

Managing Patient Flow in Hospitals

Strategies and Solutions

Second Edition



Edited by **Eugene Litvak, Ph.D.**

Foreword by **Susan Dentzer**

 **Joint Commission
Resources**

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**Joint Commission
Resources**

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Marilyn E. Rudolph, R.N., B.S.N., M.B.A., is Vice President, Performance Improvement, VHA Pennsylvania, Pittsburgh.

Chapter 2. Impact of Patient Flow Issues on Nursing Staff and Patients

Peter I. Buerhaus, Ph.D., R.N., F.A.A.N., is Valere Potter Professor of Nursing; and Director, Center for Interdisciplinary Health Workforce Studies, Institute for Medicine and Public Health, Vanderbilt University Medical Center, Nashville, Tennessee. **Anne Miller, Ph.D., R.N.**, is Assistant Professor, Center for Interdisciplinary Workforce Studies, School of Nursing, and Center for Perioperative Research in Quality, Vanderbilt University Medical Center.

Chapter 3. Assessment of Patient Flow

Brad Prenney, M.S., M.P.A., formerly Deputy Director, Program for Management of Variability in Health Care Delivery, Health Policy Institute, Boston University, Boston, is Chief Operating Officer, Institute for Healthcare Optimization, Boston.

Chapter 4. Strategies to Manage Patient Flow

Sandeep Green Vaswani, M.B.A., formerly Operations Management Consultant, Program for Management of Variability in Health Care Delivery, Health Policy Institute, Boston University, Boston, is Senior Vice President, Institute for Healthcare Optimization, Boston. **Michael C. Long, M.D.**, formerly Clinical Consultant, Program for Management of

Variability in Health Care Delivery, is Senior Fellow and Clinical Consultant, Institute for Healthcare Optimization. **Brad Prenney, M.S., M.P.A.**, formerly Deputy Director, Program for Management of Variability in Health Care Delivery, is Chief Operating Officer, Institute for Healthcare Optimization. **Eugene Litvak, Ph.D.**, formerly Professor of Health Care and Operations Management and Director, Program for Management of Variability in Health Care Delivery, Boston University, is President and Chief Executive Officer, Institute for Healthcare Optimization.

Chapter 5. Measurement and Evaluation of Patient Flow: The Right Data, Measures, and Analyses

Kathleen Kerwin Fuda, Ph.D., formerly Data Analysis Manager, Program for Management of Variability in Health Care Delivery, is Senior Associate, Domestic Health Division, Abt Associates, Cambridge, Massachusetts.

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Chapter 6. Cincinnati Children's Hospital Medical Center: Redesigning Perioperative Flow Using Operations Management Tools to Improve Access and Safety

Frederick C. Ryckman, M.D., is Professor of Surgery/Transplantation and Vice President of System Capacity and Perioperative Operations, Cincinnati Children's Hospital Medical Center, Cincinnati; **Elena Adler, M.D.**, is Adjunct Associate Professor, Department of Anesthesia; **Amy M. Anneken, M.S.**, is Lead Decision Support Analyst, Division of Health Policy and Clinical Effectiveness; **Cindi A. Bedinghaus,**

R.N., M.S.N., is Senior Clinical Director, Perioperative Administration; **Peter J. Clayton, M.P.A.**, is Vice President of Operations, Department of Surgical Services; **Kathryn R. Hays, M.S.N., R.N.**, is Senior Clinical Director, Perioperative Administration; **Brenda Lee, B.S.I.E.**, is Quality Improvement Manager, Division of Health Policy and Clinical Effectiveness; **Jacquelyn W. Morillo-Delerme, M.D.**, is Associate Professor, Department of Anesthesia; **Pamela J. Schoettker, M.S.**, is Medical Writer, Division of Health Policy and Clinical Effectiveness; **Paul A. Yelton** is Application Specialist III, Operating Room; and **Uma R. Kotagal, M.B.B.S., M.Sc.**, is Senior Vice President for Quality and Transformation and Director, Division of Health Policy and Clinical Effectiveness.

Chapter 7. Kaiser Permanente Southern California, Kaiser Foundation Hospital in Anaheim: Optimizing Patient Flow

Judith Kibler, R.N., M.Ed., is Senior Consultant and Lead Improvement Advisor, Kaiser Permanente (KP) Orange County, Irvine, California; and **Marlean Free, Ph.D.**, is Executive Consultant and Improvement Advisor. **Maria Lee, Ph.D., M.B.A.**, is Director of Healthcare Performance Improvement, KP Southern California, Pasadena, California; and **Kirk Rinella, M.B.A., R.C.P.**, is Program Manager, Strategic Work

Environment. **Judy White** is Medical Group Administrator, KP Orange County, Anaheim and Irvine, California; and **Ed Ellison, M.D.**, is Area Medical Director. **Julie Miller-Phipps** is Executive Director and Senior Vice President, KP Hospital Health Plan, KP Orange County, Anaheim and Irvine. **Lisa Schilling, R.N., M.P.H.**, is National Vice President of Healthcare Performance Improvement and Execution Strategy, KP, Oakland, California; and a member of *The Joint Commission Journal on Quality and Patient Safety's* Editorial Advisory Board.

Chapter 8. Northwest Community Hospital: Improving Hospitalwide Patient Flow

Barbara Weintraub, R.N., M.S.N., M.P.H., A.P.N., C.E.N., is Director, Pediatric and Adult Emergency and Trauma Services, Northwest Community Hospital, Arlington Heights, Illinois. **Kirk Jensen, M.D., M.B.A., F.A.C.E.P.**, is Chief Medical Officer, BestPractices, Inc., Fairfax, Virginia, and Faculty Member, Institute for Healthcare Improvement, Cambridge, Massachusetts. **Karen Colby, R.N., M.S., C.N.A.A.-B.C.**, is Clinical Director, Medical Pulmonary/Renal/Telemetry/Oncology Units, Northwest Community Hospital.

Foreword

Susan Dentzer

Looking back from our collective perch in the 21st century, it's clear that health care in the United States has evolved along two oddly distinct branches. Along one of them, sophisticated *clinical science* resulted in continual advances in knowledge—even if it was not always followed up by rigorous study to determine which interventions were best for patients. Along the other branch, health care has been delivered virtually without benefit of *operations management science*—which helps explain why the value of care falls short, given the trillions of dollars spent. Granted, patients aren't widgets, but as they flow through a hospital in particular, certain patterns can be identified, much as in other production systems. Yet although the science of industrial operations dates at least from the late 1800s, the notion that health care could somehow benefit from the same analyses has lagged more than a century behind.

A watershed marking a shift in this sorry state of affairs came in 2004, when The Joint Commission issued its Leadership standard for managing patient flow, Standard LD.04.03.11. The standard charged “leaders” in health care—hospital chief executive officers, trustees, and top administrative officials—with “develop[ing] and implement[ing] plans to identify and mitigate impediments to efficient patient flow throughout the hospital.”* The reason for

the new standard was evident in the emerging literature: When patients aren't “flowing” well through hospitals, the result is overcrowded emergency departments, ambulance diversions, and patients being “boarded” in hallways. There's been an underlying suspicion that these developments have probably worsened patient outcomes. Yet strangely enough for a sector known for clinical science, there has been no real systematic effort to find out if that were so.

This second edition of *Managing Patient Flow in Hospitals: Strategies and Solutions*, edited by Eugene Litvak, Ph.D., highlights why health care leaders must take the issue of patient flow seriously and use proven interventions for managing it. For most hospitals, the 2007–2009 credit crunch and the accompanying recession have at least for now eliminated the option of addressing overcrowding by simply adding beds or other system capacity. (If national health care reform succeeds in slowing the flow of dollars into the health care system, that option may remain off the table for years to come.) This book, through a combination of literature

* The Joint Commission: *2009 Comprehensive Accreditation Manual for Hospitals: The Official Handbook*. Oakbrook Terrace, IL: Joint Commission Resources, 2008.

syntheses, tools and methods, illustrative vignettes, and real-life case studies involving particular hospitals and health systems, clearly explains why leaders must move to better-managed patient flow systems and provides a roadmap for getting there.

Opening chapters by Marilyn Rudolph (Chapter 1) and by Peter Buerhaus and Anne Miller (Chapter 2) set the stage by describing the extent of the problem of patient flow and its impact on staff and patients. Rudolph describes the consequences of suboptimal management of patient flow—that is, patients not being directed in a timely way to the best place in the hospital to care for them. It is self-evident that a patient arriving at the emergency department (ED) with a heart attack who cannot get to a cardiac catheterization laboratory fast enough may face serious danger. Yet even ED patients with less acutely emergent needs who need to be admitted may end up being boarded in a hallway or a postanesthesia care unit simply because an inpatient bed is not available. Many such patients are eventually “internally diverted” or “misplaced”—that is, assigned to a unit or bed where the level of care provided isn’t optimal and “where potential safety issues, such as medical errors,” as Rudolph writes, may occur. As the overload grows, elective surgeries may need to be cancelled because staff can’t keep up. Those patients, needless to say, are frustrated; rescheduling open-heart surgery, after all, isn’t like rescheduling a haircut. At some point, the system may become so bottlenecked that the local emergency medical system is notified that the hospital’s ED will go on “ambulance diversion,” meaning that any incoming emergency patients will be taken to other hospitals instead. Besides being potentially dangerous for patients, these diversions often translate into lost revenue for hospitals.

Peter Buerhaus, a leading expert on the role of nursing in health care, and his colleague Anne Miller, take the story from there. In a fictional but frighteningly realistic vignette, they show how Helen, Mark, and Sue—a nursing supervisor, unit manager, and staff nurse in a community hospital—might respond to planned and unplanned changes in patient flow in the course of a single day. Among the obstacles hurled in their path: surgeons who want to do as many surgeries as possible on Thursdays (presumably because of its proximity to the weekend); other nurses calling in sick; and a sudden influx of victims of motor vehicle accidents due to rainy weather. A “musical chairs” version of patient flow ensues—without the music, and with beds instead of chairs. Nursing overtime hours mount; and Buerhaus and Miller cite studies to remind us of links between heavy nursing hours and poor care. “Given all the events of this day,” Buerhaus and Miller conclude, “it is not unreasonable to suspect that some patients were at increased risk for an adverse outcome” during their hospital stays. To add insult to injury, they add, the nursing shortage, the aging of the nursing workforce, and the declining physical

abilities of older nurses make matters worse.

How to *solve* the problem of patient flow? As Brad Prenney explains in Chapter 3, the starting point is to undertake a “patient flow assessment” that analyzes “patient demand variability,” the underlying cause of the systemic patient flow problems in hospitals. An assessment can enable the hospital to figure out what, if any, aspects of patient demand could be better managed to bring it in line with hospital capacity (that is, personnel, beds). For example, in the maternity ward, women who are giving birth naturally may arrive at the hospital in random patterns, while women being induced or giving birth by cesarean section could be scheduled at specific, manageable times.

Patient flow assessments are not for the data averse. Only by carefully collecting high-quality data will a hospital be able to identify the root causes of suboptimal patient flow—and trump various staff opinions that the problem is the fault of a particular unit, such as the ED. Hospitals need to analyze all sorts of data: admissions and how patients arrive—that is, through the ED, elective admissions, and transfers—what happens while patients are in the hospital (for example, are they boarded in hallways or smoothly transferred to inpatient beds?), and what care consequences ensue. The findings may be numerous and diverse, or they may not. Rest assured that they will “identify questions and issues that require further exploration,” as Prenney states. But don’t rest too much, because any bottlenecks identified are likely to change over time, so that patient flow assessments will have to be redone periodically.

In Chapter 4, Sandeep Green Vaswani teams with Michael Long, Brad Prenney, and Eugene Litvak to show how hospitals can use operations management science to address the patient flow issues now identified in the assessment. They drill down on the concept of variability in patient flow—especially “artificial” variability resulting from issues such as provider scheduling (get those elective surgeries done before the weekend). In fact, they identify “dysfunctional scheduling of elective admissions to a hospital” as the most significant form of artificial variability in patient “demand.” As Litvak has noted, this is counterintuitive. Most ED administrators can give fairly accurate estimates of how many victims of heart attacks and gunshot wounds to plan for on a Wednesday three weeks from now, whereas a surgery administrator, when asked to estimate the number of elective surgery patients for the same day, is likely to have no clue. “Mother Nature,” as he puts it, turns out to be “more predictable than our own actions.”[†] It’s no wonder that ED patients can’t get hospital

[†] Dentzer S: Restructuring the ER, *The NewsHour with Jim Lehrer* on PBS, Jun. 7, 2005. Transcript at http://www.pbs.org/newshour/bb/health/jan-june05/er_6-07.html (accessed Sep. 8, 2009).

beds in a timely fashion on the days when the elective-surgery patients get first crack at them.

According to Vaswani et al., there's only one way to deal with this artificial variability: Eliminate it altogether. In Boston University's Program for the Management of Variability in Healthcare Delivery's three-phase approach to redesigning patient flow management, hospitals must first divide up patients into homogeneous groups (here are the elective surgery patients, here are the unscheduled admissions that come in through the ED, and so forth). Then, they must adopt new elective-surgery schedules that smooth out the flow of patients rather than bunch them up on particular days (for example, Thursdays). Finally, they must accurately estimate the resource needs, in terms of beds and staff, that will be called for at various times on various days. Critical to the entire process are "leadership commitment" from the hospital board of trustees on down and ample investment in project management expertise and data analysis.

If a patient flow management strategy is to be "science based and data driven," as Vaswani and colleagues insist, then Kathleen Kerwin Fuda, in Chapter 5, provides the tools, examples, and general advice regarding what data to collect and how to analyze them. These data form the essential foundation for a hospital's assessment of the current state of patient flow and for its identification and implementation of solutions.

Chapters 6–8 provide case studies of hospitals that have conducted patient flow assessments and then addressed the problems to improve patient flow management. In Chapter 6, a transplant surgeon, Frederick C. Ryckman, and his colleagues at Cincinnati Children's Hospital Medical Center recount patient flow problems at Children's. These problems manifested themselves in care delays and placement of children in suboptimal beds, frustrating families and clinicians. In 2006, Children's tackled patient flow to improve patient safety and increase the efficiency and reliability of care.

Using the methods described in Chapter 4, Children's began by collecting baseline data about patients being admitted. (At the time, there was no automated information system, and data were collected by hand.) Data analysis unearthed a key finding: Elective-surgical cases at Cincinnati occupied 20%–30% of the pediatric ICU beds, constituting a "significant and extremely variable portion of daily admissions and discharges."

The smoothing-out process began—again, according to the recipe, by identifying groups of similarly situated patients. Specific operating rooms were set aside each day for urgent and emergency cases, and a dedicated surgeon was appointed during these times

to handle them. The scheduling of elective surgeries was revised. Surgeons worried that the changes would cost them patients and revenues, or that the new "block" times would get in the way of their office hours or academic commitments. However, the actual outcomes were almost universally positive. Because *more* elective surgeries were done, not fewer, revenues from 2006 to June 2008 increased by 34%. Waiting times for patients decreased sharply; so did overtime hours for nurses. And, *mirabile dictu*, there was a "culture change in the surgical provider environment, improving mutual accountability, open communication, and team mentality."

Chapter 7 describes how Kaiser Permanente's hospital in Anaheim, California, turbocharged its efforts to improve patient flow from 2008 on. January 2008 marked a recent low point at the institution; the hospital's ED was on diversion for 302 hours, patients were boarded in the ED for 55 hours, and 1.8% of patients who came to the ED were so fed up with the wait that they went LWBS (that is, left without being seen). A widely held belief among staff was that backups in getting patients admitted to the ICU was the source of the institution's problem. Once again, a thorough data analysis pointed to different culprits, including the time it took to transfer a patient from the ICU to a bed on a medical/surgical unit. Shockingly, it seems, one unintended consequence of a move to electronic health records was that it could take as long as 20 hours for an ICU nurse to become aware that a physician had ordered a patient to be transferred out of the ICU.

A series of interventions, devised by a broad-based team that included frontline workers, succeeded in markedly cutting the average transfer time and sharply reducing variation in patient flow. Meanwhile, in a related effort, the hospital tackled another problem: speeding up patient discharges from the medical/surgical floor. A key intervention here turned out to be largely a matter of common sense. As soon as patients were admitted, nurses started asking them if they had alternate options for getting a ride home on the expected day of discharge. Partly as a result, average discharge time decreased by 26% from the first quarter of 2008 to the comparable period in 2009. (Aficionados of Southern California traffic will not be surprised to learn that transportation delays remain the most frequent cause for discharge delays from the hospital.)

Chapter 8 describes the patient flow experience at Northwest Community Hospital in Chicago's northwestern suburbs. The hospital had long struggled with patient flow problems and attempted various approaches for dealing with them, to little avail. In 2007, a new emergency department medical director—evidently one named Mike, and with a good sense of humor—drew up a chart showing the tortuous, unorganized, and

uninformed-by-data process that ED personnel had to undergo to locate a bed in the hospital for an ED patient. (The chart was soon named “Mike’s ‘Dancing with the Bed Czars.’”) Patients, it seemed, had to be “pushed” through the hospital as staff tried “to coordinate a complex series of events on a schedule impossible to meet.” The hospital concluded that, instead, patients should be “pulled” through the hospital, with the institution functioning as an overall system rather than as a series of discrete, and frequently warring, units.

For all the fancy theory of operations management science, the approach Northwest used was decidedly low tech. A standardized form was developed for ED personnel to request a bed. A fax line was installed so these forms could be faxed to the office of a “capacity coordinator.” The hospital had no electronic bed board, so bed availability was tracked on a spreadsheet that could be viewed throughout the day on a shared computer drive. A new task force and special color-coded system was developed to provide hospitalwide alerts about looming peaks in demand. Data-driven patient flow assessments yielded valuable information on wait times, including a wide variation in when surgeries that were supposed to start at 7:30 in the morning actually got under way.

After undertaking a series of interventions, Northwest succeeded in achieving some goals and—importantly—sometimes just keeping things from getting a whole lot worse as patient census rose. Readers should come away with a fuller understanding that flow is a complex technical problem that can be far better managed than it typically is—starting, of course, with the basic approach of finding out what really is happening in the hospital.

As I write this Foreword in September 2009, it is difficult to discern the bigger picture of health reform legislation and how it may reshape health care in the United States. What is self-evident, however, is that whatever the nature and course of health reform, changes in health care delivery—within and across hospitals and other health care organizations—will be constant and ongoing. Most of those changes will take place well outside the legislative arena. Happily enough, as this book makes clear, making individual hospitals safer and far less frustrating places for patients, better places to work, and vastly more efficient users of the nation’s health resources are all within our grasp.

Susan Dentzer

Editor-in-Chief, *Health Affairs*, and Health Policy Analyst, *The NewsHour with Jim Lehrer*, PBS TV

Introduction

Eugene Litvak, Ph.D.

Emergence of Patient Flow Management

If 10 years ago or so you had searched for “patient flow” on the Web, you would probably have received 100 or so URLs. Today this number exceeds 300,000. The burgeoning growth in interest in patient flow, as also seen in the emergence of a large literature, reflects widespread recognition that it is a critically important aspect of the health care delivery system in the United States and indeed throughout the world. The reasons for this interest are well known—crowded emergency departments (EDs) and excessive patient waiting times there and elsewhere, limited access to care, heavy workloads for nurses and other staff, scarce health care workforce resources, and skyrocketing health care costs. The importance of patient flow cannot be overestimated, especially in light of the current push for health care reform in the United States, because only by addressing patient flow issues can we simultaneously improve the quality and reduce the cost of health care.

The Institute for Healthcare Improvement has played a pioneering role in promoting and disseminating innovations in patient flow management.¹ The U.S. General Accountability Office, the investigative arm of the U.S. Congress, gave a strong boost to recognition of the importance of the patient flow concept in two

reports, the first issued in 2003² and the second in 2009.³ The more recent report indicates, for example, that the average wait time to see a physician for emergent patients was 37 minutes, more than twice as long as recommended, and that a lack of access to inpatient beds reflects competition between hospital admissions from the ED and scheduled admissions for elective surgeries. Yet it is The Joint Commission’s accreditation standards that are likely the most important factor in the emergence of patient flow as an urgent concern in the health care industry. The Joint Commission’s Leadership standard for managing patient flow (now Standard LD.04.03.11⁴) issued in 2004, called on hospital leaders to “develop and implement plans to identify and mitigate impediments to efficient patient flow”^{5(p. 14)} throughout the hospital. Elements of performance for the Leadership standard specify, for example, that the hospital has processes that support the flow of patients throughout the hospital and uses measures of specified components of the patient flow process to assess and improve patient flow management.⁴

Purpose of This Book

This book, *Managing Patient Flow in Hospitals: Strategies and*

Solution, second edition, is a complete revision of its predecessor, *Managing Patient Flow: Strategies and Solutions for Addressing Hospital Overcrowding*.⁶ Building on the growth of theory and practice in the intervening five years, this new book provides hospitals with scientifically grounded methods to optimally manage patient flow.

Overview of Content

This book, as described by Susan Dentzer in the *Foreword*, provides a combination of literature syntheses, tools and methods, illustrative vignettes, and real-life case studies. Two of the five tutorials—Chapters 1 and 2—describe the problem of patient flow and the impact of patient flow issues on staff and patients.

The assessment and improvement strategies presented in Chapters 3 and 4 provide detailed guides on how to conduct a comprehensive assessment of patient flow and on how to use the results to identify strategies to better manage patient flow. These strategies are based on variability methodology (VM), a nonproprietary methodology developed and field tested by the authors. As Vaswani et al. state in Chapter 4, “Eliminating variability where you can and optimally managing it when you can’t eliminate it is the fundamental starting point of optimally managing patient flow.”^(p. 60) Chapter 5 provides an inventory of “the right data, measures, and analyses” on which to base measurement and improvement. Accuracy of operational data is as critical to patient flow management as is accuracy of clinical data to patient care management. The readers will find some overlap among the chapters, particularly Chapters 3–5, which reflects the interrelated nature of the issues and methods at hand and the fact that most of the content represents the authors’ collaborative work at the Boston University Program for Management of Variability in Health Care Delivery (MVP). This work is being further developed by four of these five authors at the newly created Institute for Healthcare Optimization (see <http://www.ihoptimize.org>). Chapter 4 provides a scientific yet very practical step-by-step guide to re-engineering patient flow. As noted in the chapter, implementing the recommendations is predicated on a hospital’s resources for operations data analysis, clinical expertise, and organizational change management. Attempts to “make things easier” by not sufficiently addressing one of these components are to be discouraged—for example, as in designating an operating room for unscheduled surgeries without ensuring the availability of surgeons.

Finally, Chapters 6–8 provide detailed case studies that illustrate how three hospitals have used the measures and strategies depicted in Chapters 3–5 to successfully improve patient flow.

Who Should Read This Book?

This book will help anyone who leads or is otherwise involved in his or her hospital’s efforts to improve efficiency and the flow of patients, such as the chief executive officer, chief operating officer, chief medical officer, and chief financial officer; as well as medical officers, nursing leaders, board members; medical officers; physicians, nurses, and other clinicians; quality, process improvement, and productivity managers; emergency department, surgery, critical care, and inpatient unit managers; and medical directors. Yet although this book draws on theory and practice as applied to hospitals, the patient flow management methods and tools could also be adapted to ambulatory care organizations and any other nonhospital setting. After all, all health care organizations face the challenge of balancing capacity and demand at every step in the care delivery process.

Reflections

Is reading this book *sufficient* to manage patient flow in a hospital? The answer is no. Nor would a single book enable one to become a mathematician. Is this book *necessary* for you to read if your area of expertise is patient flow—or, say, emergency nursing, finance, or quality of care—or if you are a busy health care executive or unit manager? Absolutely! Applying the patient flow management methods and tools described in this book can help to ensure that patients receive timely, high-quality care; to streamline busy EDs or ICUs; to improve nursing workloads; and to safeguard the organization’s overall financial “health.” These methods and tools can address patient flow problems across a wide range of settings, such as for-profit and not-for-profit hospitals and academic and community hospitals. Yet this is not a “one-size-fits-all” book. Before applying the specified strategies and solutions, conduct a comprehensive assessment to determine the unique nature of the patient flow problems at your own organization. Nor should you adopt solutions without careful consideration. For example, if you were the operating room (OR) manager or chief of surgery in a single-OR, 50-bed hospital, you would not want to reengineer your OR. Your main objective would be to investigate the source of your elective admissions, smooth these admissions, and then calculate the number of beds needed for your unscheduled medical admissions—as opposed to, say, the approach pursued by a large hospital such as Cincinnati Children’s Hospital Medical Center (Chapter 6).

The issues discussed in this book are particularly important today as we grapple with the dilemma of how to improve access to care while simultaneously reducing health care costs. Unless we give up one of these goals, the only solution is to improve the

efficiency of the health care delivery system so that it can serve more people with existing resources. Because efficiency depends in part on efficient management of patient flow, this book should contribute to solving the health care dilemma.

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