

Smart medicine technologies set to herald major changes in China but high costs could be an issue

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Rapid advances in an array of technologies are coming together to enable a tipping point that will fundamentally change medical capabilities over the next decade. But experts say changes in healthcare systems are needed to provide the benefits of these advances to the whole population.

Genomics, the study of the impact of genes on health, is moving quickly because new big data analytical techniques and databases are allowing scientists to explore complicated relations among hundreds or thousands of genes.

Pharmaceutical companies are working on “precision medicines” that can target cancers in an individual. Artificial intelligence (AI) routines, developed through machine learning, can provide more accurate diagnoses than most physicians.

A key concern about smart health is whether it will be cost-effective and affordable for ordinary people. Developing precision cancer drugs especially designed for a patient’s genome now requires highly skilled scientists and technicians and is expensive — maybe too expensive to be widely used.

On the other hand, some smart health technologies may save money and improve treatment. For example, wearable body sensors combined with AI routines may lead to cheaper and more effective treatment of diabetes.

AI programs may allow all doctors, including family doctors, to make better diagnoses. And Telemedicine makes treatment easier and more convenient.

Dong Chaohui, vice-director of the National Institute for Social Security of the Ministry of Human Resources and Social Security, said the ministry is “already thinking about including precision medical drugs and genetic tests in basic coverage. The concern is that genetic tests are still expensive. If we use this technology, it should be available to everybody.”

Similarly, Jay Siegel, dean of the Health Science Platform at Tianjin University in North China, emphasized the need to prioritize expenditures on healthcare.

“Certainly the use of genomics to plan personalized medicine has an enormous push in China and will have clinical applications relatively shortly, but they are going to be high-cost. We should celebrate that there will be some people who have access to frontier treatments,” he said.

“But a universal healthcare policy still has to be cost-based if it wants to achieve the vision of making develop-



A robot with artificial intelligence programs can provide services to the elderly. PHOTOS PROVIDED TO CHINA DAILY

Healthy strides



Doctors at a hospital in Haikou, South China’s Hainan province, use a remote diagnosis system to provide medical services to a patient in Sansha.

ment people-centered and balanced.”

In June 2016, China announced a 60 billion yuan (\$9 billion) precision medicine research and investment program — by far the largest such program in the world. Guidelines issued by government agencies, including the National Health and Family Planning Commission, say that a big data system including a unified and interconnected public health information platform should be created by 2020.

The State Council, China’s cabinet, also issued guidelines that encourage a greater development role for “socially innovative forces”, such as

startups and other Internet-based healthcare companies.

“The initiative won’t just help improve related public health services, but will also play a big role in economic and social development,” said Jin Xiaotao, vice-minister of the National Health and Family Planning Commission.

Chinese companies and researchers are leading the world in some types of smart health technology. BGI (formerly the Beijing Genomics Institute), iCarbonX and WuXi NextCODE are among the leaders in genomics and data analysis.

Siegel sees collecting, analyzing

and applying data flows as the key to transforming medicine.

“Think of all the ways that you could collect data,” he said. “Body sensors, genotyping, clinical trials. It all goes into this huge well of information. The question is how do you distill an essence out of the pool and to what end?”

“There are various AI methods, and statistical methods, and they serve different purposes. They can lead to personalized diagnoses, effective clinical trials, broad validation of efficacy, or analyses of post-launch efficacy, just to name a few.

“If you are monitoring a patient

continuously, you can watch the effects of the drug on a much tighter regime. Therefore, you can control dosage and treatment regimes. So, big data is at the center.”

China has a comparative advantage in big data because it has the world’s largest data sets. Even some individual big city hospitals might have thousands of beds, making very large clinical trials possible.

But access and usability of that data can pose a problem. Much of the data is not standardized and there is no clear legal procedure to allow researchers or government officials to gain access to it.

Li Lanjuan, an academic with the Chinese Academy of Engineering, said China by 2020 would have the world’s largest health data pool, covering more than 1.4 billion people. “Assessment of data helps authorities devise more targeted disease prevention and health management plans,” she said.

Currently, each large hospital has its own data platform, making data sharing difficult, she said.

Siegel said: “China has huge leads in genomics research. In AI, they are both leading and trailing. They are leading because there is a lot of really sophisticated research going on, but limitations in Internet and computer access are hindering the way this information is distributed.”

Dong, of the Ministry of Human Resources and Social Security, said:

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