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Implementing an Electronic Health Record System

With the Collaboration of Sandra A. Buckley

With 22 illustrations

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Series Preface

This series is directed to healthcare professionals who are leading the transformation of health care by using information and knowledge to advance the quality of patient care. Launched in 1988 as Computers in Health Care, the series offers a broad range of titles: some are addressed to specific professions such as nursing, medicine, and health administration; others to special areas of practice such as trauma and radiology. Still other books in the series focus on interdisciplinary issues, such as the computer-based patient record, electronic health records, and networked healthcare systems.

Renamed Health Informatics in 1998 to reflect the rapid evolution in the discipline now known as health informatics, the series continues to add titles that contribute to the evolution of the field. In the series, eminent experts, serving as editors or authors, offer their accounts of innovation in health informatics. Increasingly, these accounts go beyond hardware and software to address the role of information in influencing the transformation of healthcare delivery systems around the world. The series also increasingly focuses on "peopleware" and the organizational, behavioral, and societal changes that accompany the diffusion of information technology in health services environments.

These changes will shape health services in the new millennium. By making full and creative use of the technology to tame data and to transform information, health informatics will foster the development of the knowledge age in health care. As coeditors, we pledge to support our professional colleagues and the series readers as they share the advances in the emerging and exciting field of health informatics.

Kathryn J. Hannah
Marion J. Ball

Preface

Implementing an electronic health record system (EHR) that includes computerized physician order entry (CPOE) has gone from being a dream of researchers and visionaries to becoming a business necessity (1).

Two highly visible forces have driven this change. The first is public awareness of dismayingly high rates of avoidable errors in healthcare (2–6). The second is the demonstration that CPOE can reduce medical errors and costs significantly (7–9). In the most careful study to-date, the Center for Information Technology Leadership estimates that the adoption of high-performance ambulatory computerized physician order entry could save a total of $44 billion each year in healthcare costs (10).

Additional forces, less visible, but nonetheless important, strengthen the case for EHRs: Wennberg and others have documented wide, unexplained variations in the processes and outcomes of care—coupled with the frequently documented relationship between variation and poor quality (11–16). Expensive, inefficient, paper-based information management processes have become unacceptable in the face of internal performance improvement and external regulatory reporting needs that are increasing steadily in complexity and scope.

The forces encouraging the adoption of EHRs with CPOE have been brought to focus by the inclusion of CPOE as one of the core measures of quality care by coalitions of employers, most notably the Leapfrog Group (composed of more than 140 public and private organizations that provide healthcare benefits for 25 million people—www.leapfroggroup.org). Payers, including the Center for Medicare and Medicaid Services, have added their clout (9, 17–23).

Despite the powerful forces now driving adoption of EHRs, many care delivery organizations (CDOs—defined as any organization, large or small, that performs patient diagnosis and treatment), along with the majority of independent physician practices, continue to find challenges in implementing a high-performance EHR (one that includes CPOE).

What Constitutes an EHR?

At a high level, increasing patient safety, improving the quality and precision of care, and increasing the efficiency of clinical and administrative processes are compelling reasons to implement an EHR. To achieve these goals, the core functions of test results display, order entry, clinical messaging, and documentation of clinical observations and plans must be included in the EHR.

Many additional processes either need to be incorporated into the EHR, or supported effectively by it, for an implementation to achieve optimal results. As Mark Frisse, the healthcare informatics researcher and consultant, highlights with his healthcare information value chain (24), an EHR should be part of an information system that includes:

- Scheduling and demand management
- Determination of patient eligibility
- Referrals and authorizations
- Information access and reporting
- Care management
- Claims submissions
- Practice management, premium billing, capitation/risk pools, claims processing
- Health risk appraisals and wellness education
- Secure e-mail

While the focus of this book is on implementing an EHR that performs the core functions, your organization will need to think about which of these additional functions need to be included to achieve your business goals.

Constraints

The costs of implementing an EHR are substantial. By the time high-speed, fault tolerant networks, servers, personal computers (PCs), and other hardware are added to software costs and the salaries needed for a capable information technology (IT) team, the total will be measured in the millions of dollars annually, even for healthcare organizations employing only 100 physicians. In addition, the contributions of clinicians' and managers' that are needed for system design, user training and non-IT operational support will represent a significant new set of demands on organizational (especially managerial) attention and energy. This comes at a time when cost reduction and quality improvement requirements have already imposed more change on many CDOs and independent physician practices than they have resources to cope with effectively. Finally, despite studies suggesting that EHRs have the potential to save society and money (25), not a single persuasive case study has demonstrated overall savings.

The few careful studies of the quality effects of EHRs have been performed on isolated components of custom-built EHRs that are supported by research oriented IT teams. These efficacy studies demonstrate what can be accomplished under optimal conditions. But we do not know whether these findings can be extended to organiza-

tions that use commercial software, that are supported by internal IT teams who must focus on the practical issues of implementation and support, and whose clinicians are less familiar with EHRs. Nor do we know whether (or how) clinical decision support (CDS) can effectively address the hundreds of decision rules that would be required to improve provision of basic healthcare (6).

Commercially available (and custom developed) EHRs are still relatively immature. Usability remains sub-optimal, discouraging clinician adoption and making efficiency benefits difficult to realize (26–28). Substantial local customization is difficult, but always required. Because we are early in the evolution of EHRs, few products have even a small group of genuinely successful implementations (defined as in use by all clinicians for results viewing, clinical messaging, order entry and documentation).

The organization's existing legacy software systems will require interfacing with the EHR. These interfaces will represent substantial ongoing costs that most organizations will not be able to avoid in the near or mid-term.

Because of the inherent complexity of healthcare information needs and EHR software, it is rare for anyone working either for the vendor or the CDO to understand the product comprehensively. CDOs and vendors alike have difficulty training and retaining people with the technical and organizational change skills to manage implementations. Neither competencies nor training are standardized. Physician champions and clinician domain experts (see Glossary) make crucial contributions to implementations, but few come to the project with a realistic understanding of information systems or of the organizational changes needed to implement a system that addresses all of the organization's core processes.

Our Experience

This book arises out of our organization's experience with implementing an integrated outpatient and inpatient EHR across an integrated healthcare system. Since its founding in 1915, Geisinger has served a 31-county, largely rural area of northeastern and central Pennsylvania. Our 600 primary care and specialist physicians see approximately 1.5 million outpatient visits a year in 43 outpatient practice sites. In one of our hospitals, Geisinger Medical Center, 280 employed physicians and 200 residents and fellows provide tertiary and quaternary care for a large region of Pennsylvania. Our community hospital, Geisinger Wyoming Valley, has an open staff model and few residents or fellows. Discharges from Geisinger's inpatient units total over 29,000 annually. Our health maintenance organization, Geisinger Health Plan, covers approximately 243,000 patient lives. Our active EHR database included 2.4 million patients as of December 2003.

Our experience has included early failures based squarely on what were at the time widely-accepted best practices (see Chapter 14). We have also benefited from many of the critical success factors for implementing an EHR (29). Among them: unwavering senior leadership commitment; a visible and effective EHR physician champion; a collegial approach to decision making; widespread involvement and support of physicians; project management, financial and technical resources; and a high-quality product provided by a stable vendor. The implementation has ranged from primary care practices in geographically isolated rural communities to hospital-based subspecialty practices and a quaternary-care hospital. Recently, we have extended EHR access to 14,000 patients throughout our practice sites and to several hundred affiliated physicians. Given the heterogeneity of our own system, we believe that our experience in

implementing an EHR has wide applicability to small, medium and large groups and CDOs.

Goals of the Book

Our implementation team receives increasing numbers of requests for site visits and other forms of consultation on implementing an EHR. While we enjoy these opportunities to share what we have learned, we are invariably frustrated by time constraints. This book is our effort to package a combined site visit and consulting engagement into a convenient form.

Our goal is to provide a practical handbook that will help you address the strategic and tactical challenges of implementing an EHR successfully. It combines research-based principles, industry best practices and our own experience. For many implementation issues there are several possible approaches and no well-tested best practice. We have used different approaches at different times and places during our implementation. The book aims to represent this multiplicity and to present the pros and cons of each approach rather than reducing our experience to deceptively simple answers. Although we have planned and edited the book to be read through as a comprehensive guide, the individual chapters are also designed to stand on their own as discussions of specific topics.

Audience

This book has been designed for EHR project team managers and directors, implementation teams, clinician champions of EHR implementations, other clinician informaticians, Chief Medical Information Officers, Chief Information Officers, consultants, EHR vendors and students of healthcare informatics. Chief Medical Officers, Chief Operating Officers and Chief Executive Officers may also find it useful. We have assumed familiarity with the basics of the Western healthcare systems, health care informatics, and project management. (Please see Glossary for any unfamiliar terms. To find definitions for terms we have not included, go to www.google.com and enter the term plus the word “definition”, e.g. “project management definition”.)

We are indebted to many beyond our organization for helpful insights. Mark Frisse has been particularly generous with his time and insights. We look forward to your questions and comments. Please send them to jmwalker@communityERH.com.

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Like a successful EHR implementation, this book represents the combined efforts of a large and skilled team. The authors and editors have taken time from demanding implementation and production-support responsibilities to reflect on the principles and methods they have learned over ten years of planning, implementing, and assessing EHR-related projects. We are all in their debt.

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James M. Walker, MD

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