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The Costs and Value of New Medical Technologies: Symposium Summary

This Economic Letter *summarizes the presentations made at a symposium by the same title sponsored by the Center for the Study of Innovation and Productivity and held at the Federal Reserve Bank of San Francisco on May 25, 2007.*

Health care is among the most technologically advanced sectors, and it also constitutes a large and growing share of the U.S. economy. Between 1960 and 2005, the share of health-care spending in U.S. gross domestic product more than tripled, growing from 5.2% to 16%; this growth is likely to continue, with health care conceivably expanding to encompass up to one-third of national output by the year 2050 (Jones 2005).

Much of this growth is demand driven, as purchasers of health care spend increasing amounts of money to pay for new, technologically advanced medical procedures and drugs that extend life and improve its quality. At the same time, however, rising costs mean lower affordability: coverage under private health plans, mostly through employers, has declined in recent years, putting added strain on already strapped public programs (Buchmueller and Valletta 2006). These trade-offs are likely to intensify over time, raising a host of issues for policymakers and the public alike.

To help improve our understanding of how new medical technologies contribute to the evolution of health-care benefits and costs and how government policy may affect these trends, the Center for the Study of Innovation and Productivity convened a conference that brought together four leading scholars to discuss various aspects of the development and use of new medical technologies.

Responses to rising costs

Alan Garber, from Stanford University and the Palo Alto VA hospital, presented his work on "Cost-Conscious Coverage for Medical Innovation." His presentation focused on the role that new medical technologies have played in the rapid rise in health-care costs and how to alter the incentives in U.S. health care so that costs associated with new technologies are controlled but the quality of services is not undermined. As U.S. health-care costs have risen in recent years, out-of-pocket costs for the insured have grown rapidly: for example, premium contributions for workers covered under plans provided by their employers grew about 50% between 2000 and 2003. Such cost sharing has the potential to curb utilization, which may help contain cost growth in an efficient manner. However, the overall containment potential of cost sharing is limited because the highest-cost claims account for a large share of total spending and are relatively insensitive to cost sharing. Moreover, increased cost sharing offsets the risk-protection and risk-pooling intent of insurance plans.

Garber's preferred strategy for cost control relies on modifying the process used to determine which medical procedures and therapies are covered under insurance plans. For U.S. private and public health plans, this determination currently is based on an assessment of whether the technology or procedure yields greater improvement in health outcomes than do established alternatives. This approach entails various problems, including the possibility of mistaken assessments due to limitations of accepted experimental designs and statistical evaluations. Most importantly, the existing framework for evaluating the effectiveness of health interventions does not take into account considerations of relative cost: procedures with similar impacts on health outcomes can be regarded as equally meritorious despite large differences in the costs of their use.

The exclusion of cost considerations likely has contributed to rapid increases in U.S. health-care costs. Garber therefore recommends the use of "cost-conscious coverage" policies, whereby health interventions are evaluated in terms of their relative cost effectiveness in addition to their impact on medical outcomes (for example, Garber 2004). Evidence on cost effectiveness of different health interventions currently is available and could be used to initiate a switch toward cost-based coverage, resulting in

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immediate cost savings. Moreover, these savings are likely to grow substantially over time, as health plan designers, consumers, and medical innovators respond to the newly available information and modified incentives.

Future medical technologies

Dana Goldman, a director at the RAND Corporation and adjunct professor at UCLA, discussed his work on "The Costs and Benefits of Future Medical Technologies." He first established that expanding technology has been by far the largest contributor to the rapid increase in health-care costs since 1960, accounting for about one-half of the increase. Like Garber, however, Goldman also emphasized the large variation in benefit/cost ratios that is evident across medical procedures. In an ongoing RAND research study, his team models the effects of 34 key emerging medical technologies, including anti-aging compounds, stroke treatments, cancer therapies, and implantable heart defibrillators and pacemakers (see Goldman et al. 2005). For example, their model predicts that use of intra-ventricular cardio-defibrillators (ICDs) will expand dramatically in coming years, adding about $30 billion annually (3.7%) to U.S. medical spending through the year 2030. This makes ICDs an expensive technology relative to the value of resulting health improvements, but other advanced technologies, such as certain cancer treatments and pacemakers, are even more expensive.

In addition to their direct costs, medical innovations can have large indirect costs. For example, medical researchers currently are investigating the potential use of anti-aging compounds in humans, which could substantially extend life at relatively low cost. However, if such treatments prove successful, the size of the U.S. elderly population will swell, increasing the prevalence of old-age conditions (such as heart problems) and leading to large increases in overall health spending. Similar considerations apply to preventive health therapies such as smoking cessation and obesity control. Successful smoking cessation programs will save lives but be relatively expensive, since they entail limited savings in end-of-life treatments but increases in other forms of old-age care. By contrast, while successful obesity control may not greatly lengthen life spans, it is likely to produce substantial improvements in health and well-being that enable reductions in health-care costs more generally. The RAND model's predictions have important implications for government entitlement programs, suggesting that medical innovations are likely to increase Medicare spending but may not adversely affect the financing of the U.S. Social Security program

Impacts of government programs

Fiona M. Scott Morton is a professor of economics at the Yale School of Management. Her talk, titled "The Impact of Government Programs on Pharmaceutical Prices and Innovation," addressed pharmaceutical markets and the role of the U.S. government's large Medicaid and Medicare programs. Within health care, spending growth has been especially rapid for pharmaceuticals, with innovation accounting for a large share of producer and consumer expenditures. Moreover, the government share of this market in the United States is large (about 50%) and likely to grow. Medicaid is the state-managed program to provide health care for low-income individuals. Drug prices in the program initially are set based on market prices, but with a 15% discount imposed on manufacturers. Subsequent price increases are limited to the prevailing inflation rate, unless a new form of the drug is introduced; the new form may consist only of minor modifications in dosage or packaging. Pharmaceutical companies specializing in expensive Medicaid drugs therefore face substantial incentives for frequent product modifications and high prices, which reduces their private sector sales but yields a higher price on Medicaid sales (with no quantity reduction because Medicaid recipients do not pay for their purchases). In recent research, Scott Morton finds direct empirical evidence of such shifts in the composition and pricing of prescription medications under the Medicaid program (Duggan and Scott Morton 2006).

Scott Morton also discussed pricing decisions for the new Medicare Part D prescription drug benefit, initiated in January 2006. Drug provision under Part D is similar to provision under private sector plans, with participants choosing among competing plans, drug makers competing for business, and participants paying a cost share (which is heavily subsidized for low-income enrollees); however, access to certain classes of drugs is guaranteed under Part D plans. Although direct empirical evidence is not yet available, it is likely that drug prices under Part D plans will be similar to those in the private sector, although deviations are likely among protected classes of drugs.

In the public as well as the private sector, development of cost-effective drug therapies faces substantial hurdles due to a lack of targeted coordination between insurers and health-care providers. Like the preceding speakers, Scott Morton therefore emphasized the importance of developing integrated frameworks for assessing the cost effectiveness of health interventions.

Learning effects

Vivian Ho, from Rice University and the Baylor College of Medicine, discussed her work on "Learning Effects and the Diffusion of Medical Technology in a Regulated Environment," which expanded on the earlier presentations by addressing the issue of how best to use new technologies. In particular, she focused on the well-known "volume-outcome" relationship for medical procedures, in which hospitals and surgeons that have greater experience with complex surgical procedures typically obtain better outcomes from those procedures (such as lower mortality rates). The two leading explanations for this relationship are: (i) "learning-by-doing" (LBD), which refers to the process by which repeated performance (by surgeons and hospitals) increases knowledge and skill, thereby directly improving quality; and (ii) "selective referral," whereby hospitals that provide the highest quality service will attract more patients. Explanation (i) points toward beneficial effects of policies that encourage hospital specialization in specific procedures, whereas (ii) reverses the causation and undercuts arguments in favor of such policies.

These two explanations are difficult to distinguish empirically. Researchers have used volume changes over time for specific hospitals in an attempt to separate out reverse causation, but such studies are undermined by small changes in volume over time and confounding effects from changing technology. In recent work, however, Ho and colleagues (Gowrisankaran, Ho, and Town 2007) used an "instrumental variables" strategy, which relies on variations in procedure volumes across hospitals that are uniquely determined by the choices of individual patients. Their technique yields statistically precise estimates showing a substantial impact of volume on quality for several types of open heart and abdominal surgeries, providing strong evidence in favor of LBD.

Ho's findings suggest that medical policy guidelines that require or encourage hospitals to reach minimum volume thresholds for complex procedures may be advantageous to patients. On the other hand, regulations that attempt to capitalize on these gains may increase the market power of the high-volume providers, leading in turn to higher prices. In additional work, Ho and colleagues (Ho, Town, and Heslin 2007) found that increased market power partially offsets the value of health gains to patients, but substantial net benefits to volume remain. Overall, her findings suggest that learning is an important element for the successful use of new technologies, and that medical practitioners and policymakers should more systematically account for learning effects when developing health-care guidelines.

Discussion

Among the common themes identified by the presenters, it seems clear that advances in medical technology have generated large benefits relative to their costs in the United States in recent decades. However, incentive structures within the U.S. private and public systems for health-care delivery are not always ideal: market power among providers sometimes offsets consumer gains from new procedures, and cost control generally is not rewarded. Achieving greater cost control will be technically and politically challenging because it is likely to entail some degree of rationing in the supply of health-care services, but explicitly making such trade-offs may be necessary to ensure the spread of beneficial medical technologies to the widest possible population.

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