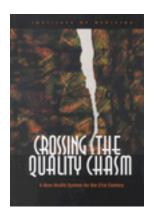# Free Executive Summary

Crossing the Quality Chasm: A New Health System for the 21st Century

Committee on Quality of Health Care in America, Institute of Medicine

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Executive Summary

The American health care delivery system is in need of fundamental change. Many patients, doctors, nurses, and health care leaders are concerned that the care delivered is not, essentially, the care we should receive (Donelan et al., 1999; Reed and St. Peter, 1997; Shindul-Rothschild et al., 1996; Taylor, 2001). The frustration levels of both patients and clinicians have probably never been higher. Yet the problems remain. Health care today harms too frequently and routinely fails to deliver its potential benefits.

Americans should be able to count on receiving care that meets their needs and is based on the best scientific knowledge. Yet there is strong evidence that this frequently is not the case.[1] Crucial reports from disciplined review bodies document the scale and gravity of the problems (Chassin et al., 1998; Institute of Medicine, 1999; Advisory Commission on Consumer Protection and Quality in the Health Care Industry, 1998). Quality problems are everywhere, affecting many patients. Between the health care we have and the care we could have lies not just a gap, but a chasm.

The Committee on the Quality of Health Care in America was formed in June 1998 and charged with developing a strategy that would result in a substantial improvement in the quality of health care over the next 10 years. In carrying out this charge, the committee commissioned a detailed review of the literature on the quality of care; convened a communications workshop to identify strategies for raising the awareness of the general public and key stakeholders of quality concerns; identified environmental forces that encourage or impede ef-

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[1]See Appendix A of this report for a review of the literature on the quality of care.

forts to improve quality; developed strategies for fostering greater accountability for quality; and identified important areas of research that should be pursued to facilitate improvements in quality. The committee has focused on the personal health care delivery system, specifically, the provision of preventive, acute, chronic, and end-of-life health care for individuals. Although the committee recognizes the critical role of the public health system in protecting and improving the health of our communities, this issue lies beyond the purview of the present study.

The committee has already spoken to one urgent quality problem—patient safety. In our first report, *To Err Is Human: Building a Safer Health System*, we concluded that tens of thousands of Americans die each year from errors in their care, and hundreds of thousands suffer or barely escape from nonfatal injuries that a truly high-quality care system would largely prevent (Institute of Medicine, 2000b).

As disturbing as the committee's report on safety is, it reflects only a small part of the unfolding story of quality in American health care. Other defects are even more widespread and, taken together, detract still further from the health, functioning, dignity, comfort, satisfaction, and resources of Americans. This report addresses these additional quality problems. As the patient safety report was a call for action to make care safer, this report is a call for action to improve the American health care delivery system as a whole, in all its quality dimensions, for all Americans.

WHY ACTION IS NEEDED NOW

At no time in the history of medicine has the growth in knowledge and technologies been so profound. Since the first contemporary randomized controlled trial was conducted more than 50 years ago, the number of trials conducted has grown to nearly 10,000 annually (Chassin, 1998). Between 1993 and 1999, the budget of the National Institutes of Health increased from $10.9 to $15.6 billion, while investments by pharmaceutical firms in research and development increased from $12 to $24 billion (National Institutes of Health, 2000; Pharmaceutical Research and Manufacturers of America, 2000). Genomics and other new technologies on the horizon offer the promise of further increasing longevity, improving health and functioning, and alleviating pain and suffering. Advances in rehabilitation, cell restoration, and prosthetic devices hold potential for improving the heath and functioning of many with disabilities. Americans are justifiably proud of the great strides that have been made in the health and medical sciences.

As medical science and technology have advanced at a rapid pace, however, the health care delivery system has floundered in its ability to provide consistently high-quality care to all Americans. Research on the quality of care reveals

a health care system that frequently falls short in its ability to translate knowledge into practice, and to apply new technology safely and appropriately. During the last decade alone, more than 70 publications in leading peer-reviewed journals have documented serious quality shortcomings (see Appendix A). The performance of the health care system varies considerably. It may be exemplary, but often is not, and millions of Americans fail to receive effective care. If the health care system cannot consistently deliver today's science and technology, we may conclude that it is even less prepared to respond to the extraordinary scientific advances that will surely emerge during the first half of the 21st century. And finally, more than 40 million Americans remain without health insurance, deprived of critically important access to basic care (U.S. Census Bureau, 2000).

The health care system as currently structured does not, as a whole, make the best use of its resources. There is little doubt that the aging population and increased patient demand for new services, technologies, and drugs are contributing to the steady increase in health care expenditures, but so, too, is waste. Many types of medical errors result in the subsequent need for additional health care services to treat patients who have been harmed (Institute of Medicine, 2000b). A highly fragmented delivery system that largely lacks even rudimentary clinical information capabilities results in poorly designed care processes characterized by unnecessary duplication of services and long waiting times and delays. And there is substantial evidence documenting overuse of many services—services for which the potential risk of harm outweighs the potential benefits (Chassin et al., 1998; Schuster et al., 1998).

What is perhaps most disturbing is the absence of real progress toward restructuring health care systems to address both quality and cost concerns, or toward applying advances in information technology to improve administrative and clinical processes. Despite the efforts of many talented leaders and dedicated professionals, the last quarter of the 20th century might best be described as the "era of Brownian motion in health care." Mergers, acquisitions, and affiliations have been commonplace within the health plan, hospital, and physician practice sectors (Colby, 1997). Yet all this organizational turmoil has resulted in little change in the way health care is delivered. Some of the new arrangements have failed following disappointing results. Leaders of health care institutions are under extraordinary pressure, trying on the one hand to strategically reposition their organizations for the future, and on the other to respond to today's challenges, such as reductions in third-party payments (Guterman, 1998), shortfalls in nurse staffing (Egger, 2000), and growing numbers of uninsured patients seeking uncompensated care (Institute of Medicine, 2000a).

For several decades, the needs of the American public have been shifting from predominantly acute, episodic care to care for chronic conditions. Chronic conditions are now the leading cause of illness, disability, and death; they affect almost half of the U.S. population and account for the majority of health care

expenditures (Hoffman et al., 1996; The Robert Wood Johnson Foundation, 1996). As the need for community-based acute and long-term care services has grown, the portion of health care resources devoted to hospital care has declined, while that expended on pharmaceuticals has risen dramatically (Copeland, 1999). Yet there remains a dearth of clinical programs with the infrastructure required to provide the full complement of services needed by people with heart disease, diabetes, asthma, and other common chronic conditions (Wagner et al., 1996). The fact that more than 40 percent of people with chronic conditions have more than one such condition argues strongly for more sophisticated mechanisms to communicate and coordinate care (The Robert Wood Johnson Foundation, 1996). Yet physician groups, hospitals, and other health care organizations operate as silos, often providing care without the benefit of complete information about the patient's condition, medical history, services provided in other settings, or medications prescribed by other clinicians. For those without insurance, care is often unobtainable except in emergencies. It is not surprising, then, that studies of patient experience document that the health system for some is a "nightmare to navigate" (Picker Institute and American Hospital Association, 1996).

QUALITY AS A SYSTEM PROPERTY

The committee is confident that Americans can have a health care system of the quality they need, want, and deserve. But we are also confident that this higher level of quality cannot be achieved by further stressing current systems of care. The current care systems cannot do the job. Trying harder will not work. Changing systems of care will.

The committee's report on patient safety offers a similar conclusion in its narrower realm. Safety flaws are unacceptably common, but the effective remedy is not to browbeat the health care workforce by asking them to try harder to give safe care. Members of the health care workforce are already trying hard to do their jobs well. In fact, the courage, hard work, and commitment of doctors, nurses, and others in health care are today the only real means we have of stemming the flood of errors that are latent in our health care systems.

Health care has safety and quality problems because it relies on outmoded systems of work. Poor designs set the workforce up to fail, regardless of how hard they try. If we want safer, higher-quality care, we will need to have redesigned systems of care, including the use of information technology to support clinical and administrative processes.

Throughout this report, the committee offers a strategy and action plan for building a stronger health system over the coming decade, one that is capable of delivering on the promise of state-of-the-art health care to all Americans. In some areas, achieving this ideal will require crossing a large chasm between today's system and the possibilities of tomorrow.

AN AGENDA FOR CROSSING THE CHASM

The need for leadership in health care has never been greater. Transforming the health care system will not be an easy process. But the potential benefits are large as well. Narrowing the quality chasm will make it possible to bring the benefits of medical science and technology to all Americans in every community, and this in turn will mean less pain and suffering, less disability, greater longevity, and a more productive workforce. To this end, the committee proposes the following agenda for redesigning the 21st-century health care system:

• **That all health care constituencies, including policymakers, purchasers, regulators, health professionals, health care trustees and management, and consumers, commit to a national statement of purpose for the health care system as a whole and to a shared agenda of six aims for improvement that can raise the quality of care to unprecedented levels.**
• **That clinicians and patients, and the health care organizations that support care delivery, adopt a new set of principles to guide the redesign of care processes.**
• **That the Department of Health and Human Services identify a set of priority conditions upon which to focus initial efforts, provide resources to stimulate innovation, and initiate the change process.**
• **That health care organizations design and implement more effective organizational support processes to make change in the delivery of care possible.**
• **That purchasers, regulators, health professions, educational institutions, and the Department of Health and Human Services create an environment that fosters and rewards improvement by (1) creating an infrastructure to support evidence-based practice, (2) facilitating the use of information technology, (3) aligning payment incentives, and (4) preparing the workforce to better serve patients in a world of expanding knowledge and rapid change.**

The committee recognizes that implementing this agenda will be a complex process and that it will be important to periodically evaluate progress and reassess strategies for overcoming barriers.

Establishing Aims for the 21st-Century Health Care System

The committee proposes six aims for improvement to address key dimensions in which today's health care system functions at far lower levels than it can and should. Health care should be:

• *Safe*—avoiding injuries to patients from the care that is intended to help them.

- *Effective*—providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse, respectively).
- *Patient-centered*—providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
- *Timely*—reducing waits and sometimes harmful delays for both those who receive and those who give care.
- *Efficient*—avoiding waste, including waste of equipment, supplies, ideas, and energy.
- *Equitable*—providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

A health care system that achieved major gains in these six dimensions would be far better at meeting patient needs. Patients would experience care that was safer, more reliable, more responsive, more integrated, and more available. Patients could count on receiving the full array of preventive, acute, and chronic services from which they are likely to benefit. Such a system would also be better for clinicians and others who would experience the satisfaction of providing care that was more reliable, more responsive to patients, and more coordinated than is the case today.

The entire enterprise of care would ideally be united across these aims by a single, overarching purpose for the American health care system as a whole. For this crucial statement of purpose, the committee endorses and adopts the phrasing of the Advisory Commission on Consumer Protection and Quality in the Health Care Industry (1998).

> **Recommendation 1: All health care organizations, professional groups, and private and public purchasers should adopt as their explicit purpose to continually reduce the burden of illness, injury, and disability, and to improve the health and functioning of the people of the United States.**

> **Recommendation 2: All health care organizations, professional groups, and private and public purchasers should pursue six major aims; specifically, health care should be safe, effective, patient-centered, timely, efficient, and equitable.**

Additionally, without ongoing tracking to assess progress in meeting the six aims, policy makers, leaders within the health professions and health organizations, purchasers, and consumers will be unable to determine progress or understand where improvement efforts have succeeded and where further work is most needed. The National Quality Report has the potential to play an important role

in continuing to raise the awareness of the American public about the quality-of-care challenges facing the health care system. Public awareness of shortcomings in quality is critical to securing public support for the steps that must be taken to address these concerns.

> **Recommendation 3: Congress should continue to authorize and appropriate funds for, and the Department of Health and Human Services should move forward expeditiously with the establishment of, monitoring and tracking processes for use in evaluating the progress of the health system in pursuit of the above-cited aims of safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity. The Secretary of the Department of Health and Human Services should report annually to Congress and the President on the quality of care provided to the American people.**

The committee applauds Congress and the Administration for their current efforts to establish a National Quality Report for tracking the quality of care. Ongoing input from the many public- and private-sector associations, professional groups, and others involved in quality measurement and improvement will contribute to the success of these efforts. The establishment of specific goals for each of the six aims could further enhance the usefulness of this monitoring and tracking system as a stimulus for performance improvement. Continued funding for this activity should be ensured, as well as regular reports that communicate progress to all concerned. It should be noted that although this report focuses only on health care for individuals, the above overarching statement of purpose and six aims for improvement are sufficiently robust that they can be applied equally to decisions and evaluations at the population–health level.

Formulating New Rules to Redesign and Improve Care

As discussed earlier, improved performance will depend on new system designs. The committee believes it would be neither useful nor possible for us to specify in detail the design of 21st-century health care delivery systems. Imagination and valuable pluralism abound at the local level in the nation's health care enterprise. At the same time, we believe local efforts to implement innovation and achieve improvement can benefit from a set of simple rules to guide the redesign of the health care system.

In formulating these rules, the committee has been guided by the belief that care must be delivered by systems that are carefully and consciously designed to provide care that is safe, effective, patient-centered, timely, efficient, and equitable. Such systems must be designed to serve the needs of patients, and to ensure that they are fully informed, retain control and participate in care delivery whenever possible, and receive care that is respectful of their values and preferences. Such systems must facilitate the application of scientific knowledge to

practice, and provide clinicians with the tools and supports necessary to deliver evidence-based care consistently and safely.

Recommendation 4: Private and public purchasers, health care organizations, clinicians, and patients should work together to redesign health care processes in accordance with the following rules:

1. Care based on continuous healing relationships. **Patients should receive care whenever they need it and in many forms, not just face-to-face visits. This rule implies that the health care system should be responsive at all times (24 hours a day, every day) and that access to care should be provided over the Internet, by telephone, and by other means in addition to face-to-face visits.**

2. Customization based on patient needs and values. **The system of care should be designed to meet the most common types of needs, but have the capability to respond to individual patient choices and preferences.**

3. The patient as the source of control. **Patients should be given the necessary information and the opportunity to exercise the degree of control they choose over health care decisions that affect them. The health system should be able to accommodate differences in patient preferences and encourage shared decision making.**

4. Shared knowledge and the free flow of information. **Patients should have unfettered access to their own medical information and to clinical knowledge. Clinicians and patients should communicate effectively and share information.**

5. Evidence-based decision making. **Patients should receive care based on the best available scientific knowledge. Care should not vary illogically from clinician to clinician or from place to place.**

6. Safety as a system property. **Patients should be safe from injury caused by the care system. Reducing risk and ensuring safety require greater attention to systems that help prevent and mitigate errors.**

7. The need for transparency. **The health care system should make information available to patients and their families that allows them to make informed decisions when selecting a health plan, hospital, or clinical practice, or choosing among alternative treatments. This should include information describing the system's performance on safety, evidence-based practice, and patient satisfaction.**

8. Anticipation of needs. **The health system should anticipate patient needs, rather than simply reacting to events.**

> *9. Continuous decrease in waste*. **The health system should not waste resources or patient time.**
>
> *10. Cooperation among clinicians*. **Clinicians and institutions should actively collaborate and communicate to ensure an appropriate exchange of information and coordination of care.**

The above rules will lead the redesign effort in the right direction, guiding the innovation required to achieve the aims for improvement outlined earlier. Widespread application of these ten rules, each grounded in both logic and varying degrees of evidence, will represent a new paradigm for health care delivery. As the redesign effort moves forward, it will be important to assess not only progress toward meeting the aims, but also the specific effects attributable to the new rules and to adapt the rules as appropriate.

Design ideas are not enough, however. To initiate the process of change, both an action agenda and resources are needed.

Taking the First Steps

The committee recognizes the enormity of the change that will be required to achieve a substantial improvement in the nation's health care system. Although steps can be taken immediately to apply the ten rules set forth above to the redesign of health care, widespread application will require commitment to the provision of evidence-based care that is responsive to individual patients' needs and preferences. Well-designed and well-run systems of care will be required as well. These changes will occur most rapidly in an environment in which public policy and market forces are aligned and in which the change process is supported by an appropriate information technology infrastructure.

To initiate the process of change, the committee believes the health care system must focus greater attention on the development of care processes for the common conditions that afflict many people. A limited number of such conditions, about 15 to 25, account for the majority of health care services (Centers for Disease Control and Prevention, 1999; Medical Expenditure Panel Survey, 2000; Ray et al., 2000). Nearly all of these conditions are chronic. By focusing attention on a limited number of common conditions, the committee believes it will be possible to make sizable improvements in the quality of care received by many individuals within the coming decade.

Health care for chronic conditions is very different from care for acute episodic illnesses. Care for the chronically ill needs to be a collaborative, multidisciplinary process. Effective methods of communication, both among caregivers and between caregivers and patients, are critical to providing high-quality care. Personal health information must accompany patients as they transition from home to clinical office setting to hospital to nursing home and back.

Carefully designed, evidence-based care processes, supported by automated clinical information and decision support systems, offer the greatest promise of achieving the best outcomes from care for chronic conditions. Some efforts are now under way to synthesize the clinical evidence pertaining to common chronic conditions and to make this information available to consumers and clinicians on the Web and by other means (Lindberg and Humphreys, 1999). In addition, evidence-based practice guidelines have been developed for many chronic conditions (Eisenberg, 2000). Yet studies of the quality of care document tremendous variability in practice for many such conditions. Given these variations and the prevalence of chronic conditions, these conditions represent an excellent starting point for efforts to better define optimum care or best practices, and to design care processes to meet patient needs. Moreover, such efforts to improve quality must be supported by payment methods that remove barriers to integrated care and provide strong incentives and rewards for improvement.

To facilitate this process, the Agency for Healthcare Research and Quality should identify a limited number of priority conditions that affect many people and account for a sizable portion of the national health burden and associated expenditures. In identifying these priority conditions, the agency should consider using the list of conditions identified through the Medical Expenditure Panel Survey (2000). According to the most recent survey data, the top 15 priority conditions are cancer, diabetes, emphysema, high cholesterol, HIV/AIDS, hypertension, ischemic heart disease, stroke, arthritis, asthma, gall bladder disease, stomach ulcers, back problems, Alzheimer's disease and other dementias, and depression and anxiety disorders. Health care organizations, clinicians, purchasers, and other stakeholders should then work together to (1) organize evidence-based care processes consistent with best practices, (2) organize major prevention programs to target key health risk behaviors associated with the onset or progression of these conditions, (3) develop the information infrastructure needed to support the provision of care and the ongoing measurement of care processes and patient outcomes, and (4) align the incentives inherent in payment and accountability processes with the goal of quality improvement.

> **Recommendation 5: The Agency for Healthcare Research and Quality should identify not fewer than 15 priority conditions, taking into account frequency of occurrence, health burden, and resource use. In collaboration with the National Quality Forum, the agency should convene stakeholders, including purchasers, consumers, health care organizations, professional groups, and others, to develop strategies, goals, and action plans for achieving substantial improvements in quality in the next 5 years for each of the priority conditions.**

Redirecting the health care industry toward the implementation of well-designed care processes for priority conditions will require significant resources.

Capital will be required to invest in enhancing organizational capacity, building an information infrastructure, and training multidisciplinary care teams, among other things. The committee believes it is appropriate for the public sector to take the lead in establishing an innovation fund to seed promising projects, but not to shoulder the full burden of the transition. Private-sector organizations, including foundations, purchasers, health care organizations, and others, should also make investments. High priority should be given to projects that are likely to result in making available in the public domain new programs, tools, and technologies that are broadly applicable throughout the health care sector.

> **Recommendation 6: Congress should establish a Health Care Quality Innovation Fund to support projects targeted at (1) achieving the six aims of safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity; and/or (2) producing substantial improvements in quality for the priority conditions. The fund's resources should be invested in projects that will produce a public-domain portfolio of programs, tools, and technologies of widespread applicability.**

Americans now invest annually $1.1 trillion, or 13.5 percent, of the nation's gross domestic product (GDP) in the health care sector (Health Care Financing Administration, 1999). This figure is expected to grow to more than $2 trillion, or 16 percent of GDP, by 2007 (Smith et al., 1998). The committee believes a sizable commitment, on the order of $1 billion over 3 to 5 years, is needed to strongly communicate the need for rapid and significant change in the health care system and to help initiate the transition. Just as a vigorous public commitment has led to the mapping of human DNA, a similar commitment is needed to help the nation's health care system achieve the aims for improvement outlined above.

Building Organizational Supports for Change

Supporting front-line teams that deliver care are many types of health care organizations. Today, these are hospitals, physician practices, clinics, integrated delivery systems, and health plans, but new forms will unquestionably emerge. Whatever those forms, care that is responsive to patient needs and makes consistent use of the best evidence requires far more conscious and careful organization than we find today.

Organizations will need to negotiate successfully six major challenges. The first is to redesign care processes to serve more effectively the needs of the chronically ill for coordinated, seamless care across settings and clinicians and over time. The use of tools to organize and deliver care has lagged far behind biomedical and clinical knowledge. A number of well-understood design principles, drawn from other industries as well as some of today's health care organizations, could help greatly in improving the care that is provided to patients.

A second challenge is making effective use of information technologies to automate clinical information and make it readily accessible to patients and all members of the care team. An improved information infrastructure is needed to establish effective and timely communication among clinicians and between patients and clinicians.

A third challenge is to manage the growing knowledge base and ensure that all those in the health care workforce have the skills they need. Making use of new knowledge requires that health professionals develop new skills or assume new roles. It requires that they use new tools to access and apply the expanding knowledge base. It also requires that training and ongoing licensure and certification reflect the need for lifelong learning and evaluation of competencies.

A fourth challenge for organizations is coordination of care across patient conditions, services, and settings over time. Excellent information technologies and well-thought-out and -implemented modes of ongoing communication can reduce the need to craft laborious, case-by-case strategies for coordinating patient care.

A fifth challenge is to continually advance the effectiveness of teams. Team practice is common, but the training of health professionals is typically isolated by discipline. Making the necessary changes in roles to improve the work of teams is often slowed or stymied by institutional, labor, and financial structures, and by law and custom.

Finally, all organizations—whether or not health care related—can improve their performance only by incorporating care process and outcome measures into their daily work. Use of such measures makes it possible to understand the degree to which performance is consistent with best practices, and the extent to which patients are being helped.

> **Recommendation 7:** The Agency for Healthcare Research and Quality and private foundations should convene a series of workshops involving representatives from health care and other industries and the research community to identify, adapt, and implement state-of-the-art approaches to addressing the following challenges:
>
> • **Redesign of care processes based on best practices**
> • **Use of information technologies to improve access to clinical information and support clinical decision making**
> • **Knowledge and skills management**
> • **Development of effective teams**
> • **Coordination of care across patient conditions, services, and settings over time**
> • **Incorporation of performance and outcome measurements for improvement and accountability**

Establishing a New Environment for Care

To enable the profound changes in health care recommended in this report, the *environment* of care must also change. The committee believes the current environment often inhibits the changes needed to achieve quality improvement. Two types of environmental change are needed:

• *Focus and align the environment toward the six aims for improvement.* To effect this set of changes, purchasers and health plans, for example, should eliminate or modify payment practices that fragment the care system, and should establish incentives designed to encourage and reward innovations aimed at improving quality. Purchasers and regulators should also create precise streams of accountability and measurement reflecting achievements in the six aims. Moreover, efforts should be made to help health care consumers understand the aims, why they are important, and how to interpret the levels of performance of various health care systems.

• *Provide, where possible, assets and encouragement for positive change.* For example, national funding agencies could promote research on new designs for the care of priority conditions, state and national activities could be undertaken to facilitate the exchange of best practices and shared learning among health care delivery systems, and a national system for monitoring progress toward the six aims for improvement could help improvement efforts remain on track.

Such environmental changes need to occur in four major areas: the infrastructure that supports the dissemination and application of new clinical knowledge and technologies, the information technology infrastructure, payment policies, and preparation of the health care workforce.

Changes will also be needed in the quality oversight and accountability processes of public and private purchasers. This issue is not addressed here. The IOM will be issuing a separate report on federal quality measurement and improvement programs in Fall 2002. In addition, the National Quality Forum has an extensive effort under way to develop a national framework for quality measurement and accountability and will be issuing a report in Summer 2001.

Applying Evidence to Health Care Delivery

In the current health care system, scientific knowledge about best care is not applied systematically or expeditiously to clinical practice. An average of about 17 years is required for new knowledge generated by randomized controlled trials to be incorporated into practice, and even then application is highly uneven (Balas and Boren, 2000). The extreme variability in practice in clinical areas in

which there is strong scientific evidence and a high degree of expert consensus about best practices indicates that current dissemination efforts fail to reach many clinicians and patients, and that there are insufficient tools and incentives to promote rapid adoption of best practices. The time has come to invest in the creation of a more effective infrastructure for the application of knowledge to health care delivery.

> **Recommendation 8: The Secretary of the Department of Health and Human Services should be given the responsibility and necessary resources to establish and maintain a comprehensive program aimed at making scientific evidence more useful and accessible to clinicians and patients. In developing this program, the Secretary should work with federal agencies and in collaboration with professional and health care associations, the academic and research communities, and the National Quality Forum and other organizations involved in quality measurement and accountability.**

It is critical that leadership from the private sector, both professional and other health care leaders and consumer representatives, be involved in all aspects of this effort to ensure its applicability and acceptability to clinicians and patients. The infrastructure developed through this public- and private-sector partnership should focus initially on priority conditions and include:

- Ongoing analysis and synthesis of the medical evidence
- Delineation of specific practice guidelines
- Identification of best practices in the design of care processes
- Enhanced dissemination efforts to communicate evidence and guidelines to the general public and professional communities
- Development of decision support tools to assist clinicians and patients in applying the evidence
- Establishment of goals for improvement in care processes and outcomes
- Development of quality measures for priority conditions

More systematic approaches are needed to analyze and synthesize medical evidence for both clinicians and patients. Far more sophisticated clinical decision support systems will be required to assist clinicians and patients in selecting the best treatment options and delivering safe and effective care. Many promising private- and public-sector activities now under way can serve as excellent models and building blocks for a more expanded effort. In particular, the Cochrane Collaboration and the Agency for Healthcare Research and Quality's Evidence-Based Practice Centers represent important efforts to synthesize medical evidence. The growth of the Internet has also opened up many new opportunities to make evidence more accessible to clinicians and consumers. The efforts of the National Library of Medicine to facilitate access to the medical literature

by both consumers and health care professionals and to design Web sites that organize large amounts of information on particular health needs are particularly promising.

The development of a more effective infrastructure to synthesize and organize evidence around priority conditions would also offer new opportunities to enhance quality measurement and reporting. A stronger and more organized evidence base should facilitate the adoption of best practices, as well as the development of valid and reliable quality measures for priority conditions that could be used for both internal quality improvement and external accountability.

Using Information Technology

Health care delivery has been relatively untouched by the revolution in information technology that has been transforming nearly every other aspect of society. The majority of patient and clinician encounters take place for purposes of exchanging clinical information: patients share information with clinicians about their general health, symptoms, and concerns, and clinicians use their knowledge and skills to respond with pertinent medical information, and in many cases reassurance. Yet it is estimated that only a small fraction of physicians offer e-mail interaction, a simple and convenient tool for efficient communication, to their patients (Hoffman, 1997).

The meticulous collection of personal health information throughout a patient's life can be one of the most important inputs to the provision of proper care. Yet for most individuals, that health information is dispersed in a collection of paper records that are poorly organized and often illegible, and frequently cannot be retrieved in a timely fashion, making it nearly impossible to manage many forms of chronic illness that require frequent monitoring and ongoing patient support.

Although growth in clinical knowledge and technology has been profound, many health care settings lack basic computer systems to provide clinical information or support clinical decision making. The development and application of more sophisticated information systems is essential to enhance quality and improve efficiency.

The Internet has enormous potential to transform health care through information technology applications in such areas as consumer health, clinical care, administrative and financial transactions, public health, professional education, and biomedical and health services research (National Research Council, 2000). Many of these applications are currently within reach, including remote medical consultation with patients in their homes or offices; consumer and clinician access to the medical literature; creation of "communities" of patients and clinicians with shared interests; consumer access to information on health plans, participating providers, eligibility for procedures, and covered drugs in a formulary; and videoconferencing among public health officials during emergency

situations. Other applications are more experimental, such as simulation of surgical procedures; consultation among providers involving manipulation of digital images; and control of experimental equipment, such as electron microscopes.

The Internet also supports rising interest among consumers in information and convenience in all areas of commerce, including health care. The number of Americans who use the Internet to retrieve health-related information is estimated to be about 70 million (Cain et al., 2000). Consumers access health-related Web sites to research an illness or disease; seek information on nutrition and fitness; research drugs and their interactions; and search for doctors, hospitals, and online medical support groups.

The committee believes information technology must play a central role in the redesign of the health care system if a substantial improvement in quality is to be achieved over the coming decade. Automation of clinical, financial, and administrative transactions is essential to improving quality, preventing errors, enhancing consumer confidence in the health system, and improving efficiency.

Central to many information technology applications is the automation of patient-specific clinical information. A fully electronic medical record, including all types of patient information, is not needed to achieve many, if not most, of the benefits of automated clinical data. Sizable benefits can be derived in the near future from automating certain types of data, such as medication orders. Efforts to automate clinical information date back several decades, but progress has been slow (Institute of Medicine, 1991), in part because of the barriers and risks involved. An important constraint is that consumers and policy makers share concerns about the privacy and confidentiality of these data (Cain et al., 2000; Goldman, 1998). The United States also lacks national standards for the capture, storage, communication, processing, and presentation of health information (Work Group on Computerization of Patient Records, 2000).

The challenges of applying information technology to health care should not be underestimated. Health care is undoubtedly one of the most, if not the most, complex sector of the economy. The number of different types of transactions (i.e., patient needs, interactions, and services) is very large. Sizable capital investments and multiyear commitments to building systems will be required. Widespread adoption of many information technology applications will require behavioral adaptations on the part of large numbers of patients, clinicians, and organizations. Yet, the Internet is rapidly transforming many aspects of society, and many health-related processes stand to be reshaped as well.

In the absence of a national commitment and financial support to build a national health information infrastructure, the committee believes that progress on quality improvement will be painfully slow. The automation of clinical, financial, and administrative information and the electronic sharing of such information among clinicians, patients, and appropriate others within a secure environment are critical if the 21st-century health care system envisioned by the committee is to be realized.

> **Recommendation 9: Congress, the executive branch, leaders of health care organizations, public and private purchasers, and health informatics associations and vendors should make a renewed national commitment to building an information infrastructure to support health care delivery, consumer health, quality measurement and improvement, public accountability, clinical and health services research, and clinical education. This commitment should lead to the elimination of most handwritten clinical data by the end of the decade.**

Aligning Payment Policies with Quality Improvement

Current payment methods do not adequately encourage or support the provision of quality health care. Although payment is not the only factor that influences provider and patient behavior, it is an important one.

All payment methods affect behavior and quality. For example, fee-for-service payment methods for physicians and hospitals raise concerns about potential overuse of services—the provision of services that may not be necessary or may expose the patient to greater potential harm than benefit. On the other hand, capitation and per case payment methods for physicians and hospitals raise questions about potential underuse—the failure to provide services from which the patient would likely benefit. Indeed, no payment method perfectly aligns financial incentives with the goal of quality improvement for all health care decision makers, including clinicians, hospitals, and patients. This is one reason for the widespread interest in blended methods of payment designed to counter the disadvantages of one payment method with the advantages of another.

Too little attention has been paid to the careful analysis and alignment of payment incentives with quality improvement. The current health care environment is replete with examples of payment policies that work against the efforts of clinicians, health care administrators, and others to improve quality. The following example, presented at an Institute of Medicine workshop on payment and quality held on April 24, 2000,[2] illustrates how payment policies can work against the efforts of clinicians, health care administrators, and others to improve quality:

> A physician group paid primarily on a fee-for-service basis instituted a new program to improve blood sugar control for diabetic patients. Specifically, pilot studies suggested that tighter diabetic management could decrease hemoglobin A1c levels by 2 percentage points for about 40 percent of all diabetic patients managed by the physician group. Data from two randomized controlled trials demonstrated that better sugar controls should translate into lower rates of retinopathy, nephropathy, peripheral neurological damage, and heart disease. The

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[2] This case study has been excerpted from a paper prepared by and presented at the IOM workshop by Brent James, Intermountain Health Care, Salt Lake City, Utah, April 2000.

savings in direct health care costs (i.e., reduced visits and hospital episodes) from avoided complications have been estimated to generate a net savings of about $2,000 per patient per year, on average, over 15 years. Across the more than 13,000 diabetic patients managed by the physician group, the project had the potential to generate over $10 million in net savings each year. The project was costly to the medical group in two ways. First, expenses to conduct the project, including extra clinical time for tighter management, fell to the physician group. Second, over time, as diabetic complication rates fell, the project would reduce patient visits and, thus, revenues as well. But the savings from avoided complications would accrue to the insurer or a self-funded purchaser.

The committee believes that all purchasers, both public and private, should carefully reexamine their payment policies.

> **Recommendation 10: Private and public purchasers should examine their current payment methods to remove barriers that currently impede quality improvement, and to build in stronger incentives for quality enhancement.**

Payment methods should:

• Provide fair payment for good clinical management of the types of patients seen. Clinicians should be adequately compensated for taking good care of all types of patients, neither gaining nor losing financially for caring for sicker patients or those with more complicated conditions. The risk of random incidence of disease in the population should reside with a larger risk pool, whether that be large groups of providers, health plans, or insurance companies.

• Provide an opportunity for providers to share in the benefits of quality improvement. Rewards should be located close to the level at which the re-engineering and process redesign needed to improve quality are likely to take place.

• Provide the opportunity for consumers and purchasers to recognize quality differences in health care and direct their decisions accordingly. In particular, consumers need to have good information on quality and the ability to use that information as they see fit to meet their needs.

• Align financial incentives with the implementation of care processes based on best practices and the achievement of better patient outcomes. Substantial improvements in quality are most likely to be obtained when providers are highly motivated and rewarded for carefully designing and fine-tuning care processes to achieve increasingly higher levels of safety, effectiveness, patient-centeredness, timeliness, efficiency, and equity.

• Reduce fragmentation of care. Payment methods should not pose a barrier to providers' ability to coordinate care for patients across settings and over time.

To assist purchasers in the redesign of payment policy based on these fundamental principles, a vigorous program of pilot testing and evaluating alternative design options should be pursued.

Recommendation 11: The Health Care Financing Administration and the Agency for Healthcare Research and Quality, with input from private payers, health care organizations, and clinicians, should develop a research agenda to identify, pilot test, and evaluate various options for better aligning current payment methods with quality improvement goals.

Examples of possible means of achieving this end include blended methods of payment for providers, multiyear contracts, payment modifications to encourage use of electronic interaction among clinicians and between clinicians and patients, risk adjustment, bundled payments for priority conditions, and alternative approaches for addressing the capital investments needed to improve quality.

Preparing the Workforce

A major challenge in transitioning to the health care system of the 21st century envisioned by the committee is preparing the workforce to acquire new skills and adopt new ways of relating to patients and each other. At least three approaches can be taken to support the workforce in this transition. One is to redesign the way health professionals are trained to emphasize the aims for improvement set forth earlier, including teaching evidence-based practice and using multidisciplinary approaches. Second is to modify the ways in which health professionals are regulated to facilitate the needed changes in care delivery. Scope-of-practice acts and other workforce regulations need to allow for innovation in the use of all types of clinicians to meet patient needs in the most effective and efficient way possible. Third is to examine how the liability system can constructively support changes in care delivery while remaining part of an overall approach to accountability for health care professionals and organizations. All three approaches are important and require additional study.

Recommendation 12: A multidisciplinary summit of leaders within the health professions should be held to discuss and develop strategies for (1) restructuring clinical education to be consistent with the principles of the 21st-century health system throughout the continuum of undergraduate, graduate, and continuing education for medical, nursing, and other professional training programs; and (2) assessing the implications of these changes for provider credentialing programs, funding, and sponsorship of education programs for health professionals.

Recommendation 13: The Agency for Healthcare Research and Quality should fund research to evaluate how the current regulatory and legal systems (1) facilitate or inhibit the changes needed for the 21st-century health care delivery system, and (2) can be modified to support health care professionals and organizations that seek to accomplish the six aims set forth in Chapter 2.

SUMMARY

The changes needed to realize a substantial improvement in health care involve the health care system as a whole. The new rules set forth in this report will affect the role, self-image, and work of front-line doctors, nurses, and all other staff. The needed new infrastructures will challenge today's health care leaders—both clinical leaders and management. The necessary environmental changes will require the interest and commitment of payers, health plans, government officials, and regulatory and accrediting bodies. New skills will require new approaches by professional educators. The 21st-century health care system envisioned by the committee—providing care that is evidence-based, patient-centered, and systems-oriented—also implies new roles and responsibilities for patients and their families, who must become more aware, more participative, and more demanding in a care system that should be meeting their needs. And all involved must be united by the overarching purpose of reducing the burden of illness, injury, and disability in our nation.

American health care is beset by serious problems, but they are not intractable. Perfect care may be a long way off, but much better care is within our grasp. The committee envisions a system that uses the best knowledge, that is focused intensely on patients, and that works across health care providers and settings. Taking advantage of new information technologies will be an important catalyst to moving us beyond where we are today. The committee believes that achieving such a system is both possible and necessary.

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CROSSING THE QUALITY CHASM

A New Health System for the 21st Century

Committee on Quality of Health Care in America

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The report was reviewed by individuals chosen for their diverse perspectives and technical expertise in accordance with procedures approved by the National Research Council's Report Review Committee. The purpose of this independent review is to provide candid and critical comments to assist the authors and the Institute of Medicine in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The content of the review comments and the draft manuscript remain confidential to protect the integrity of the deliberative process. The committee wishes to thank the following individuals for their participation in the report review process:

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Although the reviewers listed above have provided many constructive comments and suggestions, they were not asked to endorse the conclusions or recommendations nor did they see the final draft of the report before its release. The review of this report was overseen by **WILLIAM H. DANFORTH**, Washington University, St. Louis, Missouri, and **EDWARD B. PERRIN**, University of Washington and VA Puget Sound Health Care System, Seattle, Washington. Appointed by the National Research Council and the Institute of Medicine, they were responsible for making certain that an independent examination of this report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Preface

This is the second and final report of the Committee on the Quality of Health Care in America, which was appointed in 1998 to identify strategies for achieving a substantial improvement in the quality of health care delivered to Americans. The committee's first report, *To Err Is Human: Building a Safer Health System*, was released in 1999 and focused on a specific quality concern—patient safety. This second report focuses more broadly on how the health care delivery system can be designed to innovate and improve care.

This report does not recommend specific organizational approaches to achieve the aims set forth. Rather than being an organizational construct, redesign refers to a new perspective on the purpose and aims of the health care system, how patients and their clinicians should relate, and how care processes can be designed to optimize responsiveness to patient needs. The principles and guidance for redesign that are offered in this report represent fundamental changes in the way the system meets the needs of the people it serves.

Redesign is not aimed only at the health care organizations and professionals that comprise the delivery system. Change is also required in the structures and processes of the environment in which those organizations and professionals function. Such change includes setting national priorities for improvement, creating better methods for disseminating and applying knowledge to practice, fostering the use of information technology in clinical care, creating payment policies that encourage innovation and reward improvement in performance, and enhancing educational programs to strengthen the health care workforce.

The Quality of Health Care in America project is supported largely by the income from an endowment established within the Institute of Medicine by the

Although the committee takes full responsibility for the content of this report, many people have made important contributions. The Subcommittee on Designing the Health System of the 21st Century, under the direction of Donald Berwick, combined a depth of knowledge and creativity to propose a vision on how health care could be delivered in the 21st century. The Subcommittee on Creating an External Environment for Quality, under the direction of J. Cris Bisgard and Molly Joel Coye, provided expert guidance and a wealth of experience on how the external environment could support improved delivery of care. Lastly, the IOM staff, under the direction of Janet Corrigan, have provided excellent research, analysis and writing.

Now is the right time for the changes proposed in this report. Technological advances make it possible to accomplish things today that were impossible only a few years ago. Patients, health care professionals, and policy makers are becoming all too painfully aware of the shortcomings of our current care delivery systems and the importance of finding better approaches to meeting the health care needs of all Americans. The committee does not offer a simple prescription, but a vision of what is possible and the path that can be taken. It will not be an easy road, but it will be most worthwhile.

William C. Richardson, Ph.D.
Chair
March 2001

Foreword

This is the second and final report of the Committee on the Quality of Health Care in America. Response to the committee's first report, *To Err is Human: Building a Safer Health System*, has been swift, positive, and ongoing from many health care organizations, practitioners, researchers, and policy makers.

The present report addresses quality-related issues more broadly, providing a strategic direction for redesigning the health care delivery system of the 21st century. Fundamental reform of health care is needed to ensure that all Americans receive care that is safe, effective, patient centered, timely, efficient, and equitable.

As this report is being released, we are reflecting on the recent loss of a great 20th-century leader in the field of health care quality. Avedis Donabedian, member of the Institute of Medicine, leaves behind a rich body of work on the conceptualization and measurement of quality. His extraordinary intellectual contributions will continue to guide efforts to improve quality well into the coming century.

The Quality of Health Care in America project continues the Institute of Medicine's long-standing focus on quality-of-care issues. The Institute's National Roundtable on Health Care Quality has described the variability of the quality of health care in the United States and highlighted the urgent need for improvement. The report *Ensuring Quality Cancer Care* issued by the Institute's National Cancer Policy Board, offers the conclusion that there is a wide gulf between ideal cancer care and the reality experienced by many Americans. And a forthcoming report from the Institute's Committee on the National Quality

Report on Health Care Delivery will offer a framework for periodic reporting to the nation on the state of quality of care.

This report reinforces the conviction of these and other concerned groups that we cannot wait any longer to address the serious quality-of-care challenges facing our nation. A comprehensive and strong response is needed now.

Kenneth I. Shine, M.D.
President, Institute of Medicine
March 2001

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In addition, a number of people willingly and generously contributed their time and expertise as the committee and both subcommittees conducted their deliberations.

The planning committee for the Workshop on Using Information Technology to Improve the Quality of Care did an excellent job of organizing the workshop. This committee consisted of E. Andrew Balas, University of Missouri School of Medicine; Don E. Detmer, University of Cambridge; Jerome H. Grossman, John F. Kennedy School of Government, Harvard University; and Brent James, Intermountain Health Care. **The participants in this workshop** provided a great deal of useful information that is reflected in this report. These participants were E. Andrew Balas, University of Missouri School of Medicine; David W. Bates, Brigham Internal Medicine Associates; Mark Braunstein, Patient Care Technologies; Charles R. Buck, General Electric Company; Maj. Gen. Paul K. Carlton, Jr., Air Force Medical Operations Agency; David C. Classen, University of Utah; Paul D. Clayton, Intermountain Health Care; Kathryn L. Coltin, Harvard Pilgrim Health Care; Louis H. Diamond, The MEDSTAT Group; J. Michael Fitzmaurice, Agency for Health Care Policy and Research; Janlori Goldman, Georgetown University; Jerome H. Grossman, John F. Kennedy School of Government, Harvard University; David Gustafson, University of Wisconsin-Madison; Betsy L. Humphreys, U.S. National Library of Medicine; Brent James, Intermountain Health Care; John T. Kelly, AETNA/U.S. Healthcare; David B. Kendall, Progressive Policy Institute; Robert Kolodner, Department of Veterans Affairs; George D. Lundberg, Northwestern University; Robert Mayes, Health Care Financing Administration; Ned McCulloch, IBM, formerly Office of Senator Joseph Lieberman; Elizabeth A. McGlynn, The RAND Corporation; Blackford Middleton, MedicaLogic; Gregg S. Meyer, Agency for Health Care Policy and Research; Arnold Milstein, Pacific Business Group on Health; Donald Moran, The Moran Company; Michael Nerlich, University of Regensburg; William C. Richardson, W. K. Kellogg Foundation; Richard D. Rubin, Foundation for Health Care Quality; Charles Saunders, Healtheon/WebMD; Joseph E. Scherger, University of California, Irvine; Kenneth Smithson, VHA, Inc.; William W. Stead, Vanderbilt University; Stuart Sugarman, Mount Sinai/NYU Health; Paul C. Tang,

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Palo Alto Medical Clinic; and Jan H. van Bemmel, Erasmus University Rotterdam.

The technical advisory panel on the Communication of Quality of Care Information organized a successful Workshop on Communicating with the Public About Quality of Care. This panel consisted of Mary Wakefield (*Chair*), George Mason University; Robert J. Blendon, Harvard School of Public Health and Kennedy School of Government; Charles R. Buck, General Electric Company; Molly Joel Coye, Institute for the Future; Arthur Levin, Center for Medical Consumers; Lee N. Newcomer, Vivius, Inc., formerly with United HealthCare Corporation; and Richard Sorian, Georgetown University. **Participants in the Workshop on Communicating with the Public about Quality of Care** provided many useful insights reflected in this report. They included Lisa Aliferis, Dateline NBC; Carol Blakeslee, News Hour with Jim Lehrer; Robert J. Blendon, Harvard School of Public Health and Kennedy School of Government; Charles R. Buck, General Electric Company; Christine Cassel, Mount Sinai School of Medicine; Molly Joel Coye, Institute for the Future; W. Douglas Davidson, Foundation for Accountability; Susan Dentzer, News Hour with Jim Lehrer; Mason Essif, HealthWeek Public Television; David Glass, Kaiser-Permanente; Ann Greiner, Center for Studying Health System Change; Madge Kaplan, WGBH Radio; Richard Knox, *Boston Globe*; Arthur Levin, Center for Medical Consumers; Trudy Lieberman, *Consumer Reports*; Lani Luciano, *Money Magazine*; Laura Meckler, Associated Press; Duncan Moore, *Modern Healthcare*; Lee N. Newcomer, Vivius, Inc., formerly with United HealthCare Corporation; William Richardson, W.K. Kellogg Foundation; Marty Rosen, *New York Daily News*; Sabin Russell, *San Francisco Chronicle*; Stuart Schear, The Robert Wood Johnson Foundation; Richard Sorian, Georgetown University; Abigail Trafford, *Washington Post*; Mary Wakefield, George Mason University; Lawrence Wallack, Portland State University; Michael Weinstein, *New York Times*; and Ronald Winslow, *Wall Street Journal*.

The technical advisory panel on the State of Quality in America, through their findings, based on a commissioned paper from Mark Schuster at RAND, provided important input to the committee's deliberations. The panel included Mark R. Chassin, The Mount Sinai School of Medicine; Arnold Epstein, Harvard School of Public Health; Brent James, Intermountain Health Care; James P. Logerfo, University of Washington, Seattle; Harold Luft, University of California, San Francisco; R. Heather Palmer, Harvard School of Public Health; and Kenneth B. Wells, University of California, Los Angeles.

Participants in the one-day Workshop on the Effects of Financing Policies on Quality of Care also provided important input to the committee's deliberations. They included Robert Berenson, Health Care Financing Administra-

tion; Don Berwick, Institute for Healthcare Improvement; J. Cris Bisgard, Delta Air Lines, Inc.; Phyllis Borzi, The George Washington University; David Bradley, Sentinel Health Partners Inc.; Lonnie Bristow, Former President, American Medical Association; Charles R. Buck, General Electric Company; Kathleen Buto, Health Care Financing Administration; Lawrence Casalino, The University of Chicago; Molly Joel Coye, Institute for the Future; Rick Curtis, Institute for Health Policy Solutions; Charles Cutler, American Association of Health Plans; Geraldine Dallek, Georgetown University; Irene Fraser, Agency for Healthcare Research and Quality; Jerome H. Grossman, John F. Kennedy School of Government, Harvard University; Sam Ho, PacifiCare Health Systems; Thomas Hoyer, Health Care Financing Administration; Brent James, Intermountain Health Care; Glenn D. Littenberg, Practicing Gastroenterologist; James Mortimer, Midwest Business Group on Health; Don Nielsen, American Hospital Association; Ann Robinow, Buyers Health Care Action Group; Gerald Shea, AFL–CIO; David Shulkin, DoctorQuality.com; Bruce Taylor, GTE Service Corporation; and Gail R. Wilensky, Project Hope & MedPAC.

Participants in a workshop held to explore the relationship between volume and outcomes made valuable contributions to this study as well. They included Richard Bae, University of California San Francisco; Colin Begg, Memorial Sloan-Kettering Cancer Center; Donald M. Berwick, Institute for Healthcare Improvement; Bruce Bradley, General Motors; Mark R. Chassin, The Mount Sinai School of Medicine; Steve Clauser, Health Care Financing Administration; Jan De la Mare, Agency for Healthcare Research and Quality; Suzanne DelBanco, The Leapfrog Group; R. Adams Dudley, University of California, San Francisco; John Eisenberg, Agency for Healthcare Research and Quality; Irene Fraser, Agency for Healthcare Research and Quality; Robert Galvin, General Electric Company; Ethan Halm, The Mount Sinai School of Medicine; Edward Hannan, State University of New York, Albany; Norman Hertzer, Cleveland Clinic; Bruce Hillner, Virginia Commonwealth University; Sam Ho, PacifiCare Health Systems; George J. Isham, HealthPartners; Clara Lee, The Mount Sinai School of Medicine; Arthur Levin, Center for Medical Consumers; Arnold Milstein, William M. Mercer, Inc.; Peggy McNamara, Agency for Healthcare Research and Quality; Don Nielsen, American Hospital Association; Diana Petitti, Kaiser Permanente of Southern California; Joseph Simone, Huntsman Cancer Foundation and Institute; Jane Sisk, Mount Sinai School of Medicine; and Ellen Stovall, National Coalition for Cancer Survivorship.

A steering group that provided invaluable advice and review of the design of the microsystems study included Paul B. Batalden, Dartmouth Medical School; Donald M. Berwick, Institute for Healthcare Improvement; Eugene C. Nelson, Dartmouth Medical Center; Thomas Nolan, Associates in Process Improvement; and Stephen M. Shortell, University of California, Berkeley. The

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