

Transforming Health Information from Manual to Digital (Electronic) World—Reference and Guide

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Abstract—Introduction: To update ourselves and understand the concept of latest electronic formats available for Health care providers and how it could be used and developed as per standards. The idea is to correlate between the patients Manual Medical Records keeping and maintaining patients Electronic Information in a Health care setup in this world. Furthermore, this stands with adapting to the right technology depending upon the organization and improve our quality and quantity of Healthcare providing skills. **Objective:** The concept and theory is to explain the terms of Electronic Medical Record (EMR), Electronic Health Record (EHR) and Personal Health Record (PHR) and selecting the best technical among the available Electronic sources and software before implementing. It is to guide and make sure the technology used by the end users without any doubts and difficulties. The idea is to evaluate is to admire the uses and barriers of **EMR-EHR-PHR**. **Aim and Scope:** The target is to achieve the health care providers like Physicians, Nurses, Therapists, Medical Bill reimbursements, Insurances and Government to assess the patient's information on easy and systematic manner without diluting the confidentiality of patient's information. **Method:** Health Information Technology can be implemented with the help of Organisations providing with legal guidelines and help to stand by the health care provider. The main objective is to select the correct embedded and affordable database management software and generating large-scale data. The parallel need is to know how the latest software available in the market. **Conclusion:** The question lies here is implementing the Electronic information system with healthcare providers and organization. The clinicians are the main users of the technology and manage us to “go paperless”. The fact is that day today changing technologically is very sound and up to date. Basically, the idea is to tell how to store the data electronically **safe and secure**. All three exemplifies the fact that an electronic format has its own benefit as well as barriers.

Keywords—Medical records, digital records, health information, electronic record system.

I. INTRODUCTION

JUST a few centuries' years ago, medical records were written on stone to preserve valuable information regarding patient history and studied the changes to protect mankind. However, in order to decide on health planning since a few decades ago, the Health information has become almost important for any nation. The medico legal aspect act on to Healthcare delivery system with evidence and positively safe guard the treatment history of the patient either in the means of written documentation or digitally. Hence, it was imperative to improve the practicing skills in delivering

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healthcare in this partially blind world. With a boom in technology development, it happens to bring newer quality and quantity of Healthcare time to time with frequently improved manner and readily available to each physician. Thus the idea of transforming the health information from manual documentation to electronic was born to make information storage that much easy.

Health Informatics has completely transformed the way resources, devices, and methods required to optimize the acquisition, storage, retrieval, and use of information in health. Not only healthcare providers but patients too wants to access their health record on the go, thanks to increased penetration of electronic gadgets like computer and smart phones in today's era. Security and confidentiality of patient's record is another aspect which need attention as electronic record is easy to retrieve and thus prone to misuse. Uniform Health standards should be followed in order to seamlessly exchange the patient's record from one Information system to another.

II. OBJECTIVE

The concept, theory, and by definition, there is a divergence in explaining the terms Electronic Medical Record (EMR), Electronic Health Record (EHR) and Personal Health Record (PHR) in this electronic world. The time and scope has made us to use digital Health records importance and thus hastening world to adopt. The worldwide countries have agreed to discover confusion and disagreement “with the definition of terms associated with digital health records.” It is to rely on users, care settings, data, and technology of choice among the best electronic format to get. Three terms are commonly used and sometimes interchangeably to describe digital form of Health records – Electronic Medical Record (EMR), Electronic Health Record (EHR) and Personal Health Record (PHR). Regrettably, the definition of these terms varies in the entire world and often creates disarray. It will become absorbing; once we understand definitional structure and find there are many common characteristics, at the same time, its clear picture in selecting technical terminology and software before implementing.

III. SOURCE-THEORY EXPOUNDED

Firstly, to articulate the notion of “Medical Health Records or Medical Charts” is a system for Medical Documentation and capturing the health history of patient's routine treatment without outturn or break in the form of paper based setting. The basic idea was to make medical records easier to share and integrate across multiple providers. The target of recording medical or health history is to give information to

health care providers like Physicians, Nurses, Therapists, Medical Bill reimbursements, Insurances and Government [4]. The foremost information captured on Medical Records may include on patient's health i.e. Patient Demographics, Progress Notes, Diagnosis, Symptoms and Complaints, Vital Signs, Prescriptions, Medical History, Medications and Immunizations, Laboratory and Radiology reports, Scheduling and Appointments, Procedure and Coding. Currently, let us move to digital/electronic part of Medical records and carefully admire the basic conception of **EMR-EHR-PHR**.

The need to implement an **Electronic Record System** in Healthcare is sorted worldwide. However, it demands the Health care provider to implement step by step and ignorance, mistrust, disbelief and power-cut are some of the sources of resistance to change which can be broken by continuous training and stimulation of end user. To perceive these terms in easy language:

The **Electronic Record** is a clear vision and version to a journey of gathering electronic information. The main three valves which operate the process are:

1. Information on Health care of an individual.
2. Benefits obtained from components of Electronic Record.
3. Patient safety and quality assurance.

A. What Is Completion of the Health Information? [2]

1. An entire eternity Health Record of a person for duration of treatment in which a portion of health information is captured on partial basis.
2. An entire eternity Health Record of a person for duration of treatment in which all of health information is captured on complete basis.

B. Who Is the Owner of the Health Information? [2]

1. Health care provider.
2. Patient.

C. What Is an EMR?

The paper based Health information of an individual that is written, created, collected, managed, and consulted by clinicians of various specialties of single organisation which is transferred into a **digital version** for long-term storage is known as an Electronic Medical Record (**EMR**). Normally it belongs to single health organisation [7].

D. What Is an EHR?

A Health-related electronic record information of an individual in respect to his/her treatment history and plans, specific test results, allergies, images, demographics, vital signs, personal statistics like age and weight, and billing information etc. - captured totally in **digital manner**. Which allows in real-time to create, manage, share and update between different practices, specialists, multiple healthcare organizations nationally depending on the patient's needs is known as an Electronic Health Record (**EHR**) [1], [3].

E. What Is a PHR?

A documentation of health information is managed and maintained by the patient himself/herself in a private and

confidential way which contains history, diagnoses, medications, and family history. This document can be of **paper, electronic, or web-based** depending on the patient's choice. This entertains the patient to stay up to date on Health status and have full access to his/her health records is known as Personal Health Record (**PHR**) [5]. The other forms of Electronic / Digital Health information systems are [6]:

- **CPR:** (Computer-based patient record) Lifecycle patient record that may be include with information from all specialties including dentist, psychiatrist. Used nationally and internationally in near future.
- **PCR:** (Patient-Carried Record) all information contained on a token or cards that patient carry.
- **CMR:** (Computerized medical record) Document imaging-based system.
- **EPR:** (Electronic Patient Record) Just like CPR but not necessarily containing a lifecycle record and focuses on relevant information only.
- **DMR:** (Digital Medical Record) Web-based patient record using "pull" technology with minimum of messages.
- **PMRI:** (Patient Medical Record Information) Used in Department of Health and Human Services/National Committee on Vital and Health Statistics language.
- **ICRS:** (Integrated Care Record Services) Found in United Kingdom.

Barriers which encounter the implementation processes of transforming data from manual to electronic format [6]:

- A. The main obstacles for Electronic Records are the deficiency of standards in these areas:
 - Content of the Health information-Tracing uniformity, setup of compatibility, operational ability.
 - Information capturing method -compliance the report and guidelines adopted on principles of documentation.
 - How to represent the Information –selecting terminology, code sets, and languages to be used.
 - Viewable Operational dimension and data sets-allocation, deployment, staging, routing.
 - Steps in Clinical practice-line of protocols, ideal problem management system.
 - Decision support making-algorithms, triggers, logical answers.
 - Security/confidentiality-authentication, accountability, data integrity, encryption rights.
 - Performance assurances-measures, ideas, example, acceptable downtime.
 - Operational option for nationally/Internationally-translation modules, versioning, domains.
 - Assurance of Quality and system testing.
 - Software needs-Users, compatible, small/large scale setup.
- B. Absences of motivation among the users to identify its benefits.
- C. Awareness of benefits for clinicians.
- D. Confusion about the concept of Electronic Records.

IV. METHOD-STANDARDIZATION OF ELECTRONIC RECORD

Health Information Technology used for EMR_EHR_PHR varies with organizations, which provide necessary standards and legal guidelines for its implementation.

The organisations are

- **REC:** (Regional Extension Centre) RECs were funded by The American Recovery and Reinvestment Act of 2009 (ARRA) (stimulus) legislation, along with the EHR incentives for Meaningful Use of a certified HER (Honest Excellence Respect).
- **RHIO:** (Regional Health Information Organization) This is the old/passé term for organizations that facilitate the sharing of patient's key health information. Data can be entered into the RHIO through a variety of sources including feeds from EMRs/EHRs and manual data entry. RHIOs often also receive feeds from insurance companies, labs and other electronic sources.
- **HIE:** (Health Information Exchange) This is the new term for RHIO. In general, there are two types of HIEs:
 1. Private HIE
 2. State HIE
- **CCR or CCD:** (Continuity of Care Record/Document) The CCD is the portion of a patient's EMR/EHR chart that the provider shares with other providers. It is a document that can be printed or electronically sent from one provider to another or given to the patient.
- **CCHIT:** (Certification Commission for Health Information Technology) CCHIT sets annual requirements for the functionality EMRs/EHRs must contain in order to be certified for that year.
- **MU:** (Meaningful Use) Typically this refers to the Core and Menu requirements a provider must meet to demonstrate Meaningful Use of a Certified HER (Honest Excellence Respect).
- **CDS:** (Clinical Decision Support rule): This is a health information technology functionality that builds upon the foundation of an EHR to provide persons involved in care processes with general and person-specific information, intelligently filtered and organized, at appropriate times, to enhance health and health care.

V. TECHNOLOGY OPTIONS FOR STORING HEALTH INFORMATION

A. Choosing Software Application

Health care organisation can use many proprietary software applications which can be then customised according to the need of the organisation. Besides, there many open source software available in the public domain for use in the healthcare industry. Open EMR, open HER, GNU Med, Vista and many other can be used and customised according to the need.

VI. PRINCIPLE- PROCURING A LARGE DATABASE {SOFTWARE}

Electronic Health information software needs a basis for creating and generating large-scale data. This needs embedded and affordable database management, integrity of data set and

reducing map setting. Secure and role based access to various stakeholders (healthcare professional) is very important. Many Database Management Systems like Oracle, SQL server be used.

Hadoop is an open-source software framework for storing data and manipulating big data and running applications on clusters of commodity hardware. It provides massive storage for any kind of data, enormous processing power, and the ability to handle virtually limitless concurrent tasks or jobs. The next is **Hive, which** is a component of Horton works Data Platform (HDP). **Hive** provides a SQL-like interface to data stored in HDP. **Hive** provides a database query interface to Apache Hadoop [8]. All these Software Hive Hadoop, Pig Hadoop and Apache Hadoop (Cloudera) configures under **Hadoop platform** and this software rises to and assess to:

- **Open-source software.** It is created and maintained by a network of developers from around the world. It is free to download, use, and contribute to, though more and more commercial versions of Hadoop are also easily available.
- **Framework.** It means that everything you need to develop and run software applications is provided – programs, connections, etc.
- **Massive storage.** The Hadoop framework breaks big data into blocks, which are stored on clusters of commodity hardware.
- **Processing power.** Hadoop simultaneously processes large amounts of data using multiple low-cost computers for fast results.

VII. CONCLUSIONS

With Continuous advancement in technology, research and decision support in healthcare will tend to impact the way we built various systems to record patient's health record.

Even after a brief references it may be difficult to understand the concept and consider which setup to be placed in the functioning of Healthcare providers for patient's health information safety or it can be difficult to evaluate EMR, HER and PHR to determine which system to buy and implement. From the number of options available for choosing the technology, it is important that the first requirement of organisation be frozen first and accordingly technology should be adopted.

At the same time, most Healthcare providers will make their decisions based on their Information Technology budget and their career stage. The clinician will be certainly wanted to use the Information Technology for the foundation of future vision for healthcare information usability. During this time a more mature clinician who wants to "go paperless," but is not an aggressive adopter of Information Technology, may well opt for a stand-alone with EMR system and forgo the costs and challenges of integration of repeated keeping hardcopies of paper based Records. In fact, using paperless pragmatic approach where healthcare providers can reap benefits of technology while treating patients in better way.

All three methods of medical record keeping are important for patients because of how they complement and differ from one another. The Electronic Medical Record and Electronic

Health Record are systematic ways to update a patient's health information while keeping it **safe and secure** electronically. Every doctor will have their own EMR to personally keep track of everything they conclude about a patient's health, but the EHR are shared across all of the doctors an individual visits in order to keep everyone on the same page when it comes to medical history and treatments. While both of these documents are considered legal records, the personal health record is completely separate but still important. No doctor is signing off on the information placed into a PHR, but patients can still use the document to stay on top of their current health problems and future procedures. Together all three forms of **Medical Documentations** help primary care doctors, specialized doctors, and the patient collect important health information and plan for the future. Therefore, it makes clear sense to understand the EMR vs. EHR vs. PHR distinctions a little less confusing. Thus, this refers that all three exemplifies the fact that electronic formats have their vast unseen benefit as we adopt it. We use it for the fore deal of patient and study based structural reforms for researchers. Therefore, use of technology sounds better to the mankind in this world.

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