

PREVENTIVE MEDICINE, THE FUTURE STATE

Over the next two decades, medicine is slated to change from its current reactive form of treatment, to a more proactive, personalized form. As the industry takes its first steps towards preventive medicine, we explore the factors driving this change, the challenges, and the opportunities.



The pharmaceutical industry is in a state of flux. Besides a dwindling drug pipeline and patent expiries across the world, one of the biggest concerns for the industry are the spiraling costs of research and development, necessary for new drug discoveries. Plus, the end customers of the pharma sector, including governments, patients, and insurance companies, are becoming increasingly reluctant to pay the escalating prices for new medicines.

They are demanding more value for lower prices. This sea change raises concerns for the pharma industry that is already facing issues with the existing pharmaceutical model,

which is not likely to yield traditional profits or meet these growing demands. Thus, the industry has started looking for a sustainable model.

Preventive medicine: The next big step

Non-communicable diseases such as cancer, diabetes, and heart disease account for about seven out of ten deaths in America and are responsible for nearly 75 percent of America's health spend. Preventive medicine can help reduce these numbers. At the industry level, the practice of preventive medicine, as opposed to the more traditional reactive



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medicine, helps decrease the cost of patient hospitalization, which puts a huge burden on the system.

The burgeoning field of preventive medicine is a multifaceted system that depends on the collaboration between Big Pharma and start-up biotechs, as well as corporate HR departments and their wellness programs, occupational medicine, and public health officials. The success of preventive medicine depends on such a large ecosystem – especially on the collaboration of private enterprise and public institutions – and of course, leveraging the new, emerging technologies in big data, analytics, and digitization.

Novo Nordisk, a multinational pharmaceutical company based in Denmark, has embraced preventive medicine in an exemplary fashion. Working with the company's partners, including policymakers and health organizations, they are raising awareness, improving access to care, and investing in research. Its program, 'Cities Changing Diabetes,' explores and develops effective ways to address the issue of diabetes across metropolitan areas. It has become a roadmap of sorts for pharmaceutical companies to put preventive medicine into practice.

Today, the technology exists that allows companies to analyze client genome information, clinical or biological makeup, and lifestyle issues. All these factors are combined to prescribe suggestions that are tailor-made for the client based on her genetic composition. Arivale is a biotechnology company that has made big strides in this area; and according to Clayton Lewis, its co-founder, the key focus for the company is to offer solutions that enable the prevention of diseases.

Another company, Quanterix, has developed a technology platform with single-molecule sensitivity that helps identify the presence of proteins released in the presence of diseases, even before the symptoms show up. For instance, potential heart attacks can be diagnosed with Quanterix's technology, which measures the presence of a protein called troponin before the person experiences the attack.

The global pharma giant, Eli Lilly, has undertaken a critical double-blind study in which the company discovered encouraging data that has proved that investigational medicine for migraine prevention can help not just prevent migraines, but also cluster

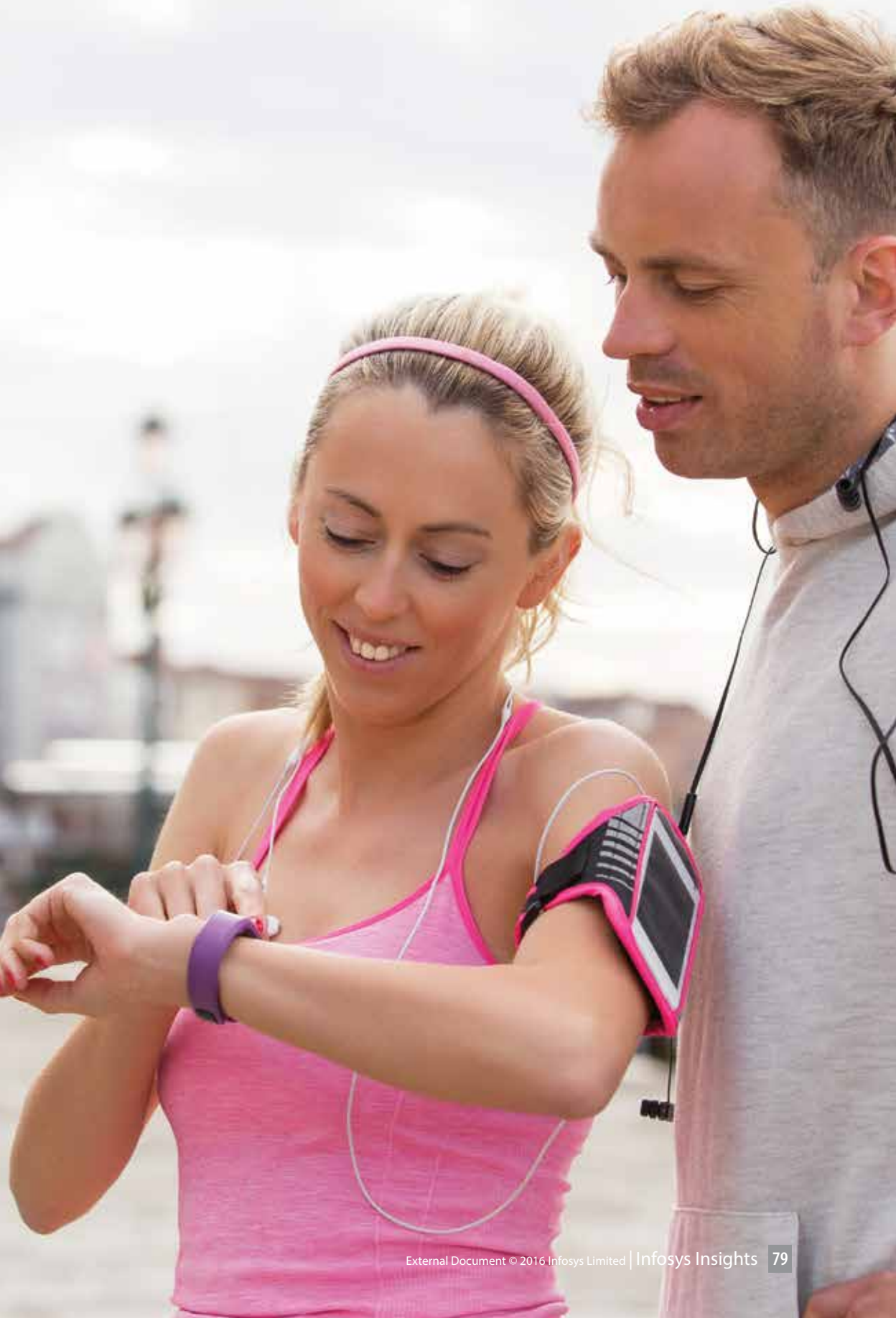
headaches. Most patients suffering from debilitating headaches like migraines, currently get relief only with strong drugs. A preventive medicine for a condition like a migraine can go a long way in allowing sufferers to lead relatively normal lives.

Pivotal role of technology

Many revolutionary technologies are coming together to enhance health, medicines, and caregiving in general.

The availability of health-related information on the Internet, including esoteric data, as well as some popular wearables – such as Fitbit and iWatch, which track our daily activities and the corresponding bodily functions – have led today's individual to be aware about one's health and therefore, more oriented towards preventing health issues and diseases.

The most fascinating aspect, of course, is that these advancements tend to originate in the information technology sector. The same technology that knows that a customer prefers a certain make and style of shirt in a store, and is instantly sent a customized offer to his mobile device while he is in a shopping mall, is what is set to transform the health and welfare of human society. These technologies, which can make short order of the biggest of big data in nanoseconds and pinpoint treatments and medical courses of action, are the tip of the iceberg when it comes to preventive medicine.





Surveys indicate that a majority of the people are keen to monitor their health. The availability of health-related information on the Internet, including esoteric data, as well as some popular wearable devices – such as Fitbit and Apple Watch, which track our daily activities and corresponding bodily functions – have led today's consumer to be more aware about health. This awareness, in turn, has encouraged people to become more oriented toward preventing health problems and diseases. Back in 2007, the concept of 'Quantified Self' was started in the Bay Area, advocating the use of technology to track a person's daily activities in order to measure wellness and health.

IT is providing the technological framework that allows the design of personalized treatments based on family histories and genetic indicators. Because of IT, a patient can go beyond 'self-tracking' and now has the option to find out about a disease she is prone to contract. Additionally, her doctors get the opportunity to manage the disease at an early stage. From that perspective, preventive medicine is empowering people to be more conscious about their health and lifestyle.

Questions, doubts, challenges

Such encouraging instances notwithstanding, life sciences companies have been wary

of making big investments in drug R&D programs that focus on preventive medicine. Companies are uncertain about how evaluation and approval of preventive drugs can be done on time, and marketed to the right audience. Some of the questions holding them back are:

- Is the burden real?
- Are people going to be open to knowing their risk?
- Will drug development be possible at the scale at which it will be needed?
- Will this allow for patent protection?
- Who will pay?

These questions are valid concerns to explore. Pharma companies should make a consolidated list of the core competencies they possess and the areas of disease prevention they can handle. If there are areas that they cannot address, they can perhaps collaborate with other companies that have competencies in those areas. Doing so will save both time and effort.

Let us examine some of these concerns and provide some perspectives.

• Who will bear the cost of new, expensive drugs?

With disruptive innovations, newer business models will emerge.

Let us take the example of the curative drug Sovaldi, to address this question. Considering the cost and the uncertainty around a cure will be factors at play in preventive drugs – just like Sovaldi. This drug has had an excellent track record of curing Hepatitis C. It costs about US\$1,000 a pill, and a grand total of US\$84,000 for the complete treatment. Gilead, the pharmaceutical company that created the drug, priced Sovaldi accordingly.

The pricing strategy seems to have worked; enough people are willing to pay the US\$84,000 to cure themselves of Hepatitis C. Sovaldi, an antiviral treatment aimed at people who already have the disease, does not work universally. However, in many cases, Sovaldi can cure those afflicted with the deadly and debilitating Hepatitis C virus.

It will be a far different situation in a country like India. In the case of Sovaldi, the Indian government would not allow Gilead to use its American pricing strategy, considering the context of affordability will completely change in a developing country. It has been mandated that the entire course of treatment – US\$84,000 in the United States – be lowered to a total of US\$900 in India. So who would absorb the cost if the discount is that steep? It would have to be the insurance companies and the government. The taxpayers will be paying for the drastically reduced cost of the treatment program, and insurance companies will pass on those extra costs to the consumers. In the end, Gilead would recover the cost of its expensive drug, no matter who pays and at what point in the process.

• What about the regulatory conundrum?

For curative medicines, there has been a direct connection between the drug and the patient with a specific disease. For preventive medicines, there is now an indirect

connection between the drug and a healthy person or a person who is susceptible to the ailment.

Elias A. Zerhouni, MD, who led America's National Health Institutes and Centers from 2002 to 2008, in an interview during his NHI leadership, outlined what was then the

upcoming field of preventive medicine. He accurately predicted that we are in a revolutionary period of medicine and referred to the 'four Ps' of medicine – predictive, personalized, preemptive, and participatory.

The four Ps require patient involvement well before the disease strikes, as opposed to the doctor-centric, curative model of the past. The future, he said, is going to be patient-centric and

proactive. It must be based on education and communication. Still, these factors will bring about complexity when it comes to regulations.

• Will people be open to knowing about their innate health risks?

Development of genomic analysis is precipitating, along with preventive medicine, the development of personalized and precision medicine.

The significant shift in thinking and approach is towards truly individualized care. Instead of a one-size-fits-all medicine, which can lead to unnecessary and even harmful treatments for some patients, advanced genomic testing devotes its attention to studying a single individual – the patient whose tumor is being tested. When a study group has just one participant, scientists can focus all their efforts on attacking that patient's tumor at its source, that is, the mutations coded in the person's DNA.

Let us take the example of cancer treatment. The traditional approach is that cancer is

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defined by where it occurs in the body (e.g., lung cancer). Then, the treatment that follows is directed toward the lungs using various types of chemotherapy.

In recent years, though, researchers and physicians have found that a particular cancer in one patient doesn't necessarily behave the same way in another patient – even though the cancers are in the same location. Some cancers even bear similarities to cancers that were once thought to be completely different. A breast tumor, for example, may look and act like a lung tumor. By looking at the tumor's genetic profile with genomic testing, physicians might be able to recommend a drug or protocol not previously considered. Imagine using a traditional breast cancer therapy to prevent a lung tumor.

Another approach with enormous potential is what is known as chemoprevention, which is the use of various agents to stop the initial phases where cancerous cells begin to mutate. Interest in this area of research has spiked because doctors are increasingly understanding the biology of how cancer begins and how they identify potential molecular targets. When people know about their vulnerability to diseases, they will be more likely to discuss prevention with their doctors.

• How to create a market for preventive medicine / prevention approach to healthcare?

The market for preventive medicines will

function in a pay-for-outcome model, among others. An existing example of this model is the Social Impact Bond (SIB), also known as a Pay for Success Bond or a Social Benefit Bond. Whatever the name, think of the bond as a kind of contract between an investor and a public sector that is committed to improve social outcomes. The idea here is that improving social outcomes translates into public sector savings. In such an arrangement, the private sector pays for smaller-scale, exploratory social interventions. If the specific program goals are met, the investors receive a payout. As these programs prove themselves, they can eventually be considered for use on a larger scale with public sector funding.

SIBs are not as common in the United States as they are in the United Kingdom. In a report released in April 2016, Mark Pauly, a professor of healthcare management, economics, and public policy, at the University of Pennsylvania's Wharton School, along with his colleagues, studied the potential for Social Impact Bonds in the pharma industry. Professor Pauly concluded that for SIBs to work in this industry, there would have to be a concrete, provable cost reduction in a program.

Another success factor would be to engage investors in the projects. Better still, private entrepreneurs might be inclined to accept lower returns than they might in a traditional investment because they are investing in the name of altruism. But they do not want to settle for zero returns, either. Having private sector investors tends to ensure that a



project is not only funded, but carried out successfully.

An American project, Social Finance, is currently working on a pilot program that it hopes to turn into the first major healthcare SIB in the nation. It is based in Fresno, California, which has one of the highest rates of asthma among American children. According to a report by Healthcare Finance News, 20 people are treated every day in the emergency room for asthma complications at a cost of some US\$35 million annually.

Members of Social Finance are working with 200 low-income families to provide education and home care to reduce environmental factors that can aggravate asthma. Their goal is to reduce emergency room visits by 30% and hospitalizations by 50% over the course of a year, which the group estimates could save US\$5,000 per child annually. Insurance claims data will be used to measure cost savings. Indeed, as the pay-for-outcomes paradigm becomes increasingly successful, people who

eat healthy and adopt healthy lifestyles will receive attractive incentives for doing so.

The global potential

Preventive medicine is taking shape in markets that can afford access to cutting-edge IT. Therefore, it has the potential to become a truly global solution, especially when integrated with the existing systems in developing countries, such as telemedicine.

The retail, manufacturing, aerospace, and financial services industries are using software, hardware, and big data-crunching programs as keys to unlocking solutions to decades-old problems. So too, are leaders in the life sciences and healthcare sectors – specifically in the context of preventive medicine. This new way of approaching health and wellness will be a fundamental transformation, not only in the way the healthcare ecosystem operates, but in collective attitudes toward health.

About the Author



Subhro Mallik

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Since joining Infosys in 1998, Subhro has held multiple leadership positions in areas such as client management and delivery in the Life Sciences and Infrastructure business units. He has worked on large, complex, strategic initiatives for clients across multiple service offerings, such as management consulting, IT, and BPO services across the globe. In his current role, he is accountable for the Infosys Life Sciences business.

Prior to his current responsibilities, Subhro was responsible for managing client relationships for a top-five pharma company in the US. This account today has expanded to include IT, BPO, and consulting services spanning the US, Europe, and Asia. In addition, he has played multiple roles in project delivery, where he successfully delivered development, reengineering, and maintenance projects within budgets, ensuring high customer satisfaction.

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