Study on the Construction of the Architecture System of Wise Information Technology of Med

Meiru Li and Jia Qiu[✉]

Guangxi Vocational Normal University, University East Road 105, Xixiangtang, Nanning, Guangxi, China
86983577@qq.com

Abstract. With the development of the times, digital technology in China has been rapidly developed. These technologies provide reliable technical guarantee for the medical industry in China, and the integration of digital and medical industry is particularly prominent. This paper mainly studies the construction of WITMED through the contemporary Internet +, Beidou, 5G technology, embedded technology and other technologies.

Keywords: Smart healthcare · platform · architecture

1 Introduction

With a large population base in China, the demand for medical care is more prominent, while the traditional medical system suffers from a series of drawbacks such as insufficient medical personnel, insufficient medical resources, and overly biased medical resources in the outbreak of various diseases. In order to solve these problems exposed by the traditional medical system, wise information technology of med (WITMED) has come into being with the advancement of technology. Wise information Technology of med (WITMED, for short) is a combination of new technologies such as Internet technology, artificial intelligence technology, and 5G network with the medical system, mainly covering hospitals, regions, and households [1]. In order to promote the faster development of the WITMED in China, China has issued a series of relevant policies, such as the Opinions on Promoting the High-Quality Development of Public Hospitals issued in 2021 and the Opinions on Further Deepening the Reform and Promoting the Healthy Development of Rural Health System issued in 2023, all of which are vigorously promoting the development of the WITMED.

2 Architecture and Implementation of the WITMED

After the outbreak of the epidemic, the shortcomings of the traditional medical system such as excessive tilting of resources, untimely treatment, untimely disease detection and shortage of medical funds were exposed. Many patients feel difficult to see a doctor, distant medical treatment, expensive medical treatment, resulting in disease dare not see a doctor, dare not treat the phenomenon [2]. To solve these problems, there is an urgent need for a new medical system, and the WITMED can meet such needs.

2.1 The Architecture System of the WITMED

The architecture system of the WITMED consists of wise hospital system, regional medical and health system, and family health system [1], The architecture is shown in Fig. 1.

The WITMED includes two aspects: the improvement and application of new medical methods, including hospital information, medical imaging, laboratory information and other subsystems. By realizing the study of real-time patient monitoring subsystem, it is composed of two parts: vital signs monitoring system and treatment monitoring system [3]. The application of big data technology can data such as CT examinations, nucleic acid tests, ultrasound and imaging information of patients are transmitted, processed and managed in a unified manner. For example, the following typical application system, diversified ward round system, doctors can grasp the patient's condition in real time through diversified ward round system and improve work efficiency. Remote diagnosis visitation system, which can diagnose the patient's condition remotely and solve the problem of geographical restriction [4]. The automated alarm system can monitor the vital signs of patients with partial loss of physiological functions and limited mobility in real time, so as to provide timely assistance and reduce their medical costs.

The regional healthcare system mainly consists of the public health system and the regional healthcare platform. Regional healthcare refers to the reasonable allocation of medical institutions of different functions and scales within a defined area according to the population size, the needs of different populations, and the status of health diseases. The public health system includes a health surveillance system and a surveillance system for the release of infectious conditions, which can monitor public health incidents occurring in the region in real time [5]. Regional healthcare uses basic network technology to collect and process and transmit the information of hospitals at all levels, medical scientific research institutions and health supervision institutions in the region, realizing the real-time monitoring of the medical status of patients in this region.
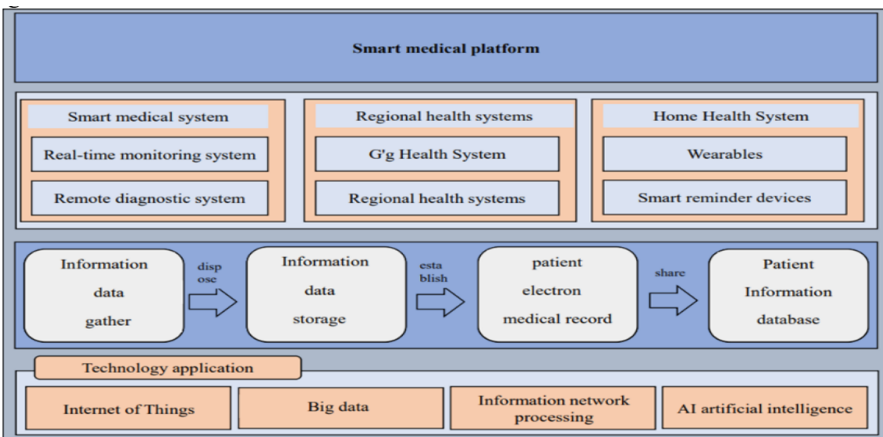

Fig. 1. Architecture diagram of Smart Medical Platform [self-drawing]

Family health system mainly employs wearable devices, smart wheelchairs, and electronic blood pressure monitors, etc. to monitor and protect the health of citizens in real time. In the family health system, AI artificial intelligence technology is mainly used to realize the health monitoring and health reminder function of adjuvant therapy [6]. For patients with chronic diseases, the elderly, young, sick, disabled, pregnant and other special groups in the daily or special isolation control, it will promptly remind them of their medication, contraindications, the remaining amount of medication and other timely access to medical care. The families of the patients can update and monitor the patient's condition in real time through the terminal system of the cell phone with the permission of the device. Moreover, it can give an alert to the family when the patient has an unexpected condition. It effectively solves the problem that no one knows the onset of disease in patients living alone.

3   Functions of the WITMED

WITMED is designed for patients suffering from different diseases, in different regions, and at different ages, who have medical problems such as expensive treatment, distant treatment, wrong diagnosis of diseases, and lack of escort, etc. WITMED provides assistance to patients through wisdom hospital treatment system strategy, regional health management strategy, and family health monitoring strategy.

3.1   Functions of Intelligent Hospital Diagnosis and Treatment System

The implementation of online light pre-consultation and hierarchical treatment. Light pre-consultation means that patients can make preliminary diagnosis of their own conditions via the Internet during their stay at home, and they can seek medical treatment on their own in less serious cases [7]. Hierarchical treatment refers to the classification of medical institutions according to the severity of the patient's condition and the difficulty of treatment, so that medical institutions at different levels can undertake the treatment of different diseases and realize a specialized medical process [8]. And through the remote diagnostic visit system, experts can communicate with patients anytime and anywhere without contact, understand the patient's physical condition and generate electronic medical records, recommend the corresponding doctor for the patient's illness and provide the most appropriate treatment.

Medical institutions can disseminate contents about how to prevent current common diseases and how to judge for themselves whether they are suffering from such diseases systematically through the Internet technology such as the applets of WeChat, the official account of WeChat and the system of the official website of the hospital [9]. Medical institutions can apply medical material redistribution strategies intelligently to the severity of patients' conditions through the WITMED to avoid overly tilted materials and equipment shortages. And use WeChat applet or WeChat official account to push the electronic case examination report of patients. For patients who need return visit and take drugs again, provide patients with appointment return visit, take drugs and other functions, in order to achieve rapid medical treatment.

The vital signs of patients are monitored in real time by using the real-time monitoring system in the consultation to improve work efficiency. The diversified checking system analyzes the patient's real condition based on the data fed back from various physiological functions of the patient. Once the vital signs are too weak, an alarm will be issued to inform the nurse's workstation. After receiving the notification, the doctor can immediately call the medical record file of the patient, which reduces the work burden of medical workers to a certain extent.

3.2 Functions of Regional Health Management.

Regional health platform management. For the management of people with infectious diseases, the strategy of regional health is adopted for effective control. State-controlled medical institutions will currently be located in the regional health information platform, which collects and processes patient information to achieve the storage and sharing of patient health information sets in order to achieve real-time monitoring, data exchange and data sharing. It is also possible to analyze data for some special conditions for effective control and prevention of the condition. And regional medical institutions can provide early warning information for the department of health, and related units, etc. based on the interconnection of these medical data information.

Public health system management. It uses the Internet, big data, 5G and other new technologies to collect, analyze, and process regional infectious disease status data to generate the latest situation data of the current region, analyze the ratio of confirmed cases, asymptomatic infected persons, and close contacts in each data, control the infected persons, provide the best travel routes for healthy people, and avoid cross-infection caused by the contact between patients and healthy people.

3.3 Functions of Family Health Monitoring

Vital signs monitoring system can collect and monitor patients' body temperature, blood pressure, heart rate, blood oxygen content and other basic physiological data in real time, and transmit the data to the IOT WITMED, while updating the patient information database in real time. Medical workers can analyze and diagnose in a timely manner through the WITMED, and patients' families can learn about patient treatment through the terminal APP. Since the conditions of each patient are very different and the rehabilitation services for them are not quite the same, the health monitoring system can use big data technology to tailor different rehabilitation and health care services for different patients.

Through the wearable electronic monitoring equipment, the family members of the user and the hospital can acquire the basic physiological data of the user, and the hospital can analyze the physiological data of the user to provide differentiated health care suggestions and treatment plans, turning the traditional "passive diagnosis and treatment" into the "active prevention and treatment" of the hospital [10]. It continuously improves and updates the patient information database in real time through the real-time patient monitoring platform and wearable monitoring devices, interconnects and

shares patients' treatment and physiological data in different hospitals, regions and countries, provides important reference for the transfer treatment, off-site consultation and emergency treatment, and improves the diagnosis and confirmation rate.

4   Simulation Testing

Influenced by regional economy, science and technology and politics, as well as the epidemic situation, the domestic medical service level shows the phenomenon of eastern strong and western weak, that is, the areas with higher economic development level are more advanced and rich in professional medical equipment and resources compared with remote areas with lower economic development level, showing a great phenomenon of uneven distribution of medical resources. Therefore, this paper builds WITMED with the help of contemporary Internet +, Beidou, 5G technology, embedded and other technologies, and updates the offline registration waiting, repeated examination, medical treatment distance, and medical difficulty of traditional medical treatment. On the one hand, it realizes information sharing, resource allocation optimization, etc., solves the problems of medical treatment distance and medical difficulty, and on the other hand, it also promotes regional development.

4.1   WITMED Functional Testing

In order to ensure that the system can be more stable, safe and reliable when put into use, various functions of the platform are tested. In this paper, the test data of user registration login, information management, appointment service, remote diagnosis and treatment, and health management of the platform are analyzed, and the analysis results are shown in Table 1 below.

4.2   WITMED Effect Evaluation

WITMED effect evaluation is composed of six parts: enhancing doctor-patient communication and interaction, online pre-diagnosis consultation, understanding disease diagnosis and treatment, late recovery prevention and other information, inquiring and obtaining and sharing the comprehensive disease information of patients, saving the time of medical treatment, coordinating, and strengthening the management of patients outside the hospital, each part has a full score of 20 points, a total of 120 points. A questionnaire was distributed to users through the questionnaire star, 100 medical staff, patients' families and other social medical institutions outside the hospital, a total of 300, with a recovery rate of 100%, The specific data is shown in Table 2.

According to the investigation results, the total average score of evaluation of this platform by medical staff, patients and their families, and other social medical institutions outside the hospital is more than 100 points, which shows that most medical staff, patients' families, and other social medical institutions outside the hospital hold a strong willingness to build this platform and believe that this platform can better serve the medical industry, so WITMED in this paper has a high feasibility.

Table 1. Analysis of Functional Testing Effect of Intelligent Medical Platform [self-drawing]

Function Name	Test Step	Test Effect Analysis	Postscript
User Registration Login	Open platform, enter username and password	Present main page after successful registration login	
Information Management	Personal information page, information can be modified and adjusted	The platform interface displays the successful modification and returns to the personal information page	Physicians can call patient information as needed, and the platform registers the caller
Appointment Services	The patient may skip to the corresponding hospital appointment applet for appointment by selecting the corresponding hospital as needed	Appointment accepted/appointment successful/appointment failed, if appointment failed, reason for failure will be indicated	
Telemedicine	The patient clicks Remote Diagnosis and Treatment on the main page, and selects the corresponding online doctor for text, voice or video connection as needed	Text, language or video chat is normal	
Health Management	After the doctor's diagnosis, the medical information is synchronized to the personal health record and the patient uploads the medical information	View only, do not modify the health record, push the corresponding rehabilitation or recuperation plan according to the patient's rehabilitation needs	

5   Outlook for the Development of the WITMED

In 2018, General Secretary Xi Jinping mentioned at the BRICS Business Forum that a new round of technological revolution and industrial change such as artificial intelligence, big data, quantum information and biotechnology would bring about dramatic changes to global development and human production and life in the next decade. And the development of the WITMED mainly relies on the development of new technologies such as artificial intelligence, big data and quantum information. In recent years, the WITMED in China has developed rapidly, but it still lags behind that of other developed countries. As early as 2020, the investment scale of China's medical industry market of the WITMED has reached 100 billion yuan. In the coming years, the industry

Table 2. WITMED effect evaluation table (mean score) [self-drawing]

User	Enhancing Doctor-patient Communication and Interaction	Online appointment consultation	Understand disease diagnosis and treatment, prevention of late recovery and other information	Inquire, acquire and share comprehensive disease information of patients	Save medical time	Collaborate and strengthen the management of patients outside the hospital	Total score
healthcare workers	18	20	18	19	15	18	108
Patient and family	20	20	20	18	17	17	111
Other social medical institutions outside hospital	19	17	16	14	16	20	102

of WITMED will usher in a period of rapid development of intelligence, efficiency, precision and scaling, and will become an indispensable part of our life in the future.

References

1. Zhao Z. (2014). To reverse the "no system" situation of intelligent medical standardization -- Interview Liu Xuan, Vice President of Zhejiang Standardization Institute. Standardization in China (05),26-29.
2. Mi Z & Qian A. (2019). Literature review on the development status and trend of intelligent medical treatment. Chinese Journal of General Practice (03),366-370.
3. Gao P. (2023). Exploration on the construction of information integration platform under the background of Smart Hospital. Computer and Information Technology (01),82-85. doi:https://doi.org/10.19414/j.cnki.1005-1228.2023.01.005.
4. Zhao L & Liang. (2013). Construction of mobile ward round system. Journal of Medical In-formatics (02),25-27.
5. Shen J, Wang H & Wei L. (2021). A study on the construction of resilience governance model of urban communities in response to public health emergencies. Hospital Management in China (12),91-95.
6. Hao J. (2020). Application of AI technology in the design of health and medical products for the aged. Journal of Heihe University (03),132-134.
7. Wu R & Shen K. (2018). Application research of mobile Internet in chronic disease management product design. Design (05),156-157.
8. Lin H, Wang L, Tang L & Yang G. (2022). Investigation on the status quo of traditional Chinese medicine nursing ability and training needs of nurses in primary hospitals under the hierarchical diagnosis and treatment model. Laboratory Medicine and Clinical Research (05),704-707.

9. Zha X, Cheng G & Yang Y.(2018). Design and implementation of medical device management system based on wechat mini program. Chinese Medical Devices (05),125-129.
10. Sun X & Feng Z. (2014). Research on wearable device interaction design. (02),28–33. doi:https://doi.org/10.16272/j.cnki.cn11-1392/j.2014.02.041.