Chapter 2

Medical Informatics: The American Recovery and Reinvestment Act, HITECH, and the Health Information Technology Decade

Chapter Outline

Learning Objectives

Medical Informatics

The American Recovery and Reinvestment Act (ARRA), the Health Information Technology for Economic and Clinical Health Act (HITECH), and the Health Information Technology Decade

The Health Insurance Portability and Accountability Act of 1996: A Brief Introduction

The Patient Information Form

The Paper Medical Record

The Electronic Medical Record

The Personal Health Record

The Electronic Health Record

The Nationwide Health Information Network (NHIN)

Computer Information Systems in Health Care

Does Computerization Improve Patient Outcomes?

The Introduction of Computer Systems

In the News

Chapter Summary

Key Terms

Review Exercises

Notes

Additional Resources

Learning Objectives

Upon completion of this chapter, the reader will be able to:

- Define medical informatics.
- Discuss the American Recovery and Reinvestment Act (ARRA) and HITECH and their effects on health information technology (HIT).
- Define the decade of HIT.
- Define the electronic medical record (EMR) and electronic health record (EHR), and discuss the differences between the two.
- Define interoperability.
- Define the Nationwide Health Information Network (NHIN).
- Describe computer information systems used in health care settings:
    - Hospital information systems (HIS)
    - Financial information systems (FIS)
    - Clinical information systems (CIS)

- Pharmacy information systems (PIS)
- Nursing information systems (NIS)
- Laboratory information systems (LIS)
- Radiology information systems (RIS)
- Picture archiving and communication systems (PACS)

- Discuss the issues raised by several studies of the computerization of health records.
- Discuss the introduction of and resistance to computer systems in health care environments.

Key Terms

American Recovery and Reinvestment Act (ARRA) of 2009

biometrics

clinical information systems (CIS)

computer information systems

encryption

e-prescribing

financial information systems (FIS)

Health Information Technology for Economic and Clinical Health Act (HITECH) of 2009

hospital information systems (HIS)

iHealth Record

interoperability

laboratory information systems (LIS)

meaningful use

medical informatics

Nationwide Health Information Network (NHIN)

nursing information systems (NIS)

personal health record (PHR)

pharmacy information systems (PIS)

picture archiving and communication systems (PACS)

radiology information systems (RIS)

regional extension centers (RECs)

regional health information organizations (RHIOs)

Discussion Questions

1. Define medical informatics.

Medical informatics seeks to improve the way medical information is managed and organized by using computer technology. The common emphasis in all definitions is on the use of technology to organize information in health care. That information includes patient records, diagnostics, expert or decision-support systems, and therapies. The stress is not on the actual application of computers in health care but, rather, on the theoretical basis.

Medical informatics is an interdisciplinary science and focuses on improving all aspects of health care. Some of the specific aspects it focuses on include improving the clarity of diagnostic images, improving image-guided and minimally invasive surgery, developing simulations that allow health care workers to improve treatments without practicing on human subjects, developing low-cost diagnostic tests, treating physical

handicaps, providing consumers with information, coordinating international medical reporting, developing and improving information systems used in health care settings, and developing decision-support systems.

2. List four subspecialties of medical informatics.

   a. *Bioinformatics, which uses computers to solve biological problems.*
   b. *Dental informatics, which combines computer technology with dentistry to create a basis for research, education, and the solution of real-world problems in dentistry.*
   c. *Nursing informatics, which uses computers to support nurses.*
   d. *Public health informatics, which uses computer technology to support public health practice, research, and learning.*

3. Discuss the potential impact of the American Recovery and Reinvestment Act (ARRA), including the Health Information Technology for Economic and Clinical Health Act (HITECH), of 2009 on the expansion of health information technology.

When ARRA was signed into law on February 17, 2009, by President Obama, it included billions of dollars for the expansion of health information technology. Through Medicare and Medicaid, monetary incentives would be offered to doctors and hospitals to adopt electronic health records (EHRs). HITECH, which is a part of ARRA, encourages the "Meaningful Use of Electronic Medical Records," with $19 billion in incentives through Medicare and Medicaid for doctors and hospitals to adopt them. Medicare EHR payments can be up to $44,000 for a single doctor between 2011 and 2015; doctors who treat many Medicaid patients can receive $65,000. After 2014, monetary penalties can be assessed against doctors who fail to adopt certified EHRs; these doctors will lose 1

percent of Medicare reimbursements in 2015–2016 and 3 percent in 2017. HITECH "seeks to improve American health care delivery and patient care through an unprecedented investment in health information technology. The provisions of the HITECH Act are specifically designed to work together to provide the necessary assistance and technical support to providers, enable coordination and alignment within and among states, establish connectivity to the public health community in case of emergencies, and assure the workforce is properly trained and equipped to be meaningful users of EHRs."

A study done by the American Hospital Association and the National Center for Health Statistics (part of the Centers for Disease Control and Prevention), commissioned by the Office of the National Coordinator of Health Information Technology (ONCHIT), was released in January 2011. It showed that 80 percent of U.S. hospitals and 41 percent of physicians "intend to take advantage of federal incentive payments for adoption and meaningful use of certified electronic health records (EHR) technology." According to the study, the number of primary care physicians adopting EHRs has significantly increased, rising from 19.8 percent in 2008 to 29.6 percent in 2010. However, many of these do not meet the criteria for meaningful use of EHRs.

4. Briefly define HIPAA and state one change made by Health Information Technology for Economic and Clinical Health Act (HITECH) on HIPAA.

The Health Insurance Portability and Accountability Act (HIPAA) was passed by the U.S. Congress and signed into law in 1996. Its goal was to make health insurance portable from one job to another and to secure the privacy of medical records. Its privacy provisions went into effect gradually starting in 2003, and the enforcement rule went into

effect in 2006. Its primary purpose is to protect the privacy of individually identifiable health information. Basically, patients must be aware of the privacy policy of the health care provider and be notified when their information is shared (with major exceptions detailed in the Patriot and Homeland Security acts). Patients are guaranteed the right to see and request changes and corrections in their medical records. The information may be used for research, but software exists to remove all personal identifiers. Staff must be trained to respect the privacy of patients. They should not discuss patients in a public area, and measures must be taken to ensure that only authorized people in the office see the record. HITECH increases the penalties for violating the HIPAA Privacy Rule.

5. Briefly define the EMR.

In a computerized office, the information that was gathered and entered onto a patient information form will then be entered into a computer into an electronic medical record (EMR). This will form the patient's medical record. Encouraged by the Health Insurance Portability and Accountability Act (HIPAA) and the federal government, the EMR is very gradually replacing the paper record. The federal government has set a goal of 2014 for universal adoption of electronic records and e-prescribing. The EMR may be stored in a hospital's private network, or it may be kept on the Internet.

Software has been developed that makes it possible to store medical information on cell phones, smartphones, and tablet computers. The records include prescribed medications, insurance, and names of doctors among other relevant data. The records also contain digital photo identification.

6. Briefly define the personal health record (PHR).

Patients may establish their own records through the iHealth Record. The iHealth

Record is a personal medical record that the patient can create and maintain at no cost. An electronic PHR is a person's health information in electronic form. It belongs to the individual and is available to him or her on any Web-enabled device. It may include any relevant health information, including your primary care doctor's name and phone number; your allergies, including drug allergies; your medications, including dosages; any chronic health problems you may have, such as high blood pressure; major surgeries, with dates; and your living will or advance directives. The PHR can be used in emergencies to alert emergency personnel to necessary information as well as during routine doctor visits. You are in control of your PHR and can share it with whomever you choose. You can also add information on blood pressure, exercise habits, and smoking that you gather between doctor visits. The PHR can help you keep track of appointments, necessary vaccinations and screening tests, and preventive services. As of August 2, 2010, veterans can download their PHRs from their MyHealthVet accounts, allowing them to control the information and share it with health care providers.

7. Define the electronic health record (EHR).

The information on a patient's electronic medical record (EMR) will form the basis of the EHR. 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. It has the ability to generate a complete record of a clinical patient encounter as well as support other care-related activities, whether directly or indirectly.

8. Discuss the differences between the electronic medical record (EMR) and the electronic health record (EHR).

The EMR belongs to one health care institution, such as a doctor's office or hospital, and it must be interoperable (able to communicate and share information with the other computers and information systems) within that institution only. Ideally, the EHR is not the property of any one institution or practitioner. Eventually, it must be interoperable both nationally and internationally. The EHR is the property of the patient, who can access the record and add information. It must include information from all the health care providers and institutions that give care to the patient. Thus, the EHR eases communication among many practitioners and institutions. It is also a source for research in clinical areas, health services, patient outcomes, and public health as well as an educational source.

9. Define meaningful use and the 15 mandatory criteria.

Meaningful use of electronic health records is defined by the Office of the National Coordinator of Health Information Technology (ONCHIT). It refers to meeting 15 required criteria and an additional 5 out of 10 other criteria. The following 15 criteria are mandatory and must be included:

a. *Patient demographics (race, gender, date of birth, preferred language)*
b. *Vital signs (height, weight, blood pressure, body mass index, and for children, growth)*
c. *Up-to-date problem lists*
d. *Active medication lists*
e. *Active medication allergy lists*
f. *A patient's smoking status*
g. *A summary of a visit, to be provided to a patient who requests it, within 3 days*

h. *Electronic health information, to be provided to a patient who requests it, within 3 days*

i. *The ability to generate electronic prescriptions*

j. *The ability to use computerized physician order entry (for medications)*

k. *The capacity to perform drug/drug and drug/allergy interaction tests*

l. *The ability to send and receive information electronically*

m. *One clinical decision-support rule*

n. *Protection of the privacy and security of patient information*

o. *Report to the Centers for Medicare and Medicaid Services or the state*

10. What are some advantages of the electronic health record (EHR)?

There are many benefits predicted from the EHR: As records become interoperable, your record will be available anywhere there is a computer on the network. This helps guarantee continuity of care; each of your health care providers will know your full medical history and can therefore provide better care. If you are in an accident in New Jersey, for example, but live in California, your record is a mouse click away. The EHR is legible and complete.

11. Define RHIO and NHIN.

Regional cooperation is being fostered through the establishment of regional health information organizations (RHIOs) in which data could be shared within a region. The Nationwide Health Information Network (NHIN) is the infrastructure that would allow communication between RHIOs. Finally, a nationally interoperable system would be established, in which any patient record would be available anywhere on the national network.

12. Describe the uses of computer information systems in health care.

Computerized information systems are used in some hospitals and other health care facilities to help manage and organize relevant patient, financial, pharmacy, laboratory, and radiological information. To receive the full benefits of computer technology, each of these separate information systems needs to be linked under the hospital information system (HIS). Very few hospitals have reached this point of computerization. Issues to be dealt with range from the high cost of introducing and maintaining computerized systems, to the resistance of staff to systems for which they are not adequately trained, to the imposition of systems designed without worker participation and knowledge of the work process.

13. Discuss the evidence regarding the effects (positive and negative) on outcomes of computerization in health care.

A recent study published in Health Affairs *found the electronic health record (EHR) and e-prescribing improved health care by decreasing errors caused by illegible handwriting and improved preventive medicine by generating reminders. Another study, completed in 2006, found that alerts led to a "22% relative decrease in prescribing of non-preferred medications."*

Even with all the positive reports on the effects of information technology in health care, there are many dissenting voices. In 2005, research published in The Journal of the American Medical Association *and reported in* The New York Times *warned of some unintended and negative consequences. Although decreasing some medication errors, computerized order entry systems can introduce other kinds of errors. Among the causes cited are "information on patients' medications was scattered in different places*

in the computer system. To find a single patient's medications, the researchers found, a doctor might have to browse through up to 20 screens of information." Computer crashes can also cause errors. Another study published in The Journal of the Americam Medical Association *examined 100 decision-support systems. It found "most of the glowing assessments of those clinical decision support systems came from technologists who often had a hand in designing the systems."*

In 2011, the Institute of Medicine (IOM) announced that it would conduct a 1-year study to "ensur[e] that health information technology (HIT) will achieve its full potential for improving patient safety…" It would focus on preventing errors caused by HIT and reporting of "HIT-related patient safety issues." A recent (2011) review of studies of HIT done by the Office of the National Coordinator of Health Information Technology (ONCHIT) looked at 154 articles published between July 2007 and February 2010. It found positive results in 96 articles (62 percent), mixed results in 46 articles (30 percent), and negative or partly negative results in 10 articles (6 percent). Among the issues examined by the articles were electronic health records, computerized provider order entry, and clinical decision-support systems. Among the findings were that "patient mortality and nurse staffing levels decreased by as much as 48 percent and 25 percent" in the 3 years after New York City started using EHRs in three dialysis centers. A clinical decision-support system decreased unnecessary transfusions but did not affect either length of stay or mortality. In a study of 41 Texas hospitals using HIT, it was "found that hospitals with more advanced HIT had fewer complications, lower mortality, and lower costs than hospitals with less advanced HIT." Some of the negative outcomes included the finding that at one hospital, e-prescribing took longer. Another study found that

interaction between health care providers and patients was inhibited by using electronic records. Many of the negative findings had to do with the implantation of HIT. However, a study of private practices, published in January 2011 in the Archives of Internal Medicine, *found that the adoption of EHRs had little effect on outcomes. The only indicator on which practices that used EHRs did significantly better was diet counseling. The study also found no difference in outcomes between practices using "advanced function" EHRs and those using simpler systems. Physicians using clinical decision systems (CDS) did significantly better only in terms of avoiding unnecessary electrocardiographs. It should be noted that this study has been criticized for the quality of the survey data it used.*

14. Define PACS and DICOM.

Picture archiving and communication systems (PACS) manage digital images. Digital images are immediately available on the monitor and can be shared over a network. PACS can enhance images and eliminate film. The standard communication protocol of imaging devices is called digital imaging and communications in medicine (DICOM).

15. What is a clinical information system (CIS)?

A CIS uses computers to manage clinical information. This information includes medical history and other relevant information, which helps health care personnel make decisions.

The information in a CIS is legible and accessible. The U.S. government states that these systems will lead to improved patient outcomes by improving decision making using computerized decision-support systems and reducing adverse drug events by eliminating handwritten prescriptions. Actual studies are divided on these questions.

However, these systems are expensive to adopt, raise privacy questions, and may be resisted by doctors who believe that their workload will increase.

In the News

According to "Carrots, Sticks And Digital Health Records," by Steve Lohr (published February 26, 2011, in *The New York Times*), the 2009 stimulus included $27 billion to encourage medical institutions to adopt electronic medical records (EMRs).

To improve our health care system and lower costs, the government is attempting to push doctors to use EMRs. Several large medical institutions have successfully adopted the EMR. These include the Mayo Clinic and Kaiser. Less than 30 percent of doctors, however, have adopted the EMR. Part of the problem is the high cost and the lack of technical expertise.

Monetary incentives from the federal government are trying to remedy this. In 2010, the Obama Administration issued a plan for the adoption of the EMR and included incentives of up to $44,000 for doctors and institutions that adopt approved EMRs.

Additional Resources

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