The Coming Golden Age of Disruptive Innovation in Health Care

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Innovation in both manufacturing and service industries often leads to increased functionality with lower prices. Cellular telephones today have more capabilities than computers that cost thousands a decade ago, and tax preparation software priced under \$50 can prepare most documents as effectively as high-priced accountants.

Innovation in health care has offered us dramatic improvements in the quality and quantity of life. An angioplasty early in a heart attack can prevent most cardiac damage, and human immunodeficiency virus has been transformed from a rapid death sentence to a chronic disease. But health care advances have not been accompanied by the cost improvements we see in other U.S. industries, in part because health care has not been fertile ground for disruptive innovation. Disruptive innovation makes a good or service simpler, allows use of lower skilled workers, and initially requires some sacrifice of functionality compared to the incumbent good or service.¹

In the health care delivery system, we have rather preferred to adopt “accretive” innovation—new technology or services that are added to existing services, thus adding new revenue streams without jeopardizing existing provider or supplier income. We promote ever more sensitive scanners, build unproven proton beam radiation centers, and purchase brand name drugs with tiny benefits over existing generics. Accretive innovation can yield better outcomes, and causes little dislocation in the health care sector, but does not dramatically increase value. We will enumerate why disruptive innovation has not yet taken hold in American medicine, and the factors that make it more likely to gain traction in the coming years, listed according to stakeholder groups influenced (see Table 1).

Third party payment for most health care in the United States has historically meant that consumers with health insurance paid only a small portion of health care costs

unrelated to the total medical expenditure. Patients and providers have therefore been relatively insensitive to price. That is changing rapidly, however, as employers scale back coverage in response to medical cost inflation. High deductible health plans have increased by a third in just a year, and more patients face coinsurance instead of copayments. Patients in high deductible health plans use less health care, demonstrating that exposure to costs encourages lower utilization. Providers that can offer care for lower cost will have a substantial competitive advantage as patient out-of-pocket costs increase.

Federal legislation will promote price sensitivity of providers through substantial decreases in Medicare fee schedule increases for inpatient services. Hospitals face a loss of over \$415 billion from Medicare, Medicaid and Children's Health Insurance Program payments over 10 years from the Affordable Care Act (ACA),² which will force them to decrease resource costs.

Still, providers have consistently found ways to lower resource costs when faced with lower reimbursements. Surgeons in capitated arrangements perform surgery much less frequently than those in fee-for-service,³ and radiologists, ophthalmologists, gastroenterologists and others have been able to change processes when faced with substantial professional fee schedule decreases.

Payment reform will also encourage disruptive innovation. Fee-for-service reimbursement encourages high utilization and the use of high margin procedures, which often use new technology. Health care providers are increasingly accepting financial responsibility for care, and Accountable Care Organizations (ACOs) are likely to be far more sensitive to the cost of medical goods or services since they will have to pay the bill. Bundling payments lowers utilization and resource cost. Hospitals dramatically reduced hospital days when diagnosis-related group payments were instituted by Medicare in the 1980s. Hospitals that once barely winced at multimillion dollar purchases of surgical robots are now likely to tolerate a magnetic resonance imaging (MRI) scanner with lesser resolution if it is much less expensive.

Physicians are increasingly moving into employed settings, where they practice in multispecialty groups financially integrated with hospitals. Hospital and physician integration means that a single entity is responsible for a large portion of all care needed by a population, which facilitates bundled payment.

Table 1. Factors Influencing Disruptive Innovation

Factors that have historically discouraged disruptive innovation	Factors that will increase disruptive innovation in the future	Stakeholder influenced
Low price sensitivity, due in part to third party payment	Increasing price sensitivity due to higher patient cost sharing	Patients Providers Payers
Fee-for-service payment mechanism	Move to bundled payments and Accountable Care Organizations	Providers Payers
Provider profit incentives	Decline in physician private practice	Providers
Regulations which protect professional turf	Decreasing influence of professional societies	Providers
Lack of transparency	Increasingly transparent prices, quality and outcomes	Patients Providers Payers

The movement away from private practice means that more physicians are paid through salary. This decreases principal-agent conflict, where individual physician's incomes have historically varied depending upon the clinical recommendations they offered their patients. Physicians often earn higher incomes in legacy private practices if they order many laboratory tests or imaging studies that are performed by their practices. Physicians are unlikely to be paid extra for test ordering by delivery systems, which would fear violating the "Stark" anti-kickback regulations. Physicians are less likely to aggressively order expensive new technology if they gain no increase in personal income.

Procedures that once required years of training can often be automated to increase reliability and safety, but this only leads to cost savings if these innovations can be deployed by lower-skilled (and lower-paid) personnel. Historically, regulations promoted by physicians and nurses have made it difficult to utilize lower-skilled personnel for procedures; in many states medical assistants are not even allowed to give immunizations. We often require pathologist supervision even for fully automated laboratory tests. While Japan has long had nurses perform gastrointestinal endoscopies, this has been proposed but not allowed in the United States. Recent manpower shortages have led to some expanded nursing scope of primary care practice in many states, and the political influence of professional societies has waned. Nonetheless, efforts to protect professional "turf" will continue to delay the advance of disruptive innovation.

Transparency through better reporting to a population with a higher personal stake in avoiding waste in health care is likely to lead to improved physician and hospital practices. Public reporting of outcomes and cost favors disruptive innovation to improve value by lowering cost of care, rather than improving quality with no attention to cost impact.

The rapid adoption of electronic medical records simplifies collection of provider data. Computerized records make it far easier to track resource use—and even to track time and motion to improve accounting. Better accounting for medical costs will make it easier to cut out wasteful steps and improve the value equation in health care delivery.

The ACA's Centers for Medicare and Medicaid Innovation Center can also promote disruptive innovation by supporting initiatives that fulfill the "triple aim" of improving quality, patient-centeredness, and cost-effectiveness. The Patient Centered Outcomes Research Institute (PCORI) authorized by the ACA will give health care providers and patients access to better evidence about what new drugs, devices, or procedures deliver better patient outcomes. Comparative effectiveness research can help decrease the attractiveness of accretive innovations, which offer small incremental advantages, often to a small minority of patients at high cost. The incremental effectiveness of rosuvastatin offers far less benefit than the more effective use of existing generic statins to prevent heart disease,⁴ and comparative effectiveness research makes it more likely we will not pay the incremental cost of this newer branded medication.

Disruptive innovation doesn't always lead to lower total health care costs, especially within a fee-for-service system that encourages greater resource use. New, less expensive procedures are often less invasive, which increases the number of patients who could benefit from the intervention. Laparoscopic cholecystectomies meant that more patients had their gallbladders removed, and it took years after angioplasties were introduced before the rate of coronary artery bypass decreased in the population.⁵ Large capital investments in incumbent technology encourage its continued use; hence, some cardiologists continued to perform cardiac fluoroscopy to assess heart function even after echocardiographs became widely available.

Slower economic growth and diminished Medicare and Medicaid payments will decrease provider reimbursement, and higher out-of-pocket payments will make patients more sensitive to health care prices. Providers, faced with price-sensitive patients, bundled payments, better outcome data and increased transparency, will gain financial success by lowering input costs, rather than by maximizing allowable charges. Recent and emerging market changes will require health systems and physicians to rethink work flows, make more efficient use of capital, and discontinue technology and processes that no longer provide substantial value to patients. We believe that the right elements might be falling into place for the health care delivery system to finally embrace disruptive innovation, and increase the value of health care delivered.

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REFERENCES

1. **Christensen CM, Bohmer R, Kenagy J.** Will Disruptive Innovation Cure Health Care? *Harv Bus Rev.* 2000;78:102–12. 199.
2. Congressional Budget Office, US Congress. Estimated Budgetary Effects of Repealing the Affordable Care Act. Available at: <http://www.cbo.gov/sites/default/files/cbofiles/attachments/43471-hr6079.pdf>. (Accessed online November 7, 2012).
3. **Shafrin J.** Operating on commission: analyzing how physician financial incentives affect surgery rates. *Health Economics.* 2009;19:562–80.
4. **Woolf SH, Johnson RE.** The break-even point: when medical advances are less important than improving the fidelity with which they are delivered. *Ann Fam Med.* 2005;3:545–52.
5. **Cutler DM, Huckman RS.** Technological development and medical productivity: the diffusion of angioplasty in New York state. *J Health Econ.* 2003;22:187–217.