




# Research on the Problems and Countermeasures of the Application of “Internet+” in County Hospitals

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Abstract: The construction of Internet hospitals is an important form of practice of “Internet+” medical treatment, which is conducive to achieving the equalization of high-quality public medical services, thereby promoting the construction of a healthy China. This article takes the construction of an Internet hospital in Jianyang People's Hospital of Sichuan Province as an example, conducts an empirical analysis of the practice of “Internet+” medical treatment in grassroots hospitals, introduces in detail the main functions and processes of Internet hospitals, and summarizes the problems in the construction process.


## 1 INTRODUCTION


People's livelihood has always been the focus of our party and country, especially health care. So how to get through the “last mile” of serving the people's health needs, and solve the problems of “three long and one short” for people to see a doctor, that is the problem of long queue time for registration, long waiting time for payment, long waiting time for taking medicine and short time for seeing a doctor (Yan 2011). And It is the unremitting pursuit of our health workers to let ordinary people enjoy high-efficiency and high-quality equal medical care. At present, China is rapidly promoting the development strategy of healthy China. Today, with the rapid development of information technology and public health emergencies, such as COVID-19, exposing many problems of modern medical care, it has become an inevitable trend to comprehensively promote the construction of Internet hospitals. Therefore, based on the practice of building an Internet hospital in a county-level public hospital in the western region, this article attempts to sort out and analyze the current challenges and problems of using “Internet +” technology in primary hospitals, and


propose some paths for scientifically advancing the construction of Internet hospitals.

## 2 RESEARCH METHODS

Since 2013, the CPC Central Committee and the State Council have attached great importance to the development of “Internet+” medical care, especially after the COVID-19 outbreak, The CPC Central Committee and the State Council have intensively issued a series of policy documents related to the field of Internet medical care, and provincial and municipal levels have successively issued specific implementation opinions, guidelines and other normative documents, which have pointed out the direction for the construction and development of Internet hospitals. “Internet+” Medical is a new application of Internet in medical industry, supported by physical hospitals. It uses the Internet as the carrier to provide various forms of health care services such as health education, disease risk assessment, remote treatment and rehabilitation through certain technical means. On one hand, through video consultation, the Internet Hospital can effectively improve patients' medical experience, and the waiting time for patients

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to register and pay fees can be greatly saved. On the other hand, It can effectively improve the coverage of medical services, including pre-treatment, in-treatment and post-treatment medical services. Meanwhile, it helps the sinking of high-quality medical resources, and Internet hospitals, in conjunction with medical associations and community medical institutions, promote a wide range of remote cooperation among medical institutions, form a two-way referral mechanism and promote graded diagnosis and treatment.

County hospitals are direct windows for more ordinary people. The effective implementation of “internet+” in county hospitals will undoubtedly benefit more ordinary people, Especially rural grassroots people. Well, how effective is the construction of county Internet hospitals at present? By referring to a large number of normative documents and related academic research and based on the empirical investigation of the People's Hospital of Jianyang city, this document explores some targeted countermeasures and suggestions for county Internet hospitals.

### 3 PRACTICE AND EXPLORATION IN PRIMARY HOSPITALS

The People's Hospital of Jianyang city was founded in 1939 and has a history of 82 years. The hospital covers an area of 33,900 square meters, with a building area of 147,000 square meters, total assets of 1.4 billion yuan and 1,600 registered beds. It is the first county-level hospital of the National Health and Health Commission to meet the recommendation standard of comprehensive service ability of county-level hospitals. Last year, there were 1.313 million outpatient and emergency visits, 65,000 hospital discharges and 23,000 operating tables.

According to the national, provincial and municipal policies of “Internet+” medical care and related requirements, Since 2015, the People's Hospital of Jianyang city gradually carry out and promote the construction of related projects.

#### 3.1 Internet + Remote

At the end of 2015, the construction of remote system began. At present, remote consultation, remote imaging, remote ECG and remote desktop consultation systems have been built. The platform covers 29 medical institutions within its jurisdiction

and has established telemedicine cooperation relations with 4 units, including People's Hospital of Peking University, Beijing 301 Hospital, West China Hospital of Sichuan University and People's Hospital of Sichuan Province, also covers 29 grass-roots medical institutions, and has established the “N+1+n” regional remote hub platform model. A total investment of more than 5.7 million yuan (including 3.7 million self-raised funds and 2 million government special funds) was invested.

By the end of August 2021, the People's Hospital of jianyang city had participated in video lecture training and case discussion for a total of 431 times, completed 2244 desktop consultations in primary hospitals of medical association, and reported 161,222 DR diagnoses (exposure times), 9,184 CT diagnoses, 939 MRI diagnoses, 35,871 ordinary ECG diagnoses and 2,821 ambulatory ECG diagnoses.

Through the “Internet+” Remote project, it is not only beneficial to the common people in medical association units, but also a powerful starting point to promote the implementation of medical reform policy and graded diagnosis and treatment at the grassroots level.

#### 3.2 Internet + Medical Care

In April, 2016, through cooperation with related enterprises, the People's Hospital of Jianyang city started the construction of “Internet+” Medical Care project, focusing on solving the queuing problem of patients' register and payment, and at the same time realizing the functions of booking, report self-printing and inquiry, etc.

At present, the hospital area has achieved the whole hospital coverage of wireless wifi. Patients can make online appointment registration through WeChat official account or hospital website. Many self-service systems machines were installed in the hospital. Through self-service systems machines, patients can register, pay fees, print inspection reports and so on. Among them, the outpatient appointment function can be accurate to 30 minutes, which greatly reduces the waiting time of patients in hospital and effectively optimizes the hospital medical order. Considering the site limitation of centralized settlement, the hospital carefully integrated the system, realized the settlement by floors, and diverted the settlement patients. Patients can complete outpatient payment, admission and settlement at the floors of the emergency building and the nurse station in the inpatient department. At present, 40% of patients choose to register and pay through WeChat and self-service machines, by this way, all patients'

examination reports are pushed and self-printed. And through the automatic medicine taking system of outpatient pharmacy, the waiting time for patients to take medicine is shortened from 2 hours to 3 minutes. Through the construction of “Internet+” Medical project, the queuing problem of patients seeking medical treatment has been greatly improved, and the experience of patients seeking medical treatment has been improved.

### 3.3 Internet Hospital Construction

In May, 2021, the Internet Hospital of the People's Hospital of Jianyang city went online, and based on the “Internet+” technology, an online and offline integrated health service model was built, which realized the intelligent mobility of the in-hospital diagnosis and treatment process (as the Figure 1 shows).

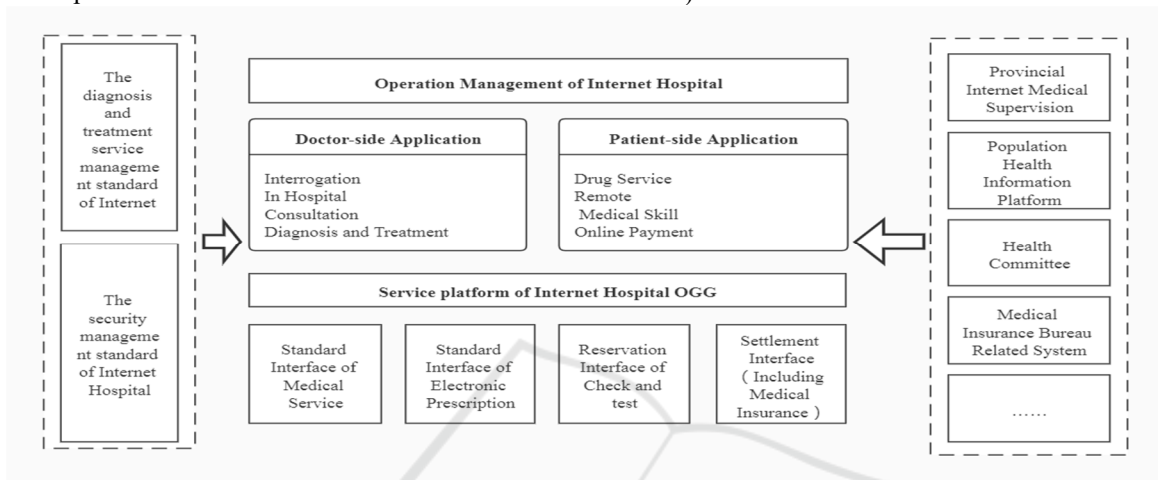


Figure 1: Internet hospital construction function and service platform.

Main online functions include: Patients register online, make an appointment, and consult and consult through pictures, texts, voice, etc. Online payment is completed, and patients can choose a variety of ways to take medicine. After the payment of the medical technology project, it will be connected with the medical technology reservation system in the hospital, and the patients can choose the time to make

an appointment for inspection by themselves, and the system will inform the patients of the appointment and expiration reminder online or by text messages. Hospitalized patients order food and mail the patient's medical records. Realize the integration of online and offline patient medical information (as the Figure 2 shows).

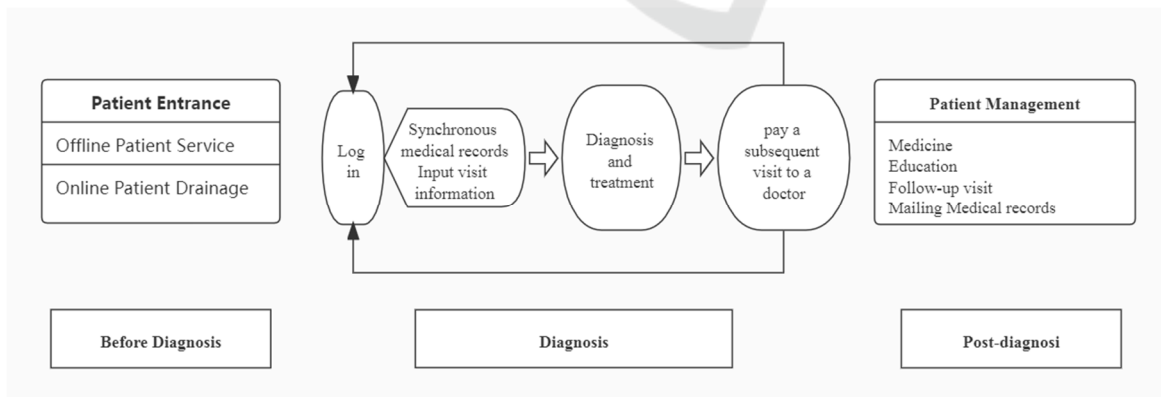


Figure 2: Internet hospital service process.

Through the construction of Internet hospitals, medical data intercommunication and business linkage have been realized. Patients can enjoy high-

quality medical resources without going to the hospital for a long time to register and treatment. Hospitals can break through the time and space

constraints to access the personal health and medical information of patients, and record the health information of patients in real time, and effectively use medical resources to provide Internet-based medical services for patients, and extend hospital services from in-hospital to out-of-hospital, from intervention in single diagnosis to full coverage of diagnosis and treatment, and constructing the whole-process diagnosis and treatment management with patients as the center, and improve the efficiency of hospital services, expand the connotation of hospital services, and strengthen the monitoring of treatment effect and medical quality (Shan 2011). Through Internet Hospital treatment, patients can also freely switch between online and offline modes for treatment according to their own needs, which greatly improves patient satisfaction and loyalty. In the satisfaction survey of public hospitals of National Health and Health Commission, the average satisfaction of hospital patients increased from 90.04% in 2018 to 95.32% in 2020.

### 3.4 Internet + Epidemic Management

Since the outbreak of COVID-19 in 2020, in order to ensure the effect of epidemic prevention and control, hospitals need to limit the number of patients and divert outpatients. Under this situation and demand, the "Internet+" Epidemic management gives full play to the advantages of online diagnosis and treatment.

With the help of Internet Hospitals, consultation, prescription, follow-up, dispensing, inspection and appointment, and other in-hospital and out-of-hospital business linkage modes came into being. Chronic patients and follow-up patients can realize online dispensing and prescription continuation through Internet Hospitals, and they can receive medical services without coming to the hospital, which greatly alleviates the difficulty of going out and seeing a doctor during the epidemic. Through the nucleic acid detection reservation function of the Internet platform, the public can directly make an online reservation for the detection time and complete the payment online, and then go directly to the site for detection according to the reservation time. By this way, it can simplify the process comprehensively, realize sampling in different time periods and at different peaks, and greatly save public time and energy. At the same time, materials services such as medical record mailing and drug delivery at home on the Internet platform can reduce the stay time of patients in hospital during the epidemic and avoid cross infection.

### 3.5 Internet +Medical Education

The latest health big data shows that the health status of Chinese people is not optimistic, the aging population is becoming more and more serious, diseases are becoming younger, and the public's demand for basic health science knowledge is increasing, while many reports from the media without screening have led the public to be misled by false health concepts (Wang and Wei 2014). In this case, it is necessary for hospitals to enhance the awareness of medical staff in spreading professional health science and open up the way for medical staff to release professional medical knowledge. The Internet platform provides a channel for medical staff to publish teaching content. Popular science articles, videos, pictures and short videos of various departments and doctors in hospitals can be published on the platform, so that high-quality and professional teaching content can accurately reach a large number of patients. On the one hand, it can help doctors to manage patients efficiently, and at the same time, it can provide patients and their families with access to professional health education information, and enhance the stickiness and compliance of patients.

In addition, on the Internet platform, medical staff can realize academic exchanges and communication through video conferences, live broadcasts and other modes, which can promote cooperation between regional high-quality hospitals and grass-roots hospitals, realize medical education assistance and help homogenize medical services.

## 4 PROBLEMS AND COUNTERMEASURES IN PRACTICE IN PRIMARY HOSPITALS

### 4.1 Compared with the Growing Health Needs of the People, the Service Scope of County Internet Hospitals Needs to Be Further Broadened

In 2018, the Opinions on Promoting the Development of "Internet+" Medical Health issued by the State Council clearly pointed out that improving the service system of "Internet+" Medical Health includes seven aspects, which Including developing "Internet+" medical service, innovating "Internet+" public health service, optimizing "Internet+" family doctor

contract service, improving “Internet+” drug supply guarantee service, promoting “Internet+” medical insurance settlement service, strengthening “Internet+” medical education and popular science service, and promoting “Internet+” artificial intelligence application service.

For county hospitals, limited by various resources and conditions, most county Internet hospitals are still in the exploratory stage, and the service items are relatively limited, their service scope can be further expanded according to the actual needs of local people, such as “Internet+” Nursing, “Internet+” Chronic Disease, “Internet+” Return Visit, “Internet+” Mission, “Internet+” Family Doctor, “Internet+” Maternity, “Internet+” Insurance (medical insurance, commercial insurance) and other extension services.

#### **4.2 Internet Hospitals at the Grass-roots Level Should Give Consideration to All Clients and Promote the Work Step by Step**

Most patients of county hospitals are from rural areas. Among the older medical group, due to low acceptance of smart phone operation and Internet hospitals, it is difficult to promote Internet hospitals for this group. Therefore, while for county hospitals, considering the full implementation of Internet hospitals and the detailed design of various procedures, we should take into account the learning and adaptation process of most of the elderly farmers, we should implement some simple and operational online medical service processes, and at the same time increase the services of outpatient medical guides or volunteers, so as to help the elderly farmers to answer questions and gradually recommend Internet Hospital.

At the same time, grass-roots hospitals should also set up a special propaganda team to increase the publicity to medical association units and the general public, so as to benefit medical association units and more grass-roots people, especially those in remote areas. Internally, there should be a special person to answer questions at each outpatient floor, also to promote outpatient face-to-face and to help some elderly people use mobile phones to operate.

#### **4.3 Higher-level Policy Support and Related Supervision and Restraint Laws and Regulations Need to Be Further Promulgated**

At present, the country has issued Internet charging standards one after another, but the policies related to Internet medical insurance have not yet been issued, and the online medical insurance payment and reimbursement docking technology has not yet been opened, which has a great impact on the implementation of Internet hospitals, and cause great inconvenience for patients with chronic diseases.

Such as the standardization of hospital medical records. Compared with outpatient medical records of physical hospitals, Internet hospital medical records have not yet issued official standards. At present, the regulations on medical records management in medical institutions and the basic norms of electronic medical records (for trial implementation) are still followed, but this standard is formulated for physical hospitals, and its content focuses on inpatient medical records and medical records management. However, compared with online Internet hospitals, its applicability needs to be verified.

At the same time, on the one hand, Internet hospitals are required to strengthen network information security management and pay attention to the protection of patients' personal information, however, at present, at the level of national legislation, there are some problems in regulating the management system of Internet hospitals and strengthening Internet supervision, such as the access of Internet hospitals and online consultation (Li 2017). In order to promote the construction of Internet hospitals in an orderly manner and protect the interests of hospitals and patients, relevant normative laws and regulations are essential.

#### **4.4 Regional Resource Integration and Internal Related Management Systems Need to Be Further Improved**

On one hand, affected by the epidemic situation in COVID-19 and the medical reform policy, the grass-roots hospitals are struggling to operate, and there are not a few operating in debt, and the competition among grass-roots hospitals is fierce. County Internet hospitals are operated with insufficient resource integration, which greatly wastes Internet medical resources. At the same time, the internal departments of the hospital should actively communicate with

each other, and the health management center should take the initiative to make full use of the personal health big data provided by the “Internet+” Medical platform, carry out health analysis, carry out health reminders and health education from time to time, and earnestly implement the concept of “preventing diseases”.

On the other hand, Internet hospital is a virtual entity institution, and it is necessary to comprehensively formulate management systems and departments similar to physical hospitals, including but not limited to: medical treatment, quality control, performance, objectives, salary distribution, etc, which can further standardize online medical behavior, ensure medical quality, and effectively motivate doctors to carry out online medical activities.

Lastly, while actively promoting Internet hospitals, we should focus on optimizing the performance distribution system, changing the concept of medical staff and fully mobilizing their enthusiasm. At present, most medical staff still stay in the traditional way of diagnosis and treatment. In addition, the daily business work in public tertiary level A hospitals is relatively heavy, and the enthusiasm of most medical staff to participate in the work of Internet hospitals is not high, especially in such surgical departments as Rehabilitation Department which give priority to treatment operations. Therefore, how to change the concept of medical staff, how to allocate performance pay reasonably, and how to balance the work of physical hospitals and Internet hospitals have become urgent problems for hospital managers.

## 5 CONCLUSIONS

Under the guidance of Healthy China strategy, the Internet hospital based on “Internet+” technology has become a new model of hospital development, which effectively improves the efficiency and coverage of medical services. Especially during the outbreak of new coronavirus pneumonia, Internet hospitals have played an active role in building integrated smart hospitals. However, in the process of Internet hospital construction, it is still necessary to pay attention to the expansion of service scope, the balance of service objects, the improvement of security policies and systems and the balance of regional development. Also, the problem of effective extraction and application of relevant data in Internet hospitals, due to insufficient mining of existing data, excessive consideration of data transmission in business

processes, and neglect of integrated integration of overall data information, leads to the original valuable data into “junk data” (Yang etc. 2021, Zhang etc. 2018). Most importantly, the positioning of Internet hospital construction should first be to improve the quality of medical services, followed by improving the efficiency of medical services, we must grasp the relationship between the two, only in this way can truly be patient-centered.

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## REFERENCES

- Li, Q. L. (2017). Discussion and Research on the Construction of Smart Hospitals in the Internet + Era. *Wireless Internet Technology*. 8, 117-118.
- Shan, Y. (2011). “Internet+” era of intelligent hospital construction path to explore. *Information research*. 2, 90-91.
- Wang, H.F. and Wei, X. X. (2014). Public health promotion is the social responsibility of public hospitals. *Modern Hospital*. 4, 149-151.
- Yan, H. (2011). Innovation Management Pilot Military Hospital New Development. *Hospital President Forum*. 6, 11-15.
- Yang, J. Y., Zhou, Y. Q. and Feng Z. C. (2021) . Reflections on the construction of smart hospitals in China under the background of public health emergencies. *China Hospital Management*. 7, 4-6+13.
- Zhang, J. Z., Li, Y. K., Cao, L.Y. and Zhang Y. (2018). Research on smart hospital construction in China and abroad. *Hospital management in China*. 12, 64-66.