patients or other individuals with knowledge and person-specific information, intelligently filtered or presented at appropriate times, to enhance Health and health care. CDS encompasses a variety of tools to enhance decision-making in the clinical workflow. These tools include computerized alerts and reminders to care providers and patients; clinical guidelines; condition-specific order sets; focused patient data reports and summaries; documentation templates; diagnostic support, and contextually relevant reference information, among other tools.

CDS has a number of important benefits, including:

- Increased quality of care and enhanced health outcomes.
- Avoidance of errors and adverse events.
- Improved efficiency, cost-benefit, and provider and patient satisfaction.

6.5 Telemedicine

Telemedicine is the use of telecommunication and information technologies to provide clinical health care at a distance. It helps eliminate distance barriers and can improve access to medical services that would often not be consistently available in distant rural communities.

6.6 Consumer Health Informatics

Consumer Health Informatics (CHI) is a sub-branch of Health Informatics helps bridge the gap between patients and health resources. It is the field devoted to informatics from multiple consumer or patient views. The Consumer Health Informatics Working Group (CHIWG) of the International Medical Informatics Association (IMIA) defines it as follows:

“The use of modern computers and telecommunications to support consumers in obtaining information, analyzing unique Health care needs and helping them make decisions about their own health”.

CHI includes patient-focused informatics, health literacy, and consumer education. The focus of this field is to allow consumers to manage their own health, through the use of internet-based strategies and resources with consumer-friendly language. Currently, CHI stands at a crossroads between various healthcare related fields such as nursing, public health, health promotion, and health education.



6.7 Health Knowledge Management

Knowledge management (KM) is an umbrella term encompassing the many unique but related facets of creating, organizing, sharing, and using information and experiences. Solving problems and making optimal decisions in healthcare is heavily dependent on access to knowledge. In today's increasingly complex environment, it is rapidly becoming essential for healthcare organizations to effectively manage both internal knowledge and externally generated knowledge in order to provide the best possible Healthcare, achieve operational excellence, and foster innovation. A well-organized and effective strategy for knowledge management in healthcare can help organizations achieve these goals.

6.8 Virtual Healthcare Teams

Virtual healthcare teams are professionals who collaborate and share information on patients with digital equipment. Learn more in: Review of Web-Based Research in Health Care for Georgia: Telemedicine, e Health, and e-Institutional Review Boards

6.9 m-Health

M Health (mobile Health) is a general term for the use of mobile phones and other wireless technology in medical care. The most common application of m Health is the use of mobile phones and communication devices to educate consumers about preventive Health care services. However, m Health is also used for disease surveillance, treatment support, epidemic outbreak tracking and chronic disease management. M Health is becoming a popular option in underserved areas where there is a large population and widespread mobile phone usage. Non-profit organizations like m Health Alliance are advocating for increased use of m Health in the developing world.

6.10 Medical Research Using Grids

It deals with powerful computing and data management capabilities to handle large amounts of heterogeneous data.

6.11 Health Informatics / Healthcare Information Systems

Health informatics (also called health care informatics, healthcare informatics, medical informatics, nursing informatics, clinical informatics, or biomedical informatics) is informatics in health care. It is a multidisciplinary field that uses health information technology (HIT) to improve Health care via any combination of higher quality, higher efficiency (spurring lower cost and thus greater availability), and new opportunities. The disciplines involved include information science, computer science, social science, behavioral science, management science, and others. The NLM defines health informatics as "the interdisciplinary study of the design, development, adoption and application of IT-based innovations in healthcare services delivery, management and planning."^[1] It deals with the resources, devices, and methods required optimizing the acquisition, storage, retrieval, and use of information in health and biomedicine. Health informatics tools include amongst others computers, clinical guidelines, formal medical terminologies, and information and communication systems. It is applied to the areas of nursing, clinical care, dentistry, pharmacy, public health, occupational therapy, physical therapy and (bio)medical research, and alternative medicine. All of which are designed to improve the overall of effectiveness of patient care delivery by ensuring that the data generated is of a high quality e.g. an m Health based early warning scorecard.

7. Positives of “e” - Health

- Following are the important advantages of “e” – health.
- Providing accurate, up-to-date, and complete information about patients at the point of care.
- Enabling quick access to patient records for more coordinated, efficient care.
- Securely sharing electronic information with patients and other clinicians.
- Helping providers more effectively diagnose patients, reduce medical errors, and provide safer care.
- Improving patient and provider interaction and communication, as well as health care convenience.
- Enabling safer, more reliable prescribing.
- Helping promote legible, complete documentation and accurate, streamlined coding and billing.
- Enhancing privacy and security of patient data.
- Helping providers improve productivity and work-life balance.
- Enabling providers to improve efficiency and meet their business goals.
- Reducing costs through decreased paperwork, improved safety, reduced duplication of testing, and improved health.
- Better health care by improving all aspects of patient care, including safety, effectiveness, patient-centeredness, communication, education, timeliness, efficiency, and equity.
- Better health by encouraging healthier lifestyles in the entire population, including increased physical activity, better nutrition, avoidance of behavioral risks, and wider use of preventative care.



- Improved efficiencies and lower health care costs by promoting preventative medicine and improved coordination of health care services, as well as by reducing waste and redundant tests.
- Better clinical decision making by integrating patient information from multiple sources.

8. Issues and Challenges of E- Health

The prominent issues and challenges of E- Health are discussed below.

- **Privacy Protection**

There will always been privacy issues in the Healthcare system on who has access to medical records of a patient. With a pen and paper system, with the physical file located at a particular institution there is a limit to who can see your records. Even if there was a security breach and patient information is not secured, it is only available to people in that proximity. But in a situation where your information is sent to a centralized information repository in digital format, all bets are off. This privacy concern is a big issue with many people and will continue to be an issue until it is addressed for good.

- **Medical Records Synchronization**

Until recently with centralized information repositories, individuals being treated at different facilities could not have their information updated at the same time, which could lead to healthcare providers not having updated information when they become available. However, with centralized repositories this problem has been solved, but it has given rise to the above mentioned issue of data security and protection.

- **High Startup Cost**

At a time when healthcare organizations need to reduce their costs, allocating capital to information systems is still a challenge. There is a high start up cost when transforming a pen and paper system to EHR. Some physicians do not see any immediate benefit to their practice in the short run and drag their feet in implementing EHR.

- **Legal Issues**

Taking the Healthcare industry to court has in the past few decades been a lucrative venture for attorneys trying to right the wrong done to a patient, whether by omission or commission.

- **Lack of Standardized Terminology, System Architecture and Indexing**

In order for an EHR to be shared, there should not only be a standard language developed, but a unique Health identifier must also be developed. Today there are many vendors with just as many software applications. Data cannot be shared unless a goeey interface is written and unfortunately these interfaces are not always accurate or dependable. When a standard language is developed systems will then have greater flexibility and will have capacity for the diverse requirements of the different healthcare disciplines.

- **Delay in Documentation**

This may come as a shock to many, however, EHRs actually increases the physician workload. With written notes, documentation tended to be briefer and straight to the point. With EHRs, much more documentation is required of physicians before, during and after a patient visit. This has its pros and cons. For example, a benefit of more robust documentation is that it provides additional information for the coders that may justify a higher level of service being billed. On the negative, it can cause further delays and errors as physicians often wait to close notes until the end of the day or, sometimes, days later. Thus they rely on memory to enter correct information. Additionally, if a patient is seeing a different provider, others will not be able to access this updated information until the note is closed. As with most systems, however, shortcuts can be built into and customized for the physician to reduce some documentation. Standard work is needed to ensure provider support and learning.

- **E-Messaging between Providers**

While e-messaging is listed above as a benefit, it can also be a drawback as it can result in a lack of face-to-face or phone-to-phone conversation. With EHRs, there are no give-and-take conversations or question-and-answer scenarios. There is no way to express emotion, nuances or voice your concerns or fears. Rather, physicians must trust that the information they are providing is what the other physician needs, interpreted without confusion and read at all. This is not always the case.

- **Continuous Need for Updates and Lack of Accountability for doing so**

For every task large or small - whether it's a basic wellness visit, a diagnosis, a procedure, a treatment or a prescription



- the EHR system requires a corresponding update. For example, when you have an active "problem list" for a patient (e.g., diabetes, hypertension, high cholesterol, etc.) someone has to be responsible for updating his or her medication and keep the problem list accurate.

- **Lack of Interoperability between Information Technologies/EHRS**

With more accountable care organizations emerging across the U.S., technology plays an essential role in developing an ACO, allowing primary care physicians to track and follow the patient flow throughout the Healthcare system. Part of the driving force behind the model stemmed from the need to integrate EHRs throughout the Health system and share information with network of referring hospitals. However, this sharing of information is often not possible. Finding a hospital partner that is willing to open the lines of communication is critical to the success. For example, Simpler Consulting client Atrius Health worked closely with Beth Israel Deaconess Medical Center and Epic Systems to develop a web portal that allows the two provider organizations to access each other's EHR systems for shared patients.¹ If this planning and integration is not put into place, communication can become a serious problem and result in additional follow up, time and waste.

9. E Health Initiatives of Government of Kerala

This e-Health project is implemented by the Department of Health & Family Welfare, Government of Kerala with the help of DeitY, Government of India to capture the demographic data, automate hospital processes and bring all information into a centralized State Health Information system through the network to ensure continuity in health care.

The Department of Health and Family Welfare is the primary Government entity responsible for Healthcare management in the state. The state has a very high level of penetration of healthcare facilities. The department has been implementing various Central and State government programs intended for improvement of healthcare of its citizens very efficiently and this is reflected in various social and health indicators which are comparable to the western standards. Now the department has also taken care to take IT implementation to the grass root level by providing one PC each down to the PHC level. All field staffs are being trained to use computers. The Department is now all set to take the IT implementation to the next level. The project is proposed to be implemented in Hospitals and Clinics under the Director of Medical Education and Director of Health Services in the Modern Medicine stream. This would cover all Sub Centres, Primary Health Centres (PHC), Community Health Centres (CHC), Taluk Hospitals, District Hospitals, Specialty Government Hospitals and Government Medical College Hospitals.

9.1. Phases of the Project

The project is going to be implemented in 3 phases:

Phase 1: All the healthcare institutions in Thiruvananthapuram district.

Phase 2: All the healthcare Institutions in Kollam, Malappuram, Kasargod, Alappuzha, Idukki, Ernakulam Districts (6 Districts).

Phase 3: All the healthcare institutions in Kannur, Wayanad, Kozhikode, Palakkad, Thrissur, Kottayam, Pathanamthitta Districts (7 districts).

The objective is to have a Universal healthcare system. This cannot be achieved without having a robust IT enabled management and monitoring system. The envisaged e-health project is an integrated solution covering the entire health sector of Kerala including all the public healthcare institutions and at a later stage to include with private healthcare institutes also. The data collected at all levels of interaction with the system to be captured and linked together to form the State Health Information System database in the State Data Centre. Following are the different components of the envisaged system:

9.2. e-Health Project

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Following are the different components of the envisaged system:

a. Building up of the Citizen's Health Database

The objective is to build up a health database of all citizens across the state. The base data comprising of the basic demographic details shall be provided by the department based on the SRDH (State Resident Data Hub), SECC (Socio



Economic & Caste Census) data. This shall be verified & suitably updated by the field level health worker using hand held devices to make comprehensive root level demographic and public health data related to the entire household, mother and child health, ante natal care, family planning, Communicable/Non-Communicable diseases etc. This would update the central database on a real time basis. In turn the system would also provide inputs based on the analysis of the overall data collected to the health workers and assist them to plan field level activities & deliver services effectively to citizens.

b. IT Enabled Integrated Hospital Management System

The project envisages end-to-end Information Management system automation in all Government hospitals. This should cover all the operations of Registration, OP counter, OP consultation, IP, Pharmacy, Stores, Blood Bank, Discharge etc. This shall create a reliable, secure and dynamically updated database of medical information about citizens in the form of Electronic Medical Record (EMR) of the citizen's health Database so that continuity of medical care is made easy. Authorized persons in any healthcare institution covered under this project can get access to centralized database to provide continuity in healthcare services to citizen.

c. Healthcare MIS System

One of the objectives of the project is to generate meaningful MIS reports from the real time data collected. This Centralized data repository created by the system would be helpful in the Non Communicable Disease control, Disease surveillance, Decision Support System, Alert Mechanisms of SMS/E-mail to all concerned including citizen as the case may be.

10. Conclusions and Implications

From the above discussions it is clear that the e Health project is becomes an excellent innovation in medical field. The application of IT will reduce the chance for manual errors and provide efficient results. In the modern busy world, this new concept is a blessing for the patients as well as doctors. It is possible to consult a doctor without much effort. The patient can make use of the facility of a specialized doctor without difficulty. It will become easy for the Hospital Authorities to record the information relating to each patient, prescribe medicine based on past records, evaluate the future improvements, etc.

This new system is subject to certain challenges also. But if it is introduced properly, of course it will yield significant positive change in the area of health care. Technological innovation can convert the existing system into more efficient and effective one.

It is hoped the following implications will be useful for the effective implementation of the e- Health system.

Since e Health concept is an innovative one it is necessary to provide proper awareness to the stakeholders about the benefits and impacts. The I T Department in association with the health sector officials can take initiative in this respect. Proper training may be imparted to the officials involved in the e Health in the area of recording and analysis. The scheme can be implemented to the hospitals functioning at the rural areas so that the benefit can be achieved by the poor people. Suitable legal framework may be made to solve the security related issues. Adequate provision should be made by the Government to take legal action against the people involved in security issues. The Department of health services may take initiatives to employ people with technical expertise to handle e Health successfully.

References

1. Book Review: Tracking E-health by Edward H. Short life.
2. "Special Issue on Emerging Technologies in Communications – e Health," IEEE Journal on Selected Areas in Communications, *vol. 31, no. 9, Sept. 2013.*
3. [Http://www.igi-global.com/](http://www.igi-global.com/).
4. [Http://www.thehindu.com/](http://www.thehindu.com/).
5. [Www.dhs.kerala.gov.in/docs/ehealth](http://www.dhs.kerala.gov.in/docs/ehealth).