

# How Taiwan uses health information technology to bring better health to more people

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Taiwan is a small island country with a land area of 14,000 square miles and 23 million people. In 2008, people over 65 accounted for 10.4% of the population. The average life expectancy for women was 81.9 years; for men it was 75.6 years. Health expenditures accounted for 6.4% of national GDP, while Taiwan's medical care system was rated the world's second-best by the Economist magazine.

Taiwan has about 500 hospitals and 20,000 clinics administered and operated by 37,880 physicians, 5,290 traditional complementary medicine (Chinese medicine) practitioners and 11,351 dentists to provide health services.

The current National Health Insurance system was initiated in 1995. This is a single-insurer, mandatory system that covers the entire population; its subscription rate is 99% and the citizen approval rate of the program is nearly 80%. Clearly this is one of the world's most successful national health insurance programs.

Electronic links between Taiwan's medical care institutions are central to the National Health Insurance system. This Health Information Technology (HIT) has five special features worth noting here:

The first is the electronic claims system. This was the first step taken by many medical care institutions in linking to the national system. By 2000, this electronic claims system had 100% coverage, and many medical care institutions

have begun to digitalize other functions (as will be discussed later).

The second special feature is the Health Smart Card, a widely noted innovation of Taiwan's eHealth system. In the National Health Insurance system's early days, each insured individual was issued a paper card with six coded spaces; medical care institutions would stamp one space for each visit. While reimbursement claim fraud could be prevented this way, it was a waste of paper and printing costs. Since 2004, the Health Smart Card has been used instead to both prevent fraud and store medical information in a convenient form.

Upon each patient visit, the doctor registers information regarding diagnosis and medication on the card. This card also registers medicines that the holder is allergic to, as well as her or his wishes regarding organ donation and hospice/palliative care. The Bureau also issues a medical personnel card. To read information, one needs the patient's smart card, the medical personnel card and a special card reader connected to the National Health Insurance network for verification to protect individual privacy.

The third special feature of Taiwan's HIT is the use of kiosks in hospitals. Medical care institutions in Taiwan seek new information technologies to improve service quality and efficiency, and kiosk use is a good example of

this. Practically all medical care institutions make a kiosk available for patients to register. As there is no gatekeeper in the NHI system, people use the kiosk to make appointments for all specialist clinics and to pay for medical expenses using credit cards. Some hospitals also provide patient portals through their kiosk systems. By using their smart cards, patients can collect personal health records such as laboratory test results and medication records.

The fourth special feature is telehealth, which extends health services through IT infrastructures beyond hospitals. Taiwan began telehealth programs in 1995 to care for people in mountain areas and offshore islands, where medical resources were inadequate. Of the various services, air emergency rescue combining real-time tele-triage and medical aviation services is most outstanding. To handle an aging population and changes in disease patterns, a telecare services pilot project was conducted in 2008. Information technologies created a user-friendly interface for three service models: community-based, home care and institutional telecare services. This provides a mutually linked electronic care records exchange mechanism and verification environment. Through these services, users at home, outdoors or in care institutions can access continuing care.

As in many countries, electronic medical records promotion is currently an important task for Taiwan; this is the fifth special feature of our health information technology system. As Taiwan's is a single-insurer system, most hospitals are information-oriented, with some 500 hospitals are currently in Stage 3 or Stage

4 of the US HIMSS EMR Adoption Model. Many doctors providing medical care services at clinics or in hospitals use CPOE 100 percent. Doctors also can perform medication reconciliation on patients using National Health Insurance databanks. Last year we completed development of a national medical image exchange center; this will be expanded this year to serve the national electronic medical record exchange center.

The first stage of Taiwan's eHealth was the E-Stage, focusing on the electronization of processes. The second stage is the M-Stage, focusing on mobile computing. The third stage is the U-Stage, pursuing ubiquitous computing. Most hospitals in Taiwan have completed the first stage, and have installed wireless networks to provide high-quality point-of-care services through the use of Computer on Wheels as they advance toward becoming U-stage hospitals.

A public poll of readers conducted by the British Medical Journal in 2007 shows that of the 15 most important milestones in medical care in the 166 years since the BMJ first appeared in 1840, computers and health information technology were rated 10th with 11,341 votes, ranking alongside such major medical advances as antibiotics, anesthesia, medical imaging and DNA research. Taiwan's case shows how health information technology can improve access to medical care and increase efficiency of services, allowing high-quality medical care to be provided to more people at lower cost.