

# The end of traditional nonprofit healthcare business models?

By David W. Johnson



**DAVID W. JOHNSON**  
david.johnson  
@4sightHealth.com

In the movie “Star Trek IV: The Voyage Home,” the spaceship Enterprise travels back in time to San Francisco in the mid-1980s. Its mission is to transport humpback whales into the 23rd century to redirect a space probe heading to destroy Earth. It’s a complicated story.

While trying to escape police custody, crewmember Pavel Chekov falls and seriously injures his head. An ambulance transports Chekov to a trauma center where surgeons are about to drill into his head to relieve pressure on his brain. Afraid of placing Chekov “in the hands of 20th-century medicine,” Captain James T. Kirk and Dr. Leonard “Bones” McCoy break into Chekov’s operating suite. McCoy, who compares contemporary medical practices to “The Dark Ages,” tells the surgeons to put away their “butcher knives,” so he can treat Chekov. The good doctor uses a 23rd-century tricorder scanner to precisely diagnose and cure an arterial tear in Chekov’s brain.

This futuristic movie scene has relevance to today’s 21st-century medicine. Advancing genetic knowledge combined with big-data analytics is giving medicine the capacity to diagnose diseases much earlier. Before long, medicine will be able to prevent or slow disease progression through less invasive, more personalized, targeted and effective treatment interventions.

Precision diagnostics isn’t science fiction. Ten years from now, physicians will require fewer surgical knives, poisonous therapies and toxic medications to treat their patients. Over the next decade, precision diagnostics will change

medicine as we know it. The healthcare industry will dedicate far more resources to prevention and far fewer resources to acute care treatments. Health systems must adapt or risk losing market relevance.

Keeping millions of Americans healthy will enable the nation’s providers to create sustainable business models that truly put patients first. As Ben Franklin first observed, “An ounce of prevention is worth a pound of cure.” With reduced reliance on expensive hospital-based technologies and treatments, health systems will achieve better outcomes at lower costs. Value-based care delivery will become a reality, not just a dream.

## PRECISION DIAGNOSTICS EXPANDS PRECISION MEDICINE

Precision medicine today centers on an emerging set of therapies and interventions that treat and even eliminate genetic abnormalities. It represents a major advance in therapeutic medicine, with the potential to cure devastating genetic conditions, such as sickle cell disease.

The best-known of the new precision medicine tools incorporates **CRISPR** (Clustered Regularly Interspaced Short Palindromic Repeats), which refers to repetitive DNA sequences. By eliminating or replacing defective DNA segments, precise gene editing tools trigger the body’s natural healing processes for repairing and replicating healthy genes.

Here's the rub. These new therapies are remarkably expensive and treat only the genetic origins of disease. There are some diseases that are entirely genetic in origin. These include sickle cell anemia, Huntington's disease and cystic fibrosis. Precision medicine's curative powers will have the highest applicability for such genetically based diseases.

As the science develops, precision medicine will also be able to address the genetic origins of many chronic conditions. This is wonderful news.

But there's more to the story. The vast majority of diseases either combine a genetic predisposition with environmental stimuli or are entirely caused by environmental factors. For example, individuals without a predisposition for lung cancer can still contract the disease by smoking multiple packs of cigarettes per day.

Environmental factors trigger humanity's most virulent and deadly chronic conditions — heart disease, stroke, COPD, most cancers, diabetes, arthritis, cirrhosis and Alzheimer's disease. By definition, precision medicine cannot treat the nongenetic origins of these diseases. This is where precision diagnostics is riding to our rescue.

## **THE MECHANICS OF PRECISION DIAGNOSTICS**

The two biggest scientific breakthroughs of the 21st century thus far are big-data analytics and the "omics" (e.g., genomics, epigenomics and proteomics). Precision diagnostics combines these advances to sift through massive biometric data sets to uncover early signs of impending disease. When combined with precision medicine, precision diagnostics will enable more effective therapeutic responses tailored to each individual's genetic makeup.

In its purest form, precision diagnostics identifies specific pre-disease markers that come with targeted interventions. This is new. Current medicine diagnoses disease when symptoms present, not at disease onset, which can occur years earlier.

The mechanics for discovering these pre-disease markers are uniform across different biometric sampling mediums (e.g., blood, imaging, device signaling). They involve longitudinal collection of biometric data, the use of machine learning (ML) analytics to identify patterns/indicators of specific diseases and the application of statistical models through ML to establish individual risk levels of disease.

## **INDUSTRY PIONEERS IN PRECISION DIAGNOSTICS**

Already, precision diagnostic companies have begun to pursue earlier and more accurate disease identification through different sampling mediums. While the companies' approaches have much in common, it is their differences that expand precision diagnostics' therapeutic potential.

SomaLogic in Boulder, Colorado, for example has developed the capability, using machine learning, to measure changes in the ways proteins express themselves in real-time. As basic building blocks of life, protein adapt as individuals' genomes interact with environmental factors. Measured properly, proteomic signaling enables researchers to identify recognizable patterns of protein expression that correlate with an individual's future risk (high, medium, low) of contracting a disease or a condition.

As SomaLogic's CEO Roy Smythe observes, "The machines see patterns of disease progression than humans cannot. The development of clinical proteomics will disrupt healthcare delivery and improve life quality. Who doesn't want that?"

New York-based [Ezra](#) uses full-body MRIs and artificial intelligence to detect minute changes in the body's organs indicative of cancer or other diseases. It is the first comprehensive diagnostic methodology to screen for the range of cancers that afflict human beings. To date, Ezra has conducted scans on more than 5,000 individuals and discovered actionable diagnoses of disease in 13% of them.

To make MRI preventive screenings more widely accessible — and achieve its mission to "detect cancer early for everyone in the world." Ezra has decreased the cost of full-body MRIs

from \$10,000 to \$1,350 by meaningfully decreasing the time required for scanning and interpretation while increasing the accuracy of its predictive algorithms. Ezra recently announced that it has [received](#) FDA 510(k) clearance for an AI that enhances MRI image quality, enabling the company to launch the world’s first 30-minute full-body MRI.

A third company, Egnite in Aliso Viejo, California, uses precision diagnostics close gaps in cardiovascular care, improve outcomes, reduce healthcare costs and enhance lives. Developed by, and then spun out of Edwards Life Sciences. Its approach is device-agnostic, having the ability to receive data continuously from any cardiac implant. Egnite also uses AI-driven algorithms to uncover disease signals through progressive and retrospective pattern recognition.

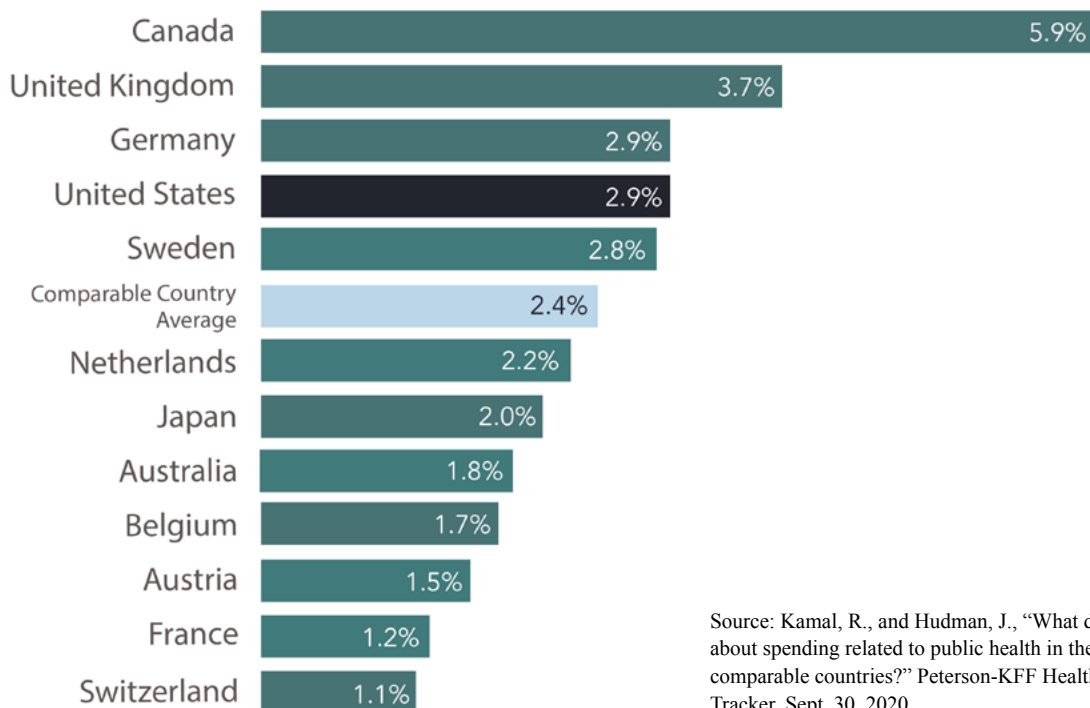
Don Bobo, corporate vice president of strategy and development at Edwards Life Science, which developed and spun out Egnite, stressed that cardiac disease too often is misdiagnosed as a byproduct of aging. Such misdiagnoses lead to needless patient suffering. Bobo believes predictive disease algorithms will become more accurate and actionable over time. This will enable people to lead longer, better and healthier lives.

### AN OUNCE OR POUND OF PREVENTION

The United States allocates a [higher percentage](#) of its national healthcare expenditures to prevention than most other wealthy nations. A study published by the Peterson-KFF Health System Tracker found in 2018 that our nation was tied for third with Germany at 2.9% for spending the highest percentage of its national health expenditure [on prevention](#). [1] That’s the good news.

## Government Preventive Care Spending

### Total National Health Expenditures in 2018



Source: Kamal, R., and Hudman, J., “What do we know about spending related to public health in the U.S. and comparable countries?” Peterson-KFF Health System Tracker, Sept. 30, 2020.

Preventive care spending as a share of total national health expenditures, United States and comparable countries.

The bad news is that the vast majority of healthcare expenditure goes to treat diseases rather than prevent them. Less than 3% goes toward prevention. That is about to change. Data has been likened to oil as the fuel that [drives the digital economy](#). [2] Just like oil in the industrial economy, data requires refinement to provide productive value. For the first time in human history, our expanded knowledge of the human body's mechanics combined with advancing digital technologies give medicine the understanding [DF2] [ECR3] and the tools to spot and expunge disease at or near its inception. Medicine is at the dawn of a new era. Today, it is often too late to reverse disease progression once symptoms present. Imagine a not-distant future where precision diagnosis uncovers disease while there's time to reverse its course. That's a game-changer.

The question we have to ask ourselves is how much higher a percentage of total healthcare expenditure will prevention constitute a decade from now? Will it be 10%, 15%, 20% or more? Whatever that percentage is, preventive care aided by big data analytics will disrupt and revolutionize healthcare delivery. Data will fuel this healthcare revolution. Humanity will be its beneficiary. As a consequence, we will all live longer and prosper.

## SOURCES

1. Kamal, R., and Hudman, J., "What do we know about spending related to public health in the U.S. and comparable countries?" Peterson-KFF Health System Tracker, Sept. 30, 2020.
2. The PyCoach, "Is data the new oil of the 21st century or just an overrated asset?" Towards Data Science, July 21, 2022.

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David W. Johnson is CEO of 4sight Health, Chicago, and a member of HFMA's National Board of Directors.