The Costs and Benefits of Medical Innovation

Looking beyond prices and assessing the true value of new technologies.

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Throughout history, innovation and medicine have gone hand in hand. A number of major advances come to mind: vaccines, anesthesia, antibiotics, imaging, and organ transplantation. Each represents a pivotal turning point in health care and an abrupt divergence in our understanding of disease. Such innovations are remarkable, not only for the impact they have had on improving health and longevity, but also in their rarity. Indeed, the majority of innovation is incremental rather than disruptive. They build on previous work and make small steps toward improvement. An example is consumer electronics, where innovation and competition have resulted in smaller, cheaper, and more high-performance gadgets.

THE RISE OF HEALTH CARE COSTS

It is not surprising that novel innovations come at a cost. Health care is currently 18% of the US GDP, and medical technology an estimated 6% of health care expenditures in the United States. The initial high prices of new products reflect the costs of development, both for the featured product as well as the many related products that never actually made it to use in patients. These prices also reflect prevailing market forces, including available substitutes and market share.

In most industries, technological innovation results in greater benefit at a decreased price to the consumer. What makes medicine somewhat unique is that the opposite is sometimes true. Many advancements in technology seemingly result in increased prices and greater health care expenditures. For example, Soliris (Alexion Pharmaceuticals), a monoclonal antibody to treat paroxysmal nocturnal hematuria costs $409,500 a year. Elaprase (Shire Plc), a drug to treat Hunter syndrome, which is a congenital metabolic disorder that affects approximately 500 Americans, costs $375,000 annually. These high prices can partially be explained by the magnitude of the potential market. Developmental costs are easier to recoup for products with broad application, rather than a narrow user market, as exemplified by drugs/devices that treat rare diseases. The fact that physicians and patients are relatively insulated from costs due to third-party reimbursement for health care services also contributes to high prices.

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BENEFITS OF INNOVATION

Innovators are protected by patents, allowing them exclusive rights to manufacture and market their products in return for public disclosure. Although this exclusivity is often seen as a source of rising health care costs, the economic balance between being an initial innovator and those who later benefit from the discovery does not always favor the innovator. There are many examples of innovations that do not return significant economic benefits until after the product becomes a public good and an experienced manufacturer or distribution organization brings the product to the full market.

Although most would agree that cost controls are needed, their implementation remains a topic of much debate. The health care systems in many other countries, such as the National Health System in the United Kingdom, use cost-effectiveness research to help guide budgetary and coverage decisions. United States governmental health care agencies, however, have been reluctant to use cost-effectiveness research. Notably, the Patient-Center Outcomes Research Institute, established by the Affordable Care Act, currently does not

fund research proposals for cost-effectiveness research, a decision at least in part driven by the politically negative association with cost-based evaluation and the specter of "death panels."

Even in its current form, cost-effectiveness research can fail to capture the entire benefit of new innovations. The value of medical innovations, including new drugs, devices, or processes, is typically measured by direct effect over a short period of time. Using vascular stents as an example, one might track vessel patency and the need for reinterventions. These outcomes are then compared with the costs of the stent, as measured by the acquisition costs from the perspective of the payer. Although somewhat more readily captured, these data represent just a small component of the potential benefit of successful treatment. To continue our example with vascular stents, the patient who has successful peripheral revascularization may return to work earlier, improve his or her cardiopulmonary function with increased walking, and may enjoy greater social integration by being able to participate in activities. Society itself may benefit from a more mobile person who is able to be productive at work and does not rely on assistance for ambulation. From the patient's perspective, these are the true benefits of revascularization. In addition, innovations often spur further advances and spinoff technologies, exponentially increasing the value of advances, but also being rarely accounted for in current models of cost effectiveness.

PENNY-WISE AND POUND-FOOLISH?

Although medical innovation and technology have been a major factor in the improvement of health care throughout history, shortsighted purchasing policies and limited investment in innovation and innovators have the potential to derail this process. Attention to cost is crucial in controlling health care expenditures, but decisions based on price alone fail to capture the true benefit of innovation. Investment in technology, appropriate endpoints in cost-effectiveness research, and support for innovators is vital to the continued advancement of health care technology. If we ignore the benefits of innovation for short-term cost gains, we risk stifling innovation and jeopardizing future gains in health, longevity, and quality of life for patients and society. ■

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