A Research Agenda For Bridging The 'Quality Chasm'

Bridging the quality chasm requires a marriage between research and action.

by Rushika Fernandopulle, Timothy Ferris, Arnold Epstein, Barbara McNeil, Joseph Newhouse, Gary Pisano, and David Blumenthal

PROLOGUE: The Harvard Interfaculty Program on Health Systems Improvement (PHSI) was created "to mobilize the resources of Harvard University to provide leadership in addressing the most pressing health care problems of our time." One of its first projects was to convene a conference of experts to formulate a research agenda for the Institute of Medicine's 2001 report, *Crossing the Quality Chasm.* This report, while conveying a "galvanizing vision" of the need to improve health care quality in the United States, contained "virtually no guidance on practical steps to achieve this vision," according to the PHSI's Web site.

This paper outlines the findings of this group of experts as it guides further research aimed at improving the U.S. health care system. Among the highest priorities for research are to improve performance measurement, to increase the adoption and use of promising information technologies, and to align payment methods with quality improvement (make the "business case" for quality).

The authors all hold Harvard faculty appointments. Rushika Fernandopulle is executive director of the PHSI. Timothy Ferris is an assistant physician at Massachusetts General Hospital. Arnold Epstein is the John H. Foster Professor of Health Policy and Management at the Harvard School of Public Health. Barbara McNeil is the Ridley Watts Professor of Health Care Policy at Harvard Medical School. Joseph Newhouse is the John D. MacArthur Professor of Health Policy and Management at Harvard University, director of the Division of Health Policy Research and Education, and director of the Interfaculty Initiative in Health Policy, under which the PHSI operates. The group's only nonphysician, Gary Pisano, is the Harry E. Figgie Jr. Professor of Business Administration at the Harvard Business School. David Blumenthal is director of the Institute for Health Policy, Massachusetts General Hospital and Partners HealthCare System, and the PHSI's director.

Perspectives by Robert Galvin and by Kim Eagle, Arthur Garson Jr., George Beller, and Cary Sennett round out the discussion of next steps to be taken in pursuing a vigorous national agenda for health quality improvement.

ABSTRACT: Realizing the vision of the IOM's landmark report, *Crossing the Quality Chasm,* will require new knowledge to support new policy and management. This paper lays out a research agenda that must be pursued if the health care system is to bridge the quality chasm. Based on a consensus process involving leading health care researchers and authorities, the paper highlights knowledge gaps and research directions in five areas identified by the *Quality Chasm* report as critical to its goals of building organizational supports for change; applying evidence to health care delivery; developing information technology; aligning payment policies with quality improvement; and preparing the workforce.

A landmark report by the Institute of Medicine (IOM), *Crossing the Quality Chasm*, documented many of the failings of our current system and described a system that would provide health care of the highest attainable quality to all Americans.[1] The report contains a compelling vision, but questions remain: How do we cross this chasm between where we are now and where we want to be? And what will it take to make this happen?

New knowledge is an essential pillar in the bridge across the quality chasm. We need to know why gaps exist, what actions will be required to close those gaps, and how those actions can be carried out. However, because uninformed action carries the risk of inefficiency and perhaps even harm, research must accompany policy development and management innovations so that interventions can be planned well and their effects tracked.

The Harvard Interfaculty Program for Health Systems Development (PHSI) was charged with preparing a research agenda for the *Quality Chasm* report. As our first step, we convened a group of prominent health services researchers and policymakers from a variety of backgrounds and institutions, to identify the major gaps in knowledge that stand in the way of achieving the report's vision.[2] We used a modified Delbecq small-group method to generate an initial ranked list of research questions and then used our own judgment, informed by a review of the literature and the *Quality Chasm* report itself, to generate the most important domains for research.[3]

We structured our inquiry using the five substantive chapters of the original report. Each of these chapters centers on a critical element of a health care system characterized by high quality: organizational supports, evidence-based care, clinical information technology, payment policies, and preparing the workforce. For each of these areas we tried to provide a general sense of the current knowledge base and to identify the most important research questions for future work. We aimed to identify the most pressing research needs, stimulate discussion, and lay the groundwork for future action. More detailed work will be required, because we did not always address how, or even whether, each of these questions can and should be researched. A further limitation is that our process did not include the views of health care consumers, which would be desirable in future work.

Research agendas such as this one can seem like special pleading for a claim on

limited societal resources. Although the research needs we identified have already been culled from a much longer list assembled by our expert panel, we recognize the need to select among even this limited agenda. Therefore, at the end of this paper we select our highest research priorities.

Cross-Cutting Themes In Quality Improvement Research

■ **Need for more robust performance measures.** Before we lay out specific findings, several larger, cross-cutting issues deserve emphasis. First is the importance of creating more robust performance measures to guide our actions and track our progress toward improving quality of care. The lack of such measures in many areas of interest—such as organizational performance, physician performance, systems-related measures, and the quality-related outcomes of workforce training—constitutes a major barrier not only to documenting and encouraging progress, but also to research on the merits of alternative social interventions. Research also is needed on optimal design and implementation of measurement strategies. For example, there is insufficient understanding of the value of different approaches to measurement (such as more measures versus fewer but more robust measures). Both the benefits and costs of performance measurement must be tracked to assure that benefits exceed costs over time.

■ **Role of the consumer/patient.** A second cross-cutting theme is the urgent need for more concentrated, rigorous, and critical attention to the role of the consumer/patient in influencing the organization and behavior of the health care system. The *Quality Chasm* report's embrace of patient-centered care is among its most important, powerful, and positive messages. However, we do not understand very well the behavior of consumers in health care. Consequently, uncertainties abound about the effects of actions undertaken in the name of the health care consumer. Understanding the effects of such efforts to "empower" and "activate" consumers should receive a high priority in future research.[4]

■ **Complexity theory.** A third theme concerns the need to explore the implications for health care research of complexity theory, a novel and potentially transforming perspective that profoundly influenced the IOM's work.[5] The *Quality Chasm* report does not explore fully the implications of this perspective for how future research should be conducted or policy formulated. Pursuing these potentially profound issues should be a high priority in future health-related research.

Building Organizational Supports For Change

Crossing the Quality Chasm acknowledges that one important key to improving quality lies in creating organizations that can optimize and improve the care process. To do this, research is needed to develop more robust performance measures to identify high-performing organizations, understand better what differentiates successful from unsuccessful organizations, elucidate the process of organizational change, and explore the role and characteristics of good leadership.

■ **Measuring organizational attributes.** While the data do not conclusively demonstrate the link between organizational factors and mortality rates, there is convincing evidence that organizational factors can affect quality of care.[6] This presumption is reinforced by recent studies linking nurse-to-bed ratios to hospitals' mortality rates.[7] Variability among organizations creates the opportunity to learn from high-performing institutions. A first critical task, then, is to be able to identify organizations that truly produce higher-quality health care. This requires better measures of organizational performance in terms of quality but also in terms of attributes (for example, structure, incentive and control systems, information systems, and processes) that may influence such performance.

Much valuable work has already been done in developing quality measures at the organizational level. Among the most widely cited and used are the Health Plan Employer Data and Information Set (HEDIS) measures developed by the National Committee for Quality Assurance (NCQA), the Consumer Assessment of Health Plans (CAHPS) instruments developed by the Agency for Healthcare Research and Quality (AHRQ), the Centers for Medicare and Medicaid Services' (CMS's) Outcome and Assessment Information Set (OASIS) measures for the measurement of home health care quality, and the risk-adjusted cardiovascular disease mortality measures used by New York State and Pennsylvania.[8]

In many respects, however, our ability to measure relevant dimensions of organizational behavior and outputs is still primitive. There is a need for disease-specific and cross-condition measures that can characterize enough of the work of institutions so that their total performance can be assessed. Such measures are available for only a small number of conditions, many of them related to a few prominent chronic illnesses (for example, asthma, hypertension, congestive heart failure, and diabetes). More such measures are needed, and these should encompass a reasonable proportion of the clinical activities of hospitals, physician groups, health plans, and other institutions.

Furthermore, measures of organizational attributes that may be causally related to quality performance are needed. These include organizational culture (related to both safety and quality); volume of cases, particularly with regard to procedures; coordination of care; team relationships; and patient-centeredness.

At a higher level, we need more research into the overall costs as well as the benefits of the efforts to develop and then implement such performance measures. There are real costs to developing measures and real burdens imposed on our delivery system to collect the information necessary to implement them. We need to carefully measure the positive impacts of such performance measurement and see how these compare to both the investments required and the improvement that might have followed alternative uses of these resources.

■ **Learning from high-performing organizations.** Information about the characteristics of high-performing organizations is desperately needed to help well-intended leaders realize their goals. Both qualitative and quantitative investigation

is essential to identify determinants of performance. For instance, understanding why successful strategies in one organization (or one part of an organization) do not spread will provide important insights. Case studies will provide essential qualitative insight into attributes associated with quality performance, but those findings will need to be validated by cross-institutional quantitative research.

Another enduring question concerns the relationship between organizational stress (consisting either of financial stress such as near-bankruptcy or quality stress such as a well-publicized medical error) and performance. Contending hypotheses hold that organizational stress can either facilitate or impede organizational improvement. In non–health care settings, the literature on quality improvement identifies a number of instances in which organizations facing a "brush with death" radically transformed themselves into international paragons of competitiveness.[9] No such examples exist in health care, where financially stressed organizations seem to pursue a few comparatively simple solutions that have uncertain effects on quality of performance: radically reducing the workforce and changing ownership (mostly from nonprofit to for-profit).

■ **Leadership.** Conventional wisdom holds that leadership is vital to progress in realizing the vision of the *Quality Chasm* report. We know that involvement of senior hospital management can improve physicians' participation in quality improvement efforts and that physician opinion leaders can play an important role in improving the practices of their colleagues.[10] However, identifying and nurturing leadership remain difficult in health care, in part because the essential characteristics of good leadership are poorly defined. In health care, an enduring question is whether leadership requires unique skills that must be taught and learned through unique leadership development activities. Studies comparing proven leaders inside and outside health care settings might shed light on this question.

Applying Evidence To Health Care Delivery

The *Quality Chasm* report emphasizes the role of evidence-based medicine in improving the quality of care. Although there has been an explosion in the sheer volume of clinical trials, guidelines, and other evidence, there remain crucial gaps in knowledge concerning how to make evidence-based medicine a daily reality.

■ **Holes in the evidence base.** The first challenge is to expand research in areas of clinical medicine where the current evidence base is weak or nonexistent. These areas are numerous, and as the recent controversy over hormone replacement therapy demonstrates, they often affect areas of practice with important health implications.[11] Some spheres of medicine, such as patient safety interventions, have suffered from inattention because of cultural, political, and philosophical biases.

■ **Using the evidence to make individual patient decisions.** The report's simultaneous emphasis on patient-centered care and evidence-based medicine creates a number of important technical challenges to overcome. One is translating evidence from clinical trials and outcomes studies to the care of unique patients.

Findings from clinical research are difficult to generalize to nonresearch populations because study patients are typically more homogeneous, lack comorbid conditions, and receive care in the rarefied world of a clinical trial, where resources are more plentiful and compliance issues are minimized. Achieving the vision of the *Quality Chasm* report requires research to improve the applicability of trials to the experience of typical patients and providers, the conduct of outcomes research that tracks experience with innovations as they are used in routine practice, and the involvement of nonacademic settings in developing evidence.

To realize a patient-centered vision in an evidence-based context also requires the collection of new and different types of information. Helping patients and providers choose the optimal path of care requires better understanding of subjective but critical factors, such as a patient's risk aversion, proclivity for self-care, time horizon, and other personal value calculations. We need first a good taxonomy to characterize such currently unmeasured variables and then tools to help factor them into individual decision making. John Wennberg, Joseph Kasper, and their colleagues have pioneered this area of research.[12]

■ **Supporting physicians and patients in applying the evidence.** Research can contribute to providing better support to both physicians, and increasingly patients, so that they can employ evidence in their day-to-day decisions. For physicians, we know a lot about why they do not follow guidelines and know several methods that work and do not work in encouraging them to improve compliance.[13] Research is needed, however, to perfect methods for disseminating evidence to clinicians and to test incentives and change processes to encourage adoption. A particular challenge will be to balance the desire to support physicians in a learning environment with the trend toward physician performance assessment at the individual level, including the public disclosure of such data, which risks reducing the openness that can empower learning within health care organizations.

Patients increasingly seek a larger role in decision making. Numerous studies show a growing number of patients seeking information on the Internet but with little evidence to date on how this has affected patients' behavior, patient-physician communication, and outcomes of care.[14] To help patients and physicians make best use of this new communication medium, a wide range of research would be useful. This includes studies of what kinds of information patients seek, how they use it, whether it influences how they relate to traditional health care resources, the effect of patient characteristics, and how providers can use the power of the Internet to involve patients more effectively in their own care. A critical area of investigation is to track the effect of the so-called digital divide on access to and quality of services available to patients of different incomes, educational backgrounds, and racial and ethnic origins.[15]

A related challenge is to perfect the use of evidence concerning providers' performance in helping patients and other health care consumers to make choices about where to get their care. Although patients seem to want more information

about their providers, they tend not to demand quantitative evidence about providers' quality performance and not to use quality data even when they are available.[16] One hypothesis holds that patients would use the evidence if the desired data were presented in simple, understandable ways.[17] Another hypothesis might hold that few patients will ever use such quantitative evidence on providers' performance to make health care decisions. Instead, patients will be guided by more personal, qualitative information.

Information Technology

The *Quality Chasm* report makes two central assertions regarding the role of information technology (IT). First, IT has an essential, undeniable place in quality improvement. Second, numerous technical and human questions will need to be addressed before IT solutions in health care will be adopted and effectively used. Research is needed on precisely what the barriers to adoption are, what strategies will be effective in overcoming them, and how to manage issues of privacy.

■ **Barriers to IT adoption.** A number of hypotheses could explain the apparent discrepancy between the promise of IT systems and their modest penetration. A first hypothesis is that the problem is overstated. According to this argument, we are simply at the flat early portion of the S-shaped adoption curve that all new technologies follow, and the rate of use is poised to increase dramatically, especially as older providers retire and are replaced by a new "wired" generation of health professionals.[18] To test whether this is the case, careful tracking of the rate of use of proven IT would provide quick feedback and early warning about whether promising quality-related technologies are spreading at desired rates.

A second hypothesis contends that current IT systems are not spreading because they are too hard to use, too unreliable, too inflexible, and too expensive; require too much customization; or do not provide measurable return on investment. To address this hypothesis, a variety of investigations would be useful that assess the performance of available IT modalities. Such work should include case studies of efforts at adoption (failed and successful), assessments of the effects of various IT modalities on costs and outcomes, and documentation of the return (both how much and to whom) on investments in various IT systems.

A third hypothesis holds that health care market failures impede the adoption of effective IT systems and, therefore, that the promise of IT will never be realized without changes in public policy. One often-cited barrier is lack of capital, especially among certain chronically undercapitalized classes of health care institutions, such as rural providers. Again, qualitative and quantitative studies, such as developing more sound estimates of the capital required, could provide critical information to inform public policy in this area.

A fourth hypothesis is that lack of reward to individual health care professionals, especially physicians, constitutes an important barrier to IT adoption. Would paying physicians for e-mail exchanges with patients materially change their re-

ceptivity to electronic mail in particular, and IT in general?[19]

■ **Privacy issues.** Threats to privacy seem an inevitable consequence of the adoption of IT in health care. The potential for misuse of patients' health care information haunts public and private decisionmakers. A number of research and development (R&D) tasks seem essential to either dispel this specter or make the technical changes that the public will demand. A first technical question is precisely how secure online health care information can be made using available or feasible encryption technologies. The answers to this question, once reasonably well established, need to be translated into terms that the public can understand. The implications of Health Insurance Portability and Accountability Act (HIPAA) regulations for IT development and deployment also require exploration.

Aligning Payment Policies With Quality Improvement

The *Quality Chasm* report acknowledges the large impact of payment policies on the behavior of patients, physicians, and organizations and concludes that "to achieve the aims of the 21st century health care system...it is critical that payment policies be aligned to encourage and support quality improvement." A variety of knowledge gaps with respect to payment policy need attention.

■ **Identifying the business case.** The realization is spreading among policymakers and providers that the lack of financial return to quality investments by private providers constitutes a major impediment to bridging the quality chasm. One important unanswered question is precisely what return exists for quality investments of various types. The previous discussion of IT's return on investment is but one example.[20] We have some grasp of the cost of poor quality. For instance, we know that each preventable medication error adds an average of about $4,700 in hospital costs and that improving performance on some measures of chronic disease care can save money for employers from decreased absenteeism.[21] However, research is needed to document more carefully the costs and benefits involved and to conduct separate calculations for critical stakeholders in both the private and public sectors. It is certain that there is no single business case for quality but multiple such assessments, and that findings will vary by condition, situation, and stakeholder.

■ **New ways to pay for quality.** Although a growing number of large employers or coalitions are focusing on quality of care, many observers agree that our current payment system does not reward organizations that expend resources to improve quality.[22] A number of important initiatives are exploring different ways to pay for quality, including the Robert Wood Johnson Foundation–funded National Health Care Purchasing Institute's Rewarding Results initiative.[23] Evaluating these and other experiments constitutes a high priority for bridging the quality chasm.

■ **Financial incentives for patients.** One area deserving greater research attention is the potential for financial incentives to change patients' behavior and compliance. Several small studies have demonstrated improvements in patients' compliance with treatment for tuberculosis, hypertension, alcohol dependence, and HIV/

sexually transmitted disease (STD) prevention, when those patients have received direct financial reward for behavior change.[24] Larger and more innovative studies in this area would be of interest. For example, what would be the effect of rewarding patients with coronary artery disease, diabetes, or hypertension for achieving target levels of LDL cholesterol, blood sugar, or blood pressure? This approach should be distinguished from the current trend toward increasing consumers' financial stake in their health care decisions (for example, defined-contribution plans).[25] Careful studies exploring how different types and levels of financial incentives affect patients' self-care are required.

■ **Potential dangers of "paying for quality."** The current movement toward paying for quality should be accompanied by investigation of the unintended side effects of such strategies. We know that quality profiling of providers is extremely difficult—for instance, even for common diseases such as diabetes, individual physician report cards may be unable to detect true practice differences.[26] Rewarding providers based on inaccurate (or worse yet, fraudulent) data could reinforce poor or undesirable performance, instead of improving quality. Research is needed to determine whether rewarding physicians for achieving improved outcomes in areas where performance is measurable may reduce their investment in and performance related to conditions where, for technical reasons, quality may not be objectively assessable and therefore, whether the net impact on public health is positive or negative.[27]

Still another question concerns the effects of channeling patients to organizations with higher quality. Might such organizations be overwhelmed and unable to sustain peak performance? What are the additional costs to patients such as increased travel time, inconvenience, and potential loss of continuity of care? To answer such questions, we need to carefully evaluate natural and planned experiments around the country, looking at a wide variety of outcome variables.

Preparing The Workforce

The last chapter in the *Quality Chasm* report explores the implications for the training of health care personnel. Research could assist with a number of critical objectives in this domain, including redesigning the training of physicians, improving continuing education, and enhancing workforce morale.

■ **Training providers.** There are several areas of concern in the area of training clinicians to function in a new quality-focused system of care. Research is needed to more clearly define the skills required for the twenty-first-century health care provider, to identify the best ways of teaching these skills, and to explore the role of new educational technologies such as simulation in training health professionals.

Such research should explore both the benefits and risks of health care educational reforms. In this regard, it is essential to study the effects of redesigning U.S. residency and fellowship programs to meet new requirements for a reduced work week. The question is not just how to more efficiently teach the cognitive and technical skills needed, but how to convey the more subtle lessons of accountabil-

ity and professionalism. Finally, research is needed to develop more sophisticated and practical measures of training outcomes, so that effective methods of education and superior programs can be identified.

■ **Continuing education.** Research to improve continuing education is equally needed. The pace of change in health care is ever more rapid. This will place increasing reliance on our continuing education system to keep health care professionals current with the latest knowledge and practices.

Numerous studies have demonstrated that traditional modes of continuing medical education—attending seminars and conferences—do little to improve the delivery of medical care services, although they may improve physicians' job satisfaction.[28] We need to learn more about effective strategies for professional learning and develop new metrics for evaluating continuing education efforts.[29]

Highest Priorities In Quality Research

The effort to realize the vision of *Crossing the Quality Chasm* could benefit greatly from research in all of the areas outlined above, but money and personnel to pursue them all simultaneously are lacking. The question is where to start. We have identified several highest-priority topics based on the following criteria: (1) urgency: the immediate need for the research based on current or planned health care developments or actions; (2) impact: the breadth and depth of potential effects on quality and efficiency of care; and (3) novelty: the development of previously understudied areas and the potential of the work to inform other research.

■ **Improvement of performance measurement.** Our first high-priority area is the development and testing of technologies, programs, and strategies of performance measurement. In "performance measurement" we include indicators of both quality and efficiency that accurately characterize the behavior and outputs of individual providers and organizations. The perfection of performance measurement meets criteria for urgency and impact. Without such measures, efforts to use information to support the *Quality Chasm* agenda will be paralyzed. It is impossible to assess the effectiveness of any quality improvement initiative affecting any aspect of our health care system without valid and accepted measures of performance.

■ **Adoption of IT systems.** A second high-priority area concerns work to understand and address barriers to the adoption and effective use of information systems in health care. This work is urgent because of the large numbers of institutions that are investing or planning to invest in IT. They need opportunities to learn from the successes and failures of others. The impact of research in this area also could be substantial in light of the widespread perception (supported to some extent by evidence) that IT has the potential to improve the quality and efficiency of care.

■ **Alignment of payment methods with quality improvement.** A third priority area concerns designing methods to align payment methods with quality improvement objectives. In this broad domain, two areas stand out. The first is to design payment policies that reward providers for improving quality. The second would do

the same for consumers/patients. As we have discussed above, a number of initiatives are under way to reward providers for quality performance. This makes research in this area both urgent and high in potential impact. Within this field, the criterion of novelty directs us to emphasize a topic that has received relatively little attention since the collapse of the managed care experiment: ways of using payment policy to reduce overuse of care. Alternatives to capitation, or new variants on risk sharing with providers, are desperately needed to revive incentives for providers to avoid overuse of care and the attendant quality problems.

With regard to designing ways of rewarding consumers/patients for improving quality, the criteria of potential impact and novelty are influential. Especially with respect to chronic illness, patients are always participants in care but are almost universally underused as active partners. Furthermore, research on the impact of financial incentives on activating patients has been rare and could greatly improve our understanding of human behavior in relationship to modern illnesses.

The Ongoing National Experiment

This review of the numerous ways in which research could and must play a role in achieving the vision of the *Quality Chasm* report should not in any way detract from the power and importance of this work. As the old saying goes, If you don't know where you're going, any road will get you there. The future envisioned in the report provides a destination. The challenge now is to bring our collective resources to bear on building the pathways to reach it. In our view, basic and applied research will be a crucial resource in guiding that process.

Among the types of basic research required will be the development of accurate and useful quality-related performance measures and the exploration of the implications of complexity theory for policy and management in the health care system. Among the types of applied research needed will be the characterization of high-performing organizations, the development of methods for generalizing the results of clinical trials, studies of the barriers to IT adoption, and careful evaluation of the risks and benefits of alternative methods for paying for quality.

Does this mean that nothing can be done in the short term, that we are condemned to what some activists call "paralysis by analysis?" The answer is no. What our findings do mean is that we need to treat action in pursuit of the report's vision as part of an ongoing national experiment in quality improvement. That experiment must be continually assessed and revised, based on the best data, so that we are not condemned to repeat past mistakes. Bridging the quality chasm requires a marriage between research and action that may prove as revolutionary and challenging as the vision set forth in the pages of the IOM report.

NOTES

1. Institute of Medicine, *Crossing the Quality Chasm: A New Health System for the Twenty-first Century* (Washington: National Academy Press, 2001).
2. Conference participants, in addition to the authors, included David Bates, Donald Berwick, Janet Corrigan, Robert Crane, David Cutler, Jennifer Daley, Adams Dudley, Arnold Epstein, Ary Goldberger, Bradford Gray, David Helms, Lisa Iezzoni, Elizabeth McGlynn, Gregg Meyer, Arnold Milstein, Heather Palmer, Dana Safran, Mark Schuster, and Ted Shortliffe.
3. A.L. Delbecq and A.H. Van de Ven, "A Group Process Model for Identification and Program Planning," *Journal of Applied Behavioral Sciences* (July/Aug 1971): 466–492.
4. The Agency for Healthcare Research and Quality (AHRQ) began work in this area with a research agenda conference in December 2000.
5. For an excellent discussion of the concept of complexity theory and its potential application to health care, see Appendix B of the *Quality Chasm* report.
6. P.H. Mitchell and S.M. Shortell, "Adverse Outcomes and Variations in Organization of Care Delivery," *Medical Care* 35, no. 11 (Suppl. 1997): NS19–NS32; and B.E. Landon et al., "Personal, Organizational, and Market Level Influences on Physicians' Practice Patterns: Results of a National Survey of Primary Care Physicians," *Medical Care* 39, no. 8 (2001): 889–905.
7. J. Needleman et al., "Nurse-Staffing Levels and the Quality of Care in Hospitals," *New England Journal of Medicine* 346, no. 22 (2002): 1715–1722; and L.H. Aiken et al., "Hospital Nurse Staffing and Patient Mortality, Nurse Burnout, and Job Dissatisfaction," *Journal of the American Medical Association* 288, no. 16 (2002): 1987–1993.
8. National Committee for Quality Assurance, "The Health Plan Employer Data and Information Set (HEDIS)," www.ncqa.org/Programs/HEDIS/index.htm (11 September 2002); AHRQ "CAHPS—Consumer Assessment of Health Plans," www.ahrq.gov/qual/cahpsix.htm (11 September 2002); Centers for Medicare and Medicaid Services, "OASIS Overview," 28 June 2002, www.cms.hhs.gov/oasis/hhoview.asp (11 September 2002); New York State Department of Health, "Heart Disease," November 2002, www.health.state.ny.us/nysdoh/consumer/heart/homehear.htm (17 December 2002); and Pennsylvania Health Care Cost Containment Council, "Pennsylvania's Guide to Coronary Artery Bypass Graft (CABG) Surgery 2000—Interactive Database," 2 December 2002, www.phc4.org/reports/cabg2000/default.html (17 December 2002).
9. M. Walton, *The Deming Management Method* (New York: Perigee, 1986).
10. R.H. Palmer et al., "Leadership for Quality Improvement in Group Practices," *Medical Care* 34, no. 9 (Suppl. 1996): SS40–SS51.
11. Writing Group for the Women's Health Initiative Investigators, "Risks and Benefits of Estrogen Plus Progestin in Healthy Postmenopausal Women: Principal Results from the Women's Health Initiative Randomized Controlled Trial," *Journal of the American Medical Association* 288, no. 2 (2002): 321–333.
12. J.F. Kasper, A.G. Mulley Jr., and J.E. Wennberg, "Developing Shared Decision-Making Programs to Improve the Quality of Health Care," *Quality Review Bulletin* (June 1992): 183–190.
13. See, for example, M.D. Cabana et al., "Why Don't Physicians Follow Clinical Practice Guidelines? A Framework for Improvement," *Journal of the American Medical Association* 282, no. 15 (1999): 1458–1465; and E.A. Balas et al., "Improving Preventive Care by Prompting Physicians," *Archives of Internal Medicine* 160, no. 3 (2000): 301–308.
14. See, for example, M.M. Cain et al., *Health e-People: The Online Consumer Experience* (Oakland, Calif.: Institute for the Future and California HealthCare Foundation, 2000); and T.L. Bessell et al., "Do Internet Interventions for Consumers Cause More Harm than Good? A Systematic Review," *Health Expectations* 5, no. 1 (2002): 28–37.
15. There is much documentation of this "digital divide"; see U.S. Department of Commerce, "Falling through the Net: Toward Digital Inclusion," www.ntia.doc.gov/ntiahome/fttn00/contents00.html (20 November 2001). However, some data indicate that these differences are now getting smaller; See the Pew Internet and American Life Project, "More Online, Doing More," 18 February 2001, www.pewinternet.org/reports/pdfs/PIP_Changing_Population.pdf (17 December 2002).
16. See, for example, M.R. Chassin, E.L. Hannan, and B.A. DeBuono, "Benefits and Hazards of Reporting Medical Outcomes Publicly," *New England Journal of Medicine* 334, no. 6 (1996): 394–398; J.H. Hibbard and J.J. Hewett, "What Type of Quality Information Do Consumers Want in a Health Care Report Card?" *Medical Care Research and Review* 53, no. 1 (1996): 28–47; and E.C. Schneider and A M. Epstein, "Use of Public Performance

Reports: A Survey of Patients Undergoing Cardiac Surgery," *Journal of the American Medical Association* 279, no. 20 (1998): 1638–1642.

17. J.H. Hibbard et al., "Strategies for Reporting Health Plan Performance Information to Consumers: Evidence from Controlled Studies," *Health Services Research* 37, no. 2 (2002): 291–313.
18. E.M. Rogers, *Diffusion of Innovation* (New York: Free Press, 1995).
19. See, for example, C.A. Moyer et al., "We Got Mail: Electronic Communication between Physicians and Patients," *American Journal of Managed Care* 5, no. 12 (1999): 1513–1522.
20. Calculations of the IT business case are particularly problematic, given the rapidly changing capabilities and costs of both hardware and software. The new Partners Center for IT Leadership, among others, is already working on this issue. See "Partners Launches Healthcare IT Research Center," *Informatic Review,* 2 June 2002, www.informatics-review.com/thoughts/citl.html (17 December 2002).
21. D.W. Bates et al., "The Costs of Adverse Drug Events in Hospitalized Patients: Adverse Drug Events Prevention Study Group," *Journal of the American Medical Association* 277, no. 4 (1997): 307–311; and NCQA, "The Business Case for Health Care Quality," www.ncqa.org/somc2001/BIZ_CASE/SOMC_2001_BIZ_CASE.html (14 September 2002).
22. A. Milstein et al., "Improving the Safety of Health Care: The Leapfrog Initiative," *Effective Clinical Practice* (Mar–Apr 2001): 313–316; and M.J. Coye, "No Toyotas in Health Care: Why Medical Care Has Not Evolved to Meet Patients' Needs," *Health Affairs* (Nov/Dec 2001): 44–56.
23. National Health Care Purchasing Institute, "Rewarding Results," www.nhcpi.net/rewardingresults (27 January 2003).
24. N.N. Bock et al., "A Spoonful of Sugar...: Improving Adherence to Tuberculosis Treatment Using Financial Incentives," *International Journal of Tuberculosis and Lung Disease* 5, no. 1 (2001): 96–98; A. Hagihara et al., "Rate of Health Insurance Reimbursement and Adherence to Anti-Hypertensive Treatment among Japanese Patients," *Health Policy* 58, no. 3 (2001): 231–242; N.M. Petry et al., "Give Them Prizes, and They Will Come: Contingency Management for Treatment of Alcohol Dependence," *Journal of Consulting and Clinical Psychology* 68, no. 2 (2000): 250–257; and M.L. Kamb et al., "What about Money? Effect of Small Monetary Incentives on Enrollment, Retention, and Motivation to Change Behavior in an HIV/STD Prevention Counseling Intervention: The Project RESPECT Study Group," *Sexually Transmitted Infections* 74, no. 4 (1998): 253–255.
25. J.D. Emery, "The Defined-Contribution Plan: The Next Generation of Healthcare Financing," *Healthcare Financial Management* 55, no. 1 (2001): 37–39.
26. T.P. Hofer et al., "The Unreliability of Individual Physician 'Report Cards' for Assessing the Costs and Quality of Care of a Chronic Disease," *Journal of the American Medical Association* 281, no. 22 (1999): 2098–3105.
27. L.P. Casalino, "The Unintended Consequences of Measuring Quality on the Quality of Medical Care," *New England Journal of Medicine* 341, no. 15 (1999): 1147–1150.
28. D.A. Davis et al., "Changing Physician Performance: A Systematic Review of the Effect of Continuing Medical Education Strategies," *Journal of the American Medical Association* 274, no. 9 (1995): 700–705.
29. J.P. Newhouse, "Why Is There a Quality Chasm?" *Health Affairs* (July/Aug 2002): 13–25.