Problems and Prospect Research of the Digital Medical Development

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***Abstract*—By building a unified standard residents Electronic Health Records (EHR), Electronic Medical Record (EMR), health information platform of interactive, two-way referral for hospitals and rural communities, remote diagnosis, remote education and health counseling and other systems, digital health improves health services quality and service availability, advances medical and health system development, benefits people. Implementation of the application which relied on the "Eleventh Five-Year" National Science and Technology Support Program and focused on projects of "national digital key technology research and demonstration area of health" project in Zhejiang Province has begun to explore the digital health and establish a set of digital health systems that really boost health care reformation and health technical services, the function of which is significant for promoting Chinese health development.**

Keywords- digital health; health records; electronic medical records; remote clinics

I. INTRODUCTION

Digital Healthcare is the new modern medical practice which applies computer technology and information technology into the whole medical procedure, and it is the development direction and management objectives of public health. Forming the core of digital medical and digital health industry is the direction of the global healthcare industry in 21st century. Digital health and the use of modern information technology combined with health services is an important part of modern service industry. Hangzhou is the state of modern service industry of digital health industry based in Zhejiang Medical Research Institute and other health technologies represent digital research institutions. Academician Wu Xingjiang, Academician Yang Shengli, Academician Li Lanjuan, Academician Zhen Shusen as the key team members of scientists promote Hangzhou development of digital health industry to carry out a major expansion. Meanwhile, Silver River Co., Ltd., Zhejiang Dean Diagnostic Technology Co., Aidikang Medical Testing Center as the representatives of enterprises promote the rapid development of digital health industry in Hangzhou. Hangzhou is one of the key figures of medical national "innovation and development of modern service industry model city" pilot areas. Approaching digital medical and digital health is the new modern medical practice which applies computer technology and information technology into the whole medical procedure. In the digital medicine, the patient can be completed with minimal flow; and doctors significantly improve diagnostic accuracy. Additionally, patients' medical information archival records of all current and historical health information that can greatly facilitate medical diagnosis and patient self-examination, and achieve remote comprehensive patient data which needed to call the clinic, and achieve fast and efficient service. There is a huge advantage of digital medication that you can achieve resource sharing of medical equipment and medical experts.

II. TELEMEDICINE

Telemedicine is a communication network for the patient who does not have good medical condition to get good diagnosis and treatment system that enables the patient connect to the medical experts in different spatial locations for consultation. Telemedicine comes from the mid-1960s to the early 1980s, in 1993 the United States in the global information highway boom explored telemedicine. American scholars will be defined as the application of communication technology, interactive transmission of information, long-distance medical services. In 1995, Dr. Lee of University of Hong Kong used a global network of highways to make diagnoses for Yang Xiaoxia's mixed infection caused by necrotizing meningitis. Through the Internet network, Tsinghua University student Zhu Ling made a "thallium poisoning" diagnosis and his success implemented examples of telemedicine. Telemedicine technology is mainly related to two aspects of multimedia and communications.

(1) Multimedia technology, including the following aspects: ① Media Acquisition: acquired high-resolution images through a digital camera (head); ② Media storage: audio, video and medical images are required to temporarily or permanently stored in the computer, available hard disk, floppy disk, CD-ROMs and other magnetic or magneto-optical devices realization; ③ Compression / decompression: now JPEG image compression standard can do 10:1 to 20:1, and to do lossless compression; ④ Image processing includes angle of rotation, horizontal and vertical expansion, acquisition error correction, and the conditions at the clinic which can be visually observed under a clear image; ⑤ User interface: to reflect the additional medical information (visual information), a display, a keyboard, a mouse, and the window manager is a basic user interface telemedicine.

Preventive health information system will provide comprehensive health care that can knowledge public. In urban areas, we should basically achieve interoperability between the basic preventive health care institutions, health

administrative departments and resource sharing; network extends to 90% of township medical institutions, underdeveloped townships collection system coupled with the system by telephone or special data collector. Improved provincial and district preventive health care resources, health and disease, maternal and child health database also will be basically completed, and provide information to the community and residents counseling, health education and other services through the public website.

Health inspection system will accurately monitor the health behavior in order to enhance the level of health services. Network of all levels of health supervisory appartment should interconnect and share data information at fixed time. Health supervisory apartment of city (state) level and above should establish a network of information application system, which can online monitor, receive approval, and supervisory information disclosure. Province, city (prefecture) and county (district) can achieve health supervisory apartment's health oversight mobile network.

Digital Medical Services Information System will provide new medical model. Number of digitized hospital will be built; meanwhile the data at all levels of health units will be built in a mesh of medical information repository. Finally everyone will have a healthy electronic archives related record including the information that the birth place of patient can be easily obtained from the Internet by the hospital. Furthermore, an electronic file number can simply provide the medical needs of the community health service centers to the doctor, and then the doctor can provide medical services according to their health records. Difficult medical treatment, repetitive inspections, improper charges would have fundamentally changed. The lifetime health records will further improve the quality of human life.

E-government information systems can provide more comprehensive services to the community. Based on provincial, city (prefecture) and county level health administrative department of e-government, the automation of office procedure will be basically completed. Implement online office, open government, various medical and health information resources sharing, efficiency, management, transparency and fairness will be greatly enhanced.

Digital research of TCM (Traditional Chinese Medicine) will promote the comprehensive development of Chinese medicine industry. TCM is people-oriented. Case studies of digital syndrome differentiation of traditional Chinese medicine will be a breakthrough in the development of information technology, and digital content analysis of traditional Chinese medicine will also become the new direction of development.

Medical research achieves resource sharing and enhances innovation capability. Networked medical document database systems, medical digital library and online electronic reading will provide more and faster information services for researchers; key disciplines, key laboratory construction resource sharing will enable researchers to optimize the allocation of resources, research innovation ability and level will be greatly improved.

Health science and technology achievements in transformation and promotion of appropriate technology platform will facilitate the development of comprehensive health undertakings. Health research will no longer be shelved, and the transformation will greatly shorten the period of industrialization and development of health outcomes will become a new economic growth point of health; appropriate technology information promotion can let the majority of medical workers develop appropriate technologies according to their actual situation learning content and training programs. Promotion of appropriate technology will enhance the quality of health services.

III. DIGITAL HEALTH IS THE CORE OF MODERN HEALTH SERVICES

Digital health has important strategic significance in the development of social undertakings in the country, and every citizen has a stake. Government attaches great importance to people's health and health information technology investment increased year by year with remarkable results. Health information technology has become an important aspect of health care reform, involving all areas of health care. The new medical reformation plan explicitly proposed to accelerate standardization of information and public service information platform construction, and gradually establish a unified and efficient, resource integration, interoperability, information sharing, transparency and openness, easy to use, real-time monitoring of the health information system, and gradually establish a unified nationwide the residents' health records. Health care reform proposed to provide free three categories of 9 national basic public health services for urban and rural residents. The first one is to establish a unified standard health records for the area residents' resident population.

In recent years, health field informatization has made brilliant achievements in China; hospital informatization is popularized; public health information system start to build; urban and rural community health service information technology has made a good start. But it also highlights the most pressing issues that compartmentalized separation between departments and applications independent of each other that is called "island" phenomenon and brings difficulties to share medical information resources; digital hygiene standards system is still not perfect and the standard cannot be implemented. Compared with developed countries, China's talent pool in the digital health, industrial training, basic research, standards, legislation and other policy gaps still exist. To some extent, restrict the development of public health is undertaking. The most urgent question is the urgent need for in-depth analysis of the health needs of individual citizens, the use of computers and next-generation network technology, electronic health records established residents, renovate and build national or regional digital health system. Therefore, the state also increased the digital sanitary engineering technology research and application of investment, which has launched a series of research projects, and encouraged to try new technologies and practices in the field of health information. In order to adapt to the changing patterns of health services needs, in line with the modern concept of health maintenance, "National Digital Health

regional demonstration of key technologies and the use of research" of the "Eleventh Five-Year" key project came into being.

IV. OVERVIEW OF THE DIGITAL MEDICAL TECHNOLOGY

A. *What is a digital medical technology?*

Digital medical technology is centered by digital technology, based on network technology, communication technology, electronic technology and information technology, which fully combined with clinical skills, and formed a figure into the main features of the new treatment technology. It is the "product" comes from the development process of digital technology and medical science technology . We should sufficiently apply IT technology into medical science and technology, and integrate entire community healthcare resources and services. Digital medical technology includes digital medical testing technology, digital medical diagnostic technology, digital clinical diagnosis technology, digital health monitoring and control technology, and digital medical rehabilitation techniques.

Its clinical applications are composed of patient clinical information for the study of clinical medicine engineering technology, clinical data flow stream for the study of engineering IT anddigital medical system for the study of the whole hospital.

B. *Features and advantages of Digital Medical Technology*

Digitizing medical devices is huge information acquisition, handling, processing, storage, transmission, application and other processes which are based on computer science and technology, medical equipment through computer software processing under a variety of working to achieve a paperless, film less digital medical era.

C. *Networked Medical Devices*

Digital medical can be shared within the hospital equipment resources, imaging results, test results and diagnostic results transmission (such as PACS, LIS and other systems); in telemedicine, it can realize distance learning, video conferencing, and remote consultation with regional medical cooperation to share resources.

V. EFFECTS AND RISKS OF DIGITAL MEDICAL DEVICE APPLICATION

Effects and risk protection of digital medical device applications to assess any kind of digital medical equipment have certain risk; even those approved by digital medical equipment listed is only an "acceptable risk" product. The so-called "acceptable risk" refers to the number of listed products, and the use of risk control measures has been taken. However, due to various factors, design, technology level, the impact of clinical applications and limitations of digital medical, equipment simply can not get rid of its inherent risks. Therefore, we can form a comprehensive risk assessment for the digital medical equipment design to carry out qualitative and quantitative assessment comparing. For example, any kind of digital medical equipment can be set according to the risk level of their role in the object; first aid for the risk level of digital medical devices should be higher; lower risk level digital medical equipment auxiliary class. In addition, we also need to develop quantitative assessment criteria that various types of certification bodies can develop appropriate value based on its impact factor scores, equipment vendors can provide certain types of certification bodies when you can get a score that matches the value. According to this type of risk assessment approaches, we can get an intuitive, effective risk assessment data which can change the vague, subjective assessment of the status quo, greatly enhance the credibility of the assessment results, and achieve a good assessment results.

VI. CONCLUSIONS

Digital medical technology as a new frontier technology, whether the universality of application technology, or the involve of disciplines' intersectionality, its basic theory, knowledge structure, discipline connotation, features characteristics still need clinic technician to realize, in-depth discuss and systematic research. Digital medical technology belonging to the scope of medical engineering and technology, compared with conventional medical technology, its theoretical knowledge and technical characteristics of the new method has the digital age. Serious，deep study and summarization of these breakthrough changes are a continuous process of innovation.

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