Chapter 17
Health Information Exchange for Improving the Efficiency and Quality of Healthcare Delivery

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ABSTRACT

In healthcare industry, providers, patients, and all other stakeholders must have the right information at the right time for achieving efficient and cost effective services. Exchange of information between the heterogeneous system entities plays a critical role. Health information exchange (HIE) is not only a process of transmitting data, but also a platform for streamlining operations to improve healthcare delivery in a secure manner. In this chapter, we present a comprehensive view of electronic health record (EHR) systems and HIE by presenting their architecture, benefits, challenges, and other related issues. While providing information on the current state of EHR/HIE applications, we also discuss advanced issues and secondary uses of HIE implementations, and shed some light on the future research in this area by highlighting the challenges and potentials.

INTRODUCTION TO EHR AND HIE

Development of EMR/EHR

The adoption of information technology in healthcare has progressed through a series of phases since the 1960s. Initially, health information systems were used in financial industry in the 1960s. These systems aided the organizations' billing, payroll, accounting, and reporting services. During this phase, the use of health information systems was limited to the elimination of clerical work. Primary care clinics took a major initiative during the 1970s in a similar direction and joined

DOI: 10.4018/978-1-60960-872-9.ch017

the bandwagon for implementation of health information systems. In the 1960s, 1970s, and 1980s, the scope of this technology was mostly limited to small areas within the hospitals, such as laboratory, radiology, or administration units (Haux, 2006). After four decades of use, the trend is now to implement an enterprise wide decision support system, including clinical data repositories and fully computerized electronic medical records (EMR) of patients. Meinert (2005) cited a Gartner report which states that EMRs are gradually evolving through five generations with each subsequent generation possessing increasingly sophisticated and integrated functionality.

There are no clear boundaries that outline what constitutes EMR, EHR, computerized patient record (CPR), or other healthcare decision support systems. The US Department of Health and Human Services (HHS) on its website defines EMR as an electronic patient health record that can help care providers in decision making with regards to patients' medical condition. EMR and EHR eliminate manual archiving of medical records and automate access to information, and thus streamline the clinician's workflow. They can also support secondary uses such as claims processing, quality management, outcome reporting, and public health disease surveillance and reporting. The subtle difference between EMR and EHR is that EHR systems usually should have some features related with interoperability to transmit data electronically.

Lærum et al. (2004) stated that using EMR/EHR systems are a prerequisite to improve productivity in healthcare industry. Medical secretaries work as transcriptionists, receptionists and coordinators of patient logistics and the nurses have their own documentation and administrative procedures. The elimination of the paper-based medical records is a radical change in the routines of not just secretaries and nurses but the entire hospital organization. The widespread use of information will lead to reduced medical errors, higher-quality care, and improved efficiency in the healthcare industry (Giannangelo & Fenton, 2008). Central theme to this technology is the automation of patient-specific clinical information. In this process, it is very vital to identify the requirements of both internal and external actors because technology is ubiquitous (Mettler & Vimarlund, 2009). Internal actors represent the personnel involved in the day-to-day functioning of the healthcare organization as well as the patients. External actors correspond to those stakeholders who have a strong influence on the healthcare organization (e.g., insurance companies, suppliers, governmental authorities, other healthcare organizations). EHR helps both the internal and external stakeholders in many different ways such as:

- EHR helps insurance companies make predictions on the future health condition of their clients based on their physical characteristics, family medical history, and lifestyle.
- Public insurance organizations use EHR data to detect frauds and abuses. The data can also be used for improving the social security system to reduce health related expenses.
- Pharmaceutical industry benefits from EHR by analyzing patient-related information and patient preferences for healthcare products.
- Researchers and epidemiologists often base their work on aggregated medical data, including identifiable personal data. EHR systems provide reliable data for such research purposes.
- Law enforcement authorities may be able to limit the number of suspects by using pertinent information on disease and genetic characteristics based on information obtained from EHR (Kokolakis et al., 1999).

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