After reading this chapter, you should know the answers to these questions:

- What is the definition of an electronic health record (EHR)?
- How does an EHR differ from the paper record?
- What are the functional components of an EHR?
- What are the benefits of an EHR?
- What are the impediments to development and use of an EHR?

12.1 What Is An Electronic Health Record?

The preceding chapters introduced the conceptual basis for the field of biomedical informatics, including the use of patient data in clinical practice and research. We now focus attention on the patient record, commonly referred to as the patient’s chart or medical record. The patient record is an amalgam of all the data acquired and created during a patient’s course through the health care system. The use of medical data was covered extensively in Chapter 2. We also discussed the limitations of the paper record in serving the many users of patient information. In this chapter, we examine the definition and use of computer-based patient record systems, discuss their potential benefits and costs, and describe the remaining challenges to address in their dissemination.

12.1.1 Purpose of a Patient Record

Stanley Reiser (1991) wrote that the purpose of a patient record is “to recall observations, to inform others, to instruct students, to gain knowledge, to monitor performance, and to justify interventions.” The many uses described in this statement, although diverse, have a single goal—to further the application of health sciences in ways that improve the well-being of patients, including the conduct of research and public health activities that address population health. Yet, observational studies of physicians’ use of the paper-based record find that logistical, organizational, and other practical limitations reduce the effectiveness of traditional records for storing and organizing an ever-increasing number of diverse data. An electronic health record (EHR) is designed to overcome many of these limitations, as well as to provide additional benefits that cannot be attained by a static view of events.
An electronic health record (EHR) is a repository of electronically maintained information about an individual’s lifetime health status and health care, stored such that it can serve the multiple legitimate users of the record. Traditionally, the patient record was a record of care provided when a patient is ill. Managed care (discussed in Chapter 23) encourages health care providers to focus on the continuum of health and health care from wellness to illness and recovery. Consequently, the record must integrate elements regarding a patient’s health and illness acquired by multiple providers across diverse settings. In addition, the data should be stored such that different views of those data can be presented to serve the many uses described in Chapter 2.

A electronic health record (EHR) system adds information management tools to provide clinical reminders and alerts, linkages with knowledge sources for health care decision support, and analysis of aggregate data both for care management and for research. To use a paper-based patient record, the reader must manipulate data either mentally or on paper to glean important clinical information. In contrast, an EHR system provides computer-based tools to help the reader organize, interpret, and react to data. Examples of tools provided in current EHR systems are discussed in Section 12.3.

Halamka et al., 1998; Hripcsak et al., 1999; McDonald et al., 1999; Slack and Bleich, et al., 2001; Brown et al., 2003).

12.1.2 Ways in Which an Electronic Health Record Differs from a Paper-Based Record

In contrast to a traditional patient record, whose functionality is tethered by the static nature of paper—a single copy of the data stored in a single format for data entry and retrieval—an EHR is flexible and adaptable. Data may be entered in a format that simplifies the input process (which includes electronic interfaces to other computers where patient data are stored) and displayed in different formats suitable for their interpretation. Further, the EHR can integrate multimedia information such as radiology images and echocardiographic video loops that were never part of the traditional medical record. Data can be used to guide care for a single patient or in aggregate form to help administrators develop policies for a population. Hence, when considering the functions of an EHR, we do not confine discussion to the uses of a single, serial recording of provider–patient encounters. An EHR system extends the usefulness of patient data by applying information-management tools to the data.

Inaccessibility is a common drawback of paper records. In large organizations, the traditional record may be unavailable to others for days while the clinician finishes documentation of an encounter. For example, paper records are often sequestered in a medical records department until the discharge summary is completed and every document is signed. During this time, special permission and extra effort are required to locate and retrieve the record. Individual physicians often borrow records for their convenience, with the same effect. With computer-stored records, all authorized personnel can access patient data immediately as the need arises. Remote access to EHRs also is possible.