# Health Informatics

*(formerly Computers in Health Care)*

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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.

Tom Abendroth and Mark Frisse provided invaluable advice. Deserée Karns' skill and hard work and humor kept the project (and me) on time and on target. Shirley, Peter, Katie, and my patients remind me of the reasons we are building EHRs.

Finally, this book is dedicated to Glenn Steele, without whose vision and support it would not have been written.

*James M. Walker, MD*

# Contents

Series Preface v
Preface vii
Acknowledgments xiii
Contributors xvii

## Part I PREPARATION

Chapter 1 Organizational Climate 3
*Sandra A. Buckley, Joseph E. Bisordi, and Bruce H. Hamory*
Chapter 2 Needs Assessment 9
*Jean A. Adams and Linda M. Culp*
Chapter 3 Vendor Selection and Contract Negotiation 15
*Frank Richards*
Chapter 4 Infrastructure 21
*Frank Richards*
Chapter 5 Workflow Assessment and Redesign 36
*Jean A. Adams, Linda M. Culp, and Janet S. Byron*
Chapter 6 Staffing and Managing Implementation Teams 40
*Jean A. Adams and Linda M. Culp*

## Part II SUPPORT

Chapter 7 Usability 47
*James M. Walker*
Chapter 8 Training 60
*Wanda L. Krum and Jack D. Latshaw*
Chapter 9 Clinical Decision Support 67
*James M. Walker and Stephen T. Tingley*

Chapter 10 Translating Scope of Practice into Effective EHR Workflows 77
*Janet S. Byron, Edward J. Zych, Tracey W. Wolf, and W. Todd Gibson*
Chapter 11 System Integration 89
*Elizabeth A. Boyer, Jean A. Adams, and Diane L. Barnes*
Chapter 12 Production Support 95
*Elizabeth A. Boyer and Michael W. Soback*
Chapter 13 Managing the Client-Vendor Partnership 101
*Frank Richards*

## Part III IMPLEMENTATION

Chapter 14 Phased Implementation 111
*Linda M. Culp, Jean A. Adams, Janet S. Byron, and Elizabeth A. Boyer*
Chapter 15 Optimizing Primary-Care Practices 120
*Ellie E. Henry*
Chapter 16 Optimizing Specialty Practices 128
*Linda M. Culp*
Chapter 17 Special-Purpose Software 134
*James M. Walker and Michael J. Komar*
Chapter 18 Optimizing Inpatient Care 141
*Roy A. Gill and James M. Walker*
Chapter 19 Extending EHR Access to Patients 153
*Kimberly A. Rokita, Joan E. Topper, Michael C. Lampman, and David L. Young*
Chapter 20 Extending EHR Access to External Physicians 165
*Joan E. Topper and Kathleen M. Dean*

## Part IV SUMMARY AND PROSPECT

Chapter 21 Summary and Prospects 173
*James M. Walker*

Appendices 177
Glossary 233
Index 241

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# Part One
## Preparation

# 1
# Organizational Climate

Sandra A. Buckley, Joseph E. Bisordi, and Bruce H. Hamory

## Introduction

Many factors influence the organizational structure of care delivery organizations (CDOs). These include location (urban vs. rural), organizational mission, size, complexity of services offered (primary and specialty care), and availability of sufficient funds to support operations and capital investments. CDOs that are part of a university are even more complex, with added administrative staff required for their teaching and research missions.

Before the 1990s, Geisinger's information technology (IT) investments were lagging behind those of non-healthcare organizations. This was almost universally true for CDOs, which, as late as 2002, were still spending only 3% of gross revenue on IT. (Other information-driven businesses, such as banks, were spending 9%.) Other industries demonstrated early on that IT investments could enable them to extract more value from their investments over time. American Airlines' Sabre® reservation system makes it easy to determine flight availability and book a flight. Federal Express implemented a tracking system that reduced delays and increased customer satisfaction. Toyota reduced the maximum time any part was present in an assembly plant to two hours.

Healthcare's initial investment in IT was largely driven by reimbursement issues and the need to report and track finances. Billing, business, and accounting systems were implemented before clinical systems.

In the early 1990s, Geisinger embarked on a program to enhance clinic practice by providing an integrated system of care serving the population of a large, mostly rural 31-county area. It became clear that to do this successfully would require radical change, including a quantum leap in information management. In 1995, the Board of Directors approved a multi-year IT strategic plan that included major investments to acquire and implement an electronic health record (EHR) system. This decision was based on many factors, including the need to improve communication of clinical data across the integrated delivery system, improve patient safety (through point-of-care clinical decision support), reduce practice variability, introduce best practices, reduce costs, increase revenues, and meet regulatory requirements efficiently. As the EHR was implemented, it became apparent that Geisinger could leverage these IT investments—not feasible elsewhere within our market—to increase cooperation with patients and referring physicians.

Today, Geisinger is a national leader in the use of healthcare information technology. In 1999, and again in 2002, Geisinger was named one of the country's "Most Wired" healthcare companies, serving as a national model for healthcare IT. In 2001, Geisinger

was the only healthcare organization to be selected as a finalist in the Wharton Infosys Awards for applying IT to business transformation. In 2003, the Chief Information Officer (CIO), Frank Richards, was named one of the 100 leaders of American information technology.

This chapter will describe how we benefited from and transformed our organizational climate to make maximum use of healthcare information technology.

## Geisinger Health System Overview

We have benefited from a number of factors that have supported information technology innovation. Key factors include:

- Knowledgeable, visionary leaders
- Location
- A collegial, service-oriented culture
- Physician leadership
- A strong financial base
- A salaried physician practice
- The confluence of business needs and technology developments

### *Mission*

Geisinger's mission is to enhance the region's quality of life through an integrated health service organization based on a balanced program of patient care, education, research, and community service. In 1915, Abigail A. Geisinger founded the George F. Geisinger Memorial Hospital in Danville, PA (current population approximately 6,500). The hospital was designed from the onset as a comprehensive facility that would offer specialized medical care to people in rural central and northeastern Pennsylvania. Geisinger's culture is inspired by the legacy of Abigail Geisinger. She challenged the first Surgeon-in-Chief, Dr. Harold Leighton Foss, to: "make my hospital right; make it the best." Throughout the years, the Geisinger community has remained faithful to this vision, perhaps best expressed as: "We can make it here; we can make it right; we can make it the best".

The Geisinger Health System includes the Geisinger Clinic, a multispecialty physician group practice that employs more than 600 salaried physicians and operates the largest ambulatory care program in Pennsylvania, including 42 widely distributed primary-care practices. Geisinger facilities also include Geisinger Medical Center, a large tertiary care teaching hospital with 450-licensed beds; Geisinger Wyoming Valley, a 200-bed community hospital; Marworth, a 77-bed drug and alcohol rehabilitation center; and an ambulatory surgery center. Geisinger Medical Center maintains an active Level I Regional Trauma Center supported by "Life Flight®," a three-helicopter air ambulance service. In fiscal year 2002 (July 1, 2001 through June 30, 2002), Geisinger recorded more than 1.5 million outpatient visits and 30,000 discharges from its inpatient units. Our primary care practices serve about 500,000 patients annually. Geisinger Health Plan, created in 1972 and restructured and incorporated in 1985, has become one of the nation's largest rural health maintenance organization (HMO).

## *Leadership History*

Geisinger's physician leadership has been remarkably visionary. Its first President and CEO, Dr. Harold Foss, was a surgeon who joined the Mayo Clinic in 1913 as a fellow in surgery. Dr. Foss, a pioneer in rural healthcare administration, led the George F. Geisinger Memorial Hospital (later the Geisinger Medical Center) through its first 44 years, replicating the multi-disciplinary clinic/hospital model he learned at the Mayo Clinic. In 1958, Dr. Foss was succeeded by Leonard Bush, MD, an orthopedic surgeon, who served as President and CEO through 1974.

Dr. Bush was succeeded by Henry Hood, MD, a neurosurgeon who served from 1974 to 1990. Having earned an undergraduate degree in hotel management before his medical degree, Dr. Hood brought a unique business perspective to Geisinger. Under Dr. Hood's leadership Geisinger accepted the challenge of state healthcare planners to use the tertiary-care capabilities of GMC to meet the healthcare needs of the entire region. Dr. Hood led a major expansion of the Medical Center, which doubled in size between 1978 and 1981 with the acquisition and development of our primary-care practices. The Marworth Alcohol & Chemical Dependency Treatment Center and the Geisinger Wyoming Valley Medical Center were also acquired (or built) during this period. The Geisinger Medical Management Corporation began providing management consulting and other medical services (home care, infusion therapy, retail pharmacies) to CDOs, both inside and outside the system.

As this large, geographically dispersed healthcare system developed, it became apparent that consistent business processes (administrative and clinical) were needed to unite the many parts into an effective whole. Dr. Hood recognized that a standardized IT infrastructure and software applications would make these goals feasible. Under his leadership Geisinger investigated EHRs, but concluded that the technology was too immature to be useful.

Stuart Heydt, MD, an oral surgeon, succeeded Dr. Hood in 1990. In the early 1990s, a team led by the COO (Frank Trembulak) and the CIO (Pat Thompson), recommended centralizing IT operations and building the IT infrastructure required to support a high-performance ambulatory EHR (see Chapter 4). With the addition of Joseph Bisordi, MD (Chair of Nephrology) as Senior Vice President for Medical Informatics, this team led the ambulatory EHR implementation, which reached all 42 clinic sites and 600 physicians. Also during this period, Geisinger's Radiology Department implemented an electronic digital image storage and distribution system, making most radiology images available on PCs throughout the organization.

In 2000, with the outpatient EHR implementation well underway, we began a second round of strategic planning to identify ways to leverage our investments in the EHR. Recognizing the value of the EHR to Geisinger clinicians, we decided to find ways for patients and independent regional physicians to access the EHR also. (For details, see Chapters 19 and 20.) In 2003, we extended this information to include hospitals outside the Geisinger system.

Today, Geisinger's fifth President and CEO is Glenn Steele, Jr., MD, PhD, a nationally known surgical oncologist and healthcare leader. Under his leadership, Geisinger is extending its clinical information systems and expertise to the region and the nation. Geisinger's Center for Health Research & Rural Advocacy, under the leadership of Walter "Buzz" Stewart, PhD, has established itself as one of the nation's premier sites for rigorous real-world research on the effectiveness of EHRs to improve healthcare quality and efficiency.

## *Organizational Structure*

The committed, visionary leadership of Geisinger's Board of Directors has been instrumental in moving Geisinger's strategic initiatives forward over decades. Its members have a strong commitment to the local community and to Geisinger's excellence. They have consistently provided the resources needed to carry out strategic program planning, including investments in IT. The shared commitment and vision of the Board and the executive management team, sustained over time, may have been the single most important factor in Geisinger's success in implementing an EHR.

## *Location, Location, Location*

Geisinger is headquartered in the small town of Danville, PA. Our largely rural service area extends over 20,000 square miles. This geographic isolation created a need for innovative methods of linking the system together, to make it more than just the sum of its disparate parts.

## *Culture*

Geisinger has had, since its beginning, a community focus. Our original model for care was based on a physically contiguous multi-disciplinary group practice. This coordinated, collaborative model of care depends critically on the ability to share information (originally in the form of a shared paper chart). As the organization expanded, we needed to replicate the benefits of this model across an expanded geographical footprint.

Our population base (2.3 million) is very stable. Many of our patients live in a house that has been passed down from generation to generation. This is also true of our employees, who are strongly committed to the region. Recruiting from outside the local area is more difficult than in urban environments. However, the stability of our employee base has a positive effect on our ability to retain good employees. The average turnover rate in our IT Department is 5%–half the national average. The average length of service is approximately 11 years. Many of the current leaders in the IT department (including the CIO) started their careers in other Geisinger departments (pharmacy, nursing, dietary, laboratory, and management engineering). This diverse clinical background results in experienced, operationally sensitive IT teams and leaders.

## *Physician-Led*

Geisinger's tradition of physician leadership ensures continued attention to the day-to-day realities of a busy clinical environment. All levels of the organization, from each practice to the executive suite have physician leaders, most of whom remain clinically active. The tradition of partnering physician and administrative leaders is replicated in IT. The Chief Medical Information Officer (CMIO), James M. Walker, MD, is partnered with the CIO, Frank Richards.

## *Financial Base*

As a not-for-profit organization, Geisinger retains its earnings for investment in program improvements. With a strong balance sheet, Geisinger has had the financial

strength and institutional patience to make the long-term investment in IT that an effective EHR requires. However, we began to realize significant returns on investment only after several years of financial investment. For example, paper chart pulls can only be eliminated when all clinicians use the EHR. Initially, the EHR is relatively empty of patient information; only after substantial information is put into it does the EHR become really valuable to clinicians. EHR software and implementation methodologies have improved markedly, but organizations considering an EHR must be aware that both hard work and patience will be needed before the full benefits of the project are realized.

## *Salaried Physicians*

Geisinger physicians are salaried. Compensation includes a base salary and a variable bonus based on achievement of specific incentive criteria. These criteria are aligned with system goals, such as patient satisfaction, clinical performance, and financial performance. This incentive system has provided valuable motivation for physician adoption of the EHR.

In addition to our salaried physicians, about 150 non-Geisinger physicians care for patients at our community hospital. For these physicians, the primary incentive for EHR use is improved efficiency and care quality. They value easy access to clinical information (e.g., test results, radiology images, outpatient notes, and procedure notes). They also value the convenience of e-messaging that is linked to the patient's record. Finally, HIPAA-compliant access to the EHR in their offices and homes gives physicians gratifying new flexibility in the way they work. These benefits create increasing demand for more access and for the ability to enter notes and orders into the system remotely.

## *Confluence of Business Needs and Technology Development*

Fortunately, Geisinger's increasing need for business and clinical information systems coincided with the maturation of information technology that could meet those needs. In the late 1980s, we deferred initial consideration of a system-wide EHR because it was clear that the available technology was inadequate to meet the challenge. Only a few years later, a number of technologies (E-mail, Web technologies, core EHRs, digital imaging) had matured sufficiently to make an EHR attractive and feasible. While these emerging technologies were becoming available, a number of factors prevented most CDOs from implementing an EHR. Prominent among these were the managerial and intellectual fragmentation of most organizations at that time, immature implementation methodologies, and the number and complexity of business processes that an EHR must support.

## *Communications*

Effective communication is frequent, accurate, succinct, tailored to the needs of the audience(s), delivered by trusted messengers, and accompanied by opportunities for feedback (1). Particularly in the case of an EHR—which will inevitably change work roles, access to information, and monitoring of individual and group performance—a comprehensive communication plan is essential to maintain your organization's focus and motivation.

Once the executive leadership and Board of Directors agreed to proceed with implementation of an EHR, we began to develop a plan for communicating the decision to the organization. The physician champion (the Senior Vice President for Medical Informatics) created a specific, consistent message that was presented at all levels of the organization. The message emphasized the importance of efficient information management in clinical care and the inclusiveness of the strategic planning process.

The message focused on five primary objectives for the EHR project: improving access (with system-wide scheduling); reducing costs; enhancing clinical communications; improving business processes; and providing clinical decision support. It included projected EHR benefits in each of these dimensions. The presentation concluded with a scenario-based patient encounter that took a patient from the initial phone call for an appointment through check out following the office visit. Other scenarios were also demonstrated, including patient telephone calls, electronic results review, and messaging among clinical staff. The implementation timeline was explained. The project remained as an agenda item on all organizational meetings with regular progress reports, emphasizing leadership's commitment to its success.

The physician champion gave these presentations to physicians at all levels and locations within the organization. This assured that physicians' questions and concerns could be understood. It also helped emphasize that the organization and its physician leadership were committed to the extensive change entailed by this project. Physicians who had already implemented the EHR were encouraged to describe their experience in organizational meetings to create a shared sense of progress and success.

A similar process of formal presentations was employed several years later to communicate the subsequent e-Health strategy and the inpatient EHR implementation.

## Summary

An institution contemplating an EHR must have buy-in from the very top of the organization (including its board) and be willing to make information technology part of the organization's strategic plan. Resources for initial and ongoing IT investments must be committed—and the institution must have the patience to wait for the returns on those investments.

EHR implementation is not easy, but it can transform your organization. Change on this scale creates the opportunity to rethink work processes, often resulting in more efficient operations. The EHR provides administrators and clinicians a powerful tool for institutionalizing process improvements. In fact, we have found that the EHR attracts clinicians and managers with a passion for quality improvement. Identify, hire, train and promote these people. Their leadership will be one of the primary benefits of the EHR project—and one of the critical factors for its ongoing success.

## *Additional Reading*

Kotter J. *Leading Change*. Boston: Harvard Business School Press; 1996.
*Although not directed specifically to healthcare, Kotter's book outlines a comprehensive approach to creating an organizational climate in which change is likely to succeed.*

# 2
# Needs Assessment

Jean A. Adams and Linda M. Culp

Implementing an EHR requires that you conduct a needs assessment, identify and quantify measures of success, and determine the methods for maximizing ongoing benefit realization. This chapter will address each of these needs.

## What Is the Definition of a Needs Assessment?

We define needs assessment as a systematic process to develop an accurate understanding of the strengths and weaknesses of a business process in terms of efficiency and quality. This understanding is used to set and prioritize goals, to develop a plan, and to allocate resources. A formal needs assessment requires that you understand:

1. The goals of the proposed project
2. The current processes and workflows
3. The gap between #1 and #2 (above)—the gap analysis
4. The capabilities and limitations of the software in addressing this gap
5. The associated risks (technical and operational)

### *Why a Needs Assessment?*

A needs assessment defines a department's priorities and lays out an organized approach for allocating resources. In addition, it helps to avoid many pitfalls, including:

- Missing stakeholder needs
- "Scope creep"—the gradual increase of the number of project deliverables
- Missed deadlines
- Unmet project goals
- Budget over-runs

To maximize the benefits realized, the EHR needs assessment should be completed prior to purchasing the EHR software or making process changes.

### *Strategic Goals*

In the initial stages of considering an EHR, we agreed on five high-level goals:

1. Enhance clinical communication (especially primary care provider communication).
2. Obtain structured data for quality improvement and practice analysis.

3. Provide access to patient information.
4. Enable clinical decision support.
5. Produce financial benefits (cost savings, as well as revenue enhancements).
6. Today, we would add a sixth goal - Increase process efficiency. Accomplishing this goal is critical to improving care quality as well as business viability. It is also critical to motivating active EHR use by clinicians and patients, without which none of the other goals will be achieved.

Next, we created seven high-level vision teams composed of senior managers, physicians, IT personnel, and patients, whose task was to think strategically about the organization's goals of delivering healthcare efficiently to a rural population.

The teams prioritized the EHR needs regarding:

- Order management
- Results display (radiology, laboratory, and pathology)
- Patient scheduling
- Registration and checkout referral management
- Utilization management
- Information security

The teams developed high-level proposals for core processes based on industry best practices. They worked to an aggressive timeline (Table 2.1) to complete their final reports, which were then presented to the Board of Directors.

The teams were instructed not to restrict their design to fit the functionality limitations of existing software systems. Appendix 1 provides a high-level overview of the Vision teams' results.

After Board approval, we formed design teams to assess current workflows and design optimized workflows. They then assessed software functionality that would be needed to achieve the optimized workflows.

The core question we ask when conducting needs assessments is, Who needs what information, at what times, and in what locations, for what purposes? This question is asked for existing workflow processes and then reviewed when designing optimized workflows.

Needs assessment begins with a detailed walk-through of a practice site with the practice's primary stakeholders (managers, clinicians, and administrative staff). This walk-through is followed by a group meeting to determine a high-level understanding of the practice's needs. This provides the basis for detailed questions in subsequent group meetings. The follow-up meetings include a team of managers, physician leaders, nurses and clinical technicians. The initial meeting is two hours in length (we have found that shorter meetings are not as productive as longer ones, since part of every meeting involves reviewing issues addressed in prior meetings). An assigned interviewer documents the sessions; the full team reviews the documentation for accuracy and completeness. The team analyst (see Glossary) then converts the interviews into

**TABLE 2.1.** Vision Team Timelines.

| Teams Identified and Formed | Weekly Team Meetings | Draft Report Review | Final Report and Presentation to Board |
|---|---|---|---|
| Month 0 | Months 1 & 2 | Month 3 | Month 4 |

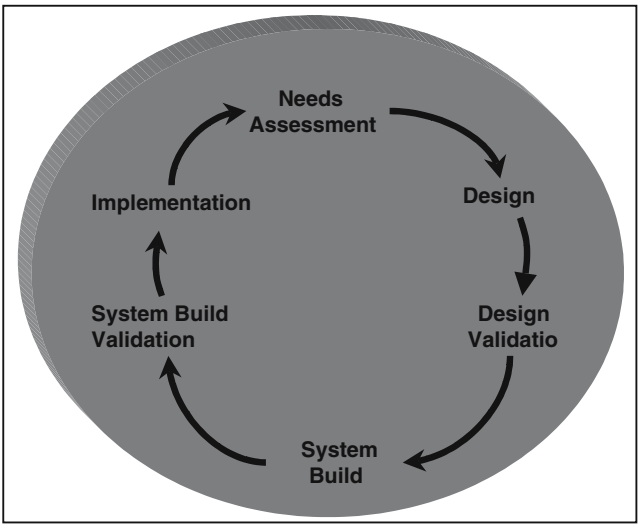


**FIGURE 2.1.** The role of a needs assessment in the implementation process.

process flow charts that are also reviewed by the team members. Appendix 2 is a sample of a completed "Needs Assessment."

It is often difficult for stakeholders to differentiate between a needs assessment and a wish list. Needs and wishes lie along a spectrum of utilization and feasibility. It is critical that the team understand (at the initial team meeting) the difference between the two. An item on a wish list might be attractive to the requestor, but have little impact on business quality or efficiency (or benefit only a few users). We record these requests as ideas for future development, but they naturally fall to the bottom of the priority list. In comparison, a need is critical to clinical or business operations and is relatively feasible. An example of a need would be a request that information be displayed in a consistent format that is usable for all users (See Figures 2.1 and 2.2).

## *Prioritizing Needs*

As needs are identified in the needs assessment, they are rank-ordered into these categories:

- Required for initial implementation
- Required for Phase II
- Desirable, but not feasible
- Potentially counterproductive (the most frequent reason for this categorization is an item that would actually impede the work of some stakeholders)

To conduct interviews effectively, analysts need a positive attitude and the ability to listen patiently. Both of these traits were vital to facilitate the brainstorming phase of identifying needs. Once the analysts understand the workflows of the interviewees, they probe for needs that might otherwise be overlooked. The interviewer analyst employs a thorough, logical approach to analyzing workflows so that they can help the team identify all relevant needs.