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Cover Story

Disruptive Innovations That Will Change Your Life in Health Care

The innovations that we list here are not unfamiliar, but don't underestimate them. As they mature, they will have strong effects.

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In 1995, Harvard business school professors Clayton Christensen and Joseph Bower put "disruptive technologies" in the business lexicon by introducing the term in a seminal article in the school's journal.

The phrase described what happened in 1960, for example, when an unknown company, Sony, began selling an affordable transistor television that eventually replaced RCA's vacuum tube.

Soon it became apparent the transistor alone — the disruptive technology — did not tell the whole story. To achieve success, the technology had to be coupled with a whiz-bang business plan, giving birth to the encompassing term "disruptive innovations." Sony, with its coveted transistor TV that many people could afford, and a plan to sell its TVs through Kmart, then a new retail chain, put both the more expensive RCA vacuum tube TVs, as well as the many mom-and-pop appliance stores that refused to sell Sony sets, essentially out of business.

Christensen has since written or co-written seven books on disruptive innovations, using the term to suggest how to mend problems in the worlds of business and education. They illustrate how upstarts using new technology can change an industry to make our lives better.

But for the 56-year-old Salt Lake City-born economist, a Rhodes Scholar who served as a Mormon missionary, speaks fluent Korean, and became a Harvard PhD student at 40 with five children, his toughest challenge was to apply successful business concepts to solve the problem of vexing runaway health costs.

Better and cheaper

He teamed up with two prominent physicians and spent 10 years dissecting and pondering the issue. The result is The Innovator's Prescription (McGraw-Hill, 2009), co-written by the late Jerome Grossman, MD, a founder of Tufts Associated Health Plans and former CEO of Tufts Medical Center, and by Jason Hwang, MD, MBA, an internist and co-founder with Christensen of the Innosight Institute, a not-for-profit think tank.

"Disruptive innovations, like we've seen in other industries, can bring complex and expensive health care products and services to greater levels of affordability and accessibility," Hwang says.

The essence of the authors' thesis is the view that America's entire delivery system must change radically, adding lower-cost providers and lower-cost venues. General hospitals and physician practices, the two dominant models in health care, are inefficient and do not produce perfect results, they suggest. With the help of technology, some medical care can be transferred from specialists to generalists, from generalists to nurses, then to allied health professionals, and ultimately to patients themselves.

It may not require a board-certified family practitioner or internist to determine whether a sore throat must be treated with antibiotics since the rapid strep test is a proven technology that can be used by other health care professionals. And it isn't hard to imagine that since diabetics and patients with clotting disorders now have the technology to test and inject themselves routinely, people with other chronic conditions could be taught to monitor and control their diseases in a similar manner.

Christensen and his co-authors support single-organ hospitals, such as the 55-year-old Shouldice Hernia Centre in Ontario, because the same operations are performed repeatedly, precisely, and less expensively than by general hospitals. A hernia repair at Shouldice is about $2,300, versus $7,000 at a general hospital in the United States. As a further trickle down, complex work previously done at hospitals can be accomplished at outpatient diagnostic centers, ambulatory surgical centers, urgent care clinics that serve as low -acuity emergency rooms, and remotely by using videoconference technology and robots. Some surgical robots, such as modern LASIK machines, can operate themselves, and this will become more common.

"We already recognize that a lot of care takes place in ambulatory settings today that would have required you to go to a hospital in the past," Hwang says. "More of this would happen, but the reimbursement system and the political clout of existing players in the system block innovation."

In all, the authors believe a host of disruptive innovations could end the health care crisis if entrenched providers allow disruptive businesses to compete and take a share of the health care load. The argument has wide implications for payers.

"Payers must shift payment models to begin rewarding precision diagnostic tests and precision diagnostic abilities of providers to begin to create a more rational system," Hwang adds.

Support for this view comes from a variety of influential sources, among them, Andrew Grove, PhD, co-founder and former chairman of Intel, who said in 2006 at City College of New York that the country could meet health care costs by encouraging development of disruptive technologies.

"Any transformative solution requires the inclusion of disruptive innovations that leverage technology," says a 2008 Deloitte Center for Health Solutions report, "Connected Care."

George C. Halvorson, chairman and chief executive officer of Kaiser Permanente, and Health and Human Services Secretary Michael Leavitt and Secretary-designate Tom Daschle, also support disruptive innovation. Retail clinics, telemedicine, medical tourism, and personalized medicine are among innovations likely to grow and be assimilated by the system, if the establishment permits.

Promise and threat

All innovations threaten livelihoods. However, as price sensitivity soars, the barriers to acceptance fall, especially for those with no insurance, those with only catastrophic coverage, those in high deductible health plans, and others whose copayments are rising. Consumers embrace innovations because they represent value — savings, convenience, access, quality, or a combination of these.

Health plans help determine acceptance. If plans pay for new technologies, they are more likely to be accepted; if they do not, as with routine full body scans, the technology along with its business model can fold up its tent and slide into obscurity.

In all industries, when an upstart company using a new technology challenges the status quo, it undercuts a market leader and itself becomes a leader. The new guy eventually takes over all or most of a market as quality improves and capabilities expand. Sony's ascent and dominance in television receivers is legendary.

Here, then, are five disruptive innovations that could make a big difference in how health care is reshaped in the coming decade. We're not saying they are the only five, or even the five biggest (who can know at this point?), but they have the earmarks that disruptive innovations have shown in the past.

RETAIL CLINICS

Retail clinics are a disruptive innovation because they operate outside conventional physician offices, disrupting existing business models of primary care. The technology driving their acceptance is the electronic medical record (EMR) with computerized physician order entry and sometimes e-prescribing applications embedded in the EMR.

Prompts, alerts, and reminders using evidence-based decision support allow nurse practitioners, who staff 80 percent of the clinics, to make sound medical decisions and to extend their scope of practice. At least 96 percent of clinics use EMRs with varying levels of capabilities, according to the Convenient Care Association, the clinic trade group.

The clinics fit with the quest by Christensen et al for expanded health care and for increased precision. "A lot of what happens in medicine is guesswork and sometimes the guesses are wrong," says Paul Keckley, PhD, executive director of the Deloitte Center for Health Solutions and a past executive director of the Center for Evidence-Based Medicine at Vanderbilt University. "The EMR is the way nurse practitioners are able to diagnose more completely and direct people to a therapeutic intervention that is more appropriate, or refer people who have more complex conditions to a physician."

As with many disruptive innovations, low-cost providers take less complicated work away from high-cost providers and deliver it in a new venue. About 90 percent of clinic visits are for 10 simple conditions, such as conjunctivitis, ear infection, and bronchitis, according to a Rand study, "Retail Clinics, the Medical Storefront," in the September–October 2008 issue of Health Affairs. A clinic visit costs $40–$75, while a typical physician office visit can run $55–$250.

Of the more than 1,100 retail clinics that have opened since 2000, at least 65 percent are in drugstores; the balance are in discount and grocery stores such as Target, Wal-Mart, Kroger, and Publix. CVS Caremark is the largest clinic retailer, with 554 MinuteClinics in 27 states. In November, the company hired Troyen Brennan, MD, JD, a former chief medical officer at Aetna, to be executive vice president and chief medical officer with oversight of the clinics. According to a forecast in "Health Care in the Express Lane: Retail Clinics," prepared in 2007 for the California HealthCare Foundation, there will be 6,000 clinics by 2012.

Though the amount of business that clinics siphon from doctors is small today, that could change if their numbers grow significantly and if frustratingly long waits to see physicians continue, Keckley says. Already, doctors have expressed opposition to clinics through their trade groups. The academies of pediatrics and family physicians argue that clinics disrupt continuity of care, have no uniform quality standard, and do not support the concept of a medical home because they fragment care. And physicians are skeptical about whether NPs actually make referrals for chronic or seriously ill patients.

However, self-insured employers and insurance carriers support clinics because they steer patients away from more costly emergency rooms, urgent care centers, and physician offices, reducing the cost of care. Blue Cross & Blue Shield of Minnesota waived copayments to clinics to encourage their use. That angered the Minnesota Medical Association, since doctors are not permitted to waive fees. In 2007, BCBSM saved $1.25 million on patients who used the clinics, according to a report in the Twin Cities Pioneer Press. Some other barriers to acceptance are continuous legislative scrutiny of NP scope of practice, supervision restrictions, and prescription-
writing challenges.

Disruptive products are almost always introduced by new entrants rather than the dominant players, Hwang notes. Some of the new guys are RediClinic, Take Care Health Systems and the Little Clinic. A few incumbents, such as the integrated delivery systems Geisinger Clinic (CareWorks, Pennsylvania), Sutter Health (Sutter Express Care, California) and Mayo Clinic (Mayo Express Care, Minnesota), have opened branded clinics in retail areas as a way to direct referrals to their own physicians and facilities.

As with all disruptions, the clinics will hone their service, quality, and convenience, get better, and expand beyond their current services. Already some clinics, like the Houston-based RediClinic chain, are involved in wellness screenings for diabetes, hyperlipidemia, and more.

It isn't hard to imagine that as clinics become more ubiquitous, health plans could eventually penalize patients seen in physician offices for minor ailments that could easily be treated at a retail clinic, just as patients are sometimes penalized now for medically unnecessary ER visits.

TELEMEDICINE

Several coalescing technologies help move care from physician offices to less expensive venues under the umbrella term telemedicine. They include advances in network bandwidth, Internet access, software development, medical devices, advanced telephony, and video conferences. The business model is to deliver care conveniently to patients, often at home.

Telemedicine improves access, promises better outcomes, and enables early screening and diagnosis to prevent more serious adverse and expensive health events.

As much as $200 million could be saved over 25 years if patients communicated electronically with their providers, the economist Robert Litan reports in "Vital Signs by Way of Broadband: Remote Health Monitoring Transmits Savings, Enhances Lives," released in October by the not-for-profit group Better Health Care Together, a business, labor, and public policy consortium. For four chronic diseases alone, outcomes and quality of life could improve for 10 million people, Litan writes.

In addition, Deloitte's Keckley estimates that at least 60 percent of adult care living facility or skilled nursing facility residents could remain at home with electronic devices. "Its better care at lower cost," he says. Medication non-adherence is a key reason that seniors move to these facilities, Keckley says. "That doesn't require a person to walk into their rooms. There is a way to prompt, alert, and remind Aunt Bea to take her medications and to monitor her depression and anxiety."

Former Intel CEO Andrew Grove agrees. "Many of the elderly who now enter nursing homes could be enabled to remain in their own homes through the adoption of digital technologies that are not much more complicated than a DVD player or cell phone player," he said in a 2006 speech. "We can equip homes with electronics and reduce cost by at least a factor of 10 compared to nursing homes."

Keckley estimates a potential annual saving of $400 billion if just two expensive health care populations are managed with in-home technologies. One group consists of those who have just been discharged from hospitals, such as patients with preterm labor; patients who just sustained a heart attack, and those who have cancer. The other group comprises those with a chronic condition intensely related to self care, such as obesity, hypertension, or depression.

"Payment systems must change to support monitoring for these patients," he says.

Some carriers are leading the charge. Starting this month, Hawaii Medical Services Association, part of the Blue Cross & Blue Shield Association, is offering "virtual consults" to 1.3 million members using technology developed by American Well. It enables an insured patient to contact any credentialed medical specialist on his or her insurer's network around the clock over the phone or by Web (including webcam), video conference, secure messaging, or secure chat to help determine whether the medical issue can be worked out at home, requires an office visit, or warrants and urgent trip to an ER. It takes convenience a giant leap forward, beyond retail clinics, with 24/7 online access to medical care from home, offices, or just about anywhere.

American Well works with carriers that pay member doctors $25–$45 for electronic consults with patients. The fees are lower than for an office visit, but the clinician can work from home, an office, or any convenient location with a computer. It's additional income doctors earn at their discretion by logging onto American Well's Web site and clicking "I am available." The innovation may draw retired physicians back into practice because they don't need to build or rent brick-and-mortar offices, pay staff, or bill patients.

Health care in the countryside, desert, and mountains has always been difficult. One example where telemedicine has been effective is the area within a 250 miles of Norfolk, Nebraska, a rural district with low population density and no medical facilities. Obstetrics-gynecology innovator Keith Vrbicky, MD, has installed kiosks in remote pharmacies.

From 7 a.m. to 10 p.m. weekdays and weekends, walk-in patients with minor problems enter the pharmacy's exam room and, with a pharmacist or technician, go online with Vrbicky's 15-provider MidWest Health Partners clinic in Norfolk, about two hours from Omaha.

The pharmacist or an assistant collects and forwards the copayment takes a history and types it into the kiosk terminals.

There are attachments to the kiosks, such as a high-definition digital otoscope, a digital stethoscope, even a digital dermascope that allows a Midwest dermatologist to see skin rashes in high definition. So far, Vrbicky says, most major insurers are picking up the tab, paying $50–$75 per e-visit.

Intel, the chip manufacturer, believes telemedicine has such enormous profit potential that in November, the company released its first FDA-approved telemedicine device, Health Guide PHS6000. It is a unit that care workers can use at patients' homes with peripheral extensions to measure blood pressure, glucose, lung function, weight, and other characteristics of people with diabetes, heart disease, and other maladies.

Still, telemedicine is not a mature family of technologies. Some barriers to overcome are difficultly of use, litigation stemming from misuse, and lack of security in sending and receiving information. In addition, physicians are slow to adapt to electronic patient communication for fear of confidentiality breaches.

Already, some payers acknowledge the potential of telemedicine to reduce hospitalizations and lower the cost of physician visits. It is just a matter of time before telemedicine becomes a more commonly accepted system of health care delivery.

MEDICAL TOURISM

Medical advances in other states and countries and speedy air travel are the technologies that enable medical tourism. The business model relies on wage and medical product price differentials along with a new breed of brokers who create comprehensive travel packages that make having surgery away from home at least 30 percent less expensive than in the United States.

Most large companies have always had employees who travel on business, so their health plans already had out-of-network provisions, including offshore coverage. The trend exploded when economically pressured patients with no insurance or with catastrophic coverage or large deductibles, and patients on long transplant waiting lists, became global health care consumers.

More than 750,000 Americans left home for treatments and care elsewhere, mostly for elective procedures such as cosmetic surgery, dental work, and surgeries like heart valve, knee, and hip

replacements in India, Thailand, and more than 30 other countries, according to Deloitte. Destination nations regard it as a lucrative source of economic development. The New York Times reported in November that the South Korean government will build a 370-acre complex of medical clinics on the resort island of Jeju. An 18-hole golf course and scenic beaches will help to lure foreigners.

"Outbound medical tourism is likely to experience explosive growth over the next three to five years," Deloitte researchers estimate in their 2008 document, "Medical Tourism: Consumers in Search of Value." The number of U.S. medical tourists is projected to grow to 6 million by 2010, representing $16–$19 billion in lost revenue to U.S. health providers, they report. Greater transparency — more hospitals posting their prices and outcomes online — has aided the trend because consumers are slowly realizing that there are huge variations in cost and results for the same procedure.

A refinement in medical tourism came when brokers like Planet Hospital, a leading medical travel planner, talked to employers and insurers and put together travel-and-treatment packages. "There is a cottage industry emerging of brokers who go to employers and health plans and say, 'If someone mentions medical tourism, we'll get the airfare set up, we'll make sure people can recover in a four-star hotel and are transported to and from the airport, and we'll see that their medical records are sent to and received by their physicians — and we'll take a percentage of the deal,'" says Deloitte's Keckley.

With logistics under control, the remaining concern was quality, somewhat allayed by accreditation from the Joint Commission International, a subsidiary of the Joint Commission on the Accreditation of Healthcare Organizations. JCI has inspected more than 100 foreign hospitals. Though the inspections are not as rigorous as JCAHO might perform, it is a measure that inspires confidence, Keckley adds. In addition, some of America's most trustworthy hospitals have forged alliances with foreign facilities. For example, Saint Luke's Medical Center in the Philippines is affiliated with Memorial Sloan-Kettering Cancer Center.

Employers and health plans are taking advantage of price discrepancies by sending workers to other states and countries for less costly comparable or better care. For Hannaford, a self-insured operator of 160 New England and New York supermarkets, some of its 27,000 Aetna-covered employees were offered the option of having knee and hip replacements in the U.S. and paying significant copayments and deductibles of $2,500, or traveling to Singapore's National University Hospital for the surgeries, all expenses paid. A hip replacement costs $43,000–$50,000 in the U.S. but only $9,000–$12,000 in Singapore, says Peter Hayes, in charge of Hannaford's health and wellness programs.

Though Aetna offered to make all the arrangements, no employee took Hannaford up on its offer. After Hannaford announced the policy in early 2008, several New England hospitals told Hayes that they would match Singapore's costs, leading some to conclude that medical tourism can spark competitive pricing, even global competition. Blue Cross & Blue Shield of South Carolina and WellPoint, in a pilot project announced in November, are offering medical tourism to members. And the West Virginia and Colorado state legislatures considered bills that would offer incentives to state employees to obtain treatment in low cost JCI-accredited foreign health facilities, but those bills failed.

Predictable barriers to acceptance include a potential backlash from community providers that are unhappy that large local companies are sending employees out of town for treatment.

Consumers may be concerned with such factors as filing malpractice litigation if something goes wrong, applying for visas and passports, obtaining necessary immunizations, traveling to a country that might be politically unstable, and assuring continuity of care. Some of these concerns dampen the zeal to save money.

Employers have other considerations: If there are complications and patients must stay abroad longer, should an employer pay for that? Who pays for travel costs for a companion? If the patient dies, is the employer responsible for transporting the body back to the U.S.?

It is no surprise that the World Medical Tourism and Global Health Congress meeting in San Francisco last June featured speakers from Cigna and United. The primary focus of the conference was integration of medical tourism into health insurance for fully insured and self funded employers. According to the conference literature, more than 100 employers and insurance companies have already included medical tourism in their programs and started to send employees overseas for health care, achieving discounts as high as 90 percent on major surgeries.

PERSONALIZED MEDICINE

In personalized medicine, patients are classified into subpopulations according to their susceptibility to particular diseases or their responses to certain drugs or treatments. This allows use of the most appropriate therapies for individual patients as well as populations.

Though the definition sometimes encompasses such categories as imaging, we focus here only on one facet, pharmacogenomics, the study of how individual genetic differences affect drug response. Typically, a drop of blood, saliva, or tissue used in genetic tests can distinguish patients who will benefit from drugs from those who will suffer adverse effects or have no improvement.

The enabling technologies for this disruption are advances in genomics and molecular biology. The $2.7 billion sequencing of the human genome in 2003 accelerated the development of tests significantly. Its business model allows public and private companies to sell the tests commercially through laboratories to physicians for carrier payment, as well as some direct-to-consumer marketing. It disrupts the status quo because the gene tests help to create specialized drugs targeted perfectly to affect small populations, instead of the Big Pharma model of blockbuster drug releases.

About 50 percent of all people do not respond to the drugs they take, says Joanne Armstrong, MD, senior medical director for women's health and clinical leader for genomics at Aetna. This leads doctors, who often rely on intuition, to engage in expensive trial and error, trying patients on different medications until they find one that works — what Christiansen et al consider a lack of precision in medicine.

Genetic tests deliver predictably effective therapy, such as Genentech's test for receptivity to the infusion medication Herceptin in patients with HER2-positive metastatic breast cancer. "The tests allow you to diagnose so precisely, it takes the guesswork out of health care delivery," says Hwang, the internist and co-founder of the Innosight Institute.

Moreover, pharmacogenomics results in meaningful cost savings to the health care system, according to the September 2008 report of the President's Council of Advisors on Science and Technology, "Priorities for Personalized Medicine." Using genetic information to determine warfarin dosing alone could save $1.1 billion annually, according to a 2006 working paper of the Brookings Joint Center for Regulatory Studies.

"Drugs that don't work perfectly well [for everyone] but work for many people are big pharma's best drugs, and that's exactly what a blockbuster is," Hwang notes. "Safer drugs that treat disease perfectly for a smaller percentage of patients will disrupt this market."

Armstrong predicts genetic testing will soon become the standard of care for certain medications.

Medco Health Solutions, the pharmacy benefit manager, is betting the farm that genetic testing will be the next big thing. Medco started researching patients' chemical reactions to different drugs in 2003. In October, Fortune Magazine named Medco the third most admired worldwide company, after Apple and Nike, in part for its effort to mine genetic information to determine how patients metabolize drugs. "Genetic research will rapidly move toward a standard practice in administering drugs within the next two to five years," predicts Medco CEO David B. Snow Jr.

Many barriers to acceptance remain. For payers, there is a fear of false positives and false negatives, fear of physicians over-ordering tests, and lack of evidence supporting safety and efficacy, Aetna's Armstrong says. Though Aetna covers hundreds of the more than 1,000 tests, "They have varying levels of efficacy and from a health plan point of view, varying levels of coverage."

In addition, many doctors lack training to order and interpret tests, according to a May 2008 study by the health and human services secretary's Advisory Committee on Genetics, Health, and Society.

Some developments may change the horizon for acceptance. In August 2008, the FDA allowed the manufacturers of the blood thinner Coumadin (warfarin) to change their labeling and advise physicians that genetic testing may help with dosing and reduce complications.

The tests will grow in number for general practice if they are built into IT-based clinical decision support systems embedded in electronic medical records. Big pharma may play a small but important role by creating linked diagnostic tests that make it possible to rescue drugs in trial that show levels of toxicity in certain populations but not others.

The advent of genetic testing and precise pharmaceuticals heralds product line fragmentation, according to Christensen et al. "Volumes per therapeutic compound will drop significantly as the number of therapeutic compounds expands. Blockbuster drugs will become rare. This will necessitate reshaping the

business model of today's pharmaceutical companies. In the future there will be fewer big gushers to cover the costs of drilling a lot of holes."

POINT-OF-CARE PAYMENTS

One disruptive technology gaining traction is point-of-care medical payments via cellular phone. A patient pays his complete medical bill as an insurance copayment and/or deductible right after care is rendered. It's not a health care disruption but instead a disruption in medical payment systems.

"If you think about how much money is spent to process claims, repetitious bills, and so on, the amount is staggering," says the technology futurist and medical consultant Dan Burrus, author of Technotrends (HarperCollins, 1993) and six other books. "The whole process can be revolutionized with point-of-care transactions, which can be done electronically. The transaction will be verified instantaneously, electronically, on the spot. We will get rid of billions of dollars of waste in paper and postage, not to mention man hours."

The technologies that makes it possible are cell phones, computer chips, software, and point-of-sale terminals. The business rationale is on-the-spot convenient payments, another step in a move toward a cashless, paperless society. It has the potential to put skyscrapers of employees devoted to medical insurance billing on unemployment lines.

How does it work? Health plan card information will be downloaded to the patient's cell phone, just as ringtones and music are today. After a medical service, the patient enters a security code into the phone and calls the point-of-sale scanner at the provider's office, just as consumers conduct online banking now. The amount owed for copayment and deductible will be configured and the doctor's copayment as well as the insurance/employer payment will be transferred electronically from the patient's bank account and the carrier's bank account to the doctor's bank account. "It's online banking but using a cell phone," Burrus says.

Cell phones have already taken over functions of land lines, personal computers, games, cameras, televisions, and MP3 players. Mobile commerce is the next frontier, as these activities have migrated from computer screens and coalesce with advances in insurance and banking.

It is part of an up-and-coming field called mobile banking and mobile wallets. Vivotech makes the retail scanners; Mastercard and Visa are testing the technology. Burrus says it already exists in Africa and Europe and will be common in the United States in three years. These scanners are equivalent to credit card terminals but are used for contactless transactions. The patient might wave a special card or cell phone over the scanner. Such payments are faster and more convenient for consumers than conventional payments in which shoppers insert their magnetic strip credit or debit cards into a reader.

Health insurers could be much leaner and patients and doctors happier.

A significant number of patients — about 20 percent — will still require intuitive care to reach a definitive diagnosis, Christensen et al write.

However, by applying rules of thumb and other heuristics, the work that many physicians do today will progress through the intuitive and empirical phases and will be very nearly all precision, or rules-based, medicine.

This will result in profound changes to the provider-payment system, irrespective of the effects of many of other technological, sociological, and political engines of change.

What is a disruptive technology?

A disruptive technology, or technological enabler, is a new technology that unexpectedly displaces an established technology, but only if it is accompanied by an innovative business model. The enabler is generally cheaper, simpler, smaller, and frequently more convenient to use. It is initially embraced by the least profitable and usually the poorest customers in a market. An example is the microprocessor, which so simplified the problems of computer design and assembly that Steve Wozniak and Steve Jobs could slap together an Apple computer in a garage and Michael Dell could build personal computers in his dorm room. In health care, technological enablers are those that provide the ability to precisely diagnose by the cause, not the physical symptom, and displace physician intuition with precision. These technologies include molecular diagnostics, diagnostic imaging technology, and widespread telecommunication.

A disruptive innovation is one that brings to market products and services that are much more affordable, and, in the end, much higher in quality. It improves a product or service in ways that the market does not expect, typically by being lower priced or being designed for a different set of consumers. Examples include personal computers, the Kodak camera, and Google advertising. They used disruption to transform markets that had been dominated by complicated, expensive services and products into simple and affordable ones. Disruptive innovations are the key to ushering in affordable health care. An example of a health care disruptive innovation is Medco, which disrupted retail pharmacies. In addition, drugs that lower cholesterol are disruptive to angioplasty, just as angioplasty was disruptive to open heart surgery.

Kiosks like this one allow physicians to interact with patients in distant areas. The machines come with attachments such as a digital stethoscope that are manipulated by a nonphysician clinician where the patient is.

A staggering amount of money is spent to process claims, says the consultant Dan Burrus. Revolutionizing the process means avoiding unnecessary costs of manpower, postage, and paper.