The Future of Telemedicine

Telemedicine has the potential to improve medical services for large populations in rural communities where quality care or medical services are limited. By enabling fast delivery of medical resources, telemedicine plays an important role in promoting hierarchical diagnosis and treatment, strengthening medical collaboration, and fueling new ICT technologies for services. Huawei has recently partnered with the First Affiliated Hospital of Zhengzhou University in a pilot project to develop a telemedicine system and joint innovation center in Henan Province, China.

With a population of over 94 million and a rich cultural heritage, Henan is a large province that remains economically underdeveloped. And, although the First Affiliated Hospital of Zhengzhou University provides top medical services for the region, quality resources for the province rank well below the national average. As a result, the hospital sought partners to help build a telemedicine system to distribute quality healthcare, medical treatment, disease prevention, education, research, and rehabilitation to vast regions within and outside Henan Province.

The hospital first created a regional medical collaboration alliance in 2012 and adopted ten technology support measures to member hospitals, such as 10 Mbit/s optical fiber connectivity, teleconsultation terminals, and access to other free digital resources. The hospital invested heavily to upgrade the hardware and software platforms throughout the alliance to bring diagnosis and treatment services to more patients through telemedicine. With Huawei’s advice and support, Zhengzhou University built the Telemedicine and Medical Big Data Joint Innovation Center inside the hospital.

Telemedicine for the Public Welfare

Based on the resources of a top, large-scale, and full-service hospital, the Henan public telemedicine system has the advantage of accessing primary medical and health services that balance affordability with access to export resources.

Today, Zhengzhou University Hospital has the largest-scale telemedicine system, the highest technical standards, and the most sought-after telemedicine capabilities in China. By the end of 2014, the Telemedicine Center of Henan Province had deployed 128 sets of teleconsultation devices in 108 counties of Henan Province and connected to hospitals in other provinces, such as Sichuan, Fujian, Gansu, and Anhui provinces, through cooperation with more than ten leading domestic and international medical information enterprises.

Upgraded Telemedicine Services

In 2014, the telemedicine center conducted more than 10,000 consultations on intricate cases, gave more than 30,000 specialist diagnoses, and received more than 40,000 inquiries through the telemedicine platform. On average, there had been 70 audio and video telemedicine consultations conducted every day — up to 120 in peak periods — and more than 100 specialist diagnoses a day. During peak hours, the three specialist consultation rooms, one multidisciplinary consultation room, and the command center were overloaded.

Though impressive, this high level of activity was insufficient to meet the demand for services, so much so that the goal of extracting better information through data mining and analysis was hindered by the operational priority of scheduling and managing day-to-day telemedicine services.

Constructing a Four-Level Telemedicine Service System

As joint partners in the development of a second-generation, ICT-based telemedicine platform, Huawei and the First Affiliated Hospital of Zhengzhou University have built a four-level (province-city-county-township) telemedicine service system that defines the future of telemedicine in the region.

The project began with an upgrade to the following telemedicine infrastructure that is now connected with more than 120 county-level hospitals in Henan Province and associated hospitals in other provinces: teleconsulting facilities, specialist centers (imaging, ECG, and pathology), emergency care, surgical recording and playback, intensive care, call center, data center, and medical education.

Based on these achievements and to reduce service pressures brought by growth in demand for consultation, mobile informatization, and Big Data analytics, Huawei and the hospital have launched a next-step project in the Joint Innovation Center that leverages the talent and technology advantages of both parties. The project aims to build a flattened telemedicine service system with these features:

- Top-Level Design and Step-by-Step Implementation: Huawei and the hospital will jointly explore future implementations of telemedicine, formulate a panoramic plan for the entire telemedicine ecosystem, and sort out implementation steps based on this top-level design.
- Two-Level Distributed Cloud Platform for Data Sharing and Collaboration: Large hospitals in the 18 cities across Henan Province will be tightly coupled with the Zhengzhou telemedicine system. A province-wide collaboration platform will be constructed with a two-level (province-city) distributed cloud architecture. This platform will enable distributed data storage and service operations in both the provincial data center and municipal sub-centers to ensure the high availability and reliability of the platform.

- Teleconsultation for Mobile, Grassroots Coverage: A convergent teleconsultation platform will be established to upgrade the existing telemedicine platform. The platform will provide client applications through PC workstations and iOS or Android smart phones and tablets. The host platform also allows for customized terminals at grassroots medical institutions to further increase coverage.

- Big Data Analytics: The Huawei FusionInsight Solution — including the FusionInsight HDP distributed data processing system and the FusionInsight Miner analysis platform — will be used for the hospital’s new medical Big Data initiative that is designed to capitalize on the analytical strengths of third-party medical application providers.

- Active-Active Platform Ensures Service Continuity: The network and services of each medical institution in the province will be connected to two data centers. During normal operation, the two centers will simultaneously provide services. If a fault occurs in one center, the other center will smoothly take over to ensure service continuity.

- Collaborating in the Construction of Telemedicine: Huawei and the hospital are collaborating in the construction of the Telemedicine and Medical Big Data Joint Innovation Center, Huawei and the First Affiliated Hospital of Zhengzhou University are expanding the quantity and quality of telemedicine services throughout Henan Province.

The hospital has optimized the provincial multi-level telemedicine service system and created a model for mobile platform solutions for the Internet+ era of China and the world at large.

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