Preface

The healthcare industry touches everyone, and is information intensive. Information systems have spread slowly from the billing room to the examination room. Successful information systems applications must be managed by people knowledgeable in the issues relevant to both healthcare and information systems. This book examines those special issues.

This book is an introduction to healthcare information systems for people with some background in healthcare and information systems. While no particular knowledge of the reader is expected, the book does not comprehensively define the basic concepts of either healthcare or information systems. Instead, the reader can expect to become immersed quickly into the challenging issues of getting information systems to work in healthcare organizations.

Many books have been written about health information systems, usually with a distinct audience for each book. For instance, one can find books for:

- Physicians with practical tips on how to use computers in the private office
- Nursing students on record keeping

This book is for students of information systems and of healthcare administration and for professionals responsible for decisions about information systems in healthcare enterprises. Feedback from information systems students has been encouraging. For instance, one student said: “gave new insight to another industry. The subject matter is important—patients, providers, payers, policies—and sparked an interest in a career path that I had not considered.”
The healthcare industry varies across countries, as explained in the penultimate chapter of this book. That chapter goes into detail about aspects of healthcare information systems in different countries. Government regulation and financing of healthcare affect the evolution of healthcare information systems in a country. For a reader to get a deep understanding of the practical issues facing practitioners in the healthcare information systems industry, a detailed look at one country’s experience is worthwhile. This book thus goes into detail about the finances, government regulations, and major entities that are relevant to healthcare information systems in the United States.

The book has 14 chapters in a logical sequence. The Introduction defines the field and examines its trends and challenges. The software life cycle is introduced in the second chapter. Providers and payers are two key components within the healthcare industry. How providers and payers work and use information systems is elaborated in Chapters III and IV. The standards and codes that are crucial in the communication among providers and payers are introduced in Chapter V. A provider sends a claim to a payer who examines the claim and makes the appropriate payment, and these transactions are analyzed in Chapter VI. The connection between providers and payers is one part of the network that is crucial to a modern healthcare industry. Healthcare information networks are addressed in Chapter VII. Healthcare is one of the most heavily regulated industries, and the nature of that regulation is addressed in Chapter VIII. Two prominent examples of government regulation of information systems in U.S. healthcare concern the privacy and security rules, and their requirements and how to comply with them are detailed in Chapters IX and X. The people who work in healthcare systems and the vendors that serve them are addressed in Chapters XI and XII. The advances in healthcare information systems are many, but the difficulty of diffusing innovations in healthcare are addressed in Chapter XIII. The final chapter summarizes and concludes.

The reader is asked to address the issues that should lead to the ability to do the following as it regards health information systems:

1. Identify needs for development of health information systems
2. Manage a design team
3. Delineate the typical components of a health information system and how they are integrated in new systems spanning diverse organizations
4. Identify the people who create and use information systems
5. Anticipate the factors that determine whether or not a system will be adopted by its users and thus diffuse through the target population

This sequence corresponds broadly with the life cycle of an information system. The first chapter defines the field of health information systems by comparing and contrasting it with the field of management information systems. The history of
computerized health information systems is relived through the eyes of those who created the history and demonstrates that many key issues have remained largely the same across time. New technologies of care are in abundance but the ability to cope with them cost-effectively is in short supply. This leads also to problems of data quality and coordination. In other words:

- New technologies demand new skills, but
- If new skills are in short supply, then new technologies may be incorrectly used.

The need for information systems in healthcare is predicated on the trends in the healthcare industry, trends in information systems, and the specific strategies of any given healthcare organization. Those trends are outlined along with the typical expectations that those trends imply for health information systems.

The Software Life Cycle chapter looks at the life cycle of information systems and focuses on the requirements and design phases. The importance of involving users in the design of a system is highlighted. Cooperative design requires methods and tools to make it easy for the users to understand the issues faced by the technical designers. To this end, simple diagrams that demonstrate the flow of information among people may help.

While the healthcare providers are much larger in number than the payers and catch more of the public eye, the payers play a crucial role that is underappreciated. The Providers and Payers chapters emphasize the information systems’ aspects of those industries. For providers, the key components are administrative systems, patient management, and clinical support. For payers, the components must support the enrollment of members and the adjudication of claims. The biggest budget in healthcare has been for hospitals, but doctors’ offices have unique and important information systems needs too. On the health plan side, case studies are offered of the “Centers for Medicare and Medicaid Services” and of “Blue Cross and Blue Shield” to illustrate the significant differences between the mandatory government plan and the private-sector plan.

The chapter Data and Knowledge looks at the range of knowledge representations that are important in healthcare and gives examples of each. It begins with types of data and moves to standardization because communication with information systems depends on standardized languages and protocols. The chapter describes a range of standardized knowledge representations from simple codes to complex rule bases. Decision-making is carefully considered with two detailed examples: one for utility theory and the other for rule-based expert systems. Systems to support research, such as the online library of the National Library of Medicine, are also described.

The interactions between the provider and payer have historically imposed a large overhead cost on the delivery of care. The government has intervened and mandated
a standard format in provider-payer transactions. Technical details of the format for certain transactions, such as an eligibility inquiry, are presented. Given the intricacy of the transactions and their complex relationships to financial exchange, careful testing of the software implementation of the provider-payer transactions is done. One problem with the human use of the provider-payer transactions is the temptation for providers to submit claims that overstate their case. Fraud occurs when claims are submitted for work that was not done. What kind of fraud occurs and how payers and government combat it with software is also addressed in the chapter on provider-payer transactions.

The connection of components of the healthcare system is a major step in improvement of the healthcare system. Through networking, different entities can better coordinate their efforts. The chapter on information networks examines some of the human, organizational aspects of networking and begins with e-commerce networks, goes to supply chain management, and then goes to community and consumer networks. Consumerism is one way that patients can improve the efficacy of the healthcare system by becoming proactive. Many governments are encouraging national health information networks.

The healthcare industry is one of the most heavily regulated industries. The chapter on regulation describes the history of government regulation in the U.S. Healthcare regulations cover access to, cost of, and quality of care. The approaches to compliance by healthcare entities are described.

The Administrative Simplification provisions of the Health Insurance Portability and Accountability Act require not only standardization of provider-payer transactions but also privacy and security of protected health information. Two chapters in this book examine first privacy and then security in the healthcare industry. While privacy and security are tangential to the core function of the healthcare industry, they are two of the hottest topics for healthcare information systems in the early 21st century. Both chapters provide all the important aspects of what the government regulations require for privacy and security. They also provide case studies of how entities have chosen to comply with the regulations. Through the course of these descriptions the reader is also exposed to some of the tantalizing philosophical, political, and social challenges associated with the very complex issues of privacy and security.

Students of healthcare information systems are particularly concerned about the career options that face them. The chapter entitled Personnel looks at the patterns of employment in healthcare and particularly in healthcare information technology jobs. The structure of information technology organizations in healthcare entities is described. Salaries of employees at different ranks and with varying responsibilities are also explored.

Many healthcare entities rely extensively on vendors and consultants to support their information technology needs. The chapter entitled Vendors examines life for vendors and consultants in the healthcare industry. That chapter also provides a case study of Cerner Corporation, a major vendor of hospital information systems.
Diffusing a healthcare information system requires overcoming many barriers. The conditions under which a healthcare information system is successfully adopted by its intended target audience are explored in Chapter XIII. Generic strategies for achieving diffusion are balanced with case studies.

Many books on healthcare information systems take the perspective of a particular healthcare professional, such as a nurse or a doctor. This book emphasizes the information systems student perspective. Many books for university courses on the topic have a decidedly academic feel with an emphasis on topics related to research, such as artificial intelligence or ethics. However, this book includes a practitioner’s view. The book also gives special emphasis to the impact of the regulations deriving from the Administrative Simplification provisions of HIPAA, given the relative novelty of that topic and thus its relative under-representation in existing books. While many books examine the staff involved in healthcare information systems, few consider the role of information technology vendors and consultants, as this book does. While the focus is on provider organizations, particularly hospitals, fair attention is given to health insurance companies.

The book is used in teaching university students. Each chapter begins with a list of learning objectives. Every chapter ends with questions that test what a reader has understood or invites readers to do projects (called the “reading” and “doing” questions, respectively). Multiple-choice quiz questions for each chapter are available from the author in plain-text format or with standard XML quiz markup.

Health information systems have been relatively under-developed compared to the information systems in other industries, such as the financial, manufacturing, retail, and publishing industries. The reasons for this under-development are presented along with the steps to change the situation. The investment in health information systems is growing, and the principles and examples given in this book can help the reader take advantage of this growth and contribute to it.