WALLACE J. HOPP WILLIAM S. LOVEJOY

HOSPITAL OPERATIONS

Principles of High Efficiency Health Care

Co-authored with Jeffrey Desmond, MD; Christopher Friese, RN, PhD; Stephen Kronick, MD; Michael Mulholland, MD, PhD; and Jeffrey Myers, MD

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To Melanie, Elliott, and Clara
—Wallace Hopp

To Lois and Julia
—William Lovejoy

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Wallace Hopp

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1

INTRODUCTION TO HOSPITAL OPERATIONS

1.1 Stakeholders' Perspectives

Thursday March 25, 2010, 8:46 p.m.

"#@%&*)^%#@!" Dr. Nate Greene swore as he clanged an easy layup clumsily off the rim.

Greene was an emergency physician from University Hospital who joined several of his medical colleagues to play basketball on Thursday evenings at a local elementary school gym. Because swearing was almost as rare as defense at these games, one of Greene's teammates, orthopedic surgeon Dr. Ben Arnold, took notice. When the game ended and the players began leaving the gym, Arnold hung back with Greene.

"You okay?" he asked. "You seem a bit off tonight."

"Aw," Greene groaned. "My layups were just bricks tonight."

"I don't mean your shooting. That's always terrible." Arnold smiled. "But you seem kind of distracted tonight."

Greene dropped the basketball banter and grew serious. "A woman I treated in the Emergency Department died in the hospital this morning. Bowel obstruction."

"Mmmm." Arnold commiserated. "That's tough."

"I knew her a little." Greene continued. "She was taking care of both her elderly parents and a handicapped son. The family is completely devastated."

"That is sad," agreed Arnold. "But when it's your time…"

"But that's just it." Greene's voice rose. "I'm not sure it *was* her time to go."

"Oh, oh. Did somebody screw up?" Arnold winced. "The surgeon?"

"No, not exactly." Greene rubbed the basketball in his hands abstractedly. "I've been thinking about the case all day and I can't put my finger on an outright error anywhere in the process. But we were slow at every step. The Emergency Department was crammed on Monday as usual, so she waited a long time. It took a while to get the CT scan and even longer to get the report. By the time we realized it wasn't a virus, we'd already lost a day. Then the operating room was full, so it was another day before we got her on the schedule and a half day of delays after that. By the time they opened her up, there was no hope." Greene dropped the ball and his voice. "I can't help thinking that if we had been faster, she'd still be here."

"Then it was the system that failed!" Arnold picked up the ball and began thumping it on the floor. "Every one of the people on the case did his or her job. So blame the hospital, not the people in it."

"What are you talking about?" Greene grabbed the ball back and heaved up a shot that missed the rim by more than a foot. "The hospital *is* the people in it. We control what goes on there. So if it failed; we failed."

"Are you kidding?" Arnold jeered, and not just about the wild shot. "Nobody controls the hospital. It's too big, too complicated, and too set in its ways. That's why I'm leaving."

"What!" Greene had taken a step to retrieve the ball but stopped and turned to face Arnold. "Where are you going?"

"I've signed on with Andry Ortho," Arnold replied. Nicolas Andry Orthopedic Surgery Center was a small physician-owned specialty hospital founded several years ago by a group of physicians from University Hospital. Greene was aware that the facility had undergone an expansion at the beginning of the year, right before the health care bill put a ban on further growth of physician-owned hospitals. But he didn't know that Arnold had been considering joining them.

"Are you an owner?" Greene asked incredulously.

"Well, I have a piece," Arnold admitted. "But it's not the money that sold me. It's the fact that the docs run the place. The hospital is small, simple, and new. We run on schedule. The IT system actually works. We can practice medicine instead of fighting the bureaucracy. The kind of system failure you had today won't happen to us."

"That does sound pretty good." Greene recovered the basketball and flipped it to Arnold.

"You should join us." Arnold launched a perfect jump shot that swished neatly through the center of the net. "We've been staffing the emergency facility with specialists, but demand has grown to the point where we could use a real Emergency Department doc. Specialty hospitals are the way of the future."

"Hmmm…" Greene mused softly. "I'll think about it."

1.2 A Metaphor for Hospital Operations

Recently, an estimated 20,000 people from the community turned out for the grand opening of an architecturally and aesthetically stunning new children's hospital. As they streamed through the sparkling entrance, the enchanted visitors were struck by the success of the design in captivating the young. Wide-eyed children stared at dynamic sculptures and mixtures of professional and elementary school art. Upbeat colors and vaulting spaces gave reassurance that this was a place to get well. Operating rooms (ORs) were large and flexible, inpatient rooms state of the art. Panoramic views of the surrounding trees and rivers inspired parents and children alike. The site even contained an onsite hotel to enable parents to stay close to their sick child, and the Neonatal Intensive Care Unit (NICU) had convertible furniture to provide sleeping accommodations for parents who could not emotionally tolerate even a few floors of separation.

Unfortunately, however, many visitors never saw the full wonder of the new hospital. Stairwells had been closed off during the open house for safety reasons, and only the central elevators were operational. Insufficient elevator capacity led to long lines on every floor. Worse, although eager guides were positioned throughout the hospital to answer questions, neither they nor the signage steered people along the planned route from top to bottom. The resulting random traffic patterns served to further aggravate the congestion. Frustrated with their inability to move from floor to floor, many people gave up and went home.

This (true) story is an apt metaphor for modern hospital operations. Infrastructure and equipment are exquisite, but flows are ill-designed and confused. Visible capital assets are awe inspiring, but invisible processes are frustratingly inefficient. Technology is state-of-the-art, but management is not. People are dedicated and knowledgeable in their fields, but they are largely unaware of operations. The net result is a system that performs far below the sum of its parts.

But it need not be like this. Just as there is a science of medicine that guides the treatment of patients, there is a science of operations that can and should guide the design and management of hospitals. For example, the physics of flows implies that it is impossible to respond quickly to highly variable demand without surplus capacity. In an acute care hospital, patient arrivals are highly variable, both over time and in levels of severity. Capacity, in the form of nurses, physicians, and high-tech equipment, is costly and therefore not installed in abundance. So the delays that are prevalent in hospitals are completely predictable.

Fortunately, the physics of flows also tells us that when resources are busy, with long queues of patients and other tasks waiting for attention, even small capacity enhancements or demand reductions will yield disproportionately large returns. That is, a little bit goes a long way. Modest increases in staffing, improvements in resources, and efforts

to eliminate waste, if applied in the right places, can achieve major improvements in responsiveness. These insights can be used to speed the flow of visitors through a new hospital or the flow of patients through an existing one.

In this book, we define, explain, and apply management principles related to physical flows, decision making, quality, and human behavior. These principles encapsulate essential insights about management that can be used throughout the hospitals of today to significantly improve responsiveness, throughput, quality, patient satisfaction, and financial viability. But, because principles are by their nature timeless, they also provide the conceptual building blocks for ultra-high performance hospitals of the future.

1.3 Health Care in Crisis

Few things affect our quality of life more than health, so few issues are more important than health care. But, while we often speak of it as such, health care is not a single, monolithic topic. It ranges from delivery of basic public health in the poorest regions of the globe to stimulation of scientific breakthroughs in the advanced research laboratories of the world's wealthiest nations. As such, health care is too vast a subject for any single book. In this one, we focus specifically on a key part of the health care system: hospitals in developed countries. In addition to constituting a significant percentage of total health care expenditures, these hospitals are central to the delivery process, which makes them candidates as catalysts for improvements in the quality and efficiency of the overall health care system.

Compared to other developed countries, the United States spends significantly more on health care. Exhibit 1.1 shows that health care consumes 17.6% of the gross domestic product (GDP), which is 47% more than the next highest country (The Netherlands, at 12%) in the OECD (Organization for Economic Cooperation and Development, consisting of 34 largely developed countries). Exhibit 1.2 shows that the per capita expenditure in the United States is $8,233, which is more than double the OECD average of $3,268 and significantly higher than the next most profligate country (Norway at $5,388).

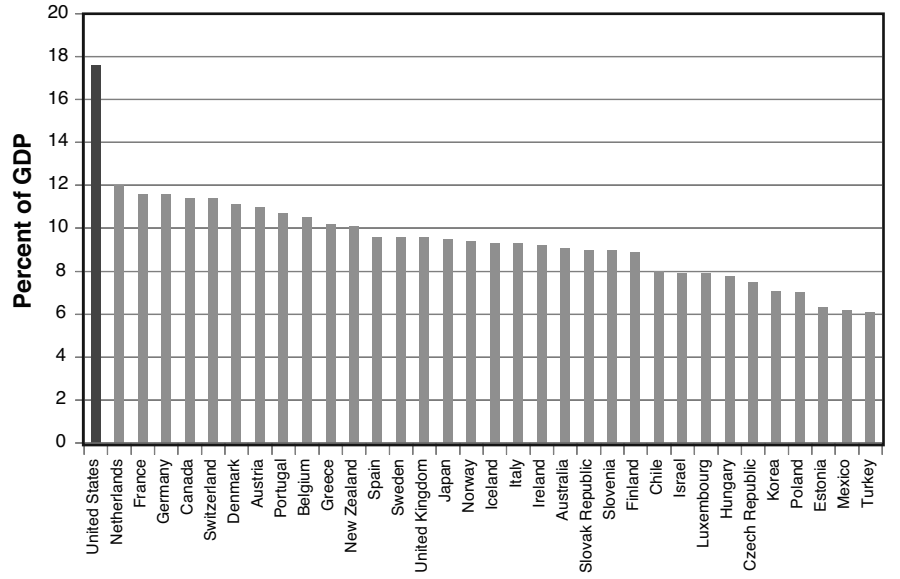

Exhibit 1.1 Health expenditures as a percent of GDP, 2010 or nearest year.

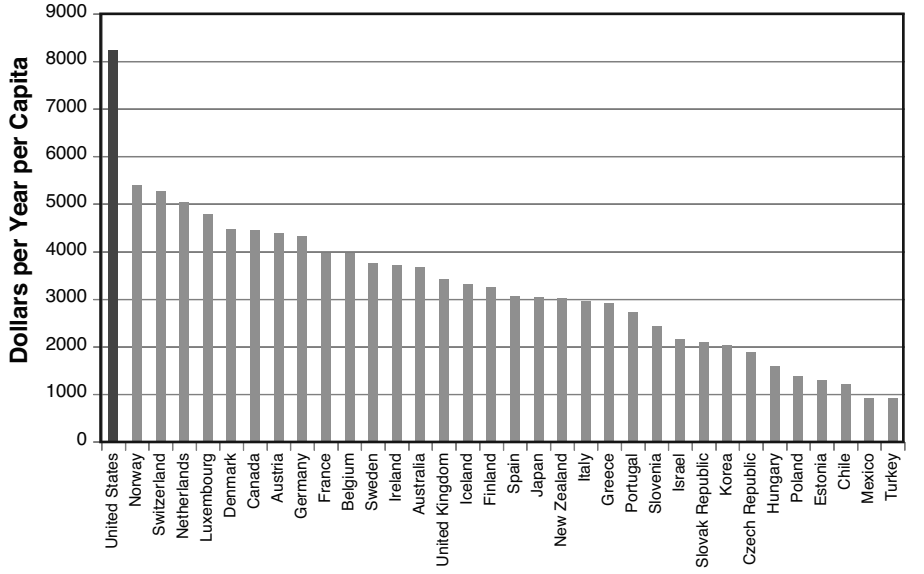

Exhibit 1.2 Health expenditure per capita, US$ PPP[1], 2010 or nearest year.

As high as these costs are now, projections are for U.S. health care costs to escalate significantly in the future. The U.S. Department of Health and Human Services predicts that health care will consume 19.8% of GDP by 2020 (CMS 2011). The high cost of health care, and particularly the gap with the rest of the world, threatens the competitiveness of the U.S. economy.[2]

Financial costs are not the only cost dimension along which the United States fares poorly; America's current health care system imposes costs beyond expenditures. Almost 50 million Americans (16% of the population) are uninsured, and even more are underinsured. The United States, Mexico, and Turkey are the only OECD countries without some form of universal health coverage (OECD 2008). What is the "cost" of the anxiety of nonwealthy Americans wondering if they will be bankrupted by a single major medical event? What is the social cost of the labor frictions injected into the economy when people hold onto jobs they don't like and are ill-suited for, simply because it is the only way they can get affordable medical coverage? When vibrancy in the economy is commonly tied to entrepreneurial start-ups and small businesses, what is the social cost of tying affordable health insurance to employment by large companies? These issues place an even bigger burden on the U.S. economy than that indicated by direct costs alone.

While the United States spends much more on health care than any other country in the world, we do not get a good return on our investment. Exhibit 1.3 shows life expectancy in the 34 OECD countries (2010 data). The United States is below the OECD average and lower than all the OECD countries except the Czech Republic, Poland, Estonia, Mexico, the Slovak Republic, Hungary and Turkey. It is also well below the leaders (Japan, Switzerland, Spain, and Italy). Exhibit 1.4 shows infant mortality in the OECD countries, and again the United States does not fare well, with rates above the average and higher than all but Chile, Turkey, and Mexico. Also, although insured Americans experience shorter wait times for elective surgeries than citizens of many other countries, the percentage of people able to see a doctor within 48 hours is lower in the United States than in Australia, France, Germany, New Zealand, the Netherlands, Switzerland, and the UK according to a Commonwealth Fund (2010) survey.

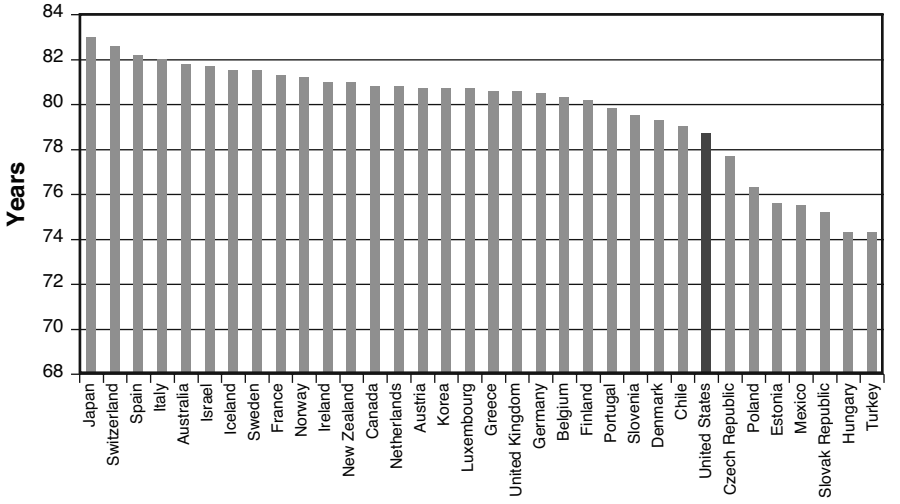

Exhibit 1.3 Total life expectancy in OECD countries, 2010 or nearest year.

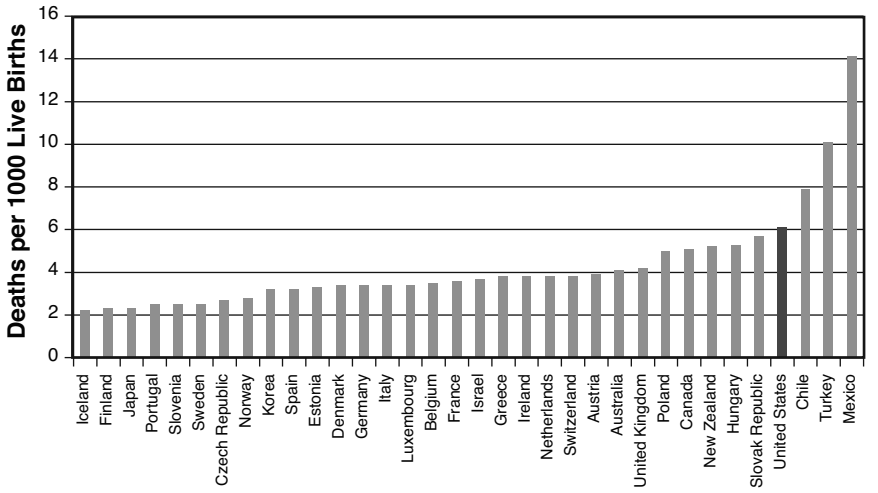

Exhibit 1.4 Infant mortality (deaths per 1,000 live births) in OECD countries, 2010 or nearest year.

The U.S. health care system does some things very well, as evidenced by the fact that some people travel great distances to come here for treatment. However, such "medical tourism" travel is typically for advanced procedures at the highest end of the health care spectrum, in which the United States excels. It is not exotic procedures for the rich that drive our embarrassing macro-statistics; it is in the inefficient (or absent) delivery of basic care (both prevention and cure) for the general population. The benefits of superior health care are not distributed evenly in the U.S. population, where death rates tend to correlate with income, race, and education (see Anderson et al. 2007, Barr 2008). To address this imbalance, we do not need more exotic procedures. We need a rationalization of basic care delivery. In this book, we focus on that rationalization within hospitals.

1.4 A Focus on Practice

Hospitals are part of a larger health care system in the United States, which has been shaped by a complex and often contradictory public policy structure. Fundamentally, health care policy debates revolve around this basic question: What is the appropriate political and economic structure for the promotion of health and health care in the country? Whether this is a centralized system with single-payer prices set by committee, a decentralized system with prices determined by a market, or anything in between, the debate tends to abstract away from actual hands-on medical practice. This abstraction is a dangerous oversimplification. All the value in any conceivable system is only realized in the actual delivery, when hands touch patients. Everything else is prelude. The closer

we get to this all-important transaction, the more immediate the returns on our investment will be.

Pundits gloss over the health care delivery process because they assume that if incentives (prices, rewards, costs) are set correctly, the rest will follow as people rationally respond by consuming more of this, less of that, and so on, reaching the desired allocation of resources and consumption. This faith is unfounded. "Correct" incentives are necessary but insufficient for efficient operations. Different firms routinely respond to the same market environment with very different internal organizations, policies, and practices. For example, the Toyota Motor Corporation revolutionized the way production is managed globally, with no significant differences in the prices or incentives it was facing relative to competing automobile companies. Granted, Toyota served a Japanese market (smaller in volume, but still demanding high variety) and was located in more rural settings where cynical models of management and labor did not hold sway. These differences may have facilitated, but cannot fully explain, the rise of the Toyota Production System, now known as "lean" or "just-in-time" production. Rather, a combination of individual genius (and near fanaticism) by one individual, Taiichi Ohno, a supportive management structure, and two decades of trial and error led to innovations that greatly enhanced the efficiency and competitiveness of Toyota. The company simply found a better way to do things. This sort of process innovation makes it possible to do more with existing resources or to achieve the same level of output using fewer resources.

In general, external incentives influence, but do not determine, outcomes. What takes place within the hospital, and how well internal processes are managed, governs how efficiently and well patients are served. Simply put, there are many ways to manage internal processes, and some ways are better than others. It is this observation that motivates this book. We seek to provide a framework for identifying the causes of inefficiencies and the path to improvement for hospital operations.

The potential social gain is significant. Hospital expenditures (including inpatient and outpatient hospitals, Emergency Departments [EDs], and ambulatory surgical centers) account for 36.3% of total health care expenditures in the United States (Exhibit 1.5). Improving these operations can have a major impact on the total social cost and benefits of our health care system. It is commonly assumed in consulting circles that if a system grows up in an ad hoc fashion, bringing some rationalization to its design can easily reduce costs by 10% or more. Applying this logic to the $2.1 trillion in health care expenditures in 2009 (of which 36.3% are spent on hospitals), we estimate that rationalizing hospital operations has the potential to achieve annual savings of at least 10% of 36.3% of 2.1 trillion, or $76 billion. We expect that the actual upside potential is significantly higher, because in the authors' experience internal processes in a typical hospital are less mature than those in most other industries.

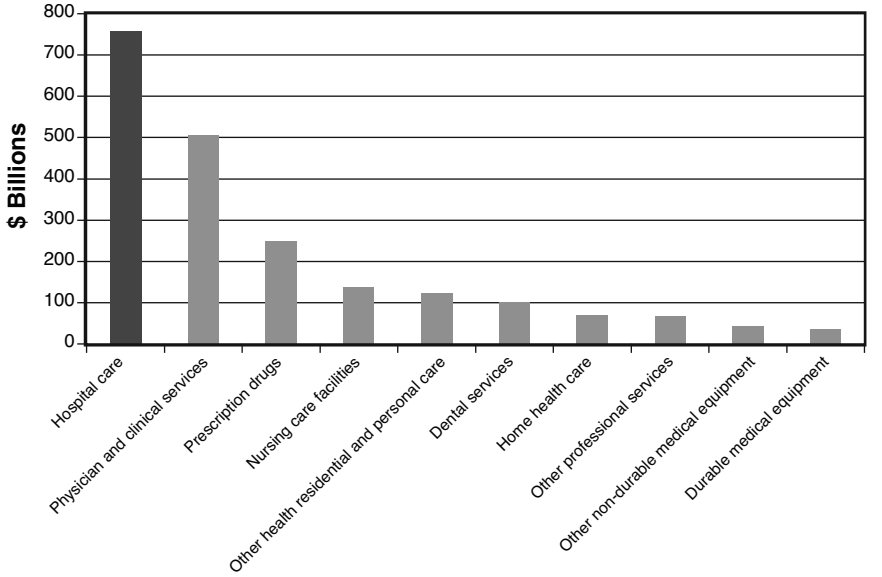

Exhibit 1.5 How to spend $2.1 trillion.

1.5 The Time Is Now; The Tools Are Known

People have voiced the need for health care reform in the United States for years, but no significant changes have been able to get past the political and organizational hurdles to implementation. However, there is evidence that we are finally in a critical transition phase where inaction is not an option. The economic surpluses that historically masked our inefficiencies are disappearing, and the various binders that hold the entire system together are straining to the point of failure.

1.5.1 The Unraveling

The surpluses masking our inefficiency are no longer affordable.

One advantage of surplus resources that accrue in a rich economy is that they can mask inefficiencies. Excess resources can, in general, cover for inefficient management and organization. For example, a firm with a substantial excess capacity can continue to serve customers well even if it uses that capacity inefficiently. In a rich economy, patients can happily enjoy continuity of care even with inefficient health care processes. However, when surpluses dwindle, those excesses are no longer affordable and must be removed, exposing the inefficiencies in the underlying process.

The United States has emerged from a post-war era in which it was the dominant economy on earth, and it has entered an era in which competition is fierce from multiple continents. The natural surpluses that characterized the United States over the past 50 years are no longer automatic. The retirement of post-war baby boomers will soon place an increasing load on the nation's health care system, which already consumes too much of the country's GDP. In short, we can no longer afford to ignore our inefficiencies. Our economic future, and indeed our very lives, are at stake.

Our reliance on values is at risk.

Health care policy debates in the United States tend to oscillate around the proper role of personal responsibility for one's own fate and the obligation of society to care for those who cannot care for themselves. Sometimes this debate devolves into a "markets" versus "socialism" caricature, which remains unresolved because neither works in pure form. Markets will visit the highest costs on the sickest people, who will therefore die if they are poor. This is socially unacceptable. Yet, universal coverage without individual incentives leads to overuse of expensive resources and produces high levels of avoidable waste. This is unaffordable.

These natural and unresolved tensions have resulted in a complex potpourri of reimbursement structures for hospitals and physicians. To serve patients in this bewildering environment, the industry has relied more than most people realize on its people being guided by principles that transcend the sometimes perverse incentives they face. This is, after all, a profession that deals with life and death, and therefore ethics. Before the government assumed responsibility for health care, charities provided care, or doctors charged based on ability to pay. That is, society expressed its values in organic rather than formally legal ways. This continues today through free clinics, volunteerism, and hospitals incurring (on average in the United States) 6% of their total expenditures providing care for people who cannot pay for it.

Further, the professional code of doctors is one that puts the patient first, and patients put some faith in this code when seeking medical care. Indeed, overt pursuit of profits in the medical arena arouses suspicion and antagonism on the part of patients when choosing physicians, or referring physicians when choosing hospitals. As Arrow (1963) observed, "The social obligation for best practice is part of the commodity the physician sells, even if it is a part that is not subject to thorough inspection by the buyer."

Not surprisingly, trust plays a more critical role in health care interactions than in other business transactions. We expect our doctors to act in our best interests, more than we expect the sellers of other services to do so. Insurance companies can ask patients to get physical exams to reduce the information asymmetry between themselves and patients, trusting an honest report from the physician. Given the convoluted and often opaque reimbursement jumble that hospitals face from multiple insurers and Medicare/Medicaid, hospital administrators could slavishly maximize profits by

exploiting accounting confusions at the expense of patients and society at large. Yet we trust them not to. This system does not work perfectly, but trust and professional conduct that transcend the profit motive are central features of current health care markets. To date, values-based behaviors in medicine have been sufficient to keep the wheels from falling off this wagon.

This values-based glue is now coming under increased stress as economic surpluses disappear. Uninsured patients who cannot pay for their care are still cared for in hospital emergency rooms, but the cost of their care has to come out of a buffer of resources somewhere in the hospital-insurance-customer system. As buffers become unaffordable, the mere presence (or not) of an emergency room can become a matter of fiscal survival for hospitals. A 2011 report by the American Medical Association (Hsia et al. 2011) noted that urban and suburban areas have lost more than a quarter of their ED capacity over the past 20 years. EDs are more likely to close if they provide a lot of uncompensated care, are in for-profit hospitals, or are in competitive markets where margins are thin.

"Safety net" hospitals, which provide care for people who cannot access it anywhere else, are increasingly at risk. The travails of one such hospital, Grady Memorial Hospital in Atlanta, are not unique. Grady almost closed its doors in 2007, and since that time it has continually struggled to balance its social mission with financial realities. Grady remains dependent on outside funding (for example, federal funding for indigent care) that is increasingly at risk (Williams and Schneider 2011).

It is a unique feature of the health care industry that hospitals often do not want a competitor to close. If a hospital providing a significant amount of uncompensated care closes, nonpaying patients will either get no care (and die) or show up in the EDs of other hospitals. Hospitals like Grady have been kept afloat by financial transfusions from the outside because everybody realizes the consequences if they close. But this is more reactive crisis management than proactive rational policy. The reliance in the United States on values and charity will come under increasing stress as financial realities become more pressing.

Further, as doctors' salaries stagnate, the temptation to shade decisions, consciously or not, toward profit maximization becomes stronger. Nallamothu et al. (2007) studied the rates of various coronary procedures in specialty hospitals relative to general hospitals. Specialty hospitals provide care limited to specific medical conditions or procedures, and two-thirds of Medicare payments to specialty hospitals are related to heart conditions. There are arguments based on both physics and economics that can justify the spinning off of specialty hospitals from general hospitals, based on economies of scale and concepts of a "focused factory" (see Skinner 1974 and Chapter 6 of this book). However, critics claim that specialty hospitals focus primarily on low-risk patients and provide less uncompensated care than general hospitals.

Nallamothu et al. found that the frequency of three key coronary procedures was higher in regions after the opening of a specialty hospital when compared with the opening of new cardiac programs in general hospitals. The authors did not comment on the appropriateness of the procedures, but their findings raise the concern that procedure utilization in specialty hospitals was higher than one might expect based on medical need alone. The authors state in their conclusions that, "Among the potential mechanisms underlying our findings, the most concerning is physician ownership." Physician ownership allows physicians to collect not just their professional fees, but a share of the facility fee as well, creating a potential conflict of interest between the physician's financial incentives and a patient's clinical needs. Estimates of physician ownership of cardiac specialty hospitals range from 21% to 49%, and hospitals are currently exempted from anti-kickback laws that prevent referral of patients to facilities in which physicians have a significant financial stake. Although we cannot say for certain that economics is trumping values in these instances, we can conclude that values will be increasingly stressed as the economic climate becomes more challenging.

A similar concern applies to the rise of ambulatory surgical centers (ASCs) in the United States. An ASC performs surgical procedures that do not require hospitalization (for example cataracts, some knee and ear surgeries, and colonoscopies). Between 2000 and 2007, the number of such facilities increased by nearly 50%. This growth was largely financed by physician-owners, who had a financial stake in 83% of them and complete ownership of 43%. Hollingsworth et al. (2010) found that physician-owners, on average, had higher caseloads and operated on healthier (fewer accompanying health conditions) and better insured (more private and Medicare, less Medicaid) patients. Further, physicians who started as nonowners and became owners during the study period increased their caseloads after ownership. As always in such complex territory, there could be reasons for these results unrelated to financial incentives. But results like these raise concerns that physician-owners may increase caseloads beyond what is clinically necessary and route the lowest risk and most well-insured patients to their own facility, leaving the rest to be treated in a general hospital. This, of course, will increase the financial stress on the general hospital, decreasing its ability to manage their higher risk, lesser insured patients.

It is difficult to overstate the consequences if profit-maximization comes to dominate historical values in medical practice. The rush away from the poor, sick, and uninsured will accelerate, like a game of hot potato in which each party tries desperately to pass the ball. The cracks in the system are already beginning to show and will only get worse as baby boomers age.

As policy makers argue, there is a crisis to be met. Fortunately, with or without coherent leadership at the federal and state levels, we can do more with our current resources within hospitals. As the economic surpluses that have masked high levels of inefficiency

disappear, hospitals must begin an evolutionary process that we have seen in other industries. These prior experiences have revealed general principles that can serve as tools with which we can manage this process.

1.5.2 The Tools Are Known

There is a famous scene in the film *Apollo 13* in which an engineer dumps a pile of spacecraft parts and materials onto a desk and demands that the team make a CO_2 filter out of them. The situation they faced was new, and conditions under which the filter would have to operate were uncertain, but the basic building blocks they had to use were known. Hospitals face an analogous situation, in which the policy structure that society will adopt is uncertain, but there are known tools, the principles of management, available with which to craft a response. These principles and their application to management challenges are what this book is all about. We articulate and apply concepts that will stand the test of time so that hospitals can excel regardless of the policy regime to which they are subjected. We will say more about which tools apply in which environments in Chapter 6, after we lay the building blocks in the context of existing hospitals. Appendix A provides a standalone summary of the management principles that we employ. This can be read as a basic management primer or consulted as a reference for the problem-oriented chapters.

1.6 Principles-Driven Management: Marrying Theory and Practice

The skill and judgment of experienced clinical practitioners is critical to quality outcomes. Yet it would be a mistake to rely on clinical experience alone, unsupported by theory, to advance the field. We could watch a surgeon all day without understanding why she is doing what she's doing. To understand the "why" behind the "what," we would need courses in chemistry and anatomy, physiology and neurology. Modern medical practice relies heavily on science.

This was not always the case. For example, doctors used leeches in ancient times for all manner of maladies (even headaches) without any scientific basis. As long as some patients got better, doctors continued to use leeches. But with only experience as a guide, outcomes were unreliable and usage of leeches steadily declined. However, more recently, science demonstrated the anesthetic and anticoagulant features of leech saliva, and modern circulatory theory helped explain when using leeches (or genetically engineered equivalents) might be beneficial and when it would be foolhardy. As a result,

leech usage has made something of a comeback. Theory tells us why things work as they do, and by so doing both explains practice and provides us with the tools to improve it.

A *theory*, according to *The American Heritage Dictionary* (1985 edition), is "systematically organized knowledge applicable in a wide variety of circumstances, especially a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict or otherwise explain the nature of behavior of a specialized set of phenomena." Practice without theory is just trial and error, with no guiding principles beyond what "seems to work." At the same time, theory without practice is ultimately sterile. In academic disciplines, it is a constant temptation to develop theories on theories, moving ever further into the sterile realm of abstraction and away from the real world of actual practice. Yet, it is practice that directly adds value to people's lives. The best theories are focused on informing real problems that real decision makers face.

Theory development involves separating out phenomena that are idiosyncratic to a certain narrow context from those that are more universal in application. The latter can be expected to stand the test of time, more so than any particular practice. Some theories are more predictably accurate (most laws of physics can be counted on to hold and to predict outcomes) than others (theories of human behavior are less reliable given the open-ended and evolving nature of human understanding and culture). But, in all cases, researchers seek guiding principles that provide fundamental understanding, inform practice, and give us the tools to improve outcomes. As new diseases, risks, and contexts evolve over time, practice can become obsolete. Theory, however, is semipermanent and should apply in circumstances old and new. Theory can therefore provide guidance in new territory, which is why we need it now.

In this book, we strive to marry the worlds of theory and practice by taking a principles-driven approach to hospital management. We identify key hospital management challenges, and for each we base potential responses on general principles that can be relied on to be applicable in a variety of circumstances and help predict or otherwise explain behaviors. Because the same principles apply to a range of specific hospital management challenges, we avoid excessive repetition by accumulating them in Appendix A. Readers who are not yet familiar with one or more of them can consult Appendix A for descriptions, explanations, and examples.

The result is a book that uses general principles of management, derived from many years of research in a variety of business subfields, to inform and improve practical hospital operations. In this way, we allow medically oriented readers to acquire general management knowledge by focusing on specific hospital issues that are familiar to them but that, once mastered, provide an approach that is applicable to new problems in the evolving future.

1.7 The Structure of This Book

Our focus is within the walls of the hospital, but occasionally it extends to extra-hospital initiatives. For example, if inpatient capacity is strained, one possibility would be to reduce demand by promoting healthy lifestyle choices or home therapies, possibly through a website. If the ED receives a pulse of older patients on Monday morning because no registered nurse (RN) was on duty in local nursing homes over the weekend, one response could be to put a hospital staff RN into the homes. In this way, we recognize the close interdependence between the hospital and the community it serves, but we consider it through the lens of hospital management rather than the broader perspective of public policy.

Until the final chapter, we assume a hospital configuration that is consistent with current practice. Specifically, we view the hospital as divided into four identifiable areas: ED, nursing units, ORs, and diagnostic facilities. We devote a chapter to each of these, and within each chapter we follow the common content format shown in Exhibit 1.6.

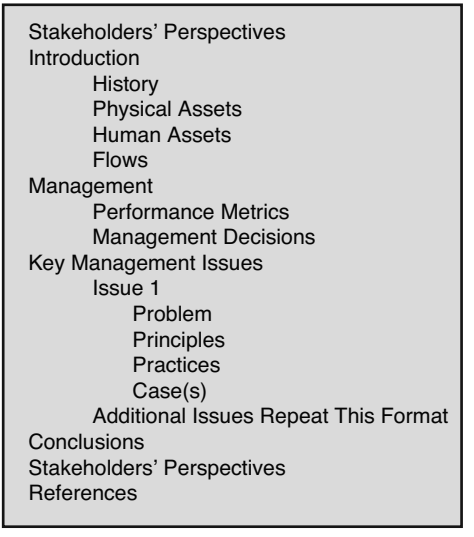

Exhibit 1.6 Hospital Operations general chapter outline.

We begin each chapter with a "stakeholders' perspective" narrative (that continues through all of the chapters) before turning to unit-specific material, beginning with an introduction, brief history, and the unit's assets and flows. We then list common metrics by which the unit's performance is judged and some management decisions that the

unit must make in practice. This is followed by two or more key management challenges, and for each we provide an introduction, affected metrics, relevant management principles, and a translation of principles into practices followed by illustrative case examples. Each chapter then ends with a continuation of the narrative.

1.7.1 Principles-Driven Brainstorming

To solve problems for complex organizations, it is helpful to begin with a broad landscape of options from which to choose. It is universal in books on brainstorming and innovation that one should not narrow the focus too early to only a few options. Rather, one should start with a long, open-ended, and uncensored list of possibilities to be sure that all options are considered. Then, using judgment, this list should be winnowed down to the most promising few, which are subjected to more detailed and rigorous analysis. The most difficult part of this exercise for many people is not the analysis part, for which tools exist, but the brainstorming part that involves coming up with a wide array of options. This is called the *concept generation* stage of an innovative process and entails a long list of concepts being generated prior to the *concept selection* phase of choosing one or a few for closer scrutiny and eventual implementation.

Principles-driven management provides a helpful tool for concept generation. Principles relate precursors to consequences, so if we want to improve the consequences, we should work on the precursors. For example, suppose the management challenge is to reduce delays getting onto the surgical schedule. What can we do to shorten delays? By turning to the principles, we can list the causes of delays and look at each of these individually as an opportunity. Delays, for example, can result from excessive workload, insufficient capacity, poor synchronization of demand and capacity, high variability, or poor sequencing of the jobs in queue. Improvements can be achieved by working on any one of these subtopics. So, in a brainstorming exercise, we can think of all the ways the hospital can work on each subtopic. For example, the hospital can reduce workload by reducing the patients served per day or reducing the time per patient in surgery. Likewise, increasing capacity, improving synchronization, reducing variability, and improving sequencing can be broken down into more detailed components. By continuing in this fashion—breaking down higher-order concepts into more detailed concepts—we will eventually reach a level of implementable specificity. By this process of cascading refinement, a few general principles beget a wide array of specific potential solutions.

Because each higher-level concept generates many lower-level offspring, after two or three levels we will have constructed a long list of possible action items. This is good and

signals a robust concept generation phase. Many of the options may be infeasible, undesirable, or difficult to implement for various practical reasons, but all of them should still be listed. The worst enemy of a productive concept generation activity is premature censoring. Sometimes an option that appears impractical can, with a small twist, become a novel and winning solution.

This principles-driven brainstorming approach is used for the key management challenges covered in each chapter. The reader may want to flip through a few chapters and inspect the tables. Their size will be striking. The illustrative cases then describe how to analyze or implement one or a few of the options in practice. Once a reader is familiar and comfortable with this approach, he or she can use it for other challenges not covered in this book. The principles and our approach are generic.

While examining the management challenges of the different units of the hospital, it quickly became apparent that three issues—responsiveness, patient safety, and organizational learning—are ubiquitous. Responsiveness is a common problem because delays negatively affect both patient satisfaction and clinical consequences. Whether the challenge is to reduce delays in the ED, the ORs, on nursing units, or in the lab, the underlying principles driving delays are the same. Similarly, ensuring and protecting patient safety and promoting organizational learning are issues that arise in many contexts and are amenable to some general principles regardless of context. So, for each of these generic management challenges, we have constructed the first three levels of the brainstorming process and have summarized them in three generic tables in Appendix A. When addressing one of these three generic challenges, a reader can start with a prepopulated generic table and then continue to break down the third-level list of options into specific action items.

1.7.2 Policies Progress but Principles Persist

The management principles presented in this book will continue to apply regardless of how the health care policy regime eventually evolves or what internal hospital structures dominate in the future. Although our division into the four subunits (ED, OR, nursing units, and diagnostics) is common in modern hospitals, one criticism of this structure is that it accepts as given the one thing that most impedes seamless patient care: a lack of cohesive integration between these subunits. Patients (and their information) often must pass through all of them during their acute-care experience (see Exhibit 1.7), and lack of coordination among them leads to poorer clinical, patient satisfaction, operational, and financial outcomes. While we focus on individual sections of the hospital, because each has its own culture of practice, the need for coordination between sections cannot be ignored.

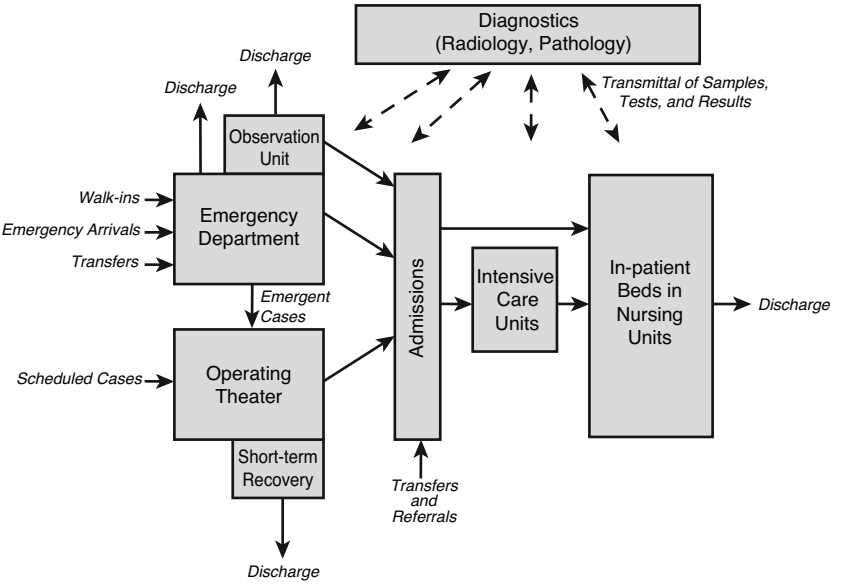

Exhibit 1.7 Hospital flows.

We pay attention to this need in some of our managerial challenges. For example, sizing inpatient units must take into account the need for post-surgery beds for patients coming out of the ORs (see Section 3.4.1). In other cases, the unit-specific managerial challenge that we cover can extend to interunit issues. For example, managing shift-to-shift patient handoffs on a nursing unit has the same character as managing ED to bed floor admissions handoffs (see Section 3.4.3).

However, we delay until Chapter 6 a more thorough discussion of alternatives to current practice in the internal organization of hospitals. There, we contrast the evolution of hospitals as service organizations to known evolutionary trajectories in other industries. We note that hospitals have been sheltered from the natural economic and competitive pressures that force firms in most industries to transit from "job shops" with poorly connected islands of expertise to "flow shops" of seamless processes as time and technology advances. The life-saving mission of hospitals does not exempt them from these pressures, but it does make addressing them significantly more complicated. In the end, however, the same erosion of economic surpluses that is threatening values-based conduct will challenge the current organization of health care services.

However, there is nothing in the future of health care that changes the basic principles of management. By focusing on these principles in the context of current practice, we equip readers to think strategically about their future and leverage fundamental management insights to get there. In the midst of an acknowledged health care crisis

featuring high expenditures, mediocre outcomes, and confusion at the policy level, there are things we can and should do at the level of the most important transaction of all—that between patient and caregiver. It is to these we turn in the remainder of the book.

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1 PPP = Purshasing Power Parity, meaning exchange rates are adjusted to reflect the cost of a fixed basket of goods among countries being compared, equating the purchasing power of currencies in those countries.

2 For example, when General Motors went bankrupt in 2009, hourly wages for production workers were only slightly higher than those at Toyota, but health care costs were seven times greater, resulting in a $1,500 per vehicle penalty for GM.

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