# SECTION 32
# HEALTH CARE SERVICES

**Donald M. Berwick**
**Maureen Bisognano**



## *INTRODUCTION*

Few industries have changed so radically in structure, focus, and process as health care in the United States has in recent years. Integrated delivery systems have replaced hospitals as the powerful force in health care delivery. The aim of the system has moved from caring for patients with disease and injury to improving the health of entire communities. Process redesign has produced changes in the kinds of care provided, the site in which care is received, and the extent to which the patient is an active participant in the plan for care.

Health care is America's second largest industry, surpassed in total expenditures only by education. A trillion dollars changes hands each year in the purchase of medical products and services, with care being given in over 6300 hospitals, 1000 health maintenance organizations, 720,000 nursing homes, and 200,000 medical offices. Health care involves the work of over 600,000 physicians in the United States, 1,900,000 nurses, 155,000 dentists, and hundreds of thousands of others in a myriad of allied health professions and support services.

The complexities of the system are evident in a comparison with other industries; a manufacturing company employing 4000 people will categorize staff in about 50 job titles; a typical health care organization of 4000 will utilize 500 titles. This specialization, originally designed to improve quality, now creates multiple handoffs for any patient procedure and contributes to a breakdown in quality processes.

The economic scale of American health care dwarfs that in other countries. On a per capita basis, Americans spend almost 40 percent more on health care than in the next most costly health care system (Canada's), and over twice as much as in many other systems in the Western world. Over 15 percent of America's Gross Domestic Product goes to health care, with the comparable figures being 11 percent in Canada, 8 percent in the United Kingdom, and 6 percent in Denmark. Throughout most

of the last half of the twentieth century, American health care costs grew at a much faster rate than did the economy as a whole. In total dollars, the bill for health care doubled in the decade of the 1970s, and then doubled again between 1980 and 1989. On average, the medical price index, the price of a "market basket" of medical products and services, has risen 2 to 3 times faster than the consumer price index during the last third of this century. One health care economist in 1970 wrote of his dismay and disbelief that health care costs might soon rise to over 7 percent of the GDP in the United States, little imagining that, by the end of the century, that figure would more than double.

Yet despite its immense scale, American health care falls short of the social need it aims to fulfill. Because of anomalies in the financing system for U.S. health care, as of the late 1990s, over 30 million Americans lacked insurance as a means to pay for their care, and simple indicators of population health place Americans surprisingly lower in health status than many other populations in the developed world. The United States ranked twenty-first in the world in infant mortality rate (deaths in the first 30 days of life) in 1995, and American life expectancy is 3.4 years shorter for men and 2.8 years shorter for women than that of the best in the world, Japan. Surveyed about satisfaction with their health care, Americans routinely give the system a dichotomous rating: They rate *their own* doctors highly, but express strong dissatisfaction with the quality and cost of American health care *in general.*

## *INITIATIVES FOR CHANGE*

Discontent with the high cost and variable outcomes of health care has led, in the last quarter of the 20th century, to a number of initiatives in public policy, finance, and organization of care—all in an effort to measure, control, and improve the value of care, and to increase the accountability of health care providers to the public and to insurers. Important examples include the following:

**Prepaid Financing of Care.** Provider organizations are given a prospective annual budget to meet the needs of enrolled populations of patients, instead of simply charging insurers without limit for care as it is consumed. Such prepaid financing is supposed to change the incentives for providers of care from "doing more" (under fee-for-service payment) to "conserving resources" (under prepayment), and to shift the risk for the increases in cost from the payor to those providing care.

**Health Maintenance Organizations.** "Managed care" systems are designed as systems of health care linked to provide health care services to members for a periodic fee, regardless of the extent of services required. In managed care systems there is often an emphasis on improving the health status of the member population to decrease the cost of care for preventable chronic disease or injury.

**"Gatekeeping" and Other Forms of Utilization Review.** Providers of care must justify to insurers their choices to use expensive tests, surgery, specialty referrals, and so forth, especially if their patterns of use deviate from prevailing patterns among their peers. The controls on resource consumption are placed in the hands of a clinician who assumes the role of care manager and who orchestrates the level of testing and service delivered to the patient.

**Innovations in Programs of Care.** For example, a major shift in *site of care* has occurred in the past several decades, as procedures and tests, formerly done only in inpatient settings, are now performed safely and at lower cost in outpatient offices and clinics. Only 15 years ago, cataract surgery required a week-long hospitalization and a quiet recovery period at home. Today, advances in technology and process changes permit such surgery to take place in physician offices or surgery centers, requiring only a 2-hour total visit/procedure time. Even more exciting innovations have occurred in outreach programs extending technical care into patients' homes, and in new communicationmethods to involve patients more directly in decision making about their own care, such as choosing between medical and surgical management of prostate disease and breast cancer. Telemedicine links special-

ists with rural physicians in remote areas and allows for the latest in diagnostic capabilities to reach patients who would otherwise need to travel for such access.

**"Report Cards" and Measurement Systems.** The performance of health care organizations is assessed by standardized instruments, and often the results of measurement are made public to help inform the choices of payers and patients. Business coalitions in key cities across the nation have accumulated comparative cost and outcomes data to aid business leaders in the decisions on which providers will care for employees. In many companies, the cost of health insurance for employees is the number one increasing cost and these data are considered a key tool in controlling what was considered an "uncontrollable" cost.

Health care leaders are also using these comparative data and internal "balanced score cards" to define organizational priorities for change and to demonstrate progress to key stakeholders.

## *FOUR ARENAS OF IMPROVED PROCESS*

Health services research has demonstrated major opportunities for improvement of the performance of health care processes in at least four arenas: health status outcomes, service characteristics (measures of satisfaction and ease of use of the system), breadth of access (including equity among racial and socioeconomic groups), and levels of waste.

**Health Status.** With respect to health status, Americans are not nearly as healthy as they could be, given available scientific knowledge. Unintentional injuries are the major cause of premature death, and many are preventable through simple steps such as wearing automobile seatbelts, using helmets when riding bicycles or motorcycles, and fencing off swimming pools. Simple counseling by health care providers can lead many people to change their life-style choices in a more healthful direction. Almost half of all deaths annually in the U.S. are caused by alterable choices in life-style and behavior. Tobacco use, alone, accounts for 19 percent of deaths in this country, by inducing heart disease, cancer, and respiratory disease (Table 32.1).

Technical medicine also could be safer and more effective than it is. Adverse drug events—complications from medication use—occur in over 6 percent of all hospital admissions, and many are due to avoidable system errors. Unnecessary surgery and testing add hazards without benefit for

**TABLE 32.1** Actual Causes of Death in the United States in 1980

| | Deaths | |
|---|---|---|
| Causes | Estimated no. | Percentage of total deaths |
| Tobacco | 400,000 | 19 |
| Diet/activity patterns | 300,000 | 14 |
| Alcohol | 100,000 | 5 |
| Microbial agents | 90,000 | 4 |
| Toxic agents | 60,000 | 3 |
| Firearms | 35,000 | 2 |
| Sexual behavior | 30,000 | 1 |
| Motor vehicle | 25,000 | 1 |
| Illicit use of drugs | 20,000 | <1 |
| Total | 1,060,000 | 50 |

many patients. In one study, for example, more than half of the operations done on carotid arteries were unnecessary according to scientific literature. Rates of "inappropriate" care (care that, on scientific grounds, cannot help the patient) range between 10 and 50 percent for many frequently performed procedures. Cesarean section rates in the United States rose from 5 percent in 1970 to over 23 percent in 1995, without any strong evidence of clinical benefit to mothers or infants. Such inappropriate care both raises costs and introduces risks.

**Service Characteristics.** Service characteristics of health care have also lagged behind those in other industries. Waiting times in health care systems—both waits for appointments and waits on-site at the time of appointment—are often very long, and many care-giving institutions experience frequent complaints from patients and families because of incomplete communication, impersonal encounters, and lapses in continuity of care. An average physician office visit takes hours and involves care by several staff members and 23 different procedural steps. The information systems in health care organizations often add to the complexity. They have not been utilized, as they have in other service industries, to produce a sense of confidence and friendliness by assuring that all appropriate information is cascaded to key staff in anticipation of patient needs.

**Breadth of Access, Levels of Waste.** Access to care in the United States is generally good, but not for all portions of the population. The health care insurance system allows over 30 million Americans to remain without health insurance. Some are very healthy, and do not notice. But others are at high risk of suffering devastating health care bills, or delay their own care imprudently because of inability to pay. For lower income groups, the gaps in access may be severe. Almost one in four pregnant women in America's inner cities lacks adequate prenatal care.

Above all, the *costs* of health care in America are far from optimal. We have already noted above how great is the difference in per capita health care expenses comparing the United States with other developed nations. Some of that difference may relate to features of the U.S. system that are not available in others—for example, we have more "high technology" imaging machines and generally newer hospital facilities—but, to a large extent, the higher costs of health care in the United States represent higher levels of waste—costs of poor quality. Compared to other nations, we in the United States do more laboratory tests, use more hospital bed-days, perform more surgery, and use more minor visits to doctors. We tend to use our capital (expensive diagnostic machines, costly hospital space, and equipment) less fully, and we use many more futile interventions in the final stages of life. Unlike other markets, the health care economy is largely "supply-driven." That is, the availability of hospital beds, specialist services, and imaging equipment, for example, appears to be the greatest single determinant of the rate of use of those resources. For historical reasons, the United States has accumulated a larger supply of specialized health care than other countries, and many health economists believe that this is a *cause,* not a *consequence,* of our high rates of use and therefore a cause of our high costs. Most important, this increased use of high-cost care has apparently not led to better health outcomes for Americans.

## *FURTHER POTENTIAL IMPROVEMENT*

The following simple list of 11 major areas for potential improvement of American health care is based on author Berwick's 1994 health service research findings. The list is only a sample; many additional entries would also be supported by available research.

*Aim 1: Increase appropriateness of practice.* Reduce the use of inappropriate surgery, admissions, and tests. Important initial targets may include: management of stage I and II breast cancer, prostatectomy, carotid endarterectomy, coronary artery bypass surgery, low back pain management, hysterectomy, endoscopy, blood transfusion, chest x-rays, and prenatal ultrasound.

*Aim 2: Increase effective preventive practices.* Improve health status through reduction in "upstream" causes of illness, including especially: smoking, handgun violence, preventable injuries in children, and alcohol and cocaine abuse.

*Aim 3: Reduce cesarean section rates.* Reduce cesarean section rates to below 10 percent, without compromise in maternal or fetal outcomes.

*Aim 4: Reduce unwanted care at the end of life.* Reduce the use of unwanted and ineffective medical technologies at the end of life.

*Aim 5: Rationalize pharmaceutical use.* Adopt simplified formularies, and streamline pharmaceutical use, especially for antibiotics and for drug prescriptions for the elderly.

*Aim 6: Involve patients in decisions.* Increase the frequency with which patients participate actively in decision making about therapeutic options.

*Aim 7: Reduce wait states.* Decrease uninformative waiting in all its forms.

*Aim 8: Reduce, consolidate, and regionalize high-technology services.* Reduce the total supply of high-technology medical and surgical care. Consolidate high-technology services into regional and community-wide centers.

*Aim 9: Reduce wasteful and duplicative recording.* Reduce the frequency of duplicate data entry and of recording of information never used in medical record and administrative systems.

*Aim 10: Reduce inventory costs.* Reduce inventory levels.

*Aim 11: Reduce racial and economic health status inequities.* Reduce the racial gap in infant mortality and low birthweight.

American health care has enormous opportunities for improvement. Despite this, we must acknowledge that American health care is, nonetheless, in many ways the very best in the world. Patients who can afford it come from all over the world to receive their care in American facilities, and the American biomedical research community is the largest wellspring in the world of new knowledge used to improve the effectiveness of treatments. Many leaders in health care systems throughout the world have received their training in U.S. facilities, and many nations, both developed and developing, base their system designs and approaches to the prevention and treatment of disease on American models.

## APPROACHES TO QUALITY CONTROL IN HEALTH CARE: HISTORY AND PREVAILING METHODS

Quality of care has been a concern of health care leaders for as long as we have written records of medicine. Quality scholar John Williamson reports the following "quality control" text in Hammurabi's code, dating from 2000 B.C.: "If a physician should operate on a man for a severe wound with a bronze lancet and cause the man's death; or open an abscess (in the eye) of a man…and destroy the eye, they shall cut off his (the physician's) fingers." Standards of ethical conduct were established in the Hippocratic Oath in the fourth century B.C. In the Middle Ages, regulations in regions of France, Germany, Italy, and elsewhere defined who was and was not permitted to practice surgery, obstetrics, and drug prescribing. In America, licensing of physicians to practice began in New York in 1760, and the first American specialty society, the College of Physicians, was founded in 1787.

Arguably, the modern era of concern for quality of medical care in America began at about the turn of the twentieth century. Academic medicine took a major step forward with the publication in 1910 of the Flexner report, which both documented the deficiencies of medical training at that time and set out new standards for the education of physicians based upon a scientific view of the practice of medicine. As a result of the Flexner report, half of the medical schools then active in the United States closed their doors, and medical training thereafter became subject to stringent accreditation procedures.

At about the same time, medical professional organizations began to dominate the landscape of professional certification. Prime among them was the American College of Surgeons (ACS), which undertook, in 1916, an extended project to study quality of care and to develop standards for American hospitals in areas such as medical staff organization, record keeping, and availability of diagnostic and therapeutic facilities. The initial findings in 1919 from the so-called Hospital

Standardization Program were disturbing; only 89 of the 692 surveyed hospitals with over 100 beds had met the new American College of Surgeons Standards.

The work of the ACS, along with other professionally driven efforts at self-inspection, led, in the 1950s, to the formation of the Joint Commission on Accreditation of Hospitals [later renamed the Joint Commission on Accreditation of Health Care Organizations (JCAHO)], which rapidly became the major accrediting body for hospitals throughout the nation. The JCAHO purpose, largely unchanged throughout the years, is to establish standards of care for hospitals and to conduct surveys that teach and promote improved systems of care and safety. The scope of work of the Commission extends from physical plant inspection to medical documentation review to interviews with hospital staff and physicians ascertaining their level of organizational involvement and their capacity to perform effectively and to improve their work. Still today, the triennial accreditation site visit from a JCAHO team is a recurring milestone for most American hospitals. Other prevailing forms of outside inspection include those from state and local health departments to review and enforce regulations bearing on the operations of clinics and hospitals, and regular procedures for licensure and relicensure of doctors and other health professionals, as administered by the state licensing board.

While the Joint Commission, state health departments, and professional boards of registration were developing as the major forms of external quality inspection for hospitals, a set of conventional forms of internal inspection gradually became routine, even traditional, inside the organization of hospitals themselves. These internal surveillance systems, many required by the Joint Commission, consist mainly of committees drawn from the medical staff, each with jurisdiction to review specific components of care process and outcome. Tissue Committees, for example, review organs and tissues removed in surgical procedures. Pharmacy and Therapeutics Committees review medical use and set pharmacy policy. Morbidity and Mortality Conferences, especially in surgical departments, review cases of operative death or complication. To staff these quality control groups, and often also to help prepare for Joint Commission surveys, most hospitals maintain Quality Assurance departments, whose members collect necessary data, prepare documents, and conduct special studies of quality-related issues. Membership is traditionally drawn mainly from nursing backgrounds.

An extensive research literature on quality of care has developed during the century in parallel with these accreditation and inspection activities. Researchers have explored methods of inspection—such as "explicit review" and "implicit review," in the jargon of health care quality assurance. Explicit review consists of reviews of care processes against written criteria. For example, such a review may ask: Did patients with anemia on screening tests receive the correct follow-up laboratory tests according to a preexisting protocol? Implicit review consists of summative judgments by recognized clinical experts rating the adequacy of care without reference to specific, preexisting criteria.

One of the seminal authors in the history of health care quality research, Professor Avedis Donabedian, offered in 1966 what remains the dominant categorical framework defining possible objects of inspection, whether by explicit or implicit means: "structure, process, and outcome." Donabedian claimed that quality assessment could study the resources and organizational architecture of care (structure), the sequences of diagnostic and therapeutic activity (process), or the health status, mortality rate, and functional results of care (outcomes), and that each object of study could shed light of a different type on the overall pattern of quality of care (Donabedian 1966).

The inspection-oriented foundations of so-called quality assurance in health care took a significant step of maturation in the 1970s and 1980s due largely to research at the Rand Corporation, which was employing an experimental design to assess the effects of various forms of health care insurance on the processes and outcomes of care (Brooke et al. 1979; Lohr and Brooke 1984). As an important byproduct of their main research plan, Rand's investigators developed a carefully crafted set of surveys and measures to assess quality. They employed a very broad definition of "quality of care," encompassing patient satisfaction, ease of access, and appropriateness, as well as the more traditional definitions of health outcomes. They broadened the definition of "health outcome" itself, by describing dimensions such as emotional well-being, social and role functioning, and physical comfort, rather than stopping with simplistic, unidimensional measures of health. For example, the instrument analyzes days lost to work and the degree of effective work ability 6 weeks after a surgical procedure in addition to a more introspective measure such as complications at the time of discharge after surgery.

Most important of all, these researchers showed that simple questionnaires and record abstracting forms could have excellent properties—validity, reliability, and sensitivity to changes over time. Colleagues in other research centers built upon this work, producing, by the end of the century, a relatively well-developed tool kit of sound measures of the effect of health care on its customers.

Meanwhile, researchers concerned primarily with the processes of care (in Donabedian's sense of the word) had become aware of large variation among health care practitioners in their approach to diagnosis and therapy. Pathfinding research by Dartmouth Professor John Wennberg (Wennberg and Gittelsohn 1973) showed that, adjusted for the "case-mix" (age, gender, etc.) of the populations treated, rates of use of laboratory tests, surgical operations, and hospital bed-days varied greatly, depending on which doctor, which hospital, and what geographical region, both within the United States and among countries. In one study in the mid-1980s, for example, Wennberg found a variation in rates of hysterectomy in women before the age of 70 years of 350 percent between two cities in Maine less than 100 miles apart.

Wennberg's work, along with the many confirmatory studies that followed, raised interest in the need for *standards of practice* to reduce this unexplained variation. In the last two decades of the twentieth century, a virtual subindustry developed in the United States of both public and private groups who developed and promulgated guidelines and protocols for care, some allegedly based on scientific literature, others on expert opinion, and still others on prevailing practice patterns. Some regulatory agencies seized upon such guidelines as another component for their systems of external surveillance of quality of care, and payers (insurance companies and corporations covering their employees' health care needs) began widespread use of the guidelines to help them decide what care to pay for, and what not. National guidelines for the care of common conditions, such as cardiac chest pain, low back pain, and diabetes, emerged from the work of several federal agencies, as well (see Figure 32.1 for an example).

Using more modern information systems and claims databases, many health care systems have recently begun offering direct feedback reports to physicians as individuals and groups, showing their rates of utilization of resources or, sometimes, their degree of adherence to protocols for care. Reactions to such feedback vary. In some cultures, physicians show fear, wariness, or anger at this apparent invasion of their professional autonomy. Doctors in other systems appear to welcome the feedback, and use it to engage each other in discussion or to set in place personal learning plans. One of the most dramatic examples of successful arrangements for feedback of performance data to physicians has been the work of the Maine Medical Assessment Foundation (Wennberg and Keller 1994), which sponsors peer group collaborations of specialists who receive such data confidentially, and who then use it to explore the causes of variation among the individual members, often with prompt results in reduced variation and correction of outlier patterns.

In summary, the system's familiarity with issues of quality management comes traditionally in its use of various forms of inspection—internal and external—applied both to its work procedures (in guidelines, accreditation, and certification) and, to a smaller degree, to its outcomes. Senior health care leaders mainly seek to assure quality through accreditation of facilities and people, through periodic external and internal reviews against standards, and through the study of unusual events and complications. For the most part, more formal statistical methods for quality control are not in evidence even decades after they have become conventional in many industrial settings. Exceptions include a few technical areas in care, where statistical process control theory makes its appearance in supervisory use of run charts and control charts on a local basis, such as in clinical laboratories (where control charts are used to maintain machine calibration) and radiology units (where graphical methods are used routinely to control the temperature of x-ray film developer solutions).

## QUALITY IMPROVEMENT

Health care's traditional reliance on external and internal inspection to maintain quality has had its expected effects on performance. The extensive inspections are very costly, but are agreed to, by providers and outsiders alike, as the best they can do. Reviews do tend to call attention to serious

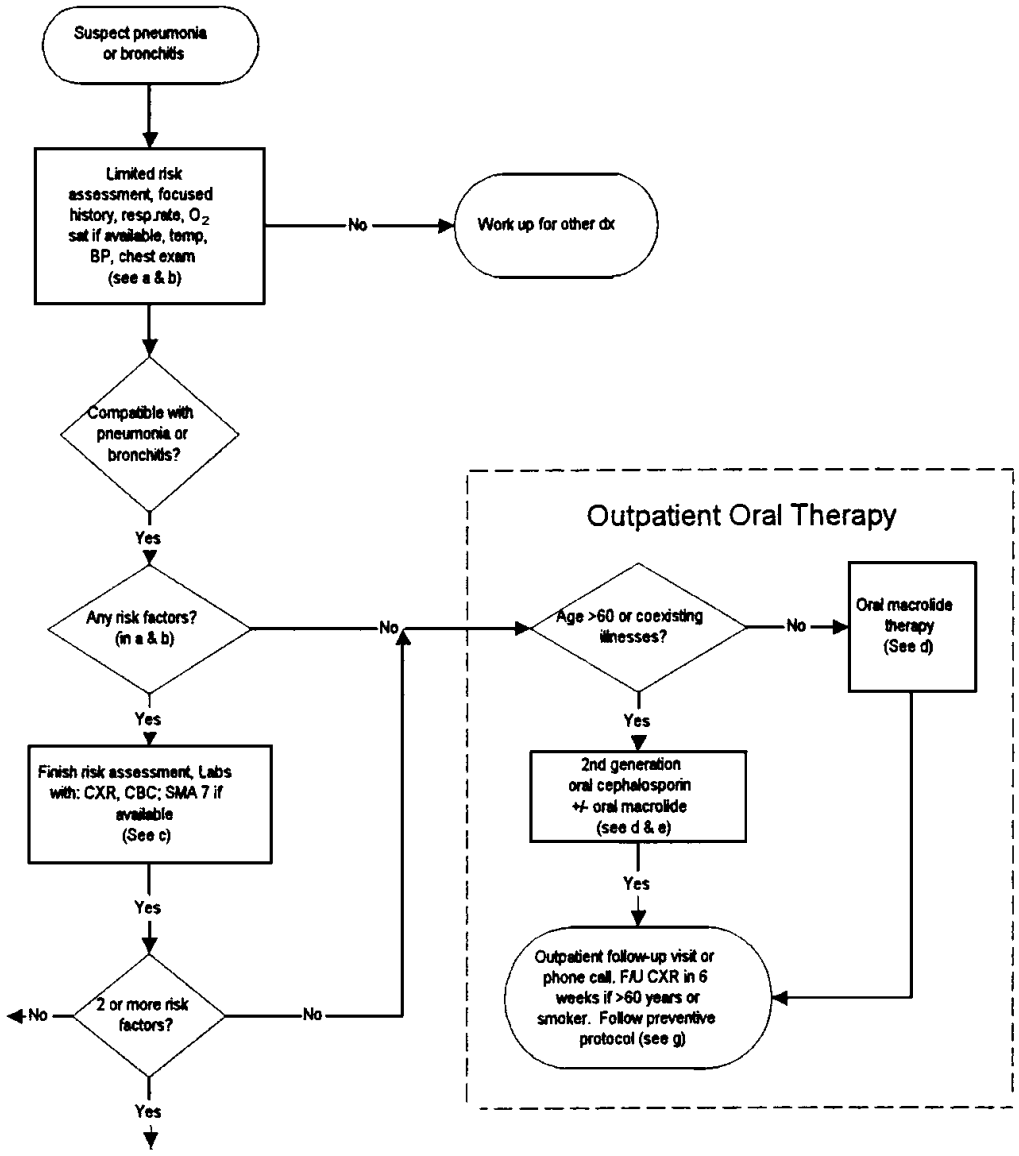
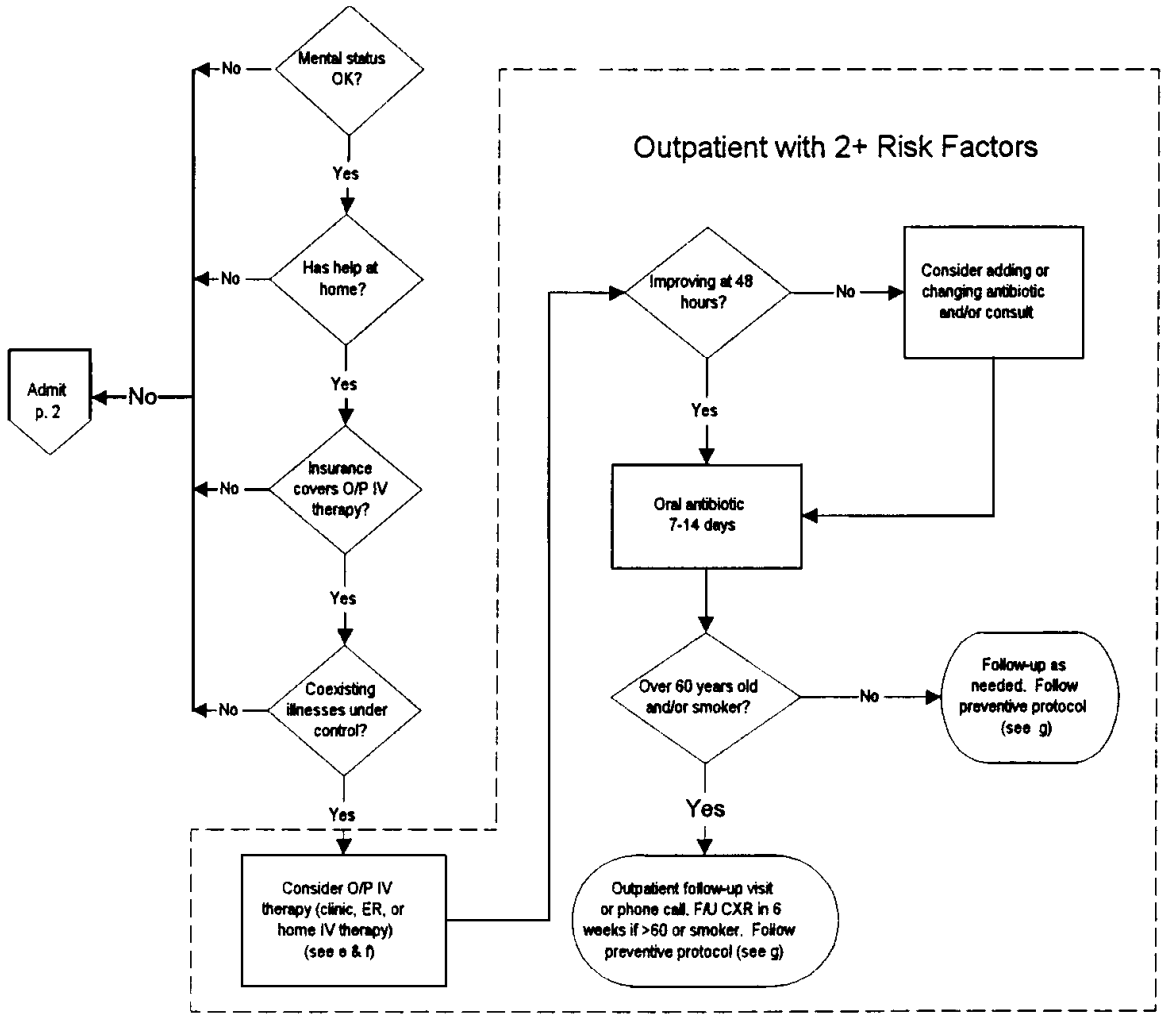



**FIGURE 32.1** Guideline for care of patient with pneumonia.

problems, some of which are remedied correctly, and others which invite overreactions that have probably added to the cost and complexity of care without much gain in quality or efficiency. One good example of waste of this type is the accretion of requirements and guidelines for medical record keeping, which have resulted today in a medical record whose size, complexity, and format confound accurate and efficient use. No modern industry outside health care keeps records as wasteful as those in medicine. On the whole, quality assurance in health care is viewed as cumbersome, occasionally revealing, and a necessary evil.

At a deeper level, however, quality improvement concepts, though they have had a second seat to inspection, are not so new at all in medicine. The Joint Commission itself developed and refined an improvement procedure, which it recommended to hospitals for their internal quality assurance procedures, and which incorporates many of the aspects of modern approaches to "plan-do-check-act" (PDCA) cycles (Figure 32.2).

In another example of going beyond the inspection model, John Williamson, the dean of American health care quality researchers, drew heavily upon an adult learning model for his work, and proposed eloquently that quality assurance should involve a "cybernetic" (i.e., feedback) process in which data on performance were systematically used to identify opportunities for further improvement. Williamson's




Risk Factors for the Immunocompetent Patient

(a) History

Coexisting Illnesses
- COPD
- CHF
- Diabetes
- Chronic renal failure
- Chronic liver failure
- Hospitalization prior 12 months
- Postsplenectomy
- ETOH or malnutrition
- Tuberculosis
- Bronchitis

Suspicion of Aspiration

Age >65

(b) Physical

Vital signs

Adult: Respiratory rate >30

Blood pressure <90/50

Temperature >101

$SaO_2$ <66 or $PaO_2$ <50

Acute altered mental status

Extrapulmonary site of infection (e.g. septic arthritis, meningitis, etc.)

Coexisting illness findings

(c) Laboratory

Chest film complicated
- multilobar
- cavitation
- effusion

CBC with differential
- WBC < 4,000 > 20,000
- Hgb < 9 or Hci < 30

BUN & creatnine
- BUN >20 or Creatinine > 1.2

Coexisting illness lab abnormalities

Therapies

(d) Macrolides

Erythromycin 500 mg po qld x 10-14 days

Blaxin (Clarithromycin) 250 mg po bid x 10-14 days

Zithromax (Azithromycin) 500 mg po 1st day, 250 mg qd x 4 days

If mycrolide intolerant, use Doxycycline 100 mg po bid x 10-14 days

(e) Cephalosporins

Oral Therapy: Cefin (Cafuroxime) 250-500 mg bid po x 10-14 days

If allergic, use Blaxin (Clarithromycin) 250 mg PO bid x10-14 days or Cleocin (Clindamycin) 300 mg PO every 8 hours

IV Therapy:

2nd Generation:
- Kefurox (Cefuroxime) 1.5 grams IV every 8 hours

3rd Generation:
- Claforan (Cefotaxime) 2 grams IV every 8 hours
- Rocephin (Cefriaxone) 1-2 grams IV every 24 hours

If penicillin allergic, give Cleocin (Clindamycin) 900 mg IV every 8 hours + Nebcin (Tobramycin) IV every 8 hours (dose by patients)

Notes

(f) Medicare and Medicaid coverage is complex; verify insurance coverage with home IV therapy agency

(g) Evaluate for pneumococcal and/or flu vaccination with follow-up visit if needed.

**FIGURE 32.1** *(Continued)*

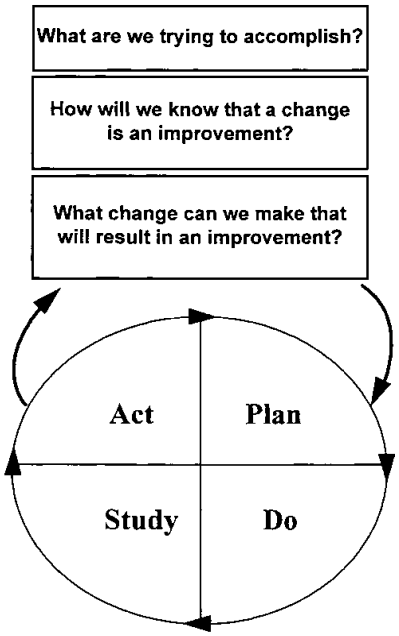



**FIGURE 32.2** Model for improvement. (*Langley et al. 1996.*)

recommendations, as early as the 1960s, were clear harbingers of the modern approach to quality improvement and design (Williamson 1971). Nonetheless, through most of the twentieth century, health care quality activities remained those of inspection, with its primary aim of stabilization.

A new emphasis on the opportunity for improvement began to blossom in the mid-1980s. Due in part to the exploratory work of the National Demonstration Project on Quality Improvement in Health Care (Berwick et al. 1990), and in part to the entry of industrial quality professionals into positions of influence on hospital boards and in health care management, health care organizations became gradually more receptive to the ideas that stabilization was not enough, that important improvements in cost and quality could be achieved, and that new managerial methods—quality management—might help in health care, even though these methods had first appeared in other industries.

The early efforts of this sort, such as those documented in the monograph report on the National Demonstration Project, *Curing Health Care,* concentrated largely on classical business processes that appeared also in health care organizations—processes like scheduling, equipment maintenance, and transportation. In one highly successful project in 1987, for example, the University of Michigan Hospitals, working with the help of a quality professional from Corning, Inc., reduced waiting times in its ambulatory care clinic by 89 percent in a few short months. Efforts in improvement at Intermountain Health Care's LDS Hospital in Salt Lake City reduced perioperative wound infection rates from 1.9 percent to 0.4 percent, compared with the national average of 4 percent, and a standardization project to reduce the number of different prostheses used in total hip replacement saved almost $1 million annually, while achieving better functional outcomes for patients (Pestotnik et al. 1996; James 1993; Morrissey 1996).

On the basis of these initial successes, quality improvement methods rapidly spread among dozens, then hundreds, of American hospitals and other health care organizations. Senior management groups organized Quality Councils; formal Quality Improvement teams became commonplace, and more fundamental redesigns of care began to make systems more patient-friendly. In general, the health care models for managing these improvements closely paralleled those in other industries. Perhaps for this reason, the models worked more smoothly in segments of health care that, from the start, looked more "corporate" in structure.

Less-well-developed managerial environments, such as medical staffs in hospitals, office-based medical practices, nursing homes, and interprofessional processes (such as those involving both doctors and nurses) proved less susceptible to repackaged industrial quality improvement methods. Not being employees, and tending to see themselves as customers of hospitals, rather than as partners or employees, doctors, for example, exhibited difficulty understanding and buying into coordinated, corporate objectives. They objected to attending improvement team meetings regularly as contributors, and redesigning their own work to fit better into the system as a whole. The various special languages and turf boundaries that have developed in health care (and that professional certification processes perversely reinforce in an effort to protect quality) have stood in the way of whole-hearted collaboration on systemic improvement. Hospital records still often maintain separate "nursing diagnoses" and "medical diagnoses." Professions sometimes do not even share common lounge areas, cafeterias, or meeting times, and it is still common in hospitals to find "nursing notes" and "doctors' notes" in separate sections of the same medical records.

Thus medical care, perhaps even more than other industries, finds itself susceptible to forms of fragmented efforts that impede systemic vision and optimization of the whole. Even more, old habits of work die hard in medicine. Physicians, nurses, and others are trained in highly conservative modes of work; they often regard changes as dangerous until proven to a standard far more stringent than in other industries. The learning cycles (plan-do-check-act) so characteristic of robust quality improvement can therefore feel especially threatening to health care professionals trained, first of all, "to do no harm."

Like other industries that came new to improvement methods, health care organizations often simply do not seem to believe that significant improvement is possible. Many tend to regard disease outcomes as biologically predetermined, patient expectations for comfort and service as "unrealistic," and excessive health care costs as inevitable. (All these constraints are, of course, quite real, unless the processes of work can be systematically changed and improved on the basis of data—unless, that is, quality is managed actively.)

Yet, despite the cultural barriers, the promise of quality improvement in health care remains great. A deeper look at two improvement projects shows how it can work under the best of circumstances.

**Case I: The Northern New England Cardiovascular Disease Study Group.** In the mid-1980s, the five hospital centers and 17 cardiothoracic surgeons performing open heart operations in the three northern New England states (Maine, New Hampshire, and Vermont) began receiving some unwelcome news from the Health Care Financing Administration (HCFA), the federal agency that administers health care payment for Americans over 65 years of age who are covered by Medicare. HCFA's leaders had begun an annual program of feedback to hospitals of their mortality rates for Medicare patients in specific diagnostic categories. Initial findings for the northern New England centers showed wide variation in death rates associated with coronary artery bypass graft surgery—from 4 percent to 9 percent among the five institutions, and from 2 percent to 11 percent among the individual surgeons (O'Connor et al. 1996).

The surgeons doubted the adequacy of HCFA's "case-mix adjustment" procedures, which used variables like age, gender, and comorbidity in a statistical model to "level the playing field" for outcomes of care among the hospitals and surgeons. If Surgeon A's patients tended, on the whole, to be older than Surgeon B's, then it seemed only fair to adjust for the increased risk of surgery in older people before declaring any differences in the two surgeons' mortality rates to be associated with the "quality" of their care. When HCFA published mortality rates, it was natural for the surgeons to suspect that any differences among them were due to unmeasured, extraneous differences in the incoming mix of patients. In defense, the surgeons began a collaboration with a Dartmouth epidemiologist to develop a better case-mix adjustment model using a prospective, comprehensive database.

A strong case-mix adjustment model emerged, able to account for some of the observed variation in death rates, but the residual differences among centers and surgeons remained large even after the new adjustment. By 1989, the cardiovascular surgeons of northern New England faced a problem: *By their own measures* the mortality rate in coronary surgery still varied by over 300 percent among hospitals and more than 500 percent among surgeons.

With remarkable courage and honesty, the surgeons decided to continue their collaboration, but not now for the purpose of playing defense against HCFA's data release. They decided to use their data to support improvement efforts, and they began with comparisons of process. Interdisciplinary teams of surgeons, nurses, open-heart pump technicians, and others made site visits among the institutions (even though those institutions competed with each other for patient referrals) with the aim of studying variations in technical approaches to surgery and surrounding support systems—patient selection, preparation, surgical technique, postoperative care, rehabilitation, and so on. The variation in processes that they observed astounded them, and reinforced their own intent to discover and document "best practices" in care. They found important innovations within their own group in approaches to control of bleeding, reduction of time on the heart bypass machine, use of medications, patient education, and much more.

Within a year, the payoff for this collaborative improvement effort began, and, thanks to their careful system of prospective data collection, the surgeons soon documented the improvements on their own charts. Between 1989, when the first improvement efforts began, and 1991, the Northern

New England Cardiovascular Disease Study Group documented a 40 percent decrease in operative mortality rates for coronary bypass patients in the region, adjusted for case-mix by their own statistical model. What is more, the decrease occurred not only among the hospitals and surgeons originally at the high end of the variation first reported by HCFA, but among all of the surgeons and centers combined. Even the best got better.

Although they eschewed the jargon and formalisms of classical industrial quality improvement, the Northern New England Group used many of the basic, driving principles: benchmarking, measuring process and outcome variables over time, breaking down barriers among centers and departments, setting ambitious improvement aims, maintaining control charts to classify variation correctly, innovating in small plan-do-check-act cycles, and maintaining a system for reflection and learning from their own experiences. (The group met regularly as a whole at least four times a year throughout the project period—and, as of 1996, they are still meeting regularly.)

**Case II: Collaborating to Reduce Delays.** Late in 1995, 28 organizations from across the United States and Canada joined in a collaborative improvement effort to reduce waiting times and delays. Frustrated by delays in operating room starts and turnaround times, emergency room waiting, and delayed access to office appointments, these organizations, ranging from community hospitals to major integrated delivery systems, began to test a focused improvement model (Figure 32.3) based on a common aim, to reduce the delay by 50 percent over the course of 1 year.

Teams from each of the organizations met in at a learning session organized by the Institute for Healthcare Improvement. With a specific organizational goal for their own organization in mind, the teams learned from experts in the field about lean process methods and principles for improvement in handoffs and queueing. Each team worked to learn and to apply the concepts to tests of change back in their organization's area of study. Sewickly Valley Hospital tested the following changes in improving operating room flow:

- Scheduling unpredictable cases at the end of the day or in a separate room
- Working to optimize surgery team utilization rather than operating room utilization
- Doing tasks in parallel and converting internal tasks to external to reduce turnover time between cases
- Staggering start times for the first cases of the day (Nolan et al. 1997)

Team members learned from the rapid cycles they tested at their own sites and from the other participant teams as well (Figure 32.4). Two subsequent learning sessions reinforced skills and encouraged many cycles of testing changes that accumulated to substantial progress for a number of the organizations (Nolan et al. 1997).

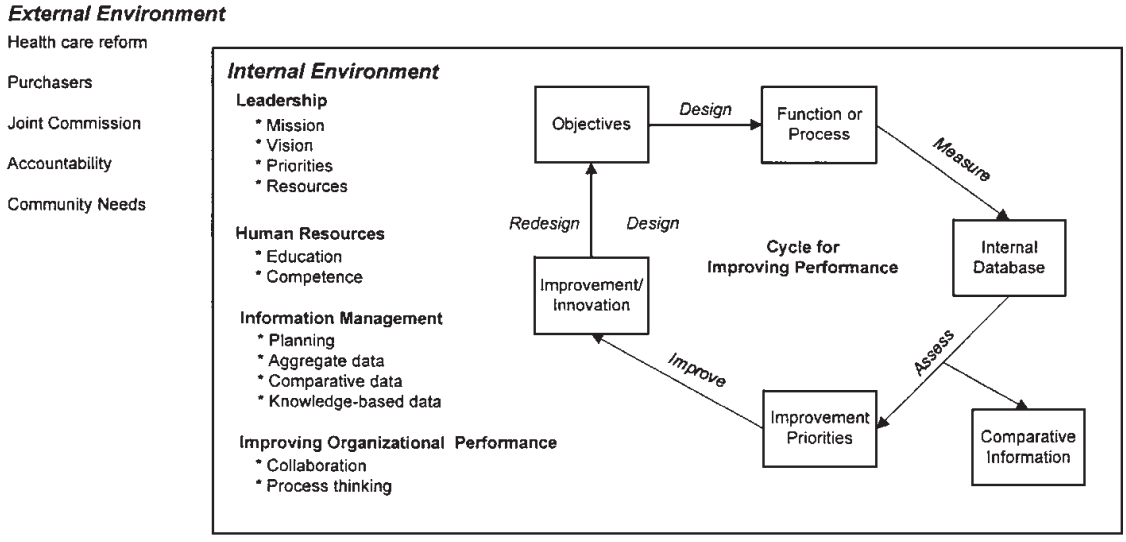



**FIGURE 32.3** Framework for improving performance. (*Joint Commission Accreditation of Health Care Organizations.*)

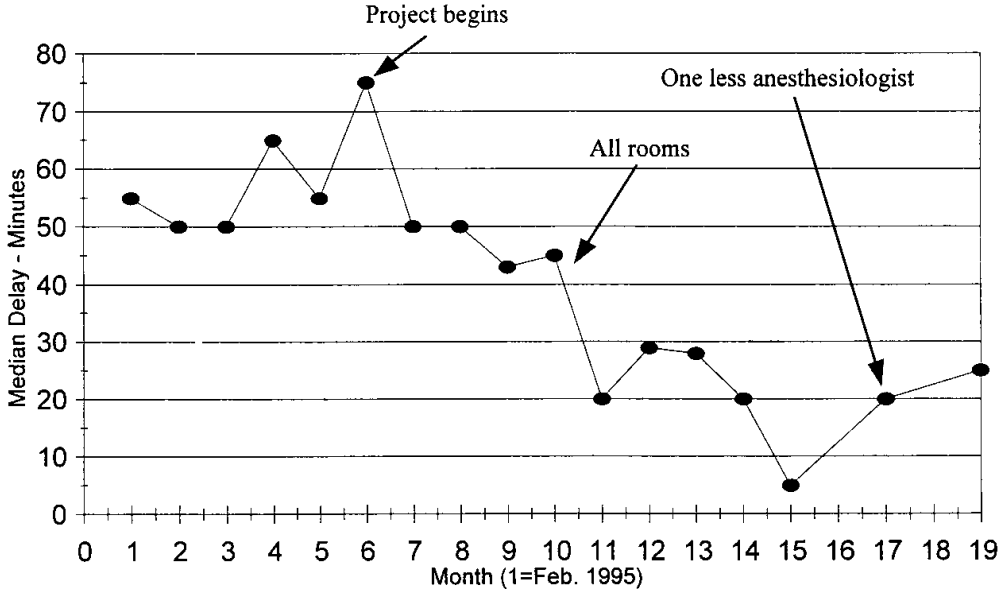



**FIGURE 32.4** Sewickley Hospital: median delay 11 a.m. and 2 p.m. (*Nolan and Schall 1996.*)

Delays have long been a chronic symptom within health care systems, and these organizations have demonstrated results now that are being shared internally to widen the reach of the projects in each. The results provided some energy to an industry struggling with substantial cost reductions; these teams proved that customer satisfaction improvement and waste reduction can happen at the same time. These cases and hundreds of other early successful (and unsuccessful) experiences in applications of quality improvement methods in health care settings underline lessons such as the following.

**1.** *In health care, as in all other known examples of successful improvement, the role of leaders is crucial:* Improvement must be a led and managed undertaking; it does not happen by accident. This leadership challenge is especially acute in health care organizations, which often have traditions of divided leadership (among nurses, doctors, and administrators, for example) or dysfunctional barriers among staff areas.

**2.** *Breaking down barriers among functional areas is necessary for effective system changes:* Medical care has a strong tradition of suboptimization of functions, especially where professions (medicine, nursing, pharmacy, physical therapy, etc.) have taken exclusive control over activities within their own boundaries. The advantages of this professional autonomy have been great, as each profession has refined its technical skills and sense of discipline. But the price has been high, as well, as each profession's special vocabulary, technical priorities, physical space, and prerogatives have combined to decrease anyone's ability to view the system of care as an integrated whole. Members of successful health care teams have crossed disciplinary boundaries, and cut new windows on shared processes. Dr. Robert Master, a Boston-based physician, has redesigned care for a challenging population of patients by eliminating these disciplinary boundaries. The patients, severely challenged with chronic diseases such as end-stage neuromuscular disorders, cerebral palsy, and quadriplegia, historically received costly care in hospitals. Their care was directed by specialists, and many lived in medical centers. The pattern of their care was not directed toward independence. Dr. Master changed all that, working with a theory that these patients should be at home, not in hospitals. He created a team of providers, with nurse practitioners taking the lead role in coordination and management. The effect of the role reversal has been dramatic improvement in both cost and quality. Today 87 percent of all medical contacts for these patients occur in the home. Chair cars, ambulances, clinic fees, and specialist charges are almost things of the past. The use of specialists has dropped to $26 per member per month (pmpm), which is about the same as a normal HMO spends per person for speciality care for a normal, healthy enrolled population ($22 pmpm). Whereas Medicaid claims data show that normally 55 percent to 70 percent of all dollars for patients like this

go to the hospital sector, in Dr. Master's program, this has fallen to 30 percent (Master 1997). His program spends $140 pmpm for nurse practitioner services, $60 pmpm for primary care physicians, and only $26 pmpm for specialty care. Quality reviews show better outcomes and higher satisfaction than ever before, and there has been literally no voluntary disenrollment. (Berwick 1996).

**3.** *Sound data, soundly analyzed, are as important in improving health care as in any other industry:* With voluminous medical records, constant physiological monitoring, response to extensive regulatory reporting requirements, and increasing levels of computerization, health care is awash in data. But improvement teams often find that the data lie unused, unrefined, and displayed, if at all, in uninformative lists and charts, rather than in graphs, run charts, and control charts that "tell a story" on the basis of which theories for improvement can be developed and tested. Culturally, doctors seem especially receptive to data-based approaches to improvement. Physicians left cold by philosophical explanations of the principles of quality improvement can come alive in a simple presentation of evidence of variation or of tests of a hypothesis about the cause of a recurrent defect. More than a few health care improvement efforts have accelerated once the potential benefits of measurement and display of information were demonstrated.

**4.** *"Customer focus" is as meaningful in health care as in any other industry:* When the concept of "customer" was first introduced by quality consultants into health care organizations, an allergic reaction occurred. "I don't have 'customers,' " was an angry, recurrent refrain from doctors and nurses, "I have 'patients.' " The reaction seemed to come from a misunderstanding that "focusing on customers" somehow demeaned the importance of the doctor's technical expertise or commitment to professionalism.

But the idea of customer focus was, in fact, entirely convergent with the trends of quality research in health care throughout the last quarter of the twentieth century. The investigators in the Rand health insurance experiments and others in the 1970s and 1980s developed an important focus on "patient-based measurements" of quality of care, including the insight that patient self-reports of health status and function were among the most reliable and valid forms of assessment of the outcomes of care. (Until then, most "outcome" measures were of variables observed by the doctor—like blood pressure, pulse, and fever—rather than variables reported directly by patients.)

The concept of "patient-centered care" (health care that continually views itself from the patient's perspective and adjusts processes to meet needs) also made inroads into health care, most impressively in places like the experimental "Planetree Units" established in a few American hospitals to test entirely new forms of interaction with patients. In Planetree settings, patients wear street clothes, instead of hospital smocks, and are invited to read and to write in their own medical records.

Becoming more receptive to the concept, health care leaders now understand that they serve multiple "customers," including patients, families, payers, communities, and referring institutions, and that each has legitimate and important needs. Each also defines "quality" somewhat differently. For patients and families, "quality" includes dimensions of health status outcome, accessibility, communication, comfort, dignity, cleanliness, convenience, problem resolution, and respect for the individual's time, among others. Payers value all of these (as representatives of the insured population), but also insist strongly upon cost control based on rational parsimony and waste reduction, and upon the timely provision of accurate accounting information and benefits management. Increasingly, communities as a whole demand from health care new forms of participation in collaborative health improvement, respect for the environment, and coordinated services, especially for the elderly and people with multiple problems.

As the flow of patients among institutions becomes more complex, demands increase for smooth coordination of referral patterns, "seamlessness" as patients move among sources of primary care (where they may first receive a diagnosis of, say, breast cancer), secondary care (where initial tests and treatment may begin), tertiary care (where high-technology procedures should be concentrated), and community services (for rehabilitation, employment support, social service, home care, and so forth). The watchword for redesign and improvement of health care in the 1990s has been "integration," as new amalgams of providers—hospitals merged with each other, physician-hospital organizations, vertically integrated systems with hospitals, offices, laboratories, and nursing homes—seek to create this seamless system of former fragments.

**5.** *Cost containment through improvement is attainable in health care:* But the consciousness about the favorable relationship between cost and quality is only dawning. For many decades, a "more-is-better" attitude dominated thinking about health care quality. America overbuilt health care, providing technology, hospital beds, specialty services, and laboratory capacity that, as mentioned above, not only vastly exceeded the supply of these services in other developed countries, but also acted as drivers of demand and cost. In a fee-for-service financing environment, it was easy for health care organizations to maintain wasteful levels of inventory, inefficient programs for use of capital, high levels of scrap, and, in comparison to analogous processes in industry, low productivity.

Increasingly familiar with process improvement methods, many health care organizations defined cost reduction as Improvement Priority 1. No one knows yet what levels of savings can be achieved while improving quality through a thorough war on waste in health care systems, but the evidence abounds of inappropriate practice, redundant and complex processes, excessive inventory, and wasteful waiting. Table 32.2 lists some examples of cost savings achieved by health care improvement teams through relatively simple process changes.

Deaconess Hospital in Boston used an improvement method from General Motors to reduce excess inventory from operating room shelves and saved $200,000. Standardizing operative stapling devices and prostheses helped Mayo Clinic to hold costs down. Changing the way that nurses, therapists and nutritionists team up to provide care has dramatically reduced complications such as infections and skin breakdown at several hospitals and resulted in cost savings with better patient outcomes.

**6.** *Benchmarking is useful:* Despite their professional collegiality, health care organizations and professionals traditionally work in remarkable isolation from each other. Few doctors routinely visit with colleagues to discover differences and innovations, and few methods exist by which hospitals and health maintenance organizations can discover best practices and copy each other. That is changing. Health care organizations are consolidating into integrated systems whose components can have easier access to each other, and students of quality management in health care have discovered the power of benchmarking through visits, trade associations, and collaboratives. Sometimes, the first "wake up" call has come from the payer community, as in Cincinnati, San Francisco, and Chicago, for example, where payer collaboratives have collected and published performance data on managed care plans. In one case, payer data first showed the care planorganiza-

**TABLE 32.2** Quality-Improvement Steps at Intermountain Health Care

*Samples of projects large and small that reduced operating costs in 1994*

| Project | Expense reduction |
|---|---|
| System project: | |
| Standardizing hematology procedures | $259,000 in supplies, |
| Standardizing chemistry reagents | $58,000 in equipments |
| Decrease in costs of coronary artery bypass surgery | $209,000 in supplies<br>$245,000 (since 1993) |
| Facility-specific project: | |
| Emergency room lab turnaround time | $18,000 in salary and supplies |
| Fast-track extubation | $575,500 in shorter length of stay |
| Decreased retake rate for x-rays | $11,200 in film costs |

Long-term clinical care improvement efforts

- 50% decrease in adverse drug events since 1991, with much of that coming in the first year. A computerized alert system was a key factor in avoiding prescriptions that could pose a risk to patient.
- 80% decrease in postoperative wound infection rates, reducing an incidence of nearly 2% in 1990 to a fraction of a percent in 1994.

***Source:*** Intermountain Health Care application for the National Quality Health Care Award.

tions that their rates of hysterectomy varied eightfold from the highest plan to the lowest—a fact they did not know until the payers documented it.

Once alerted to the variation, curious health care organizations can make good use of benchmarking to discover new ways to approach their own work. Sometimes the best benchmarking is outside health care entirely. The Mayo Clinic leadership team has made fruitful visits to winners of the Malcolm Baldrige National Quality Award—companies like AT&T, IBM, Eastman Chemical, and Milliken—and has directly grafted process ideas from those pioneers into the work of the Clinic.

**7.** *Involvement of all staff in improvement is powerful:* The dedication to excellence of health care workers at all levels is no surprise, but until recently most organizations have had difficulty tapping that energy to support systemic improvements. As a result, improvement in health care has tended to move slowly, lacking the momentum of total involvement. But counter examples are emerging. At Wesley Medical Center in Wichita, Kansas, a single project on reducing waiting times in the operating room, which began as part of Wesley's participation in a national collaborative benchmarking effort, was replicated internally within a few months as the hospital's leaders built upon what they had learned to support delay-reduction projects in 85 departments.

**8.** *Financing systems can be a major barrier to improvement:* The suboptimization of professions and functions in health care has its mirror image in traditional payment systems. As one example, consider the perverse incentives in the compensation of hospitals in a capitated system (in which a strong incentive exists to shorten a patient's length of stay to save money) where doctors are still paid separately for each inpatient visit (so that shortening length of stay reduces physician incomes).

With the hospital aiming to reduce resource consumption, and the physicians (who control the ordering of all tests and the length of a patient's stay) reimbursed for each day of stay, and in some cases for the analysis of each test ordered, conflicts arise quickly in what improvements should be made. In another recent case, a hospital successfully reduced the frequency of unnecessary admission of patients with chest pain by better identifying in the emergency room those who did (or did not) have a heart attack. Their success led to a safe reduction in the total cost of chest pain treatment because people without heart attacks were more likely to avoid admission, but naturally caused an increase in the cost-per-admitted-case for that smaller number of patients who actually entered the hospital. (After all, a larger proportion of admitted patients were now turning out actually to have had a heart attack, and required the full resources of the hospital for diagnosis and treatment.) An unwise, but very important, health care insurance company, noticing that the *cost per case* was rising, and failing to notice the savings on a population base, caused a major crisis in the hospital by threatening to cut off reimbursement because of "excessive cost."

A third, and even more compelling, example of perverse financing affected the Magic Valley Medical Center in Twin Falls, ID (Roessner 1993). The leadership of the hospital, having made a commitment to help Magic Valley become "the healthiest community in America," made a major investment in leading the reduction of bicycle head injuries in the community by supporting the use of bicycle helmets. Helmet use did increase, head injuries in children fell by almost 50 percent in three months, and the hospital harvested both the satisfaction of saving lives and the severe economic problem of a shortfall in Emergency Department revenues as those well-paying cases of head injury decreased dramatically. Only a firm sense of mission allowed them to stay the course (Roessner 1993).

Clever managers have been able to maintain momentum for improvement despite these absurd payment paradoxes, but, for the longer term, payers and providers of care are coming to realize that the basic structure of finance in American health care is less favorable to rapid, strategic improvement than it may be in other industries. Innovations that consolidate payment and make rational systemic improvement more attractive are now beginning. The most significant of these changes is the expansion of *capitated* payment, in which provider systems are paid for the total costs of care and illness for populations, and in which, therefore, rational savings at one point in the system can be reallocated elsewhere, and in which the incentives of professionals, institutions, and consumers of care are better aligned.

## THE FUTURE

Major trends toward better quality of care are now well underway in health care. Integrated delivery systems, more sophisticated information systems, and capitated payment are all helping to focus energies on improvement—especially on waste reduction. Better informed about the performance of health care organizations, consumers and payers are beginning to make their choices about where to receive care based on technical and service quality characteristics, as well as on price. The new century will witness the maturing of a quality-driven health care system, probably with at least the following characteristics:

**1.** *Much improved service quality:* The time is ending when health care customers will tolerate—or must endure—waiting times, communication lapses, and process failures that have long ago become intolerable in other industries. Rental agencies, hotels, airlines, or retail stores that had the same waiting times as the average hospital or doctor's office today would be out of business quickly. Quality improvement in health care will drive new standards of service in health care.

**2.** *Decreasing total costs:* With a refined understanding of the nature of waste, it is probable that leading health care organizations will achieve completely unprecedented production efficiencies within the next decade. We have at least the international comparisons to sustain confidence that excellent care is achievable at far lower cost than prevails in America today. The early success of individual project teams, able to return the same 6-to-1 or 10-to-1 return on investment while improving the experience of customers, needs only to be rolled up into strategic, deployed, systemwide improvement efforts to yield enormous savings for the system as a whole. Health care leaders are smart enough to build on this success over time.

**3.** *Health care will downsize, especially in high-technology services:* Because of health care's unusual characteristic of "supply-driven costs," effective cost containment will require a smaller, tighter industry than we have as the 1990s close. We can expect fewer specialists, hospital beds, and sites of high-technology service per capita within the next decade. This should not spell a decrease in quality or service. On the contrary, research suggests that a "volume-outcome" relationship exists for many forms of technical care. Hospitals performing a small number of sophisticated procedures each year tend to have worse outcomes than those doing more. On two counts then—cost and outcome—the American public will be well-served by a consolidation of sources of advanced technical care into fewer, larger specialized centers.

**4.** *Prevention will take on new energy:* The "upstream" causes of disease are in many cases controllable, but not within the classical boundaries of health care delivery. A rational public will maintain and increase investments in injury prevention, smoking cessation, reduction of alcohol and drug abuse, increasing physical exercise, and wise diet. At this moment, health care financing favors none of these, but the quality of outcomes depends on shifting the pattern of investment.

**5.** *Participative decision making will become more widespread:* Important research now shows that, when patients become involved in making decisions about their own care (for example in choosing between medical and surgical treatment for prostate disease, in selecting from among therapeutic options in breast cancer, and in self-monitoring in diabetes and asthma), satisfaction, outcomes, and costs all tend to improve. The trend is so strong that it will make good business sense for health care organizations to build upon this notion of partnership as a core concept in the design of care systems of the future.

**6.** *Information systems and remote communication will advance:* The greatest technical advances of all in the next phase of development of health care may be more in the realm of information management than in diagnosis and treatment. By the early twenty-first century, we can expect common use of automated patient records, computerized order entry, regular monitoring of both processes and outcomes of care, and remote forms of "telemedicine." It is already possible for the world's best interpreters of MRI scans or CT images to receive on-line images good enough to interpret locally from almost anywhere in the world. The well-trained nurse who answers a phone call from an anxious mother in the middle of the night can be next door or a thousand miles away and be equally effective in coordinating care. We are only a few steps away from remotely guided

procedures, in which technical experts can not only talk, but also act, from a remote site. The potential for improvements in cost, outcomes, and service is extraordinary.

**7.** *Job boundaries will change:* The traditional professional classifications of medical care—doctors, nurses, respiratory therapists, laboratory technicians, and dozens of others—reflect the historical configuration of care systems. As the configuration changes, so will the jobs. This type of change is progressing much more slowly than logic or need would dictate, due largely to the well-established forms of professional self-regulation. But the boundaries are fraying, and fundamental change will sooner or later arrive. Many tasks and procedures currently done by doctors could easily be reallocated. Repetitive technical tasks may be done more competently and less expensively by technicians; just as intravenous lines formerly inserted only by doctors are put in today far more comfortably by IV teams, so may the colonoscopies, hernia repairs, fracture setting, and angiographies of the future be done well by people with highly focused training. Managed care systems and well-run clinics are already assigning to physicians' assistants and nurse practitioners tasks previously only given to doctors. Expert computer systems, which are already helping doctors to choose antibiotics or to make difficult diagnoses, will become better complements to traditional approaches to diagnosis. [The visionary Dr. Larry Weed suggests that expecting doctors to remember all pertinent diagnostic options is like expecting travel agents to remember airline schedules; to him, neither makes sense in the computer age (Weed 1968).]

**8.** *Organizational boundaries will change:* As professions evolve, so will organizations. In fact, the heart and core of the American health care system of the twentieth century—the hospital—may become a dinosaur in the twenty-first. Gradually, it is becoming the case that patients not sick enough to be in intensive care units may not be sick enough to require a hospital bed at all. Better alternatives will exist. In the future, the whole hospital may be an intensive care unit; other patients will be at home or in a new kind of step-down setting. Sick asthmatic patients already skillfully use in their own homes devices and drugs that 10 years earlier would have been found only in emergency rooms.

**9.** *"More is better" will give way to "First, prove it works."* A fundamental shift in the burden of proof for health care practices will take firm hold in the coming years. Scientific evidence and public consciousness are converging into a realization that health care does not generally provide what people want most: health; and that excessive care produces excessive risks. Combined with the problem of high cost, this consciousness should make providers and patients both more wary of technology than they have been in the past and more inclined to question the need for a test or treatment than to request it. One example of this new, more prudent attitude is in the work of the U.S. Preventive Services Task Force, which in 1989 and then again in 1995 produced a *Guide to Clinical Preventive Services,* reviewing the scientific evidence for and against over 200 preventive services—like screening tests, counseling on risk factors, and immunizations (U.S. Preventive Services Task Force 1996). The Task Force report documents strong evidence in favor of some preventive practices, but, even more impressively, shows that little or no evidence exists to support many others, some of which are in common use. Table 32.3 lists some of the recommendations in the *1995 Guide.* The general trend is toward what some call "evidence-based practice" in medical care; and it will mark a new, more scientific era in clinical work.

**10.** *Breakthrough performance will emerge:* In the end, the momentum behind quality improvement in other industries has not come from theory, it has come from evidence, especially evidence owned by the competition. Great cars from competitors, not great ideas about cars, caused the American automotive industry to change. So it will be in health care. It is only a matter of when. The crucial turning point will have come when there exists for health care what Toyota was for the automobile—a breakthrough example, operating at an unprecedented level of performance and built for less than anyone had theretofore imagined possible. We do not yet have such a model in medicine. We have breakthroughs in process, superb cost reductions, and exciting new designs. But all of these achievements remain at the level of individual process, product, or service. We have improved parts, in some cases dramatically, but no one has yet fundamentally improved the whole—an entire system of care.

It is, at last, just within the reach of health care leaders to do so early in the twenty-first century. The rewards will be thrilling, and, as a consequence of that achievement, both health care and health itself in the early twenty-first century will be forever transformed.

**TABLE 32.3** Guide to Clinical Preventive Services

| Intervention | Level of evidence | Strength of recommendation |
|---|---|---|
| **Screening for hypertension** | | |
| Periodic blood pressure measurement in persons aged ≥21 years | I | A |
| Measurement of blood pressure in children and adolescents during office visits | II-2, II-3, III | B |
| **Screening for breast cancer** | | |
| Routine mammogram every 1–2 years with or without annual clinical breast exam | | |
| Women aged 40–49 | I | C |
| 50–69 | I, II-2 | A |
| 70–74 | I, II-3 | C |
| ≥75 | III | C |
| Annual clinical breast exam without periodic mammograms | | |
| Women aged 40–49 | III | C |
| 50–59 | I | C |
| ≥60 | III | C |
| Routine breast self-exam | I, II-2, III | C |
| **Screening for cervical cancer** | | |
| Regular Pap testing in women who are or have been sexually active and who have a cervix | II-2, II3 | A |
| Discontinuation of regular Pap testing in women aged >65 | III | C |
| Routine cervicography or colposcopy | III | C |
| Routine testing for HPV infection | III | C |
| **Screening for prostate cancer** | | |
| Routine digital rectal exam | II-2 | D |
| Routine prostate-specific antigen or other serum tumor markers | I, II-2, III | D |
| Routine transrectal ultrasound | II-2, III | D |
| **Screening for lung cancer** | | |
| Routine chest x-ray or sputum cytology | I, II-1, II-2 | D |

*Strength of recommendations:*

A. There is good evidence to support the recommendation that the condition be specifically considered in a periodic health examination.

B. There is fair evidence to support the recommendation that the condition be specifically considered in a periodic health examination.

C. There is insufficient evidence to recommend for or against the inclusion of the condition in a periodic health examination, but recommendations may be made on other grounds.

D. There is fair evidence to support the recommendation that the condition be excluded from consideration in a periodic health examination.

*Level of evidence:*

I. Evidence obtained from at least one properly randomized controlled trial.

II-1. Evidence obtained from well-designed controlled trials without randomization.

II-2. Evidence obtained from well-designed cohort or case-control analytic studies, preferably from more than one center or research group.

II-3. Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.

III. Opinions of respected authorities, based on clinical experience; descriptive studies and case reports; or reports of expert committees.