

Introduction

Healthcare has lagged behind many other industries in applying information systems to improve processes and outcomes, and there is intense global interest in closing this gap. Major national efforts are underway to promote more widespread and effective use of tools such as the **electronic medical record (EMR)** and **computerized provider order entry (CPOE)** to address these problems. Much of the implementation activity in the United States, for example, focuses on dissemination and initial adoption of these systems. Although computerizing clinical data and transactions can substantially improve information management in patient care, this automation reaches its full potential only when pertinent clinical knowledge is combined with the data to inform care decisions and actions.

Providing pertinent knowledge within workflow to inform care is a challenge for most healthcare organizations, particularly when that workflow involves **clinical information systems (CIS)**. This book is designed as a practical tool intended to help healthcare institutions deliver this knowledge, or **clinical decision support (CDS)**, in ways that measurably improve outcomes important to the organization. It does this by guiding the planning, development, implementation, and evaluation of **CDS interventions** that will effectively address specific clinical or strategic concerns.

Improving Outcomes with Clinical Decision

Support: An Implementer's Guide first helps organizations identify stakeholders in their CDS programs. It then guides them through the steps of working with these **stakeholders** to

- Determine the **CDS program's goals and clinical objectives;**
- Catalog local information systems capabilities to help achieve those **targets;**

- Select the best approach to address the targets with specific **CDS interventions;**
- Develop the interventions;
- Make sure those interventions are acceptable to stakeholders and put them into use; and
- Monitor and enhance the CDS program on an ongoing basis to ensure it achieves the desired organizational objectives.

AUDIENCE

This book is designed to help healthcare organizations build a comprehensive and systematic approach to addressing organizational needs through a CDS program. It is also designed to help with the development and implementation of specific CDS interventions that may be part of such a program. Organizations with applications in place that support robust CDS interventions, such as CPOE or an EMR, will have a greater range of CDS options to consider in developing the program. Organizations with more limited clinical information systems currently in place will also find valuable strategies for more fully leveraging their infrastructure and for planning for enhanced CDS as more sophisticated systems are implemented.

Individuals who are responsible for developing and implementing an organization's CDS strategy, and those who have a leadership role in improving patient safety and quality, will benefit from this book. They may have broad leadership roles, such as chief medical/nursing/quality/safety officers. They may also

- Be leaders in key quality-related departments such as pharmacy and laboratory;
- Hold information systems positions such as chief information officer or clinical director of information systems; or

Definitions

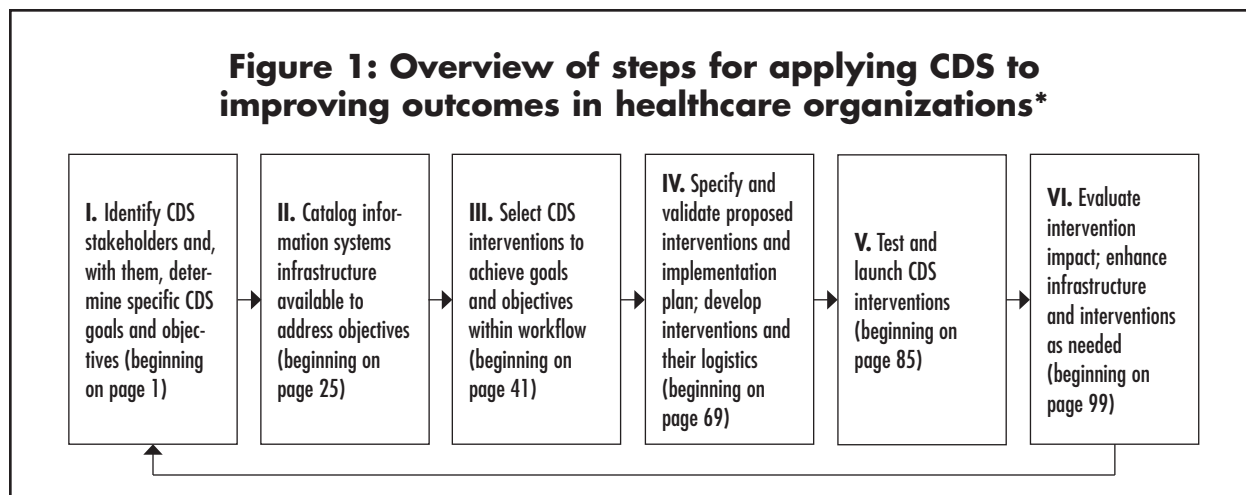
Different readers might have different ideas about the meaning of many of the central terms used throughout this book. To help ensure clarity and consistency, we define our use of these terms in the glossary at the end of this book. Glossary terms are boldfaced the first time they are used in the text. Several of the most critical definitions are also presented below.

- **Clinical decision support (CDS)** refers broadly to providing clinicians or patients with clinical knowledge and patient-related information, intelligently filtered, or presented at appropriate times, to enhance patient care. Clinical knowledge of interest could include simple facts and relationships, established best practices for managing patients with specific disease states, new medical knowledge from clinical research, and many other types of information (see Figure 2-5, page 33).
- **High-level CDS goals** are high-level or strategic targets, such as increasing patient safety, that an organization might address with CDS (see Figure 1-5, page 7).
- **Clinical goals** are more specific than CDS goals and include desired care processes or outcomes, such as reducing complications from diabetic kidney disease (see Figure 1-5).
- **Clinical objectives** are more specific and measurable components of clinical goals, such as increasing the rate of appropriate screening for diabetic kidney disease (see Figure 1-5).
- A **CDS intervention** involves delivering one or more specific pieces of clinical information (knowledge and/or data) to an individual, at a specific time and place, to address a clinical objective. CDS interventions include the CDS content and the method for delivering that content (e.g., which software application, which type of presentation, or where in the workflow process). A simple rule-based **alert**, such as a drug allergy warning, is one of the most recognizable types of CDS intervention; however, as illustrated in Figure 2-5, page 33, the range of CDS interventions is broad and extends far beyond rule-based approaches. While there are many successful examples of CDS provided via paper-based systems, this book focuses on computer-facilitated interventions.
- A **CDS program** consists of the overall set of CDS interventions that an organization uses to achieve its healthcare goals, as well as the processes used to select, prioritize, implement and evaluate these

- Participate in departmental or organization-wide safety and quality programs.

In organizations not yet ready to embark on a comprehensive CDS program, individuals in these

positions can use this book to help implement more limited and focused CDS interventions, and potentially help educate the organization about the value of a broader approach as well. CDS system develop-



ers and researchers may also find the framework and material in the book useful.

USING THIS BOOK

This book's approach to CDS implementation involves a series of major steps or processes, outlined above and schematically in Figure 1. Each chapter is designed to provide a substantial educational background on the major issues and also to walk the reader step-by-step through the necessary tasks to complete the process successfully in a real clinical environment. Each chapter includes

- An overview of the tasks;
- A summary of key lessons;
- A discussion of pertinent issues;
- Worksheets (with sample data) and recommendations to help gather, organize, and process institution-specific information critical to accomplishing the tasks;
- Concluding comments; and
- A bibliography with references and Web links to additional readings and resources.

The online book supplement (www.himss.org/cdsguide) is a companion resource. It contains blank

templates for each worksheet that readers can download and use in their own organizations.

This book helps focus, enhance, and organize your approach to CDS planning and implementation. Although the guidance builds successively with each chapter, it is not essential to work through the book in a strictly linear fashion, to address every step, or to complete each worksheet. For example, you might focus on specific sections that address issues that are important or timely in your organization. Similarly, you can use the ideas reflected in the worksheets and steps as background material to validate or stimulate your own CDS approach.

All of the authors of this book work in the U.S. When we make reference to professional and governmental organizations, we typically employ examples drawn from the U.S. However, most of the fundamental drivers and issues related to CDS implementation are not specific to any single country. The authors expect that the approach to CDS outlined in this book will be useful outside the U.S., though readers from other countries may need to consider analogous professional and governmental initiatives pertinent to their environment.

Iterative Refinement of This Book—Your Role

The first edition of this book was published in February 2004 and was well received by the CDS

* Figure 1 graphically depicts the clinical decision support implementation steps around which this book is organized. This is a cyclical process; results from each CDS implementation cycle feed back into subsequent iterations through each step.

implementer community as a valuable resource. Many readers offered helpful suggestions for enhancing its usefulness; some of these readers had extensive expertise in CDS implementation, while others were just starting out. This second edition incorporates a large number of those enhancements.

If you have successfully accomplished specific CDS tasks or used the first edition of this book, we are most interested in hearing about your experiences and insights. We would particularly appreciate the chance to see any sample documents, completed worksheets, and other implementation tools from your CDS program that you would be willing to share with others. We would also appreciate feedback from those just beginning to develop a CDS program. Your input will help us provide clearer and more valuable guidance to other such readers. Whatever your stage in the process, your input is welcome; we have

already begun collecting ideas for the third edition! You can reach us via e-mail at cdsguide@himss.org.

Based on the widespread interest in the first edition, the **Healthcare Information and Management Systems Society (HIMSS)** has launched a CDS Task Force to help build and support the community of CDS implementers. Short-term goals include optimizing the dissemination, successful use, and enhancement of this book. A longer-term goal is to create an active forum for mutual support among the CDS implementer community. If these activities sound interesting to you, we welcome your involvement. You can send an e-mail to cdsguide@himss.org for additional information.

A Note about Internet Resources

All Internet Web links cited in this book were accessible as of April 2005.