

# The Concept of a Multiple Functioning Health Management Platform in China

Yuyun Zhang<sup>1</sup>, Xiaolong Li<sup>2, 3\*</sup>

<sup>1</sup> School of Nursing, Tianjin Medical University, Qixiangtai Road, Tianjin, China

<sup>2</sup> School of Economics, Peking University, Beijing, China

<sup>3</sup> China National Health Development Research Center, NHFPC, Beijing, China  
lidiazhang@yahoo.com, tell714@gmail.com

Keywords: Health Management Platform, Informatization, Nationwide System.

Abstract: Chinese State Council proposed informatization in all industries in 2015, the destination is to provide impartial, efficient, high-quality and fast online health services. However, the contemporary Internet system cannot match the demand of mass storage and powerful calculation for large amount of data and restrict the share of information between health service providers, thus a new system is required to solve the problem. After reviewing literatures related to health information management and internet usage in medical field in different regions and integrating multiple frameworks, the new framework of a health management platform seek to connect individuals, institutions and government is conceived and built. The platform-constructed based on recent ideas and applications of health database, mobile devices, cloud computing and virtual reality-include individual, institution, emergency response and supervision system. Chinese future health management platform will be set up refer to this framework.

## 1 INTRODUCTION

### 1.1 The Contemporary Condition of Health-Related Informatization

Health management is a process for control and intervention of health hazards based on testing, analyzing, estimating and calculating the health condition and hazards of individuals and colonies (Li et al. 2007). This is a long-term process in which life-time follow-up and proper distribution of resources are demanded. However, in China, the lack of communication between patients and health service providers and family doctors, the irregular three stage referral system and health education and promotion system, the diversity of health service institutions' information systems restrict the follow-up of patients and others groups of people, which have a negative effect on long-term management especially for people suffer from chronic diseases or sub-health condition (Zhang et al. 2015).

Informatization has been changing the way of health management and health care system. Electronic health records, mobile devices and cloud technology appear to be new ways for health care.

International Medical and Health Organization define mobile health as 'Using mobile communication technology in the delivery of medical information and health care services.' On July 4th, 2015, Chinese State Council proposed informatization in all industries, which became a national plan for future development and demands for new online medical pattern. The destination is to provide impartial, efficient, high-quality and fast online health services (Li 2015). The new information system look for ways to anastomose Internet, mobile Internet, cloud computing, virtual technology and mega data technology.

However, based on the contemporary Internet system, mobile communication technology and incipient Cloud computing cannot match the demand of mass storage and powerful calculation for large amount of data (Jiang 2013). The individual medical Apps used currently are mainly focus on information collection and arrangement (Chen & Long 2015). After several years developing from finance charge mode to a multiple system for treatment, education, research and resources management, the contemporary electronic health record systems widely used in hospital are based on wireless local area networks with more advantage

and efficiency for the medical records entering, patient monitoring, treatment delivering and comprehensive hospital management (Zhang et al. 2015, Jiang 2013, Estevão Soares dos Santos & Henrique Gil Martins 2011). However, the system still confined to single institutions and restrict the share of information between health service providers (doctors, experts and institutions), which cannot match the blooming users and servers, make them more cost and resource consuming and difficult to manage. A platform connecting individuals (objects and providers of health care), institutions (medical institution, scientific institution, profitable companies) and government is required as a respond to the situation (Jiang 2013, Xu 2014).

## 1.2 The Purpose of the New Health Management System

The new system aims to link individuals and institutions together, collect and manage health information from different sources, and promote the rationality of resources distribution and proper delivery of health services. For individuals, the new system allow them to enter and manage their own health-related information, get health advice from health care professionals and practitioners, order for proper medical treatment, connect health service providers and so on. For health service providers, the new system is useful in managing medical treatment and health care information, use them in clinical practice and share information with other institutions when necessary to deliver proper health services to individuals. For pharmaceutical companies and instrument companies, the new system is mainly used for manage clients' information and adjust the consume market.

## 2 THE FORMULATION OF AN INTEGRATED HEALTH MANAGEMENT SYSTEM

### 2.1 Core system

Core system is the central system for collecting, storing and managing information from individual platform, institution platform, emergency responding system and supervision system (see Figure 1).

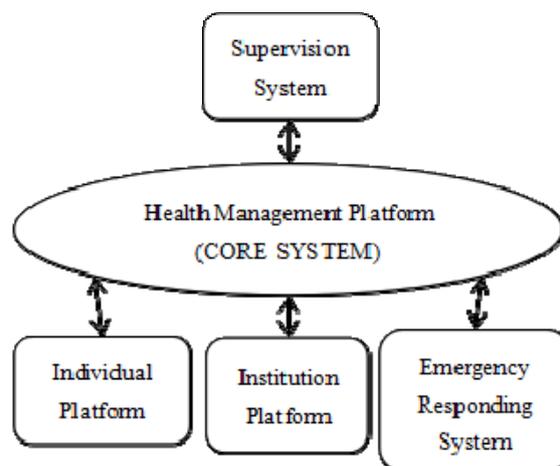


Figure 1: Core System and main subsystems.

### 2.2 Individual Platform

According to the survey target to 951 patients from three different hospitals in three provinces in 2013, more than 80% of the patients seek for health information online. For those who get health information online, 75.3% of them getting information mainly from integrated portals such as Google and Baidu while less than half of them choose to find information through website of registered health institutions. More than 97% of them tend to totally or partially believe the information online (Dai et al. 2014). Meanwhile, as a result of profitable purpose for medical applications, many medical information online aim at promoting sales instead of delivering helpful, reliable and objective health information. From the research done by Sajid, more than half of the information online are products and services advertisement produced by commercial companies. Thus brought up the issue of people's vulnerability of the inaccurate or misleading health messages (Sajid et al. 2008, Dai et al. 2009, Jin & Pan 2012). In order to protect individuals from the onset detriment, a system for medical monitoring, management, prevent and succour which are controlled and monitored by government, led by registered health institutions are required (Zhang et al. 2015, Sajid et al. 2008). Individual Platform is mainly used by individual consumers (objects of health services), who are allowed to choose devices and modules based on their own requirement (Jiang 2013). The basic purpose is to store physical information (including monitoring for basic body constitution, vital sign, nutrition, blood sugar, etc.), life and social information (diet, motion, rest, family condition, etc.), psychological conditions, medical

history (history of past illness and allergy, etc.) and family members' health information using embedded scales, questionnaires and tabulations (Cipresso et al. 2012, Jeong et al. 2009, Anderson et al. 1998). The information collected will be used in monitoring body condition and alerting for onset. According to the result, individuals can get highly-targeted health-related information and proper and seasonable treatment, which are provided by health service providers, from the core system (Zhang et al. 2011, Zhang 2011). All information given must be objective containing positive and negative information with plain language (Sajid et al. 2008). The mobile devices and applications include hardware devices such as personal computers, tablets, smart phones, bio-sensors and health patches such as wearable sensors(contact lenses, audiphone, smart bracelet, smart watch and smart shoe-pad, etc.) and software includes phone-used applications and sensors and transmission systems in the bio-sensors (Cipresso et al. 2012, Taylor et al. 2016). (see Figure 2)

### 2.3 Institution Platform

Institution platform is designed for health service providers, including health care institutions, pharmaceuticals companies, insurance companies, pharmacies, professionals, practitioners. The platform is related to two sub-system: staff-using system and management system.

For health service providers such as health care institutions, center for diseases control and prevention and hospitals, information contributed to the core platform will come from digital medical records and scanning copies of past paper documents, including hospital visit history, prescription, diagnosis result, examination result, medical treatment process, hospitalization and discharge description and reservation information (Jeong et al. 2009). For other institutions, the information are mainly from clients entered by staffs. To guarantee the exactitude of personal information, the system must include complete records from outpatients, inpatients, medicine consumers and corporate clients from all institutions, and all information has to be connected together in the core health management platform (Hugo et al. 2011).

The staffs of the medical institutions can use mobile terminals as a workstation and can inquire for medical information, deliver treatment, nursing care and enter information, which increase working efficiency and reduce the rate of errors and accidents (Liu & Liu 2010). Based on the information from

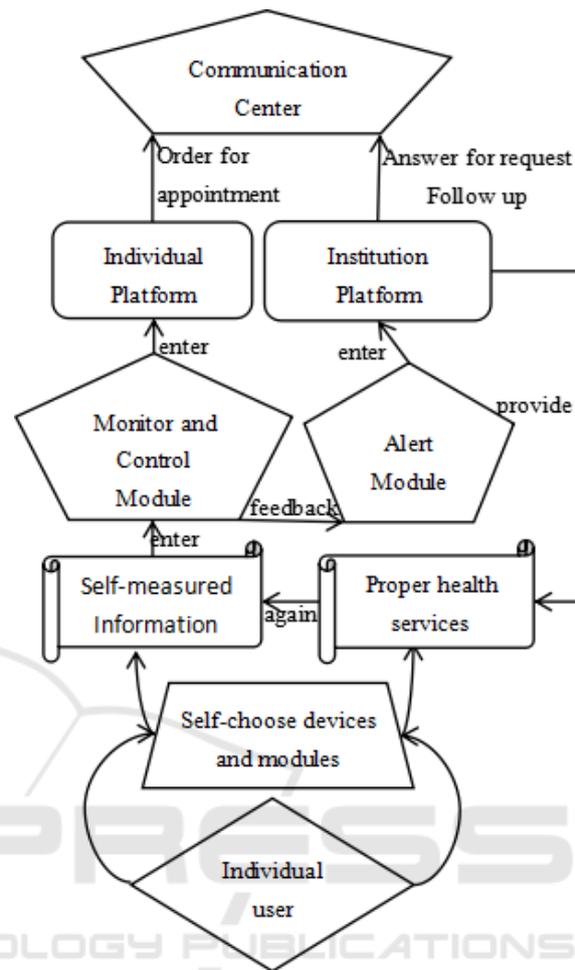


Figure 2. Individual platform and its relationship with other platforms.

the core platform and directly from individual users, providers can deliver niche targeting advice and guidance to individuals, including hospital visit guidance, treatment plans, related services, trigger and vulnerability control, health education and consultation. During an emergency situation, providers can obtain information in a certain domain, they can only get part of the information which is vital for rescue and treatment. For instance, allergy, blood type, pharmacy history, recent visit history and contact information are open to providers while family and financial conditions are closed (Chen & Long 2015, Jeong et al. 2009). As for profitable companies and scientific researchers, information any personal information is closed unless permissions are guaranteed by the supervision system.

In health service institutions, management departments can use mobile terminals to supervise the medical treatment, safety issues, logistics and

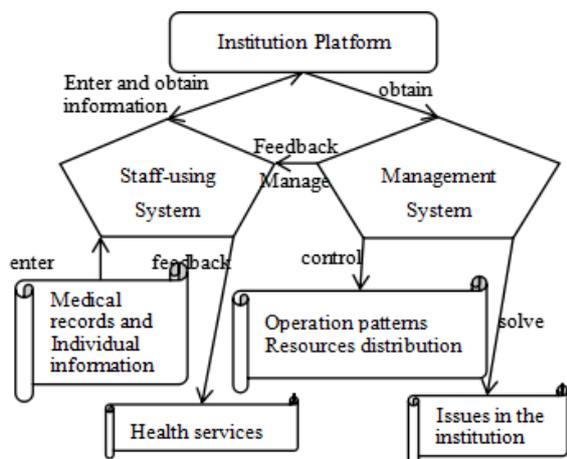


Figure 3. Institution platform, its subsystems and main function.

other conditions, solve problems and control medical quality and financial condition (Liu & Liu 2010). In profitable companies, management team is allowed to obtain both companies' operation patterns and the market trends within limits. (see Figure 3).

## 2.4 Supervision System

Supervision System is designed for ethical issues. The supervision system will totally controlled by computer program to avoid the selection bias. All the standards of requests for linked health information will be formulated by a committee formed by citizen deputies, health care practitioners, scientists and government staffs before the whole system being introduced to the society (Chamberlayne et al. 1998).

The new health management system, as a system related to individuals, institutions and governments in a wide range rather than being kept locally, contains a population-based and person-specific information which can be accessed and shared for some reasons. As a result, the privacy risk will increased as individual can be identified by multiple data and information shared in a single system (Anderson et al. 1998, Abbing 1999). The standards must include coding and linkage regulations, conditions for information release and share, commission for information usage and security arrangement for personal information (Chamberlayne et al. 1998). Individual users and institutions have the right to decide the information shared in the core system, which means that they can choose to keep part of the information private or only shared in a particular range (Jiang 2013, Abbing 1999).

Institutions' right to deliver health-related services also required to be limited to avoid improper health care for users since medical practice need to be precise rigorous. Rules for specify admittance, service providers, extents, quality, safety, information criterion and payment system is efficacious for supervising health-related services (Sajid et al. 2008, Wang & Zhao 2016).

## 2.5 Communication Center

Communication Center is a linkage for individuals, institutions, governments and emergency responding system to accomplish information exchange.

According to Dai Fei-fei and colleagues, patients found it more convenient, time-saving and better-arranged to order online (Dai et al. 2014). Thus in the new system, individual users can order an appointment with a doctor and require for examination results through communication center (Zhang et al. 2011). The center allows Individuals to get health advice from health care professionals, order for proper medical treatment and connect health service providers during treatment (Jeong et al. 2009). Peer-lead education (communication and symposium between patients) is efficient in health education and psychotherapy and mental nursing. The empathy towards people with same diseases can producing a supportive environment for experience share and knowledge transfer. Thus the communication center will design a set of online chat rooms for patients suffering from same diseases (Dai et al. 2009, Sharif et al. 2010, Taleghani et al. 2006).

Health service providers can use mobile terminals to follow up patients' condition and give proper advice and treatments through the center. Government can use the center to distribute and arrange medical and social resources, communicate with health providers during emergency situations.

## 2.6 Technical and Logistics Supporting System

As the whole system include a set of service systems and terminals, a big team of IT professionals are needed for developing related software, services, applications, monitoring and keeping the system work properly, avoiding serious safety vulnerabilities, breakdown and ensuring that health care services can be delivered at the proper occasion (Jiang 2013, Xu 2014).

### 3 DISCUSSION AND CONCLUSION

Although the system will help with the informatization in medical industry, there are still problems to solve. The biggest problem lay on the legislation and national standards regarding privacy, confidentiality, patent protection, information share and safety and benign competition. The limits of the contemporary medical legislation prohibit medical practitioners to provide long-distance diagnosis and treatment through internet and mobile terminals (Xu 2014, Wang & Zhao 2016, Stanimirovic & Vintar 2013). Addictive behavior is another considerable problem related to Internet users. People might search for health information to fulfill the demand of ceremonial and process satisfaction rather than for the application of information, which can trigger superfluous addiction for mobile terminals (Jin & Pan 2012, Wang & Peng).

### REFERENCE

- Abbing, H. 1999. Central Health Database in Iceland and Patient's Rights. *European Journal of Health Law* 6: 363-371.
- Anderson, R. et al. 1998. The DeCODE Proposal for an Icelandic Health Database. *October 1998*.
- Chamberlayne, R. et al. 1998. Creating a Population-based Linked Health Database: A New Resource for Health Services Research. *Canadian Journal of Public Health* 89(4): 270-273.
- Chen, B.G. & Long ling 2015. The Current application situation and development trend for mobile medical. *Guangxi Medical Journal* 37(9):1375-1379.
- Cipresso, P. et al. 2012. Is your phone so smart to affect your state? An exploratory study based on psychophysiological measures. *Neurocomputing* 84:23-30.
- Dai, F.F. et al. 2014. Research on patients' acquisition of health information and utilization of medical services under the network environment. *J Med Postgra* 27(5):517-520.
- Dai, X.C. et al. 2009. A Quantitative and Qualitative Study on Needs of Health Communication Pattern among Community Patients with Diabetes in Shanghai. *Chinese Primary Health Care* 23(6):50-52.
- Estevão Soares dos Santos, Henrique Gil Martins. 2011. Usability and Impact of Electronic Health Records for Primary Care Units in Portugal. *Iberian Conference on Information Systems and Technologies (CISTI) 2011 6<sup>th</sup>*.
- Hugo, M. et al. 2011. Routine health insurance data for scientific research: potential and limitations of the Agis Health Database. *Journal of Clinical Epidemiology* 64: 424-430.
- Jeong, H.J. et al. 2009. Development of a Personal Health Record System Based on USB Flash Drive and Web Service. *J Kor Soc Med Informatics* 15(3): 341-350.
- Jiang, W.N. 2013. Research on Application of Cloud Computing in Hospital Information. Jilin: Jilin University.
- Jin, P.H. & Pan, Ji 2012. Ceremonial Search and Functional Expectation for Online Medical Information. *Journal of Anhui University (Philosophy and Social Science Edition)* 36(3):125-130.
- Li, H.C. 2015. Innovative Medical Service Model Based On 'Internet+'. *China Digital Medicine*.
- Li, Lu et al. 2007. *The Third Editor of Social Medicine*. Beijing: People's Medical Publishing House.
- Liu, G.W. & Liu, C.X. 2010. The Necessity of the Clinical Use of Mobile Medical System. *Practical Journal of Medicine and Pharmacy* 27(2): 182-183.
- Sajid, M.S. et al. 2008. Internet information on colorectal cancer: commercialization and lack of quality control. *Colorectal Disease* 10(4):352-356.
- Sharif, F. et al. 2010. The effect of peer-led education on the life quality of mastectomy patients referred to breast cancer-clinics in Shiraz. *Health and Quality of Life Outcomes* 23(8): 2-7.
- Stanimirovic, D. & Vintar, M. 2013. Evaluating the Development of e-Health Project: The Case of Slovenia. *European Conference on e-Government* 1: 491-498.
- Taylor, K. et al. 2016. The report on the trend of life sciences and medical industry in year 2020.
- Taleghani, F. et al. 2006. Coping with breast cancer in newly diagnosed Iranian women. *Journal of Advanced nursing* 54(3): 265-273.
- Wang, Lei & Zhao, G.G. 2016. Confusion and policy analysis on internet plus medical. *Chinese Hospitals* 20(2): 45-46.
- Wang, Ling & Peng, Bo 2016. The Application Prospect and Risk Prevention for Mobile Medical APP in the Age of 'Internet Plus'. *Journal of Mudanjiang University* 25(1): 157-160.
- Xu, min 2014. Research and Construction of Hospital Information Technology Platform Based on Cloud Technology. Xiamen: Xiamen University.
- Zhang, H.J et al. 2015. Present situation and development trends of mobile medical technology. *Chinese Medical Equipment Journal* 36(7): 102-105.
- Zhang, H.J. et al. 2011. Design of Health Barometer Based on Smart Phone. *Chinese Medical Equipment Journal* 32(2): 11-16.
- Zhang, G.P. 2011. A New Model for Home-based Socialized Services for The Aged-Take Virtual Nursing Home in Canglang district, Suzhou as an example. *Social Sciences in Ningxia* (3): 56-62.