

## International public health organizations need to guide innovation in public health

Dear Editor,

Over the centuries, innovations occurring outside the context of medical science (e.g., new technology and techniques) have had a great effect on human health. For example, technological improvements in water and sanitation helped eliminate dysentery as much, if not more than, medical interventions.

A similar trend remains today, as technological advancements in computer science, genetics, nanotechnology, robotics, and other applied sciences are expected to lead to profound changes in the nature and delivery of health care. While some critics claim innovation in medical and other technology has promised more than what it has delivered thus far, fast-growing markets for telehealth, radiology/imaging, robotics, and personalized medicine indicate the potential for substantial changes in the near future, as described below.

**Telehealth.** The modality known as “telehealth” involves a new approach to health care in which the patient has a much more active role, and, through the use of communication technology, more and more services are removed from the confines of hospitals. Scaling up this new paradigm of health care will require adjustments to health worker profiles as well as payment procedures and quality control. Telehealth includes the provision of remote health care services, using computer-assisted telecommunication to diagnose and treat patients and provide surveillance and support to isolated populations. The global mHealth (mobile health) market, which is based on the use of mobile technology, was estimated at US\$ 6.6 billion in 2013 and is expected to reach US\$ 20.7 billion by 2018, with a yearly increase of about 25.5%.<sup>1</sup>

**Radiology/imaging.** Advances in diagnostic imaging technology have redefined how physicians diagnose and treat some of the most life-threatening diseases, such as cancer and heart disease. Globally, X-ray technology is the most frequently used imaging procedure, with more than 100 million X-ray exams conducted per year. Other common types of diagnostic imaging include computed tomography (CT) scans, magnetic resonance imaging (MRI), ultrasound, and nuclear imaging. The global diagnostic imaging market is expected to reach approximately US\$ 27.1 billion in the next five years.<sup>2</sup>

**Robotics.** The demand for medical robotics is increasing significantly. In addition to a high level of accuracy, robotic procedures offer significant cost savings in pre- and post-operative care, and reduce patient length of stay at hospitals. Technological advancements creating expanded applications of robotic systems, robotics combined with imaging platforms, and capsule

robot systems are expected to drive the growth of the global medical systems market in the next few years. The global medical robots market is expected to reach US\$ 11.4 billion by 2020 from an estimated US\$ 11.4 billion by 2020 from an estimated US\$ 4.2 billion in 2015, at a compound annual growth rate of 22.2% during the forecast period.<sup>3</sup> The consequences for human resource planning could be substantial, as public health facilities would need engineers as much as health assistants and technicians.

**Personalized medicine.** Genomic testing enables physicians to identify an individual’s susceptibility to disease; predict how a given patient will respond to a particular drug; reduce the incidence of adverse reactions to drugs; increase the efficacy of treatments; and, ultimately, improve health outcomes. The personalized medicine market in the United States alone has already reached US\$ 232 billion and is projected to grow 11% annually. The core diagnostic and therapeutic segment of the market is estimated at US\$ 24 billion and is expected to grow by 10% each year, reaching US\$ 42 billion by 2015. The related nutrition and wellness market—including retail complementary and alternative medicine offered through consumer and food and beverage products—is estimated at US\$ 196 billion and is projected to grow 7% annually to more than US\$ 290 billion by 2015.<sup>4</sup>

Given the expected changes in health-related technology and markets described above, international public health organizations should consider developing a plan to guide innovation and help deal with the anticipated changes that will occur in the public health sector. This could include the following tasks:

- a) Guiding collaborative efforts across countries in their regions. Increased collaboration would require open debate on the potential effects (e.g., management changes that would need to be implemented, human resource needs, and legal/ethical issues). While it may be too soon to address these issues, the questions that need to be resolved could be reduced to a few essential ones, and the experiences accumulated thus far by different initiatives compiled and assessed;
- b) Mapping technological excellence in developing countries to guide South–South collaboration in the advanced sciences in each region. At the same time, address disparities in the level of development across and within countries (e.g., in India and Brazil, access to basic services is problematic for rural/remote populations, but both countries host companies producing advanced technology);
- c) Using evaluation studies to assess selected programs that have implemented innovation to determine the replicability and economic consequences of the technological advances;

<sup>3</sup> <http://www.marketsandmarkets.com/PressReleases/medical-robotic-systems.asp>

<sup>4</sup> <http://www.prnewswire.com/news-releases/232-billion-personalized-medicine-market-to-grow-11-percent-annually-says-pricewaterhouse-coopers-78751072.html>

<sup>1</sup> <http://bit.ly/1JIBbgc> and <http://bit.ly/VgiRZ6>

<sup>2</sup> <http://www.researchandmarkets.com/research/4j5pt9/diagnostic>

d) Advocating for equity to prevent for-profit enterprises from monopolizing technological innovations and knowledge to serve and benefit only the richest part of the population. For example, the health needs of the largest segment of the world's population—resource-poor and vulnerable groups—should be addressed and used to define priorities in research and applications.

The path to innovation in public health can not be left in the hands of market forces alone. Countries need support from international public health organizations in determining the

important choices that must be made in the near future to avoid increased inequity in health, quality of services, and economic sustainability of public health systems.

Sincerely,

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