

# The Implementation of Telemedicine in China: Difficulties and Future Directions

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**Abstract.** Telemedicine is a digital communication technology that makes the delivery of healthcare more efficient even in remote settings. This paper chronicles the implementation of telemedicine in China, describes the Chinese government's current policies and practices in promoting the adoption of telemedicine, and explores the importance of telemedicine in responding to public health emergencies such as the COVID-19 pandemic. Difficulties to implement telemedicine and underlying factors are interpreted, such as pricing dilemma, payment obstacles, the lack of social acceptance, and the lack of information integrity on a national level. Although these obstacles have constrained the widespread implementation of telemedicine in China, its current application attests to its efficacy and potential. To further promote and ensure the adoption of telemedicine, the Chinese government should streamline its administration in medical procedures, design comprehensive business strategies according to the country's medical insurance policies, and construct reliable information system. Meanwhile, the Chinese government could adopt adaptative approaches, combining cutting-edge medical technology with traditional Chinese medicine to expand public acceptance.

**Keywords:** Telemedicine, Medical Policies, China.

## 1. Introduction

In the past a few decades, health scientists, clinicians, and other investigators have focused on how to employ cutting-edge technologies to enhance healthcare services. Telemedicine, a combination of established and innovative information technology, become salient among many of these initiatives. As a specific scope of telehealth, telemedicine emphasizes on remote clinical services, which refers to the utilization of digital information and communication technologies to deliver and support healthcare when participants are separated by distance. [1] It creates opportunities for people living in disparate areas to access equal-qualified and cost-saving healthcare services.

At the beginning of 2020, the World Health Organization (WHO) emergency committee proclaimed COVID-19 (coronavirus infectious disease, 2019), which was caused by SARS CoV-2 virus infection, to be a global pandemic that could have impacts worldwide. [2] The pandemic brought a largely increased focus on telemedicine, which is capable of minimizing the possibility of disease transmission while alleviating pressure on the healthcare system. China, as one of the countries that had been mostly affected by the COVID-19 pandemic, achieved unprecedented improvements in the field of telemedicine. In February 2020, China built 65 Internet hospitals in a single month; at the same time, the traditional public hospitals have also launched several online consultation services. On the other hand, the government's attention and support for telemedicine has been significantly increased. In February 2020, the Chinese central government issued initiatives and made detailed strategic plans to strengthen and standardize telemedicine services. [3]

Since the 1980s, China has started its exploration in the field of telemedicine, and the related technologies are gradually improving. However, further development of telemedicine in China has been stagnant due to several concerns, including payment and information sharing difficulties. From a long-term perspective, China is still facing significant challenges in the maintenance and promotion of telemedicine. This paper aims to identify difficulties and associated factors in implementing telemedicine in China and propose directions for future actions. The following passages provide an overview of China's current telemedicine strategies, examine current challenges and underlying

reasons that are obstacles of the implementation of telemedicine, and discuss interventions and actions that can be utilized in the future.

## 2. Current Telemedicine Practice

The history of telemedicine implementation in China can be viewed as three stages. In the first stage (around early 2000s), the Chinese government mainly focused on addressing the income and resource gaps between the urban and the rural areas, which gave rise to the earliest telemedicine. Remote medical consultation was implemented during that time to help reduce health resources inequity issue. In 2009, the Initiatives on Deepening the Reform of the Medical and Health System issued by the central government of China clearly stated that it is necessary to "actively develop telemedicine for rural and remote areas". [4] And in 2012, the State Council issued the Twelfth Five-Year Plan for Health Development, which put developing telemedicine system for rural and remote areas and improving health services fairness at basic levels as the main priority. [5]

The transformation to the second stage (2014-2019) was marked by the promoting of the Internet + (Internet Plus) Model, which is called the "Internet + Medical Care" in the field of telemedicine. [6] With the help of Internet and artificial intelligence, more mobile hospitals and online medical platforms are emerging to solve medical problems such as registration and consultation. However, as a new technology, "Internet + Medical Care" has aroused great concern from the government and the medical community. Song Shuli, the spokesman for the National Health and Family Planning Commission (NHFP), said that medical diagnosis and treatment on the Internet is not allowed. [7] In August 2014, the NHFP issued the Opinions on Promoting Telemedicine Services in Medical Institutions, which made specific instructions for telemedicine services between medical institutions. The initiatives prohibit medical professionals from conducting medical diagnosis and treatments of patients online; but it is legal to respond to patient inquiries on the Internet and give consultative advice on health issues. [8] In this stage of implementing telemedicine, remote medical services were only used for providing suggestive consultations, staff training, and other education purposes.

The third stage, which is brought by the COVID-19 pandemic, has been started since 2019. During the COVID-19 pandemic, telemedicine was largely utilized in several areas in China to support measures in preventing and controlling the spread of the virus. In early 2020, large-scale lockdowns and isolation restrictions were enacted across the country, and most hospitals were closed. This situation caused great trouble for patients with either acute or chronic diseases to seek medical support and obtain medicines in a timely manner. In response to these demands, medical institutions in various places quickly built online hospital platforms and opened online consultation channels. For instance, Shaanxi province quickly put the "Telemedicine Cloud Platform" into use, which connected 499 hospitals in 107 counties in the province to help them efficiently implement COVID-19 control measures. In a month after implementing the platform, 22 video conferences and training sessions across the province have been completed, with nearly 25,000 online institutions and 310,000 medical staff participating, and the cumulative number of online consultations has reached more than 41,000 [9]. This evidence suggests that, during the pandemic, medical services tended to be online to provide consultations and medication guidance to patients with past medical history. Meanwhile, the government become to encourage the application of telemedicine in medical settings, For example, in February 2020, the National Health and Health Commission issued the Notice of the General Office of the National Health and Health Commission on Strengthening Information Technology to Support the Prevention and Control of Pneumonia Epidemic of Novel Coronavirus Infection, requiring all medical facilities to actively use information technologies, such as Internet + model, to reduce the pressure of in-person medical services and minimize the risk of cross-infection [10].

### 3. Difficulties

Although the government has been vigorously promoting the implementation of telemedicine since the beginning of the COVID-19 pandemic, many medical facilities are still facing difficulties in the fully adoption of this new service. Other than concerns common in the global telemedicine practices, such as privacy and legal issues, China's unique political structures, healthcare systems, demographic features, and several socioeconomic factors are subtly affecting the development of telemedicine. In this context, even though China has effective technologies to provide remote medical services, there are still determining barriers that forestall a wide implementation of telemedicine across the country.

#### 3.1. Pricing Dilemma

There are currently two pricing methods for telemedicine services in China [11]. One is remote consultation, which based on the connection between hospitals, mainly for supporting emergencies and serious diseases in remote areas. The corresponding cost can be extremely high [11]. For example, the telemedicine outpatient consultation fee of Zhejiang University First Hospital is 280 yuan (about US \$40; 1 yuan  $\approx$  US \$0.14) for one meeting, the emergency consultation fee is 1,000 yuan per consultation and the normal consultation fee is 600 yuan per hour, which is more than ten times the registration fee of ordinary in-hospital consultation (10-30 yuan each time) [12]. The other method is the direct connection between doctors and patients via a third-party platform. The charging standard is not yet specified for this method; its market prices are various ranging from free to 30 yuan per appointment [11].

The service costs of these two types of telemedicine can be very different. For the first option, service providers are usually elite professionals from public hospitals in urban areas, whose costs are unaffordable to patients living in less developed remote areas. At the same time, remote consultation is not included in the medical insurance system (public universal coverage) at present, which makes telemedicine even more impossible for patients who mainly rely on medical insurances' coverage. The second method's biggest issue is that the price is not much different from in-person services. Remote hospitals have no advantage in fees, compared to normal registration fees in other hospitals in China. Also, when patients choose this method for medical consulting, they prefer to get medicines nearby at pharmacies, instead of from hospital facilities. Therefore, it is hard for the hospital to make money through prescriptions, so income from this type of remote service is negligible.

There are obvious gaps in the pricing of different telemedicine services in China, and the underlying reason for this dilemma is that the overall medical service is undervalued [13]. The low prices in in-person services makes telemedicine for conventional diseases less advantageous; meanwhile, remote medical services divert a part of the hospitals' revenue away. Therefore, most hospitals are motivated to do so. Moreover, the price difference and lack of medical insurance support seems to make remote consultation a "VIP channel" to patients with higher income. These factors make the telemedicine service too niche, which is impossible to cover the demanded population on a large scale.

#### 3.2. Payment Problems

Costs associated with telemedicine services has not been covered by public health insurance in China yet, which creates both technical and payment challenges [14]. The main technical dilemma is that the medical insurance plan varies greatly, and the coverage, reimbursement ratio, and technical interface are different, which brings difficulties to medical insurance payment. For example, in what proportion the service fees should be divided between hospitals, will the bill be paid by public or private medical insurance, and who pays them respectively, are all issues to be solved at the technical level. Moreover, remote consultation usually has dual purpose in providing both medical supports and staff training, which can be disparate in prices depend on the program's type. At the same time, the necessity of consultation, the demand for experts, and the allocation of resources will affect the

pricing and, therefore, the balance of proportions in medical insurance compensation [14]. At present, consultation resources and prices are various from areas to areas. Due to the different coverage of medical insurance in different places, the reimbursement ratios are also different. The difficulties in predicting and calculating the specific prices and reimbursement ratios forces challenges on the fully implementation of telemedicine.

### 3.3. Information Disintegration

The imperfect construction of the existing electronic medical information system in China also makes the foundation for the development of telemedicine fragile. China's electronic medical records and medical information platforms have a relatively short history. In 2013, the first guidance on meeting the needs of individuals to search for electronic health records appeared in China, and the government did not pay much attention to it until 2017 [15]. Personal access to health records such as their own medical history and medical records is not convenient enough, which directly limits the possibility of patients seeking medical service solutions such as monitoring, evaluation, and nursing other than outpatient treatment. In addition, although China issued documents in 2018 to support the sharing of electronic health records by multilevel hospitals, there were only a few regions such as Shanghai, Nanjing, and Chongqing took the lead in trying to establish a unified medical information platform [16]. The disintegration of patients' data has brought great obstacles to the information transmission and communication between hospitals, doctors, and patients, which has become a nationwide challenge.

### 3.4. Social Acceptances

The Chinese government has been actively promoting the implementation of telemedicine since the 2000s. However, the social acceptance of the new technology approach is much lower than expected. One of the main causes is the ageing population in China. China has one of the fastest growing ageing populations in the world. By 2019, there were 254 million older people aged 60 and over, and 176 million older people aged 65 and over [17]. Due to factors such as age, frailty, disability, and polypharmacy, the elderly often requires long-term, high-frequency and multidisciplinary disease management, and will undoubtedly be one of the main service targets of telemedicine. Nevertheless, the application and promotion of telemedicine are facing the difficulties from the perspective of geriatric care. First, the high incidence of sensory and cognitive dysfunction in the elderly population is more likely to affect the process of doctor-patient communication and the accuracy of information transmission [18]. Older people are less able to learn and adapt to modern information technology than young people. It means that they have higher demands for related education and supervision, while requires the operational convenience of remote medical services, which creates multilevel challenges on the development and implementation of telemedicine. Second, the willingness of the elderly to use telemedicine is generally low. Statistics show that 54% of those using telehealth are millennials and 25% are between the ages of 35-44. Nearly half of the users over the age of 65 are very reluctant to adopt telemedicine [19].

On the other hand, Chinese traditional medicine (TCM), which has thousands of years' history, has been an indispensable part in most Chinese's medical means. There were 2,641 million visits to TCM practitioners in the year 2017 in China, which is about 32.3% of total visits to medical practitioners [20]. However, it is impossible to practice TCM through remote methods. For example, doctors adopted TCM methods focus on "the four steps": inspection, listening and smelling, inquiry, and palpation [21]. None of these steps can be simply achieved with online communication platforms. Thus, for those who rely on TCM as their main medical approaches, telemedicine will be their last choice to do so. The large proportion in TCM adopters can also be an illustrator of the difficulties in implementing telemedicine in China.

## 4. Future Directions

From 2010 to 2014, the Chinese government invested 84.28 million RMB to support 22 central and western provinces to establish a grassroots telemedicine system [21]. In response to the problems existing in the Notice on Strengthening the Management of Telemedicine Consultation issued by the former Ministry of Health in 1999, the National Health and Family Planning Commission (NHFP) publicized the Opinions on Promoting Telemedicine Services in Medical Institutions as supplement in August 2014. [8] However, it was still stipulated that remote consultations can only be carried out between medical facilities. Meanwhile, due to the lack of large and high-quality hospitals, the imperfect identification of remote diagnosis and treatment laws, and unspecified responsibilities, public medical institutions have insufficient motivation to participate. Also, the pricing of telemedicine does not conform to the general market rules and other capital barriers are inconducive to the establishment of a diversified telemedicine business model. Although there was a high enthusiasm for the development of telemedicine in the early stage, problems mentioned above preclude the telemedicine field in China to survive sustainably.

In order to solve the practical dilemma of telemedicine's implementation, it is necessary to integrate relevant policies and systems to promote the "Internet + Telemedicine" model. The first thing to do is to formulate specific national standards and establish a graded quality control system for the "Internet + Telemedicine" model. Chinese policymakers should integrate their current professional resources and learn from the experience of telemedicine implementation in other countries to specify detailed telemedicine industry standards. Then pilot units should be picked to experiment with the "Internet + Telemedicine" strategy. If the outcome turns to be great, related policies could be implemented in a larger nationwide level. Meanwhile, the government should corporate with other private sectors and capitals to develop multiple projects that are suitable for hospitals in different areas.

Further actions should include streamlining administration and delegating powers. Referring to the relevant policies to encourage social capital to run hospitals, medical institutions at all levels are allowed to purchase equipment according to their own conditions and demands. Meanwhile, new pricing scopes and standards for the "Internet + Telemedicine" project should be introduced; related medical insurance policy should be adjusted in an optimized and convenient market, and those that can be priced according to market demand should be priced by the market mechanism.

Moreover, from the view of information disintegration, policies should be carried out to break current medical data separatism and accelerate the establishment of a sharing medical record platform to build connections between hospitals in all levels. Through professional medical organizations, standardization and sharing of data on the consumer side of medical services should be achieved. Also, information including satisfaction surveys and patient follow-up visits should be provided to medical institutions as a reference for future treatment plans and a basis for the evaluation of medical staff supervision.

Finally, the Chinese government should increase awareness of telemedicine among the general citizens. By enhancing the publicity of both pros and cons of telemedicine, the public could have a more objective understanding of this emerging services. A large proportion of Chinese rely on community-based clinics or rural small-scale hospitals for medical inquiry; therefore, the telemedicine approach can also be implemented on a community-based level to build familiarities and trusts.

## 5. Conclusions

Although China started late in the field of telemedicine, this field has already arisen the attention from different sectors, including the government, the medical community, and many social capital forces. It has been acknowledged that telemedicine is the best option to help fix the current medical system's defects, such as the uneven distribution of medical resources and the lack of professional skills of grass-roots doctors. However, there still are persisting difficulties that preclude the large-

scale implementation of telemedicine. The pricing dilemma is one of the key barriers because it eliminates the advantages of telemedicine comparing to traditional in-person consultations in public hospitals. Meanwhile, vague healthcare insurance coverage and unspecified responsibilities in the payment of telemedicine services also isolate the public away from accessing convenient remote medical supports. The best way to clear these barriers is to publicize related policies on a national level that specify each sector's responsibilities and charge details. In July 2020, the National Development and Reform Commission in China issued the Opinions on Supporting the Healthy Development of New Business Forms and New Models, Activating the Consumer Market and Driving Employment Expansion, proposing that the eligible "Internet + Medical Care" service fees should be considered to be included in the scope of medical insurance coverage [22]. More specific details and implementation strategies are still in progress. Moreover, the disintegration of medical records between medical facilities and hospitals and patients makes telemedicine inaccessible to patients. To solve this problem, a national level medical database should be built, and related access should be equally divided to each individual in the medical community. And following policies and procedures are also in demand to protect patients' privacies.

Fully implementation of telemedicine requires detailed and practical policies and supports from the government. It could be helpful for China to learn from the experiences in other countries who have successfully developed functional telemedicine services.

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