

The background of the page is a vertical strip on the left side, featuring a complex pattern of interlocking gears of various sizes and wavy, flowing lines that resemble a stylized river or a network of paths. The gears are rendered in a light gray, semi-transparent style, while the wavy lines are composed of numerous thin, dark gray lines that create a sense of movement and depth. The overall aesthetic is technical and modern, suggesting themes of engineering, technology, and systems.

PART I

An Overview to Healthcare Operations

CHAPTER 1	Operations Management and Decision-Making	3
CHAPTER 2	Hospitals and the Healthcare Industry	25
CHAPTER 3	Operational Finance	33
CHAPTER 4	Health Plan Operations	49

CHAPTER 1

Operations Management and Decision-Making

GOALS OF THIS CHAPTER

1. Describe a systems approach to management.
2. Define healthcare operations management.
3. Describe the roles and responsibilities of healthcare operation managers.
4. Examine the management decision-making process.
5. Understand the goals of operations management.
6. Describe the management discipline and where operations management fits.

Healthcare operations management is a discipline that integrates scientific principles of management to determine the most efficient and optimal methods to support patient care delivery. Given the interrelatedness of processes across most organizations, a systems approach, which encourages optimizing the whole rather than simply parts, is essential. Most employment positions in healthcare organizations today are, in fact, roles that involve coordination and execution of day-to-day operations. This chapter provides the rationale for operations management and describes its evolving role in helping both hospitals and other clinical organizations become more competitive.

► A Systems Approach

This text is fundamentally about providing practical information to guide management of operations in a healthcare organization. In order to do this, we have to

start with a foundation to understand the industry, the organization, and then provide the necessary toolkit to guide improvements across organizations. Throughout this text we focus on understanding the organization as a system, improving processes and productivity, analyzing and measuring operational performance, using data and systems to guide improvements, and streamlining the healthcare supply chain. **FIGURE 1-1** presents the common themes in this text.

An **organization** is a group of people who work together, through interconnected processes and behaviors, to achieve a common purpose. Therefore, a healthcare organization is a specific type of organization engaged in either production or delivery of health goods and services. Types of healthcare organizations include primary care clinics, urgent care centers, hospitals, freestanding emergency departments, retail pharmacies, physician offices, device and equipment firms, and pharmaceutical manufacturers, to name a few.

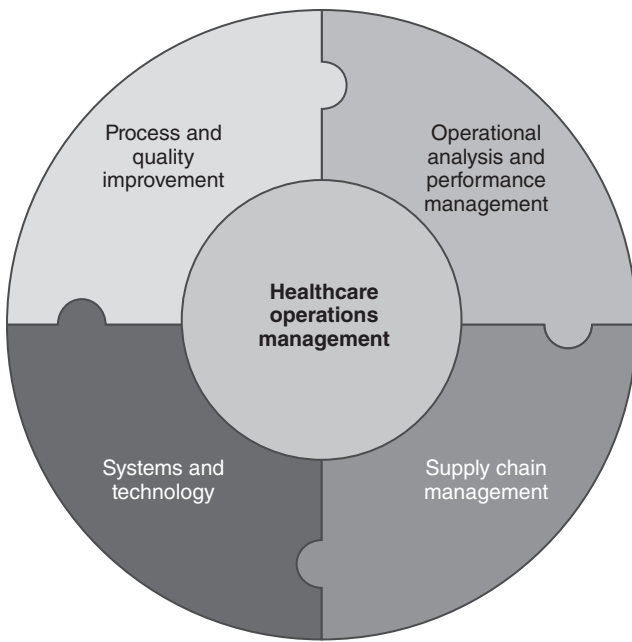


FIGURE 1-1 Operations Management in Health Care

One of the key terms used in organization involves the interconnection or interrelationships between workflows and people. This is aligned with the systems perspective or systems thinking, which entails a focus on the whole, rather than just on the parts. Healthcare operations management is about planning and directing these interconnected processes or systems. When we use the term **system**, we refer to a set of connected parts that fit together to achieve a purpose. Healthcare operations and systems management is the set of diverse and interrelated activities that allow for diagnosis, treatment, payment, and administrative management in healthcare facilities.

► The Healthcare Industry

Many healthcare organizations are nonprofit in nature, which influences management styles and thinking. For example, nearly 80% of hospitals are considered not-for-profit and exist solely to serve the community in which they operate, although this has decreased in recent years. As nonprofits, these organizations are exempt from most federal and state taxation and are not expected to show continuous positive growth rates or large profit margins, as most publicly traded firms do. However, if a hospital or healthcare organization cannot show some return on the capital or dollars invested, there will be negative consequences. For example, failure to show reasonable margins will likely cause the public bond market (which finances most healthcare growth today) to assign subpar credit ratings; therefore, the bonds themselves will have poor

yields, making hospitals less than stellar investments for bondholders.

Most importantly, the term *limited profit margins* implies there will be fewer dollars to invest back in the business to ensure that buildings are updated, that equipment is replaced and technology is modern, and that clinical programs will continue to expand and be enhanced. Without these investments, hospitals will probably be unable to attract the most qualified physicians and administrators, which will continue the downward spiral. While some hospitals and healthcare systems wait for changes in the public health policy to save them, the more competitive and successful hospitals are acting now to protect their margins.

In this era of continual pricing pressures affecting the top line of the income statement, and with a large majority of all hospitals reporting negative profit margins, it is essential that hospitals begin to look toward more sophisticated business strategies to succeed. Differentiated marketing programs and strategies, broader use of advertising, and more careful and precise long-term planning about service lines are all strategies that must be utilized (Rovin, 2001).

There needs to be a broader adoption of operations management techniques into health organizations. Monitoring and maximizing labor productivity for all medical support and allied health professionals is critical to maintaining salary expenses. Incorporating queuing theory and scheduling optimization methods helps drive waste and cycle time out of facilities. Incorporating logistical and supply chain management techniques helps reduce operational expenses, eliminate excess safety stocks, and generally improve working capital management. Most importantly, using technology to further automate and streamline all processes in healthcare operations can help reduce costs and maximize efficiencies. Yet, this is only possible through systems thinking, encouraging a better understanding of how all of the parts are connected and influence each other.

Hospitals and other healthcare organizations cannot rely on the extrinsic factors (such as health policy, federal payer regulation changes, or shifts in managed care market structures) to change their margin potential. That is to say that these are important and probably very significant issues; however, they are covered in other texts and will evolve regardless of the managerial behavior that hospitals employ. These macro-level issues are important, but equally significant are the micro-economic and organization factors that can be affected by operations management. Operations management can help organizations succeed today.

Think of healthcare profit margins as a balloon, where a variety of extrinsic, or external, factors cause

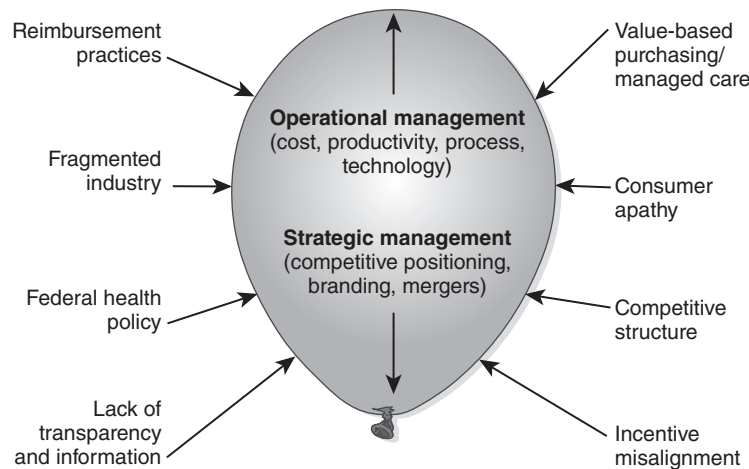


FIGURE 1-2 Operations Management Counters the Extrinsic Pressures Deflating Healthcare Margins

deflationary pressure from the outside. On the inside is the set of decisions and management systems put in place to combat these pressures and essentially inflate the balloon, or expand the margin. In effect, operations management is the set of intrinsic, or internal, processes and decisions that help address costs, process, technology, and productivity. Strategic management, although equally important, is not a focus of this text. **FIGURE 1-2** shows conceptually the margin-expansion role that operations management plays.

Health care is primarily a service sector, in that the industry provides intangible or nonphysical “goods,” as opposed to physical objects that can be seen or touched. Hospital services primarily deliver care through providers to patients and therefore lack a manufacturing or assembling process. These services are unique and somewhat differentiated from other hospitals, are knowledge based, and have high levels of customer interaction. Of course, there is a physical good that accompanies the service, which is the focus of supply chain management in hospitals that procures, replenishes, and stores medical supplies and pharmaceuticals as well. In this regard, hospitals have a mix of both tangible and intangible characteristics. All of these attributes make operations management in health care somewhat different than in industries that strictly produce and market physical goods or widgets.

► Defining Operations Management

Healthcare operations management can therefore be defined as the management of the supporting business and clinical systems and processes that transform

resources (or inputs) into healthcare services (outputs). Inputs are defined as the resources and assets, such as labor and capital, including cash, technology, personnel, space, equipment, and information. Outputs include the actual production and delivery of healthcare services. Quantitative management implies a heavy use of analytical and optimization tools, as well as extensive use of process and quality improvement techniques to drive improved results.

Healthcare operations management is a discipline of management that integrates scientific or quantitative principles to determine the most efficient and optimal methods to support patient care delivery. This field is relatively new to health care, but it has existed in other industries for nearly a hundred years.

► Key Functions of Healthcare Operations Management

The scope of healthcare operations management includes all functions related to the management systems and business processes underlying clinical care. This includes extensive focus on the following: workflow, physical layout, capacity design, physical network optimization, staffing levels, productivity management, supply chain and logistics management, quality management, and process engineering. **TABLE 1-1** summarizes these key functions and illustrates some of the critical issues and questions that must be addressed in the healthcare enterprise.

Healthcare operations management includes all of these managerial functions and provides job opportunities for people with titles such as administrator, scheduling manager, operations supervisor, vice president of support services, quality manager,

TABLE 1-1 Key Functions and Issues in Healthcare Operations Management

OM Function	Objective or Issue to Consider
Organization	■ Are there too many departments or people performing the same task? ■ Do we have an end-to-end map of our major clinical and business processes? ■ Are there manual processes that can be automated? ■ Are there ways to reduce cycle time, steps, and choke points for key processes? ■ Can we improve speed and patient satisfaction?
Financial	■ Do we understand the cost accounting behind key processes? ■ How can we improve our revenue cycle metrics?
Physical layout	■ Are our facilities designed with the consideration of speed, capacity, traffic flow, and operational efficiency? ■ Are unit or floor layouts designed to eliminate redundancy (e.g., safety stock on all resources)?
Capacity design and planning	■ How can we reduce bottlenecks to improve patient throughput for each area? ■ In which cases should we increase the use of technology to improve labor productivity?
Physical network optimizations	■ Where should we position appropriate par locations, pharmacy satellites, warehouses, and supplies to minimize resources and costs? ■ Do we strategically utilize vendors and their facilities? ■ How can we design and position optimal locations for clinics or resources to ensure the lowest total costs?
Staffing and productivity management	■ How much output can we expect from our staff? ■ Have we maximized the use of automation and electronic commerce to increase productivity? ■ Have we implemented sophisticated analytical models to optimize labor and resource scheduling?
Supply chain	■ Have we built collaborative planning and forecasting processes to standardize items and reduce total costs? ■ Should we use “just in time” operations? ■ Do we use automated, optimized replenishment of medical–surgical supplies to increase turns and asset utilization? ■ How much inventory of each item do we need? ■ Do we use perpetual inventory systems to ensure stringent internal controls and accurate financial reports?
Quality management	■ Do we use advanced tools for tracking projects? ■ Are we measuring the right performance indicators to bring visibility to trends and exceptions? ■ Do we know how we compare to our key competitors? ■ Have we identified the quality issues that affect goals of customer satisfaction and efficacy, in addition to efficiency, costs, and speed?

operations analyst, director of revenue cycle, procurement manager, management engineer, inventory analyst, facilities manager, supply chain consultant, and so on. Nurses, technicians, and other health providers

also play a key role in managing service operations. The advance of operational management positions in healthcare organizations will continue as the need for increased cost efficiency and accountability rises.

► The Need for Operations Management

In 2006, the Institute of Medicine of the National Academy of Sciences produced a report called *The Future of Emergency Care*, which is a series of documents that describe the problems facing health care at that time (and are still relevant today), especially the emergency care arena. The report outlines a number of recommendations for solving the current crisis. One of the key recommendations calls for the following: “. . . hospitals should reduce crowding by improving hospital efficiency and patient flow, and using operational management methods and information technologies” (Institute of Medicine, 2006).

Even others outside of the healthcare industry have identified weaknesses in how healthcare managers manage the processes and systems. McKinsey Consulting, one of the premier consulting firms, recently found that over \$500 billion in opportunities exist for improvement (Singhal, Latko, & Martin, 2018). A *New York Times* report citing multiple research studies found that 30% of average healthcare costs per year are spent on administrative costs alone (Frakt, 2018).

Many other researchers and associations have called for operations management to help drive improvements and efficiencies into the healthcare system through efforts such as Six Sigma, Lean, and process improvement (Herzlinger, 1999; Langabeer, DelliFraine, Heineke, & Abbass, 2009). Hopefully, the rest of this text will help students and practitioners do just that.

► Goals of the Operations Manager

Today’s modern operations executive and manager may hold any number of job titles discussed earlier, but generically we will refer to the role “operations manager” to describe all such positions in this text. A clinic manager who ensures that processes are in place so patients efficiently move from registration to treatment rooms to payment is an operations manager. An administrative director who oversees financial operations is an operations manager. An operations manager is any individual that directs and transforms processes to improve the delivery of patient care. So, what else do operations managers do? They have multiple broad goals and functions in the hospital, including all of the following: reduce costs, reduce variability and improve logistics flow, improve productivity, improve

quality of customer service, and continuously improve business processes. These are outlined in more detail in the following sections.

Improve Financial Results

Operations managers’ primary role is to both take costs out of the healthcare system and increase revenue opportunities, while simultaneously maintaining and enhancing quality. Finding waste, improving utilization, and generally stabilizing and reducing the overall cost of delivering services are essential functions. A hospital with appropriate tracking and management systems—that can isolate all personnel, material, and other resources utilized for delivery of care—will be much more likely to reduce costs because it understands the underlying cost structure. Identifying costs and eliminating unnecessary waste and effort are at the forefront of an operations manager’s priority list.

Reduce Variability and Improve Logistics Flow

Operations managers continuously look for the most efficient and optimal paths for movement of resources, whether those resources are physical or information flows. Similarly, there is a continuous focus on reducing variability. **Variability** is the inconsistency or dispersion of inputs and outputs. Variability threatens processes because it results in uncertainty, too many or too few resources, and generally inconsistent results. For example, if there are 10 patients typically seeking care in a specific clinic within a certain time period, and then 20 appear the following period, it will be difficult to staff, to control waiting times, and to manage patient flows.

Improving flow means seeking higher throughput or yields for the same level of resource input. **Throughput** is the rate or velocity at which services are performed or goods are delivered. For example, if a hospital typically sees four patients an hour and can increase throughput to six per hour, this is a 50% improvement in logistical flow and throughput. Similarly, a hospital that doubles patient volume while maintaining the same historic inventory levels of supplies would show significant improvements in material flow because the assets have higher utilization and turns.

Staffing and resource consumption should be tied directly with patient volumes and workload: if patient volumes increase, so too should resources. Unfortunately, many healthcare facilities do not understand patient volumes and the variability that exists from

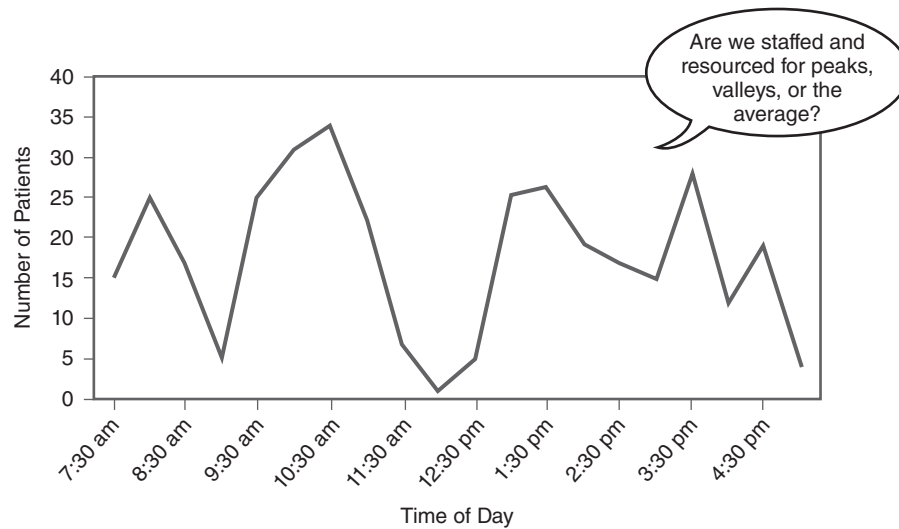


FIGURE 1-3 Variability Creates Chaos and Inefficiency

hour to hour and day to day. Managing this variability allows a change in staffing mix and scheduling to accommodate the changes—without staffing at the peaks (which causes excessive costs), overstaffing the valleys or low points (which will cause long lines periodically due to limited resources and therefore service quality issues), or staffing for the average (which is the most common suboptimal approach). **FIGURE 1-3** shows how variability changes over time, which necessitates both capacity and demand analyses.

Logistics is defined as the efficient coordination and control of the flow of all operations—including patients, personnel, and other resources. The role of operations managers is to facilitate improved logistics and throughput by using streamlined process and facility designs to increase capacity, workflow, and throughput.

Improve Productivity

Hospitals have a tendency to hire additional staff faster than in other industries. This is partly driven by the highly structured organizations that are common in health care and partly because of the historical lack of focus on costs. In years past, hospitals were reimbursed from government and other payers on a “cost-plus” basis—meaning that whatever the cost to deliver, hospitals would be reimbursed fully plus a small profit margin. When pricing is guaranteed to cover costs, there is not a tendency to be overly cost conscious. Even though the industry continues to move toward a prospective payment system and managed care (two terms we will learn about in future chapters), the mentality and behavior of many hospitals have been slow to adapt. **Productivity** is defined as the ratio of

outputs to inputs. Improving productivity implies a search for higher levels of output from all employees and other assets. This is one of the most vital roles of an operations manager.

Improve Quality of Service

Health care cannot become so focused on cost and efficiency that quality starts to diminish. Improved quality implies reduced medical errors and improved patient safety, in addition to higher levels of patient satisfaction. Maintenance and improvement of high quality and service levels, both from patient care and other business services (such as the cafeteria or admissions), are expected from an operations manager. Across all industries, higher quality services lead to the ability to secure higher prices, which drives increased market shares and operating margins (Buzzell & Gale, 1987).

Ensuring that services continue to improve patient satisfaction levels while simultaneously reducing response and waiting times are key deliverables to providing higher quality services. The **cost-quality continuum** refers to a theoretical trade-off in which a focus on one side of the equation leads to diminishing returns on the other. A focus on costs might lead a hospital to reduce services provided, which might affect overall quality. Operations professionals must balance both and help make optimal decisions on many fronts.

Continually Improve Processes

Since operations management is systems-focused, it is essential to manage holistically all processes in an organization. In highly structured organizations,

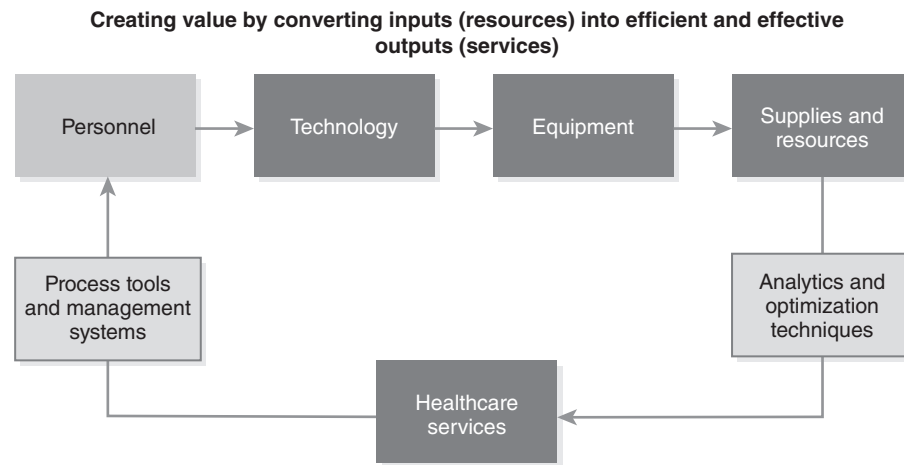


FIGURE 1-4 The Operations Management Process

business processes tend to be unique to each department and are not highly cross-functional or integrated. The operating room in one hospital may handle procurement of goods one way, while the same hospital's gynecology department may handle procurement another way. There is typically no sharing of best practices internally or standardization of processes that can lead to improved learning and economies of scale and very little multi-department workflow automation. Today, each department in large hospitals operates as an independent business, which creates multiple efficiency problems. The role of operations management is to find ways to carry out business processes while improving process efficiency and effectiveness. **FIGURE 1-4** shows the operations management process of converting inputs into outputs.

► Competitive Advantage of Operations

Overall, if a hospital is successful at delivering each of these goals throughout the facility, it will deliver improved operational effectiveness. **Operations effectiveness** is a measure of how well the organization is run. It considers both the efficiency of resource inputs and usage and the effectiveness of overall management in achieving desired goals and outcomes (Kilmann & Kilmann, 1991). **Operational excellence** is a term often used to describe a business strategy that focuses exclusively on maximizing operational effectiveness.

A hospital that is operationally effective is heading toward increased competitiveness. **Competitiveness** is management's ability to respond to environmental changes (such as changes in reimbursement practices)

and competitor's actions (such as adding new facilities or expanding existing service lines). If a hospital can achieve a competitive edge or advantage over other hospitals, and can sustain this position, it will have higher operating margins and will be able to continue improving, expanding, and surviving. Operations management is critical to this outcome.

Competitiveness is often driven by innovation. **Innovation** is the continuous search for a way to do new things or just do current things better. Organizations innovate by using new technologies or finding ways to change the playing field so that processes that once were considered essential are no longer necessary. The electronics industry is an example of an industry in which firms continuously innovate. A firm that was competitive based on analog technology had its perspective of the world shaken up considerably when digital technology was created, and the products that the firm once made were completely irrelevant. In addition, continuous innovation often results in hypercompetition, which ultimately is characterized by economics wherein both prices and costs decline (D'Aveni, 2006). For example, when digital video disc players were first introduced, prices were nearly \$1000. Today they can be purchased for as little as \$30 in discount stores. The prices of cell phones, televisions, computers, fax machines, and many other electronics all follow the same pattern. In health care, innovation also helps to improve competitiveness.

► Factors Driving Increased Healthcare Costs

Imagine that a healthcare organization's expenses could be maintained and even show signs of deflation,

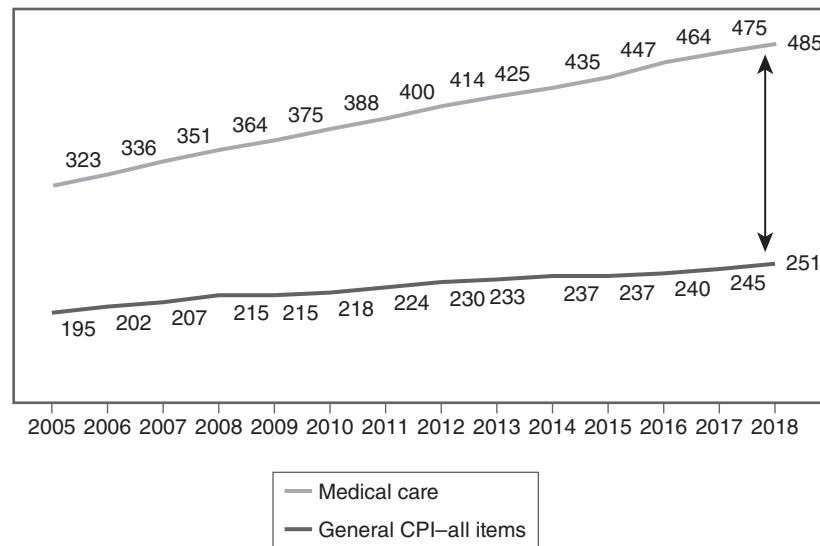


FIGURE 1-5 Controlling Exponential Price Increases in Health Care

Data from US Department of Labor, Bureau of Labor Statistics, 2019.

or negative price/cost growth, rather than its annual budget increasing between 5% and 15% (which is the range of industry average annual changes). This would be very beneficial to a hospital's financial condition if it could reduce costs and maintain similar pricing levels.

The historical argument justifying continuously growing healthcare inflation rates typically focuses on five points:

1. Consumers are aging and living longer and are increasingly consuming or utilizing a greater number of services than in prior years.
2. The costs of medical technology and equipment continue to rise, and this represents a growing percentage of capital budgets for most organizations.
3. The labor costs of key resources (such as physicians and nurses) are governed by market shortages for these positions, which have increased steadily the past few decades.
4. Prices of pharmaceuticals, which represent a sizable portion of medical treatment plans, continue to escalate to cover high costs of research and development, long U.S. Food and Drug Administration approval cycles, and generally high industry margins for pharmaceuticals.
5. Emphasis on strict managed care, which appeared to be the predominant model a decade ago, is slowly shifting and diminishing in practice.

The result has been a steadily increasing cost of care. Using the Department of Labor, Bureau of Labor Statistics (BLS) data highlights this fact. The BLS tracks inflation growth through eight major groups in

its consumer price index (CPI). The CPI is a mathematical calculation of the average pricing changes over time, using a market basket approach. The general CPI for all items in years 2005 through 2018 showed an increase of less than 29% over 14 years, or around 2% per year (Bureau of Labor Statistics, 2019). Compare that with the cost of medical care, which rose nearly 50% in that same time period, or 3.5% per year—1.5 times that of the rest of all other goods tracked.

FIGURE 1-5 shows this growth over time.

Overall spending for health care in the United States has risen steadily. In 1993, healthcare costs represented 13% of the national gross domestic product (GDP); in 2006, it was more than 16.5% of the GDP; and today, it is nearly 18%–19%. While some hospitals wait for the national debate to continue, it is important to first look at the intrinsic factors in the organization that are driving excessive costs: redundancy, inefficiency, bureaucracy, waste, paper, limited productivity, lack of performance monitoring, poor deployment of information technology, and generally unsophisticated levels of management.

► Learning from Other Industries

Although health care is unique and has its own set of challenges, hospitals can learn a great deal from other industries that have evolved faster due to technology or process innovation, industry economics, more aggressive competition, reduced barriers to entry and exit, or just better trained business managers. For example, if managers looked at a hospital as being similar to the

TABLE 1-2 Teachings from Other Industries

Retail	Building layout and configuration, customer flows, use of forecasts and planning, electronic commerce
Airlines	Scheduling, logistics, strategic pricing (yield management)
Chemicals	Efficiencies, economies of scale, extensive use of linear programming and quantitative modeling
Electronics	Technology innovation, product life-cycle management, pricing strategy
Telecommunications	Command and control center

retail industry, they could better understand how to lay out floors, design configurations to achieve more efficient movement and handling, and use analytical forecasts to drive all aspects of the business. There is a lot to learn from the more operationally effective industries. The tools and techniques that are most similar should be borrowed and applied to health care where appropriate.

For example, in the airline industry, thousands of planes move through the sky fairly seamlessly. A plane lands every few seconds at major airports throughout the world, yet there are very few accidents (as a percentage of total flights), very high levels of on-time rates (given numerous factors, such as weather and security), and very little lost baggage. Nearly 850 million passengers board planes every year in the United States alone (Bureau of Transportation Statistics, 2019). Airlines have learned to operate using speed and volume as an advantage. When an airplane lands, it has very little time before it must be turned around and take off to another destination. This changeover process allows less than 30 minutes, on average, to completely refuel, check maintenance and mechanical conditions, validate aviation systems, restock food and supplies, change over personnel, and unload and reload hundreds of passengers. Think of this changeover as it relates to the process a hospital goes through when changing out beds after a patient is discharged (i.e., admitting and bed management process). A lot can be learned from how another industry approaches a somewhat similar problem. **TABLE 1-2** summarizes what operations managers in health care can learn from other industries.

► Principles of Management

Operations management is one of the disciplines of the broader field of management. According to most theorists, management concerns itself with four key

functions: planning, organizing, leading, and controlling. **Planning** involves the establishment of goals and a strategy to achieve these goals. In health care, planning can be strategic (such as deciding which geographic region to invest in a new facility), or it can be operational (such as determining how many employees to have on staff for each shift). **Organizing** includes making decisions about what tasks will be done, where, when, and by whom. Organizing uses a variety of tools, such as an organization chart to manage people's roles and reporting relationships, process flow charts for improving activities, and Gantt charts for managing projects. **Leading** includes motivating employees, building support for ideas, and generally getting things done through people. Providing direction and clarification to expectations, as well as the role of change management, or preparing the organization for changes to come, is instrumental to providing leadership in hospital operations management. **Controlling** includes all tasks to monitor and track progress toward goals, ensure performance improvement, and make corrective changes in strategy where necessary. The use of status reports, budgets, procedures, and a multitude of other tracking tools is useful in helping enhance management control.

Managers wear many hats and play many roles. They might serve as a figurehead, make decisions, reward employees, and handle conflicts and solve problems. Managers help plan tasks, organize them, direct them, and continually adjust and control. Henry Mintzberg (1973), one of the earliest researchers on management processes, described the nature of managers' work as grouped around three key themes: informational, decisional, and interpersonal. Informational roles refer to collecting, monitoring, and disseminating information from the external and internal environments to work teams. Decisional roles refer to making key decisions for the organization, such as allocation of scarce resources, rewards and penalties

for employees, and negotiations with employees and others. Interpersonal roles include training and motivating employees, serving as spokesperson, facilitating communication exchanges among various groups, and serving as a liaison.

The study of management continues to evolve. It has moved through a variety of schools of thought: from scientific management, to process-focused, to human behavior, to decision or management sciences theory, to social and open systems (Certo & Certo, 2005). These schools of thought represent different contexts or perspectives upon which a manager's role and tasks should be based. For example, systems theory emphasizes that a manager views the organization as a living organism, which is changing and adapting and which operates by an integrated network of open processes. Behavioral schools tend to focus on viewing management from a psychological perspective, highlighting the importance of understanding what motivates employees and how human and cognitive factors influence work environments.

For the purposes of operations management and looking for the ways to improve operational effectiveness, the school of thought that is the most relevant is that of scientific management.

► The Scientific and Mathematical Schools of Management

Operations management seeks to apply quantitative and analytical techniques to achieve the goals of reduced costs, higher quality, higher productivity, improved processes, and improved logistical flows. The role of mathematics started to drive concepts of industrial efficiency in what is now known as the scientific management era, which began prior to the turn of the 20th century.

Scientific schools of thought historically focused on use of concepts such as “time and motion” studies, which measured how long business processes took, seeking ways to reduce the variability of the results and continuously shrinking the times and associated costs. Early work by Frank and Lillian Gilbreth helped drive a focus on continual improvements—finding ways to do things faster and with fewer resources. In fact, the Gilbreths' research has had a profound impact on health care as well (Gilbreth & Carey, 1966). In the early 1900s, they were credited for observing the productivity of surgeons and found that the introduction of changes in both staffing and work flow could

significantly alter physician productivity. The introduction of a surgical nurse—to help provide surgical instruments and supplies when needed to free up the surgeon, thereby improving overall productivity—was one of the key recommendations made. In addition, the Gilbreths recommended other hospital improvements, such as a tray to hold common surgical instruments. These are just two of the contributions made by scientific management to health care.

Frederick Taylor, one of the original management researchers and the “father of scientific management,” was often quoted as saying that scientific management is a great “mental revolution” (Matteson & Ivancevich, 1996). By this, he meant that a scientific approach encourages a different perspective or outlook that can change management behaviors and results. This revolution led to some key concepts, such as specialization, division of labor, and mass production. The concept of **specialization** suggests that if a person repeatedly performs just one task, he or she will be able to perform that task faster and with higher quality than others, because he or she has repeated exposure to the process and has learned from his or her experiences. Specialization, in many regards, is what leads hospitals to structure their organization around units such as nursing or materials management. Continued specialization helps to produce well-defined roles and tasks, concentrated work efforts, and higher efficiencies. This is also known as **division of labor**. **Mass production** is the concept of the creation of rapid production processes through the use of assembly-line techniques. Mass production has been embraced by most other industries, but, in many respects, it is not relevant in health care.

The scientific era has been shown to have a number of failings and issues, which led to several other schools of thought. The lack of focus on human behavior, on aligning employees' rewards with those of the organization, and on understanding the need for job rotations and expansion all are major issues that well-rounded managers have to consider. Thus, many of the analytical concepts of scientific management remain vital to healthcare operations management. First, scientific management suggests the need for a strong understanding of processes, their costs and resource utilizations, constraints, and cycle times. Second, scientific management encourages an initial focus on understanding expected outcomes and subsequently designing management systems and business processes around this operational strategy. Third, the variability of processes has to be smoothed out and consistently managed. Finally, scientific management shows that in many cases, quantitative approaches can

help create mathematically optimal results for common management decisions and problems. These four fundamental concepts are the foundation of the operations management discipline.

► Management Decision-Making

Management **decision-making** is a process in an organization in which decisions are made (Yates, 2003) and reflects the major processes involved in managing the work of organizations (Szilagyi & Wallace, 1990). Decisions are the output of the process. Decisions are typically described as a choice between two or more alternatives (Rowe, Boulgarides, & McGrath, 1984). Decisions can also be described as an “action” taken as a result of a process. As Hoch and Kunreuther (2001) state “...the strength or weakness of managerial decisions is the linchpin of the business enterprise.”

Herbert Simon (1960), one of the first researchers on decision-making in organizations, describes the decision-making process as a three-step process:

1. Finding occasions to make a decision,
2. Finding possible courses of action, and
3. Choosing among many options.

Browne (1993) describes it similarly as “that which occurs at the highest level of an organization.” Schwenk (1988) describes management or strategic decisions as ill structured, nonroutine, important to the organization, involving large resource commitments, and generally very complex. A traditional management decision process, adapted from Browne (1993), is shown in **FIGURE 1-6**.

Decision-making theory has been defined by a number of perspectives: sociology, psychology, economics, engineering, and business. Since management decisions are made within organizations, organizational theorists early on shaped the field by suggesting a rational approach in which decision-makers make decisions in the best interest of the organization and emphasize “information processing.” More recently, there has been a strong emphasis on decision-making as a behavioral process, since decisions are made by individuals, in which personality and judgment represent both a source of bias and influence on decision processes.

Harrison (1987) describes decisions as either “routine and programmable” or “complex and unique.” If decisions are routine, then they are procedural and can use computation and rational models for decision support. This area is obviously well suited for

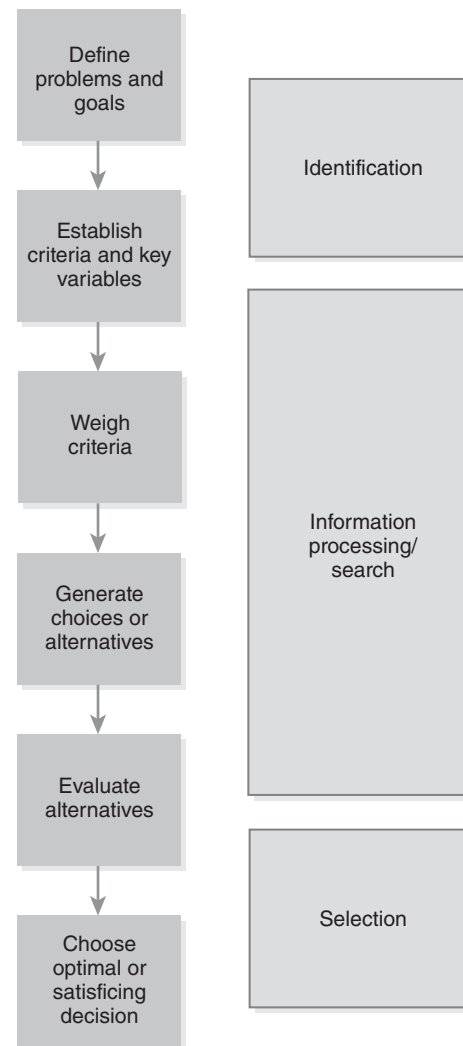


FIGURE 1-6 Traditional Decision-Making Process

operations research (OR) methods. The latter is more unstructured and relies more on judgment and general problem-solving approaches. This approach has generally been considered to emphasize behavioral processes over quantitative ones, since they involve ambiguity, conflict, negotiations, and bias created by the interaction of individuals and personalities.

Similarly, Allison (1971) outlined three perspectives on strategic decision-making: rational, organizational, and political.

- **Rational.** It has been suggested that decisions are made in a rational, logical, or systematic way. The rational, conscious choice emphasizes a “search and selection” process that has limited alternatives, maximizes decision outcomes, and adjusts for risks. Christensen, Andrews, Bower, Hammermesh, and Porter (1982) have outlined structured methods for organizational decision-makers to follow to reach optimal or maximizing outcomes.

- *Organizational.* Henry Mintzberg (1978) is generally recognized as one of the leading researchers on decision-making from an organizational theory perspective. The organizational perspective views decisions as the outputs of organizational processes, not individual ones, and includes adapting strategy to the environment. The organizational approach emphasizes “satisficing.” **Satisficing** is a process of making a less than optimal decision, but one that can be supported and is acceptable since it meets the minimal criteria (e.g., decision is reached quickly, is adequate, and/or is the result of consensus between parties). Satisficing terminates the search for alternative processes early. Ambiguity plays a critical part, as does the concept of “randomness,” which leads to models of decision-making that are less than rational, and can be described as “organized anarchies” or “garbage can” models (March & Olsen, 1979).
- *Political.* From this perspective, decisions are the result of bargaining among individuals attempting to achieve their own personal goals (Abell, 1975). This would include social, nonprofit, educational, and other organizations. Political models tend to redefine the decision processes, structures, and goals on a continual basis, making evaluation difficult. Behavioral concepts, such as the role of judgment, biases, emotions, and heuristics, are often a component of this perspective. Bazerman (2005) is one of the prominent researchers on individuals and behavior in decision-making processes.

From both the organizational and political perspectives, the concept of “bounded rationality” has emerged. Bounded rationality suggests that humans or individuals have only a limited, finite capacity to understand all options available to them and process them in an evaluation mode (Simon, 1979). Bounded rationality can also be described as limits on the human’s ability to process and interpret large volumes of data (Bazerman, 2005). While rational models assume all alternatives are known, they usually are not and there is no known probability or consequences of the actions. Also, goals are changing and the process is not always as sequential as it would appear. Complexity of decision processes is also often used to describe why rational models are not appropriate.

There are two components of bounded rationality: search and satisficing (Simon, 1979). Search refers to how extensively a decision-maker searches for information to guide decision-making (Tiwana,

Wang, Keil, & Ahluwalia, 2007). Simon envisioned an “aspiration point” where managers determine what is “good enough.” This process of terminating the search process without incorporating more extensive information is called “satisficing,” as discussed earlier. This obviously creates biases and risks for managers.

The concept of “trade-offs” is related to “satisficing,” a term coined by Herbert Simon many years ago (Simon, 1965). Trade-offs represent a cognitive process of balancing the pros and cons of attributes or decision criteria, in an effort to accept less of something to get more of something else (Luce, Payne, & Bettman, 2001).

Browne (1993) describes four models or perspectives in decision theory: normative, descriptive, analytical, and behavioral. Normative, or prescriptive, models describe what managers should be doing to produce optimal outcomes. Normative models he suggests are the contributions of scientific management. Simon (1965) argues that rational models of management science are valuable contributions toward normative decision-making theory. Descriptive models describe what actually occurs in organizations, not what should occur. Analytical models, which are the contribution of management science, involve risk and uncertainty quantification and the role of modeling decisions and predicting outcomes. Finally, behavioral models examine the role of bias and cognition in humans as well as how information is processed and used.

As theory has established, decision-making is not necessarily a rational search and evaluation process, in which alternatives are clearly defined, evaluated, and then the best alternative is selected. Brunsson (1985) argued that decision-making is less about finding the right choice and more about giving an impression of rationality in organizational processes. He also describes other more common irrational processes used by managers.

In decision-making, decisions are sometimes categorized into one of the following two types: routine or complex. Routine decisions have been described as “programmable” and are sometimes associated with selection and evaluation methods that can be mechanized or automated (Harrison, 1987). These routine decisions are often supported by methods such as OR. The more complex the decisions are, the greater the use of intuition or judgment in the process, and presumably the less likely that methods such as OR will be used. Discussion in strategic management literature about the role of intuition versus analytics touches on this subject, but does not comprehensively address the role of quantitative methods using the routine-complex dimension (Miller & Ireland, 2005).

In summary, organizational decision-making processes are quite complex and appear to be variable in nature. In addition, both the complexity of the decision and the cognitive capacity of the decision-makers influence the form of decision processes. As a result, some healthcare organizations might find a quantitative component of operations management decision-making more useful or relevant, while others may value it to a lesser extent.

► Power and Decision-Making in Health Care

Decisions in health care do not follow the traditional, logical processes used in industrial organizations. In other industries, where profit maximization and shareholder wealth are the primary motives, decisions are primarily driven by goal alignment for both managers (those who run the business) and owners (shareholders who invest in equity or debt and have a claim on the profits and assets). Decision-making tends to follow cost-benefit models and focus on risk minimization, cash flows, and return on investment (ROI). Although disputes and conflicts may arise because of incomplete or imperfect information (as described in the agency theory of economics), these disputes can typically be minimized by changing incentives, behaviors, and structural mechanisms.

In health care, however, there is incomplete alignment of goals between different agents, or managers, in the organization because of three issues:

1. Goals are unclear. There are clinical goals, financial goals, educational or academic goals in some cases, societal goals, community goals, and so on. The ambiguity that exists in terms of priorities and focus makes goals much less acute than in other industries.
2. Organizations are complex. In industrial organizations, the organization is focused clearly on the key aspects of buying, making, selling, and moving products to the marketplace. In health care, reporting relationships often involve complex matrices and dual-reporting structures. This is definitely not the “command and control” structure, focused on speed and efficiency of decision-making, that might work in other places.
3. Relationships are ambiguous. Many business units in health care are interconnected, but they often behave as if they were not. Independence of departments and providers helps create an environment that is less team focused than in other

industries, making relationships important for purposes of mutual support as allies. Also, there are continuous power struggles in the healthcare arena between different factions of employees. This creates ambiguity in decision-making.

Physicians are typically the most dominant players, given their clinical expertise and control over the “production” of healthcare services, and have a very substantial role in most major organizational decisions (Young & Saltman, 1985). Power conflicts with nurses and other providers are frequent and have developed (for structural reasons) in the struggle for control over patients, their care, and overall patient management processes (Coombs, 2004). As such, several formal power bases have emerged: business managers, who increasingly are becoming more professional and sophisticated; physician leadership, which historically dominates the power pendulum; and nursing leadership, which probably has the most intimate knowledge of patients and their needs.

Those who control the “production” process in most industries tend to have the most influence and can control decision-making for many things. In the production of health care (i.e., delivery of treatments and provision of care), physicians are by far the dominant players, yet their role in most operational management processes in most hospitals is waning as professional business managers evolve.

Decision-making in teaching hospitals and academic medical centers is even more complicated—through the introduction of another dominant party: academic faculty and researchers (Choi, Allison, & Munson, 1986). In the largest hospitals, this complexity in decision-making is complicated by large business infrastructures, which may employ hundreds or thousands of individuals in all types of support functions, from admissions to patient finance to facilities.

Three characteristics define this complexity of decision processes: problematic preferences, unclear technology, and fluid participation (Cohen, March, & Olsen, 1972). These characteristics, together with “streams” of both problems and choices, can be combined in unclear decision processes in a “garbage can,” where they can often address the wrong problems at the wrong time. This garbage can tends to allow issues and solutions to resurface in strange ways, which often results in a lack of clarity and focus.

With all of these dominant players and complexities, many hospitals have become large bureaucracies. These bureaucracies make it difficult to make important decisions, address financial and business issues, change behaviors and business processes, and implement new technology.

Sophistication in operations and logistics management requires not only understanding concepts and their application to health care, but also understanding the persuasive and leadership characteristics necessary to navigate the bureaucracy, influence dominant power groups, engage support for ideas, and ultimately gain approval and acceptance of changes. These changes will come only if business executives achieve more dominant power positions, which can evolve only when operations and logistics executives are recognized for their contributions, specialized education, professional expertise, and leadership skills. Collaboration within these multidisciplinary organizations is just one way to retain more control in the decision-making process.

► The Role of Technology and Systems

With its focus on improvements, operations management rests highly on the use of technology and automation. Many new technologies—including mobile devices, handhelds, scanning capabilities, asset tracking, database management, health information exchanges, and electronic health records—all help managers to improve their capture of data and transformation of this into improved decisions. Decisions about capital investment in new information and management systems are always at the forefront of

the modern operations manager's mind. Technology should be considered whenever quality and efficiency is low. Processes that are repetitive in nature and that can be replaced by less expensive automation are also suitable for a technology investment.

Technology often serves one of the three roles:

1. Automate manual processes.
2. Improve transaction processing capabilities.
3. Improve the quality of analysis, reports, and decisions.

Technology has the ability to substantially alter the economics of a process. Processes that can be mechanized allow for faster production or delivery with less resource usage—two keys to improving operational effectiveness. The decision to substitute capital, or technology, for labor—especially in areas of business support services—is the only way to reduce processing and transactional costs over the long run. For this reason, several other chapters in this text address the issue of technology and its role in productivity enhancements.

► Trends in Operations Management

There are several trends that are being widely considered and adopted in hospitals. These are depicted in **TABLE 1-3**, and the trends correspond to the role

TABLE 1-3 Roles and Trends in Healthcare Operations Management

Primary Role of Operations Managers	Evolving Trends
1. Reduce costs	Standardization Optimization Resource tracking systems
2. Reduce variability and improve logistical flow	Integrated service delivery Analytics Supply chain management
3. Improve productivity	Information technology; mobile devices; asset and patient tracking systems ROI
4. Provide higher quality services	Evidence-based health care Six Sigma
5. Improve business processes	Outsourcing Globalization

or function of operations management most closely related to it. Some of these will be highlighted in this section, while others will be discussed in other parts of this text.

Outsourcing is the contracting of an outside firm to perform services that were once handled internally. Outsourcing is quite common in many industries, and in health care, it has been used successfully for cafeteria operations, bookstore management, investments, and even nursing and other clinical care areas. Outsourcing is not a new concept, but it has a slow adoption rate in health care, where decisions such as these are often quite difficult to make, especially when they result in the dismissal of employees from hospital payrolls. However, outsourcing, when used selectively to target the right areas, can be quite beneficial from a cost perspective.

Outsourcing relies on the notion that a hospital should focus on its core competencies—delivering clinical care—and not on some of the less mission-centric functions, such as housekeeping, materials management, finance, and information technology. When analyzing pre- and post-performance improvement, the evaluation of internally performed or selective outsourcing costs needs to be undertaken to ensure all options are explored and the most operationally effective process remains.

Integrated service delivery is another trend that has been developing over the past few years. Many researchers have pointed to the excessive cost of care as being driven by the medical community's continued desire for specialization and concentration on discrete diseases and treatments, rather than on integrative, comprehensive care (Porter & Teisberg, 2006). In response to this, hospitals are looking for ways to push care toward more integrative medicine, including higher sharing of information, resources, and collaboration. The impact on operations management will include redesign of business processes and changes in the number and frequency of logistics networks.

Supply chain management is the integrated management of all products, information, and financial flows in a network designed to pull products from manufacturers to consumers. In health care, there has been widespread adoption of improved sourcing and inventory techniques designed to lower overall supply expense ratios (which typically account for 25%–50% of all hospital costs). Significantly more detail about the use of supply chain and logistics management will be covered in Part III.

Another trend in healthcare operations management is globalization. The world is becoming smaller, and vendors from all around the globe are competing

for business in retail and other industries. Health care has only recently felt the effects, but this trend will continue. When firms look for outsourcing opportunities (e.g., in information technology), they are now able to turn to vendors as far away as Ireland and India to help manage their information technology operations infrastructure. Medical care that might once have required specialists on site is now only a television away, allowing physicians to practice medicine without even setting foot in the hospital. Vendors for certain medical supplies, pharmaceuticals, and equipment are emerging and starting to compete for business as potential suppliers, requiring hospital managers to understand global logistics. As more and more hospital services become automated, the location of the technology does not matter. This is the true impact of globalization, and it will require adjustments by hospital management.

Investments in a hospital's information technology infrastructure are quite common today. Electronic medical records (EMRs), computerized physician order entry, enterprise resource planning, picture archival communication systems, supply chain management, and many other systems are much more prevalent today than in years past. Investments in a number of lesser-known technologies for admissions, cashiering, inventory management, and even bed management are also becoming more common.

The basic premise of most technologies is that they provide some return that, when quantified, is greater than the costs associated with it. In some cases, this is simple to calculate, as when a system creates known financial value and has well-defined costs. In others, when the information technology produces vague benefits (such as extending a system's end of life or improving clinical quality), the returns are more difficult to measure and quantify and thus are more complex if creating a cost–benefit comparison. Regardless, the trend in leading hospitals is to conduct thorough ROI analyses that clearly define the pre- and post-environment and then make comparisons of the delivered or earned value for the project. Significantly more about this will be discussed later in this text.

The growth in deployment of resource tracking systems is also quite interesting. Information systems and technology are being developed specific to health care to allow for tracking of patients, equipment, supplies, pharmaceuticals, bed occupancy, and much more. Microprocessor chips, bar coding technology, global positioning systems, and radio frequency identification systems are all technologies that are being slowly adopted in larger hospitals. Many of these use existing wireless frequencies and infrastructure, so

they are becoming easier to implement at lower costs. These tracking systems allow for closer monitoring of utilization patterns, location analysis, stationary or downtimes, and logistical flows, which thus helps better manage the number, type, and mix of resources required. Improved operational effectiveness results from improved utilization and higher asset productivities. Many of these technologies will be described later.

Another trend that is being followed closely in operations management is that of standardization. **Standardization** is the use of consistent procedures, resources, and services to achieve consistent results across multiple departments. In a system or network, standardization suggests that two hospitals could use the same basic medical supplies for multiple procedures, rather than a wide variety of them, which helps reduce inventory and purchasing costs and creates some economies of scale. Standardization also refers to the use of common standards for information systems, as well as personnel and operational processes. Standardization helps ensure alignment among departments, helps promote familiarization and learning curves, and helps reduce the number of transactions processed—which all result in lower costs and higher productivity.

Finally, many hospitals practice what is called evidence-based health care. **Evidence-based medicine** applies the scientific method to medical practice and seeks to quantify the true outcomes associated with certain medical practices by applying statistical and research methods (Heneghan & Badenoch, 2006). Evidence-based health care, as it applies to operational management, emphasizes that prior to decisions being made, the options are conscientiously

analyzed for the effects each would have on operations. For example, if a certain piece of equipment needs to be replaced, evidence-based medicine suggests that the true costs and outcomes associated with this item be carefully analyzed over time; a replacement piece of equipment undergoes the exact same controls to guarantee and quantify the total impacts of this change on the system. Evidence-based health care, in its use of quantitative methods and in seeking to comprehensively analyze operations, is completely in alignment with operations management theory. The use of quality management processes such as Six Sigma, which attempts to improve process and outputs through continuous improvement techniques, is beginning to gain a solid foundation in the healthcare industry.

► Best Practices for Successful Operations Managers

Operations managers will become more integral. It is necessary and vital for managers in healthcare organizations to fully understand how clinical processes are paid for, how supplies and products are moved between units, how billing and cost management are connected, and how facility layouts can improve flows of patients.

The types of operations and productivity analyses we describe in this text are perfectly aligned with the evolving direction of healthcare in the United States. The direction of health care is being shaped by a number of trends. We see at least eight broad trends in operations management, as shown in **FIGURE 1-7**.

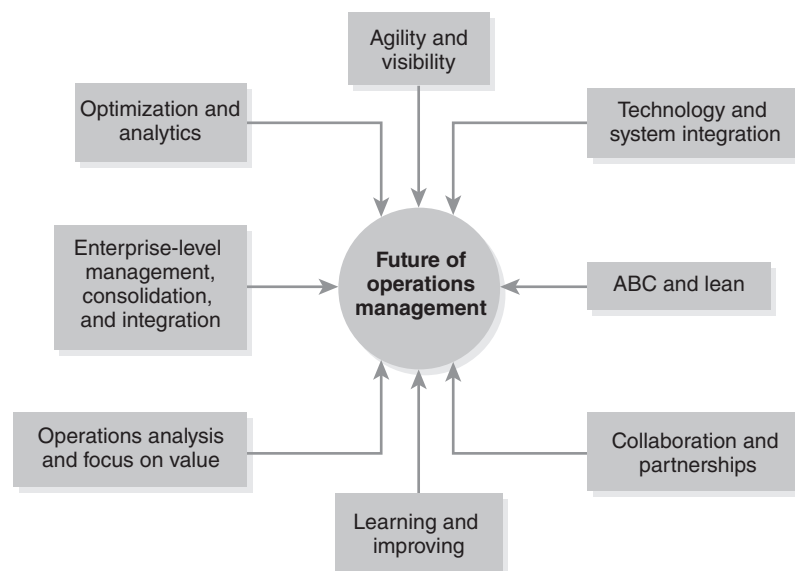


FIGURE 1-7 The Future of Healthcare Operations Management

Remain Strategically Focused on Agility, Speed, and Transparency

One of the biggest challenges in large hospitals and systems is the inability to know where patients and expensive resources are at all times, which effectively reduces capacity and causes excessive amounts of resources to be deployed. Imagine, however, the following scenario. A new patient is finalizing registration in admissions; subsequently, an order is given to housekeeping to make the room ready; a request also is made to materials management to order the typical procedural supplies required for the patient's stay and to simultaneously update the census, EMRs, and other key systems. If this same hospital tracks the flow and movements of all wheelchairs, infusion pumps, medications, crash carts, and other key resources as well, there would be higher utilization and throughput with reduced level of investments. All of the manual bed boards, tracking sheets, and paper processes could be discontinued, and in its place would be real-time visibility shared by all clinical and support services.

Healthcare strategy is moving toward greater agility and speed in business processes in an effort to improve throughputs and service simultaneously. These strategic capabilities will drive decision-making processes and will ultimately result in greater operational excellence.

In the long run, hospitals and other organizations will evolve over time much the same way that other low-margin, operationally focused industries have, such as telecommunications, retail, and energy. The technology and processes in these industries have evolved to where a continuous, real-time monitoring environment is used to manage the key aspects of the business. In health care, the use of scorecards (or dashboards) is primarily retrospective, in that it looks back over the previous day or month for metrics and results. As health care improves its operational focus, a control center concept using tracking technologies supports:

- Radio frequency identification (RFID) tags for use on key resources.
- Visibility of patients from admit to discharge—and all departments that are visited in between.
- Movement of expensive drugs and supplies to reduce the risk of theft or loss.

Health care is in the early phases of this evolution. Organizations are selectively putting tracking technologies such as patient bar coding and RFID on equipment and are simultaneously implementing real-time clinical systems to improve processes such as discharge planning. These systems will prove useful,

will have a limited ROI, but will eventually dictate the need for further system integration (discussed later) to achieve greater benefits throughout the entire organization. This will eventually lead to the need for a new, integrated department that can monitor and control the flow and throughput of resources throughout the entire system. A control center concept—staffed by professionals focused on operational efficiencies and driven by new metrics of speed, agility, and acuity—that can significantly decrease the organizational barriers and process inefficiencies will be implemented.

Embrace and Integrate Technology into Operations

When harnessed, data are converted into useful information. But, what do we do with all this data? Technology plays a vital role in integrating disparate processes and automating manual ones. As operations management begins to understand and influence the infrastructure to produce better costs and outcomes, technology will become even more pervasive. Much of this technology will be focused less on clinical needs than on business needs.

Technology deployment will continue to rise. Consumer-based technology that allows patients access to better information will prevail, but management technology that supports evidence-based medicine, reporting, and better operations is starting to reach a tipping point. These technologies are being pushed from clinic managers, physicians, and IT executives. This will involve much more than just EMRs, but also mobile apps, tele-medicine, analytics, and population health.

Most large hospitals have hundreds of enterprise and stand-alone systems, many of which are quite interdependent. Health care in the future will have much broader integration of these key systems and technology to allow for sharing and linking of data so that applications can operate as one large system. This is called **interoperability**, and extensive work is currently underway to define integration standards, middleware, and platforms on which this can occur. Interoperability ensures that all key systems—such as EMRs, a picture archiving and communication system, medication administration, enterprise resource planning, charge description master, and many more—work together seamlessly. This interoperability will allow the first trend (strategy) to be fully realized. Interoperability is also encouraging connection between different hospital systems, via health information exchange. A **health information exchange** is the electronic movement of patient records between hospital systems.

Integrate Service Delivery with Activity-Based Costing and Lean

Healthcare organizations are moving away from vertical, stand-alone, silo-based business units, where patients are treated differently at each department or clinic. More streamlined business processes will result in an integrated, or horizontal, service delivery. The current redundancy that exists—where each unit captures similar patient data, creates its own schedules, and manages separate systems—will be replaced by a more holistic and integrated service line approach.

This new approach will help drive improved throughput and patient flow through Lean and Six Sigma, but it will do little to reduce costs if it is not paired with an activity-based costing approach. **Activity-based costing (ABC)** defines total costs at a detailed level where activity drivers and resource consumers are used. Understanding the costs at an activity level is necessary because, in most healthcare organizations, there has been very little work done to understand what drives costs and where the true costs lie. Many of the hidden or fixed costs that are dormant in vertical processes are more easily exposed in a horizontal cross-functional approach, which is why ABC should be used in conjunction with integrated service delivery.

Work Toward Greater Collaboration

New forms of partnerships and collaboration will focus on interorganizational processes. Once you have your own internal operations mastered, be prepared to understand and improve upon these boundary-spanning processes. This also includes enhancing the continuum of care and vertically/horizontally integrating with other practices, payers, and acute services. There are opportunities in the healthcare value chain for significantly higher levels of collaboration internally with physicians and providers, and externally with vendors and payers. Interactions with all of these stakeholders today are still highly manual and do not involve electronic commerce and collaborative processes. Collaboration can take the form of automated reconciliations of charges and patients, shared business plans, and collocation of employees.

In many large facilities, limited outsourcing is already in use for support services, such as gift shops and cafeterias. As health care continues to focus on operational efficiencies, many organizations will discover that their **core competency** (or expertise that underlies their reason for existing and the source of the competitive advantage) does not involve operating

all aspects of a business process directly. A shift toward more selective outsourcing, in both clinical and business areas, will be significantly greater in the future than what currently exists.

Vendors will also control much more of the supply chain in many areas. Vendors possess more specialized knowledge and technology, which will penetrate deeper into many organizations, and complicated mechanisms will be used to better align incentives between vendors and providers—in a much different way than the cost-plus arrangement that is common today. The large healthcare distributors will have an expanded role. Incentive payments for improved bottom-line performance in key metrics will be used, and vendors will offer more attractive solutions that are comprised of labor, technology, and process.

Different managerial skills are required to manage vendor arrangements such as these, and operational managers must also include business acumen such as contract administration, performance management, and vendor collaboration.

Continue Learning and Improving

A continuous improvement mentality is necessary in today's post-modern healthcare enterprise. We are going to see a change in how health care is operationalized. There will be plenty of hospital beds and clinical treatment rooms, but we will also find ways to explore use of improved technologies that allow patients to treat themselves, or provide health care at home. The rise of chronic conditions will encourage a change in how care is delivered, and from where. Tele-medicine, for example, might help allow the patient to communicate directly with her provider without leaving the confines of her home. Emergency medical services (EMS) will also begin providing field-based medicine and using emergency medical technicians to provide care proactively (in advance of a 911 call) instead of waiting for the emergency to happen. Changes in how care is delivered are coming. Operations managers need to be in a position to support these changes.

Many administrators can benefit from improved management and business education. There are nearly 75 accredited graduate-level programs in healthcare administration, yet far too many programs focus predominantly on public and social policy and not enough on management, financial, and business issues. While most healthcare degree programs focus on the healthcare enterprise as a governmental organization, this will change as programs evolve to teach a broader curriculum focusing on operations, finance, and technology. In those facilities governed by physicians,

the pursuit of the MBA degree has risen steadily and a large number of physicians are obtaining graduate business degrees, such as an MHA or MBA. Yet, far too many physicians are relatively inexperienced in business practices that will help improve financial and operational performance.

As the healthcare industry continues to change into a more dynamic one, where financial pressures force administrators to act as true business managers, there will be a much higher need for well-rounded graduates with advanced business skills. Being able to use accounting and financial data to help drive improved decision-making and processes currently relies on skills that are better developed outside of health care. Having and using these skills, though, is necessary if hospitals are to manage increasing scale, horizontal integration, and effective operations.

Conduct Operations Analysis and Demonstrate Financial Value

Operations analysis is fundamental to understanding your organization or department's performance and to continue to focus on improving productivity and combating downward margin pressures. Clinical and support services need to continuously measure and improve the financial value offered. As health care becomes more sophisticated, organizations will be managed much more like a financial portfolio, where departments and units that offer the greatest value at the lowest risk are cultivated, while those that destroy value (i.e., where total costs of operations are greater than the returns provided) are mitigated or eliminated. As healthcare organizations continue to measure performance more holistically, the emphasis on tracking ROI and value creation will force differential management of service lines. This emphasis on financial value will ultimately help each unit deliver better and more competitive services.

Manage the "Enterprise" Through Consolidation and Horizontal Management Processes

New payment and practice models will continue to be created. These are highly experimental, so operations managers should be prepared to have multiple types of contracts in place. Insurance exchanges will obviously mean a different set of payer plans and models, but in addition, there will be other forms of *experimentation* from payers. These should be viewed as positive—they force you to know how to use simulation, forecasting,

and demand utilization to understand the financial impact on operations.

The healthcare industry will most likely continue to consolidate, as it has over the past few decades. Horizontal integration—through mergers, acquisitions, and joint ventures—will probably be used (much more than vertical integration) to create integrated delivery networks, as organizations attempt to use their current skills to manage similar operations in other geographic areas. This will require management of the healthcare organization as an **enterprise**, or a complex, multidimensional organization that is interconnected as a whole (and not just specific departments or activities).

This consolidation will create the need for a systems approach that can manage the interrelated facilities to achieve better results. Standardization, aggregation, and alignment are all necessary if hospitals are to achieve any synergistic effects from integration. Operational management, therefore, has to evolve from a narrow perspective to a much larger network view that can take disparate operations and connect them to achieve better results. This will require better leadership skills and the ability to manage and align processes that are expansive and currently decentralized.

Deploy Big Data and Analytical Techniques

Data are collected everywhere—from patients (in EMRs and registration systems), from payers (in payer databases), from activities and events (from radio frequency identification tags on equipment and devices), and from procedures (activities performed on patients). Harnessing this large amount of data (or **big data**, as it is called) is complicated since it derives from multiple sources and is extremely large and complex to manage with traditional tools. Health care has significantly greater potential for utilization of optimization and analytical techniques. As discussed in this text, all of the key operational processes in most healthcare organizations have developed over time using trial and error and do not deliver optimal results. The use of game theory, process engineering, Six Sigma, and other techniques will help augment the deployment of analytical techniques. Use of linear programming, simulation modeling, and other mathematical tools will become much more widespread in hospitals of the future than they are today. The use of analytics and optimization in the future will support a broad range of processes, including labor scheduling, patient routing, wait line and service delivery, and department or resource location analysis, to name just a few.

► Tips for Success

With the concepts and tools learned from this text, there should be a number of opportunities for improvement that can quickly be addressed. Here are some final thoughts on how operations managers can get started in the process of improvement and change by applying their knowledge to achieve better results quickly.

1. *Learn as much as possible about the organization.* Develop a list of the high-priority problems that the organization faces. Create a list or a plan of the processes that need the most improvement. Chart those initiatives that have the highest value and that can be achieved with minimal risks and faster timelines. This will allow for some “quick hits” or initial success to build an improvement program, one process at a time.
2. *Innovate and challenge the status quo.* To a large extent, healthcare organizations are governed by the people who are the most averse to change or who do not understand the financial or business reasons that make change necessary. Many clinicians and administrators will not see the need for continuously improving processes, managing performance on a routine basis, and identifying opportunities for breaking down barriers to increased throughput and operational efficiencies. Challenging this behavior and thought process is required if health care is to improve cost and quality simultaneously. Operations managers must be change agents.
3. *Always look for analytical or quantitative approaches to problems.* Operations managers should not settle for outdated heuristics (i.e., rules of thumb) or other biased methods for making decisions. Quantitative techniques, wherever possible, should be used to model processes, productivity, and performance and to substantially improve decision-making processes. Quantitative data form the basis for many operations techniques, such as forecasting demand and capacity and then aligning healthcare operations strategies accordingly.
4. *Comprehensively analyze and measure everything important about the process and organization.* Relying on text reports and tables makes trends and changes over time very difficult to identify and measure. Whether looking at statistical control charts of clinical procedures or financial outcomes, viewing data graphically in a scorecard puts things in perspective. All key processes and business units should have scorecards developed, so that pre- and post-project performance can be measured and planned results can be achieved. Comparison of trends to published benchmarks or targets helps instantly focus management on opportunity areas.

Of course, these are just some of the things that must be done if operations management is to be successful in transforming healthcare organizations. All of these will be covered in subsequent chapters of this text. Remember, there are always new tools and techniques that can be adopted to improve outcomes.

Chapter Summary

Operations management is the quantitative management of the supporting business systems and processes that transform resources into healthcare outputs. Operations management is fundamentally about coordinating diverse, complicated activities into a comprehensive system. It is focused on achieving operational effectiveness—defined as lower costs, higher productivity, and continuous process improvement. There are five key goals of the operations manager: enhance financial effectiveness, reduce variability and improve logistics flows, improve productivity, improve quality of customer service, and continuously improve

business processes. Operations management is a field within the discipline of management, and it evolved initially from the scientific management school of thought. The process of management decision-making supports the choices for how operations management occurs. The decisions made impact the quality and efficiency of operations. With the increased emphasis on efficiency and quality in healthcare organizations, operations management has progressed and become more comprehensive and valuable. There are many trends evolving that are changing healthcare operations, and many of these are discussed in later chapters.

Key Terms

Activity-based costing (ABC)	Healthcare operations management	Organizing
Big data	Health information exchange	Outsourcing
Competitiveness	Innovation	Planning
Controlling	Interoperability	Productivity
Core competency	Leading	Satisficing
Cost–quality continuum	Logistics	Specialization
Decision-making	Mass production	Standardization
Division of labor	Operational excellence	System
Enterprise	Operations effectiveness	Throughput
Evidence-based medicine	Organization	Variability

Discussion Questions

1. Why do we need operations management for health care?
2. How does health care represent a system?
3. What are the key goals of operations managers?
4. Does operations management impact a hospital's competitive advantage?
5. What are three of the key trends affecting hospital operations?
6. Who is considered the “father” of scientific management?
7. How are decisions made in organizations?
8. What are the basic steps of a rational management decision-making process?
9. What are the common sources of cost increases in health care?
10. How does the medical care CPI relate to cost increases for other items?

Exercise Problems

1. Healthcare organizations routinely make complex organizational decisions. As an example, a decision to modify the physical layout or space of a department, or alter the schedules of a nursing unit, will impact patient care in many ways. Since there are so many stakeholders involved, what process for making management decisions do you think will be followed? How would you use the decision-making process to make important decisions such as this in an organization?
2. Richmond Community Hospital currently receives more than 10,000 boxes of pharmaceutical supplies per month. All of these items are manually inspected and logged to ensure adequate receipt prior to payment. Eight employees manage receipts and deliveries, while four employees manually record and track them. A new software package that allows automated scanning of bar codes will replace all or some of the employees used for manual tracking, or at least allow redeployment to other areas of the hospital. What are some of the key questions that must be explored to fully understand the impacts of technology and whether a capital investment should be made to substitute capital for labor?

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