Health care may be the most entrenched, change-averse industry in the United States. The innovations that will eventually turn it around are ready, in some cases – but they can't find backers.

Will Disruptive Innovations Cure Health Care?

by Clayton M. Christensen, Richard Bohmer, and John Kenagy

ILLUSTRATION BY BARBARA HRANILOVICH

IMAGINE A PORTABLE, LOW-INTENSITY X-ray machine that can be wheeled between offices on a small cart. It creates images of such clarity that pediatricians, internists, and nurses can detect cracks in bones or lumps in tissue in their offices, not in a hospital. It works through a patented "nanocrystal" process, which uses night-vision technology borrowed from the military. At 10% of the cost of a conventional X-ray machine, it could save patients, their employers, and insurance companies hundreds of thousands of dollars every year. Great innovation, right? Guess again. When the entrepreneur who developed the machine tried to license the technology to established health care companies, he couldn't even get his foot in the door. Large-scale X-ray equipment suppliers wanted no part of it. Why? Because it threatened their business models.

What happened to the X-ray entrepreneur is all too common in the health care industry. Powerful institutional forces fight simpler alternatives to expensive care because those alternatives threaten their livelihoods. And those opponents to low-cost change are usually lined up three or four deep. Imagine for a moment that our entrepreneur was able to license the technology. Even then, he would probably face insuperable barriers. Regulators, afraid of putting patients at risk, would withhold approvals. Radiologists, who establish the licensing standards that regulators enforce, don't want to lose their jobs, so they'd fight it, too. Insurance companies, which approve only established licensed procedures, would refuse to reimburse for it. And hospitals, with their large investments in radiology and emergency departments, want injuries to flow to them – so they, too, would join the forces holding back change.

This resistance to low-cost alternatives is understandable, but it's not in the best interests of the industry or of the patients it serves. Quite the reverse – the health

care industry desperately needs to open its doors to market forces. Health care professionals often shudder when they hear that phrase "market forces." But when we use it, we're not talking about letting insurance companies micromanage doctors as they practice medicine or about putting profits above patient care. Rather, we're talking about being open to disruptive technologies and business models that may threaten the status quo but will ultimately raise the quality of health care for everyone.

Make no mistake: the U.S. health care industry is in crisis. Prestigious teaching hospitals lose millions of dollars every year. Health care delivery is convoluted, expensive, and often deeply dissatisfying to consumers. Managed care, which evolved to address some of these problems, seems increasingly to contribute to them – and some of the best managed-care agencies are on the brink of insolvency. We believe that a whole host of disruptive innovations, small and large, could end the crisis – but only if the entrenched powers get out of the way and let market forces play out. If the natural process of disruption is allowed to proceed, we'll be able to build a new system that's characterized by lower costs, higher quality, and greater convenience than could ever be achieved under the old system.

What's Wrong with Health Care

In any industry, a disruptive innovation sneaks in from below. While the dominant players are focused on improving their products or services to the point where the average consumer doesn't even know what she's using (think overengineered computers), they miss simpler, more convenient, and less costly offerings initially designed to appeal to the low end of the market. Over time, the simpler offerings get better – so much better that they meet the needs of the vast majority of users. We've seen this happen recently in the telecommunications industry, where routers – initially dismissed by leading makers of the faster, more reliable circuit switches – came to take over the market.

The graph "The Progress of Disruptive Innovation" illustrates this dynamic. The top solid line depicts the pace of technological innovation – the improvement an industry creates as it introduces new and more-advanced products to serve the more-sophisticated customers at the high end of the market. We call these *sustaining innovations*. The shaded area outlines the rate of improvement consumers can absorb over the same time.

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The pace of sustaining innovation nearly always outstrips the ability of customers to absorb it. That creates the potential for upstart companies to introduce *disruptive innovations* – cheaper, simpler, more convenient products or services that start by meeting the needs of less-demanding customers. The progress of these disruptive innovations is shown by the bottom solid line. Disruptive technologies have caused many of history's best companies to plunge into crisis and ultimately fail.[1]

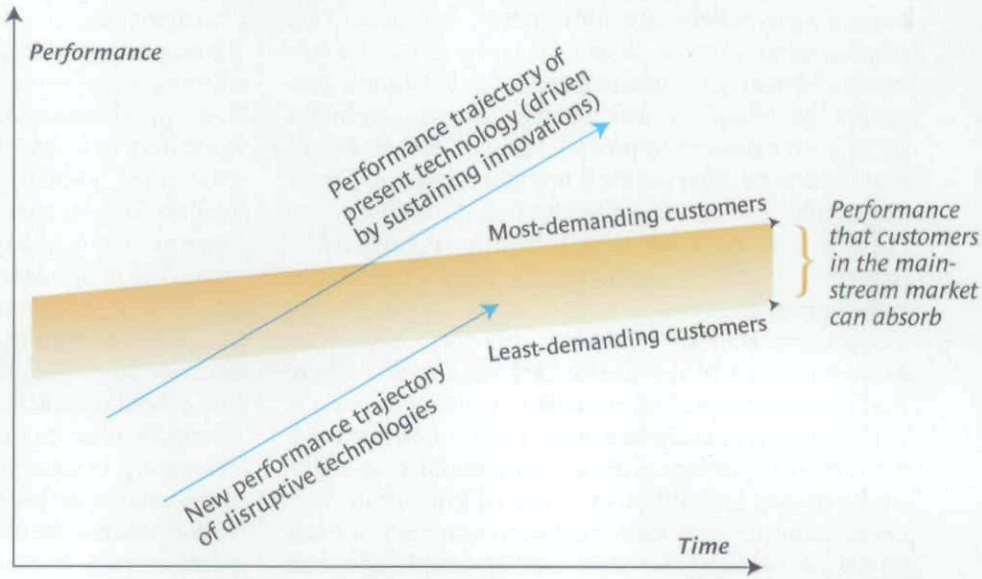
This phenomenon of overshooting the needs of average customers and creating the potential for disruption quite accurately describes the health care industry. If we were to draw a graph to illustrate health care specifically, we would measure the complexity of diagnosing and treating various disorders on the vertical axis. The least-demanding tiers of the market are patients with disorders such as simple infectious diseases. The most-demanding tiers include patients with complex, interactive problems such as an elderly man with a broken hip complicated by poor health from long-standing diabetes, hypertension, and heart disease – situations in which multiple systems of the body are involved, and cause and effect are difficult to disentangle.

Our major health care institutions – medical schools, groups of specialist physicians, general hospitals, research organizations – have together overshot the level of care actually needed or used by the vast majority of patients. Indeed, most players in today's health care system are in a lockstep march toward the most scientifically demanding challenges. Between 1960 and now, for example, our medical schools and residency programs have churned out specialists and subspecialists with extraordinary capabilities. But most of the things that afflict us are relatively straightforward disorders whose diagnoses and treatments tap but a small fraction of what our medical schools have prepared physicians to do. Similarly, the vast majority of research funding from the National Institutes of Health is aimed at learning to cure diseases that historically have been incurable. Much less is being spent on learning how to provide the health care that most of us need most of the time in a way that is simpler, more convenient, and less costly.

General hospitals – especially teaching hospitals – have likewise overshot the needs of most patients. Their impressive technological ability to deliver care enables them to address the needs of a relatively small population of very sick patients. But in the process of adding and incurring the costs of such capabilities, they have come to overserve the needs of the much larger population of patients with less serious disorders. Most types of patients that occupied hospital beds 20 years ago are not there today; they're being treated in lower cost, more-focused settings. As the stand-alone cardiac care centers, outpatient surgery centers, and other focused institutions get better and better, they become the price

The Progress of Disruptive Innovation

Dominant players in most markets focus on sustaining innovations – on improving their products and services to meet the needs of the profitable high-end customers. Soon, those improvements overshoot the needs of the vast majority of customers. That makes a market ripe for upstart companies seeking to introduce disruptive innovations – cheaper, simpler, more convenient products or services aimed at the lower end of the market. Over time, those products improve to meet the needs of most of the market, a phenomenon that has caused many of history's best companies to plunge into crisis.



setters. As a consequence, the old high-cost institutions can't compete financially; nor are there enough really sick people to sustain them. Last year not a single teaching hospital in Massachusetts made money.

As a group, the medical schools, specialist physicians, hospitals, and equipment suppliers have done an exceptional job of learning to treat and resolve difficult, intractable problems at the high end. We stand in awe of what they have accomplished. But precisely because of their achievements, health care is now ripe for disruption.

How Disruptive Innovations Work

To get a sense of what those disruptions might be, let's look briefly at what has happened in other industries. Many of the most powerful innovations that disrupted other industries did so by enabling a larger population of less-skilled people to do in a more convenient, less expensive setting things that historically could be performed only by expensive specialists in centralized, inconvenient locations.

For example, in the 1960s when people needed computing help, they had to take their punched cards to the corporate mainframe computer center and wait in line for the data-processing specialists to run the job for them. Minicomputers and then personal computers were disruptive technologies to the mainframe makers. At the outset, they weren't nearly as capable as mainframes, and as a consequence the professionals who operated the sophisticated computers, and the companies that supplied them, discounted their value. But minicomputers enabled engineers to solve problems for themselves that had required centralized computing facilities. And personal computers enabled the unwashed masses – less-skilled people like the rest of us – to compute in the convenience of their offices and homes.

Nearly every disruptive innovation in history has had the same impact. George Eastman's camera made amateur photography widespread. Bell's telephone let people communicate without the need for professional telegraph operators. Photocopying enabled office workers to do things that historically only professional printers could do. On-line brokerages have made investing so inexpensive and convenient that even college students now actively manage their own portfolios. Indeed, disruptive technologies have been one of the fundamental mechanisms through which the quality of our lives has improved. In each of these cases, the disruption left consumers far better off than they had been – we don't yearn to return to the days of the corporate mainframe center, for example.

Our health care system needs to be transformed in the same way. Rather than ask complex, high-cost institutions and expensive, specialized professionals to move down-market, we need to look at the problem in a very different way. Managers and technologies need to focus

instead on enabling less expensive professionals to do progressively more sophisticated things in less expensive settings.

We need diagnostic and therapeutic advances that allow nurse practitioners to treat diseases that used to require a physician's care, for example, or primary care physicians to treat conditions that used to require specialists. Similarly, we need innovations that enable procedures to be done in less expensive, more convenient settings – for doctors to provide services in their offices that used to be done during a hospital stay, for example. The graphs "Disruptions of Health Care Professions" and "Disruptions of Health Care Institutions" suggest the patterns by which these disruptive innovations might transform health care.

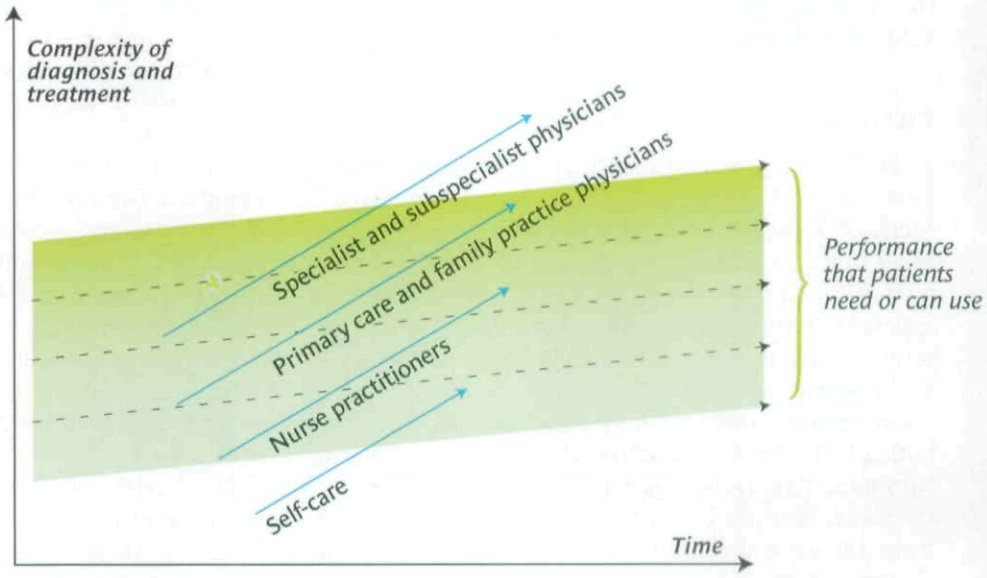
Some innovations of exactly this sort have transformed pockets of the health care system, and where they have happened, higher quality, greater convenience, and lower cost actually have been achieved. Before 1980, for example, patients with diabetes could only know whether they had abnormal levels of glucose in their blood indirectly; they used an often inaccurate urine test or visited a doctor who drew a blood sample and then measured its glucose content on an expensive piece of laboratory equipment. Today, patients pack miniature blood glucose meters with them wherever they go; they themselves now manage most aspects of a disease that previously had required much more professional involvement. They get far higher quality care far more conveniently. No patient or professional pines for the good old days – even though the companies that made the large laboratory blood-glucose testers were all driven from the market, and endocrinologists now face significantly reduced demand for their services.

Angioplasty is another example. Before the early 1980s, patients with coronary artery disease were treated through bypass surgery. It required a complex, technologically sophisticated surgical team, as well as multiple specialists in several disciplines, complicated equipment, days in the hospital, and weeks in recovery. The far simpler angioplasty uses a balloon to dilate narrowed arteries, causing less pain and disability. It enables less expensive or specialized practitioners to treat more people with coronary artery disease in lower cost settings. Initially, angioplasty was used in only the easiest cases and was much less effective than surgery. Experts viewed the procedure with skepticism because of all the things it and its practitioners couldn't do. But over time the disruptive innovation improved. Increasing skill and experience, together with sustaining technological innovations such as stents, have allowed angioplasty to supplant surgery in many cases. Angioplasty can now be reliably performed in stand-alone cardiac care centers, which aren't burdened with the tremendous overhead costs of hospitals.

By enabling less expensive practitioners to treat diabetes and coronary artery disease in less costly locations, these disruptive innovations have made health care

Disruptions of Health Care Professions

As specialist physicians continue to concentrate on curing the most incurable of illnesses for the sickest of patients, less-skilled practitioners could take on more complex roles than they are currently being allowed to do. Already, a host of over-the-counter drugs allow patients to administer care that used to require a doctor's prescription. Nurse practitioners are capable of treating many ailments that used to require a physician's care. And new procedures like angioplasty are allowing cardiologists to treat patients that in the past would have needed the services of open-heart surgeons.



more efficient. But more important, no compromises in quality were made. On the contrary, more patients get more care. When care is complex, expensive, and inconvenient, many afflictions simply go untreated. Before the disruption of angioplasty, for example, many people with coronary artery disease were not treated. Patients had to be disabled with chest pain or at risk of heart attack to justify the expense and inconvenience of open-heart surgery.

We need many more such disruptions – and today we have them within our reach. Unfortunately, the people and institutions whose livelihoods they threaten often resist them. We saw such resistance in the story of the portable X-ray machine. Here's another example. An English entrepreneur has developed a system for customizing eyeglasses quickly and efficiently. The patient puts on a pair of eyeglasses with seemingly flat lenses and an odd-looking rubber bulb attached to each stem. Looking at a vision-test chart and covering one eye, she squeezes the bulb on the right stem until she can read the fine print on the chart. A monomer in the bulb shapes the lens until that eye can see perfectly. She repeats the process for the other eye. Within two minutes, she has perfectly tailored eyeglasses – at a cost of about $5. This is a disruptive technology. It lets patients do for themselves something that historically required the skill of professionals.

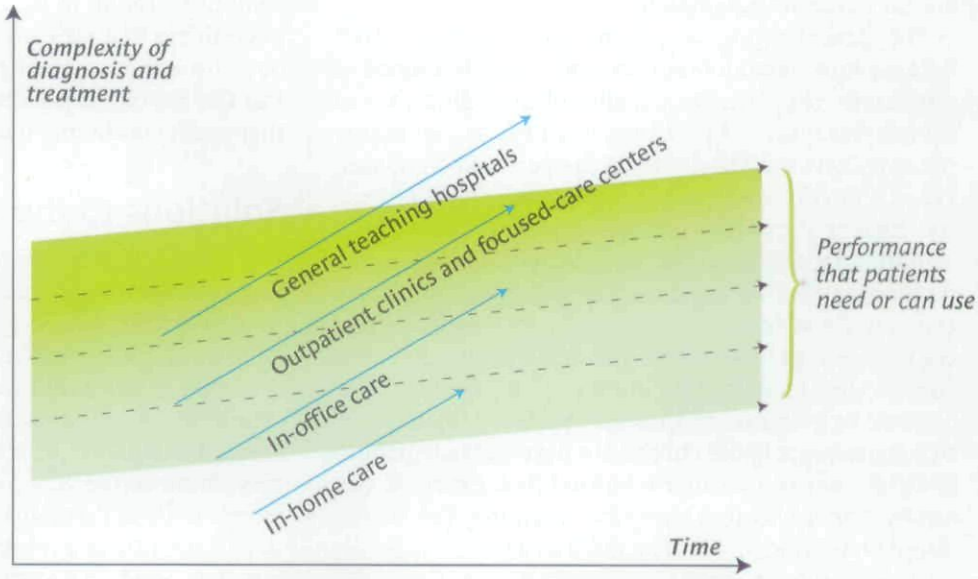
When care is complex, expensive, and inconvenient, many afflictions simply go untreated.

Predictably, the established professions quickly mobilized to discredit the entrepreneur's technology, asserting that dangers such as glaucoma might go undetected if patients corrected their own vision and that for the long-term well-being of patients, care of the eyes must be left in the hands of professionals. Of course this is a reasonable concern. But it frames the problem incorrectly. The problem should be, instead, let's find a way to allow patients to correct vision for themselves while finding new ways for professionals to catch potentially serious disorders at an early stage.

Such resistance affects not only technology but people as well. Take nurse practitioners and physicians' assistants. Because of advances in diagnostic and therapeutic technologies, these clinicians can now competently, reliably diagnose and treat simple disorders that would have required the training and judgment of a physician only a few years ago. Accurate new tests, for example, allow physicians' assistants to diagnose diseases as simple as strep infections and as serious as diabetes. In addition, studies have shown that nurse practitioners typically devote more time to patients during consultations than

Disruptions of Health Care Institutions

Teaching hospitals incur great costs to develop the ability to treat difficult, intractable illnesses at the high end. In the process, they have come to overserve the needs of the much larger population of patients whose disorders are becoming more and more routine. Most types of patients that occupied hospital beds 20 years ago are now being treated in more-focused care centers and outpatient clinics, doctors' offices, and even at home.



By now it's clear that the simplest ailments can be reliably treated and diagnosed by less highly skilled clinicians – and also that institutional forces will fight that reality.

physicians do and emphasize prevention and health maintenance to a greater degree.[2] But many states have regulations that prevent nurse practitioners from diagnosing diseases or from prescribing treatment that they are fully capable of handling.

The flawed rationale behind such policies is that because nurse practitioners are not as highly trained as physicians, they are not capable of providing care of comparable quality. This is the same logic that minicomputer makers used to discredit the personal computer. When a physician diagnoses a simple infectious disease, the patient uses only that fraction of the physician's training that relates to simple infectious diseases. Studies have shown that nurse practitioners with comparable training in simple infectious diseases can provide care of comparable quality in that tier of the market – even though they lack training in more complex disorders.[3]

Some nearsighted advocates of patients' rights assert that nurse practitioners might not have the judgment to recognize when a disorder is beyond their expertise. But family practice doctors recognize when they can treat a disorder and when it merits referral to a specialist. Surely nurse practitioners, working at even simpler tiers of the market, can be equipped to do the same thing. The real reason for blocking such disruption, we suspect, is the predictable desire of physicians to preserve their traditional market hegemony.

Instead of working to enable the natural upmarket migration that is an intrinsic part of economic progress, today's managed care organizations, insurers, and regulators have done just the opposite. They have forced highly trained physicians down-market to diagnose ear infections and bronchitis and have prevented nurse practitioners from doing things that technology enables them to do perfectly well. The result of this policy is perverse. To maintain their incomes, primary care physicians are forced to churn patients at an alarming rate – frequently spending only a few minutes with each patient. That reduces the quality and convenience of care.

This practice, which has become pervasive in most managed care organizations, is akin to what would have happened if some regulatory body in the early 1980s had decreed that because microprocessors were inferior in computing power to wired logic circuits, all personal computers had to be equipped with wired logic boards, not microprocessors. Such a regulation would have halted the industry's progress. The fact that we were able to use microprocessor-based computers for the jobs they were capable of handling, and wired-logic-based machines for the jobs for which microprocessors weren't suited, has been a key to the creation of high-quality, convenient, cost-effective computing for all of us. Enabling less expensive people to do things that were previously unimaginable has been one of the fundamental engines of economic progress – and the established health care institutions have fought that engine tooth and nail.

Solutions to the Crisis

The crisis in health care is deep, to be sure. But the history of other disruptive revolutions offers a number of suggestions for how a systemic transformation might be managed. We describe some of these here:

Create – then embrace – a system where the clinician's skill level is matched to the difficulty of the medical problem. Medical problems range from the very simple to the very complex, as we've said. Let's look more closely at that range for a moment. In the simplest tiers, diagnosis and treatment can be rule-based: accurate data yield an unambiguous diagnosis, indicating a proven therapeutic strategy. Many infectious diseases fall

into this category. In the middle tiers, diagnosis and treatment occur through pattern recognition – no single piece of data yields an answer, but multiple data points lead to a definitive diagnosis. The onset of Type I diabetes, for example, is diagnosed when a pattern is observed – blurry vision, incessant thirst, weight loss, and frequent urination. Once a diagnosis is confirmed, relatively standardized treatment protocols often exist. In the most complex disorders, diagnosis and treatment occur in a problem-solving mode. These problems require the collective experience and judgment of a team of clinical investigators and often involve cycles of testing, hypotheses, and experimentation.

By now it's clear that the simplest tiers can be reliably treated and diagnosed by less highly skilled clinicians – and also that institutional forces will fight that reality. We cannot allow such opposition to arrest reform. Instead, we must invent processes that can channel complex problems, which can't be solved in a rule-based mode, to clinicians whose skills are appropriate to a pattern-recognition or a problem-solving mode.

Scientific progress moves disorders that used to be dealt with in a problem-solving mode toward a pattern-recognition mode and those that had to be addressed through pattern recognition toward a rule-based regime. Mapping the human genome will accelerate this process. Not long ago, for example, leukemia was thought to be a single disease. Diagnosing and treating it was complex – no two patients responded identically to the same therapy, and treatment required the experience, intuition, and problem-solving skills of the best oncologists. Our improved understanding of the human genetic code, however, has helped researchers see that what we previously called leukemia is really at least six different diseases. Each is characterized by a specific genetic pattern, and patients can be precisely diagnosed by matching their patterns to a template.

Where once therapy used to be applied experimentally, such precise definition of the disease will allow for precise treatment protocols. Disruptive technologies such as this are precisely what are needed to reform health care. They will continue to enable less-experienced caregivers to make more precise diagnoses and provide higher quality care than they could have in problem-solving mode.

It's in physicians' interest to embrace this change. Rather than fight the nurse practitioners who are invading their turf, primary care physicians should move upmarket themselves, using advances in diagnostic and therapeutic technologies to perform many of the services they now refer to costly hospitals and specialists. They should, in other words, disrupt those above them rather than fight a reactionary and ultimately futile battle with disrupters from below.[4] Let us be clear. Many managed care organizations today give primary care

Patient Welfare in Disruptive Times

How might patients fare amidst health care disruptions? The answer depends on whether competitive markets are allowed to work efficiently. If clinicians or patients are forced to use less expensive technologies, disaster will result. But if consumers and providers are given choices, the use of disruptive technologies will migrate to those applications where they create real value.

Consider Sonosite, a Seattle-area company that makes a small, highly portable, inexpensive ultrasound machine. The machine is good, but it is disruptive – it lacks the analytical features and the degree of resolution found in more expensive ultrasound equipment. If a managed care organization forced echocardiologists and OB-GYN physicians to use these less expensive devices for situations in which they previously have used traditional equipment, a specialist could risk missing something important, and the patient's well-being could be compromised. But suppose instead that because Sonosite's technology now makes ultrasound accessible and affordable to generalist clinicians, they could begin to provide better, more accurate care within the low-cost and more convenient context of their offices. Instead of conducting exams in which they hypothesize about what's going on inside a patient's body by listening through a stethoscope or by using their fingers to probe for irregularities, they could use this simple ultrasound device that would let them see inside the body. By enabling generalists to diagnose more quickly and with greater precision, disruptive technologies such as Sonosite's can improve, not compromise, the cost, quality, and convenience of care.

Ultimately, we would expect that the disruptive portable machines will improve to the point that they will supplant the more expensive traditional ultrasound equipment in established applications as well. But the true transformative impact of such technologies in health care will come as they allow less expensive professionals to provide better care.

If history is any guide, the established high-end providers of products and services are likely to be articulate and assertive about preserving existing systems in order to ensure patient well-being. Very often, however, their eloquence reflects concerns about their own well-being. Customers have almost always emerged from disruptive transitions better off – as long as the disruptions are not forced into an old mode, but instead enable better service to be delivered in a less-costly, more convenient context.

physicians a financial incentive *not* to refer patients to specialists – to continue treating patients they are not competent to care for. Inviting them to move incompetently upmarket is a recipe for disaster. Disruptive technologies such as those we have described will enable these caregivers to move *competently* upward. These innovations are the sort that will reform health care. This strategy – unlike the one that pushes these physicians down-market or encourages them upward without enabling technology – is consistent with the way technological progress and customer needs interact.

Invest less money in high-end, complex technologies and more in technologies that simplify complex problems. Equity markets have not been generous to companies making health care products and equipment in recent years. Other sectors of the economy are perceived to exhibit greater growth and profit potential. One reason for this, we believe, is that much of the energy and capital spent in the development of new health care products and services have been targeted at the high end – at sustaining technologies that enable the most skilled practitioners to solve problems that could not be solved before. We do not contest the value of these innovations – but they will not transform health care. The great growth opportunities exist in the simpler tiers of the market. History tells us that major new growth markets coalesce when products, processes, and information technologies let less highly paid groups of people do things in more convenient settings. To truly disrupt the health care system, venture capital, entrepreneurial energy, and technology development need to flow toward these enabling initiatives. Rather than focus on complex solutions for complex problems, research and development need to focus on simplification.

Instead of working to preserve the existing system, health care regulators need to ask how they can enable disruptive innovations to emerge.

It's not entirely clear why more venture capital hasn't flowed in this direction. One possible reason is that individual entrepreneurial companies don't get to pick fights with individual Goliaths – more often, they face an army of giants. Because regulators, litigators, insurers, physicians, hospitals, and medical schools have such powerful interlocking interests in the status quo, disruption might require the concerted strategic focus of major health care companies such as Johnson & Johnson, Baxter, Medtronic, or Merck. Over time, they could overcome the inertia of entrenched institutions. A series of disruptive business ventures launched by these companies would create far greater growth for them, with less investment, than would continued pursuit of sustaining technologies that enable specialists to push further into high-end complexities.

Create new organizations to do the disrupting. The health care industry today is trying to preserve outmoded institutions. Yet the history of disruptive innovations tells us that those institutions will be replaced, soon enough, with new institutions whose business models are appropriate to the new technologies and markets.

When disruptive innovations have invaded the mainstream markets of other industries, a difficult period typically has preceded the arrival of truly convenient, lower cost, higher quality products and services. Between 1988 and 1993, for example, as networked personal computers became the dominant information technology architecture, the former industry leaders fell into disarray. Together, the mainframe and minicomputer makers logged $20 billion in operating losses during that period. None of these companies was able to adapt its business model to compete in the personal computer world. Instead, they seemed able only to tighten the thumbscrews on their existing processes, attacking costs through mergers and layoffs, as they withered away. During this period, it wasn't the computer industry that was in crisis – only its traditional institutions were. Disruptive innovators such as Intel, Sun, Microsoft, and Dell were creating extraordinary value.

The massive financial losses that hospitals and managed care institutions are suffering today mirror exactly what happened to the dominant players in other disrupted industries. And they are responding in the same way – by tightening controls on their existing business models. They are merging, closing facilities, laying off workers, forming buying groups, delaying payments, adding layers of control-oriented overhead workers, and hiring consultants – while going about their work in a fundamentally unchanged way. In fact, the billions of dollars large general hospitals are spending to build information technology systems and to create integrated feeder systems of physicians' group practices and primary-, secondary-, and tertiary-care hospitals are designed to preserve, rather than displace, the existing institutions.

We will always need some general hospitals to provide intensive and critical care to the sickest patients, just as we still need IBM and Hitachi to make mainframe computers for the most complex computing applications. But it is very likely that the care of disorders that primarily involve one system in the body – from earaches to cardiac and renal illnesses – will migrate to focused institutions whose scope enables them to provide better care with less complexity-driven overhead. If history is any

guide, the health care system can be transformed only by creating new institutions that can capably deliver the vast majority of such care, rather than attempting a tortuous transformation of existing institutions that were designed for other purposes.

Leaders of today's hospital and managed care companies might profit from comparing the approaches that S.S. Kresge and F.W. Woolworth took toward disruptive discount retailing, beginning in the early 1960s, as recounted in Clayton Christensen's *The Innovator's Dilemma.* Kresge addressed the disruption by systematically closing 10% of its variety stores every year and funneling all its cash into its disruptive start-up, Kmart. Woolworth, by contrast, tried to maintain its pace of investment in its traditional stores while building its discount-retailing arm, Woolco. Despite the fact that Woolworth was far larger and had much deeper pockets, Woolco – and ultimately all of Woolworth's variety stores – folded. The lessons for today's medical institutions: don't be scared to invent the institution that could put you out of business, and stop investing in dying business models.

Overcome the inertia of regulation. Attempts to use regulation to stave off disruptive attacks are quite common. The U.S. automakers, for example, relied on import quotas as long as they could to keep disruptive Toyota and Honda at bay. Unfortunately, regulators are inclined to be even more protective of the entrenched professions and institutions in health care than they were of the U.S. automakers. The links between those institutions, federal and state regulators, and insurance companies are strong; they are wielded to preserve the status quo. (Nothing else could explain why nurse practitioners are forbidden from diagnosing simple illnesses in so many states.)

Instead of working to preserve the existing system, regulators need to frame their jobs differently. They need to ask how they can enable disruptive innovations to emerge. Let's return to the example we began with – the low-cost X-ray machine. Suppose the regulators wanted to see this disruptive innovation work in doctors' offices but were concerned about potential risks. They might require that all images interpreted in a physician's office by a nonradiologist be transmitted via the Internet to a second-opinion center, where skilled radiologists could confirm those initial diagnoses. Admittedly, that would require a massive change in the way regulators do their work.

The Need for Leadership

Once an industry is in crisis, individual leaders often become paralyzed. They're incapable of embracing disruptive approaches because the profitability of the institutions they lead has been so eroded. Typically, not only do they ignore the potential disruptions, they actively work to discredit and oppose them. Thus far, this pattern has held true in the health care industry as well.

Successful disruptive revolution of this system will unfold more quickly, and far less painfully for everyone, if leaders at regional and national levels work together – not to regulate the existing system but to coordinate the removal of the barriers that have prevented disruptions from happening. Unfortunately, in this presidential election year, the proposals from both leading parties for dealing with the crisis in health care have been molded within the established system. These proposals can be divided into three categories of solutions: control costs by consuming less health care; impose reimbursement controls that force high-end providers to become more efficient; and use government money to subsidize the high costs of health care for targeted segments of the population. None of these proposals addresses the fundamental causes of the dilemmas that the health care system faces.

Government and health care industry leaders need to step forward – to help insurers, regulators, managed care organizations, hospitals, and health professionals work together to facilitate disruption instead of uniting to prevent it. If they do, some of the established institutions will fail. But many more health care providers will realize the opportunities for growth that come with disruption – because disruption is the fundamental mechanism through which we will build a higher quality, more convenient, and lower cost health care system. If leaders with such vision do indeed step forward, we will all have access to more health care, not less.

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1. Clayton M. Christensen, *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail* (Harvard Business School Press, 1997).

2. See James Lardner, "For Nurses, a Barrier Is Broken," *U.S. News & World Report*, July 1998.

3. Richard A. Cooper, MD, et al. "Roles of Non-physician Clinicians as Autonomous Providers of Patient Care," *JAMA*, September 2, 1998. These market forces are already at work. It is estimated that by the year 2005, the number of nurse practitioners in clinical practice will equal the number of family physicians. Between 1992 and 1997, the number of schools offering qualification programs for NPs more than doubled, from less than 100 to approximately 250. During that same time, the number of students pursuing NP degrees quintupled, from 4,000 to over 20,000.

4. Evidence that specialists are already being disrupted in this manner can be found in a 1995 report by the Council of Graduate Medical Education, which predicted an excess of 115,000 specialists by the year 2000. See Stephen M. Shortell et al., *Remaking Health Care in America: Building Organized Delivery Systems* (Jossey-Bass Publishers, 1996), p. 298.

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