Using Human Factors Engineering to Improve Patient Safety: Problem Solving on the Front Line

SECOND EDITION

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Introduction

WHY HFE?
If you’ve heard about human factors engineering (HFE), it may have been in the context of making things “easy to use” or “user friendly.” Although these attributes are desirable, it may not be so obvious that the concept of making things “user friendly” can be extended to make a hospital or other health care organization safer and more efficient. HFE is the discipline concerned with understanding human characteristics and applying that knowledge to the design of systems that are reliable, safe, efficient, and comfortable to use (*system* refers to all the elements that are part of the delivery of care to patients).

What makes HFE so valuable is that it attempts to address complexity, something that is abundant in health care. To achieve simplicity of use, safety, and efficiency, HFE uses knowledge of human cognitive and physical capabilities and limitations to design or redesign the tools, tasks, and work areas in health care. HFE complements other quality and patient safety improvement methods that because of their lack of focus on systems design, may lead to solutions that are either inappropriate to the level of complexity, impractical, or inefficient, resulting in workarounds (that is, alternative work procedures undertaken to bypass perceived or real barriers in work flow). According to the HFE perspective, you design the system to fit the human, not the other way around. In so doing, you can create enduring conditions that make it easier for people to reliably carry out work correctly and efficiently. We can alter our tools and work environment, but it is quite difficult, even one can argue, impossible, to alter human nature.

To tackle the formidable challenge of taming complexity, HFE draws upon a broad knowledge base of applied research in human performance. This gives the HFE professional—usually, someone with a human factors degree from a university program, such as engineering or psychology, or even education or computer science (Chapter 4)—an understanding of how and why people interact the way they do with the systems around them. For example, the manner in which people perceive, recall things from memory, or make decisions can determine how easy or difficult it is to program a pump or use an electronic order entry system. In addition, the task at hand imposes its own needs and requirements. If a system does not meet these needs or does so in a clumsy fashion, then it places a mental or physical burden on the person. A system, say, an electronic health record software, might be considered clumsy if, for example, it required the clinician to memorize data from one screen and keep it in memory as he or she navigates to find another screen to enter the data. Alternatively, it may use terminology that is somewhat ambiguous or too technical for the typical clinician. Having frequently used functions buried deep in a menu system is another example of a “clumsy” software system. In all cases, the system does not provide a good fit to either the task or the human.

HFE professionals use a variety of methods and tools to (1) analyze system usability or safety, (2) design solutions, and (3) test the system or solution to determine its impact on human performance.
PURPOSE OF THIS BOOK
This book, Using Human Factors Engineering to Improve Patient Safety: Problem Solving on the Front Line, Second Edition, (1) shows health care organizations how they can develop and use HFE expertise to improve patient safety, and (2) shows HFE professionals how others have pursued a career path to help health care organizations address a variety of HFE–related issues. This twofold purpose is designed to help managers, leaders, and clinicians at health care organizations, and HFE professionals, learn how to work together to best deploy HFE in clinical settings.

NEW IN THIS EDITION
Using Human Factors Engineering to Improve Patient Safety: Problem Solving on the Front Line, Second Edition, like its predecessor, Using Human Factors Engineering to Improve Patient Safety, consists of two parts. For Part I, Chapters 1–2 are updated and expanded, and Chapters 3–4 are new. For Part II (Chapters 5–10) in this new edition, we enlisted top experts in the United States and Canada to tell their own stories of how their organizations are deploying HFE to improve patient safety.

OVERVIEW OF CONTENT
Part I
Part I provides basic background on key HFE principles and theories (Chapter 1), which can help you identify systems in your health care organization that are plagued with human factors problems. Chapter 2 guides you through methods and tools that HFE professionals employ in devising solutions. Organizations interested in integrating HFE into their safety and quality activities can learn from step-by-step recommendations provided in Chapters 3 and 4.

Chapter 1 “Theory and General Principles” explores human capabilities and limitations, which will help you recognize the signs and symptoms of human factors issues. This chapter provides readers a basic understanding of how design can either accommodate these human characteristics (good design) or ignore them (poor design).

Chapter 2 “Methods and Tools” discusses the process and methods for diagnosing HFE issues behind adverse events in your health care organization.

Chapter 3 “Lessons Learned in Teaching Human Factors Engineering” reviews the reasons you have missed many design problems “hiding in plain sight” in your setting and provides the “top 10” pearls that we have found useful for the “practice” of HFE.

Chapter 4 “Finding and Using Human Factors Engineering Expertise” includes “Finding the HFE Professional ‘Right’ for the Organization” which provides tips and recommendations for health care organizations that want to recruit HFE professionals and integrate HFE into their quality and patient safety activities. The chapter also highlights the lessons learned from the experiences of the organizations represented in Part II.

Part II
The case-study chapters (Chapters 5–10) provide stories from the front lines of how health care organizations have integrated HFE into their quality and patient safety activities. The chapters provide detailed project-specific accounts of the deployment of HFE principles, theories, and tools described in Chapters 1–2. The projects chosen are not necessarily large but were selected as most representative of the work that HFE professionals conduct on a daily basis to have an impact on patient safety—and, in some cases, efficiency. The Appendix provides references to guidelines, handbooks, HFE
textbooks, and special topics for those looking for additional material on HFE.

**A NOTE ON TERMINOLOGY**
As discussed in Chapter 1, there is considerable diversity in the terminology used to describe HFE, just as there are many paths to becoming an HFE professional or to applying HFE to the health care setting, as discussed in Chapter 4. This diversity will also be readily apparent in Chapters 5–10. Yet differences in terminology should be of minimal concern. Whether starting out in injury prevention, as did Laurie Wolf (Chapter 8), or patient safety research, as did Yan Xiao (Chapter 9), HFE professionals share common methods and mind-sets—and a key focus on redesign to improve outcomes.

**WHO SHOULD READ THIS BOOK?**
*Using Human Factors Engineering to Improve Patient Safety: Problem Solving on the Front Line, Second Edition,* is intended for anyone interested in reducing errors in health care and improving patient safety, whether you are a chief executive officer, chief operating officer, patient safety officer, physician, nurse, risk manager, performance improvement professional, physician assistant, or engineer. The book is also addressed to the HFE professionals themselves to learn how to contribute their HFE expertise in improving patient safety on the front line. Whether you are a student working toward an HFE graduate degree or an HFE professional considering a change in career focus, this book provides practical guidance.

This book shows how theory and practice are applied to hospitals, ambulatory care, emergency medical services, and outpatient cancer care. Yet HFE methods are adaptable to all health care organizations, which face the challenge of designing patient safety–enhancing systems that are reliable, efficient, and comfortable for clinicians—and patients—to use.

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