

The story of Peter and Louise and their journeys through the changing healthcare systems of the future.

By Linda Brookes

# Growing Up Into Preventive Care

*In 2010, a girl, let's call her Louise, and a boy, whom we'll call Peter, are born to two families. This is the story of how advances in healthcare could impact the lives of these two babies as they grow up over the coming decades. Both of them are fortunate: their parents live in developed countries that have nationwide healthcare systems intended to cover the whole population. However, the success of these systems in keeping Louise and Peter in good health will depend on a number of factors, including advances in medical and technological research, and how these will be incorporated into future healthcare services.*

Despite living in comparatively high-income countries, Louise and Peter may have different experiences within the healthcare system. Louise's family is well-educated and relatively wealthy, with sufficient means of purchasing additional healthcare above the basic services guaranteed by their provider. Peter's access to healthcare is less secure because his family receives its healthcare through his father's temporary employment. If Peter's father loses his job, he could lose access to all but basic healthcare. Louise's parents do not smoke, avoid junk food, moderate their alcohol intake, and exercise regularly; Peter's parents live a less healthy lifestyle. Children usually follow the example of their parents.

Louise's parents are concerned that she may be at risk for breast or ovarian cancer later in life. Genetic testing has revealed Louise's mother has a breast cancer susceptibility gene 1 (BRCA1) mutation. This means her chance to develop breast cancer or ovarian cancer during her lifetime is greatly increased, and she also has a higher risk for other cancers. Louise's mother is screened regularly with ultrasound, mammography, and magnetic resonance imaging (MRI) for breast cancer, as well as transvaginal ultrasound, blood test for CA-125 antigen, and clinical examinations for ovarian cancer. Luckily, no tumors have been identified to date. Louise's parents know that their daughter possesses a very high risk of having inherited the gene variant and are sure to have her tested as well. This used to involve having a blood sample taken by a doctor and sent to a laboratory and waiting several days for the result. Now, this is done using a portable device ("lab-on-a-chip") and the result is available within minutes. It shows that Louise does carry the BRCA1 variant. Her physician assures her parents that counseling will be available for the family and that Louise will have regular cancer screening from age 30 onward.

## Lifestyle Diseases

By age ten, Peter is already overweight, like one-third of schoolchildren in

See imprint on page 85 for a listing of experts who provided input for the composition of this scenario.



# Direct Interaction Will Define Future Healthcare Brands

By Gil Bashe

During the next 50 years, healthcare providers will face a more challenging competition that will demand perceptible marketing initiatives: health services will be increasingly evaluated and selected autonomously by well-informed, responsible patients – their prospective customers. Moreover, expectations and decisions of these customers will increasingly intertwine with the reimbursement decision-makers' final tabulation or intuitional budget – especially when the 'pay-for-quality' approach will be gaining ground worldwide. After all, social media and patients' immediate ability to connect and influence physicians, payers, and policymakers will be everyday practice.

Look up any given product today – medical devices, treatments, or health services – on the Internet and you can instantly access testimonials, conversations, and debates. Second opinions and crowd-sourcing are available at patients' fingertips, and are a trusted source of information.



*Gil Bashe, Executive Vice President, Health Practice Director at Makovsky + Company, has devoted 30 years to helping health professionals, patients, payers, policymakers, and health-product innovators find common ground. He is coeditor of Branding Health Services: Defining Yourself in the Marketplace.*

Only the most trusted companies will have a voice in the conversation. Digital communications will not only change the way we interact, they will alter how we act on healthcare needs or wants. Going forward, memorable brands will edge out competitors by incorporating immediate gratification power (e.g., knowledge) into their designs. Whether for women at risk of breast cancer or patients with a cardiovascular disease history: the considerations will be accuracy, speed, cost, transparency, and sustainability.

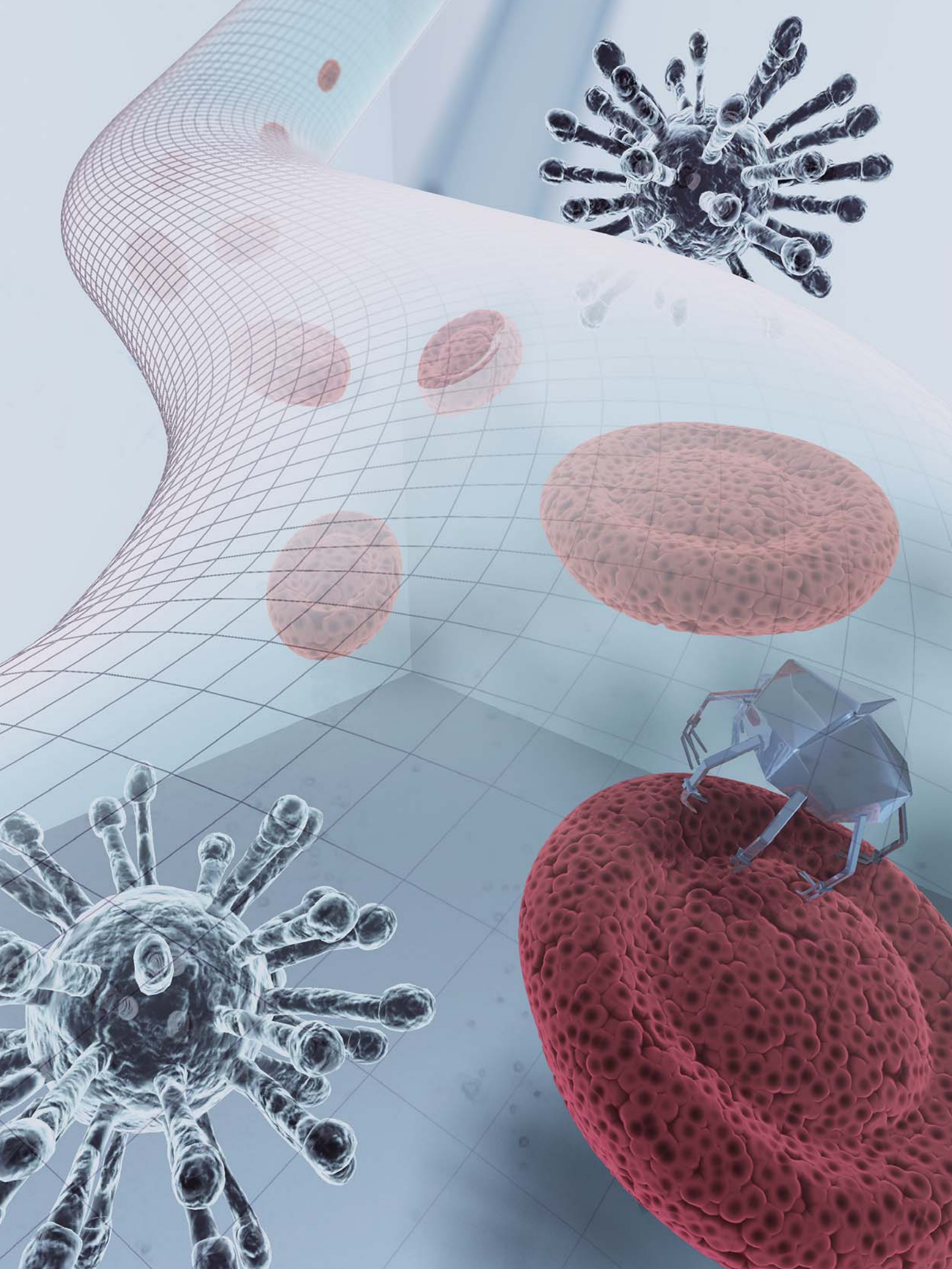
In the future, customers who come in contact with data, diagnosis, and health delivery will be voicing their opinions on the brand publicly and in real-time. Interacting, listening, and responding almost immediately to these patients will be key to ensuring relevancy in their lives. These consumers will want accurate information at eye-blinking speed and will increasingly attach importance to guaranteed sustainability. Personnel desires will weave together with societal concerns.

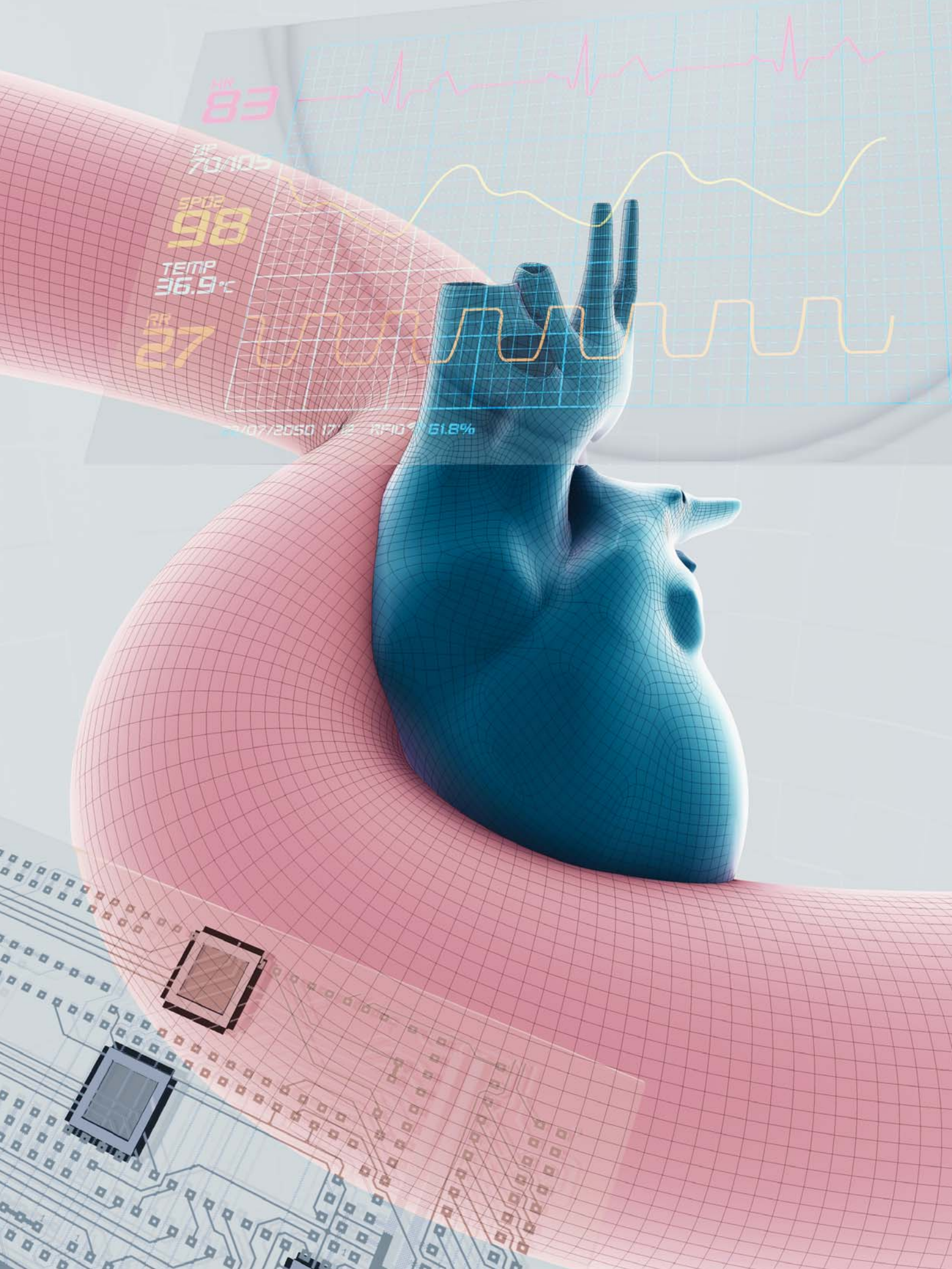
We will find that as Generation X and Y consumers enter their senior years, healthcare providers and policymakers will be confronted by consumers who react less to flashy bells and whistles and are more interested in engaging in a two-way dialogue. For medical brand builders, the key to good performance lies in the ability to communicate immediately as much as it does in the ability to innovate consistently. It will be all about championing customer expectations – now.

developed countries. This places him at increased risk for future adverse health effects, including hypertension, hyperlipidemia, and diabetes. His grandfather had heart disease, and his father and mother are overweight with a body mass index (BMI) above 25, with high blood pressure, high LDL cholesterol, and type 2 diabetes. Both parents are taking appropriate medications, but are at high risk for cardiovascular disease. By age 20, Peter also is obese and already has high blood pressure, LDL cholesterol, high

blood sugar, and high sensitivity C-reactive protein (hs-CRP). "Smart" pill bottles relay information to his doctor and pharmacist about whether he has been adhering to his prescribed medication regimen. In 2035, Peter's 55-year-old father has chest pain, and an ambulance is called to the small town where he lives. His health data on record has already been accessed by the paramedics in the ambulance as well as the hospital to which he will be taken. With portable technology in the ambulance, the paramedics run an ECG

and perform a troponin test along with other biomarkers. The ECG shows that he is having an ST segment elevation myocardial infarction (STEMI) and that he could benefit from interventional revascularization. The area of infarction is identified by 3D echocardiography and relayed to the cardiologist, who now knows exactly where the coronary artery is blocked and where to intervene. Diagnostic tests are used to assess the risk of potential complications, such as bleeding, which can be induced by additive drugs that are





HR  
**83**

BP  
**70/105**

SpO2  
**98**

TEMP  
**36.9°C**

RR  
**27**

2023/07/20 17:22 RFID 61.8%

# What Lies Ahead for Electronic Health Records and Information Technology?

In the coming decades, the cost of healthcare will continue to rise as a result of increases in chronic diseases and the aging population. Organizations that fund healthcare will face the challenge of streamlining healthcare services, making them more effective and keeping costs down. A major part of this will be achieved through the global introduction and use of electronic healthcare records (EHRs). In the past, most EHR systems were designed to record occasional clinical encounters between patients and healthcare professionals and/or the diagnosis and treatment of diseases. The next generation of EHRs will include a patient's individual genome, proteome, metabolome, and health data, including results of diagnostic tests, imaging, and treatment history, entered automatically from birth into computerized databases. EHRs are intended to eliminate paper records, although opinions vary as to whether this will actually happen.

Although EHRs will be managed by healthcare organizations, patients will be able to access their own personal information online. Authorized healthcare personnel, including emergency paramedics, will also be able to access patients' EHRs directly, but will require authorization from each patient to do so. Ownership of individual data will remain with the patient. Patients will be able to access their own EHRs from different locations at any time. By 2050, everyone may have an implanted electronic chip containing an access code that allows wireless access to their personal data. Patients could also use electronic

devices similar to smart phones to move data from home monitoring devices to their EHRs. EHR databases must be compatible for the generation and exchange of health information and data security worldwide. By 2050, it is anticipated that there will be robust global standards for EHRs based on those currently emerging in the United States and Europe.

The use of the information will drive standards, which is important not only to access information, but for the ability to apply computer-modeled knowledge to it. By 2050, computing power up to 100,000 times greater than exists today will be available to provide the kind of information technology needed for access and security. In order to address concerns about privacy, all the data will be encrypted – by 2050, computing power will be sufficient to achieve this.

The EHR database will also be used as a knowledge engine of best practices by physicians to help them reach diagnoses and prescribe treatment by comparing their own patients with other, similar cases worldwide. The data could also be made available for research – for example, for use in observational follow-up studies of drug treatments. This would afford the opportunity of studying real-life data, as compared with data from clinical trials, to estimate the effectiveness of a specified therapy. Since patients would own their own data, each individual would be able to decide whether or not their personal data would be made available for use in this way.

administered during interventional revascularization. Peter's father is then treated with percutaneous coronary intervention (PCI) with a stent.

## Breast Cancer Treatment

At age 30, Louise is being monitored for breast cancer. Imaging techniques, where tumor-sensitive tracers are applied, specifically mammography, ultrasound, and MRI, are now able to detect tumors up to a decade earlier than tumor markers and with less risk of false-positive results. The screening process is also more comfortable for the patient. Louise's mother has

had a positive test and undergoes treatment at a specialist center, which she has located from databases comparing hospitals' success rates in treatment of her type of breast cancer. Her treatment is based on tailored therapy with chemotherapy and radiation delivered by nanotechnological microscopic robots that target malignant tumor cells with high specificity.

By 2040, high-income countries with aging populations, such as those where Louise and Peter live, are having to cope with increased costs for treatment and long-term care. Healthcare payers seek

to prevent chronic conditions by lifestyle improvements, and they are reluctant to pay for treatment for "diseases of civilization" such as those previously suffered by Peter and his family.

## Taking Personal Responsibility

Affected by this trend, as well as his own tests, including molecular imaging of his atherosclerosis, which shows his own increased risk of myocardial infarction, Peter takes control of his health. With the help of educational material provided by his local healthcare center, he starts bicycling with his son and eating healthier

and at home. He measures his own blood pressure, cholesterol, blood glucose levels, and other risk markers. The results are transmitted wirelessly to his physician and stored as part of his electronic health record by a device he uses at home. All relevant information is automatically transferred to specific databases at local and worldwide servers. When Peter achieves normal readings over a consistent period, his physician receives a 'pay-for-performance' fee. Both Louise and Peter and their partners decide to have their first children tested with genome sequencing as babies, which is now inexpensive. It reveals the diseases they are most at risk for and also how they would respond to a range of diagnostic tests and treatments. Louise already knows that her baby daughter does not carry the same cancer risk as she and her mother do. She was already

screened as an embryo: neither she nor her descendants will face this genetic form of breast cancer or ovarian cancer in their adult lives. Louise's cousin, who carries the same gene mutation, hopes that during her pregnancy, the defective gene can be repaired by gene therapy in utero.

In 2045, new screening methods and imaging techniques have revealed that Peter's mother has early signs of Alzheimer's disease. Although no definite cure is yet available, following early detection and definitive diagnosis, medical treatment is available to slow down the onset of the disease. By 2050, Louise's mother's cancer is still in remission. She has an implantable sensor that can detect tumor markers and relay the information to her so that she can immediately contact her physician and begin treatment, if necessary. A new, more specific urine and gene

test for prostate cancer has also allowed Louise's father to have early, cancer-preventive vaccine treatment.

The outlook for Louise and Peter and their children is bright. The children will be part of the first generation to benefit from personalized medicine throughout their lives. Advances in medicine and technology mean that, in their countries, life expectancy in 2050 is more than 90 years for women and more than 85 years for men.

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### Further Information

[www.siemens.com/  
personalized-medicine](http://www.siemens.com/personalized-medicine)

## Reimbursing Quality and Effectiveness

*Medical Solutions* asked an expert journalist to cast a look into the future of reimbursement. Read why the 'episode-of-care' or 'pay-for-quality' approach will become commonplace across the globe, while personalized medicine will become firmly established during the period 2030 to 2050.

By Anthony Beachey

Western European countries and the United States have traditionally reimbursed healthcare providers by using a 'fee-for-service' approach, whereby a payment is received following the provision of a service. However, one of the main drawbacks of this system is that there isn't necessarily a relationship between the actual cost of the service and the amount of money that is reimbursed, which inevitably has implications for cost containment.

What's more, the fee-for-service approach evolved before the advanced economies began to face the increasing healthcare burden associated with aging populations. The epidemiological environment

has partly shifted, and the highly sophisticated technology commonplace today had yet to be introduced.

Unsurprisingly, in light of demographic and other changes and its disadvantages in terms of cost containment, the fee-for-service approach is now giving way around the globe to payment of a lump sum for all services related to a condition or a disease. Hence, a provider receives a single, bundled fee for an episode of care, such as a hip implant, a few months' cancer therapy or the treatment of a chronic disease.

Certainly, the lump-sum approach facilitates a more effective containment of costs than the fee-for-service concept.

This is even more so with the pay-for-quality approach, where predefined quality indicators are strongly tied to the reimbursement and healthcare providers thus rewarded to deliver high-quality care. By contrast, under fee-for-service, providers are rewarded for fixing problems that better care might have prevented, and there are hardly incentives tied to predefined quality standards. Episode-of-care was first introduced in the U.S. and Australia and was adopted in Germany in 2003. The U.K. is currently in the process of rolling out episode-of-care reimbursement, and it seems likely that episode-of-care, as well as pay-for-quality, will sweep across the globe in the