Commentary

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In this issue of *Medical Care Research and Review*, Chernew and colleagues (1998) present a review of the literature regarding three central questions that have dominated health policy discussions for some time: (1) the impact of managed care on health care cost growth, (2) the relationship between cost growth and medical technology, and (3) the impact of managed care on the adoption and use of *new* medical technology. From their analysis of the evidence, the authors conclude that managed care may have reduced the rate of health care cost growth in selected markets during the 1980s and early 1990s, largely because of spillover effects on the entire market, but that the magnitude of these reductions appears insufficient to stabilize or reduce the percentage of gross domestic product (GDP) devoted to health care. Moreover, these managed-care-induced reductions in cost growth may, at best, be only transitional and not indicative of a long-term trend. The authors also conclude from the evidence that new medical technologies, on average, are indeed key drivers of rising health care expenditures and that the ability of managed care to control technology diffusion remains unclear at this time.

Taken together, these conclusions are important and pose interesting implications for future policy, practice, and research. If managed care is to ever have a long-term constraining effect on health care spending, then it must be able to manage the costs associated with technology adoption and use. However, technology adoption decisions are made individually—by individual providers or plans for a specific technology. Thus, the "behavioral response" of health care organizations to changes in their environments (such as increased competition and new financing policies) must be viewed not only in the aggregate

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but also in terms of the disaggregated decisions made by individual organizations in response to incentives—incentives to raise or lower prices, incentives to overuse or underuse specific services, and incentives to adopt or not adopt particular technologies. In this commentary, I will first explore the changing incentives for technology adoption and use under managed care, using a framework that considers the cost/quality trade-offs facing adopters. Then, I will examine important policy and research questions raised by the literature review.

INCENTIVES FOR THE ADOPTION AND USE OF TECHNOLOGY UNDER MANAGED CARE

Beginning with the introduction of the Medicare Prospective Payment System in 1983, health care providers have faced incentives to become more prudent buyers of new technology (Anderson and Steinberg 1984; U.S. Congress, Office of Technology Assessment 1984), but because these incentives applied only to hospitals through the Medicare program, they were not particularly strong and failed to achieve the desired systemwide constraining effect on spending associated with the adoption and use of technology. More recently, the aggressive cost reduction efforts by managed care organizations (MCOs) have presented health care providers with much stronger incentives to adopt potential cost-saving technologies and disincentives to acquire cost-raising ones (Weisbrod 1991, 1994; Neumann and Weinstein 1991). Provider decisions to adopt and use new medical technology are not driven solely by cost considerations, however, and the potential impact of technology on health care quality and outcomes also must be considered, along with other relevant variables.

A framework for conceptualizing potential cost/quality trade-offs of new technology under managed care is presented in Figure 1. The framework assumes that (1) providers employ a comprehensive decision-making process, involving assessment of all relevant technical, clinical, financial, organizational, legal, ethical, and logistical considerations when making technology adoption decisions; (2) cost-effectiveness analysis (CEA) is a valuable tool in assessing new technology; and (3) potential cost and quality impacts of new technology are assessed *relative to existing clinical alternatives*. An important caveat, though, is that CEA determinations of a technology's worth early in the research and development (R&D) process will be difficult to obtain, hindering one's ability to acquire adequate advance knowledge about the cost/quality trade-off characteristics of the technology.

Nine different scenarios are possible in the framework, depending on the specific cost and quality characteristics of the new technology. Under man-

Impact on Quality of Care	Impact on Cost of Care: Cost-Saving	Cost-Neutral	Cost-Increasing
Quality-Enhancing	ADOPT (Big Winner)	ADOPT (Winner)	CLOSE CALL (Marginal CE is Key)
Quality-Neutral	ADOPT (Winner)	NO COMPARATIVE ADVANTAGE (Other Factors May Decide)	DO NOT ADOPT (Loser)
Quality-Decreasing	CLOSE CALL (Marginal CE is Key)	DO NOT ADOPT (Loser)	DO NOT ADOPT (Big Loser)

FIGURE 1 Cost/Quality Trade-Offs in Technology Adoption and Use Decisions

aged care, the incentives to develop, to adopt, and to use *cost-saving technologies* are especially strong. Therefore, a technology that shows promise in saving dollars (e.g., by lowering hospital inpatient expense, by increasing efficient use of resources, or by averting future treatment costs) will be highly prized by providers. Manufacturers recognize this and are pursuing R&D leads that they hope will result in technological "winners"—that is, *cost-saving, quality-enhancing innovations* that offer the greatest opportunities to generate profits. Many firms are concentrating their R&D efforts on technologies that yield savings either by (1) improving existing technique, such as minimally invasive surgical techniques that reduce the risk of complications and shorten hospital stays, or by (2) shifting care from expensive inpatient settings to less costly settings, such as the physician's office or the home (Arno, Bonuck, and Padgug 1994).

Cost-saving, quality-neutral technologies also are likely to be adopted. Examples might include various information technologies, as well as teleradiology

and other forms of telemedicine, that offer more efficient means of performing certain tasks or functions but may not necessarily affect clinical outcomes and quality. *Cost-saving, quality-decreasing technologies*, on the other hand, pose an interesting dilemma. While it may seem incongruous to adopt a technology that adversely affects quality, some providers may find such innovations tempting, especially if the cost savings are substantial and the decrement in quality is minimal. The decision may prove to be a "close call," with CEA playing an instrumental role in guiding the decision. Even with careful analysis of the marginal cost-effectiveness of the new technology relative to existing alternatives, a value judgment ultimately may be necessary to determine whether the financial gain justifies the corresponding quality loss.

With *cost-neutral technologies*—such as those that offer no cost advantage over existing alternatives—potential quality impact becomes increasingly important and, in two of the three cases, is likely to be the deciding factor. *Cost-neutral, quality-enhancing technologies* should be adopted, as they appear to confer improved outcomes while costing no more than existing alternatives. Of all nine trade-off states, *cost-neutral, quality-neutral technologies* are the most difficult to evaluate. Without some comparative advantage, based either on cost or quality, the technology is not likely to be adopted and used. Other factors, such as ease of use, physician preferences, or convenience will determine its fate. Even so, manufacturers may not be compelled to invest unless potential profits are sufficiently attractive. *Cost-neutral, quality-decreasing technologies*, in contrast, produce worse outcomes of care while conferring no cost advantage over current alternatives and therefore should not be adopted.

Finally, as a group, *cost-increasing technologies* appear to be relatively unattractive. Those with *quality-decreasing* or *quality-neutral* properties likely will not be adopted, as they fail to confer comparative advantages over existing alternatives and are likely to be abandoned in the R&D phase. *Cost-increasing, quality-enhancing technologies*, however, present us with another close call in which analysis of the marginal cost-effectiveness of the new technology versus alternatives will be critical. The majority of new technologies probably fall into this category. Consumers likely may be attracted to the quality-enhancing properties of such technologies, but providers will have to determine whether the increased costs are justified by the gains in quality. Manufacturers may not be inclined to invest unless there is clear evidence that a market exists. An example would be the use of tissue plasminogen activator (TPA), a thrombolytic drug, in place of a lower cost alternative, streptokinase, for the treatment of acute myocardial infarction. Despite recent evidence (Mark et al. 1995) demonstrating marginally greater cost-effectiveness for TPA, some payers,

such as state Medicaid programs, may still opt for streptokinase because of severe budgetary constraints.

As this framework suggests, the incentives created by managed care for technology adoption and use are very different from those of the premanaged care era. While they suggest, in the aggregate, a movement toward the diffusion of technologies with cost-saving properties, the net effect of technology adoption on health care cost growth is still likely to be cost increasing, as Chernew et al. (1998) conclude from their literature review.

IMPLICATIONS FOR FUTURE POLICY

The finding that managed-care-induced reductions in cost growth may be only transitional and are of insufficient magnitude to stabilize or reduce the percentage of GDP devoted to health care is indeed troubling. This suggests that managed care may not be the "magic bullet" for cost containment that its proponents believe it to be and raises serious policy questions about (1) the long-range prospects for controlling national health care spending and (2) the wisdom of recent policy decisions by federal and state governments to increase the enrollment of vulnerable populations, such as the elderly, the poor, and the disabled, in managed care plans under the Medicare and Medicaid programs.

The suggestion by Chernew et al. (1998), under one of their future scenarios, that managed care plans may increasingly ration care is also alarming. Variations in access to care already exist in the health care system. Any exacerbations of these variations by managed care would be detrimental to the nation as a whole. Increasingly, individual states, through their political and legal systems, have responded to such threats to access by enacting legislation that mandates coverage for some services and specifies minimum requirements for others. These actions, taken ostensibly in response to public perceptions of rationing by managed care, call into question once again what the appropriate role of government should be in such matters and the potential need for regulation in the marketplace. Chernew et al. (1998) point out that current Food and Drug Administration regulation of pharmaceuticals (and medical devices) is based on evidence of efficacy as opposed to reduced costs. Moreover, the Health Care Financing Administration (HCFA) does not employ cost reduction as a criterion when making a technology coverage policy decision for the Medicare program. Thus, we are faced with a health care system that places growing emphasis on cost reduction and, yet, the regulatory oversight of the two principal federal agencies engaged in review of technology adoption and use presently does not extend into the realm of making cost

determinations. Perhaps it is time to redirect the question toward one of cost-effectiveness rather than cost reduction and to incorporate this as an explicit review criterion within the policy purview of HCFA. It is hoped that this would lead to more appropriate technology coverage decisions under the Medicare program.

Information about what works and what doesn't in health care is essential to the well-informed consumer. Unfortunately, there are few public sources of such information, and the demise of the U.S. Congress's Office of Technology Assessment, after a distinguished 23-year career of sponsoring and publishing numerous research reports on health care technology for laypersons and professionals, has left a serious void for consumers on technology-related issues. The Agency for Health Care Policy and Research, particularly through its Evidence-Based Practice Centers, is attempting to produce useful information for public consumption, but there remains a clear need for government to increase the level of its dissemination efforts.

AREAS FOR FUTURE RESEARCH

The review by Chernew et al. (1998) underscores how little we currently know about the impact of managed care on health care cost growth and on medical technology diffusion. Clearly, there is a need for further research not only into the central questions posed in the review but also into a variety of other areas. First and foremost, we must study the effects of managed care in various markets, geographic areas, and populations, particularly as managed care continues to evolve over time, as it penetrates new markets, and as new population groups (e.g., Medicare, Medicaid) are increasingly enrolled in such plans. We also need to overcome the limitations of previous studies by looking at the effects of managed care on cost growth outside the hospital, such as in the ambulatory and home care settings, where many services are being shifted for cost-reduction purposes and where new technologies are being used with increasing frequency. Studies of the effects of these service and technology shifts on total cost growth, and of the ability of managed care to control such expenditures, are vital to our understanding of managed care.

A second broad area for further exploration involves physician behavior. Chernew et al. (1998) conclude that physicians appear to employ treatment patterns for their fee-for-service patients that mirror the patterns for their managed care patients, suggesting the existence of spillover effects from managed care. But do we really know this to be true? How aware are physicians of the insurance status of their patients when making clinical decisions, and how does this information influence their roles as principal agents for patients? As the managed care picture becomes even more diverse, will

individual physicians be able to continue "managing" all of their patients in the same uniform practice style, or will they be increasingly pressured to manage patients differently, depending on the specific practice guidelines or protocols of the patients' respective managed care plans?

With regard to the effects of managed care on technology diffusion, numerous research questions abound. Here is just a sampling of broad categories of questions that I consider to be important:

- How will the incentives engendered in managed care play out in terms of decision making by various stakeholders? Additional studies of the incentives for technology adoption and use are needed to gain a better understanding of the dynamics inherent in the technology R&D process (Weisbrod 1991, 1994) and to determine how these incentives influence the behavior of providers, consumers, payers, and manufacturers. For example, as hospitals increasingly merge and consolidate to form integrated systems, decisions to adopt and use new technologies are no longer the sole province of each institution's managers and physicians but instead come under the control of managers in the parent organization, who must see that these decisions are consonant with the mission and goals of the entire system. Thus, a decision by one hospital to acquire new technology has direct implications for other institutions within the system.

  Studies of these organizational changes and their effects on technology adoption and use decisions, in concert with managed care incentives, are needed. Studies within market areas are particularly valuable to assess the effects of technology adoption decisions by providers on their competitors (i.e., "first mover" effects) and to understand the benefits and risks of different adoption strategies. For physicians, who traditionally have played key roles in hospitals' decisions to adopt and use medical technologies, the future under managed care is uncertain and they must decide (1) how to position themselves, organizationally, for survival in a more competitive environment and (2) how to respond, behaviorally, to new and unfamiliar incentives. Studies of how managed care specifically affects physicians' decisions to adopt and use new technology will be important to our overall understanding of managed care.
- To what extent will managed care be able to control the adoption and use of complementary technologies? The incentives under managed care clearly favor the adoption of substitutive technologies, but this is not always possible and medicine has a long history of producing expensive "halfway" innovations (Thomas 1977) that often are additive and labor increasing. More studies that employ the "affirmative approach" of analyzing a specific technology or disease are needed, especially those that consider a technology relative to its competing clinical alternatives within a cost-effectiveness context.
- To what extent will managed care foster the increased application of CEA in the technology assessment process? Many HMOs and other managed care organizations historically have embraced technology assessment activities and increasingly are making technology adoption decisions on the basis of marginal cost-

effectiveness considerations; however, as indicated in the literature review, more technology-specific studies are needed. Most important, these studies need to consider the particular medical purpose of a given technology, that is, whether it is preventive, diagnostic, therapeutic, or rehabilitative in nature, since this may have important implications for its potential adoption and use under managed care, as well as for the choice of analytic method to be used in its evaluation. For example, managed care plans have looked to various pharmaceuticals as potential cost-saving therapies that help to avoid costly hospitalizations, but recent dramatic growth in drug spending has caused many plans to reevaluate the management of their pharmacy benefits within the context of their premium structures. Broader application of CEA and pharmacoeconomic studies would yield useful information on these kinds of questions to both managers and health care practitioners.

In closing, these are but a few of the areas that seem especially fertile for future research. The central questions raised in the literature review remain the most salient and perhaps the most daunting. Continued sponsorship of research into these and other questions by public and private sources is critical to our understanding of managed care, medical technology, and health care cost growth, and to our ability to formulate future health policy.

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