

CLINICAL VIGNETTE

A Brief Introduction To Electronic Health Records And Associated Terminology

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Abstract: The purpose of this article is to provide a brief overview of the electronic health record (EHR) and the associated terminology. We start by reviewing some of the definitions of an EHR and how EHR's differ from terms like electronic medical record (EMR) and computer-based patient record (CPR). We continue the overview by looking at the following terms: Hospital Information System (HIS), Admission-Discharge-Transfer (ADT), Meaningful Use (MU) and Computerized Provider Order Entry (CPOE). Where possible, we include historical contexts. By the end of this article, the reader will have increased awareness and understanding of key EHR-associated terms.

Introduction: In the U. S., many physicians are getting acquainted with electronic health records (EHRs) for the first time in their careers. This trend may be at least in part due to Medicare's EHR Incentive Program, which was enacted in February 2009 as part of the American Recovery and Reinvestment Act (ARRA). As EHR's continue to penetrate every corner of clinical practice, physicians will need a basic familiarity with EHR terms.

What is an EHR? In the U.S., EHR's began to enter the collective vocabulary in 2004. Then President George W. Bush advocated for a nationwide EHR in his State of the Union Address to reduce "medical mistakes, reduce costs and improve care."¹ Since then numerous other terms that sound similar to EHR have been used by the media and in the literature, such as computer-based patient record (CPR), electronic medical record (EMR) and many more. Sometimes the terms are used interchangeably, adding to the confusion.

At the time of this article, the term EHR has emerged as the dominant and preferred term. However, EHR may mean different things to different people. For many, EHR is a "generic term for any electronic patient care system."² Stakeholders have attempted to refine this generic definition. We will look at the definitions from three important stakeholders: The Institute of Medicine (IOM), the United States Department of Health & Human Services (DHHS), and Healthcare Information and Management Systems Society (HIMMS).

The IOM is an independent, nonprofit U.S. organization that advises decision makers and the public³. The IOM views an EHR as more than a "paperless record." The IOM defined an EHR by the eight core functions that it must have (see box 1): 1) Health information and data; 2) Results management; 3) Order entry/management; 4) Decision support management; 5) Electronic communication and connectivity; 6) Patient support; 7) Administrative processes; 8) Reporting & population health. This "function-based" definition was promoted to help guide and set expectations for purchasers and sellers of EHRs⁴.

Box 1: IOM's Eight Core Functions that Define an Electronic Health Record (EHR)	
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| 1. | Contain health information and data |
| 2. | Results Management |
| 3. | Order entry/management |
| 4. | Decision support management |
| 5. | Electronic communication and connectivity |
| 6. | Patient support |
| 7. | Administrative processes |
| 8. | Reporting and population health |

In the United States, DHHS is a key stakeholder in building a national health information network. From the DHHS perspective, the EHR is more than a "digital version of the paper charts." The EHR is a tool to manage the total health of the patient. EHRs go "beyond standard clinical data collected in the provider's office and inclusive of a broader view on a patient's care." EHRs should be able to "share information with other health care providers, such as laboratories and specialists, so they contain information from all the clinicians involved in the patient's care."⁵

HIMMS is a U.S.-based not-for-profit health information technology organization⁶. One of their public policy principles is to "facilitate the maintenance and use of an EHR system compatible across various care settings."⁷ From their perspective, the EHR is a "longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports. The EHR automates and streamlines the clinician's workflow. The EHR has the ability to generate a complete record of a clinical patient encounter - as well as supporting other care-related activities directly or indirectly via interface - including evidence-based decision support, quality management, and outcomes reporting."⁸

These are just a few examples of the definitions that exist. These examples demonstrate that substantial overlap and differences exist at the same time. As one researcher put it, "the meaning of EHR is unstable."⁹ So what is an EHR then? "At their simplest, digital (computerized) versions of patients' paper charts...(and yet) so much more than that."¹⁰

How does an EHR differ from an EMR and CPR? EMR is a term that is diminishing in use as EHR is gaining. An EMR is essentially a digital version of the patient chart in a doctor's office. Two general features differentiate an EMR from an EHR. First is the emphasis on "medical" versus "health."⁵ Since it replicates the patient chart, an EMR tends to function like a "medical" repository of diagnoses and treatments. In comparison, the term "health" encompasses a broader view of a person's wellness⁵. Consequently, EHRs tend to have broader functions to enable health and wellness such as care coordination and patient engagement. Second is the role of connectivity and information sharing. EMR's are typically connected within the doctor's office

or across a health enterprise. However, if a patient leaves the enterprise, the digital chart does not follow and is confined to the enterprise digitally. In contrast, the information follows the patient with an EHR. For example, if a patient is admitted to an outside hospital, then an EHR can seamlessly connect and share information between the doctor's office and the hospital.

CPR is another term that is diminishing in use as EHR is gaining. A CPR is a "lifetime record of a person's health status and health care that meets all clinical, legal and administrative needs."¹¹ A key feature of the CPR is how data is stored. For a true CPR, each element of a patient's data is unique, discrete and searchable¹¹. In comparison, the EMR and EHR are less stringent about data storage and emphasize the display of information in an electronic format. As one can imagine, the technical challenges alone of codifying every data element is a significant barrier to CPR adoption.

What is HIS (Hospital Information System/Health Information System)? A hospital has a lot of information to keep track of. Traditionally the information can be divided into administrative and clinical, although the lines may blur. Administrative data include patient demographics, appointment schedules, bed census and financial tools to name just a few. Sometime in the 1950's, hospitals began to computerize the administrative and clinical information. Thus was born the HIS¹². The term "Health Information System" has increasingly replaced the "Hospital Information System," creating uncertainty and duplicity in the meaning of HIS. Analogous to the difference between an EHR and EMR, a Health Information System opens up a broader umbrella beyond the hospital alone. One might view the Hospital Information System as a subset of the Health Information System at an enterprise¹³. A Health Information System takes on broader functions such as patient research, quality assurance¹³. HIS and EHR obviously overlap to some degree. One could say that an EHR is more patient-centric and that an HIS is more enterprise-centric.

What is ADT (Admission-Discharge-Transfer)? As anyone who has been to a hospital knows, a seemingly endless number of patients come and go through the hospital doors. How does a hospital keep track of all the patients? Hospitals computerize the tracking process through an electronic system typically known as ADT. As the abbreviation implies, ADT helps a hospital track patient admissions, discharges and transfers. Additionally, ADT monitors the hospital census and captures the initial patient demographic profile¹⁴. ADT is considered a subcomponent of an HIS. ADT is commonly the backbone of an HIS as the ADT functions to link patient identities and locations.

What is MU (Meaningful Use)? It is obvious that an EHR should be meaningful and useful in patient care. However as we found out, there are many different ways to define an EHR. How would a purchaser go about selecting an EHR from the many options in the marketplace? How would a vendor go about developing an EHR product that can stand out in a crowded market? Enter the U.S. government.

When President Obama signed the HiTECH Act in 2009, he provided the DHHS with the authority to establish programs that promoted adoption of EHRs. One of those programs is the Centers for Medicare and Medicaid Services (CMS) EHR Incentive Program. In a nutshell, MU is CMS's carrot and stick program. The long version of MU "is the set of standards defined by the Centers for Medicare & Medicaid Services (CMS) Incentive Programs that governs the use of electronic health records and allows eligible providers and hospitals to earn incentive payments by meeting specific criteria."¹⁵ A detailed discussion of MU is beyond the scope of this article. However we will highlight the following three points: 1) Who is an eligible provider (EP)? 2)

How much is the incentive payment? 3) What are the criteria for earning the incentive payments? Who is an EP? CMS defines an EP as physicians (MD or DO), dentists, podiatrists, optometrists, and chiropractors. EP's who are hospital-based cannot participate in the EHR Incentive Program. An EP is considered "hospital-based if he or she provides more than 90% of their covered professional services in either an inpatient or emergency department of a hospital."¹⁶ How much is the incentive payment? The total maximum incentive amount that an EP can be paid under the Medicare HER Incentive Program is \$44,000 over five consecutive years of program participation. To achieve the maximum incentive, an EP must register for the program by 2012. EP's who do not meet the requirements for meaningful use by 2015 are subject to payment adjustments (penalties) to their Medicare reimbursements that start at 1% per year. EP's can designate a practice or medical group to receive the incentive funds on their behalf¹⁶.

What are the criteria for earning the incentive payments? This is where things get a little complex. The abridged version is that EP's must use the right EHR, meet quality and functional metrics, and report their quality metric performance. The right EHR is one that has been certified by CMS. Certified EHRs have the basic functions as specified by CMS to qualify for the CMS Incentive Program. The quality metrics fall into three broad categories: core measures, menu measures, and clinical quality measures. Certified EHRs must have the functionality to generate the quality metric reports electronically for CMS¹⁷.

What is CPOE (Computerized Provider Order Entry)? As mentioned earlier, electronic order entry and management is an essential EHR function, also known as computerized provider order entry. It is believed that computerized order entry increases patient safety and quality, although it may have some unintended consequences such as workflow impacts¹⁸. The reader should be aware that computerized *provider* order entry has replaced the older term computerized *physician* order entry. This reflects a general move away from a physician-centric model of healthcare delivery to a team-based model. In fact, CMS uses computerized *provider* order entry, and recognizes a provider as "any licensed healthcare professional who can enter orders into the medical record per state, local and professional guidelines."¹⁹

In summary, EHR is the preferred term despite its unstable nature. HIS is evolving to be more health-system centric instead of hospital-centric. ADT is an essential feature that tracks patient movement through a health system. MU is CMS's carrot and stick program for EHR's. CPOE has moved away from a physician-centric model and toward a broader scope of providers.

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