## SECTION **I**

# Understanding Health Information Systems and Technology

# Alignment: Health Information Systems and Current Challenges in Health Care

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### LEARNING OBJECTIVES

**By the end of this chapter, the student will be able to:**

- Identify the major reasons for the increase in health information systems (HIS) activity in U.S. health care.
- Describe current healthcare challenges such as cost and quality issues and explain how HIS initiatives might help.
- Explain the U.S. government's role in and goals for health care, including the aims of legislation such as HIPAA, ARRA, and HITECH.
- Describe evolving consumer expectations regarding automation of healthcare processes and ways that HIS uses enable patients to become more engaged in their health care.
- Identify ways HIS is used in other countries.

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## INTRODUCTION

### Why Is HIS Getting So Much Attention Today?

It makes great sense to automate health care using modern information technology and systems, but currently an inordinate amount of attention is focused on the rapid introduction of **health information systems (HIS)**, especially **electronic health records (EHRs)**, into healthcare organizations of all shapes and sizes throughout the United States. Hospitals, clinics, physician practices of all sizes, public health organizations, and other settings in which health care is delivered have put HIS implementation high on their priority lists. This is because patients, physicians and nurses, managers of these healthcare organizations, the government, public health organizations, policy makers, and quality improvement organizations have

an extreme sense of urgency about implementing HIS as a means of improving the quality and efficiency of health care. Traditional paper-based records and work processes are inadequate for addressing the complexities of medical care and the interactions between healthcare organizations involved in the care of patients, particularly as many require a variety of care settings and services. Administrative processes in health care have also increased in volume and complexity. Done properly, computerization of these tasks relieves people of many mundane manual tasks and also improves efficiencies. Health care innovations today commonly incorporate new technologies such as mobile devices, genomic capabilities, and high-speed networks. Infrastructure spans from organizations to personal computing devices and smartphones. The field of health care seeks to improve cost and quality performance by adopting these new technologies and HIS in new ways across the care continuum. Any student preparing to work in health care in *any* capacity is compelled to understand the basics of HIS and its use in health care now and into the future. This need was the motivation for this text, the *Essentials of Health Information Systems and Technology*.

### What Else Is Happening in HIS That Students Must Be Aware of?

Every student needs to be aware of the powerful roles that government and the free market play in influencing how HIS is used in health care. The government regulates and passes laws concerning proper implementation and use of HIS and **health information technology (HIT)**, while the free market

encourages commercialization of HIS products and services to enhance vendor company stock prices and dividends for shareholders. Both of these forces are changing the way health care is delivered and how the U.S. health system functions, but their efforts often push in different directions or collide with opposing interests.

### How Can a Student Begin to Understand HIS?

This text is designed to take the mystery out of understanding HIS. Computer systems can be complicated. This text describes how HIS is used in organizations and throughout the U.S. health system by healthcare and public health professionals—but not how such systems are built, programmed, or technically developed. Those areas are better addressed in schools of computer science and engineering. The text matches different types of HIS to different purposes within healthcare organizations and health care in general, such as to meet clinical, financial management, and public health reporting needs. It also covers the innovative ways HIS is expanding its reach through mobile devices, social networking, digital health and wellness, predictive analytics, and convergence with entire areas such as the biotechnology and pharmacology fields.

## HEALTHCARE COST AND QUALITY ISSUES

In 2012, health care accounted for 17.2% of the U.S. gross domestic product (GDP); this is equal to $2.8 trillion, or $8915 per person, and with an average annual projected growth rate of 6.2% per year for 2015 through 2022, health spending could comprise 19.9% of the GDP by 2022.[1] Health care in all its related parts is undergoing massive change and experiencing numerous challenges in the process. The drivers of change are inadequate quality and the unsustainably high costs of health care. The Institute of Medicine (IOM) published two watershed reports, *To Err Is Human* (1999) and *Crossing the Quality Chasm* (2001), which provide solid evidence of alarming quality problems and make suggestions for improvement. *To Err Is Human* describes high levels of avoidable medical errors in U.S. hospitals that result in as many as 98,000 patients dying every year—patients who should have been discharged from the hospital successfully.[2] *Crossing the Quality Chasm* outlines six key aims necessary to improve the quality of care[3]:

- *Safe*: Ensuring care helps and does not harm patients.
- *Effective*: Providing services based on scientific evidence to all who could benefit, and refraining from providing services to those not likely to benefit.
- *Patient centered*: Providing respectful and responsive care according to patient preferences, needs, and values.

- *Timely*: Reducing delays for those who receive and those who give care.
- *Efficient*: Avoiding waste of materials and resources in patient care processes, including equipment, supplies, ideas, and energy.
- *Equitable*: Providing care that is consistent in quality regardless of a patient's characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

Unfortunately, despite significant efforts on many individuals' and organizations' parts, the U.S. health system remains inefficient and ineffective compared to the health systems of other developed nations by the majority of standard population-based outcome measures.[4] Sadly, these numbers have not improved since the two seminal IOM reports were published more than a decade ago. An updated evidence-based analysis estimates the number of deaths due to medical errors in U.S. hospitals to be more than 400,000 per year; the same analysis cites poor incident reporting processes (only 14% of total adverse events) as contributing to this phenomenon and appeals for greater patient involvement in identifying errors and preventable harmful events.[5]

Given this background, what does HIS mean to health care? Is HIS just a collection of computers and technologies used by those practicing modern medicine and delivering healthcare services to automate their work? Or is HIS a transformative force that can radically alter and improve the work processes by which health care is delivered? The answer to both questions is "yes." HIS can both speed up existing processes *and* enable brand new ways of delivering health care to people. It is also important, as we delve into the complex world of HIS, to always ask the question, "What are the benefits and what are the risks of adopting any new technology?" New and computerized is not always better than how things have been done traditionally, if they have been done safely and in a well-organized fashion.

Another key question for understanding HIS is, "How prevalent is HIS use?" Today, we are in the midst of a growing, massively transitional phase of healthcare delivery, moving toward greater use of computers in delivering, managing, and studying health care. It is much more difficult to transition from traditional paper-based processes to computerized information processes than it is to begin a new health-related activity or process that uses automation from the beginning. The fact that our society is in the throes of such massive, disruptive change in the way we do our work in health care has added an ever-present element of risk and uncertainty to the exact end point of this journey to

automate and improve health care. We can envision a better health system and enhanced health for all people through the use of technology and HIS. But getting there will be a long journey, fraught with missteps and difficulty because these changes rely on technology innovation and human behavior, and the end point of such change is not defined. In addition, the introduction of HIS into health care is creating many unintended consequences, both good and bad, that are not yet fully understood.[6]

Thus, when we move to computerize health care, we must constantly ask the question, "What are we trying to accomplish and why?" We must evaluate whether we have achieved what we set out to and make necessary adjustments along the way as we make sweeping changes throughout the U.S. health system, including computerizing our systems and processes. From the broadest perspective, the future of HIS in health care will entail the automation of processes we know and the adoption of new processes that have yet to be created. It is difficult to predict whether this transition will be truly disruptive or simply innovative, and to evaluate the difference between those two. The net effect of HIS, however, must be positive—the health of people depends on it.

## MOTIVATION

The IOM's watershed report *To Err Is Human* studied 33.6 million hospitalizations in the United States. Based on the resulting data, the IOM estimated that each year an estimated 44,000 to 98,000 patient deaths occur during hospitalizations, not because of the patient's condition, but rather due to mistakes occurring in hospitals. This number was greater than the number of deaths per year due to motor vehicle accidents, breast cancer, and AIDS combined.[2] This devastating statistic translates into 1310 to 2917 deaths per 1 million hospitalizations due to medication errors every year, year after year. If the Six Sigma level of reliability is applied, that ratio translates into 114 avoidable deaths per 1 million hospitalizations due to medication errors. (Six Sigma is a quality improvement methodology that strives to eliminate errors in processes to a near-perfection level through data analysis techniques.[7]) Unfortunately, if any one of those persons included in the avoidable death statistics is you or a loved one, this is 100% of what matters to you. The *To Err Is Human* report provides all the motivation needed to improve quality and outcomes and to increase the focus on patient safety. It sheds light on the whole U.S. healthcare system, rather than focusing on any one caregiver or provider. The bottom line is that the costs of health care continue to rise, and quality problems have persisted. But what is the connection to HIS?

The answer lies in the IOM's second watershed report, *Crossing the Quality Chasm*. This report identified four key reasons for the significant gap in the U.S. health system between reality and ideal quality:

- *The growing complexity of science and technology, with delays between innovation and implementation.* Modern medicine is becoming increasingly multifaceted, with increasingly specialized areas of practice emerging. Also, new biomedical equipment and information technologies are being developed at an exponential rate, all of which make the access to complete and current information and the interaction between the various new technologies equally complex. This trend has been relentless for decades, as expressed more than 30 years ago by David Eddy: "The complexity of modern medicine exceeds the inherent limitations of the unaided human mind."[8] HIS initiatives must target this gap and help close it.

- *The increase in chronic illness burden with a system centered on acute illness.* The aging demographics of the U.S. population and the increasing incidence of chronic illnesses such as obesity, cancer, diabetes, and heart disease occurring within a health system that emphasizes the "medical model" of care have resulted in a lack of effectiveness in dealing with the majority of today's illnesses. The mismatch between an epidemic of chronic illness and settings oriented toward acute care dominates the U.S. health system, resulting in failure to successfully address these conditions. By the time a person with diabetes is sick enough to come to the hospital, it is too late to treat that condition in a way that addresses the root cause of the illness. All that can be done in a hospital setting is address the symptoms and outcomes of this condition. Such chronic illnesses require access to patients in less costly settings such as clinics and doctors' offices, and importantly, in their homes and everyday lives. The inpatient hospital setting is ill equipped to deal with these prevalent chronic conditions; hospitals are set up to cure acute illness, not manage chronic illness or prevent it in the first place.

- *The inadequate use of information technology (IT).* The IOM report asserts that IT can be instrumental in preventing or catching many types of medication errors that cause avoidable deaths and countless injuries or near misses each year. Many HIS capabilities contained within EHRs are designed with

capabilities to prevent such errors, such as drug–drug interaction alerts, allergy alerts, **computerized physician order entry (CPOE)**, and others. Also, the IOM report indicates that many of the errors responsible for avoidable patient deaths occur in "hand-offs" of patient information between caregivers, between departments of the hospital or clinics such as the laboratory and nursing, or between physicians in their offices and the hospital settings. These paper or verbal hand-offs can be eliminated or reduced through the use of computer systems such as EHRs that transmit information electronically, greatly reducing the risk of errors in the information as it is transmitted.

- *A payment system that provides conflicting incentives and does not reward quality improvement.* For decades, doctors and hospitals have not been paid based on the quality of their services or on patient outcomes. Instead, they are paid just for providing those services and properly documenting this care. Thus there is a low correlation between how well patients do and how well the provider is paid. This translates into a lack of financial incentives for quality outcomes and instead provides incentives for utilization of services, regardless of the outcome for the patient. Quality improvement is not "baked into" the processes surrounding patient care, but rather is seen as occurring at additional effort and expense to the physician and hospital organizations (providers). This results in quality improvement being viewed as an add-on or separate activity in these organizations and discourages efforts to inter-weave quality improvement into the fabric of the care provided.[2]

## HIS AND THE U.S. GOVERNMENT'S ROLE AND GOALS IN HEALTH CARE

Several seminal laws and research reports have marked the U.S. government's current involvement in the evolution of HIS activities and in response to the unsustainable escalation of healthcare costs. These important elements include the following:

- The **Health Insurance Portability and Accountability Act (HIPAA) of 1996**
- The IOM reports *To Err Is Human* and *Crossing the Quality Chasm*
- The IOM report *Health IT and Patient Safety: Building Safer Systems for Better Care*

- President George W. Bush's and President Barack Obama's healthcare initiatives
  - The **American Recovery and Reinvestment Act (ARRA) of 2009**: Title IV—**Health Information Technology for Economic and Clinical Health (HITECH) Act**
  - The **Affordable Care Act (ACA) of 2010**

## The Health Insurance Portability and Accountability Act

Initially introduced to ensure that individuals' insurance would be portable across states and jobs, HIPAA had far greater impact through its "administrative simplification" (Title II) elements. HIPAA requirements for **electronic data interchange (EDI)** anticipated the need for data standards for electronic claims in health care, in addition to seeing that electronic records required standards for privacy and security. These standards, originally targeting the Medicare claims processes, introduced far-reaching administrative simplification attributes, including the following:

- Standards (the first mandate for electronic HIS standards for data transmission protocols)
- Requirement that providers and health plans participating in Medicare participate
- Privacy and security of **protected health information (PHI)**
- Preempted state laws, thus reducing fragmentation across the United States
- Imposed penalties for noncompliance, giving these regulations and laws teeth[9]

### *Title II Administrative Simplification Act*

The Title II Administrative Simplification Act aimed to improve the U.S. health system's efficiency by introducing standards governing the use and communication of healthcare information. The rules include protection of identifiable PHI and apply to all provider and payer organizations, called "covered entities" by the legislation. Covered entities include health plans, healthcare billing services, and healthcare providers (hospitals, clinics, and physician practices) that transmit healthcare data, submit claims, and receive reimbursement from Medicare. While the scope of these regulations refers to organizations participating in Medicare, the impact reaches far beyond Medicare to virtually all healthcare entities, because Medicare standards and practices set the benchmark standards for all payers. HIPAA's administrative simplification rules include the following:

- *Privacy Rule*: Regulates the use and disclosure of PHI, laws implemented in 2003. It mandates that a person's medical information with identifying information attached to it cannot be used, viewed, or shared by anyone in a healthcare organization other than a healthcare professional or public health practitioner who has the need to look at that information for the purposes of taking care of or addressing the business needs of that person. The privacy rule applies to PHI on any medium—electronic or paper.
- *Transactions and Code Sets Rule*: Establishes EDI standards for healthcare claims. Claims sent to payers for reimbursement, and subsequent reimbursement to the providers, must be sent electronically in a certain technical format, standardizing electronic claims processing and thus making it more efficient.
- *Security Rule*: Defines administrative, physical, and technical security safeguards. This rule establishes specifics for ensuring secure transmission of data through systems and over the Internet, so that even though HIS and the Internet are used, the data traveling on these networks and in these systems are secure.
- *Unique Identifiers Rule*: Establishes **National Provider Identifier (NPI)** standards for providers. This rule establishes unique identifiers for providers, ensuring accuracy of electronic provider payments.
- *Enforcement Rule*: Defines civil financial penalties for HIPAA violations. This rule provides the teeth of the HIPAA regulations. If providers violate HIPAA rules, they face significant financial and other penalties.[9]

HIPAA rules and regulations have set a new bar for government participation in defining the way forward in automating healthcare administrative and clinical processes while protecting individuals' privacy and allowing for public health issues to be addressed to prevent disease, injury, or disability. Driven initially by the need to ensure portability by establishing standards for electronic claims transactions for Medicare, HIPAA standards for electronic data transmission, privacy, and security of PHI have redefined HIS's and the U.S. healthcare system's norms and practices.

## THE QUALITY CRISIS FURTHERS U.S. GOVERNMENT INVOLVEMENT IN HIS

Responding to the findings outlined in the *To Err Is Human* and *Crossing the Quality Chasm* reports, the federal government established two waves of policies intended to encourage the implementation of HIS in the U.S. health system. With added emphasis on improving quality and cost-effectiveness in health care, the federal government identified the implementation of HIS initiatives as a priority, particularly the implementation of EHRs for all U.S. patients by 2014, first by President George W. Bush and then by President Barack Obama.[10]

President Bush signed several initiatives into law to provide "seed grants" to fund pilot projects testing various uses of IT in healthcare settings. One of these initiatives was the Medicare Prescription Drug Improvement and Modernization Act of 2003; it included provisions for the development of standards for electronic prescribing, an initial step in the implementation of EHRs. This move precipitated the establishment of a Commission on Systemic Interoperability to plan the establishment of technical interoperability standards for e-prescribing systems.[11] Also under executive authority of President Bush, the Office of the National Coordinator of Health Information Technology within the Department of Health and Human Services (HHS) was established.

Next, also under the administration of President Bush, came Executive Order 13335 of April 27, 2004, titled "Incentives for the Use of Health Information Technology and Establishing the Position of the National Health Information Technology Coordinator," as well as the "President's Health Information Technology Plan," calling for a 10-year plan to get EHRs online for all Americans.[12,13] These national policy interventions built upon other major national initiatives, including the Consolidated Health Informatics initiative in 2003 involving HHS, the Department of Defense, and Veterans Affairs, which established the goal of uniform standards for electronic exchange of clinical health information across all federal healthcare entities.[14]

While these national and presidential initiatives provided encouragement and incentives for hospital and physician providers to invest the money and time in the daunting task of automating their organizations and practices using HIS, the stimulus with the greatest impact has been ARRA, the legislation that includes the HITECH Act. This act greatly expanded the resources available for HITECH activities. First, it created a strategic plan for a nationwide interoperable HIS, a plan that is required by this act to be updated annually. Second, it called for a leadership structure consisting of two committees to advise the coordinator: a Health Information Policy Committee and a Health Information Standards Committee. As part of the $787 billion ARRA stimulus package, the HITECH Act requires the government to lead the development of standards that allow for nationwide electronic exchange and use of health information to improve the quality and coordination of care.[15]

Through the HITECH Act, the government is investing about $30 billion in HIT infrastructure and Medicare and Medicaid incentives to encourage doctors and hospitals to use

HIS to electronically exchange patients' health information.[16] The Congressional Budget Office calculated that this investment will save the government $10 billion and will generate additional savings throughout the health sector through improvements in quality of care and care coordination, reductions in medical errors, and duplicative care. The HITECH Act also strengthens federal privacy and security laws to protect identifiable health information from misuse as the healthcare sector increases the use of HIS. The Congressional Budget Office estimates that as a result of this legislation, approximately 90% of physicians and 70% of hospitals will be using comprehensive EHRs by 2020.[17] These standards are having a seismic effect on vendor products for EHRs and other HIS software, which must now meet these standards or else face quick elimination from the marketplace because they will not qualify organizations to receive their incentives based on meeting these standards.

HITECH establishes "meaningful use" criteria for EHR implementations that must be met for hospitals and physicians (provider organizations) to receive incentive payments (for Medicare patients). **Meaningful Use** criteria are features, functions, and capabilities of EHRs shown to improve care (**Table 1.1**). The meaningful use criteria measure EHR adoption of these capabilities, such as the percentage use within an organization of EHR capabilities such as CPOE, as a way of encouraging EHR adoption. Although many specifics are laid out in the Stages 1 and 2 criteria (followed by Stage 3, the criteria and dates of which are being set), generally speaking, through 2016, if a provider organization meets these criteria for implementing specified levels of EHR system functionality, that qualifying provider receives an incentive payment through a slight increase in payment for Medicare patients. After 2016, if these criteria are *not* met, a penalty is levied in the form of reduced Medicare reimbursement for services provided by those noncompliant hospitals and physicians. Financial penalties for physicians not using EHRs meaningfully by 2016 include a loss of 1% of their Medicare payments, a loss of 2% in 2017, and a loss of 3% in 2018. Hospitals will lose percentages of their annual updated reimbursements from Medicare under the **diagnosis related groups (DRGs)** system (which is used for calculating payments for various conditions and treatments) if they do not meet the meaningful use criteria by 2017.[18] These increases (incentives) or reductions (penalties) in Medicare payments will significantly impact the financial well-being of these provider organizations, as Medicare patients account for a major proportion of patients and participation in Medicare is the only realistic course for the vast majority of provider organizations to remain viable.

**TABLE 1.1** Summary of Meaningful Use Criteria Stages 1, 2, and 3

The meaningful use criteria, objectives, and measures will evolve in three stages over the next 5 years:
1. **Stage 1, 2011–2013:** Data capture and sharing
2. **Stage 2, 2014–2015:** Advance clinical processes
3. **Stage 3, 2016–2017:** Improved outcomes

| Stage 1: Meaningful Use Criteria Focus on… | Stage 2: Meaningful Use Criteria Focus on… | Stage 3: Meaningful Use Criteria Focus on… |
|---|---|---|
| Electronically capturing health information in a standardized format | More rigorous HIE | Improving quality, safety, and efficiency, leading to improved health outcomes |
| Using that information to track key clinical conditions | Increased requirements for e-prescribing and incorporating lab results | Decision support for national high-priority conditions |
| Communicating that information for care coordination processes | Electronic transmission of patient care summaries across multiple settings | Patient access to self-management tools |
| Initiating the reporting of clinical quality measures and public health information | More patient-controlled data | Access to comprehensive patient data through patient-centered HIE |
| Using information to engage patients and their families in their care | | Improving population health |

HIE, health information exchange.
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The HITECH Act paves the way for increased demand associated with the ACA, making available major training grants to stimulate the establishment of university- and community college–based HIS training programs as a means of addressing the current shortage of approximately 60,000 HIS professionals needed to support implementation of EHR systems and other HIS activities called for in the HITECH program.

## CONSUMER EXPECTATIONS AND ENGAGEMENT

Emerging research and common sense tell us that if patients—people—are more engaged in their healthcare processes and in maintaining their health, their health status outcomes will improve. Of course, personal responsibility is a strong determinant of health and well-being, and the more attention paid to one's health and the health of one's family members, the better. Clinicians are adapting their practice of medicine and healthcare services in ways that engage and involve patients in the process. HIS in its many forms—including the Internet, secure email, smart devices, machine-to-machine (M2M), and social media—will play a part in the integration of people and providers in the care process. In addition to information being available to caregivers and providers through components of HIS such as EHRs and other robust capabilities such as clinical decision support, direct interaction between patients and clinicians is now becoming the norm. While the infrastructure necessary to accomplish this communication between organization-based providers and patients in their homes is not available everywhere, healthcare delivery organizations are earnestly building out these systems and connectivity in a wave of innovation characteristic of today's evolving healthcare landscape. If you do not yet communicate with your doctor using computer technology, you soon will.

These new uses of intersecting HIS and social media are also placing new demands on HIS in healthcare organizations, because any transmission of PHI (as defined by HIPAA) must take place securely and in ways that ensure privacy and the confidentiality of that information. As you will recall, providers who violate HIPAA face stiff penalties. Organizational models are also changing rapidly in response to the evolution of technology. Through IT, families can now be connected to their loved ones who may be in the hospital. Likewise, care settings can be connected across the continuum of care, from the hospital, to the physician's office, to the imaging center, to home health, to the workplace, and to schools, to name a few of the various settings in which health care happens. Myriad new devices have been devised to facilitate this connection: In addition to mainframe computers, desktops and laptops, tablets, iPads, smartphones and smart, mobile, biomedical devices can be used by people wherever they are to test blood sugar or capture other important health symptom data. Clearly, paper medical records will no longer suffice—they do not have the capacity to house the data and information that originate far and wide about a patient who traverses this range of care settings in the normal course of care and life, let alone genomic data and customized cancer

care, and medical home frameworks. These new types of data, care, and organizational structures require new ways of handling information. People must be connected to their healthcare providers and medical information in new ways. All this means healthcare providers must learn to think "horizontally" in terms of clinical workflows and the movement of important information about patients among all these cross-continuum settings; they must collaborate across and between vertical settings (e.g., different offices, specialties) to optimize the new flows; and they must provide increasingly efficient patient care processes and better outcomes, improved patient experiences and involvement, and improved satisfaction for providers as well.

## USES OF HIS IN OTHER COUNTRIES

HIS activity is an international affair, with many countries engaged in activities of information infrastructure establishment, especially EHRs and health information exchange initiatives (efforts to automate, streamline, and innovate within their unique healthcare systems). In a recent study funded by the Commonwealth Fund, HIS and technology plans and projects in Australia, Canada, Germany, the Netherlands, New Zealand, the United Kingdom, and the United States were examined. More than 90% of general practitioners in Australia, New Zealand, the Netherlands, and the United Kingdom reportedly used EHRs, whereas only 10% to 30% of practitioners in ambulatory settings in the United States and Canada used EHRs. A striking finding of this study is that only 10% of hospitals in the seven countries studied met the criteria for major elements of an EHR.[19] Massive but varied investments of financial resources and organizational energy are being made country by country, and the results are largely the same internationally—HIS adoption is slow and painstaking work.

While national systems that are based on a single payer—that is, "closed" health systems in which providers, hospitals, and the payer are all part of the same unified health system, such as in the United Kingdom—have a shot at pulling together a consistent effort to implement HIS initiatives nationwide, this is still incredibly difficult work for many reasons. First, the financial resources required to both start up and then maintain EHRs and HIS infrastructure are of such magnitude that if other major priorities such as economic crises or changes in national leadership emerge at the same time, progress can be slowed. Also, as in the United States, political, popular, and professional energy and will must align to muster the resources and commitment to initiate and implement the HIS infrastructure required to support

a health system nationally. Unfortunately, sometimes one of these pillars of progress may falter. For instance, in Germany, a setting in which EHRs and "smart cards" for 80 million citizens' personal health records made major headway in the past decade, more recent times have seen mounting concerns about privacy on the part of the citizenry, slowing momentum and progress toward EHR adoption in that country.[20] The United Kingdom, Denmark, Australia, the Netherlands, and Taiwan also have encountered major difficulties in adopting electronic systems for health care. Major transformational systems such as EHRs and the infrastructure they require are accomplished slowly, and while such change is desired, the obstacles associated with their implementation are felt in all types of health systems, whether national or free market in philosophy.[21] In addition to the software, hardware, and network infrastructures needed to support these systems, the difficulties of other changes such as the establishment of technical standards and discipline in the management of data have proved enormously challenging to health systems in countries around the world.

## PROTECTING THE PUBLIC'S HEALTH

All of these HIS initiatives on the part of healthcare organizations, the government, consumers, and health IT professionals have an additional purpose: to make data available, using appropriate safeguards to ensure data integrity and protect citizens' privacy, for purposes of protecting the public's health. Public health officials and organizations can benefit from HIS data made available by healthcare providers; such data may provide alerts to outbreaks of disease, aid in preventing injury, or provide tip-offs to bioterrorism.

These data may also be used to conduct comparative studies of the effectiveness of different types of therapies across groups or populations and thereby determine which might be better to use under various circumstances. It is most efficient, from the entire health system's perspective, for healthcare data to be coordinated, protected, consistent, and used for multiple purposes, each with the intent of providing health care, improving the public's health, and improving the overall quality of health services in the United States. This understanding is reflected in the HIS model that forms the conceptual foundation for this text.

## SUMMARY

Motivation for recent significant increases in HIS initiatives in the United States centers largely on deepening concerns regarding the cost and quality of health care. HIS initiatives, including EHRs and health information exchanges, are seen as key ingredients in improving the efficiency and effectiveness of health care. The U.S. federal government has included HIS initiatives in its economic stimulus legislation, intended to update the nation's aging infrastructure and elevate the technical sophistication of the healthcare system. Major regulations and policy interventions by the federal government include HIPAA and ARRA, which established the HITECH Act. Consumers of healthcare services have come to expect the same level of automation and convenience in health care as they experience in other segments of the U.S. economy and consumer services. The United States is one of many countries internationally that are striving to implement comprehensive HIS to improve the efficiency and effectiveness of their health systems.

## KEY TERMS

Affordable Care Act (ACA) of 2010   **6**

American Recovery and Reinvestment Act (ARRA) of 2009   **6**

Computerized physician order entry (CPOE)   **6**

Diagnosis related groups (DRGs)   **8**

Electronic data interchange (EDI)   **6**

Electronic health record (EHR)   **3**

Health information exchange (HIE)   **8**

Health information systems (HIS)   **3**

Health information technology (HIT)   **3**

Health Information Technology for Economic and Clinical Health (HITECH) Act of 1996   **6**

Health Insurance Portability and Accountability Act (HIPAA)   **6**

Meaningful Use   **8**

National Provider Identifier (NPI)   **7**

Protected health information (PHI)   **6**

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# Discussion Questions

1. Which current challenges in health care are primary drivers of HIS adoption in the United States? How might HIS initiatives help the U.S. health system address these issues?

2. Do you think that the federal government needed to establish regulations and enforce laws regarding privacy, security, and confidentiality of PHI? What about policies and regulations intended to stimulate adoption of HIS, including EHRs? Why or why not?

3. Should the government mandate capabilities of EHRs intended to improve quality of care or should quality initiatives be left to providers and provider organizations? Explain your response.

4. Are consumer expectations capable of influencing HIS adoption in the United States? In which ways should patients/consumers engage in their care using HIS?

5. Which lessons can U.S. providers draw from the experiences of other countries in implementing HIS?

6. What are a few of the many ways that HIS data can be used not only for supporting the delivery of healthcare services, but for additional purposes such as protecting the public's health?

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